

Electromagnetic Compatibility Society



Newsletter



ISSUE NO. 122

SUMMER 1984

(ISSN 0164-7644)

EDITOR: ROBERT D. GOLDBLUM

RETIREMENT FOR HERMAN GARLAN

Herman Garlan, technical advisor to the RF Devices Branch, Office of Science and Technology recently announced his retirement after 44 years with the FCC.

Mr. Garlan joined the FCC in 1940 as an inspector in the Chicago district office. In 1945 he transferred to what is now the Private Radio Bureau. In 1953 he became Chief, RF Devices Branch with the responsibility to plan and supervise a program to eliminate RF interference to communications by establishing regulations to control radiation from Industrial, Scientific and Medical (ISM) equipment, radio

receivers, miniature transmitters and a host of other non-licensed devices. Under his direction, Parts 15 and 18 of the FCC Rules were developed and formally adopted by the Commission.

In 1980 Mr. Garlan stepped down as Chief of the RF Devices Branch but continued his service as a technical advisor to the Branch. In February of this year his friends at the Commission finally convinced him that he had earned his retirement! Mr. Garlan is Fellow of the IEEE.

EMC SOCIETY TWENTY-FIFTH ANNIVERSARY MEDALLION PRESENTED AT IEEE CENTENNIAL AFFAIR

When Jim Hill attended the IEEE Centennial Celebration in Boston on May 14th he was impressed by the program at which 83 "Learned Societies" presented gifts to the IEEE in honor of the 100th birthday. While the EMC 25th Anniver-

sary Medallion presentation was not on the official program, IEEE President Gowen agreed that it would be appropriate to present the medallion to Society representatives as part of the IEEE Centennial memorabilia.

(See page 5)

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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EDUCATION COMMITTEE NEWS

The Education Committee has put together a preliminary draft of a booklet titled *Experiments and Demonstrations in Electromagnetic Compatibility*. At present the booklet contains five experiments and will be expanded in the future, provided we get more participation by the members of the society with regard to a critique of the present experiments in the booklet and submission of additional experiments. The intent of the booklet is to provide a source of experiments and demonstrations concerning EMC. The audience was considered to be undergraduate or graduate engineers as well as managers and others who would benefit from becoming more familiar with the EMC problem.

Over 100 copies of the booklet were distributed from the IEEE booth at the EMC Symposium in San Antonio in April. Initial responses to the booklet were very favorable. If you would like to receive a copy or contribute to the contents please contact me.

The Education Committee has decided to sponsor sessions on EMC Education at the 1985 Symposium in Boston and the 1986 Symposium in San Diego. At the 1985 Symposium we intend to have a panel discussion on EMC Education consisting of panelists who are involved in various aspects of educating people on EMC. This session will be organized by Clayton Paul of the University of Kentucky.

At the 1986 Symposium we intend to have a regular session, with papers, on EMC Education similar to a session held at the 1981 Symposium in Boulder. I will organize this session. Anyone interested in writing a paper on EMC education should contact me to discuss the topic.

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

The Center for Professional Advancement is sponsoring two courses on *Electromagnetic Compatibility Engineering* to be given in East Brunswick, NJ on September 24 to 27, and in San Mateo, CA on August 21-24. The instructors will be Henry Ott and Don Heirman. For more information contact the Center at 201-238-1600.

R & B Enterprises will offer an *EMI Testing Workshop — Commercial* in Philadelphia on Sept. 6-7 and Oct. 29-30 and an *EMI Testing Workshop — Military* on Sept. 24-25. A seminar on *Grounding, Bonding and Shielding* will be presented in Chicago on Sept. 24-25, in Boston on Oct. 9-10 and in Washington DC on Nov. 13-14. A one-day seminar on *Printed Circuit Boards* will be given on Oct. 17 in Boston and on Nov. 8 in Philadelphia. *EMI Susceptibility Guidelines for Computing Equipment* will be offered in Boston on Oct. 15 and in Philadelphia Nov. 7. A new two day course on *Electromagnetic Pulse (EMP) Design and Test* will be offered Sept. 17-18 in Chicago and Oct. 18-19 in Boston. For more information contact R&B Enterprises at 215-825-1965.

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SHORT PAPERS, ARTICLES & APPLICATION NOTES	Edwin L. Bronaugh Electro-Metrics 100 Church St. Amsterdam, NY 12010

(Cont'd. from page 2)

Don White Consultants will be offering *Grounding and Shielding* in Ottawa Canada on August 14-17, in San Diego CA on Sept. 18-21 and in Atlanta GA on October 23-26. A course on *Tempest Design, Control and Testing* will be presented on Oct. 15-19 in Sunnyvale CA. *An Introduction to EMI/RFI/EMC* will be given on October 23-25 in Washington DC. A course on *EMC For Mechanical and Packaging Engineers* will be offered in Philadelphia on September 25-26. For more information contact Don White Consultants at 703-347-0030.

George Washington University, Washington DC, is offering a course *Grounding, Bonding, and Shielding* on August

27-28 as well as a course *Electromagnetic Interference and Control* on October 29 to November 2. For more information contact the school at 202-676-6106.

Henry Ott
Chairman, EMCS
Education Committee
AT&T Bell Laboratories
Room 1E-212A
Whippany, NJ 07981
201-386-6660

1985 IEEE-EMC REGICON IN LOS ANGELES

The Los Angeles Chapter in cooperation with the San Diego and Orange County Chapters of the IEEE-EMC Society will be hosting a Regional Conference. The conference will be a review of the state-of-the-art in EMC in Commercial and Military Electronics and will be held at the Los Angeles Hilton, 5711 West Century Blvd., Los Angeles, on Wednesday, 23 January 1985.

Two comprehensive seminars will be held:

- Commercial and Consumer Products EMC
- Military EMC

Each session will have nationally recognized speakers.

Presentations will be made by invited speakers. Handouts will be available. Topics to be covered are:

- Designing to Meet FCC & VDE Requirements
- The FCC Certification/Verification Process
- The VDE Certification Process
- Shielding for EMC/EMP
- Immunity Design & Requirements
- Cabling Design

An exhibition of RFI, EMC, EMP, ESD and immunity equipment facilities and suppression services will be held to coincide with the seminar. Potential exhibitors should reserve their space early, since space is limited in the Exhibition Hall. For general information contact Ms. Terry Cantine, Eaton Corporation, 5340 Alla Road, Los Angeles, CA 90066. Phone: (213) 822-3061.

1985 INTERNATIONAL SYMPOSIUM ON EMC

The 1985 IEEE International Symposium on EMC will be held at the Hilton at Colonial, Wakefield, Massachusetts from August 20-22, 1985. The theme "EMC, A UNIVERSAL GOAL", was chosen to stress the need for engineers of all disciplines to be concerned about EMC. The IEEE EMC-Society is seeking original, unpublished papers on all aspects of EMC. Suggested topics include but are not limited to the following categories:

TECHNICAL AREAS

EMP	Non-Sinusoidal
ESD	Radiation Hazards
Filters	Regulations
Instrumentation & Theory	Signal Processing
Lightning	Spectrum Management
Magnetics	Standards
Materials	Susceptibility
Microwave Theory & Techniques	Vulnerability

APPLICATION AREAS

Aerospace & Electronic Systems	Electrical Insulation Electron Devices
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Antennas & Propagation
Biomedical Engineering
Communications
Components, Hybrids & Manufacturing
Computer Aided Design of Integrated Circuits & Systems
Computers
Consumer Electronics

Geoscience & Remote Sensing
Isolation & Shielding
Medical Imaging
Military Applications
Quantum Electronics
Solid State Circuits
Vehicular Technology

Abstracts and summaries (three copies) are due by November 30, 1984. Notifications of acceptance will be issued by February 1, 1985. Camera-ready copy must be submitted by April 5, 1985.

Abstracts and summaries should be sent directly to: Dr. Donald D. Weiner, Department of Electrical and Computer Engineering, 111 Link Hall, Syracuse, NY 13210.

For other information, contact: Dr. Chester L. Smith, General Chairman, P.O. Box 536, Bedford, MA 01730. Tel: (617) 271-7086.

BOARD OF DIRECTORS MEETING IN SAN ANTONIO

It was Fiesta week in San Antonio, the site of our national EMC Symposium. As usual, the EMC Board of Directors met the day before the symposium on Monday, the 23rd of April, at the Hyatt Regency on the "Riverwalk". With the appointment and Board approval of Linda Haskell to replace Charlie Anderson who resigned and Tei Iki to represent Dr. Sato, there was 100% attendance! That figure attests to the draw of the symposium and the city of San Antonio.

Following the approval of the minutes of the last meeting, the major discussions, decisions, and reports are summarized as follows:

1. Warren Kesselman presented an in-depth Treasurer's report. The projected year end net worth of the Society based on data supplied by the Institute is \$146.5K. This is up by about \$25K over the actual net worth as of the end of 1983. Budget estimates for 1985 were discussed at length. The Board decided to retain the \$7.00 Society dues and to authorize Warren to take advantage of new investment options provided by the Institute for Society surpluses. The Treasurer's report was approved.

2. Bill Parker presented his report on Communications Services. The page count for the Transactions is predicted to be less than budgeted. Editor Dick Schulz plans to prepare a special index for retrieving articles to make up for the under-run pages. Ed Bronaugh was named as the 11th associate editor for the Newsletter. Ed will be in charge of finding short, timely technical articles and practical application notes of a non-archival nature. For more information of this new Board-approved activity, call Ed on (518) 843-2600.

3. Gene Cory presented a review of future symposium activity. The estimated surplus from last year's Washington, DC symposium is about \$4K. The October international symposium in Tokyo has an overwhelming number of papers — 203!! There will be 5 parallel technical sessions. Thirty-one exhibitors will be accommodated (5 non-Japanese). As reported, the air fares are quite attractive with United Airlines providing a low cost fare of \$732 round trip from Seattle to Tokyo with add-on round trip domestic connections in the order of up to \$300 for the most distant location such as New York and Washington, DC. Yvonne Donick is the travel agent arranging the flights and further sight-seeing in the Orient after and before the conference. Her number is (619) 451-2330 or 695-1025. She and a representative from United Airlines made a presentation to the Board and answered questions. Boston in 1985 is on target according to Chet Smith. The hotel is the Hilton in Wakefield for the August 20-22, 1985, symposium. The call for papers is due November 30, 1984 (abstracts and summaries). For more information, call Chet on (617) 271-7086. The other sites will be discussed in subsequent Newsletters.

4. Jim Hill reports that there will be an EMC conference in England on September 18-21, sponsored by the IERE. Zurich hosts the sixth Symposium and Technical Exhibition on EMC on March 5-7, 1985. Tom Dvorak is the point-of-

contact for further information. His international phone number is (411) 256-2790 or Telex: 53178 ethbi ch.

5. Ed Bronaugh presented his report on technical services. Standards work continues to increase in pace as reported by Don Heirman. Project Authorization Requests (PARs) for IEEE Standards and new projects under the cognizance of the EMCS were submitted to the IEEE Standards Office for review by the New Standards Committee (NESCOM) at their September meeting. (See the Winter Newsletter for a complete review of the EMCS Standards activity). If approved by NESCOM and the Standards Board, the various updates and revisions many of you have worked on will be given the go-ahead for completion. The EMCS standards committee met at the symposium. The next meeting will be in Tokyo in October. Volunteers to work on projects are still being sought. Give Don a call on (201) 834-3566. The technical advisory committee chaired by Ed Skomal lists the following technical committee (TC) chairman. In addition to Dave Hantulla (TC-1), Don Heirman (TC-2), Will Lauber (TC-3), and Len Berry (TC-6) reported in the last Newsletter, George Kunkel remains as chairman of TC-4, Ed Vance chairs TC-5 and Henning Harmuth chairs TC-7. TC-4 deals with EMI Control, TC-5 with EMP, and TC-7 with Sequency Union. In education, Hank Ott had available 100 copies of the EMCS Lab Notebook. The notebook describes practical experiments on EMC and is intended for use in colleges to introduce the subject of EMC to undergraduates. For copies, call Hank on (201) 386-6660.

6. Fred Nichols presented his report on Member Services. Jim Toler's work in membership development is paying off. The % growth of our Society is third highest among the 31 Societies of the Institute. 84 new EMCS members were added as a result of the membership drive at our symposium last year in Washington, DC. In the area of awards, Jim notes that the 8 IEEE Centennial Medal recipients for the EMCS Society were honored at the symposium luncheon in San Antonio. Those honored were:

Gene Cory
Don Heirman
Jim Hill
Warren Kesselman
Fred Nichols
Dick Schulz
Ralph Showers
Leonard Thomas, Sr.

