

Electromagnetic Compatibility Society



Newsletter

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EDITOR: ROBERT D. GOLDBLUM

AARON HUMPHREY SULLIVAN, JR., 1915-1985



A. H. Sullivan, Jr., or Sully as he was known to his friends, passed away quietly at his home on January 2, 1985. He was a Life Fellow of the IEEE and had been a member since 1940. He was a founding member of the Washington Chapter of the EMC Society and had served as secretary in 1959/61, as vice-chairman in 1961/62, and as chairman in 1962/63. He served on the EMC Society Board of Directors from 1964 to 1969, and again from 1973 to 1975. During this period, he served as Chairman in 1966 and 1967, and was the first editor of the PGRFI (now EMC) Transactions from 1962 to 1968. He was also active on each of the Washington EMC committees hosting the EMC symposia. He was secretary of the 1960 symposium committee. In 1961 he again served as secretary. In 1967 he was a member of the technical program committee. On the 1976 symposium committee he was vice-chairman and technical program committee chairman.

Continued on page 3

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INTER-SOCIETY ACTIVITIES

Walt McKerchar, senior IEEE, EMC-S, and SAE board member, has been appointed the latest newsletter associate editor. His section titled "Inter-Society Activities," will report the dB Society and SAE AE-4 activities. Walt has been involved in the electromagnetic effects industry for over 35 years, and operates his own test and consulting business, Northwest Engineering Service and Electromagnetic Engineering, Inc. From 1965 to 1975, Walt served as chairman of the SAE AE-4 committee on EMC, and is founder and president of the dB Society. He is the recipient of two Outstanding Achievement Awards from the SAE, an Outstanding Service Award from the US Senate, and an award from NATO for services to the EMC community.

Note: EMC-S BoD Meeting

The next IEEE EMC Society Board of Directors meeting will be held on January 22 at the Airport Hilton in San Diego. This meeting is being held in conjunction with the REGICON on January 23. Other BoD meetings are scheduled for May 29 in Philadelphia preceding the Division 4 meeting and the meeting of society presidents on May 23, and August 19, Wakefield, MA, in conjunction with the International Symposium on August 20-22.

The Society would also like to mention that the Tuscon chapter will become a joint chapter with the A & P and MTT Chapters.

1985 NORTH AMERICAN RADIO SCIENCE MEETING AND INTERNATIONAL IEEE/AP-S SYMPOSIUM CALL FOR PAPERS

The 1985 North American Radio Science Meeting, sponsored by the U.S. and Canadian National Committees for URSI and the International Symposium, and the IEEE Antennas and Propagation Society (AP-S), will be held jointly at the Conference Centre of the University of British Columbia, Vancouver, B.C., Canada, June 17-21, 1985. Authors are invited to submit papers on all topics of interest to the AP-S and URSI membership. All inquiries may be directed to K. Charbonneau, Conference Coordinator.

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INTER-SOCIETY ACTIVITIES

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A year before the date of the symposium, the chairman was called out of the country and Sully assumed the additional duties of the chairman for the duration. When the Washington EMC Chapter was again host to the symposium in 1983, it was Sully who organized the symposium committee and served as chairman. This Silver Anniversary Symposium was the most outstanding symposium in the history of the EMC Society. Sully also found time to serve as chairman of the EMC Society Fellow Evaluation Committee. He believed that every man owes something to the advancement of his profession and Sully achieved this in his service to the IEEE and the EMC Society.

Sully was honored by the EMC Society with the Certificate of Appreciation in 1966, Honorary Life Member in 1976 and Certificate of Acknowledgement in 1983. Sully had been active in the communications-electronics technology since 1932 when he obtained his first "ham" license as W8IDY. He received his First Class Radio/Telephone license in 1939.

In 1937, Sully was commissioned as a 2nd Lieutenant in the Signal Corporation. Following his graduation from Cornell with an EE degree in 1939, he went on active duty in 1940. In 1941, he reported to Ft. Monmouth and was sent to England to study the new radar device developed by Sir Robert Watson-Watt, and bring the radar technology back to the USA. Before he could complete this assignment war had been declared, and Lt. Sullivan was to stay in England for the duration. In 1943-44, as head of the Radar and Radar Countermeasures Section at SHAEF, he took part in one of the first EMC studies (Project FEELER). Shortly before D-Day for the Normandy invasion, it was found that severe mutual interference could be expected between various Allied Radar and VHF systems, which would be operating for communications and aircraft warning in the invasion area. Project FEELER tests and calculations in England prior to the invasion (taking into account radiation and reception characteristics, harmonic radiation and Frequency of propagation characteristics), resulted in an amendment to the Signal Annex of the Operation OVERLORD invasion plan. Specific locations were established for all radar and VHF equipment on the beach-head together with operating rules and conditions to prevent interference.

Later in the war, he became head of electronics intelligence at Headquarters U.S. Air Forces in Europe, and after the war, he led the Air Force investigation into German electronics systems, equipments and components. His article in the May 1949 issue of "Electrical Engineering," the AIEE monthly, described the German developments in electronics, communications, and missile guidance systems in some detail. In 1946 he returned to the states and retired as a Lt. Colonel.

During the period from 1946 to 1955, he worked at the Air Technical Intelligence Service and the CIA. He left government service to become Executive Engineer with Bendix Aviation where he was involved in development and production of missile and air defense systems including SAGE. In 1958, he joined Engleman & Co. where he worked on a joint project with Frederick Research to measure output and interference characteristics of Air Force high power radars throughout the United States. In 1961, he went with Frederick Research as Director of Advanced Systems Development where he continued to work on various aspects of EMC. During this period he edited and co-authored the first EMC reference book "Handbook on Radio Frequency Interference" published by Frederick Research in 1962.

He joined HRB-Singer in 1964 as head of the Washington Office. Later he joined the Executive Office of the President as Head of the Spectrum Planning Division of the Office of Telecommunications Management. In 1967, he transferred to the Naval Scientific and Technical Intelligence Center as Technical Director. During his work with the Navy, he was awarded the Navy Superior Civilian Service Award, the Meritorious Civilian Service Award, and a number of Outstanding Performance Awards. He retired from government service in 1975 and set up his own firm, Sullivan Associates.

In the period 1964 to 1967, he served as member of the Joint Technical Advisory Committee (JTAC) of IEEE/EIA, Subcommittee 63.1 (EMC), which performed an extensive study of radio spectrum utilization resulting in the publication in 1968 of a report (requested by the Special Assistant to the President for Telecommunications) entitled "Spectrum Engineering - The Key to Progress." This report was both broad in scope and penetrating in depth, and recommendations resulted in a number of major changes and new initiatives in government spectrum utilization programs.

