

Electromagnetic Compatibility Society



Newsletter

ISSUE NO. 119 FALL 1983

(ISSN 0164-7644)

EDITOR: ROBERT D. GOLDBLUM

FUTURE EMC-S INTERNATIONAL SYMPOSIA SCHEDULE

1984 - Tokyo, Japan; October 16-18
Hotel Pacific/Tokyo
Prof. Risaburo Sato, Chairman
Tohoku University
Aramaki Aza Aboa
Sendai, Japan 980

1984 - National Symposium
San Antonio, TX; April 24-26
Hyatt Regency
M. Johnson, Chairman
(512) 684-5111

1985 - Boston, MA; August 20-22
Hilton Wakefield
C. L. Smith, Chairman
(617) 271-7086

1986 - San Diego, CA; September 16-18
Town & Country Hotel
H. K. Mertel, Chairman
(619) 578-1480

1987 - Atlanta, GA; September
H. W. Denny, Chairman
(404) 894-3535

THE IEEE EMC SOCIETY BOARD OF DIRECTORS ELECTION

A ballot for the election of six members to the IEEE Electromagnetic Compatibility Society Board of Directors was issued on July 1, 1983. The returned ballots have been counted, and the following candidates were elected for a three-year term beginning January 1, 1984:

Edwin L. Bronaugh
Robert D. Goldblum
Donald N. Heirman
Henry W. Ott
Richard B. Schulz
Leslie A. Wall

IEEE ELECTROMAGNETIC COMPATIBILITY SOCIETY NEWSLETTER is published quarterly by the EMC Group of the Institute of Electrical and Electronics Engineers, Inc., 345 East 47th Street, New York, NY 10017. Sent automatically and without additional cost to each member of the EMC Group.

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

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DONALD L SWEENEY
1403 HUNTINGTON DR
GLENVIEW

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OCT 4
IL 60025

EDUCATION COMMITTEE NEWS

The Education Committee held a meeting at the EMC Symposium in Washington on August 22, 1983. At the meeting, the committee decided it would try and put together a book of EMC Related Experiments and Demonstrations. This document would then be available through the EMCS to colleges, universities, and other interested parties. It may be used as source material for courses or laboratory demonstrations on EMC.

The document is not intended to be the work of any one individual, rather a compilation of material submitted by many individuals. All the members of the committee agreed to submit at least one item for use in the book. We hope to have a very preliminary draft to show to the executive committee at the symposium in San Antonio in April 1984. If they agree to support the idea, we will continue the project.

If you would like to contribute one of your favorite experiments or demonstrations, please contact me. If this overall project is to be successful, we must have contributions from members of the society other than those on the Education Committee.

The education committee would also like to compile a list of colleges and universities which offer an EMC course as part of their normal undergraduate or graduate curriculum. Anyone with information on such courses should contact me, giving the name of the college or university, the name of the course, whether it is graduate or undergraduate course, elective or required, the name of a contact for further information on the course and the number of credits.

If you have any information of an educational nature that you would like to see mentioned in the newsletter, please contact me at the address shown below.

Henry Ott
Chairman, EMCS
Education Committee

Bell Laboratories
Room 1E-212A
Whippany, NJ 07981
201-386-6660

NEWSLETTER STAFF

EDITOR

Robert D. Goldblum
R & B Enterprises
20 Clipper Road
W. Conshohocken, PA 19428

ASSOCIATE EDITORS

- | | |
|---------------------------------|--|
| CHAPTER CHATTER | Charles F. W. Anderson
Martin Marietta
1716 Reppard Road
Orlando, FL 32803 |
| BOOK REVIEWS | James S. Hill
The EMXX Corp.
6706 Deland Drive
Springfield, VA 22152 |
| EMC PERSONALITY PROFILES | William G. Duff
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5390 Cherokee Ave.
Alexandria, VA 22314 |
| SEQUENCY UNION | Dr. G. Robert Redinbo
Electrical & Systems Engrg. Dept.
Rensselaer Polytechnic Institute
Troy, NY 12181 |
| ABSTRACTS | Melvin J. Johnson
Southwest Research Institute
P.O. Drawer 28510
San Antonio, TX 78284 |
| PHOTOGRAPHER | Fred J. Nichols
LectroMagnetics, Inc.
6056 W. Jefferson Blvd.
Los Angeles, CA 90016 |
| EMC STANDARDS ACTIVITIES | Richard B. Schulz
ITT Research Institute
ECAC P.O. Box 1711
Annapolis, MD 21404 |
| EMCS EDUCATION COMMITTEE | Henry Ott
Bell Laboratories
Room 1E-212A
Whippany, NJ 07981 |
| EMC-S BOD ACTIVITIES | Donald N. Heirman
American Bell, Inc.
Room 2E-514
Holmdel, NJ 07738 |
| POINT AND COUNTERPOINT | Anthony G. Zimbalatti
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FIRST CALL FOR PAPERS

The 1978 Nuclear EMP Meeting (NEM 1978) held in Albuquerque at the University of New Mexico generated considerable interest in holding such conferences on a regular basis. The Permanent NEM Committee was formed consisting of principal officers of the previous NEMs and sponsoring organizations in order to sponsor and schedule periodic NEMs. It was decided to sponsor such conferences every second year with about half of these conferences at locations other than Albuquerque.

A committee has been formed in the greater Baltimore, Maryland, Washington, DC area to host the next conference. The 1984 Nuclear EMP Meeting (NEM 1984) will be held at the Baltimore Hilton Hotel on:

2-6 JULY 1984

The symposium will focus on EMP effects technology and its interrelationship with all other electromagnetic protection disciplines including EMC, EMI, and Lightning.

Papers submitted should address the following broad subject areas such as:

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

Each abstract submitted *must* be accompanied by a cover letter from the sponsoring agency specifically stating the abstract and content of the proposed presentation has been appropriately reviewed by the cognizant authorities and has been subsequently approved for public dissemination.

Authors are requested to submit a one page abstract, original plus five copies, by December 9, 1983 to:

Dr. Arthur Sindoris
NEM '84 Technical Program Committee
Harry Diamond Laboratories
2800 Powder Mill Road
Adelphi, Maryland 20783

Abstracts with related information should be typed single spaced on a single 21.5cm x 28cm page (8.5 in. x 11 in.) with the typed portion not to exceed 15cm x 23cm. Title of the paper and author(s) name(s) and affiliation, including complete address, should begin 2cm from the top of the page and the left margin should be 4cm. This single page shall include all references and other material the author deems appropriate in camera-ready form.

Notices of acceptance or rejection will be mailed to the principal author by March 1, 1984 along with information related to the paper presentation.

TRAVEL PLANS TO TOKYO FOR THE 1984 IEEE INTERNATIONAL EMC SYMPOSIUM

1984 is the first year in which the IEEE International EMC Symposium will be held outside of the United States. The 1984 Symposium is scheduled for October 16-17-18 in Tokyo, Japan. Many engineers from the USA will be interested in attending, but may be hesitating because of the cost of air travel to Japan. If we can get enough people traveling together to form one or more groups, we should be able to take advantage of group fares or, possibly, charter a flight. While this event is a year away, it is not too early to poll the interest of IEEE members and non-members so that we can explore the possibilities of cost-saving on air travel. If you have any possible interest in attending the Tokyo Symposium, please fill in the questionnaire form below so that we can put you on the mailing list to keep you up-to-date on travel arrangements.

I am interested in traveling to Japan to attend the EMC'84 Symposium. I understand that my reply on this form does not obligate me in any way.

Name _____

Address _____ Tel.: () _____

Zip _____

1. Preferred point of departure: New York _____ Chicago _____ Washington _____ Los Angeles _____ San Francisco _____
Other _____

2. My employer requires that I travel on USA Carrier. Yes _____ No _____

3. I am interested in staying for just one week. Yes _____ No _____

4. I am interested in staying two weeks for the symposium and a week of travel. Yes _____ No _____ Before symposium _____
after _____

5. Include hotel in package _____ Include rental car in package _____

6. Other comments _____

Return this form to Jim Hill, 6706 Deland Drive, Springfield, VA 22152; Telephone: 703-451-4619.

EMCS/BOD MEETING August 22, 1983

It was apparent by the attendance at our annual EMCS BoD meeting held on Monday, August 22 at the Hyatt Regency in Crystal City, Arlington, VA, that a record symposium attendance would occur. All but 2 Board members were present and over a dozen EMCS committee chairpersons/ symposia/Society members were present and lining the walls of the room.

President Duff called the meeting to order at 1:06 P.M. The Secretary distributed the minutes of the 4 May meeting to those who did not receive them in the mail. Later in the meeting, the Board approved the minutes with minor changes.

The major topics covered by the Board are summarized as follows:

1. The Treasurer's report was presented by Warren Kesselman and approved by the Board. Based on the current and projected expenditures through the end of the year, the Society's net worth will be approximately \$136K, down from that at the start of the year by about \$4K. We continue to have roughly half of our assets in long term, high interest, bearing options.
2. The Board recommended that the abstracts for the Japanese Chapter technical activities be merged with the "EMC Abstracts" pages in the Newsletter to facilitate the filing, with no printing on the other side of the page.
3. The various symposia reports were presented. After Sully Sullivan gave a capsule of the week's activity, the future symposia planning highlights were discussed. Gene Cory indicated that the call for papers for the national symposium in San Antonio next April 24-26 was extended until September 16, 1983, to ensure that all submissions were received during the summer months. The symposium committee for the 1984 international symposium in Tokyo on October 16-18 presented their interim budget and plans. The registration fee will be approximately \$140, with room rates comparable with those at the 1983 symposium at the high end and rates as low as \$30-33 for a single for a Class C room. All rooms have baths and tax and service charges are included. The estimate for round trip from the U. S. is between \$1500 and \$2000 business class. That rate depends heavily on group participation. The Japanese committee and Jim Hill, who is our international affairs committee chairman, will work out special packages if the groups traveling together materialize. Let's plan now! Call Jim Hill on 703-451-4619. The technical and social programs for both 1984 symposia were also discussed. It looks like our membership will have an especially exciting and technically challenging symposia. This expectation is further heightened by the fact that we will also be celebrating the 100th anniversary of the IEEE in 1984. In other symposium news, two future sites were named: Seattle for 1988 and Denver/Boulder for 1989. Finally, a revised budget for the 1985 symposia in Boston was approved.
4. Our cooperation was again extended by the Board to the EMC Symposium in Wroclaw, Poland in March 1984 and to the IERE Symposium at the University of Surrey in England on 18-20 September 1984. Similar arrangements were made for the next Zurich Symposium in 1985. Jim Hill is to continue reporting developments in these key matters to the Board.
5. Gene Knowles reported that three recently new or revised chapters are having meetings. In particular, the Philadelphia Chapter will be holding its first meeting in several years. Gilda Haskins of SEMCOR is spearheading that revitalization. The Littleton (Denver) chapter is also back in action, while Bob Hofmann is keeping the pace with the Chicago chapter which was reactivated last year. Our second international chapter—Ottawa, Canada—has been established jointly with MTT and AP Societies. Gene also prepared the annual chapter chairman's breakfast at the Washington, DC Symposium on August 24. A short summary of chapter activities was presented by each chairperson or his/her designate.
6. Membership development continues to improve, but not as dramatically as those entering into our EMC field, unfortunately. One reason is due to members with dues in arrears. Jim Toler, membership chairman, moved that letters be sent to these individuals; the Board approved the expenditures. Letters were also sent to certain IEEE non-EMCS members who showed EMC on their IEEE technical interest profile. The Board approved applying the non-member symposium differential cost to IEEE membership for those who attended the symposium. The additional \$7.00 Society fee was also included. At last count, approximately 100 took advantage of this offer.
7. Jim Toler also discussed the results of the awards ballots which were sent to all Board members. The results of the ballot indicated that 10 received a Certificate of Appreciation: A. H. Sullivan, Bob Brook, Herb Mertel, Herb Bartman, Nasir Ahmed, Don Miller, Fred Haber, Scott Cameron, Tom Dvorak and John Spina. A Certificate of Achievement was voted to Ed Bronaugh and a Certificate of Recognition was awarded to R. S. Powers, the keynote speaker at the symposium. The EMCS Transactions prize paper award went to Martin Uman and E. Phillip Kirder. The Laurence G. Cummings award was given to Jim Hill, Fred Nichols, and Gene Cory. Both Jim and Fred were also given Honorary Life Membership in the EMC Society. Congratulations to all the recipients who received their awards at the awards luncheon during the symposium. Jim Toler also requested the Board to submit candidates for the 8 IEEE Centennial Medals that will be awarded by the Society next year. The awards committee deliberated during the symposium and selected the slate of recipients to be approved by the Board later in the year. Candidates for both the IEEE major awards and Fellows were also solicited. Call Jim (404-894-3964) or Sully Sullivan (301-881-4036) for further details.

8. Hugh Denny presented suggested changes to the Constitution and By-laws. The changes to the Society's field of interest was considered and defeated, pending a submission of one that took into account more international definitions and scope. Also defeated was a motion to give Chapter Chairmen a vote for Society President and Vice President. Only Board members can vote these and other elected offices. It was felt that the present procedure allows any chairman the opportunity to voice his support of these candidates, while not creating an unwieldy voting membership for these two offices during the annual meeting. The Board did approve the change from 12 to 9 nominees needed annually for election to the Board and that no Board member can be re-elected for more than 6 consecutive years. Finally, the terms of office for the Secretary and Treasurer were set at no more than 3 consecutive one-year terms, with a break of at least one year. This was also made a requirement of the Technical Directors and standing committee chairmen. Technical committee chairmen appointment terms were set at 2 successive two-year periods, with a lapse of at least 2 years. These changes will be published formally in the Newsletter. Constitutional changes require the IEEE Technical Activities Board approval as well.

9. Election results for the Board for the three year term ending 31 December 1986 were announced:

Ed Bronaugh
Bob Goldblum
Don Heirman
Hank Ott
Dick Schulz
Art Wall
Congratulations!