The other Society major awards will be given at the Tokyo symposium. (We inadvertently indicated the opposite in the Spring Newsletter.) There is a concerted push to increase the number of IEEE awards granted to our Society. In the past we have received less than our share primarily because suitable candidates have not been forwarded to the IEEE Search Committee. If you have any deserving candidate, please call Jim on (404) 894-3964. It is not too early to prepare future nominations for 1986 awards.

7. Len Carlson presented the report for professional services. He noted that Lou Libelo was looking into the problem of last minute withdrawal of papers which were deemed classified after initial release. Bob Brook reported on the first conference and last administrative committee meeting of the Society on Social Implications of Technology. He announced that he was elected to a 3-year term on the SSIT AdCom. The other committee under professional services had no reports.

8. President Knowles reviewed his action item list with the Board. Action was still needed to send extra copies of the symposium record from Washington DC (1983) to those student IEEE members requesting them. He also reviewed the BoD attendance rules and indicated that the secretary will

keep track of absences as part of the secretary's report at all BoD meetings. In addition, all Society chairpersons were asked to submit budget requests for 1985. Finally, there may be a November 30 BoD meeting for those who could not make the 15 October meeting in Tokyo.

9. The meeting adjourned at 5:30 pm. The next meeting will be on Monday, 15 October 1984, at the Hotel Pacifica, site of the 1984 International EMC Symposium in Tokyo. For more details, contact Don Clark on (404) 894-3535.

Respectfully submitted,

Don Heirman
Associate Editor
BoD Activities

EMC SOCIETY TWENTY-FIFTH ANNIVERSARY MEDALLION PRESENTED AT IEEE CENTENNIAL CELEBRATION

This presentation of the EMC Society 25th Anniversary Medallion to IEEE President Richard J. Gowen was not on the official program. Jim Hill, EMC Society Board of Directors member, was attending the IEEE Centennial Convocation in Boston on May 14th. Eighty-three of the Learned Societies of the world were there to salute the IEEE on its hundredth anniversary and present gifts. The British IEEE presented an oil painting of Michael Faraday, the Chinese Institute of Electronics presented a large painted vase. Other gifts included a holographic picture and a parchment scroll. President Gowen agreed that it would be appropriate to receive the EMC medallion as part of the IEEE Centennial memorabilia. President Gowen is shown on the left in the picture as he received the EMC Medallion from Jim Hill.



TRAVEL PLANS FOR THE EMC'84 TOKYO SYMPOSIUM

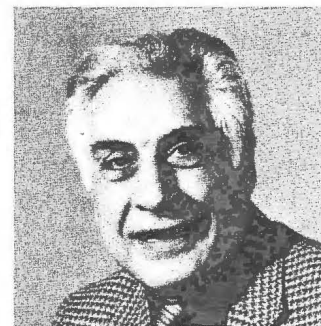
1984 is the first year in which the International EMC Symposium will be held outside of the United States. The 1984 EMC Symposium is scheduled for October 16-17-18 in Tokyo, Japan. Those from the United States who are interested in attending will be pleased to know that arrangements have been made with United Airlines for a very favorable round trip fare to Tokyo from major west coast cities. Those coming from the east coast and inland cities are offered substantial discounts on the add-on fare to a west coast United Airlines terminal. Typically, this would be Seattle. While the EMC'84 Tokyo is only a few months away, these special airline tickets

must be purchased no later than 45 days before departure. These travel arrangements are not limited to group travel so there is flexibility in travel arrangements to allow for plans to go over early and/or stay over after the symposium or to make a quick trip for the symposium only. A number of optional excursions have been set up to interesting points in Japan and nearby Asian locations and even individual travel plans can be accommodated. For more information 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 _____ Number in Party _____
Address _____ Tel. () _____
_____ Zip _____

POINT AND COUNTERPOINT



by Anthony G. Zimbalatti

MIL-STD-461B EQUIPMENT SUSCEPTIBILITY TESTING

In response to my column in EMC-S Newsletter No. 121, Bob Keith wrote, "as now written, the susceptibility test requirement in 461B for test samples is very difficult to cost and would increase test time." This would be the case for test samples that exhibited "no susceptibility" at the 461B limits since testing would be continued until the onset of susceptibility or until the maximum outputs of the test equipments were reached. Regarding test sample damage, Bob wrote that one should know the damage levels prior to testing and should specify these levels in the control and/or test plans if there is a possibility of equipment damage. He offered a way out by suggesting that "test time" be costed under the old method of susceptibility testing, and by clarifying the exact procedure for testing beyond 461B limits in the test plan that must be approved by the customer. I guess he means that based on the test plan, the customer would negotiate the additional test time and test sample damage corrections. Bob stops short of recommending a "beyond the specification limit" test, but he does recommend a safety margin in dB above the specifica-

tion susceptibility test limit. Finally, he says the purpose of the "461B beyond the limit" susceptibility test is obvious because "the services (customer) would like to know the susceptibility level of each piece of equipment."

Well, its not obvious to me that, as written in 461B the customer will know the susceptibility levels of test samples for samples that "pass" the 461B limit unless negotiations take place for every test. If the susceptibility levels beyond the specification limits are to be measured, the services (customer) should make these measurements an explicit requirement of 461B. On the other hand, if safety margins are to be measured, then safety margins should be an explicit requirement. A word of caution, however, both of these explicit requirements could generate the need for test equipments of unusually high capacity unless a maximum susceptibility level or safety margin were to be delineated in 461B.

Let's hear more on this subject. We are listening.

ELECTROMAGNETIC COMPATIBILITY VERSUS ELECTROMAGNETIC ENVIRONMENTAL EFFECTS (E³)

Regarding my first and second columns (EMC-S Newsletters No. 118, Summer 1983 and No. 121, Spring 1984) for opinions on the name change to E³ from EMC, the latest tally is 8 for and 10 against. Bo Wahlgren wrote that SAAB-SCANIA, Linkoping, Sweden has already adopted E³ as the corporate group and he sent me his business card. Three persons wrote that they were against the name change. Essentially, these antis — Robert Keith, St. Petersburg, Florida;

M. W. Shores, Pomona, California; Mr. John Schmelzer, Albuquerque, New Mexico — said that EMC adequately describes our activities.

I would like to bring the proposed name change discussion to an end by the next issue of the newsletter so that a "final point" can be made. So, let's hear more from the pros and cons.

SHORT PAPERS, ARTICLES, AND APPLICATION NOTES



by Edwin L. Bronaugh

This is a new feature of your Newsletter which was approved by the EMCS Board of Directors at its last meeting, April 23, 1984, in San Antonio, Texas. The purpose of this feature is to provide speedy publication of timely technical information that has little, if any, archival value. Papers and articles of significant archival value belong in the EMC Transactions and should not be submitted here. What is wanted in this feature are short papers, articles, and application notes containing technical information which will be valuable to engineers, scientists, technicians, and managers involved in EMC, and which is timely or even perishable. Essays which deal with controversial topics, but contain only little technical discussion of the issue, should be published in the Newsletter feature entitled, "Point and Counterpoint," edited by Anthony G. Zimbalatti.

Examples of Subjects for this New Feature

Explanations of practical methods and techniques that people working with EMC can apply to their everyday work; clear, practical explanations of mathematically or physically compounded EMC-related theory, so that people without advanced degrees and/or extensive experience can understand the basis of our everyday EMC work; and narratives of practical experiences you have had which will help your fellow EMC people avoid or surmount the obstacles you encountered.

Example: A new and/or simple way you have found to design P.C. boards to make them insensitive to electrostatic discharge (ESD) phenomena.

Example: Techniques or methods you have found to make commonly available instruments perform new tasks (please report both the advantages and the pitfalls of your method).

Example: Nomographs, charts, or calculator/computer programs you have found helpful in your area of EMC work.

Example: Mistakes you, your associates, or clients/customers have made in applying instruments or standardization documents to EMC activities.

These are only a few examples of the wide range of topics.

Ground Rules

The following rules are the basis for effective operation of this Newsletter feature. These are not meant to be intimidating; rather they are intended to assure fair treatment for all submitted items. If it is found that they are unworkable in any way, these ground rules will be revised and published.

1. Submit short papers, articles, and application notes as early in each Newsletter quarter as possible. Anything I receive after the last working day in February, May, August, or November will definitely be delayed until

the next succeeding quarterly Newsletter.

2. Submit materials in clean, double-spaced, clearly legible form (preferably-typed).
3. Limit the length to four Newsletter pages (approximately 3600 words) or less; one-pagers (900 words) are highly desirable. Items slightly longer than four pages will not be automatically rejected, but available space may cause editing to be required.
4. Start the paper/article/note with a clear, understandable title, followed by the name(s) of the author(s), and then a brief abstract (goal 100 words or less for the abstract).
5. Apply the English language carefully and as correctly as possible. Correct spelling, grammar, logical organization and clarity of thought in your presentation will go a long way toward securing understanding by the reader. If you find it necessary to use sophisticated mathematics, keep in mind that many of your readers will not have advanced degrees and may not be able to understand what your equations are intended to tell them. Help your readers by providing clear English discussions in simple terms to explain the meaning and impact of the equations.
6. Each item submitted will be reviewed by the associate editor for technical correctness and adequacy, and by other experts if and as needed, selected from among the members of the several EMCS Technical Committees. We intend to keep the review process as brief and as streamlined as possible, but this may affect the publication schedule.
7. Items may be edited for length. If an item is too long, it may require heavy editing which may in turn affect its publication schedule. As many items will be published as the space available will allow. Space allowances are decided by the Newsletter editor-in-chief. Any editing found necessary by the editors will normally be discussed with the author to assure that no meaning is changed.

Items should be sent to Ed Bronaugh, Electro-Metrics, 100 Church Street, Amsterdam, NY 12010.

BOOK REVIEWS



by Jim Hill, The EMXX Corporation

In this issue we are going to review the new book, "Engineers and Electrons" by Ryder and Fink, published by the IEEE Press as a part of the Centennial Year Celebration program. We had the distinct pleasure of attending the 100th birthday celebration at the Westin Hotel in Boston on May 13th. The main event was the presentation of awards and the recognition of newly elected Fellows and Honorary Members. All of the major annual medal awardees were present to receive their awards and many of the Field and Service Award recipients were also present. It was an impressive ceremony followed by a reception for which the IEEE had brought together many of the living past presidents and officers of the AIEE, IRE, and IEEE. In addition IEEE staff retirees such as Dr. Emberson were in attendance.

On the following day, Monday, May 14th, there was a luncheon at which some 83 "Learned Societies" representatives from all over the world presented gifts to the IEEE in acknowledgement of the 100th anniversary. In a reciprocal gesture, IEEE President Gowen presented the IEEE Centennial Medal to each "Learned Society" representative. The program wound up with the premiere showing of the IEEE Centennial Motion Picture "The Miracle Force". We understand that this film will be available for showing to technical as well as non-technical audiences.

The highlight of this two-day affair was the IEEE Centennial Convocation on the evening of May 14th. Dr. Robert Lucky acted as Master of Ceremonies. A special presentation of the IEEE Centennial Medal was made to Dr. William Everett, 1945 IRE past president, and retired head of the department of electrical engineering at the University of Illinois. David Packard was the featured speaker, giving a review of past accomplishments of the profession and his view into the future. The unusual feature of the program was a theatrical production "Generations Of Giants," in which the parts of such notables as Benjamin Franklin, Faraday, Edison, Bell, Steinmetz, Tesla, and Von Neuman were acted out by a group of professionals. The scenario brought together non-contemporary giants of the profession to exchange comments that might have occurred if they had been contemporaneous; a "what might have been" drama.

The whole two-day program was put together with a high degree of professionalism. With our own membership going back 50 years in AIEE, IRE and now the IEEE we had a feeling of being a significant part of the 100 year history of our professional society. While we were attending the affair we picked up a copy of "Engineers and Electrons" and were impressed to the extent that we will review it for you herewith.