Sully was a Registered Professional Engineer in Ohio. In addition to being a Fellow of the Institute of Electrical and Electronics Engineers, he was a member of the American Institute of Aeronautics and Astronautics, American Association for the Advancement of Science, American Ordnance Association, the Armed Forces Communications and Electronics Association, the Air Force Association, the Reserve Officers Association, and the Association of Old Crows. In recognition of his service in England on SHAEF Staff, he was awarded the Bronze Star, among a number of other awards.

Sully was a native of Lincoln, Nebraska, born there on April 7, 1915. He is survived by his wife, Constance, whom he met and became engaged to in London while on duty there. They were married when he returned to the states and have resided in the Washington area since 1958. He is also survived by a brother Robert, living in retirement in Knoxville, Tennessee.

REPORT OF THE DIVISION 4 DIRECTOR ELECTROMAGNETICS AND RADIATION DECEMBER 1984

The final meeting of the IEEE Board of Directors and Technical Activities Board (TAB) was held in San Francisco, November 30 through December 3, 1984. During these meetings, IEEE Centennial Keys to the Future Awards were presented by Richard Gowen, IEEE President, to five outstanding young engineers selected by the societies of Division 4: David M. Pozar, University of Massachusetts (Antennas and Propagation Society); L. Gilda Haskins, Haskins Associates, Inc. (Electromagnetic Compatibility Society); Ronald S. Indeck, University of Minnesota (Magnetics Society); Steven J. Temple, Raytheon Co. (Microwave Theory and Techniques Society); and Ronald M. Gilgenbach, University of Michigan (Nuclear and Plasma Sciences Society). The award consisted of a silicon key and a certificate. The presentation was preceded by an address by Dr. Gordon E. Moore, Chairman of the Board of Intel Corporation.

During the meeting of the Division's Management Committee (consisting of the five society presidents) Kiyo Tomiyasu was welcomed as the newly-elected Director of Division 4 for the 1985-1986 term. Also in attendance were Harlan Howe (President-Elect of MTT), John A. Martin (President-Elect of NPS), and Alan J. Simmons (Vice President Elect of AP).

Several decisions of interest to our members were taken. First, it was agreed that a one-page "News of Division 4" would be initiated to appear regularly in each society's newsletter. Second, the use of a percentage (perhaps 20 percent) of the interest income earned by society reserves to support general activities of IEEE was discussed. This has been done in the past, but not made explicit. The practice helps keep IEEE dues low and tends to permit wealthy societies to aid the less fortunate ones. Support of this practice is significant because the reserves of Division

4 are the largest of any division in the Institute. Finally, it was agreed not to enlarge the simple management structure of the division, which consists only of the five society presidents and the division director in a Management Committee. Approval was given for the minutes of the meetings of the Management Committee to be distributed to the vice presidents of the five societies, and, of course, news from these meetings should be carried in the proposed Division 4 news page.

A number of significant items were reported by the society presidents: Allen W. Love (AP) reported on the production of two educational video tapes; Eugene D. Knowles (EMC) reported they have held their first conference outside the United States and have the largest percentage growth rate among all societies; H. George Oltman (MTT) reported on the establishment of a special AD COM negotiating team whose function is to obtain the best possible rates for hotels and other conference facilities; Ernesto A. Corte (NPS) reported on the coupling of short courses with their conferences as a cost-effective arrangement; and, Clark E. Johnson (Mag.) reported the establishment of an *IEEE Translations Journal on Magnetism in Japan*. Published monthly beginning in April 1985, it will provide English-speaking engineers with access to much of the Japanese magnetics literature. This is the first translations journal to be started in the IEEE and is being underwritten with \$75,000 from the Magnetics Society's reserves.

Emerson W. Pugh, Director
Division 4
Electromagnetics and
Radiation

BOARD OF DIRECTORS' MEETING IN TOKYO

The Board of Directors was especially pleased to hold its first meeting ever outside the United States. Our gracious hosts were the Tokyo symposium organizers, and our meeting site was the Hotel Pacific in downtown Tokyo. With most of us just recovering from jet lag, the Board meeting was held on Monday, October 15th, the day before the start of our 1984 international symposium.

President Knowles presided over the meeting attended by nine board members and several guests from the symposium steering committee and the Tokyo EMC chapter. After introductions, the meeting was called to order at 1:30 p.m. The first order of business was to discuss the extent of EMC-S support of the CISPR meeting planned in conjunction with the 1986 San Diego EMC symposium. The Board voted to support the CISPR meeting plans. The question of monetary support was tabled until the next meeting to allow the organizers to better identify the amount of money needed from the EMC-S.

The meeting returned to the order of the agenda to accept the minutes of the San Antonio meeting as written. The remaining major items of business are now summarized:

1. The Treasurer's report was presented by Don Heirman. The Society's projected year's end net worth based on income and expenses as of 8/31/84 is approximately \$165,000, up by about \$40,000 from the end of 1983 figures. The principal reasons for this surplus were a \$27,000 excess over expenses for the San Antonio symposium and our switching to a new investment option that earned income on our entire operating balance, not just a portion which was held in lower interest bearing savings accounts in the past. Warren Kesselman was congratulated on his activity in this area and the obvious beneficial results.

2. Bill Parker, Technical Director for Communications Services reported on EMC-S publications. The new feature of including short technical papers in our EMC-S Newsletter was discussed. Ed Bronaugh had been requested to expand the effort and to use full length papers. The Board again indicated that the present format as shown in the Fall Newsletter was desirable and that there be a clear distinction with these articles and those warranting archival treatment in the Transactions. Publishing articles from other journals or newsletters were also brought up. It was decided that the original intent of short papers by EMC-S contributors not be changed at this time unless there are compelling reasons to do so. However, such journal or newsletter articles of interest to EMC members could be abstracted and placed in our newsletter "Abstracts" column.

3. A review of EMC-S symposia was presented by Gene Cory. First, a report on the San Antonio symposium was passed to the attendees. A net surplus of about \$27,000 was reported. Other facts include the following as provided by the symposium chairman, Mel Johnson:

1984 San Antonio Symposium (April 24-26, 1984)

Registrants:	800+
Exhibits:	86
Luncheon:	450
Reception:	600

Because exhibitors had to be turned away, Ed Norris of Honeywell is heading up an exhibitors committee to help ease this situation as well as review other symposia plans for exhibitors.

Next Dr. Sato reported on preliminary data for the Tokyo symposium, which was presented entirely in English.

Registrants:	392 advanced (512 were registered by the end of the week)
Breakdown:	68% Japan 15% USA 2% France, West Germany, Sweden and Switzerland 1% Canada, China, India <1% 14 other countries
Exhibits:	30+
Papers:	Close to 200 (two volumes needed for conference record)

Further details will be reported in the next newsletter.

Boston in 1985 is progressing with papers due last November 30, 1984. It was noted after the meeting that the 1985 CISPR meeting is the week following the Boston symposium in Sydney, Australia. That ought to keep a few members on the go! Plans for the San Diego 1986 symposium as well as Atlanta in 1987, Boulder in 1989, and Washington, D.C. in 1990 are all proceeding. It was noted that the 1990 date was changed to August 21-23.