10. Ralph Showers presented his report on technical activities. He reported the progress being made by Don Heirman, EMCS Standards Chairman. Don's report noted the continuing need for volunteers and standards working group chairmen. Work in the areas of vehicular EMI, shielding transfer impedances, and grounding practices are among those where membership contributions are needed. Call Don on 201-834-3566 now!! Herb Mertel's report on the technical committee activities showed their contribution to the symposium technical program. He noted that new committee chairmen are needed for the EM Measurements and Spectrum Management Committees. Call Herb on 714-578-1444. The education committee is now focusing on producing an EMC video tape and publication of an EMC Lab Manual. Those interested in that activity, please call Hank Ott on 201-386-6660.

11. Len Carlson was unable to attend the meeting. His report on professional services will be given by his elected replacement, Dr. Sato, at the next Board meeting in January 1984.

12. President Duff reported on TAB activities. Of particular interest are the realignments of technical divisions within TAB. Our Society is now sharing a division with Nuclear (2700 members), Antennas and Propagation (5300), Microwave Theory and Techniques (6600), and Magnetics (2600).

13. A discussion ensued regarding the use of symposium literature to advertise items not associated with, nor sponsored by the EMCS. The Board recommended that in the future no overprints or printing on the blank back side of EMCS symposium literature be allowed without written permission of the Board.

14. Finally, the Board held its annual election of officers. This year we had a slate that had up to 4 eligible candidates vying for several positions. The slate was a result of the efforts of the nominating committee, chaired by Don Heirman. After the candidates had an opportunity to present his reasons for seeking office and answering questions by the Board members, secret ballots were cast. The results were as follows:

President:	Gene Knowles
Vice President:	Chester Smith
Secretary:	Don Clark
Treasurer:	Warren Kesselman
Technical Directors:	
Communications:	Bill Parker
Technical:	Ed Bronaugh
Member:	Fred Nichols
Professional:	Risaburo Sato

Congratulations to these outstanding Society members for 1984.

15. The meeting adjourned at 6:15 pm. The next meeting will be at the call of the chair. Plans are for a late January meeting on the west coast. For more details, contact the new secretary Don Clark on 404-894-3535.

Respectfully submitted,

Don Heirman

SYMPOSIUM EXHIBITORS

The following is a list of exhibitors at the 1983 International Electromagnetic Compatibility Society Symposium. Both the Society and the Symposium Committee would like to thank the exhibitors for their participation.

ACHESON COLLOIDS COMPANY

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Port Huron, MI 48060
(313) 984-5581
Contact: Donald G. Sands

AVX CORPORATION

60 Cuttermill Road
Great Neck, NY 11021
(516) 829-8500
Contact: Donna Aronson

DONTECH INC.

P. O. Box 889
Doylestown, PA 18901
(215) 348-5010
Contact: Richard D. Paynton

ACME CHEMICALS & INSULATION

P. O. Box 1404
New Haven, CT 06506
(203) 562-2171
Contact: Donald B. Effgen

AXEL ELECTRONICS INC.

134-20 Jamaica Avenue
Jamaica, NY 11418
(212) 291-3900
Contact: Joseph Alaimo

DWCI—DON WHITE CONSULT- ANT INC.

State Route 625, P. O. Box D
Gainesville, VA 22065
(703) 347-0030
Contact: Royce White

AD-VANCE MAGNETICS, INC.

625 Monroe Street
Rochester, IN 46975
(219) 223-3158
Contact: Lester Danff

CHOMERICS

77 Dragon Ct.
Woburn, MA 01888
(617) 935-4850

DYNAMIC SCIENCES INC.

7660 Gloria Avenue
Van Nuys, CA 91406
(213) 782-0820

ADVANCED ELECTROMAGNETICS

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Santee, CA 92071
(619) 449-4492
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B26 Merry Lane
Dorine Industrial Park
East Haover, NJ 07936
(201) 887-3055
Contact: John Severinsen

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P. O. Box 425
Valley Forge, PA 19481
(215) 644-3332
Contact: Joseph Banasiak

A. H. SYSTEMS INC.

9710 Cozycroft Avenue
Chatsworth, CA 91311
(213) 998-0223
Contact: Michael Cohen

DASH STRAUS AND GOODHUE INC./

ROBERTS INST DIV.
593 Massachusetts Ave.
Boxborough, MA 01719
(617) 263-2662
Contact: Glen Dash

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5340 Alla Road
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(213) 822-3061
Contact: G. P. Rothhammer

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(312) 671-6670
Contact: F. A. Johnson

DAYTON T. BROWN, INC.

Church Street
Bohemia, NY 11716
(516) 589-6300
Contact: Art Salander

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901 Market St., Suite 830
Wilmington, DE 19801
(302) 654-7781
Contact: John L. Jackman

AMPLIFIER RESEARCH

160 School House Road
Souderton, PA 18964
(215) 723-8181
Contact: D. W. Roth

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16 Commercial St., Box 427
Branford, CT 06405
(203) 481-4277
Contact: B. W. Bowman

THE ELECTRO-MECHANICS CO.

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Austin, TX 78767
(512) 835-4684
Contact: Bill Krueger

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5390 Cherokee Avenue
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(703) 642-4123
Contact: Arlie Turner

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7528 Auburn Rd.
P. O. Box 348
Painesville, OH 44077
(216) 357-3211
Contact: Richard H. Trampenau

ELECTRO-METRICS

100 Church Street
Amsterdam, NY 12010
(518) 843-2600
Contact: David R. Cook

ELECTRONIC ENCLOSURES, INC.
6995 Airport Highway Lane
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(609) 665-6810
Contact: Ron Pache

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Glendale, CA 91201
(213) 247-6000
Contact: John E. Merrell

KEENE CORP. RAY PROOF DIV.
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Norwalk, CT 06856
(203) 838-4555
Contact: Robert Barbour

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P. O. Box 494
Carmiel 20101
(04) 985181 or 985161
Contact: Eytan Malits

GRAHAM MAGNETICS INC.
6625 Industrial Park Blvd.
North Richland Hills, TX 76118
(817) 281-9450
Contact: Harris W. Armstrong

KERN ENG. & MFG. CORP.
1141 E. Ash Ave.
Fullerton, CA 92631
(714) 879-2055
Contact: Horst Langecker

E/M LUBRICANTS
P. O. Box 2200
West Lafayette, IN 47901
(317) 463-2511
Contact: A. Lewis

HEWLETT-PACKARD COMPANY
1424 Fountain Grove Pkwy.
Santa Rosa, CA 95401
Contact: Al Wilcox

KEYTEK INSTRUMENT CORP.
12 Cambridge Street
Burlington, MA 01803
(617) 272-5170
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Contact: W. Nick Sidovar

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Signal Analysis Center
P. O. Box 391
Annapolis, MD 21404
(301) 224-4500
Contact: Ed Norris

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418-1 Caredean Drive
Horsham, PA 19044
(215) 672-7070
Contact: David P. Thomas

GENISCO TECHNOLOGY CORP.
18435 Susana Road
Rancho Dominguez, CA 90221
(213) 537-4750
Contact: William H. Parker

INSTRUMENT SPECIALTIES CO. INC.
P. O. Box A
Delaware Water Gap, PA 18327
(717) 424-8510
Contact: Bruce D. Page

ELECTROMAGNETICS INC.
6056 W. Jefferson Blvd.
Los Angeles, CA 90016
(213) 870-8383
Contact: Fred Nichols

GENRON INC.
22 Cell Drive
East Syracuse, NY 13057
(315) 446-6957
Contact: Milton Nadel

INSTRUMENTS FOR INDUSTRY, INC.
151 Toledo Street
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Contact: R. J. Richards

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1228 Capitol Drive
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Contact: Frederic E. Freeman

GEORGE KUNKEL CONSULTANTS/
SPIRA MFG. CORP.
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Contact: George M. Kunkel

ITT CANNON
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Contact: Glenn Leibowitz

3M INDUSTRIAL ELECTRICAL
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3M Center
St. Paul, MN 55144
(612) 736-9785

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22 Clark's Hill Avenue
Stamford, CT 06902
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Contact: Dr. Ferdy Mayer

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100 Pine Aire Drive
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Contact: Mervin H. First

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Contact: Diane Huffman

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ENTERPRISES
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Contact: Alan Jones

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Contact: Robert Johnson

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North Rochester, NH 03867
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Contact: R. William Simpson, Jr.

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300 Constitution Drive
Menlo Park, CA 94025
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Contact: Lauren McCann

SPECTRUM CONTROL INC.
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(814) 455-0966
Contact: Henry J. Stammier

UNIVERSAL SHIELDING CORP.
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(516) 667-7900
Contact: Jack Rance

RAYSHIELD LTD.
2630 Royal Windsor Drive
Mississauga, Ontario L5J1K7
(416) 822-6100
Contact: Robert E. Webster

SPRAGUE ELECTRIC COMPANY
87 Marshall Street
North Adams, MA 01247
(413) 664-4411
Contact: Stanley D. Pitkin

VERMILLION ENTERPRISES, INC.
P. O. Box 12147
Wichita, KS 67277
(316) 942-8238
Contact: Betty J. Vermillion

R & B ENTERPRISES
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Conshohocken, PA 19428
(215) 825-1950
Contact: Leonard Levin

TECH ETCH, INC.
45 Aldrin Road
Plymouth, MA 02360
(617) 747-0300
Contact: Philip A. Thomas

WATKINS-JOHNSON COMPANY
700 Quince Orchard Road
Gaithersburg, MD 20878
(301) 948-7550, ext. 335
Contact: Don Utt

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Flowerfield Bldg. 25
St. James, NY 11780
(516) 751-4600
Contact: Richard S. Janiec

TECKNIT
129 Dermody Street
Cranford, NJ 07016
(201) 272-5500
Contact: R. E. Bilby

THE ZIPPERTUBING CO.
13000 S. Broadway
Los Angeles, CA 90061
(213) 321-3901
Contact: Charles Mehling

LIGHTNING CONFERENCE

The 1984 International Conference on Lightning and Static Electricity will be held in Orlando, Florida, June 26-28, 1984. It will be sponsored by the National Interagency Coordination Group of the National Atmospheric Electricity Hazards Protection Program in concert with the Florida Institute of Technology. This group consists of research experts from the U. S. Air Force, U. S. Navy, U. S. Army, NASA, NOAA, and the FAA.

The conference sessions will be based on, but not limited to, the following subject categories:

- Phenomenology
- Channel Modelling and Coupling Analysis
- Lightning Test Criteria and Techniques
- Electrostatics and 'p-Static'
- Protection of Aerospace Vehicles

- Hardening of Airborne and Ground Equipment
- Protection of Fuel Systems
- Protection of Ground Systems
- Structures and Materials
- Effects upon Electrical/Electronic Systems
- Helicopters
- Shipboard Installations
- Specifications and Standards
- Management Responsibility
- Ordnance
- Personnel Hazards
- Grounding and Bonding
- Protection of Aircraft

For more information, contact: J. J. Fisher, Conference Chairman, U. S. Naval Air Systems Command, P. O. Box 15036, Arlington, VA 22215; Tel.: 202-692-7822.

IEEE/EMC REGION IN SAN DIEGO

The IEEE San Diego Chapter on Electromagnetic Compatibility will sponsor a regional conference and exhibition. It will be held at the Town and Country Hotel Convention Center, Wednesday, 18 January 1984, 1:00 to 8:00 P.M.

The theme of the conference will be the impact of RFI regulations and EMC/EMP specifications on electrical and electronic equipment. Papers will be presented by invited speakers on topics such as EMI specification summaries, immunity requirements, up-front costs of EMI measure-

ments, EMI suppression techniques and components, and what to do once EMI problems are found. In addition, two comprehensive seminars with round table discussions will be held, one on EMI regulations for commercial and consumer products, the other EMC/EMP specifications for military products.

General information on the conference can be obtained by contacting Mr. John McDonald, 1625 Valley High Avenue, Thousand Oaks, CA 91360; Tel.: 805-496-6766.

EMC Zurich 1983

The fifth symposium and Technical Exhibition on Electromagnetic Compatibility was held in Zurich from March 8 - 10, 1983. The symposium was held under the auspices of Mr. R. Trachsel, Director-General of the Swiss PTT and was sponsored by the Swiss Electrotechnical Association (SEV/ASE). A number of international and national professional organizations cooperated. Organization of the conference was by the Institute for Communication Technology of the Swiss Federal Institute of Technology Zurich (ETHZ). President of the Symposium was Professor Dr. P. Leuthold (Zurich), organizing chairman Dr. T. Dvorak (Zurich) and technical program chairman Professor Dr. R. M. Showers (USA).

Ninety-six papers from eighteen countries were presented. Sessions included: Nuclear EMP; Biological Effects of Exposure to RF Radiation; NEMP Simulation; Shielding and Grounding; EMC Standards; EMC Computer Programs, EMI in Microelectronics; and EMC Analysis and Design. The conference proceedings, "Electromagnetic Compatibility 1983" (103 papers, 565 pages), is available at a net price of Swiss Francs 100. - including mailing costs from: Dr. T. Dvorak, ETH Zentrum-IKT, 8092 Zurich, Switzerland.

The sixth EMC Symposium and Technical Exhibition is planned for March 1985 in Zurich. The call for papers is scheduled for February 1984.

Book Reviews



by Jim Hill, EMXX Corporation.

We are pleased to finally bring you the review of *Electromagnetic Compatibility in Radio Engineering*, the English edition of the book first published in Poland in 1978. On my trip to Warsaw in 1979, I was presented with a copy by the authors, W. Rotkiewicz, R. G. Struzak, W. Moron, D. J. Bem, W. Stawski, and A. Wojnar. At that time, they were working on the English edition scheduled for publication in 1981. It took a bit longer than that. The English edition, published by Elsevier Scientific Publishing Company, is dated 1982. This English edition is not a direct translation of the original Polish book. It has been revised and updated with additional references offsetting the deletion of certain Polish National Standards which are not readily available outside of Poland. The chapter on measurements originally was based on instrumentation manufactured in Poland. The English edition includes instrumentation from the USA, England, and Germany, as well as Poland. Another improvement is the addition of an index.