ENGINEERS AND ELECTRONS

by

John D. Ryder and Donald G. Fink

Published by the IEEE Press

The IEEE Service Center

445 Hoes Lane, Piscataway, NJ 08854

Hardbound, 272 pages, Copyright 1984

Price: IEEE Members, \$17.95; List \$29.95

This book is one of the products of the annual IEEE History Fellowship which was established to support a student working on a dissertation in the history of electrical science and technology. Financial support of this program came from the IEEE Life Member Fund. Earlier, the fellowship program had fostered the IEEE Press book, "Turning Points in American Electrical History", by Dr. James Brittain of the Georgia Institute of Technology, and the September 1976 Bicentennial issue of the Proceedings of the IEEE entitled "Two Centuries in Retrospect". All of this is prelude to the IEEE Centennial Celebration wherein it was suggested that a popularly oriented and illustrated history of electrical engineering and of the IEEE could be a useful contribution to the Centennial celebration. Early in 1982 the author team was chosen and work was started on this book. Again the IEEE Life Member Fund gave financial support using funds that had been set aside for the Centennial projects.

The setting of the book is engineering and scientific world over the years, with emphasis on the United States. The time span is two centuries, although attention is focused on the past hundred years. The story is particularly rich in characters with Faraday, Edison, Steinmetz, Tesla, Marconi, Babbage, Armstrong, plus many others from the past and present. The plot is concerned with electrical engineering in all its aspects, including power, communications, entertainment, electronics, and computers.

The chapter titles give an idea of the development of the plot:

In the Beginning
Discovery and Invention
From Electricians to Engineers
Maxwell's Prophecy Fulfilled
The Electron Sings a Golden Tune
The Electron Shows Its Muscle
Electrons and Holes: Much from Little
Electrons in War and Peace
All the World Becomes a Stage
Computers and the Information Revolution
Young Engineers and Their Elders
AIEE + IRE = IEEE

While this isn't a book with a "hold-your-breath" plot, it is hard to put down once you have started to look at it. The authors have selected a format and style well suited to the subject. Most of the subjects of each chapter are covered in one page, some a bit less, and some going to two pages. Most of the subjects have at least one photo-illustration of a person or piece of equipment associated with the subject. For the reader it is easy to pick up, read capsule stories on selected subjects and put down for another time.

For the IEEE member the final chapter is of particular interest. It gives the background leading up to the merger of the AIEE and the IRE. There are details of the negotiating between the AIEE and the IRE committees that have not been generally known.

While the book has a complete index it is also notable for the chapter by chapter bibliography of articles and books for further reading. In addition the Centennial Task Force has arranged for the publication in early 1984 of a more comprehensive social history of electrical engineering written by a professional historian, Dr. Michal McMahon. The book will be entitled, "The Making of a Profession: A Century of Electrical Engineering in America".

CHAPTER CHATTER

Central New England

The Chapter's March 14th meeting was held at the MIT Bitter National Magnet Lab, with Dr. A. G. Doukas (CCNY) speaking on "Picosecond and Femtosecond Lasers and Techniques of Time-resolved Spectroscopy."

The following were elected as Chapter officers for the 1984/85 season:

Chairman — Len Long
Vice Chairman — Art Murphy
Program Chairman — Bob Berkovits
Secretary/Treasurer — John Clarke

Of the above, all but Bob Berkovits are the incumbents. Elections were held at the April 11th meeting, which took place at the Chomerics-Woburn facility. The speaker was K. Childers, whose topic was "Designing Electronic Enclosures to Meet HEMP Survivability Requirements." About 50 members and guests were in attendance, the largest number in quite a few years!

At the May 9th meeting, Vin Kajunski, Engineer-in-Charge, Boston FCC Office, discussed FCC Docket 20780 in relation to computer EMI. There were 17 attendees. In late May, the '84/'85 officers met to discuss the September '84 through May '85 program. Chet Smith was also present to give the '85 Symposium status.

Thanks to John Clarke for the above — John is now at MITRE.

Central Texas

The Chapter met on 22 March. Dinner at Captain Boomers in Austin was followed by a site visit — to the TI EMI Test Facility in Austin. Charles Hinkle, of TI, and his staff hosted the visit. A brief business meeting followed the Dinner, dealing mainly with some of the final planning for the Symposium in San Antonio.

The above is from the Section newsletter, *The Analog*, which is edited by Bob Hunter, of Tandem Computers.

Chicago

On February 21st, AT&T's Naperville Labs and Bob Hofmann played host to the area's EMC-S Chapter. Dr. Leonard Farber spoke on high-altitude nuclear EMP.

Littleton

The quarterly meeting of the Chapter was held on 17 January. A discussion on alternate meeting locations was held. They are planning to have one per year in Boulder and, possibly, one in Colorado Springs. It was also suggested that a joint meeting with the Power Society be considered. Officers for 1984 were elected as follows:

Chairman — Bob Loveland
Vice Chairman — Melvin Anderson
Secretary/Treasurer — David Lubar



by Charles F.W. Anderson

At the same meeting, Jim Andrews of Picosecond Pulse Labs presented some interesting information on impulse generators and their applications.

On April 17th, the Chapter met at the Martin Marietta Westpoint Office Building. A tentative meeting schedule for September and November '84, and January '85, was discussed. EMC-S BOD nominating petitions were circulated. Three presentations were made:

- (1) "Semi-automated TEMPEST/EMC Testing," by Robert Docky (TRW-Colorado Springs)
- (2) "Comparison of Shielding Effectiveness and Transfer Impedance of Cabling," by Roger Reed (Martin Marietta)
- (3) "War Stories of an EMC consultant," authored by Steve Jensen and presented by Michael Lassise (Martin Marietta).

Thanks to Dave Lubar for the input.

Los Angeles

February 23rd, the Chapter meeting was addressed by Fred Nichols, founder and President of LectroMagnetics. He first showed a short Navy film on basics and construction of RF shielded enclosures and anechoic chambers. He followed the film with some financial and technical recommendations for selection and use of such enclosures as related to FCC and DOD requirements. Discussions on the LA Region '85 were also held.

The March 15th meeting featured Bernie Cooperstein (Xerox - El Segundo). His topic was "Basic Theory for a Better Understanding of EMI". He covered such items as how EMI gets on a wire and radiates, how ground planes influence radiation, and common- and differential-mode effects.

Jim Spagon of TRW, was the April 19th meetings speaker. He discussed "Planning and Implementing Organizational Growth," based on the TRW E³/EMC organization's changes during recent years and its plans to meet parent organization needs. Jim presented a process model which enables a manager to optimize his human resources to achieve organizational goals. The model has wide applicability.

On May 17th, the meeting topic was Anti-submarine Warfare (ASW) Patrol Aircraft EMC, presented by Frank Frakos of Lockheed California Co. His presentation included information on the P-3 Orion, the S-3 Viking and the CP-140 Aurora as related to EMC. He also presented an overview of the Lockheed Military Engineering Control Program, and related some unique ASW-EMC experiences. Frank is the E³ Task Leader for the P-3 Avionics Department.

New Jersey Coast (Joint EMC/VT chapter)

The Chapter's Annual Christmas Party took place on 20 December, and 16 members plus 9 guests were present. A slide show, "The Benefits of IEEE Membership," was presented, after which three non-members opted for IEEE/EMC-S affiliation (Must be a pretty good show!). Door prizes were won by Ed Bullwinkel (who entered the drawing only after considerable salesmanship by Chet Friedman!). The prize was an HP15C Scientific Calculator; second prize, a bottle of Chivas Regal, went to Eugene Chu.

The Chapter's February 21st meeting featured a presentation, by John Greely, Section Head of AEL's Communications Group, on American Electronics Labs' TEMPEST receivers. The AEL Automated TEMPEST Test Receiver/Portable TEMPEST Testing Receiver, and its control and calibration equipment were available for hands-on demonstration.

On March 8th, Eaton corporation held one of their EMC testing seminars. The Eaton presentation team consisted of D. Black, B. Lawrence and Dr. D. Shipman. Allan Freeland was the seminar organizer. Total attendance was 50, of which 30 were IEEE members.

For the April 17th meeting, Robert Kepner of Watkins-Johnson, gave a presentation on the WJ-8940B TEMPEST Receiving System and the new field-portable TEMPEST receiver. There were 10 attendees.

The May 15th meeting topic was "Modeling UHF Mobile Radio Channels from Multi-path Propagation Measurements." Dr. Donald Cox, Bell Communications Research, was the speaker. His presentation was based on delay, delay-spread and path-loss measurements made in New York City, and included discussions of the effects of such parameters on mobile radio system performance.

Orange County

On March 6th, Don Clark, who is doing consultant work at Transients Limited Corporation, presented a talk on "EMP Protection for Small Communications Systems."

The April meeting was addressed by Warren Lewis (VP of Technology, Computer Power Systems Corp., Carson, CA). His topic was "Grounding Principles for Computer Rooms." He discussed choice of proper EDP system power sources, including UPS; isolation devices; and interfacing requirements of isolated power sources with EDP systems.

For the May meeting, Dr. Dave Shipman (Eaton AILTECH) was the speaker, on the topic of susceptibility.

Philadelphia

The March 27th meeting was addressed by Jerry Johnson of the Office of the Chief of Naval Operations, who was substituting for Dr. Bob Haislmaier. A last-minute commitment prevented Bob from making the trip. Jerry Johnson's presentation described the Navy's training program which is designed to give ship community personnel adequate background on effects of EMI, how to recognize and deal with it, and EMI reporting methods. These training programs are designed on an all-ranks philosophy. A number of questions were stimulated by the talk.

On May 1st, the Chapter held a meeting on the subject "Connector Design for Control of Electromagnetic Interference." David Strange (Product Marketing Manager for AMP Special Industries) was the speaker. Among items discussed were shielded and filtered circular-shell connectors, low-profile D-type connectors, zero-insertion-force connectors and "Amplatch" connectors. Dave Strange's presentation stimulated considerable questions, especially in the area of Naval aircraft applications. The Chapter's next meeting will be held in the September/October time frame. Thanks to Mike Daniele for the above inputs.

San Diego

From all accounts, the January 18th Regional Conference and Exhibition was quite a success. Principle emphasis was on the impact of RFI regulations and EMC/EMP specifications on electrical and electronic equipment.

On April 18th, the Chapter met at the Naval Ocean Systems Center. Jim Schukantz discussed the NOSC Time-domain Range (Scale-model EMP Range). This is the facility developed to evaluate HF antenna-coupled EMP, using scale models of Navy ships developed for antenna design purposes. The facility is also a useful RF systems design tool. Following Jim's presentation, a tour of the facility with an operational demonstration was featured.

Tokyo

The monthly research meetings of our Far Eastern Chapter continue to feature outstanding menus of technical papers. This bodes well for the quality of the International Symposium technical sessions! Some typical paper titles/authors over the past few months: "Oblique-incidence Characteristics of Two-layer-type Electromagnetic Wave Absorber" by Messrs. Hatakeyama & Inui of NEC Corp.; "Experimental Study of Frequency Spectra of Arc Current Due to Electrical Contacts on Opening" by Messrs. Minegishi & Ohmori of Tohoku Gakuin University; "Change of Electric Field Intensity at Ground and Surge Voltage Induced on Distribution Power-line in the Experiment of Triggered Lightning with Rocket" by Mr. Norii of Nagoya University.

Thanks to Dr. Sato and Professor Nagasawa for providing the above information.

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NEW INTERFERENCE BULLETIN

A new microwave interference criteria bulletin titled "EIA Telecommunications Systems Bulletin 10-D: Interference Criteria for Microwave Systems in the Private Radio Services," is now available through the Engineering Department of the Electronic Industries Association. The document, designated TSB 10-D, replaces the IEB 10-C which had been in effect since 1976. TSB 10-D addresses digital and video

criteria, updated methods of calculation for analog message interference criteria, and newly recommended C/I ratios. The new version is recommended to licensees removed from the 12.2 to 12.7 GHz band due to FCC Docket 82-334. Copies are available for \$17.00 from the Electronic Industries Association, 2001 Eye St., NW, Washington, DC 20006.

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1984 - Tokyo, October 16-18
 1985 - Boston, MA, August 20-22
 1986 - San Diego, CA, September 16-18
 1987 - Atlanta, GA, September 24-28
 1988 - Seattle, WA, Fall
 1989 - Boulder, CO, Fall

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(cont'd. on page 16)

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EMCABS

In this issue, we are publishing 60 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.