The 1991 symposium location was approved. The symposium will be in New Jersey. Don Heirman is General Chairman with Hank Ott handling arrangements. Any members in the New Jersey/Philadelphia/New York/Long Island/Upper New York State area willing to help, please call Don at (201) 834-3566.

Finally, subsequent to the meeting, the Tokyo organizing committee agreed to sponsor another international symposium in Japan in 1989. France also has agreed to consider sponsoring an international symposium in 1987. It looks at long last that we may have the opportunity to sponsor not only our yearly national symposia, but also participate in truly international conferences outside the U.S. on at least a bi-yearly interval.

4. To aid in fostering international activity, Jim Hill suggested that an "EMC Counsel" be formed. The first counsel activity was a brief meeting held at the Tokyo symposium with representatives planning the French symposium in 1987. Jim also reported on the 1984 Wroclaw, Poland, EMC symposium which is also planned for 1986.

5. Ed Bronaugh, Technical Director for Technical Services, gave his report next. In the standards area, Don Heirman indicated that a major milestone was reached. Project Authorization Requests for six of our older EMC-S Standards were approved by the IEEE Standards Board on September 13, 1984. That means that our standards working group efforts are officially approved, and the path for revision and coordination with other standards writing bodies set. This is the first time PARs were approved on these standards in years (some over 20 years). Don will present more detailed information on the impact of the Standards Board action in a later newsletter, and not in this one as reported in the 1984 Summer Newsletter. Poul Anderson, SAE, was named to act as liaison representative member to the EMC-S Standards Committee to work with us on IEEE STD 263. In addition, Lou Weinberg and Glenn Dash were added to the committee roster and Bud Taggart resigned. We want to thank Bud, our immediate past Standards Committee Chairman, for his many contributions to EMC-S standards over the years and wish him well in retirement from NBS.

The Education Committee, chaired by Hank Ott, indicated good reception of their "EMC Experiments Book." The Board asked that the material be budgeted in 1985 for distribution to the EMC-S members at a price to be determined. Finally, the Education Committee has underway a survey of U.S. colleges and universities to determine if they now offer or plan to offer courses on EMC. IEEE student chapter counselors will receive the questionnaire.

Ed finished his report with a brief discussion of the work of the EMC-S Technical Advisory Committee, chaired by Ed Skomal. Ed has requested that the Board formalize the degree of TAC participation in the technical programs of our symposia. It should be noted that TAC with its seven technical committees has already been asked to serve as the papers review committee for the 1986 San Diego symposium.

6. Gene Knowles presented Fred Nichols' report on Member Services. The good news is that there are three new EMC-S Chapters: Detroit, Ottawa, and Israel. Israel and Ottawa join Tokyo as our non-U.S. chapters. Jim Toler's report on membership was presented by Don Clark. Our Society membership is approaching 2,500 worldwide, which exceeds our projections for 1984. The Committee is also considering a contest among local EMC Chapters to see which can get the most members upgraded to senior member in 1985. The election results to the Board for the three years ending December 31, 1987, were not released in order to investigate why ballots were not received by all members in time to cast their vote. By the time this newsletter is published, it is hoped that the problem will be resolved. For further details, call Gene Knowles at (206) 575-5280.

7. Dr. Sato presented his report on Professional Services. Ernie Freeman's employment analysis based on data from 247 attendees at the San Antonio Symposium is being tabulated. The areas of public relations and inter-society relations were not reporting any activity. The Board indicated that these and the other committee activities in the professional services area are important and need to be increased. Jerry Rothhammer agreed to assist Dr. Sato in developing positive plans of action for these committees.

8. President Knowles reported on action items, in particular, the deadline for 1985 budgets from committee chairmen, due by January 1, 1985. The proposed November 30, 1984 Board meeting reported in this column in the Summer Newsletter was moved to January 22, 1985, in Los Angeles on the day before the REGICON meeting also discussed in Summer 1984 Newsletter.

9. The meeting adjourned at 5 p.m. President Knowles again expressed the appreciation of the Board for the generous hospitality provided by the Tokyo Symposium Steering Committee. After all, how often do we get an opportunity to meet and exchange ideas with such a large EMC community in the Far East. The results of the January 22 Board meeting will appear in the Spring Newsletter.

Respectfully submitted,

Don Heirman
Associate Editor
BOD Activities

BOOK REVIEWS

Although we have been home for almost two months, memories of the symposium recently held in Tokyo, Japan still linger. It was an outstanding event, well managed, and the first one held outside of the United States. The turnout was very good, with about 350 Japanese EMC engineers, 80 from the USA, and about 70 from other parts of the world. The program was well organized with over a hundred fine papers. The exhibits were truly international in scope with suppliers not only from Japan, but also the USA, England, Switzerland, and other countries. The Proceedings are in a two volume set which we will review in the next issue of this newsletter. We have also received the Proceedings of the IERE International Conference on EMC held last September at the University of Surrey. This will also be reviewed in the next Newsletter. For this issue, we have a review of "Noise in Electronic Systems and Devices."



by Jim Hill, EMXX Corporation.

We have just received a letter from Dr. Excell of the University of Bradford in England. He has responded to our comment in the last Newsletter that many of the papers presented at the Wroclaw Symposium are in Russian. He states that the University of Bradford can offer specialists translation services from Russian, German, French, or Spanish into English. This is the result of an arrangement between Dr. Excell, and EMC specialist with some knowledge of languages, and the University Modern Language Department, which is among the leaders in its field in the U.K. The procedure is that Modern Language personnel have a first shot at the translation; then Dr. Excell goes through it with them to sort out the jargon and make sure that it all makes sense. Anyone interested should contact:

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The current charges for this service is about \$60.00 per 1000 words.

NOISE IN ELECTRONIC SYSTEMS AND DEVICES

by
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New York, NY 10016 U. S. A.
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Noise, as discussed in this publication, is the random fluctuations in voltage (or current) at the terminals of devices and components. It originates in the microscopic behavior of charge carriers. For the EMC engineer and designer, it is the "micro" aspect of interference (particularly important in limiting the performance of small signal circuits) that is discussed, as opposed to the "macro" aspect of interference caused by higher voltage and power signals generated in equipments and systems.

The book is devoted substantially to solid state noise, since, as noted by the author, another book, "Electrical Noise" by D. A. Bell, published by Van Nostrand in 1960, fully discusses noise in vacuum tubes.

The book contains 13 chapters, seven appendices and an index (plus, of course, a table of contents). A very rigorous and thorough approach is taken and all aspects of solid state

noise appear to be covered. History of solid state noise investigations is covered in some detail, and there are extensive references to other publications.