Dick Schulz has volunteered the review of *Digital Communications* by Kamilo Feher. In doing so, he has suggested that this reference text on digital communications supplements *Electromagnetic Compatibility in Radio Engineering* and that the two books together are suitable for textbooks for a college level course on EMC. The Polish book gives a good basic background and the Feher book adds the insight on digital communications which has become so important in the transmission of information.

DIGITAL COMMUNICATIONS **(Satellite/Earth Station Engineering)**

by

Kamilo Feher

Published by Prentice-Hall, Inc.

Copyright 1983

Hardbound \$36.00 (469 pages)

Reviewed by Richard B. Schulz

ITT Research Institute

Annapolis, Maryland

In his preface, the author claims that "this book is for the professional engineer and manager, for the advanced student who wants a solid understanding of this field, and for the researcher who needs a consolidated, comprehensive up-to-date reference text of digital communications systems." This reviewer believes that the claims are well substantiated by the material presented, which includes a considerable number of figures, some tables, and questions and problems posed to the student at appropriate points (an answer book is available). He also believes that the book would have been more readily assimilated with the addition of two items: a glossary of symbols (even though the book is not unduly mathematical) and a list of acronyms for the various systems described.

The emphasis in this book is on modern satellite communication systems, where the trend in development is to utilize digital methods. A prerequisite to understanding it is an exposure to the fundamentals of communication systems. For a portion of the text, an exposure to probability theory would also be an asset. An EMC engineer with such a background will find the book fascinating in its up-to-the-minute presentation of the principles of satellite digital communications. He will be especially interested in Section 4.10 on Adjacent and Cochannel Interference-Effection on the P_e (probability of error) Performance of Binary PSK Systems, profusely illustrated with graphs. He also will be interested in Chapter 7 on Synchronization Subsystems: Analysis and Design, especially Sections 7.2 on Carrier Phase Recovery, 7.3 on Baseband Timing Recovery, and 7.4 on Joint Recovery of Carrier Phase and Symbol Timing. For the EMC engineer concerned with spectrum utilization, the entire Chapter 5 on Spectrally Efficient Modulation Techniques for Satellite Systems will be a reading "must."

The various chapters, some written by specialists in the areas, will now be reviewed. Although Chapter 1 is an introductory chapter, it also provides a wide perspective of operational and planned communications satellite systems that employ digital techniques. It discusses basic considerations inherent in their design.

Chapter 2 discusses signal processing and multiplexing in terrestrial interface systems, including various techniques for analog-to-digital conversion, echo suppression, digital speech interpolation, interfacing, and energy dispersal (scrambling) in digital communications.

Chapter 3 covers baseband systems, with respect to the spectral density of random synchronous signals, band-limited systems, Nyquist theorems (minimum bandwidth, etc.), filtering and equalization techniques, and probability-of-error performance in an additive white Gaussian noise environment.

Chapter 4 relates power-efficient modulation techniques for linear and non-linear channels. This appropriately long chapter (112 pages) covers a large number of different techniques and includes Section 4.10 on EMC mentioned earlier.

Chapter 5 is concerned with spectrally efficient modulation techniques for satellite systems, as also noted earlier. By "spectrally efficient" is meant better than the Nyquist criterion for linear systems of 2 b/s/Hz. The nonlinear systems described are able to achieve approximately 3.7 b/s/Hz for a 16-ary QAM system.

Chapter 6 describes coding for error and detection and correction, and is written by Dr. William H. Tranter. Concepts are clearly presented on entropy, mutual information, and channel capacity; coding for reliable communications; and convolutional codes.

Chapter 7 on synchronization subsystems; analysis and design, written by Dr. Lewis E. Franks, was discussed earlier.

Chapter 8 covers quite well time-division multiple-access (TDMA) systems; it was co-authored by Dr. S. Joseph Campanella and Dr. Daniel Schaefer. TDMA is expected to supersede current frequency-division multiple-access (FDMA) systems, and has already been selected for some satellite applications. TDMA material includes basic TDMA architecture, TDMA control architecture, TDMA terminal implementation, ancillary TDMA processing, terrestrial interfaces, and TDMA system examples.

Chapter 9 on regenerative (on-board processing) satellite systems covers a performance comparison of regenerative and conventional QPSK satellite systems, on-board DQPSK regenerative satellite systems, and performance of regenerative satellite systems using NLF-OKQPSK (Feher's QPSK) and conventional QPSK modems.

The final chapter 10 discusses single-channel-per-carrier (SCPC) preassigned and demand-assigned, SPADE, digital satellite earth stations. Among the topics are single-channel-per-carrier frequency-division multiple-access (SCPC-FDMA) digital satellite systems, system capacity and trade-offs in SPADE and SCPC systems, and new modulation techniques for low-cost, power-efficient earth stations.

The book concludes with an extensive list of references for those who wish to "dig deeper", and also an index.

In summary, this book is impressive on several counts:

- a. Thorough coverage of the subject area
- b. Emphasis on principles and practical applications
- c. Just enough mathematics to support the text
- d. Well illustrated, with many useful graphs
- e. Pertinent problems to assure a correct understanding.

It is unusual to find a well-written text like this that is suitable to the professional engineer and the serious student alike, and that will also form a valuable reference for future use.

ELECTROMAGNETIC COMPATIBILITY IN RADIO ENGINEERING

Edited by

Wilhelm Rotkiewicz

*Volume 6 in Studies in Electrical and
Electronic Engineering*

Published by Elsevier North-Holland, Inc.

52 Vanderbilt Avenue

New York, NY 10017

Copyright 1982, ISBN 0-44499722-9; Hardbound,

313 pp., \$67.50

Reviewed by: James J. Whalen

Dept. of Electrical and Computer Engineering

State University of New York at Buffalo

Amherst, New York 14222

There are now several useful, single-volume books on EMC. Each book tends to be directed toward certain aspects of EMC. The book being reviewed is no exception. The restricted scope of the book is clearly stated in the Introduction.

"There is considerable literature concerning various detailed aspects of EMC in radio communications, and the authors of the book do not intend to repeat it. The aim of the book is to give ordered introductory knowledge on selected problems that must be taken into account to achieve EMC; the authors also believe that it fills in some existing gaps in the available literature." (italics added)

The book consists of ten chapters written by six Polish authors who are well-versed in EMC. It is believed that eight chapters were written in English by the authors and that two chapters were translated (very clearly) from Polish to English. Each chapter is a detailed introduction to a specific subject. Each chapter could have been doubled or tripled in length simply by adding more material from the references. On more than one occasion this reviewer wished for more details in the book, but he, like other readers, will have to seek them in the references. The references are extensive (more than 325) and are one of the book's greatest strengths. Since different chapters have different authors, it seems appropriate to identify the authors and to discuss their contributions on a chapter-by-chapter basis. Instead of listing all the topics in each chapter (as is done in the table of contents), an attempt will be made to discuss a limited number of topics from each chapter to indicate the level of treatment in that chapter.

Chapter 2 by Ryszard Struzak is on "Terrestrial Electromagnetic Environment." A detailed introduction to natural and man-made noise is presented which makes very interesting reading. A list of 74 references where additional information if available is given. The simple models for the projected growth of Electromagnetic (EM) smog make interesting reading. Urban EM smog is increasing 7 to 14% per year which means it will double every 5 to 10 years in the near future. Examples of what this means are given; e.g. 50 years ago a 120 kW long wave transmitter could cover all of Poland, but today 17 times as much power is needed to achieve the same area coverage.

Chapter 3 by Wladyslaw Moron is on "Electromagnetic Spectrum Protection: International Cooperation and Standardization." The author describes roles played by the 3 most important international organizations concerned about EMC: (1) International Telecommunications Union (ITU); (2) International Electrotechnical Commission (IEC); (3) International Union of Radio Science (URSI). The reader will become well-versed on the meaning of the alphabet soup of abbreviations for international EMC groups and this will help him understand the source of many references. The description of the ITU includes information on the International Radio Consultative Commission (CCIR), the International Telegraph and Telephone Consultative Commission (CCITT), and the International Frequency Registration Board (IFRB) which maintains the "Master International Frequency Register." The ITU policies and procedures are up-dated every few years and are published in a massive document known as "Radio Regulations." Similar descriptions are given about the EMC activities of the IEC International Special Committee on Radio Interference (CISPR) and URSI-Commission E on EM Noise and Interference. There are 65 references providing detailed information. The author views the EM spectrum as a relatively new natural resource which is virtually indestructible but

which must have its utilization carefully planned and managed on an international scale. He makes the interesting points that "a unit of spectrum utilization has not yet been determined and neither has a measure of its use." This makes it difficult to determine if the EM spectrum is being used optimally.

Chapter 4 on "Selected Topics of EMC in Transmitter and Antenna Technology" and Chapter 6 on "Transmitter and Antenna Measurements" are written by Daniel Bem. Models are given for transmitter discrete and band emissions for the fundamental, harmonics and non-harmonics. A concise and very readable introduction to antenna models for EMI prediction is given. The models describe the antenna far-field radiation pattern not only for intended (in-band) frequencies and intended polarizations but for unintended (out-of-band) frequencies and all polarizations. Similar models are given for near-field radiation patterns and near-field reactive region. The use of the models in the far-field radiation region and in the near-field radiation region is illustrated for a parabolic antenna. Additional examples throughout these two chapters would have been appreciated, but their inclusion may not have been in keeping with the stated objective of providing an ordered introduction (and not a treatise) on the subject.

Chapter 5 on "Selected Topics of EMC in Reception Technique" and Chapter 7 on "Receiving Measurement Technique" are written by Wilhelm Rotkiewicz. A rather extensive introduction is provided in these two chapters on a variety of interference effects in AM, FM, and TV receivers. The interference effects described include undesired signals penetrating through fundamental channel, adjacent channels, and spurious channels (e.g. image frequency responses in double heterodyne systems). Intermodulation interference and cross-modulation interference in AM-receivers are illustrated using the convention power series expansion of a resistive nonlinearity excited by two signals one of which may be am-modulated. Also discussed is cross-modulation in FM-receivers which is caused by a strong interfering signal affecting the local oscillator frequency. Mentioned briefly are cross-modulation effects in AM-receivers caused by slope detection of strong interfering FM signals. A detailed account is given about cross-modulation effects in resonant circuits tuned by capacitance diodes (varactors) for both AM and FM receivers. Numerous additional topics are discussed such as receiver blocking caused by a strong interfering signal capturing the AGC, a variety of whistles produced internally or by one or two interfering signals, interference signals coming through the main leads, etc. The corresponding chapter on measurement describes methods for measuring interference effects in AM, FM, and TV receivers. Many of the measurement procedures reference documents of the CCIR, CCITT, CISPR, IEC and national standards can be consulted for details. The reviewer has used some of the methods described to make interference measurements on broadband

RF amplifiers. It was often necessary to add a band-pass filter between the RF signal generator output and the input of the RF amplifier to attenuate undesired signal generator output signals. (Many modern solid-state signal generators, particularly frequency synthesizers which are often used in automatic measurement systems, do not have the spectral purity of older signal generators which have some internal RF tuning.)

Chapter 8 is "Measurements of Man Made Noise" by Włodzimierz Stawski and describes how to measure signals produced unintentionally. Methods are described for the measurements of continuous interference voltage and current, interference field intensity, radiated interference power and for intermittent interference measurements called "Clicks." "Clicks" are randomly occurring single pulses or groups of pulses produced by relays and switches. The measurement procedures reference both international documents, especially those of CISPR and national documents such as Polish Standards, VDE Regulations and Procedures, FCC Rules and Regulations, etc. Next, special interference measurement equipment is described. The standard RF interference meter (IM) is a special superhetrodyne (frequency) selective micro-voltmeter characterized by a defined dependence of its response upon the parameters of its excitation. More simply, it is a set of special purpose, tuned, RF receivers which cover the frequency range 10 kHz to 1000 MHz (and higher). The various types of detectors such as peak (used in U.S.A.), quasi-peak (specified by CISPR and used extensively in Europe), average and rms are explained and illustrated, and their relative responses given for pulse signals as a function of pulse repetition frequency for a standard pulse. The basic parameters of the CISPR IM are given in detail including the charging and discharging time constants for the quasi-peak detector; its standardized response to a specified impulsive interference is also given. A variety of commercially available IM's are illustrated. Also described is a Click Analyzer which is used with an IM. Also described are Artificial Mains Networks (AMN) which are also called Line Impedance Stabilization Networks (LISN) which are used to standardize mains (power line) conditions during conducted interference measurements of currents and voltages. Both CISPR and U.S.A. MIL-STD requirements are illustrated. Described briefly are measuring antennae and current clamps. Although this Chapter does provide a detailed introduction to the subject of EMC measurements, an interested reader will undoubtedly have to seek additional details from the references. Nevertheless, the material presented on EMC measurements is very useful and should be of considerable value both to those new to the subject of EMC measurements and to those interested in EMC measurements that conform to both national and international requirements.

Chapter 9 on "Radio Monitoring (General Aspects)" is by Ryszard Struzak. The emphasis is on automatic monitoring systems because, to quote, "(the) best solution from a technical point of view is an automatic, modular measuring and monitoring system based upon uniform technology, built of standard elements and interconnected in a standard mode." The use of IEC standard interface bus is stressed to which smart instruments and computer controlled systems can be connected. Flow charts for command and control are illustrated. Descriptions are given of modern fixed monitoring systems, mobile and transportable monitoring stations, and HF mobile (rapid) signal acquisition and direction finding systems. This chapter describes clearly what state-of-the-art radio monitoring involves.