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Improvement of Attenuation Characteristics in Tunnels (II)
(1) Yoshio Yamaguchi, Takeo Abe, (2) Toshio Sekiguchi
(1) Faculty of Engineering, Niigata University (2) Tokyo Institute of Technology

Rpt. of Technical Group on EMC, IECE and IEE of Japan
Vol. 83, No. 150, EMCJ 83-48, pp. 7-14

ABSTRACT: To reduce the attenuation characteristics of radio waves in tunnels, coal mines, etc, for the effective communications, the following methods are examined experimentally using lossy dielectric wave guides at 3-12 GHz. 1. Setting conductive strips periodically in (a) axial direction (ring), (b) circumferential direction (strip), and (c) both axial and circumferential direction at the wall of waveguides. 2. Setting metallic mesh over the guide wall. It is shown that method 2 is the most effective.

INDEX TERMS: attenuation, improvement, tunnel

Lightning Surge Noise Voltage Characteristics Induced in Overhead Telecommunication Lines

Hiroshi Yamane, Mitsuo Harori, Fumio Ohtsuki, Tamio Motomitsu, Hiroaki Koga

Ibaraki Electrical Communication Laboratory, N.T.T.
Report of Technical Group on EMC, IECE and IEE of Japan
Vol. 83, No. 150, EMCJ 83-50, pp. 23-29

ABSTRACT: Lightning surges may result in major electrical induction noise interferences in subscriber lines for digital transmission systems. This paper clarifies the characteristics of lightning surge transverse voltages induced in overhead transmission lines, and estimated interruption time exceeding certain voltages for lightning surge transverse voltages. Interruption time rates at which digital signals may be interrupted by arrester operations, due to lightning surge longitudinal overvoltages, are also estimated.

INDEX TERMS: lightning surge, induction, noise, interferences, subscriber lines digital transmission systems

Propagation Characteristics of Electromagnetic Waves in Snow Pack
Takeo Abe, Masakazu Sengoku, Yoshio Yamaguchi, Saburo Nakamata, Kiyomichi Aoyama, Kaoru Izumi
Niigata University
Kazushige Iyoda
Kazushige Iyoda, Dainippon Printing Co., Ltd.; Kouichi Shibata, Hitachi Co., Ltd.

ABSTRACT: This report presents the experimental propagation characteristics of microwaves through the snowpack in the frequency range from 1 to 12 GHz. Waves at 1-7 GHz were little attenuated in the new snow and the settled snow with water contents less than 1% at 0--1°C. Waves over 2.5 GHz were much attenuated in the granular snow with water contents 5-10%. From the results, microwaves at 1-2.5 GHz are suited to the detection of buried bodies in the snowpack.

INDEX TERMS: attenuation, microwave, snowpack, water contents

Coupling of the Crossover Transmission Lines

Yoshio Kami (Jr. Tech. College of Electrocommunications) Risaburo Sato
(Faculty of Engineering, Tohoku University)

Report of Technical Group on EMC, IECE and IEE of Japan
Vol. 83, No. 150, EMCJ 83-51, pp. 31-38

ABSTRACT: A coupling problem of arbitrarily crossing transmission lines is mentioned. For crossover transmission lines, the line equations are derived by an application of the line equations for externally excited transmission lines. For parallel lines those are compared with the equations for the coupling lines to check errors. From the results of numerical computations for some models, characteristics of induced powers in the termination loads are studied in comparison with properties of directional coupler.

INDEX TERMS: coupling, crossover transmission lines, line equations, coupling line

Suppression Method Against False Echoes due to Large Bridge — Large Bridge with Sea Reflection and Estimation of Suppression Method
Yoshizo Hagino (Japan Radio Co., LTD.) Yutaka Nakajima (Ooshima Merchant Ship College)

Report of Technical Group on EMC, IECE and IEE Japan
Vol. 83, No. 150, EMCJ 83-49, pp. 15-22

ABSTRACT: Radar false echoes due to large bridges and the suppression method against false echoes were reported in several papers. The construction method using the expanded aluminum reflector nets, reflect the radar waves to the direction where no secondary reflecting targets exist. The reflector system was designed using Fourier analysis. This paper reports on the echoing character of large bridges with sea reflections, the estimation of construction works by bistatic radar measurement and the result of the suppressed false echoes.

INDEX TERMS: radar false echoes, large bridges, suppression method

Radio Frequency Induced Voltages and Pair Unbalances for Telecommunication Lines

Mitsuo Harori, Fumio Ohtsuki, Tamio Motomitsu, Hiroaki Koga
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Report of Technical Group on EMC, IECE and IEE of Japan
Vol. 83, No. 150, EMCJ 83-52, pp. 39-46

ABSTRACT: In order to evaluate digital transmission quality on subscriber lines, it is necessary to obtain voltage characteristics from radio broadcast waves which is one of the major induction interferences. Through measurement, it was clarified that induced voltages at subscriber ends are larger than those at exchange office ends. The relation between the ratio of induced longitudinal to transverse voltages and pair unbalances was also made clear. As a result, a practical evaluating equation for radio frequency transverse voltages induced in subscriber lines was obtained.

INDEX TERMS: induction, subscriber lines

TECHNOLOGY-ALERTING INDEX



by Richard B. Schulz

- 84-9
A3b/d Analysis of a TEM Cell With Septum on a Dielectric Slab: B. N. Das, S. Anandamohan; Department of Electronics and Electrical Communication Engineering, Indian Institute of Technology, Kharagpur-721302, INDIA. (221-224)
- 84-10
B18d/g, H7k, G4e Main Effects of Mutual Interference in Radio Communication Systems Using Broadband Transmitters: J. Gavan; Center for Technological Education Holon, 52 Golomb Street, P. O. Box 305, Holon 58 368, ISRAEL. (03) 85 11 81-4
- 84-12
K4c/d/e Demonstration of a Time-Domain Integrated Electromagnetic Field-Circuit Analysis Program: W. R. Zimmerman; Electromagnetic Applications, Inc., P. O. Box 8482, Albuquerque, NM 87198. (505) 265-3538
- 84-13
12d, I11d Image Theory for Dipole Excitation of Fields Above and Below a Wire Grid With Square Cells: I. V. Lindell, V. P. Akimov, E. Alanen; Department of Electrical Engineering, Helsinki University of Technology, Otakaari 5A, Espoo, 012150 FINLAND. (90/+358 460144)
- 84-14
13d, 17d, I11d, J3j A Numerical Method for Near-Field Array Synthesis: D. A. Hill; Electromagnetic Fields Division, National Bureau of Standards, 325 Broadway, Boulder, Colorado 80303. (303) 497-3472
- 84-15
A3b/d TEM Cell in Absence of One of the Walls Parallel to the Septum: B. N. Das, S. A. Mohan; (see 84-9)
- 84-16
H29k, P3k, P7d Vectorcardiographic Data Compression via Walsh and Cosine Functions: S. A. Dyer, N. Ahmed, D. R. Hummels; (for Dyer) Department of Electrical and Computer Engineering, Kansas State University, Durland Hall, Manhattan, Kansas 66506. (913) 532-5600
- 84-17
D2d, A3k Capacitance Between Perpendicular Conducting Planes Separated by A Gap: B. N. Das, S. Anandamohan, K.V.S.V.R. Prasad; (see 84-9)
- 84-18
H29k, P3k, P7d Classification of Vectorcardiograms Using Walsh and Cosine Orthonormal Transforms: S. A. Dyer, N. Ahmed, D. R. Hummels; (see 84-16)
- 84-19
D6d/e/f, D7d/e/f Electric and Magnetic Field Coupling Through a Braided-Shield Cable; Transfer Admittance and Transfer Impedance: H. A. Roberts, S. B. MacDonald; Commander, Harry Diamond Laboratories, Attn: DELHD-NW-ED, H. Roberts, 2800 Powder Mill Road, Adelphi, Maryland 20783.
- 84-20
MOb/c/f An Experimental Investigation of the Distribution of Current and Charge Induced on a Tubular Conducting Cylinder by an Electromagnetic Pulse: W-Y Pan; Gordon McKay Laboratory, Harvard University, Cambridge, Massachusetts 02138. (617) 495-4464

EMCABS:7-6-84

Electromagnetic Waves Radiated from Microcomputers
Takeo Abe, Masakazu Sengoku, Yoshio Yamaguchi, Ryouichi Ookura,
Junichi Sato, Kazuhiro Watanabe
Faculty of Engineering, Niigata University
Report of Technical Group on EMC, IECE and IEE of Japan
Vol. 83, No. 150, EMCJ 83-53, pp. 47-52

ABSTRACT: In this report, experimental results of electric field intensity radiated from microcomputers are shown in the frequency range from 1 to 200 MHz. 43 microcomputer sets were used in the measurements. Field intensity was detected by small monopole antennas on the main frame, display, bus line and keyboard, etc. From the results, the display was found to radiate the maximum power, and hence it should be considered in absorption power in the human body.

INDEX TERMS: microcomputer, field intensity, absorption

EMCABS:10-6-84

Power Diposition in a Block Model of Man Exposed to the Near Field of a
 $\lambda/2$ Dipole Antenna
Shinji Uebayashi, Yoshifumi Amemiya
Faculty of Engineering, Nagoya University
Report of Technical Group on EMC, IECE and IEE of Japan
Vol. 83, No. 150, EMCJ 83-56, pp. 69-75

ABSTRACT: The values of absorbed power in a realistic model of man in the near field of a portable radio transmitter are calculated numerically using a block model. Effects of body and ground upon the absorbed power in a head are found to be less in the near field of a dipole antenna than in the field of a plane wave. The numerical results suggest that the specific absorption rate in the eye exceeds the provisional safety level for ocular damage on several occasions when a 7W portable transmitter is used.

INDEX TERMS: portable radio transmitter, block model, specific absorption rate

EMCABS:8-6-84

On the Measurement of Power Distribution of Composite City Noise
Hiroshi Echigo, Akira Tanji, Yoji Nagasawa, Tasuku Takagi, Risaburo Sato
Tohoku University, Faculty of Engineering
Report of Technical Group on EMC, IECE and IEE of Japan
Vol. 83, No. 150, EMCJ 83-54, pp. 53-60

ABSTRACT: Authors have been studying the measurement method for the power distribution of composite noise sources. In this paper, a measurement method using two beam antennas, detecting the correlation of the two receiving signals, is described. Simulations showed this method effective.

INDEX TERMS: composite city noise, beam antenna, simulation

EMCABS:11-6-84

The Radiation at a Bend of a Transmission Line
Takashi Nakamura
Gifu University
Report of Technical Group on EMC, IECE and IEE of Japan
Vol. 83, No. 125, EMCJ 83-31, pp. 9-14

ABSTRACT: A theoretical study of the radiation at a bend of a TEM mode transmission line is given. It is assumed that the current along the line is expressed by the traveling wave modes. Treating a discontinuous point of a traveling wave mode current as a radiating source, the radiation field from the bend on the line is obtained by the principle of pattern multiplication. A numerical example is given to illustrate how the radiation properties vary from different degrees of the bend.

INDEX TERMS: bent transmission line, traveling wave modes, radiation

EMCABS:9-6-84

The Performance of the Dipole Array Applicator for Radio Frequency
Hyperthermia
Noriyoshi Terada, Yoshifumi Amemiya
Faculty of Engineering, Nagoya University
Report of Technical Group on EMC, IECE and IEE of Japan
Vol. 83, No. 150, EMCJ 83-55, pp. 61-68

ABSTRACT: Hyperthermia has been studied as a safe and reliable cancer therapy in recent years. Previously we proposed the applicator with cylindrical dipole array to heat a deep-seated tumor. This paper describes temperature elevation of a dynamic phantom heated with the applicator. We designed and constructed a dynamic phantom that simulates blood flow in a tumor by circulating a saline solution. Experimental results are that uniform temperature elevation according to electric field is achieved without circulation.

INDEX TERMS: hyperthermia, electromagnetic radiation, dynamic phantom

EMCABS:12-6-84

An Automatic Measuring System for Electromagnetic Field
Norishige Numata, Keiji Fujiwara, Isao Ootawara
Faculty of Engineering, Iwate University
Report of Technical Group on EMC, IECE and IEE of Japan
Vol. 83, No. 125, EMCJ 83-33, pp. 23-28

ABSTRACT: This paper describes the method for automatic measurement of electromagnetic fields. The system consists of a personal computer which has a display, printer, magnetic disk and measuring instruments. Some experimental data are shown in the paper.