Chapter 1 begins with a discussion of mathematical techniques including singularity functions, Fourier transforms, stochastic processes, energy theorems, the Wiener-Levy process, shot and thermal noise, and other techniques. Other chapters include "Noise in JFETS and MOSFETS," "1/f Noise," "Burst Noise," "Tunnel Diode and Parametric Amplifiers," "Quantum Mechanics and Noise," "Josephson Junction Devices," and more. The appendices discuss Poisson distribution, Nyquist's treatment of thermal noise and similar subjects.

The author is impartial and objective in his treatment of noise and points out, frequently, the controversial nature of our understanding of some types of noise. For example, it is somewhat surprising to note that the "physical origin (of 1/f noise) remains as obscure today as it has ever done." The author delineates the various experimental and theoretical explanations, and points out that none have been satisfactory to date, although one approach known as "Handel's quantum theory" may provide some answers to questions raised experimentally.

This book contains a complete in-depth presentation for professional people, who must understand solid state noise as it pertains to component and device circuitry. The reader should have a substantial knowledge of mathematics and solid state physics. I suggest that the book will become a standard reference on solid state noise.

Reviewed By: A. H. Sullivan, Jr.
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CHAPTER CHATTER



by Charles F.W. Anderson

Central New England

As reported in the last column, the Chapter's October meeting featured Glen Dash's talk on ESD, including ESD simulators and their use in testing computer hardware. A proposed specification for ESD testing at product level was also discussed. There were 15 attendees.

At the December 5th meeting, Chet Smith reported on the 1985 IEEE Symposium of which he is the general chairman. Chet mentioned that the August Symposium will emphasize the increasing importance which EMC has assumed in the public sector, because of such aspects as safety, transportation, home environments, and use in industrial complexes. Twelve attended this meeting.

Chicago

The Chapter held a meeting at D.L.S. Electronic Systems, Inc., Glenview on November 23rd. Elections were held (no information yet on the new officers) and two topics were presented: "Use of Ferrite Beads to Reduce Emissions," and "Dealing with the FCC."

Littleton (Denver)

Several Chapter business items were handled at the September 18th meeting, the rest of which was devoted to the two talks mentioned in our previous column. Lloyd Perry (FCC) described the interference resolution organization of the FCC, and detailed a number of interference situations which were investigated by the local FCC office. Chuck Hilger (Tektronix) demonstrated spectrum analyzer use and applications. He had four working systems available for hands-on operation by the attendees. Tektronix's local office hosted the meeting and provided refreshments. There were nine IEEE members and four guests in attendance.

On November 14th, the Chapter met at the Straube Associates offices. A Corcom Co. speaker discussed EMC filter testing and Bud Taggart (who is now a consultant) spoke on the topic "Radio Station EMP Hardening."

Los Angeles

The Chapter's October 18th meeting featured an overview and demonstration of Dynamic Sciences' DSI-900 automated wide-range receiving system. Paul Glovins and Stan Kranzler of DSI made the presentation/demo.

New Jersey Coast

The Chapter is now the New Jersey Coast EMC/VT/AP Chapter, merger approval having recently been given by IEEE headquarters. (To your Column Editor's knowledge, this is the only tri-partate Chapter in the IEEE Society organization.)

In addition to the speaker mentioned in the Fall newsletter, the September meeting also had a demonstration of EMC equipment by Sol Abrams of Polarad.

The October 16th meeting had Anatoly Tsaliovich (Thomas & Betts) as the featured speaker. He discussed cable, connector and cable assembly aspects of electronic systems EMC.

On November 20th, Luke Schimpf (who has now retired from Bell Labs) presented a talk on "Estimates of Expected Coverage for 930 MHz Paging Systems." He described a method which can be used to estimate the distance to the reliable service boundary for one-way signaling transmitters. This method includes building penetration loss factors, as well as pager sensitivities.

As might be expected, the December 18th meeting was the annual Christmas Party/ Membership Drive. The only business item included the reconfirmation of Chapter officers because of the merger mentioned above.

Chapter officers for the '84 - '85 period are:

Luke Schimpf, Chairperson
John Mumbauer (Honeywell), Vice chairperson
Mike Sligh (Honeywell), Secretary/Treasurer

San Diego

On November 13th, Dr. James Knighten of IRT Corp. was the speaker, and the meeting was held at IRT's new facilities in Torrey Pines Science Park. A complimentary buffet was provided by the host organization. Dr. Knighten presented an overview of the IRT EMP/EMC facilities prior to a detailed tour of the IRT complex.

Tokyo

Three papers were presented at the July research meeting held in Tokyo. The September 20/21 meeting, in Sendai, had a total of 15 papers presented, plus a report on the 1984 International Microwave Symposium. The November 20th meeting, again in Tokyo, featured three papers and a report on the EMC Symposium. There were 512 Symposium attendees from 23 countries. The paper topics at the research meetings covered the usual wide range. Representative titles included:

- "Immunity of Twisted-wire Pairs," by Yoshio Kami and Professor Sato
- "Crosstalk Noise on High-density PC Boards" by Messrs. Sudo, Iida, Yoshihara and Miyagi (of Toshiba)
- "Evaluation of three meter Site Attenuation by the Moment Method" by Messrs. Kawana & Yamanaka (Radio Research Laboratories, M.P.T. and Horiguchi (Tohoku University)

Washington

Congratulations to the Chapter, which celebrated its 25th anniversary with a dinner at Patton Hall Officers' Club, Ft. Myers on December 6th. Jim Hill and his fellow committee members, Tom Doeppner, Bruce Gabrielson, Bob Haislmaier and Julius Knapp, should get special thanks for the affair and the banquet program, which included a copy of the menu of the Chapter's banquet held in June 1960, as a part of the Second National Symposium on Radio Frequency Interference, as well as other historical information. The Anniversary Dinner included an open bar (sponsored by a number of the companies which have operations in the Washington area), a fine menu (including wine - courtesy of Frank Borghetti of Eaton), drawings for door prizes (contributed by AEL, EMXX, R&B Enterprises, and Don White Consultants), chapter awards and a showing of the IEEE Centennial film, "The Miracle Force." May the next 25 years be even more successful for our Washington Chapter as the first 25 have been! Incidentally, as of December 1, the Chapter had a membership of 186!

SHORT PAPERS, ARTICLES, AND APPLICATION NOTES

The initial response to this department in this newsletter was good. However, this time we received nothing. Is everyone out of ideas? Surely not. We hope it is because of the hustle-bustle of the Tokyo EMC Symposium, submitting papers for next year's Boston EMC Symposium, and the holidays.