Chapter 10 on "EMC of Terrestrial Radio Communication Systems" is by Andrzej Wojnar. The emphasis is on elementary EMC design based upon average values of field intensity which yield CCIR recommended levels of signal-to-interference (S/I) protection ratios. However, a brief introduction to advanced EMC design based upon probability distribution of S/I and S/N (signal-to-noise) is also presented. First a basic one-way radio link (transmitter to receiver) is introduced. Formulas for the minimum desired electric field intensity $E_s = pE_i$ where p is the protection ratio and E_i the interfering field at the receiver. Next a lattice mode consisting of regular hexagon cells for a point-to-area network of transmitter channels is illustrated. A cell has a transmitter at its center which can communicate with many receivers. The cell and lattice dimensions and transmitter frequency assignments depend upon the service radius d_s (the communication range) and interference radius d_i . The main unknown in determining d_s and d_i is the propagation loss L between transmitter and receiver. A useful table of formulas for L under standard diffraction conditions is given. A representative statistical field-strength curve illustrating how to obtain the trans-horizon correction factor ΔL which is caused mainly by tropospheric scatter is given. However, specific information on this important correction to the propagation loss must be obtained in the references. Similarly, the reader will need to consult the references for additional information on more complicated communication network designs based upon the cellular concept and on advanced EMC design based upon the probability of exceeding interference threshold levels.

Now for a few comments on non-technical aspects. There are relatively few typographical errors in the book. A list of those noted will be sent to the editor and to anyone else requesting it. A few figures were reduced to such a small size that a magnifier was used to read all the details, particularly subscripts. The use of the color brown for figures occasionally yielded figures of insufficient contrast and legibility. That figure 3.2 is a foldout inserted at the inside rear cover is not mentioned in the text; initially it was believed missing.

The reviewer is one of several from industry and university interested in the following question: If the subject of EMC were taught at universities to either undergraduates or graduate students via the standard-semester course format (typically 45 fifty minute lectures), what EMC topics should be included in the course? One objective in reviewing this book was to determine how it might be used as an EMC textbook. Chapter 2 on the EM environment would be used to introduce students to EM smog. Next Chapter 10 on EMC design which is one of the chapters best suited for a university course would be covered in detail. Chapter 3 on the international aspects of EMC would be read next. Then almost all of Chapters 4 and 6 (which are short) on EMC in transmitters and antennas would be included. Chapters 5 and 7 on EMC in receivers are long and quite specific. However, many of the topics discussed such as intermodulation and cross-modulation are well-suited for demonstrations. Chapter 8 on EMC measurements of unintended conducted and radiated signals is more general and contains material now important to digital equipment designers. Demonstrations also could be used to illustrate topics discussed in

Chapter 8. A decision on what topics to select from Chapters 5 & 7 vis-a-vis Chapter 8 would be strongly influenced by the equipment available for demonstrations and the interests of the instructor. The communications specialist would tend to favor Chapters 5 & 7, but both the EM fields specialist and the digital equipment specialist would tend to favor Chapter 8. A reading of Chapter 9 with its descriptions of state-of-the-art computer-controlled monitoring system would appeal to today's students and should be included. It should be clear that the goal of a university course so structured would be to make students aware of the existence of EMC and not to train EMC specialists.

It should be emphasized that *Electromagnetic Compatibility in Radio Engineering* is not a textbook but a mini-treatise on the subject. The six authors have succeeded very well in uniformly meeting the stated aim to give an ordered introduction on selected EMC topics. The set of extensive references where additional details can be obtained is an important part of the book. This is a book that many EMC engineers will want to include in their personal library. It is a must acquisition for the libraries of EMC organizations and universities.

REPORT OF THE IEEE DIVISION 4 DIRECTOR

The IEEE Board of Directors took several important actions at its meeting in August. The restructuring of technical societies into ten technically cohesive divisions was formally approved. The impact on Division 4 is substantial, with the loss of four of our societies: Components, Hybrids and Manufacturing Technology; Electron Devices; Quantum Electronics and Applications; and Sonics and Ultrasonics. I wish these societies and their members continued success in their new division. Simultaneously, I welcome the Electromagnetic Compatibility Society, and the Nuclear and Plasma Sciences Society to Division 4 and am pleased to be able to continue to serve the Antennas and Propagation Society, the Microwave Theory and Techniques Society, and the Magnetics Society as their IEEE Division 4 Director. In 1984, IEEE will celebrate its centennial year. Each society has special plans to commemorate this event and I urge each member to participate. As an incentive to recruit new members during the last few months of 1983, special centennial gifts are being offered to members who recruit new IEEE members. You will be doing yourself and your friends a favor by urging them to join IEEE at this time. Also, beginning now and during 1984, affiliate members may upgrade their status to full IEEE membership without paying the usual \$15 initiation fee — watch for an official announcement of this program.

Other actions of the board include raising the annual dues by

\$4 to \$52 for all members while keeping the assessment of United States members for professional activities unchanged at \$13. A Conference Board had been established to better coordinate conference and exposition activities, which contribute about one quarter of IEEE's total revenues. Finally, consistent with a new IRS regulation of May 1983, the IEEE by-laws were changed to permit sales and order-taking at conferences and exhibitions without obtaining prior approval of the Executive Committee.

Important actions by other boards include adoption of a position statement by the United States Activities Board on alien engineers which urges that they practice in their native countries, that they be paid as well as U.S. citizens if they practice in this country, and that only limited exceptions be permitted in the rule that students must return to their own countries for two years before taking employment in the United States. A very significant role has been undertaken by IEEE in the development of standards for unregulated telephone lines in cooperation with the Exchange Carrier Standards Association which was founded on August 1, 1983, to fill the void resulting from the breakup of AT&T.

I look forward to serving as Division 4 Director during the IEEE Centennial year and welcome your comments and suggestions.

Emerson Pugh

WROCLAW SYMPOSIUM RECORD NOW AVAILABLE IN THE USA

You can now order the 1982 Wroclaw EMC Symposium Record here in the USA. Orders should be addressed to James S. Hill, The EMXX Corporation, 6706 Deland Drive, Springfield, VA 22152. Payment should be by check in the amount of \$30.00 made out to "IEEE-EMC Society." Post-paid in Canada and the USA, add \$6.00 for overseas.

The Wroclaw EMC Symposium Record is in two volumes, 750 pages, that contain 74 papers. 41 of these are in English and 33 in Russian. The symposium, with 14 sessions, was to have been held in Wroclaw in June 1982, but due to circumstances beyond the control of the organizing committee, was cancelled. However, since the papers had been submitted in form to publish, it was decided to go ahead with publication of the symposium record and offer it to those who might have attended and others interested in the subject.

The session subjects were as follows:

EMC and Space Technology
EMC Theory and Models

Switching and Discharge Noise Sources
Antennae
EM Fields and Propagation
Radiocommunication
Mobile Radiocommunication
Immunity
Wire communication
Lightning
EMC in Power Systems
Specific Noise Sources and Filters
Measurement Technology
EMC and Biology

This Symposium Record, edited by Prof. D. J. Bem, W. Moron, and Prof. R. G. Struzak, contains the Patron's Address by Prof. W. Majewski, the Chairman's Message by Prof. Struzak, "Some Notes" by Prof. Stumpers, and the Keynote Address by Dr. Ralph M. Showers, Chairman of CISPR.

CONGRESSIONAL FELLOWSHIPS

The Institute of Electrical and Electronics Engineers, Inc. announces the 12th Annual Competition for 1984-1985 Congressional Fellowships. Electrical and Electronics Engineers and Allied Scientists are competitively selected to serve a one-year term on the personal staff of individual Senators or Representatives or on the professional staff of Congressional Committees. The program includes an orientation session with other Science-Engineering Fellows sponsored by the American Association for the Advancement of Science (AAAS). The purpose of the Fellowships is to make practical contributions to more effective use of scientific and technical knowledge in government, to educate the scientific communities regarding the public policy process, and to broaden the perspective of both the scientific and governmental communities regarding the value of such science-government interaction.

Selections of Fellows shall be based on technical competence, on ability to serve in a public environment and on evidence of service to the Institute and the profession. Specifically

excluded as selection criteria shall be age, sex, creed, race, ethnic background, and partisan political affiliations. However, the Fellow must be a U.S. citizen at the time of selection and must have been in the IEEE at Member grade or higher for at least four years. Additional criteria may be established by the selection committee. The IEEE plans to award at least two Congressional Fellowships for the 1984-1985 term. Additional funding sources may permit expansion of awards.

Applications are being accepted for Fellowships beginning on September 1, 1984, or January 1, 1985. Further information and application forms can be obtained by calling W. Thomas Suttle (202-785-0017) at the IEEE Washington, D.C. Office or by writing: Secretary, Congressional Fellows Program, The Institute of Electrical and Electronics Engineers, Inc., 1111 Nineteenth St., N.W., Suite 608, Washington, DC 20036. Applications must be postmarked no later than March 31, 1984 to be eligible for consideration.

MEASUREMENT PROCEDURE FOR FIELD DISTURBANCE SENSORS

This Standard describes the method of measuring the RF field strength emissions from the microwave type intrusion alarm systems with sensors in the frequency range of 300 MHz to 400 GHz. It also specifies how to measure power line

emissions between 30 and 300 MHz. The Standard, IEEE 475-1983, was generated by the EMC-S and is available for \$6.00 plus \$2.00 handling charge from the IEEE, 345 East 47th Street, New York, NY 10017.

BILL GREEN PASSES AWAY

William C. Green, 73, an electrical engineer with the Defense Communications Agency, died at the Sibley Memorial Hospital in Washington, DC of cancer on July 31, 1983. Bill was a native of New York City and earned a BSEE at New York University. He served with the Army Signal Corps in the Pacific in WW II. His membership in the IEEE goes back to 1931 when he joined as an associate member. He advanced to member grade in 1959 and became a life member in 1974. From 1952 to 1971, he was with the National Scientific Laboratories, Inc. where he was engineering director before becoming president in 1969. Until 1979, he was an independent consultant before joining the Naval Security Station in Washington. In 1979, he transferred to the DCA.

Bill was active in the Washington Chapter of the EMC Society. He was a founding member in 1959, served as secretary, vice-chairman and chairman, and was general chairman of the symposium committee for the 1976 IEEE International EMC Symposium in Washington. Bill was also active in the Washington Section, serving as treasurer and for several years on the auditing committee. He was a founder and past president of the Washington Chapter of the Retired Service League of Australia. It was on a recent trip to Australia that he was hospitalized. When he returned home, he underwent treatment for the cancer. He is survived by his wife, Amy, a native of Australia, and by two brothers, Adolph and Dr. Louis Green, both of New York City.

EMCABS

In this issue, we are publishing 72 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.



MELVIN J. JOHNSON

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

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

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

EMCABS: 1-9-83

Ground Fault Detector and Shutdown System

Leroy W. Tucker, and Floyd E. Nelson

Department of the Navy, Washington, DC

PAT-APPL-6-260-524, PC A02/MF A01, Patent Application, Availability:

This Government-owned invention available for US licensing and possibly, for foreign licensing. Copy of application available NTIS.

Filed 22 Mar, 82. 17p, AD-D009-373/2

ABSTRACT: A Ground Fault Detection and Shutoff System for Underwater Power Transmission provides protection to divers from swimming into electric fields. This system used DC power to monitor the true resistance of the load system rather than the AC power to the load. The system comprises DC power supply, ground fault monitor, circuit breaker, and isolation transformer which monitors the system's DC resistance to ground and shuts off the power system if the resistance falls below a preset value.

INDEX TERMS: ground fault detection, shutoff system, underwater power transmission

EMCABS: 4-9-83

Electrical Overstress/Electrostatic Discharge Symposium

Proceedings, held Denver, CO, Sept 24-27, 1979

Reliability Analysis Center, Griffiss AFB, NY

AD-A114 563/0, PC E 10, Available from National Technical Information Service, Springfield, VA 22161. PC \$23.50 (No copies furnished by DTIC) 1979, 229p, Rept. no.. RAC-EOS-1

ABSTRACT: Partial Contents: Precautionary Measures; Testing; Failure Mechanisms; Electrical Overstress; and Design and Analysis.

INDEX TERMS: electrical overstress, Electrostatic Discharge Symposium

EMCABS: 2-9-83

HVDC Ground Electrode Design, Final Report

J. W. Hannestad

International Engineering Co., Inc., San Francisco, CA

DE82900354, PCA20/MF A01

August 81, 451 p, EPRI-EL-2020

ABSTRACT: HVDC Ground Electrode State of the Art Study, EPRI Project RP 1467-1, brings together into one work a compilation of the pertinent information on all types of ground electrodes for service in HVDC transmission systems. The text discusses in brief the background of Ground Electrode Theory and the properties of the earth and water in which electrodes are located. Detailed information on the siting of ground electrodes is presented, with illustrations of typical methods of investigation and mapping. A section describes the procedures of designing all types of ground electrodes, including formulas and sample designs of representative electrodes, with illustrations of each type. Techniques of mitigating the effects of ground current are presented, as well as testing procedures to determine the operating conditions of electrodes in service. An appendix gives the pertinent data on all ground electrodes built up in mid-1981, resulting from a world-wide survey. Also included is a glossary of geotechnical vocabulary. (ERA citation 07:014224)

INDEX TERMS: HVDC, ground electrode theory, ground current

EMCABS: 5-9-83

Characterization of Electrostatic Discharge Transients

G. Gerbi, M. Mensa, D. Goizio

Aeritalia, S.p.A., Turin (Italy)

N82-24445/0, PC A07/MF A01, Final Report, Contract ESTEC-

4165/79/ML-JS

30 Oct. 80, 144p, RCE-2163, ESA-CR(P)-1523

ABSTRACT: Electrostatic discharges which occur on Spacecraft were simulated on Teflon, Mylar, and Kapton samples. Electric field emission, magnetic field emission, structure discharge current, and voltage and current coupling on interface circuits were examined. Results show that discharge amplitude is a function of sample size, but the relation is not directly proportional. Teflon has the highest discharge amplitude. Mylar and kapton have almost the same discharge amplitudes, but Mylar is damaged after 30 min. testing. Perforated Kapton does not discharge.

INDEX TERMS: electrostatic discharge transients, spacecraft.

EMCABS: 3-9-83

Electrical Overstress/Electrostatic Discharge System

Proceedings held San Diego, CA Sept 9-11, 1980

Reliability Analysis Center, Griffis AFB, NY

AD-A114 562/2, PC E10, Available from National Technical Information

Service, Springfield, VA 22161. PC 23.50 (No copies furnished by DTIC)

1980, 254p, Rept. No. RAC-EOS-2

ABSTRACT: Partial Contents: Electrostatic Discharge: Problems and Techniques; Protective Devices; Part Failure, Protective Networks; Failure Mechanisms and Modeling; Lightning/EMP; and Implementing EOS/ESD Controls.