INDEX TERMS: electromagnetic field, computer processing, automatic measurement

EMC PERSONALITY PROFILES



by William G. Duff



L. GILDA HASKINS

The EMC Personality for this issue of the IEEE EMC Newsletter is Ms. L. Gilda Haskins who is one of two managers in the engineering division of SEMCOR, Inc., Warminster, PA. Ms. Haskins is under contract to the Naval Air Development Center; she and her team are responsible for the development and maintenance of the NAVAIR E³ database which contains information on all electrical/electronic equipment installed in naval airborne systems. These data are used to track past performance of systems so that mistakes will be avoided in designing future systems and to ensure that corrective techniques are used as they are developed. The database is also used to solve E³ problems being experienced by the naval forces.

In her previous assignment, Gilda was a senior engineer with Veda, Inc., Arlington, VA where she was active in planning

the implementation of EMC programs in the Navy and evaluating the need for changes to equipment existing in the Fleet.

Earlier in her career, she participated in various missile programs to ensure their non-vulnerability to electromagnetic radiation. She participated in electromagnetic environmental definitions and the testing and evaluation of missile systems.

Born in Norristown, PA, she received her BS degree in Physics from Drexel University in 1971, and her ME in Engineering Science from Pennsylvania State University in 1975. During her career, Gilda has published many reports and presented a paper at the IEEE EMC Symposium. She is very active in the IEEE EMC Society. She was appointed to the IEEE EMC Society Board of Directors and serves as Chairperson for the Philadelphia EMC Chapter.

EMCABS:13-6-84

On a Model of Intra-System EMI
Hiroshi Echigo, Tasuku Takagi
Faculty of Engineering, Tohoku University
Report of Technical Group on EMC, IECE and IEE of Japan
Vol. 83, No. 125, EMCJ 83-34, pp. 29-36

ABSTRACT: In this paper, a consideration on Intra-System EMI is based on an example showing interference between inter and outer fields of coaxial lines.

Equivalent circuits were introduced and some experimental results shown to help understand the EMI mechanism. These results of analyses are helpful in understanding EMI reduction techniques.

INDEX TERMS: shielding, coaxial line, interference

EMCABS:16-6-84

Broadband Phase-Shifter for Eliminating Ghost Interference in TV Reception

Akira Takahashi, Kazuhiko Tamura, Kazunori Sekiuchi

Yagi Antenna Co., LTD

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

Vol. 83, No. 126, EMCJ 83-38, pp. 17-22

ABSTRACT: Newly developed anti-ghost TV receiving antenna device, built with two sets of phased-Yagis and one phase-shifter. Its functional theory and performance are introduced and summarized. Over the FM and VHF TV Ch. No. 1-12 bandwidth, the direction of antenna null-point can be altered continuously, and the ghost interferences of all the channels can be eliminated with one initial setting when the interference waves are arriving from the same direction.

INDEX TERMS: Anti-Ghost TV receiving antenna

EMCABS:14-6-84

Contact-Free Detection of 1/f Fluctuation (II)

Shoichi Iino, Hiroyuki Akita, Sumihisa Hashiguchi

Faculty of Engineering of Yamanashi University

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

Vol. 83, No. 126, EMCJ 83-36, pp. 1-8

ABSTRACT: In measurements of 1/f fluctuation, the accuracy is strongly dependent on the quality of the ohmic contact. It is desirable to reject the influence of the electrodes. We propose a new method to measure 1/f fluctuation without employing ohmic contacts. It is shown that samples with relatively low resistivity and driving current with high frequency are preferred in this method.

INDEX TERMS: 1/f fluctuation, contact-free measurement, eddy current excitation

EMCABS:17-6-84

$\lambda/4$ Type Absorber Consists of a Cloth Which is Woven of Electric

Conductive Yarn and Polyester Synthetic Fibers

Kenichi Ichihara, Ken Ishino

TDK Corporation, Yasutaka Shimizu, Tokyo Institute of Technology

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

Vol. 83, No. 126, EMCJ 83-39, pp. 23-30

ABSTRACT: In this paper we propose a new $\lambda/4$ type absorber consisting of a cloth which is woven of electric conductive yarn and polyester synthetic fibers in chequers. This electric conductive yarn is made of polyacrylonitril synthetic fibers whose surface has an electric conductive layer of Cu_2S 400 \approx 600Å in thickness. We used this cloth as a resistive film of $\lambda/4$ type absorber. This new type absorber has very wide band characteristics and is very light in weight.

INDEX TERMS: $\lambda/4$ absorber

EMCABS:15-6-84

Direction Finding From the Current Distributions on the Circular Loops

Kenji Kubota

Iwate University, Risaburo Sato, Tohoku University

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

Vol. 83, No. 126, EMCJ 83-37, pp. 9-16

ABSTRACT: Direction finding techniques using current distributions on the circular loops are described when these loops are in an incident plane wave field. For cases of a circular loop and a concentric double loop array, numerical results for the real and imaginary parts of the current distributions are presented. These results show that the direction of a distant source may be determined by using the term of $n=1$ in Fourier series expansion solution for about a one wavelength loop and the term of $n=2$ for about a two wavelength loop.

INDEX TERMS: direction finding, current distribution, Fourier series expansion, circular loop

EMCABS:18-6-84

Ferrites with Conductive Membrane for Electro-Magnetic Shielding

Yasuo Hashimoto, Yoshikazu Narumiya, Ken Ishino

TDK Corporation, Yasutaka Shimizu, Tokyo Institute of Technology

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

Vol. 83, No. 126, EMCJ 83-40, pp. 31-38

ABSTRACT: Recently, conductive composite materials have been investigated for the use of electro-magnetic shielding. In this paper, the new shielding material with absorptive property is discussed. We researched the shielding materials, which consist of the magnetic layer and the conductive membrane, which have prevented reflections as well as transmissions. The composite ferrite material of 3mm thickness with the special conductive cloth had good shielding effects: the reflection -8dB, the transmission -35dB.

INDEX TERMS: conductive membrane, electro-magnetic shielding

CENTENNIAL MEDALS

The following are members of the EMC Society who were awarded Centennial Medals. Congratulations to all!

Walter L. Bacon Monterey Pk, CA	B. E. Keiser Vienna, VA	Neal H. Shepherd Lynchburg, VA
S. L. Bailey Silver Spring, MD	J. J. Kelleher Annandale, VA	Carl G. Shook Pittsford, NY
R. Bartnikas Varennes, Que, Canada	L. U. C. Kelling Waynesboro, VA	R. M. Showers Philadelphia, PA
Robert D. Briskman Bethesda, MD	Warren A. Kesselman Eatontown, NJ	D. B. Sinclair Boston, MA
A. A. Collins Dallas, TX	Ronold W. P. King Winchester, MA	Bradley J. Strait Syracuse, NY
William E. Cory San Antonio, TX	William R. Kruesi Fairfield, CT	John J. Tary Boulder, CO
Thomas W. Doeppner Alexandria, VA	George F. McClure Winter Park, FL	Leonard W. Thomas, Sr. Washington, DC
R. S. Duggan, Jr. Atlanta, GA	Fumio Minozuma Tokyo, Japan	J. C. Toler Atlanta, GA
R. M. Emberson Eugene, OR	Raj Mittra Urbana, IL	Ricardo Valle-Sanchez Barcelona, Spain
Kazys B. Garbriunas Bogota, Colombia	James H. Mulligan, Jr. Santa Ana, CA	John Van Savage Edison, NJ
H. D. Gorakhpurwalla Kingsville, TX	J. R. Neubauer Collingswood, NJ	J. R. Wait Tucson, AZ
Roger F. Harrington Syracuse, NY	F. J. Nichols Los Angeles, CA	Bruno O. Weinschel Gaithersburg, MD
Donald N. Heirman Lincroft, NJ	Alvin Reiner Silver Spring, MD	Curtis B. White Rockford, IL
R. E. Henning Clearwater, FL	Harold R. Richman Annandale, VA	T. L. Wilson Louisville, KY
Eric Herz New York, NY	L. Rohde Munich, W. Germany	E. A. Wolff Silver Spring, MD
James Stewart Hill Springfield, VA	O. H. Schmitt Minneapolis, MN	H. L. Wolfman Northbrook, IL
Robert D. Hunter Austin, TX	Richard B. Schulz Dallas, TX	R. J. Yee Honolulu, HI
J. W. Joyner Metairie, LA	Gustave Shapiro Silver Spring, MD	

EMCABS:19-6-84

EMCABS:22-6-84

The Shielding Effect of Wave Absorber on Leakage from Gaps
Y. Shimizu, Y. Hashimoto, K. Ishino, A. Nishikata
Tokyo Institute of Tech., TDK Corporation.
Report of Technical Group on EMC, IECE and IEE of Japan
Vol. 83, No. 126, EMCJ 83-41, pp. 39-46

ABSTRACT: The microwave leakage from microwave ovens is a serious problem for human health. The microwave leaks are mainly through gaps of the door. Therefore, some kind of preventive method should be applied to them, and a wave absorbing sheet, such as rubber ferrite is one of the best methods to overcome the leakage. This paper presents the effects of different absorbing sheets which are inserted in the gap of the door. A theoretical analysis is provided and it is found that theoretical results are in good agreement with experimental results for several kinds of absorbing sheets.

INDEX TERMS: leakage, microwave ovens

Theoretical and Experimental Investigations of Site Attenuation of Vertically Polarized Waves Radiated at a Distance of 3 Meters
Tatsuichi Kawana (Radio Research Laboratories, M.P.T.)
Susumu Horiguchi (Education Ctr. for Info. Processing Tohoku University)
Report of Technical Group on EMC, IECE and IEE of Japan
Vol. 83, No. 126, EMCJ 83-44, pp. 63-68

ABSTRACT: Theoretical investigations of the site attenuation were made by the Moment Method and compared with experimental values when two vertical half-wave dipole antennas were located at a distance of 3 meters. Both antennas were set at the height of 3 meters (26 - 50 MHz) and 2 meters (52 - 1000 MHz) on two kinds of test sites. One is a ground plane. The other is a counterpoise on which a copper net was placed. A good correlation was obtained between the theoretical values and experimental values which were within 2 dB.

INDEX TERMS: site attenuation, antenna impedance, moment method

EMCABS:20-6-84

EMCABS:23-6-84

Measuring System for Scattering Waves Using In-Phase Synthetic Method
Nozomu Hasebe, Hiroaki Kobayashi
Nihon University

Report of Technical Group on EMC, IECE and IEE of Japan
Vol. 83, No. 126, EMCJ 83-42, pp. 47-54

ABSTRACT: The method for the measurement of reflection characteristics of materials is based on the focused synthetic aperture radar technique. The system is constructed of a two element endfire array antenna, the vector-voltmeter, the moving instrument of materials and the microcomputer. In order to establish reproducibility of data, the moving instrument was improved. It is possible to calculate reflection characteristics of materials in real time.

INDEX TERMS: measurement, reflection, materials

Rocket-Triggered Lightning Investigation: 1981 Progress Report
Charles W. Schubert, Jr. and Richard D. Richmond
Air Force Wright Aeronautical Labs., Wright-Patterson AFB, OH.
AD-A131 409/5 PCA05/MF A01

Final rept. Oct 80-Sep 81, May 83; 83p Rept no. AFWAL-TR-83-3031

ABSTRACT: The 1981 progress of the Rocket Triggered Lightning Investigation program is reported. In it, a Lightning Strike Object (LSO) was designed, fabricated, and instrumented. A Lightning Strike Scaffold capable of elevating the LSO above the ground plane was constructed atop South Baldy Mountain, near Socorro, New Mexico. During the summer thunderstorm season, the LSO was hoisted into the Strike Scaffold and was subjected to over forty nearby and attached triggered lightning strikes. The recorders available for the 1981 program were insufficiently responsive to provide high quality data on lightning interaction characteristics; however, all sensors and data links were proved to be operable. The primary finding was that lightning-object interaction data can be reliably and repeatedly acquired through the directing of triggered lightning to an instrumented target object. The report includes a detailed description of the system developed for the program, a discussion of system limitations, and results of the effort as of September 1981.