This department can be an excellent, valuable technical forum if used. The items here come from EMC people: engineers, scientists, and technicians, i.e., you, the reader! Please take time to contribute.



by Edwin L. Bronaugh

SHORT REPORT

ON THE SEVENTH INTERNATIONAL WROCLAW SYMPOSIUM ON ELECTROMAGNETIC COMPATIBILITY

The Symposium was held from 18 to 20 June 1984. Organized by the Association of Polish Electrical Engineers, The Wroclaw Technical University, and the Institute of Telecommunications, it was co-sponsored by national engineers' associations from 13 countries and by eight international organizations (see appendix). Prof. W. Majewski, Minister of PTT of the Polish People's Republic, was the Patron of the Symposium.

Prof. A. Smoliński, vice-president of the URSI, headed the Symposium Council, and Prof. F. L. Stumpers, vice-chairman of the URSI Com. E and a former chairman of the CISPR, chaired the Scientific Program Committee. Prof. R. G. Struzak, vice-chairman of the CCIR SG1, served as the symposium chairman.

Over 200 scientists and engineers from 32 countries participated, representing Europe, North America and Asia.

On June 18, Mr. E. Janowski, Director General of the Polish PTT, opened the conference on behalf of the Symposium Patron. Among the greeting telegrams submitted there was one in which Dr. V. A. Shamshin, the Minister of PTT of the USSR, underlined the truly international character of the event and its special role in direct contacts between scientists and engineers from East and West, North and South.

From many contributions offered, more than 100 papers from 21 countries have been selected for printing in the Symposium Record and for discussion at the conference. The core of the symposium was constituted by seven special invited sessions organized by Prof. K. Bullough from the United Kingdom (EM environment), Prof. H. Kikuchi from Japan (EMC and active line models), Prof. H. Mikolajczyk from Poland (EMC and biology), Prof. L. E. Varakin from the USSR (EMC in mobile radiocommunications), Prof. Ch. Ts. Tsydypov from the USSR (radio wave propagation), Dr. H. Lorke from GDR/CCITT (EMC and wire telecommunications), Prof. S. Lundquist from Sweden/URSI and Prof. F. L. Stumpers from Holland/URSI (lightning and EMC).

Moreover, there were four special workshops organized on automatic interference measurement software (Mr. L. von Necker, Rohde and Schwarz Co., FRG), on computer-aided TV network analysis (Prof. R. G. Struzak, Institute of Telecommunications, Poland), on radio monitoring (Mr. G. Gruen, Rohde and Schwarz Co., Austria), and on RF field strength measuring instrumentation (Dr. R. Thierbach, Messeelektronik Co., GDR).

This core was complemented by invited papers on the most actual topics such as those prepared by Prof. D. Middleton

from the USA on threshold signal detection in non-uniform, non-gaussian EMI fields, Prof. J. Seidler from Poland on dynamic compatibility in systems with state identification, Dr. M. Borsero and Prof. E. Nano on generation of EM fields for immunity measurements, and Dr. J. Hamelin et al. from France on radiation emitted by leaders and intracloud lightning.

Contributions offered spontaneously were allocated to sessions chaired by Mr. J. Rutkowski, Poland, Dr. J. Pawelec, Poland, Dr. Yu. Polozok, USSR, Prof. J. Perini, USA, Dr. J. Hamelin, France, Prof. A. Wojnar, and Prof. L. Kiernozycki, Poland.

The 17 sessions of the symposium covered the broad field of EMC. Prof. F. L. Stumpers in his Keynote Address drew special attention to the URSI studies with which the program of the Wroclaw conference coincides in many aspects.

All the meetings took place on the premises of the Wroclaw Technical University.

In addition to usual technical and social activities, on the last day there was a common meeting of the Symposium Council, Program Committee, Organizing Committee and all session chairmen. Problems of international information exchange in the field of EMC and possible improvements of future Wroclaw EMC symposia were discussed. Among others, questions of authors' attendance, simultaneous translation, and possible meeting places were considered. A general opinion was that the 7th Wroclaw EMC Symposium was the occasion for useful review of the activity in the field of EMC.

Copies of 1070-page Proceedings of the Symposium "Electromagnetic Compatibility 1984" are still available from:

EMC Symposium
Box 2141
51-645 Wroclaw 12
Poland

The papers are printed in their original languages, i.e., English or Russian, with the summaries in the language other than the full paper.

A review of the Proceedings of the Seventh International Wroclaw Symposium on EMC appeared in the Book Review Section of the last issue of the EMC Society Newsletter (Issue No. 123).

In North America copies of the Wroclaw Proceedings are available from the EMXX Corp., 6706 Deland Drive, Springfield, VA 22152. The price is \$30.00 for the two-volume set, postage prepaid.

EMC PERSONALITY PROFILES



by William G. Duff



CHESTER L. SMITH

Chet has been with the MITRE Corporation in Bedford, MA since 1979 where he is currently involved with EMC issues on the Aircrew Alerting Communications (EMP) (AACE) and also on the Ground Wave Emergency Network (GWEN) programs. In connection with GWEN, he has been representing the Air Force on the NTIA Special Working Group to resolve certain issues involving the Power Line Carrier systems which also occupy the same general portion of the spectrum. During the first couple of years at MITRE, Chet was concerned with IM and certain EMI problems with satellite down-link stations both fixed and mobile. He was and still is involved with evaluating antenna designs for these and other AF programs. He devised a special LF low-profile (height about 15 m) for use in areas where aircraft may be active.

Prior to MITRE, Chet was with GTE for a total of 15 years. At GTE he was involved with antenna research and EMP/EMR/EMI problems. He was interested in EMP back when it was called the "Radio Flash" (which sounds like something that should be arrested). He headed up the Advanced Techniques Section in the Antenna and Microwave Laboratory, a group concerned with such diverse problems as buried antennas for Minuteman to large parabolics for commercial satellite ground stations. Later he was in charge of the Sprint Ground EMP group.

He was born in Escondido, CA and after serving in the US Army Signal Corps in WW II, he attended the California Baptist Theological Seminary (Th. B) and later finished at the University of Utah (BS EE). He also has degrees from Northeastern University in Boston (MS in Math/Physics) and the Ph. D. EE from Clayton University. After graduation from Utah, he joined the Douglas Aircraft Company, El Segundo Div. to work on aircraft antennas and radomes.

Before leaving DAC, he headed up the radome design and test group. From there he went to the Raytheon Company in Bedford, MA to work on radomes for Hawk, Sparrow, and Hustler. From microwave radomes to microwave antennas was an easy transition at Raytheon. After Raytheon he tried a stint as Chief Engineer for Gabriel Electronics, then of Millis, MA. Having decided that high management was not for him, he left Gabriel for the position at GTE Sylvania.

He has written a number of papers on various aspects of radome testing and holds a patent on microwave darkrooms. He authored a book-length report on antennas for radiometers for NASA concentrating on designs for sensing the neutral oxygen lines. He also appeared a time or two in the hallowed pages of the IEEE EMC Symposia Records.