INDEX TERMS: electrical overstress, Electrostatic Discharge Symposium

EMCABS: 6-9-83

Atmospheric Electricity Hazards Analytical Model Development and Application. Volume III. Electromagnetic Coupling Modeling of the Lightning/Aircraft Interaction Event.

F. J. Eriksen, T. H. Rudolph, Rodney Perala

Electro Magnetic Applications, Inc., Denver, CO

AD-A114 017/7, PC A15/MF A01, Final Rept. Aug. 79-Jun 81. See also Volume I, Ad-A114 015. Prepared in cooperation with Lightning Location and Protection, Inc. and Lightning and Transient Research Inst., Jun 81, 330p, EMA-81-R-21-VOL-3, AFWAL-TR-81-3084-VOL-3, Contract F33615-79-C03412

ABSTRACT: In this report, the state of the art of coupling of electromagnetic fields to aircraft is reviewed. The objective is to identify the best models available for assessing the electromagnetic interaction of lightning with aircraft. The coupling process is explained and the modelling requirements implied by the lightning environment are discussed. Finally, the description of models selected and implemented at the AFFDL Computing Center is given.

INDEX TERMS: atmospheric, aircraft, coupling, electromagnetic fields, lightning.

<p>Evaluation of Lightning Accommodation Systems for Wind-Driven Turbine Rotors. H. Bankaitis National Aeronautics and Space Administration, Cleveland, OH. Lewis Research Center N82-23679/5, PC A03/MF A01, Final Report, Contract DE-A101-76ET-20320 Mar. 82, 49p, nasa-TM-82784, E-1116</p> <p>ABSTRACT:Wind-Driven Turbine Generators are being evaluated as an alternative source of electric energy. Areas of favorable location for the wind-driven turbines (high wind density) coincide with areas of high incidence of thunderstorm activity. These locations, coupled with the 30 m or larger diameter rotor blades, make the wind-driven turbine blades probable terminations for lightning strikes. Several candidate systems of lightning accommodation for composite-structural-material blades were designed and their effectiveness evaluated by submitting the systems to simulated lightning strikes. The test data were analyzed and system design were reviewed on the basis of the analysis.</p> <p>INDEX TERMS: wind-driven, turbine generators, electric energy.</p>	<p>EMCABS: 7-9-83</p>	<p>Atmospheric Electricity Hazards Analytical Model Development and Application. volume II. Simulation of the Lightning/Aircraft Interaction Event. John D. Robb Electro Magnetic Applications, Inc., Denver, CO AD-A114 016/9, PC A04/MF A01, See also Volume 3, AD-A114 017. Prepared in cooperation with Lightning Location and Protection, Inc. Final rept Aug 79-Jun 81. Jun 81. 59p, EMA-81-R-21-VOL-2, AFWAL-TR-81-3084-VOL-2, Contract F33615-79-C-3412</p> <p>ABSTRACT: In this report, a review of currently used lightning test techniques for aircraft is given. The requirements for lightning simulation are given and discussed. Finally, a new approach for simulating the lightning/aircraft interaction is presented, and is based on nuclear electromagnetic pulse (NEMP) technology.</p> <p>INDEX TERMS: lightning, test techniques, aircraft.</p>	<p>EMCABS:10-9-83</p>
<p>Coupling of Lightning Stroke Current to Aircraft Balanced Twisted Shielded Pair Cables R. B. Cook, R. A. Perala Electro-Magnetic Applications, Inc., Colden, CO. AD-A115 069/7, PC A03/MF A01 Mar 79, 36p, Grant N00019-79-G-0584</p> <p>ABSTRACT: The F-18 is the first military aircraft which makes extensive use of praphite epoxy composite materials. These materials are used on the wings, tail, horizontal stabilizer, and on various access doors and panels. In view of these facts, electromagnetic hazards assume a more important role in aircraft survivability, both to man-made and natural threats. In particular, the use of graphite epoxy composites implies a shielding effectiveness which is less than that obtained on metallic aircraft, because of the composite's smaller electrical conductivity and the problem associated with obtaining good electrical joints. The scope of this investigation is not to investigate the susceptibility of the aircraft to all electromagnetic threats. Instead, one of the threats of greatest concern, an attached lightning stroke, is the subject of the investigation.</p> <p>INDEX TERMS: susceptibility, aircraft, lightning stroke.</p>	<p>EMCABS: 8-9-83</p>	<p>A Compendium of Lightning Effects on Future Aircraft Electronic Systems Nickolus O. Rasch Federal Aviation Administration Technical Center, Atlantic City, NJ AD-A114 117/5, PC A12/MF A01, Final rept. Feb 82, 257p, Rept no. DOT/FAA/CT-82/30</p> <p>ABSTRACT: This publication is a composite of presentations given at the NASA-Langley Research Center/FAA Technical Center "Lightning Effects on Future Aircraft Systems Workshop" held on November 4-6, 1981, at the NASA-Langley Research Center Facility. The presentations encompassed the full spectrum of lightning research from lightning phenomenology, lightning modeling, electromagnetic issues associated with composite materials, to the lightning/aircraft electromagnetic interaction analysis. Also included are a total of five presentations assessing the digital system upset phenomena.</p> <p>INDEX TERMS: future aircraft systems, lightning research.</p>	<p>EMCABS: 11-9-83</p>
<p>Atmospheric Electricity Hazards Analytical Model Development and Application. Volume I. Lightning Environment Modeling. Martin A. Uman, E. Philip Krider Electromagnetic Applications, Inc., Denver, CO. AD-A114 015/1, PC A08/MF A01, See also Volume 2, AD-A114 016. Prepared in cooperation with Lightning Location and Protection, Inc. Final rept. Aug 79-Jun 81, Aug 81, 172p, EMA-81-R-21-VOL-1, AFWAL-TR-81-3084-VOL-1, Contract F33615-79-C03412</p> <p>ABSTRACT: This report is a review of the state of the art of lightning phenomenology and its electromagnetic environment. All aspects and phrases are discussed. A model is chosen for each phase which best describes what is currently known and understood. Computer models for predicting the electromagnetic environment for several of the processes are given, along with numerical predictions. A comprehensive bibliography is also provided.</p> <p>INDEX TERMS: electromagnetic environment, lightning, computer models.</p>	<p>EMCABS: 9-9-83</p>	<p>The 1981 Direct Strike Lightning Data. F. L. Pitts, M. E. Thomas National Aeronautics and Space Administration, Hampton, VA Langley Research Center N82-22848/7, PC A03/MF A01, Mar 82, 40p, NASA-TM-83273, NAS 1.15:83273</p> <p>ABSTRACT: Data waveforms obtained during the 1981 direct strike lightning tests, utilizing the NASA F-106B aircraft specially instrumented for lightning electromagnetic measurements are presented. The aircraft was operated in a thunderstorm environment to elicit strikes. Electromagnetic field data were recorded for both attached lightning and free field excitation of the aircraft.</p> <p>INDEX TERMS: measurements, aircraft, lightning.</p>	<p>EMCABS: 12-9-83</p>

<p>Global Thunderstorm Activity Research Survey S. C. Coroniti Coroniti (Samuel C.), Inc., Fairfax, VA N82-26924/2, PC A06/MF A01, Contract NAS8-34587 Final report, 15 May 82, 108p, NASA-CR-162030, NAS 1.26:162030 ABSTRACT: The published literature on the subject of the monitoring of global thunderstorm activity by instrumented satellites was reviewed. A survey of the properties of selected physical parameters of the thunderstorm is presented. The concepts used by satellites to identify and to measure terrestrial lightning pulses are described. The experimental data acquired by satellites are discussed. The scientific achievements of the satellites are evaluated against the needs of scientists and the potential requirements of user agencies. The performances of the satellites are rated according to their scientific and operational achievements. INDEX TERMS: global thunderstorm activity, instrumented satellites.</p>	<p>EMCABS: 13-9-83</p>	<p>Lightning Discharge Identification System C. L. Lennon National Aeronautics and Space Admin., Cocoa Beach, FL., John F. Kennedy Space Center PATENT-4 272 720, Not available NTIS, Supersedes PAT-APPL-6-043 945, N79-25313 (17-16, p 2121). This Government-owned invention available for US licensing and possibly for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 \$0.50. Filed 30 May 79, patented 9 Jun 81, 4p, N82-24779/2, PAT-APPL-6-043 945 ABSTRACT: A system for differentiating between cloud to cloud and cloud to ground lightning discharges is described which includes an electric field antenna that senses the rate of charge of an electric field produced by a lightning discharge. When the signal produced by the electric field exceeds a predetermined threshold, it is fed to a coincidence detector. A VHF antenna is also provided and generates a video signal responsive to a cloud to cloud lightning discharge, and this signal is fed through a level sensor, an inverter, to the coincidence detector simultaneously with the signal from the field detector. INDEX TERMS: differentiating, cloud to cloud, cloud to ground, lightning discharges.</p> <p>EMCABS: 16-9-83</p>
<p>Correlation of Satellite Lightning Observations with Ground-Based Lightning Experiments in Florida, Texas, and Oklahoma B. C. Edgar, B. N. Turman Aerospace Corp., El Segundo, CA N82-26922/6, PC A03/MF A01, Final Report, Contract NAS8-33885 Jun 82, 39p, NASA-CR-3564, NAS 1.26:356 ABSTRACT: Satellite observations of lightning were correlated with ground-based measurements of lightning from data bases obtained at three separate sites. The percentage of ground-based observations of lightning that would be seen by an orbiting satellite was determined. INDEX TERMS: satellite observations, lightning, correlated, ground-based measurements.</p>	<p>EMCABS: 14-9-83</p>	<p>EMI Evaluation of SESEF S. T. Li, J. C. Logan, D. W. S. Tam Naval Ocean Systems Center, San Diego, CA AD-A117 852/4, PC A06/MF A01, Final rept. Dec 81-Jan 82 Feb 82, 113p, Rept no. NOSC/TR-762 ABSTRACT: This report describes an EMI evaluation of the effects of off-shore exploratory drilling operations on the SESEF facility at Long Beach Naval Shipyard. This study uses mathematical model simulation techniques to determine interference effects due to electromagnetic scattering (diffraction and multipath reflections). Interference due to radio frequency transmissions and electromagnetic noise is also considered. INDEX TERMS: EMI evaluation, off-shore, drilling operations.</p> <p>EMCABS: 17-9-83</p>
<p>Aurora Flash X-Ray as a Source-Region EMP Simulator M. Bushell, R. Manriquez, G. Merkel, W. D. Scharf Harry Diamond Labs., Adelphi, MD AD-A117 087/7, MF A01, Availability: Microfiche copies only 1981, 16p ABSTRACT: The study of source-region electromagnetic pulse phenomenology and coupling is distinguished from more conventional electromagnetic research by the presence of time-varying air conductivity. A good deal of thought and discussion is currently being generated on possible designs for new SREMP simulation techniques. Nevertheless, the AURORA facility remains a significant and ever-improving source of data relevant to SREMP environments and coupling. Tactical work using auxiliary sources and strategic work using the electron mode continue to provide a steady stream of information and new techniques which bear directly on current problems. Other existing radiation sources - such as HERMES II, which offers less energy, but which can be fired outdoors, eliminating the shorting effect of metal walls—are, and should be, under consideration for use in SREMP testing. Also, development of new radiation-source concepts is taking place, at Harry Diamond Laboratories and elsewhere. All these alternative sources can, and no doubt will, be used in conjunction with the techniques — auxiliary sources and electron mode. However, for the time being, AURORA still dominates the SREMP scene. INDEX TERMS: AURORA facility, SREMP, environments and coupling.</p>	<p>EMCABS: 15-9-83</p>	<p>Interfering Noise Pulse Eliminator and its Use Mervyn C. Hoover, Bruce M. Heydhuff Department of the Navy, Washington DC PAT APPL-6-371 706. PC A02/MF A01, Patent Application, Availability: This Government-owned invention available for US licensing and possibly, for foreign licensing. Copy of application available NTIS. Filed 28 Apr 82, 17p, AD-D009 505/9 ABSTRACT: An apparatus and method removes interfering noise pulses from low-level radio-frequency signals through the application of a video-frequency circuit which causes detection of interfering pulses above an automatically and dynamically established threshold, voltage level. Upon detection of an interfering pulse, a control signal activates a hold circuit causing the conventional radiometric circuit to be interrupted during the period of the occurrence of the interfering pulse, thereby blocking passage of the pulse, while simultaneously the voltage level of the video-frequency signal is held constant. INDEX TERMS: removal, interfering noise pulses, low-level radio-frequency signals.</p> <p>EMCABS: 18-9-83</p>