INDEX TERMS: rocket triggered lightning, lightning-object interaction

EMCABS:21-6-84

EMCABS:24-6-84

A Practical Measurement Method of Scattering Characteristics of the Pyramidal Absorber (The Case of $|\Gamma_{11}| = |\Gamma_{22}|$)
Mitsuhiro Ono, Toru Shibuya, Hitoshi Susaki
Yamagata University

Report of Technical Group on EMC, IECE and IEE of Japan
Vol. 83, No. 126, EMCJ 83-43, pp. 55-62

ABSTRACT: The standing wave technique of oblique incidence is studied as the measurement method of scattering characteristics of the pyramidal absorber. The case that absolute values of two scattering coefficients are considered identical. Using this method, two scattering coefficients and two scattering angles can be easily measured at the wide range of frequency and angles of incidence. Special measuring apparatus or complicated operation is not required.

INDEX TERMS: Pyramidal absorber, scattering characteristics, scattering

Biological Effects of Radiofrequency Radiation: Review Draft. Parts 1, 2, and 3

Daniel F. Cahill and Joe A. Elder
Health Effects Research Lab., Research Triangle Park, N.C.
PB83-262550 PC A99/MF A01
June 83, 611p EPA-600/8-83-026A

ABSTRACT: The document presents a critical and comprehensive review of the available literature on the biological effects of radiofrequency (RF) radiation through 1980. The objective is to determine whether the existing data base can contribute to the formulation of RF-radiation exposure guidance for the general public.

INDEX TERMS: biological effects, radiofrequency (RF) radiation

FUTURE EMC-S INTERNATIONAL SYMPOSIA SCHEDULE

- 1984 — October 16-18
Tokyo, Japan
Hotel Pacific/Tokyo
Prof. Risaburo Sato, Chairman
Tohoku University
Aramaki Aza Aboa
Sendai, Japan 980
- 1985 — March 5-7
Zurich, Switzerland
Dr. T. Dvorak
(411) 256-2790
Telex 53 178 ethbi ch
- 1985 — August 20-22
Boston, MA
Colonial Hilton,
Wakefield, MA
Chester L. Smith, Chairman
(617) 271-7086
- 1986 — September 16-18
San Diego, CA
Town & Country Hotel
Herbert K. Mertel, Chairman
(619) 578-1480
- 1987 — August 24-27
Atlanta, GA
Marriott Downtown
Hugh W. Denny, Chairman
(404) 894-3535
- 1988 — August 2-4
Seattle, Washington
Westin Hotel
Donald A. Weber
- 1989 — Boulder, Colorado
- 1990 — August 28-30
Washington, DC
Hyatt Regency Crystal City Hotel
Thomas W. Doeppner

RADIO NETWORK FOR EMC-S MEMBERS

A group of EMC Society members involved in amateur radio have formed a 20 meter net to exchange information and ideas. The net begins at 6:30 A.M. each Sunday between 14,310 and 14,320 kHz if conditions permit, and 14,320 and 14,350 if they do not. For more information contact Marv Shores, 9 Meadow Ridge Cr., Pomona, CA 91766.

EMCABS:25-6-84

Digital System Upset; The Effects of Simulated Lightning-Induced Transients on a General-Purpose Microprocessor

C. M. Belcastro

National Aeronautics and Space Administration, Hampton, Va. Langley Research Center

N83-24212/3 PC A03/MF A01 NASA-TM-84652

Apr 83, 33p NAS 1.15:84652

ABSTRACT: Flight critical computer based control systems designed for advanced aircraft must exhibit ultrareliable performance in lightning charged environments. Digital system upset can occur as a result of lightning induced electrical transients, and a methodology was developed to test specific digital systems for upset susceptibility. Initial upset data indicates that there are several distinct upset modes and that the occurrence of upset is related to the relative synchronization of the transient input with the processing rate of the digital system. A large upset test data base will aid in the formulation and verification of analytical upset reliability modeling techniques which are being developed.

INDEX TERMS: lightning, digital system, upset

EMCABS:28-6-84

Electromagnetic Pulse Protective Properties in Transient Suppressors Consisting of Gas Discharge Tubes and Filters

B. Backlund, S. Garmland, T. Karlsson, G. Unden

Foersvarets Forskningsanstalt, Stockholm (Sweden)

N83-27142/9 PC A03/MF A01

Feb 83, 47p FOA-C-30312-A3

ABSTRACT: The effect of the components of a transient suppressor on the protective function of the device were studied. Measurements show that the operation of the gas tubes requires low inductive connectors. An injected pulse with a rate of rise of 20 A/nsec lights the tubes within less than 2 nsec. The filter consists of an inductor and a Zener diode. The residual voltage is attenuated by the inductor, while the high frequency components pass due to stray capacitance. The Zener diode clamps the voltage only at the low frequency part. Calculations for a model theoretical circuit are presented.

INDEX TERMS: electromagnetic pulse, transient suppressor

EMCABS:26-6-84

Nuclear-Induced Lightning Aurora Equipment (Technical Report)

J. W. Erler, B. C. Passenheim, W. G. Vulliet, and V. A. J. van Lint

Mission Research Corp., San Diego, CA.

AD-A131274/3 PC A04/MF A01 Technical Rept. A. J. van Lint

11 Aug 82, 68p MRC/SD-R-103, DNA-TR-81-158 Contract DNA001-81-C-0151

ABSTRACT: Nuclear lightning has been experimentally produced at AURORA. The propagation velocity, the current carried by the streamer and other parameters were measured. The results are compared with existing models.

INDEX TERMS: nuclear, lightning, propagation, velocity, current

EMCABS:29-6-84

Physical and Computer Modeling of Military Earth Grounding Practices in a HEMP Environment

Andrew A. Cuneo, Jr., James J. Loftus, Rodney A. Perala

Harry Diamond Labs., Adelphi, MD.

Jun 83, 22p Rept No. HDL-TM-83-6 Contract MIPR-HC1001-9-400

Technical Memo

ABSTRACT: Military grounding practices compatible with hardening electronic systems to high-altitude electromagnetic pulse (EMP) illumination are considered. This study concerns the grounding practices outlined in MIL-STD-188-124, Common Long-Haul/Tactical Communications Systems. Three standard grounding schemes and one new scheme were chosen for study at a 10:1 scale, illuminated by a 59-V/m peak simulated HEMP. There were several significant results: (a) The theoretical technique in general agrees to within a factor of three with the experimental results; (b) The type end of earth ground system does not appear to be important; and (c) intrasite transients tend to be dominated by electromagnetic coupling to completed conductive loops. When the loop is broken, the transient is characterized by the half-wave length resonance of the conductor. Grounding paths which do not form part of the loop do not contribute significantly to the transient in the loop.

INDEX TERMS: grounding practices, hardening electronic systems, EMP

EMCABS:27-6-84

Introductory Course on Lightning Protection for Aircraft: High Voltage Testing and Radome Protection

E. L. White

ERA Technology Ltd., Leatherhead (England)

ERATL-83/25 Aug 78, 31p ERA-78-54

Aug 78, 31p ERA-78-54

ABSTRACT: At the invitation of Culham Laboratory, UKAEA, a lecture was given in a Short Introductory Course on Lightning Protection for Aircraft in September 1978. The aim of the course was to create an awareness amongst aircraft designers, aircraft component manufacturers and aircraft operators of the present understanding of the risks to aircraft from lightning, and of precautions that can be taken in design. This report is a reproduction of lecture notes on the subject "High Voltage Testing and Radome Protection" as provided for the course.

INDEX TERMS: lightning, protection, aircraft

EMCABS:30-6-84

Atmospheric Overvoltage Statistics for Studies of the Coordination of Substation Insulation Statistique des Surtensions

G. Bernard

Electricite de France, Clamart, Div. Appareillage

N83-34217/0 PC A02/MF A01

Jan 82, 16p HM-71-04668, EMTP-G-6

ABSTRACT: Stress induced by lightning on electric power installations is described. Rules for the variation of the physical parameters of these effects are given. Calculation of overvoltage in a substation and determination of the maximum allowable stress are covered. A calculation method for evaluating the statistical risk of these values being exceeded is presented. Lightning strikes close to the substation (up to 1500 m) and far from it are represented.

INDEX TERMS: lightning, electric power installations

EMCABS:31-6-84

EMP (Electromagnetic Pulse) Analysis. Final Report.
F. F. Parry, and W. E. Feero
Electric Research and Management, Inc., Thomaston, ME.
DE839025737 PC A05/MF A01
Jul 83, 84p EPRI-EL-3172

ABSTRACT: The analyses concluded that no realistic assessment can be made of system and component vulnerability to EMP attack until engineers familiar with both power system and EMP phenomena have conducted further analyses and tests. Insulation strength in the 10-nanosecond to one micro-second range and the assessment of EMP generated very-low frequency effects on the power system must be determined. In the operations area the study concludes that the current confusion in federal-industry emergency planning could be alleviated by reviving the Defense Electric Power Administration within the Department of Energy with its influential Industry Advisory Committee and strong industry field organization which existed until 1977. The Industrial Advisory Committee and field organization could also serve as an integral part of an early-warning system.

INDEX TERMS: analyses, EMP

EMCABS:34-6-84

Modeling the Effects of Corona on Electric-Power Line Surges Induced by
EMP-Paper No. 119
B. W. McConnell
Oak Ridge National Lab., TN.
DE83015500 PC A03/MF A01 Contract W-7405-ENG-26 20 IEEE Annual
Conference
27p CONF-830714-11 1983

ABSTRACT: This paper examines the models used to determine corona effects on power lines under various electrical surge conditions. Lightning and EMP surge responses are discussed and the EMP surge is found to have faster rise times but lower magnitude. The global nature of the EMP indicates a need for modeling other than surge propagation effects. A model is proposed and examination of the boundary conditions leads to the definition of corona time-domains. Use of early time corona models with late-time coupling models is shown to be inappropriate.

INDEX TERMS: corona effects, power lines, lightning, EMP

EMCABS:32-6-84

Satellite Test Chamber with Electromagnetic Reflection and Resonance
Damping for Simulating System Generated Electromagnetic Pulses
William G. Kirby
Dept of the Air Force, Washington, D.C. Supersedes PAT-APPL-6-286-817
Jul 81, patented 7 June 83 6p AD-D010 355/6, PAT-APPL-6-286-817
PATENT 4 387 467

ABSTRACT: The simulation of systems generated electromagnetic pulses in a space environment for satellite testing is accomplished by means of a spherical test chamber that is coupled with a pulsed x-ray source. Resonance damping is provided by a spherical resistive resonance suppression grid that is placed within the test chamber and spaced from its inner surface by a distance that effects optimum damping of electromagnetic wave energy at the fundamental chamber standing wave frequency. Electrons generated from surfaces within the chamber are suppressed by a spherical resistive electron backscatter suppression grid disposed between the resonance suppression grid and the chamber inner wall and by coating the inner chamber wall with electron emission suppression material.

INDEX TERMS: systems generated, electromagnetic pulses, space environment

EMCABS:35-6-84

Probabilistic Approach to EMP Assessment
R. M. Bevensee, H. S. Cabayna, F. J. Deadrick, L. C. Martin, & R. W.
Mensing
Lawrence Livermore National Lab., Ca.
UCRL-5280 PC A03/MF A01 Contract W-7405-ENG-48
Sep 80, 49p CONF-7908140-1 Symposium on system EMP Hardening

ABSTRACT: The development of nuclear EMP hardness requirements must account for uncertainties in the environment, in interaction and coupling, and in the susceptibility of subsystems and components. Typical uncertainties of the last two kinds are briefly summarized, and an assessment methodology is outlined, based on a probabilistic approach that encompasses the basic concepts of reliability. It is suggested that statements of survivability be made compatible with system reliability. Validation of the approach taken for simple antenna/circuit systems is performed with experiments and calculations that involve a Transient Electromagnetic Range, numerical antenna modeling, separate device failure data, and a failure analysis computer program.

INDEX TERMS: EMP, hardness requirements

EMCABS:33-6-84

Numerical Simulation of Overvoltage Caused by Lightning on Aerial Power
Lines, Including the Corona Effect Simulation
Z. Ahcene, G. Bernard
Electricite de France, Clamart Div. Appareillage
N83-34213/9 PC A03/MF A01
18 Dec 81, 48p HM-71-04658

ABSTRACT: A corona effect analog model is studied and the influence of surges due to lightning on power lines is discussed. The effect of a lightning strike on lines with and without guard cables was simulated. Results show that the surge is very strongly damped as it travels away from the strike point. The corona effect lengthens front times and dampens the high frequency components of the propagated waves.