Chet is and has been an active participant in professional activities. He joined AIEE in 1950 as a student member and the IRE in 1954. He helped organize the Boston Chapter of Aerospace Navigational Electronics Group of the IRE, and was the first chairman when the merger of IRE and AIEE created the Boston Chapter of the Group on AES. AES was something of a shotgun wedding of four groups, three from IRE and one from AIEE and getting the ruffled feathers smoothed down was a genuine learning experience. During the EMC's Boston Chapter's lean years, AES had many joint meetings with EMC. This created a warm appreciation for EMC and its dedicated practitioners. When job assignments changed with consequent modification of career objectives, Chet joined EMC and became quite active in the Boston Chapter, now called the Central New England Chapter.

After attending a number of International Symposia, Chet and several others in the New England/Upstate New York area got together to seek the privilege of hosting one of these events. Since there is a rather large EMC community (over 100 members of the CNE Chapter alone), this seemed to be a worthy project. The 1985 IEEE International Symposium will be at the Hilton at Colonial, Wakefield, MA on August 20-22 1985. Over 100 papers are on hand and being reviewed, and the 78 exhibit spaces are likely to be filled. To encourage engineering participants to bring their spouses (wives and husbands), the hotel is charging the convention rate for either single or double occupancy. Also travel discounts are being extended by American Airlines for the EMC Symposium. Donick Travel (1-800-621-0852, ext. 121) has full details, and will make sure travelers get all the breaks coming to them.

Chet is currently a member of the Board of Directors for the EMC-Society, having served as Technical Director for Communications Services and lately as Vice President.

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.

EMCABS

In this issue, we are publishing 48 abstracts. These are abstracts on various EMC topics. We plan to continue publishing abstracts of papers from previous EMC Symposia and from other conferences. The EMCABS committee is composed of the members listed below. By way of introduction to the community, they are listed with their company affiliations.



MELVIN J. JOHNSON

L.F. Babcock, Bell Aerospace Textron
E.L. Bronaugh, Electro-Metrics/Penril Corp.
R.N. Hokkanen, Naval Training Equipment Center
R. Jacobson, Sperry Flight System

D.R. Kerns, Southwest Research Institute
S. Kuniyoshi, Naval Sea Systems Command
R.B. Schulz, Xerox Corp. Off. Prod. Div.
R.M. Showers, University of Pennsylvania

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

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

Mathematical and Physical Scaling of Triggered Lightning
R. W. Ziolkowski, and J. B. Grant
Lawrence Livermore National Lab., CA
DE84002480 PC A02/MF A01, Contract W-7405-ENG-48
Dec 82, 22p UCID-19655

EMCABS: 1-12-84

ABSTRACT: As the aircraft industry incorporates current technology in airborne systems, electromagnetic compatibility can decrease. Composite fuselages can be more transparent to EMP, whether nuclear or lightning generated, than metal ones. Solid-state circuitry is sensitive to intense EM fluctuations, whereas mechanical controls generally are not. With this increased vulnerability comes increased concern for these dangers. Recently the anxiety over lightning has risen. Answers are sought to such questions as: how do the lightning EM effects couple into the aircraft's interior? Do aircraft trigger lightning, and if so, can the triggering be minimized? An understanding, at least to some extent, of lightning would provide a needed foundation to examine the interaction of aircraft with lightning. A review of the literature on lightning and lightning-aircraft investigations, including triggered lightning, was conducted, and is briefly summarized in this paper. In addition to this brief literature review, scaling the lightning event to laboratory size is also discussed. The ability to scale would allow accurate investigation of lightning effects as well as the triggering phenomena, in scaled experiments. (ERA citation 09:001620).

INDEX TERMS: aircraft, review, literature, triggered lightning

EMC (Electromagnetic Compatibility) Modeling and Analysis-A Probabilistic Approach

A. Ephreth, and D. D. Weiner

Syracuse Univ., NY. Dept. of Electrical and Computer Engineering.

AD-A 135 664/1 PC A06/MF A01 Phase rept., Contract F30602-78-C-0083

Apr 83, 110p, RADC-TR-83-102

ABSTRACT: This report provides a new and fundamental basis for EMC analysis, i.e., a probabilistic approach. The advances in high speed, high density integrated circuit (IC) technology provides the impetus for investigating new concepts in electromagnetic compatibility/electromagnetic interference (EMC/EMI). Performance criteria, acceptable performance, EMI performance curve and performance threshold are concepts relating to susceptibility levels in a probabilistic manner. In addition, the interaction at different levels (e.g., system, subsystem, equipment, component) are also discussed. Because large portions of systems are being replaced by complex ICs and because the electromagnetic environment and equipment susceptibility are in reality, random in nature, a probabilistic approach enables one to develop a statistical macromodel. In such an approach, detailed circuit models and functions are replaced by statistical models where probability density functions are used to evaluate probabilities and statistical averages associated with various responses at various operational levels. (Author)

INDEX TERMS: EMC analysis, probabilistic approach

EMCABS: 4-12-84

Intrasystem Analysis Program (IAP) Code Summaries
J. J. Dobmeier, A. L. S. Drozd, and J. A. Surace
ITT Research Inst., Chicago, IL

EMCABS: 2-12-84

AD-A 135 673/2 PC A04/MF A01 Interim rept. Aug 7-Dec 82, Contract F30602-78-C-0222 May 83, 70p RADC-TR-83-101

ABSTRACT: This report contains detailed descriptions and capabilities of the codes that comprise the Intrasystem Analysis Program. The four codes are: Intrasystem Electromagnetic Compatibility Analysis Program (IEMCAP), General Electromagnetic Model for the Analysis of Complex Systems (GEM-ACS), Nonlinear Circuit Analysis Program (NCAP), and Wire Coupling Prediction Models (WIRE). IEMCAP is used for computer-aided evaluation of electromagnetic compatibility (EMC) at all stages of an Air Force system's life cycle, applicable to aircraft, space/missile, and ground-based systems. GEMACS utilizes a Method of Moments (MOM) formalism with the Electric Field Integral Equation (EFIE) for the solution of electromagnetic radiation and scattering problems. The code employs both full matrix decomposition and Banded Matrix Iteration solution techniques, and is expressly designed for large problems. NCAP is a circuit analysis code which uses the Volterra approach to solve for the transfer functions and node voltage of weakly nonlinear circuits. The Wire Programs deal with the Application of Multiconductor Transmission Line Theory to the Prediction of Cable Coupling for specific classes of problems. (Author)

INDEX TERMS: descriptions, capabilities, IEMCAP, GEMACS, NCAP, WIRE, ECM

Attenuation of 900 MHz Radio Waves Propagating into a Metal Building

Harold H. Hoffman and Donald C. Cox

Bell Laboratories

IEEE Transactions on Antennas and Propagation

Vol. AP-30, No. 4, July 1982, pp 808-811

ABSTRACT: The attenuation of radio waves propagating into buildings is a crucial factor in the feasibility and design of portable radio telephone systems. In order to characterize signal statistics of an approximate worst-case building, signal levels were measured inside a steel shell building at 900 MHz. Cumulative signal level distributions determined for 4-ft.-square areas at 3, 5, and 7 ft. heights within the building are good approximations to the Rayleigh distribution. Attenuation medians for the 4-ft.-square areas range from 26 dB to 32 dB.