<p>Nonionizing Electromagnetic Radiation: Biological Effects. 1970-August 1982 (Citations from the Engineering Index Data Base). National Technical Information Service, Springfield, VA PB82-873704, PC N01/MF N01, Rept. for 1970-Aug 82. Aug 82, 97p ABSTRACT: This bibliography contains citations concerning the biological effects of non-ionizing electromagnetic radiation (EMR). Radio frequency ignition hazards and radiation hazards are discussed. Measurement methods and instrumentation used to measure and evaluate EMR are considered. Safety standards are also discussed. (Contains 102 citations fully indexed and including a title list.) INDEX TERMS: bibliography, biological effects, non-ionizing electromagnetic radiation (EMR).</p>	<p>EMCABS:19-9-83</p>	<p>Mechanism of Electromagnetic Energy Effects of the Nervous System. Experimental System and Preliminary Results N. L. Campbell, C. L. Brandt Naval Ocean Systems Center, San Diego, CA AD-A117 527/2, PC A04/MF A01, Preliminary rept. Oct 79-16 Jun 81 1 Jul 82, 68p, Rept no. NOSC-TR-698 ABSTRACT: Effects of high-level electromagnetic (EM) energy on living nerve tissue were assessed by subjecting individual nerve cells of the marine gastropod <i>Aplysia californica</i> to microwave radiation levels of 10-300 mW/sq. cm. Of the 84 cells exposed, five showed inhibitory responses and one showed excitatory response that required from 6 to 82 minutes to develop. In each case, the cell returned to normal activity within 70 minutes of removing the EM field. It appears from the data collected that interaction of EM energy with the electrical activity of nerve cells does exist, and that this interaction is not heat-related. Understanding the mechanism of this interaction will provide a valuable tool in determining the hazards of nonionizing EM energy and the necessary safety limits of exposure. INDEX TERMS: electromagnetic (EM) energy, living nerve tissue, microwave radiation.</p>	<p>EMCABS: 22-9-83</p>
<p>Nonionizing Electromagnetic Radiation: Biological Effects. 1972-Aug 1982 (Citations from the International Aerospace Abstracts Data Base). National Technical Information Service, Springfield, VA PB82-873712, PC N01/MF N01, Rept. for 1972-Aug 82. Prepared in cooperation with the National Aeronautics and Space Administration, Washington, DC Aug 82, 195p ABSTRACT: This bibliography contains citations concerning the biological effects of non-ionizing electromagnetic radiation. Energy absorption and radiation effects to humans, animals, and insects are discussed. Theoretical and experimental dosimetry are considered, and safety standards are included. (Contains 194 citations fully indexed and including a title list.) INDEX TERMS: biological effects, non-ionizing electromagnetic radiation.</p>	<p>EMCABS: 20-9-83</p>	<p>Exposure of Structures on the Ground to an Electromagnetic Field Pulse Emitted by a Rectangular Horn Simulator-Illumination de Structures au Sol Par Une Impulsion de Champ Electromagnetique au Moyen d'UN Simulateur de Type Cornet C. Rodiere, M. Crochet Societe Nationale Industrielle Aerospatiale, Les Mureaux (France) N82-27559/5, PC A02, Text in French. Presented at Coll. Sur la Compatibilite Electromagnetique, Lille, Jan. 1981. 1981, 6p, SMAS-821-422-112 ABSTRACT: The possibility of exposing a ground surface of several hundred square meters to an electromagnetic impulse plane wave front is analyzed. When evaluating the electromagnetic hardness of a system, the individual components are often studied, then the results are collected into a comprehensive model. Coupling effects can be overlooked. An electromagnetic field simulator, formed by two conductive sheets whose axis is vertical or oblique, is proposed. The test method determines on a macroscopic scale mean values for permittivity and conductivity parameters of the exposed surface. INDEX TERMS: ground surface, electromagnetic impulse plane wave, electromagnetic field simulator.</p>	<p>EMCABS: 23-9-83</p>
<p>Biological Effects of Static Magnetic Fields: A Selective Review with Emphasis on Risk Assessment C. E. Easterly Oak Ridge National Lab., TN DE82013350, PC A05/MF A01, Contract W-7405-ENG-26 Apr 82, 78p, ORNL/TM-7860 ABSTRACT: Rather than focusing on literature per se, the current study determines the status of magnetic field information that is applicable to risk assessment. Hence, an attempt is made to identify both the literature that is useful to the goal of risk assessment and a framework within risk assessment methodologies can be derived. From this selected review, it is concluded that three areas exist for which adequate information can be found to begin modelling: disease induction, reproduction and development, and cardiovascular response. The first two are supported by a combination of positive and negative findings and the last by a calculational technique which utilizes the physically well-known principle of flow retardation for a conducting fluid moving through a magnetic field. (ERA citation 07:048110) INDEX TERMS: biological effects, magnetic field, risk assessment.</p>	<p>EMCABS: 21-9-83</p>	<p>Guidance for Evaluating the Potential for Interference to TV from Stations of Inland Waterway Communications Systems R. Eckert Federal Communications Commission, Washington, DC, Office of Science and Technology PB82-247644, PC A03/MF A01, Technical memo Jul 82, 30p, FCC/OST/TM-82-5 ABSTRACT: Inland waterways communications systems will occupy spectrum that until now has been underutilized. Before allocation to IWCS, the frequencies 216-220 MHz were authorized only in very limited applications because of their potential for interfering with television service. The capability of large-scale operators to suitably engineer their systems for the protection of television makes use of these frequencies feasible; the willingness of IWCS applicants to make necessary technical preparations and to remain responsible for correcting interference which may result is making this improved spectrum utilization a reality. The rules established for IWCS operation require that license applications be accompanied by an engineering determination of geographical areas which may be affected by TV interference. The present document provides guidance for making suitable determinations of this kind. INDEX TERMS: inland waterways communications systems, allocation, 216-220 MHz.</p>	<p>EMCABS: 24-9-83</p>

EMCABS: 25-9-83

EMCABS: 28-9-83

Ionospheric and Geomagnetic Radiowave Interference, 1975-August 1982 (Citations from the International Information Service for the Physics and Engineering Communities Data Base).

National Technical Information Service, Springfield, VA
PB82-873282, PC N01/MF N01, Rept. for 1975-Aug 82
Aug 82, 179p

ABSTRACT: This bibliography contains citations concerning ionospheric and geomagnetic radiowave interference. Ionospheric radiowave propagation and scattering, atmospheric radio noise, radio-frequency interference, and ionospheric electron density profile are discussed. Radio signal attenuation and interference, ionospheric propagation mechanism, magnetospheric phenomena, seasonal and phase variations, and multipath effects are also presented. (Contact 158 citations fully indexed and including a title list.)

INDEX TERMS: bibliography, ionospheric, geomagnetic, radiowave interference.

Improving Electric Grounding in Frozen Materials

A. J. Delaney, P. V. Sellmann, S. A. Arcone
Cold Regions Research and Engineering Lab., Hanover, NH
AD-A117 873/0, PC A02/MF A01, Special rept.
Jun 82, 16p, Rept no. CRREL-SR-82-13

ABSTRACT: This study shows that resistance to ground of a simple vertical electrode in frozen fine-grained soil can be lowered significantly by placing it in a hole backfilled with a conductive soil-salt mixture. These tests were performed near Fairbanks, Alaska, in perennially frozen silt. Three electrodes were installed in holes created by detonating standard military shaped charges placed at the ground surface. The backfill contained varying amounts of salt. Measurement of resistance to ground of each electrode was made seasonally. The resistance to ground was lowered by an order of magnitude by the addition of a water-saturated salt-soil backfill. Improvement persisted six months after the backfill was placed and allowed to freeze. The degree of improvement provided by this technique will be a function of grain size and permeability of the surrounding soil.

INDEX TERMS: electric grounding, frozen materials.

EMCABS: 26-9-83

EMCABS: 29-9-83

Digital Communication Systems: Interference, 1970-August 1982 (Citations from the Engineering Index Data Base.)

National Technical Information Service, Springfield, VA
PB82-873811, PC N01/MF N01, Rept. for 1970-Aug 82
Aug 82, 272p

ABSTRACT: This bibliography contains citations concerning interference analysis of digital communication systems. Topics include digital and radio transmission systems, signal interference and noise, bit error rate, phase shift keying, and pulse code modulation. Interference and noise immunity, fading multipath environments, error probability, error rate monitoring techniques, pulse and quantization noise, radio telephone, and mobile radio systems are discussed. (Contains 303 citations fully indexed and including a title list.)

INDEX TERMS: bibliography, interference analysis, digital communication systems.

ESD Protective Material and Equipment: A Critical Review

Norman B. Furqua
Reliability Analysis Center, Griffiss, AFB, NY
AD-A116 954/9, PC E15, Availability: Reliability Analysis Center, Rome
Air Development Center, Griffiss AFB, NY 13441 \$HC37.50
State-of-the-art rept. Apr 82, 132 p. Rept no. SOAR-1, Contracts F30602-78-C-0281, F30603-81-C-0299

ABSTRACT: This document addresses those factors effecting the choice of optimum, cost effective materials and equipment to prevent electrostatic discharge (ESD) damage to sensitive electronic components and equipment. The approach is that of reviewing applicable data and discussing the relevant trade-off options. Section 1 addresses Wrist Straps; Section 2, Protective Work Surfaces; Section 3, Protective Packaging; Section 4, Air Ionizers; Section 5, Electrostatic Detectors, Voltmeters and Monitors; Section 6, Conductive Floors, Floor Mats, and Footwear; Section 7, Garments and Clothing; Section 8, Topical Antistats; Section 9, Material and Equipment Test and Inspection Procedures; Section 10 is a listing of the applicable references.

INDEX TERMS: (ESD) damage, materials and equipment.

EMCABS: 27-9-83

EMCABS: 30-9-83

Arc-Sprayed Metals for Structural Electromagnetic Shielding
Paul Nielsen

Construction Engineering Research Lab. (Army), Champaign, IL
AD-A117-673/4, PC A02/MF A01, Final rept.
Jun 82, 22p, Rept. no. CERL-TR-M-316

ABSTRACT: Electromagnetic shielding tests of small samples (2 ft by 4 ft or 0.61 m by 1.22 m) of arc-sprayed metals on typical construction materials were conducted to determine the feasibility of using arc-sprayed technology to provide a low-cost method of shielded construction. Test results indicate that such panels can provide significant shielding and that this technology may be useful for applications having low shielding requirement. In an additional study, it was determined that arc-spraying of leaky seams of conventional modular shielded construction can provide increased electromagnetic shielding.

INDEX TERMS: electromagnetic shielding test, arc-sprayed metals.

Corrosion Evaluation of Underground Telephone Cable Shielding Materials

J. L. Fink, E. Escalante, W. F. Gerhold
National Bureau of Standards, Washington, DC
PB82-245838, PC A05/MF A01, Sponsored in part by Rural Electrification Administration, Washington, DC. See also PB-258-227.
Jun 82, 88p, NBSIR-82-2509

ABSTRACT: Corrosion data are given on the performance of base and plastic-coated metals intended for use as cable shields for buried telephone cable. The materials investigated on specially prepared specimens were buried for periods up to six years in six different soil environments. Metals tested included homogeneous plastic-bonded and metallurgically-bonded laminates. Some specimens were exposed bare (uncoated), while others had plastic coatings or other types of coatings on either one or both sides. Metals studied included aluminum, copper, low carbon steel, and stainless steel alloys.

INDEX TERMS: corrosion data, cable shields, buried telephone cable.

<p>Absorption Characteristics of Insect Exposed to Standing-Wave Fields 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 <i>Tenebrio Molitor</i>, which has often been used to investigate the microwave biological effects, are given in the frequency range of 1-20GHz, and the results are also discussed with respect to the exposure locations. INDEX TERMS: microwave power absorption, insect</p>	<p>EMCABS: 31-9-83</p>	<p>Beat Disturbances of Home-use VTRs in the High-level Electromagnetic Field of Medium-wave Broadcasting Ryoji TSUNOI, Hiroshi KURONUMA NHK Technical Research Laboratories Report of Technical Group on EMC, IECE and IEE of Japan Vol.82, No.238, EMCJ 82'68, pp. 25-32 ABSTRACT: With the recent growth of home-use VTRs, beat disturbances have occurred in the VTRs in the high-level electromagnetic field of medium-wave broadcasting. We have conducted an investigation of beat disturbances by using a TEM cell and found the following facts. (1) Beat frequency enters the area around the video head when playing back a VTR. (2) Beat frequency is the difference between medium frequency and color subcarrier in the low frequency range. (3) The level of beat disturbance is proportional to the strength of the electromagnetic field, and it varies in accordance with the placement of the VTR. We have used the cancel-coil method as one solution and could reduce the beat to the level not observable on the TV screen. INDEX TERMS: home-use VTR, investigation, beat disturbance</p>	<p>EMCABS: 34-9-83</p>
<p>Introduction to Swell Wave Observation by Pulse Radar 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 Vo. 82, No. 238, EMCJ 82-66, pp. 9-15 ABSTRACT: We observed the waves with a conventional X band radar under typhoon conditions. Received radar echoes were measured 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. INDEX TERMS: swell wave observation, pulse radar</p>	<p>EMCABS: 32-9-83</p>	<p>A Fundamental Investigation on Preventing the Fifth Harmonic Radiation that Leaks from Microwave Ovens Youji Kotsuka Department of Telecommunication Engineering, Tokai University Report of Technical Group on EMC, IECE and IEE of Japan Vol.82, No.238, EMCJ 82-69, pp.33-40 ABSTRACT: To prevent fifth harmonic radiation that leaks from microwave ovens, both problems involving the structure of the vent hole and suppressing leaky waves from the power source line of the magnetron have been experimentally studied and a few ways proposed to eliminate these leaky waves. As to the vent hole, a circular hole of 5 (mm) diameter should be adopted to prevent fifth harmonic leaky waves from microwave ovens, and at the same time, a metallic fan with electromagnetic wave-absorbing sheets attached to its blades should be used to provide ventilation. Secondly, a new method of winding the wave-absorbing electromagnetic tape around the power source line connected to the magnetron is proposed. This tape, consisting of rubber ferrite backed by metal, is effective in reducing the intensity of a strong spectrum radiated from the power source line by more than 10dB. INDEX TERMS: investigation, fifth harmonic radiation, leaks, microwave ovens</p>	<p>EMCABS: 35-9-83</p>
<p>HF Radio Wave Environment Over Kokubunji, Tokyo Tosbichika 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 mainly formed by solar or terrestrial artificial and natural radio sources. Equipment adaptive to the usual ionosonde which is conducted in HF band every 15 minutes routinely has been designed to enable the reception of interference outside the time interval and to receive the observed wave. Using this equipment, successive variations in signals and interferences were measured and the HF radio wave environment was observed. This report presents the construction of the modified ionosonde and some interpretations of the results. INDEX TERMS: HF radio wave environment, ionosphere</p>	<p>EMCABS: 33-9-83</p>	<p>Low Noise Switching Power Supply for Electronics Equipment TOSHIHIRO ONODERA Toshiba Research and Development Center Report of Technical Group on EMC, IECE and IEE of Japan Vol.82, No.238, EMCJ 82-70, pp.41-46 ABSTRACT: A low noise switching de-dc converter is presented, which operates with an ordinary bipolar transistor and diode. A new converter is based on the buck converter. By positively taking advantage of the switching transistor output capacitance and the transformer leakage inductance, it is possible to realize little switching noise. When the "off" state transient response reaches zero voltage across the switch, before beginning the "on" state, it does so with approximately zero slope. By comparing the new converter noise level with the ordinary buck converter, we showed the low noise characteristics of the new converter. INDEX TERMS: low noise, switching power supply</p>	<p>EMCABS: 36-9-83</p>

EMCABS: 37-9-83

Occurrence Region of Showering Arc in Breaking Silver Contacts and Relationship Between its Region and Radio Noise

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 VB increases, E (dB) increases.
- 2) generally, the damped oscillation appears just after the dielectric breakdown, and this oscillation is one of the main reason of radio noise.