INDEX TERMS: corona effect analog model, lightning, power lines

EMCABS:36-6-84

Eight Years Experience of Lightning at St. Privat-d'Aller (France) Huit &
d'Experience sur la Foudre
C. Gary
Electricite de France Clamart Service Material Electrique
N83-34526/4 PC A03/MF A01
Jun 82, 42p HM-00-1065 Text in French

ABSTRACT: The equipment of a lightning investigation station, and results concerning lightning effects on high voltage power lines and telecommunication networks are described. A rocket system for triggering lightning with up to 93% success rate is presented. The flashes are very similar to natural ones between high structures and storm clouds, but peak current is more like that of the secondary waves of natural flashes. The system enables electromagnetic wave propagation, localization of atmospheric electric charges, pylon response, equipment protection, and flash time histories, to be studied.

INDEX TERMS: lightning, high voltage power lines, telecommunication networks

<p>Electromagnetic Compatibility of Nuclear Power Plants H. S. Cabayan Lawrence Livermore National Lab., Ca. DE83012324 PC A02/MF A01 National colloquium on electromagnetic compatibility 1983, 5P UCRL-89102, CONF 830638-1 Contract W-7405-ENG-48 ABSTRACT: Lately, there has been a mounting concern about the electromagnetic compatibility of nuclear-power plant systems mainly because of the effects due to the nuclear electromagnetic pulse, and also because of the introduction of more sophisticated and, therefore, more susceptible solid-state devices into the plants. Questions have been raised about the adequacy of solid-state-device protection against plant electromagnetic-interference sources and transients due to the nuclear electromagnetic pulse. In this paper, the author briefly reviews the environment, and the coupling, susceptibility, and vulnerability assessment issues of commercial nuclear power plants. INDEX TERMS: electromagnetic compatibility, nuclear-power plant</p>	<p>EMCABS:37-6-84</p>	<p>Industrial Electromagnetic Checkout of Armored Wiring Controls Electromagnetique a Caractere Industriel de Cables Blindes J. Ferre (Text in French) Societe Nationale Industrielle Aerospatiale, St Medard-Jalles (France) N83-33043/1 PC A02/MF A01 1983, 4p SNIAS-831-430-102 ABSTRACT: A method for testing whether armored wiring can withstand EMP's caused by nuclear explosions is described. The wires are checked in their production cases, using a strip line antenna as pulse source. Only one measurement per connector is made, with the connector conductors in parallel. The method is quick, repeatable, and does not damage the wiring. INDEX TERMS: armored wiring, EMP's</p>	<p>EMCABS:40-6-84</p>
<p>Sensitivity of Electric Explosive Devices to Electromagnetic Pulses: An Estimation for Assessing Hazards in Connection with Stray Fields O. Lish Foersvarets Forskningsanstalt, Stockholm, Sweden N83-27056/1 PC A03/MF A01 28 Feb 83, 27p FOA-C-20485-D1(D4) in Swedish; English Summary ABSTRACT: An EMP simulator was erected close to an ammunition store and the risks of premature explosions due to stray fields from the simulator were studied. Results show that common bridgewire electric explosive devices (EED) can withstand 0.5 mJ in pin-to-pin ignition; a 20 db safety margin should be used, spurious level should not exceed 5 micro J. Conducting composition EEDs cannot withstand the normal electromagnetic environment. For Va type fuseheads a pins-to-case ignition level of 50% occurred at 22 micro J. The varnish around the pyrotechnic mix fusehead is not a protection against pins-to-case ignition. INDEX TERMS: EMP, ammunition</p>	<p>EMCABS:38-6-84</p>	<p>Power-Line-Induced AC Potential on Natural-Gas Pipelines for Complex Rights-of-Way Configurations. Volume 2 Graphical Analysis Handbook Final Rept. M. Frazier Science Applications, Inc. Schaumburg, Ill. DE83902188 PC A20/MF A01 - Portions are illegible in microfiche products May 83, 455p EPRI-EL-3106-V.2 ABSTRACT: Joint use of common corridors for overhead electric-power-transmission lines and buried natural gas transmission pipelines results in undesired coupling of electromagnetic energy onto the natural-gas-transmission pipelines. The project has resulted in the development of the methodology and techniques for analyzing such complex common corridor coupling problems. Field tests were conducted to verify key aspects of the analysis. Two complementary methods have been developed for solving coupling problems on common corridors; a handbook that provides simplified procedures and graphical aids that can be used to analyze many less complex common corridor concerns, and a computer program that provides the means for analyzing a wide range of more complex configurations. This volume presents the simplified graphical analysis. (ERA, citation 08:040203) INDEX TERMS: electric-power-transmission lines, natural gas transmission pipelines, coupling, electromagnetic energy</p>	<p>EMCABS:41-6-84</p>
<p>Design and Development of a Multipin SGEMP Current Injection Test Technique D. Tasca, J. Peden, J. Klish, B. Beers, & H. O'Donnell General Electric Co., Philadelphia, Pa. Space Division AD-A130 932/7 PC A10/MF A01 Contract DNA001-78-C-0251 1 June 82, 212p DNA-6171F, SBI-AD-E301167 ABSTRACT: Verification tests are imposed by satellite system survivability specifications which require that an SGEMP current injection test be performed on each Qualification Level Component Box to demonstrate SGEMP hardness. This report represents the results of an extensive analytical and computational evaluation of the response of termination loads to cable SGEMP signals driven in multiwire cable bundles, and the design, development and experimental verification of a Multipin Current Injection Test (C.I.T.) Method for performing SGEMP hardness verification tests on electronic component boxes. This C.I.T. method was developed to meet the technology needs for user-Oriented current injection technique using realistic hardware to correctly perform these SGEMP electrical simulation tests at the individual component box level as well as at the subsystem and system levels. The purpose of the analytical development work was to quantify the dependence of the termination response on the manifold of parameters which specify the cable SGEMP threat in choice of the drive levels, coupling factors, and cable characteristic</p>	<p>EMCABS:39-6-84</p>	<p>Airborne Lightning Characterization P. L. Rustan, B. P. Kuhlman, A. Serrano, J. Reazer, M. Risley Air Force Wright Aeronautical Labs., Wright-Patterson AFB, OH. AD-A130 627/3 PC A09/MF A01 Final Technical Rept. Jun 79-Aug 82 Jan 83, 186p Rept no AFWAL-TR-83-3013 ABSTRACT: A WC-130 aircraft was instrumented with 11 electric & magnetic field sensors at different locations. The aircraft was flown in the vicinity of active thunderstorms at altitudes between 1500 & 16000 feet mean sea level (MSL). To correlate the electric fields produced by the lightning flashes & the respective location of the flashes, a ground station network was employed. The ground network consisted of a central station where the electric field & very high frequency (VHF) radiation were measured & four remote stations arranged in a wye configuration with a 20 kilometer (km) radius for measuring VHF. 14 channels of continuous analog data with 2 Mega hertz (MHz) bandwidth & ten channels of digital data of 164 microsecond (micro sec) windows with 20 MHz bandwidth at a maximum rate of two data windows per second were recorded in the aircraft. Analog data for the electric field & VHF radiation with 2 MHz bandwidth were recorded at the central ground site.</p>	<p>EMCABS:42-6-84</p>

<p>Power-Line-Induced AC Potential on Natural Gas Pipelines for Complex Rights-of Way Configurations; Volume I-Engineering Analysis Final Report M. Frazier Science Applications, Inc., Schaumburg, Ill. DE83902222 PC A17/MF A01 May 83, 381p EPRI-EL-3106-V.1</p> <p>ABSTRACT: While many benefits accrue from the sharing of corridors for overhead electric-power-transmission lines and buried natural-gas-transmission pipelines, the coupling of electromagnetic energy onto the natural gas transmission pipelines is an undesired consequence of this joint usage. Many common corridors include multiple power lines and pipelines with complexities such as bonds or crossovers between the pipelines and terminating pipelines or insulators. This project has resulted in the development of the methodology and techniques for analyzing such complex common corridor coupling problems. Field tests were conducted to verify key aspects of the analysis. Two complementary methods have been developed for solving coupling problems on common corridors; a handbook that provides simplified procedures and graphic aids that can be used to analyze many less complex common-corridor concerns, and a computer program that provides the means for analyzing a wide range of more complex configurations. (ERA citation 08.040191)</p> <p>INDEX TERMS: electric-power-transmission lines, natural-gas-transmission pipelines, coupling, electromagnetic energy</p>	<p>EMCABS:43-6-84</p>	<p>Simulation of the Interaction of an Electromagnetic Pulse with A Cylindrical Structure by a Current Injection M. Perey Societe Nationale Industrielle Aerospatiale, Saint-Medard-Jalles (France) N83-33042/3 PC A02/MF A01 Text in French, Presented at Tregastel, Conf., Jun 1983, 5p SNIAS-831-430-101</p> <p>ABSTRACT: A test method which creates a current on a cylinder similar to that produced by coupling with an electromagnetic pulse is outlined. Condensers are discharged at the ends of a cylinder placed above a mass plane. Modeling, based on line theory, enables optimum coupling configurations for generators to be determined, and surface currents at different points to be calculated. A method for analyzing surface currents, which decomposes the signal into a sum of sinusoids representing the resonance frequencies of the structure, is presented. Tests show that the method can be used at test assemblies which have cabling. It gives results comparable to strip line tests, but is much simpler.</p> <p>INDEX TERMS: test method, current, cylinder, electromagnetic pulse</p>	<p>EMCABS:46-6-84</p>
<p>Supplemental Grounding of Extended EMP Collectors H. W. Denny, D. W. Acree, G. B. Melson, & D. P. Millard Georgia Inst. of Tech., Atlanta Energy & Material Sciences Lab. Contract DNA001-80-C-0294 Final Rpt I May 80-31 Jan 82 31 Jan 82, 180p DNA-5940F</p> <p>ABSTRACT: The external conductors of a facility, particularly long, above ground types, pose a severe EMP threat. A primary purpose of this program was to investigate the premise that supplemental ground connections in these types of conductors could serve to reduce this threat. To support this investigation an External Collector Analysis Model (ECAM) was developed. ECAM was applied to analyzing the EMP-induced current levels appearing at a facility under various conditions of line length, line height, and number of grounds. From the results, approaches to the treatment of external collector penetrations are suggested. In addition to the external collector assessments, preliminary studies of internal collector responses are reported. Supplemental studies of techniques for measuring the responses of earth electrode systems over the EMP power spectrum are described. A successful technique utilizing currently available instrumentation was used to validate a test probe and to evaluate scaled models of various commonly used earth electrode geometries. From the measurements, observations relating to the behavior of various geometries up to 500 MHz are made. (Author)</p> <p>INDEX TERMS: external conductors, facility, EMP</p>	<p>EMCABS:44-6-84</p>	<p>Electromagnetic Pulse (EMP): Phenomena, Simulation, and Hardening 1976-September, 1983 (Citations from the Energy Data Base) National Technical Information Service, Springfield, VA. Rept. for 1976-Sep 83 Sep 83, 132p Supersedes PB83-858795. Prepared in cooperation with Dept of Energy Washington, D.C.</p> <p>ABSTRACT: This bibliography contains citations concerning various aspects of electromagnetic pulse (EMP) from the environment through systems design and testing. The interactions and coupling of electronic components and systems, communication and power transmission systems, and sea, air, and spacecraft with EMP are considered as is their protection from it by shielding, isolation, and hardening methods and devices. Some attention is given to physical and computerized simulations of EMP and to health and safety hazards associated with its generation. (This updated bibliography contains 161 citations, 16 of which are new entries to the previous edition.)</p> <p>INDEX TERMS: bibliography, EMP, interactions and coupling</p>	<p>EMCABS:47-6-84</p>
<p>Measurement of Earth Resistivity Affecting MHD-EMP (Magnetohydrodynamic Electromagnetic Pulse) Response of Buried Cables J. W. Erler and V. A. van Lint Mission Research Corp., San Diego, CA. MRC/SD-R-69, DNA-5530T Contract DNA001-80-C-0215 1 Dec 80 37p</p> <p>ABSTRACT: The response of buried conducting cable to a MHD EMP wave is determined in part by the resistivity of the earth at frequencies ranging from 10 to 0.01 Hz. Three methods of measurement of earth resistivity are presented with their advantages and limitations.</p> <p>INDEX TERMS: magnetohydrodynamic electromagnetic pulse, buried cable</p>	<p>EMCABS:45-6-84</p>	<p>General Guidelines for the Mitigation of Nuclear Weapon Effects On Fiber Optic Communication Systems through the Use of Selected Design Practices Ronald J. Reyzer, Stewart Share, and John F. Sweton Harry Diamond Labs., Adelphi, MD. AD-A128 267/2 PC A02/MF A01 Special Report Apr 83, 25p Rept no. HDL-SR-83-4</p> <p>ABSTRACT: This report provides guidelines for the design and installation of a fiber optic communication system to improve the tolerance of that system to a nuclear environment. These guidelines, if incorporated, can protect a significant portion of the national fiber optic communication system resources that might otherwise be destroyed.</p> <p>INDEX TERMS: fiber optic communication, nuclear environment</p>	<p>EMCABS:48-6-84</p>