INDEX TERMS: attenuation, metal buildings, Rayleigh distribution

EMCABS: 5-12-84

Electromagnetic Near-Field Computations for a Broadcast Monopole
Using Numerical Electromagnetics Code (NEC)

D. D. Thompson

Naval Postgraduate School, Monterey, CA

AD-A 135 975/1 PC A07/MF A01, Master's thesis

Sep 83, 150p

ABSTRACT: An often ignored aspect of electromagnetic radiation from antennas is the characterization of their near-fields. A computer program, Numerical Electromagnetics Code, is validated for accurate near-field computations and applied to a model of a broadcast monopole. E- and H-fields are plotted as a function of position along the antenna for various distances from the surface. The fields are also plotted as a function of radial distance outward for various heights. (Author)

INDEX TERMS: electromagnetic radiation, antennas, Numerical Electromagnetics Code

EMCABS: 3-12-84

New Concept in Backplane Communication

EMC & Gary Connor

Advanced Micro Devices

Electronic Engineering

Vol. 56, NO. 689, May 1984, Pgs. 97-99

ABSTRACT: A new type of bus transceiver that allows differential signaling is described. The device helps to reduce RFI and EMI if matched terminations and twisted pairs are used.

INDEX TERMS: backplane communication, differential signaling, RFI, EMI

EMCABS: 6-12-84

FCC INITIATES NEW SAMPLING PROGRAM

As part of a reorganization of the FCC's Authorization and Standards Division, Office of Science and Technology, the Division has augmented its equipment sampling program. The sampling program will emphasize but not be limited to testing new types of equipment, such as cordless telephones, computing devices, and RF lighting sources.

The new program will concentrate on production units manufactured for sale to the public after the initial equipment authorization grant has been issued, rather than on engineering prototypes presented prior to grants. The Commission expects to use the results of these tests for a number

of purposes: (1) evaluation of the Verification and Notification programs, adopted in FCC Docket 83-10; (2) enforcement actions in cases of non-compliance with FCC Rules; (3) confirming initial estimates of the interference potential of new devices; (4) supporting rulemaking activity; (5) verifying test data provided by manufacturers in support of equipment authorization applications; and, (6) monitoring the test results of independent labs.

For further information, contact Richard Fabina, Sampling and Measurements Branch, FCC Laboratory, P.O. Box 429, Columbia, MD 21045. Phone: (301) 725-1585.

22ND ANNUAL NUCLEAR & SPACE RADIATION EFFECTS CONFERENCE CALL FOR PAPERS

The 1985 Conference on Nuclear and Space Radiation Effects will be held July 22-24, 1985, at the Hyatt Regency in Monterey, California. In addition to the program, a short course on radiation effects will be offered on July 21 at the Naval Postgraduate School. The conference will cover nuclear and space radiation effects and electromagnetic pulse effects on electronic devices, materials, circuits, and systems, as well as semi-conductor processing technology and techniques for producing radiation-tolerant (hardened) devices, integrated circuits, and memories.

Papers in the following are sought:

- Basic Radiation Effects Mechanism for Materials and Devices
- Radiation Effects and Spacecraft Charging in Satellites
- Radiation Transport, Energy Deposition, Dosimetry, and Radiation Facilities
- Methods of Design and Manufacturing for Radiation-Hardened Electronic Devices, Integrated Circuits, and

the Effects of Radiation on These Devices

- EMP Phenomena, Assessment of Coupling, and Measurement Technology (IEMP, SGEMP, SREMP)
- Single-Event Upset and Latchup Phenomena
- Hardness Assurance Technology and Testing Techniques
- Radiation Effects on the Materials and Electronics of Nuclear Reactors (Power and Space)
- New Developments and New Technologies of Interest to the Nuclear and Space Radiation Effects Community

Ten (10) copies of the summary must be submitted to the 1985 Technical Program Chairman no later than March 1, 1985. Mail summaries to J. M. McGarrity, 1985 NSRE Technical Program Chairman, Harry Diamond Laboratories, 2800 Powder Mill Road, Adelphi, MD 20783. Phone: (202) 394-3180.