INDEX TERMS: occurrence region, showering arc, breaking silver contacts

EMCABS: 40-9-83

Low Level Modulated Microwave Biological Effects

Teruhisa HOCHIN, Tetsuo IKEDA

Nagoya Institute of Technology

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

Vol.82, No.298, EMCJ 82-75, pp.1-8

ABSTRACT: To study the biological effects of low-level modulated microwave field, the first antenna of crayfish was exposed sinusoidally modulated and unmodulated electromagnetic field. Carrier frequency is 9.45GHz and modulating waves are 10Hz and the frequencies that synchronize neural impulse train. The irradiated microwave power was 1mW or 10mW as the input power of the waveguide. There was a difference between the intervals of the spontaneous discharge during modulating frequency at 10Hz and the control.

INDEX TERMS: biological effects of modulated microwave, neural impulse train

EMCABS: 38-9-83

Electromagnetic Field in the Lossy Sphere Exposed in the Near Field of a $\lambda/2$ Dipole Antenna

Yoshifumi AMEMIYA, Shinji UEBAYASHI

Faculty of Engineering, Nagoya University

Report of Technical 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/cm² (the American National Standard Safety Level) at the nearest face of the sphere to the antenna.

INDEX TERMS: calculated values, power absorbed, human head, near field

EMCABS: 41-9-83

An Analysis of Radio Noise Measured in a City Area

Hiroshi ECHIGO, Nobuo HANDA, Tasuku TAKAGI, Risaburo SATO

Faculty of Engineering, Tohoku University, Sendai 980

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

Vol.83, No.91, EMCJ 83-27, pp.77-82

ABSTRACT: This report shows some data of the radio noise due to a motor bicycle, which may be one of the components of the radio city noise. First, some noise waveforms which were picked up by a standard dipole antenna are shown, second, the INAD (impulse noise amplitude distribution) of the source are given, together with the radiation pattern, third, the INAD dependency on distances is given to lead to the INAD while the bicycle is running. Finally, the INAD measured beside a road is shown and the correspondence to the quasi peak indication is discussed.

INDEX TERMS: radio noise, motor bicycle

EMCABS: 39-9-83

Test Results on Electro-Magnetic Field of Roadside Radio Diffusion Cable
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 electro-magnetic fields are limited in its neighborhood and do not interfere with remote radio equipment. In 1980, this cable was installed experimentary 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.

INDEX TERMS: test results, electro-magnetic field, roadside radio diffusion cable

EMCABS: 42-9-83

Distribution of Temperature Rise Inside Insect Exposed to Standing-Wave Fields

Yoshiyuki GOG, Osamu FUJIWARA, Yoshifumi AMEMIYA

Faculty of Engineering, Nagoya University

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

Vol.83, No.91, EMCJ 83-29, pp.89-95

ABSTRACT: This paper describes the microwave-induced temperature rise inside an insect exposed to the standing-wave fields. A method is presented to obtain the transient temperature rise in the insect simulated by the sphere having the same thermal characteristics as those of the insect.

Numerical calculations on Tenebrio pupa heated by the microwave are given, and the results are compared with those of the traditional heating.

INDEX TERMS: insect, standing-wave, microwave heating, temperature rise, calculation.

<p>Excitation of a Semi Infinite Tunnel by a Line Source Kuniaki YOSHIDOME, Kazuo AOKI Kyushu University Kazunori UCHIDA Fukuoka Institute of Technology Report of Technical Group on EMC, IECE and IEE of Japan Vol.83, No.91, EMCJ 83-21, pp.37-42 ABSTRACT: The excitation problem of electromagnetic fields in a tunnel by a line source is analyzed based on the Wiener-Hopf technique. It is assumed that the tunnel is the impedance-walled parallel plate waveguide whose upper plate is truncated, and that the impedance boundary condition is satisfied. The strength of the fields in the tunnel is numerically calculated. It is found from numerical results that the reflection at the mouth of the tunnel is very small. INDEX TERMS: tunnel, excitation, line source, Wiener-Hopf technique.</p>	EMCABS: 43-9-83	<p>A Technique to Calculate Induced Currents in a Human Body Exposed to ELF Electric Fields Tetsu KOBAYASHI, Goro MATSUMOTO Research Institute of Applied Electricity; Hokkaido University Report of Technical Group on EMC, IECE and IEE of Japan Vol.83, No.91, EMCJ 83-24, pp.55-62 ABSTRACT: A technique is developed which calculates induced currents in a human body exposed to ELF electric field. The induced currents are obtained from the cross-sectional area of the tube of force that contains the same number of electric force lines at each cross-section. Here, the human body is assumed to be axially symmetrical. Thus, the currents can be obtained only by calculating the electric lines of force. The agreement between the calculation and the measurement was reasonable. This technique does not require involved mathematics and can be applied to the objects with 3-dimensional shape. INDEX TERMS: ELF E-field, induced body currents</p>	EMCABS: 46-9-83
<p>Microwave Simulation of Electromagnetic Wave Propagation in a Tunnel Kazunori UCHIDA, Toshiaki MATSUNAGA Fukuoka Institute of Technology Kuniaki YOSHIDOME, Kazuo AOKI Kyushu University Report of Technical Group on EMC, IECE and IEE of Japan Vol.83, No.91, EMCJ 83-22, pp.43-48 ABSTRACT: This paper presents the rigorous solution to the electromagnetic wave excitation by a waveguide mode, concerning a two-dimensional impedance tunnel which might be the most simplified model of a rectangular tunnel surrounded by a lossy dielectric medium. Using microwave simulation method, experiments are also performed to determine whether the assumption used in the theory is valid. INDEX TERMS: microwave simulation, electromagnetic wave propagation, tunnel</p>	EMCABS: 44-9-83	<p>Investigation and Suppression for Electromagnetic Interference from Radio-Frequency Hyperthermia Equipment Yoshiaki SUDA, Takeshi NAKAZONO Sasebo Technical College Report of Technical Group on EMC, IECE and IEE of Japan Vol.83, No.91, EMCJ 83-25, pp.63-68 ABSTRACT: The radio noise from the radio-frequency hyperthermia equipment (home-type) was measured by the RFI field strength meter based on the CISPR standard and spectrum analyzer. This paper describes the relation between the radio-interference-field-strength E(dB) and the limits of interference (Electrical Appliance and Material Control Law in Japan), the characteristics of the radio noise, and the method to reduce the noise. INDEX TERMS: radio noise, radio-frequency hyperthermia, CISPR</p>	EMCABS: 47-9-83
<p>Usage and Effectiveness of Shielded Electrical Connectors Hiromasa INOUE, Tomonari OSTUKI, Takao HIROSE DAI ICHI DENSHI KOGYO K.K. Report of Technical Group on EMC, IECE and IEE of Japan Vol.83, No.91, EMCJ 83-23, pp.49-54 ABSTRACT: When cable and connector assembly is not sufficiently shielded, the assembly may act as antenna and radiate or receive radio interference. To resolve such problems, we researched materials, construction and terminating and assembling means of connectors. INDEX TERMS: usage, effectiveness, shielded electrical connectors</p>	EMCABS: 45-9-83	<p>A Non-Invasive Thermometry for Hyperthermia Using NMR With a Star-Shaped Magnetic Field Yositsugu KAMIYA, Yoshifumi AMEMIYA Faculty of Engineering, Nagoya University Report of Technical Group on EMC, IECE and IEE of Japan Vol.83, No.91, EMCJ 83-26, pp.69-76 ABSTRACT: We have previously presented two kinds of non-invasive thermometries for the clinical hyperthermia, which could be realized by using NMR with a spherical focusing magnetic field and with a lineshaped one, respectively. However, the above methods required significantly large currents to generate the focusing magnetic fields. This paper proposes a new temperature measurement method using a star-shaped magnetic field. This method can reduce the coil currents by one third on the same temperature measuring conditions. INDEX TERMS: NMR, hyperthermia, thermometry, star-shaped magnetic field</p>	EMCABS: 48-9-83

EMCABS: 49-9-83

EMCABS: 52-9-83

EMI Control in Personal Computers
Yukio HOTTA, Jinichi OYAMA, Yoshiro SATO
TOHOKU METAL IND. Ltd
Report of Technical Group on EMC, IECE and IEE of Japan
Vol.83, No.59, EMCJ 83-14, pp.33-40

ABSTRACT: EMI from personal computer was measured by means of FCC, CISPR, and VDE ruled, and compared each results. To the radiated interference, the effect of copper shielded cable was compared with that of a common mode choke (CMC) filter which we developed recently.

INDEX TERMS: EMI, personal computer

C-r Circuit for Suppressing the Surge Voltage in Breaking Contacts and its Accompanying Problem (Study 2)
Shigeru OGATA, Teizo AIDA, Keiichi UCHIMURA, Yasuharu OKAZAKI

Faculty of Engineering, Kumamoto University
Report of Technical Group on EMC, IECE and IEE of Japan
Vol.83, No.91, EMCJ 83-17, pp.9-14

ABSTRACT: As mentioned in a previous paper, the abnormal decreasing of the surge voltage v_p occurs at about 3 A in breaking Ag contacts. In this paper, the method to suppressing the abnormal decreasing of v_p , i.e. C-r surge suppression circuit, was discussed. From unavoidable circumstances, there is a case when inadequate C-r surge suppression circuit is connected to contacts. The danger for this case and the method to avoiding the danger were also discussed.

INDEX TERMS: surge suppression circuit, contacts

EMCABS: 50-9-83

EMCABS: 53-9-83

A Measuring Method and Measurements of Occurrence Intervals of Microarcs Caused by High Speed Sliding Contact
Jun ITO, Osamu FUJIWARA, Yoshifumi AMEMIYA
Faculty of Engineering, Nagoya University
Report of Technical Group on EMC, IECE and IEE of Japan
Vol.83, No.59, EMCJ 83-15, pp.41-47

ABSTRACT: This paper describes a measuring method and measurements of the occurrence interval of microarcs caused by a high speed sliding contact. The measuring instrument is constructed by the digital IC circuits and the micro-computer. Its normal working limitation and calibration are examined by using known pulse trains. Experimental results on the microarcs in some sliding contacts are also demonstrated.

INDEX TERMS: sliding contact, microarc, occurrence interval, measurements, frequency distribution

Generation Mechanism of Radio Noise in Carbon Sliding Contact
Osamu FUJIWARA, Jun ITOH, Yoshifumi AMEMIYA
Faculty of Engineering, Nagoya University
Report of Technical Group on EMC and IEE of Japan
Vol.83, No.91, EMCJ 83-18, pp.15-21

ABSTRACT: This paper describes the generation mechanism of radio noises in a carbon sliding contact that is well recognized as a low noise source. The noise currents caused by arcs of the sliding contact are examined experimentally and theoretically. From the results, the suppression effects of the carbon contact material on the noise level are also elucidated.

INDEX TERMS: radio noise, sliding contact, carbon material, arc, noise

EMCABS: 51-9-83

EMCABS: 54-9-83

Numerical Analysis of the Surge Voltage Wave Form in Breaking Contacts Using the Quasi Arc Chopping Current (Study 1)
Shigeru OGATA, Teizo AIDA, Keiichi UCHIMURA, Yasuharu OKAZAKI
Faculty of Engineering, KUMAMOTO University
Report of Technical Group on EMC, IECE and IEE of Japan
Vol.83, No.91, EMCJ 83-16, pp.1-8

ABSTRACT: As mentioned in a previous paper, the abnormal decreasing of the surge voltage v_p occurs at about 3 A in breaking Ag contacts. In this paper, the method to suppressing the abnormal decreasing of v_p , i.e. C-r surge suppression circuit, was discussed. From unavoidable circumstances, there is a case when inadequate C-r surge suppression circuit is connected to contacts. The danger for this case and the method to avoiding the danger were also discussed.

INDEX TERMS: surge suppression circuit, contacts

Transfer of the Contact-Showering-Showering-Arc-Quenching-Region Due to the Change of Circuit Constants.

Keiichi UCHIMURA, Hideme INOUE, Toshihide MUTO, Teizo AIDA
Faculty of Engineering, Kumamoto University
Report of Technical Group on EMC, IECE and IEE of Japan
Vol.83, No.91, EMCJ 83-19, pp.23-30

ABSTRACT: In the region which is the source voltage $V=0-100$ Volts and the closed circuit current I less than about 1 Amperes, a showering arc appears in breaking Ag contacts. We obtained the upper side limiting curve of the showering arcs in the resistive load. We then found that the curve transferred to the higher current side by connecting the parallel capacitance C and the series inductance L . The experimental formulas of the limiting current I_0 of the curve were obtained as function of V , L and C .