<p>Electromagnetic Pulse (EMP): Phenomena, Simulation, and Hardening. 1975-September, 1983) Citations from the International Information Service for the Physics & Engineering Communities Data Base National Technical Information Service, Springfield, VA. PB83-873109 PC N01/MF N01 Rept. for 1975-Sep 83. Sep 83, 165p Supersedes PB83-858803.</p> <p>ABSTRACT: This bibliography contains citations concerning natural and nuclear electromagnetic pulse (EMP) phenomena. Analyses and simulations of EMP interactions and coupling with various susceptible objects and devices and their responses are covered. Protective methods and technology are also considered along with test techniques and results. Attention is also given to computer aided EMP analysis. (This updated bibliography contains 178 citations, 29 of which are new entries to the previous edition.)</p> <p>INDEX TERMS: bibliography, EMP, interactions, coupling</p>	<p>EMCABS:49-6-84</p>	<p>EMCABS:52-6-84</p> <p>Study of the Behavioral and Biological Effects of High-Strength 60-Hz Electric Fields. Quarterly Technical Progress Report Number 10, 18 December 1982 - March 1983. Southwest Research Institute, San Antonio, Texas DE83008226 PC A02/MF A01 Contract AC02-80RA50219 20 Apr 83, 4p DOE/RA/50219-T1</p> <p>ABSTRACT: The objective of this contract is to use the baboon as a surrogate for the human in studies of the possible deleterious effects of exposure to high strength, 60 Hz electric fields. The specific aims of this contract are to (1) design and construct an exposure facility in which baboons can be exposed to an electric field up to 60 kV/m in intensity for experiments and (2) to develop computer models relating the fields and currents produced in both baboons and humans by exposure to high strength, 60 Hz electric fields. (ERA citation 08:031603)</p> <p>INDEX TERMS: effects, 60 Hz electric fields, exposure facility, baboons</p>
<p>Statistical Failure Analysis of Military Systems For High-Altitude EMP H. S. Cabayan, F. J. Deadrick, L. C. Martin, and R. W. Mensing California University, Livermore, Lawrence Livermore Lab. Contract W-7405-ENG-48 Electrical overstress/electrostatic discharge symposium, Denver, Co. USA, 25 Sep 1979</p> <p>ABSTRACT: A probabilistic approach to vulnerability assessment that allows inclusion of uncertainties into the analysis is outlined and discussed. The approach is illustrated and validated to a limited extent by two simple system experiments that included device failure data, circuit analyses, failure analyses, and separate laboratory system tests with a transient electromagnetic facility. The computer programs NET-2 and FAST were essential tools in the analyses. (ERA citation 05:006147)</p> <p>INDEX TERMS: for high-altitude EMP, vulnerability assessment</p>	<p>EMCABS:50-6-84</p>	<p>EMCABS:53-6-84</p> <p>Radiofrequency Radiation Exposure Facilities for Bio-Effects Research at the Health Effects Research Laboratory, Research Triangle Park, N.C. Joseph S. Ali, and Claude Weil Health Effects Research Lab., Research Triangle Park, N.C. PB83-229591 PC A04/MF A01 Mar 83, 64p EPA-600/2-83-018</p> <p>ABSTRACT: The report describes the multi-user radiofrequency radiation exposure facilities for bio-effects research in use at the Health Effects Research Laboratory, Research Triangle Park N.C. Four facilities are described: 1) a 100 MHz CW exposure system; 2) a 2450 MHz CW exposure system; 3) a 2450 MHz AM exposure system; and 4) an X-band pulsed RF exposure system. The individual facility descriptions include construction details, specifications, photographs, circuit drawings and block diagrams. All of the facilities incorporate environmental control systems and three have RF power-level regulation.</p> <p>INDEX TERMS: radiofrequency radiation, facilities, bio-effects research</p>
<p>Human Leukocyte Functions and the U.S. Safety Standard for Exposure to Radio-Frequency Radiation. Norbert Roberts, Jr., Shin-Tsu Lu, and Sol M. Michaelson Rochester University, N.Y. 1983, 5P EPA-600/J-83-020 Contract EPA-R-806390 Pub. in Science, v220 p318-320, 4 Mar 83</p> <p>ABSTRACT: Human mononuclear leukocytes were exposed to microwaves at energies relevant to current public safety recommendations. No detectable effects on viability or function of the leukocytes resulted from exposure to microwaves at specific absorption rates up to 4 milliwatts per milliliter. The results were highly reproducible and provided no evidence that current safety standard recommendations are inappropriate insofar as leukocyte function is concerned.</p> <p>INDEX TERMS: mononuclear leukocytes, microwaves</p>	<p>EMCABS:51-6-84</p>	<p>EMCABS:54-6-84</p> <p>Health Aspects of Power Transmission R.D. Phillips Battelle Pacific Northwest Labs., Richland, Wa. PNL-SA-7218 (REV.) PC A02/MF A01 Contract EY-76-C-06-1830 Mar 79, 17P CONF-7903107-1</p> <p>Symposium on energy and human health: human costs of electric power generation, Pittsburgh Pa. USA 19 Mar 1979, Portions are illegible.</p> <p>ABSTRACT: Exposure of rats and mice to 60 Hz electric fields at 100 kV/M for up to 120 days had no statistically significant, reproducible effects on a number of measures of metabolic status and growth, bone growth and structure, reproduction, hematology and serum chemistry, endocrinology, cardiovascular function, nerve function, or organ and tissue morphology. An effect on cell-mediated immunity was detected and is being evaluated further in additional experiments. Exposure of rats in utero (day 0 of gestation to 8 days of age) had a transient effect at 14 days of age on motile behavior and development of the righting reflex. Significant effects were observed in synaptic transmission and behavior. Exposure to 60 Hz electric fields may increase the excitability of the nervous systems of rats. Experiments are in progress to obtain a better understanding of these effects and their potential consequences. (ERA citation 05:014389)</p> <p>INDEX TERMS: health aspects, electric fields</p>

<p>Human Reactions to Transient Electric Currents. Volume 8 J. P. Reilly, W. Larkin, R. J. Taylor, V. T. Freeman & L. B. Kittler, Johns Hopkins Univer., Laurel, MD. Applied Physics Lab Sponsored in part by Maryland Dept of Natural Resources, Annapolis. Power Plan Siting Program & Canadian Electrical Assoc. PB84-112895 PC A08/MF A01 Jul 83, 151p JHU/APL/CPE-8305 Annual rept. Jul 82-Jun 83 ABSTRACT: The report describes research on human sensory responses to transient electrical currents. Stimuli include those that may be encountered with capacitive discharges in high-strength DC or 60-Hz AC oscillatory currents. Measurements of electrical impedance properties of the human body are also described. Parameters studies involve variables of the stimulus (e.g., magnitude, discharge capacitance, time constant, monophasic versus biphasic currents), variables involving the subject (e.g., body location, skin hydration), and variables involving the method of applying the stimulus (e.g., electrode size, spark discharge versus contact current). Sensory reactions are studied for both threshold and suprathreshold currents. A neuroelectric model is developed and applied to a variety of the experimental findings. The present report (Volume VIII, CPE-8305) summarizes the second year of research; for background material, the previous annual report (Volume IV, CPE-8203) should be consulted. INDEX TERMS: human sensory responses, transient electrical currents.</p>	EMCABS:55-6-84	<p>Nonionizing Electromagnetic Radiation: Biological Effects. 1970-June, 1983 (Citations from the Engineering Index Data Base) Rept. for 1970-June 83 National Technical Information Service, Springfield, VA. PB83-866285 PC N01/MF N01 Supersedes PB82-873704 June 83, 280p ABSTRACT: This bibliography contains citations concerning the biological effects on 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. (This updated bibliography contains 287 citations, 185 of which are new entries to the previous edition). INDEX TERMS: biological effects, radiofrequency radiation (RFR)</p>	EMCABS:58-6-84
<p>Criteria for Electric Field Bioeffects Investigations and Risk Assessment S. M. Michaelson Rochester Univ., NY, Dept. of Radiation Biology & Biophysics DE83010193 PC A02/MF A01 IEEE/ESMO Conference, Atlanta, GA. USA, 9 Jun 1983 1983, 20p DOE/EV/03490-2250, CONF-830626-1 ABSTRACT: Most of the research on biological effects of electric fields (EF) has been done with small rodents that have many physical and physiological attributes significantly different from those of man. In making extrapolations from animal data to man we must be particularly cognizant of the limitations and pitfalls in the use of animal experimentation data. Many factors must be considered in the design of experiments using organisms other than man as a test subject. These include the species, strain, sex, age of the animal, the methods of caring for the test animals, the animals' feeding patterns, the roles of seasonal and circadian rhythms, biological drifts, temperature and humidity. The reliability of laboratory studies using experimental animal models depends on the following considerations: (1) its cognitive limits, (2) scaling factors associated with the nature of the field in the laboratory investigation of the biological processes using animal models, and (3) the methods by which the extrapolation of the data from the animal models relate to human studies. (ERA citation 08:032617) INDEX TERMS: biological effects, electric fields</p>	EMCABS:56-6-84	<p>Lightning Arresters for Domestic and Commercial Electrical Power Supplies; 1976-August, 1983 (Citations from the Energy Data Base). Rept. for 1976-Aug 83. Supersedes PB82-866708 Prepared in cooperation with the Department of Energy, Washington D.C. Aug 83, 174p ABSTRACT: This bibliography contains citations concerning design, materials, construction and testing of various types of lightning arresters for domestic and commercial electric power supplies. Topics include lightning arresters for structures and water, as well as lightning connectors. (This updated bibliography contains 175 citations, 51 of which are new entries to the previous edition.) INDEX TERMS: bibliography, lightning arresters, power supplies</p>	EMCABS:59-6-84
<p>Bioeffects of Radiofrequency Radiation: A Review Pertinent to Air Force Operations. Louis N. Heynick and Peter Polson SRI International, Menlo Park, CA. AD-A126 515/4 PC A09/MF A01 SAM-TR-83-1 Mar 83, 186 p Contract F33615-82-C-0604 ABSTRACT: The primary purpose of this review is to present analyses of research results and other pertinent information on the biological effects of radiofrequency radiation (RFR) to serve as a basis for determining whether the health of people exposed briefly or continuously to the RFR transmitted by proposed or currently operating Air Force RFR emitting systems is likely to be affected adversely. Representative research results were selected from the large body of literature on the bioeffects of RFR and analyzed. The selection included those most significant scientifically and most pertinent to RFR frequencies and intensities likely to be encountered in regions around such systems, that are accessible occupationally or to the general public. Discussed first as background information are the increasing use of RFR emitters by the public, private, and governmental sectors; measurements by the Environmental Protection Agency of environmental levels of RFR in selected U.S. cities; problems of risk assessment; and current and proposed exposure standards in various countries. INDEX TERMS: biological effects, radiofrequency radiation (RFR)</p>	EMCABS:57-6-84	<p>LEW-II: New Lightning Early Warning System at Sandia National Laboratories J. P. Boettger Sandia National Labs., Albuquerque, N.M. CONF-800652-1 PC A02/MF A01 DOE Engineering Safety Conference Las Vegas NV, USA, 1 June 1980 Contract AC04-76DP00789 ABSTRACT: Improvements made in the Lightning Early Warning (LEW) System at Sandia are described. The improvements include a new more flexible display unit; redesign of the sensor system for a total rf system; updating the computer system; and a new Radio Frequency Potential Gradient Monitor (RFPG-II). (ERA CITATION 5:029433) INDEX TERMS: Lightning Early Warning (LEW) System</p>	EMCABS:60-6-84

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