INDEX TERMS: showering arc, contacts

<p>The Shielding Effect of the Conductive Plate on the Infinite Plane Kazuo AOKI, Tooru MATSUURA Kyushu University Report of Technical Group on EMC, IECE and IEE of Japan Vol.83, No.91, EMCJ 83-20, pp.31-35. ABSTRACT: First, we have analyzed the electromagnetic field of the infinite corner reflector antenna with a conductive plate. Second, by substituting π for the aperture angle in the resulting formula, we have calculated the conductive plate standing on the infinite conductive plane. INDEX TERMS: electromagnetic field, infinite corner reflector antenna</p>	EMCABS: 55-9-83	<p>Surge Damage of the CATV Line Amplifier Power Supply and its Countermeasure Nobutaka INOUE, Toshihiro SUGIURA MASPRO DENKOH CORP. Report of Technical Group on EMC, IECE and IEE of Japan Vol.83, No.59, EMCJ 83-11, pp.11-16 ABSTRACT: Despite the fact that the head-amplifier and trunk line amplifier employed by the CATV system are protected against surge using an arrester, there is no cessation of damage to equipment. Damage to equipment is originated mainly from short-circuiting in the rectifying diode of the power supply. By connecting 1-3 surge protective resistances to the rectifying diode in series, the surge flowing into the rectifying diode can be cut down over 1-order (nearly 1/10), showing a computation method for a highly-efficient surge absorbing circuit as confirmed by experimentation. INDEX TERMS: surge damage, CATV line amplifier power supply</p>	EMCABS: 58-9-83
<p>Protector of P C M Telecommunication System for the Electric power Company Minoru AIZAWA, Toshio ITABASHI, Yoshio SAITO THE TOKYO ELECTRIC POWER CO., INC. Chiaki ISOKAWA, Yoshiyuki KUMADA SANKOSHA COMPANY Yoshikatsu HIRANO SHODEN COMPANY Report of Technical Group on EMC, IECE and IEE of Japan Vol.83, No.59, EMCJ 83-9, pp.1-6 ABSTRACT: This report discuss the circuit system, protection characteristics and component parts for a protector of pulse code modulation telecommunication system, which has been newly developed for use at the Electric Power Company. The protector shall consist of the primary unit and secondary unit. The former one is provided with drainage coil and high capacity zinc oxide varistors. The later is one provided with resistors and silicon diode varistors. As compared with a conventional one, the protector is characterized by its excellent protection characteristics. INDEX TERMS: new developed protector for P C M telecommunication system.</p>	EMCABS: 56-9-83	<p>A Consideration to Countermeasures Against Lightning Damage to CATV Facilities Nobutaka INOUE, Shigeyuki ITO, Hiroshi MATSUBARA, Masaaki KATSUMI MASPRO DENKOH CORP. Report of Technical Group on EMC, IECE and IEE of Japan Vol.83, No.59, EMCJ 83-12, pp.17-24 ABSTRACT: Approximately one-half of all damage to CATV facilities is caused by lightning. Close investigation of equipment damaged by lightning shows that counter flashover current accompanying the rise of ground potential, and "flashover" by lightning originate as the cause, along with dynamic current flowing into low-tension power line from a high-tension power line. As a countermeasure to this, the head amplifier housing shall not be grounded. We suggest that dielectric strength between CATV line and housing of a power supply and line surge protector be more than that of the high-tension power line voltage. INDEX TERMS: damage, CATV facilities, lightning</p>	EMCABS: 59-9-83
<p>Arrester Susumu AIBA Kanazawa Institute of Technology Kazushi OTSUKI Otowa Electric Co.Ltd. Kenji HORII Nagoya University Report of Technical Group on EMC, IECE and IEE of Japan Vol.83, No.59, EMCJ 83-10, pp.7-10 ABSTRACT: The experiment of power distribution transformer in the high-tension side of transformer struck by triggered lightning make use of the rocket. In the case of the connections of high-tension windings for the cases of the floating and grounding respectively, though the flashover through the surface of the insulator bushing occurred, there was no damage inside the transformer. In another experiment, the high-tension winding was burned out at the terminal inside the transformer by the impulse current of the main discharge. INDEX TERMS: power distribution transformer, flashover</p>	EMCABS: 57-9-83	<p>Measuring Instruments for Testing the Shielding Effectiveness Eizo HARIYA, Masahiro UMANO Kansai Electronic Industry Development Center Report of Technical Group on EMC, IECE and IEE of Japan Vol.83, No.59, EMCJ 83-13, pp.25-32 ABSTRACT: This paper presents a method of measuring the electromagnetic shielding effectiveness of electromagnetic shielding materials. Two types of measuring instruments used are in near field evaluations: one for evaluation of the electric field (high impedance field) shielding effectiveness and the other for magnetic field (low impedance field) shielding effectiveness. The instrument for electric field is essentially a small TEM (transverse electromagnetic) cell consisting of symmetrical halves as sectioned in the right middle of the transmission path. The instrument for the magnetic field consists of a small circular shielded loop antenna and a 90° corner reflector, with a quarter portion of the loop antenna passed through across the reflector and the rest of the loop antenna housed in a copper box. Using these two instruments, the shielding effectiveness of conductive plastics and other materials measured over a frequency range from 100kHz to 1 GHz. The results indicate that the shielding effectiveness of the conductive plastics is very similar to the theoretical characteristic as predicted for metal plate. That is, the electric shielding effectiveness decreases with the increase of the frequency, whereas the magnetic shielding effectiveness increases. INDEX TERMS: measuring instruments, testing, shielding effectiveness</p>	EMCABS: 60-9-83

EMCABS: 61-9-83

Brief Report of the 5th EMC Symposium (Zurich)
 Tasuku TAKAGI
 Tohoku University
 Report of Technical Group on EMC, IECE and IEE of Japan
 Vol.83, No.38, EMCJ 83-7, pp.15-22

ABSTRACT: The outlines of the schedule, contents, organization and others of the above symposium are briefly reported. Over 100 papers have presented through 18 session (AR) and over the following points of view; i) Organizing efforts to hold a high quality symposium, such that over 1/2 session chairmen have been invited. ii) All timely topics and recent advancements have been reported. iii) Room arrangements and related facilities were perfect. iv) Programme was well arranged.

INDEX TERMS: report, 5th EMC symposium (Zurich)

EMCABS: 64-9-83

Electro-magnetic Wave Absorber in GHz Frequency Range Using Ferrite
 Absorbing Materials Composed of Short Metal Fibers
 Kenichi HATAKEYAMA, Tetsuju INUI

NEC CORPORATION
 Report of Technical Group on EMC, IECE and IEE of Japan
 Vol.83, No.13, EMCJ 83-3, pp.15-19

ABSTRACT: Thin ferrite broad-band absorber was achieved, e.g., more than 20dB absorption from 8GHz to 13GHz. The absorber consists of two layers, which operate as a low impedance resonator and individually as a transforming layer. Experimental procedures are shown in detail relating the impedance characteristics of each layers which is composed of ferrite, short metal fibers and organic resin.

INDEX TERMS: electro-magnetic wave absorber, ferrite, short metal fiber

EMCABS: 62-9-83

EMC Research Progress in Japan, 1981-82
 Yasuo AKAO
 Nagoya University, Faculty of Engineering
 Report of Technical Group on EMC, IECE and IEE of Japan
 Vol.83, No.38, EMCJ 83-8, pp.23-30

ABSTRACT: Articles, which reported at the monthly meetings of EMC group and in the Journals and the Transactions of the IEEE of Japan in the past two years, are reviewed and classified. The biological effects of both RF and ELF fields are studied. The noise characteristics of various contact switches are intensively analyzed. Various kind of RF absorbing materials are developed. A new protection method against surge voltage due to lightning discharge and a result of balloon measurement of harmonic radiation from power line are also reported.

INDEX TERMS: review of EMC articles, research progress

EMCABS: 65-9-83

Search for Unknown Location of Electromagnetic Noise Sources in LF
 Band Using the Synthetic Aperture Array Antenna Technique
 Junichi KIKUCHI, Motoyuki SATO, Yoji NAGASAWA, Risaburo SATO
 Faculty of Engineering, TOHOKU University
 Report of Technical Group on EMC, IECE and IEE of Japan
 Vol.83, No.13, EMCJ 83-4, pp.21-28

ABSTRACT: The authors have proposed the method of search for unknown location of electromagnetic noise sources in LF band using the Synthetic Aperture Array Antenna technique. In this paper we show some numerical simulations with cosin-pattern-antenna. Experiment in UHF band shows that this method can be used practically.

INDEX TERMS: searching technique, distributed noise sources, LF band, synthetic aperture array antenna, scale model experiment

EMCABS: 63-9-83

Electric Fields due to Lightning Return Stroke
 Tetsuju ABE, Kiroaki KOGA, Nobuo KUWABARA
 Ibaraki Electrical Communication Laboratory, N.T.T.
 Report of Technical Group on EMC, IECE and IEE of Japan
 Vol.83, No.13, EMCJ 82-2, pp.9-14

ABSTRACT: We have two calculating methods to obtain the electric field due to lightning return stroke. One is obtained through the time dependent Maxwell's equations. The other is given by integrating the initial response electric field for the unit step return stroke current. This paper clarifies the calculable condition and application for return stroke current model, in regard to both methods. Horizontal electric fields are also calculated in case of perfectly and finite conducting ground, respectively. The relation between distance from lightning strike point and both horizontal electric fields is clarified.

INDEX TERMS: lightning electric field, lightning surge

EMCABS: 66-9-83

Design Method of Induction Over-Voltage Reduction for
 Telecommunication Lines by 3-Electrode Arresters
 Hiroshi YAMANE

N.T.T.
 Mitsuo HATTORI, Hiroaki KOGA
 Ibaraki Electrical Communication Laboratory
 Report of Technical Group on EMC, IECE and IEE of Japan
 Vol.83, No.38, EMCJ 83-5, pp.1-6

ABSTRACT: This paper describes a reduction design method of induction over-voltage from high power transmission lines for telecommunication lines by using 3-electrode arresters. We found a new parameter in 3-electrode arrester discharge characteristic, and clarified that the parameter is one of the important factors for the design of the over-voltage reduction method. Simplified design conditions for the earth resistance are clarified, taking into account the 3-electrode arrester discharge characteristic.

INDEX TERMS: arrester, induction

EMCABS: 67-9-83

EMCABS: 70-9-83

Distributed Constant Circuit Theory Under the Electromagnetic Environment (IX)

Yoshio KAMI

Jr. Tech. College of Electro Communications

Risaburo SATO

Faculty of Eng., Tohoku University

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

Vol.83, No.38, EMCJ 83-6, pp.7-14

ABSTRACT: To clarify a coupling mechanism of transmission lines and external waves, forcing terms of the line equations have been studied by investigating those physical meanings. Experimental results, measurements of an induced power in a terminated load at end of lines of finite length suspended above the perfect ground plane illuminated by external plane waves polarized parallel and normal to the incident plane, show to be in good agreement with the theory under certain restrictions. To extend the applicable region a compensation method is proposed.

INDEX TERMS: externally excited transmission line, line equations

Search for Unknown Location of Electromagnetic Noise Sources in LF Band

Junichi KIKUCHI, Motoyuki SATA, Yoju NAGASAWA, Risburo SATA

Faculty of Engineering, Tohoku University

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

Vol.82, No.298, EMCJ 82-78, pp.25-32

ABSTRACT: This paper proposes the method of search for unknown location of electromagnetic noise sources in LF band by using the Synthetic Aperture Array Antenna technique. Some numerical simulations show that this technique can be even applied for the distributed noise sources.

INDEX TERMS: searching technique, distributed noise sources, LF band, synthetic aperture array antenna

EMCABS: 68-9-83

EMCABS: 71-9-83

Fundamental Characteristics of Radio Interference Measuring Apparatus Employing an Average Detector

Tetsuo OGUCHI, Akira SUGIURA, Hirojiro NAGATOMO

Radio Research Laboratories, M.P.T.

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

Vol.82, No.298, EMCJ 82-76, pp.9-16

ABSTRACT: In connection with measurement of radio interference from data processing equipment, theoretical and experimental studies have been made of the recurrent impulse response of the measuring apparatus with an average detector. It is found that the responses to low repetition rate inputs are different from those specified in CISPR Publ. 15, if the pre-detector state output has an oscillatory envelope. In high repetition rates the meter readings depend on the selectivity of the apparatus. Some types of average detectors were examined on their compliance with the specification and the results are described in detail.

INDEX TERMS: radio interference, radio noise, average detector

On the Statistical Measurements of Impulsive Noise in a City

H. ECHIGO, N. HANDA, T. TAKAGI, R. SATO

Faculty of Engineering, Tohoku University

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

Vol.82, No.298, EMCJ 82-79, pp.33-38

ABSTRACT: Impulsive Noise Amplitude Distributions (INAD) were measured under similar condition as the previous measurements in 3 years ago, which was shown in the past technical report. The data shows that INAD were almost same as the earlier one, therefore the noise level was virtually unchanged for these 3 years. Adding them, data in both polarizations (vertical & horizontal) were compared. Averaged curves reveal no differences between them but each 1 minute interval data showed that vertical polarization data gives higher level for the cars. 5% values of coincidental quasi-peak measurements and INAD levels which give 100 pulses/minute were compared and the straight correlation were shown.

INDEX TERMS: statistical measurements, impulsive noise, city

EMCABS: 69-9-83

EMCABS: 72-9-83

High Precision Open-site Attenuation Measurement and Site Correction Factor

T. FUJIKAWA, T. ARAI, H. HARUKI, M. OKANO, S. TAKEYA, A. MAEDA

MATSUSHITA COMMUNICATION INDUSTRIAL CO., LTD.

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

Vol.82, No.298, EMCJ 82-77, pp.17-24

ABSTRACT: Attenuation at EM1 measurement site has been thought to include only attenuation of the direct wave from the equipment under test to the receiving antenna, attenuation of the wave reflected from the ground plane, and their phase relationship. Precise measurements show that part of the received signal is re-radiated and again received after reflection from the ground plane. Inclusion of this factor in calculations improves their agreement with measurements.

INDEX TERMS: site attenuation, correction factor

A Mechanism of Origin and Propagation of Radio Noise in Commutator Motor

Shun SUZUKI, Kumio TAKAHASHI

HITACHI KOKI CO., Ltd.

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

Vol.83, No.13, EMCJ 83-1, pp.1-8

ABSTRACT: At the frequency band 0.15-5 MHz, we measure the pulse amplitude distribution of the radio noise voltage, in the universal motor.

As the result of measurement, we estimate that the main origin of the noise is the current fluctuation which occurs in the coil, which is commutated later among armature coils in the same slot.

Moreover, we estimate that in this frequency band the coupling between the current fluctuation and the field coil affects the noise level, and we develop the equivalent circuit of the noise origin and propagation.

INDEX TERMS: universal motor, radio noise voltage, equivalent

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