<p>Microwave Radiation Protection Donald R. Kerns U. K. Ministry of Defense Electronic Engineer Vol. 55; No. 683; Nov 1983 pgs 25 1-24-84; Vol. 55; No. 683; Nov 83, pgs 25 ABSTRACT: An English language abstract of two West German reports dealing with the effects of microwaves and radio waves on humans and methods of protection. English translations available from Tech Alert, Room 206, Ebury House, Ebmorey Bridge Road, London. SW/W820. INDEX TERMS: radiation hazards, radiation protection, effects, microwaves, radio waves, humans</p>	<p>EMCABS: 7-12-84</p>	<p>Picosecond Domain Waveform Measurements: Status and Future N. S. Nahman National Bureau of Standards, Washington, DC PB84-152297 Not available NTIS Mar 83, 8p Pub. in IEEE Transactions on Instrumentation and Measurement IM-32, nl p117-124 Mar 83. ABSTRACT: A review of the state-of-the-art of picosecond time-domain waveform measurements is presented which includes measurements in both the electrical and optical regions of the electromagnetic spectrum. This review is the latest edition of a series of reviews on high-speed pulse measurements compiled by the author commencing in 1967; specifically, this review updates the 1978 review. The significance of the IEEE Pulse Standards 181 and 194 (or the identical IEC Standards 469-1 and 469-2) are discussed briefly. The classification of time domain measurements from the 1978 review is summarized and augmented with basic instrumentation block diagrams. The advances in the present-day capabilities from those in 1978 are presented via temporal resolution state-of-the-art charts using the 1978 format; however, the only entries in the charts are those that have changed since 1978. Also, presented are some opinions as to the future directions of electrical and optical picosecond domain measurements. Fifty-six references are cited. INDEX TERMS: picosecond, waveform measurements, electrical, optical, electromagnetic spectrum</p>	<p>EMCABS10-12-84</p>
<p>Electromagnetic Shielding National Technical Information Service, Springfield, VA 1972-October, 1982 (Citations from the NTIS Data Base) Dec 82, 370p; supersedes PB81-808669 and PB80-810849 ABSTRACT: The bibliography presents research on electromagnetic shielding of electronic and electrical equipment, personnel, and ordnance. The shielding effectiveness of materials and structures is covered. Nuclear electromagnetic pulse shielding is included. (This updated bibliography contains 364 citations, 30 of which are new entries to the previous edition.) INDEX TERMS: bibliography, shielding effectiveness, materials, structures</p>	<p>EMCABS: 8-12-84</p>	<p>Impact of Electrostatics on IC (Integrated Circuit) Fabrication W. K. Denson, and T. Turner Reliability Analysis Center, Griffiss AFB, NY AD-A137 372/9 PC E04/MF A01 Contract F30602-81-C-0299 Final rept. Jan-Sep 83 Sep 83, 39p Rept no. RAC-TR-83-09-E01 ABSTRACT: Integrated circuit fabrication processes inherently involve materials with a high propensity of triboelectric charge generation. This report details the results of a study in which the intent was: 1) to determine how electrostatic charges can catastrophically damage integrated circuits during their fabrication; and, 2) to investigate the effect these charges have on individual fabrication processes. Possible reliability implications of the presence of electric charges during fabrication are also hypothesized. An experiment was also carried out to determine the susceptibility of IC's in wafer form. In these tests, devices were stressed at various levels and then electrically tested to determine their functionality. Additionally, the susceptibility modes of devices in wafer form were compared to those in packaged form. INDEX TERMS: impact, IC, fabrication, electrostatic charges</p>	<p>EMCABS:11-12-84</p>
<p>Electromagnetic Shielding Plastics National Technical Information Service, Springfield, Va. 1972-February, 1983 (Citations from the International Aerospace Abstracts Data Base). Report for 1972-Feb. 83., Feb. 83, 91p.; Supersedes PB82-861311. Prepared in cooperation with the National Aeronautics & Space Admin. Wash., DC ABSTRACT: This bibliography contains citations concerning electromagnetic shielding by means of electrically conducting plastics. Applications include coatings for infrared instrumentation, radar absorbers, composite materials for aircraft construction, laser window materials, and shielding of probes to minimize RF interference on scientific satellites. (This updated bibliography contains 80 citations, 13 of which are new entries to the previous edition.) INDEX TERMS: bibliography, electromagnetic shielding, plastics</p>	<p>EMCABS: 9-12-84</p>	<p>High Voltage Grounding Device for Pressurized Equipment J. W. Ogland Department of the Air Force, Washington, DC PAT-APPL-6-549-532 PC A02/MF A01 Patent Application, Filed 8 Nov 83, 14p AD-D010 774/8 ABSTRACT: A safety device for discharging high voltage circuits operated in pressurized containers. The device is positioned within an elbow or other protrusion through which passes the high voltage feed thru electrode. In one embodiment the grounding contact is automatically forced against the high voltage contact by the expansion of a bellows upon decompression of the container while in an alternate embodiment, the grounding contact is manually threaded against the high voltage contact. INDEX TERMS: high voltage grounding device, pressurized equipment</p>	<p>EMCABS: 12-12-84</p>

EMP NOTE SERIES

The following EMP-related notes have been published and distributed recently:

- "Plane Wave (EMP) Incidence on a Finitely Conducting Plane Earth with the Magnetic Field Intensity Parallel to the Earth's Surface," H. P. Neff, Jr. and D. A. Reed, University of Tennessee, Knoxville, TN 37916, February 1984. (Specify TN 351.)
- "Finitely Conducting, Infinitely Long, Cylindrical Wire in the Presence of a Plane Wave (EMP)," H. P. Neff, Jr. and D. A. Reed, University of Tennessee, Knoxville, TN 37916, February 1984. (Specify IN 436.)
- "Characteristics of American Rockets used for Triggering Lightning. Part I: Rockets from Flight Systems Inc., Burns Flat, Oklahoma," C. B. Moore, D. L. Hall, and I. J. Caylor, Langmuir Laboratory, Geophysical Research Center, New Mexico Institute of Mining and Technology, Socorro, NM 87801, and T. F. Stueber, Bryan Cason, and Duane Patrick, Sandia National Laboratories, Albuquerque, NM 87185, February 1984. (Specify MN 29.)
- "An Investigation into the Use of Detonating Fuses to Create Conducting Paths in the Atmosphere," C. B. Moore, W. P. Winn, D. L. Hall, and J. W. Cobb, Langmuir Laboratory, Geophysical Research Center, New Mexico Institute of Mining and Technology, Socorro, NM 87801, March 1984. (Specify MN 30.)
- "Airborne Platform for Measurement of Transient or Broadband CW Electromagnetic Fields," D. V. Giri, LuTech, Inc., 3516 Breakwater Court, Hayward, CA 94545, and C. E. Baum, Air Force Weapons Laboratory, Kirtland AFB, NM 87117, May 1984. (Specify SSN 284.)

Copies of these notes may be obtained directly from the author, from the Defense Documentation Center, Cameron Station, Alexandria, VA 22134, or from the note series editor, Dr. Carl Baum, Air Force Weapons Laboratory (EL), Kirtland AFB, NM 87117. In addition, these notes are available at many universities and companies doing research in EMP and electromagnetic theory.

EMCABS: 13-12-84

Improving the Repeatability of EM Susceptibility Measurements of Electronic Components When Using TEM (Transverse Electromagnetic) Cells

M. L. Crawford

National Bureau of Standards, Washington, DC

PP84-151844 Not available NTIS Final rept.

1983, 8p Pub. in Proceedings of Society of Automotive Engineers Int.

Cong. Exposition, Detroit, MI, Feb 28-Mar 4 1983, p1-8

ABSTRACT: The paper outlines a systematic approach, using a TEM cell, for evaluating the electromagnetic (EM) radiated susceptibility of electronic equipment. The purpose of the paper is to provide guidelines, for those using Tem cells for performing EM susceptibility measurements, to improve the repeatability and, hence, the value of their test results. The paper describes the test setup, details the step-by-step procedures to use in performing susceptibility measurements, and discusses pertinent information related to the range of application and limitations associated with the use of TEM cells.

INDEX TERMS: TEM Cell, EM, radiated susceptibility, electronic equipment

EMCABS: 16-12-84

General Electromagnetic Model for the Analysis of Complex Systems (GEMACS) Computer Code Documentation (Version 3) Volume 3, Part 2

D. L. Kadlec, and E. L. Coffey

BDM Corp., Albuquerque, NM

AD-A137 464/4 PC A18/MF A01 Final technical rept. Feb 81-Jul 83,

Contract F30602-81-C-0084

Sep 83, 414p BDM/A-83-020-TR-VOL-3-PT-2, RADC-TR-83-217-VOL-3-PT-2, See also Volume 1, AD-A137 461

ABSTRACT: No abstract available.

INDEX TERMS: GEMACS

EMCABS: 14-12-84

Connecticut ELF (Extremely Low Frequency) Field Strength Measurements, March to May 1978

P. R. Bannister

Naval Underwater Systems Center, New London, CT. New London Lab.

AD-A 137 385/1 PC A04/MF A01 Technical rept.

11 Jan 84, 74p Rept no. NUSC-TR-7079

ABSTRACT: From August 1976 to December 1978, extremely low frequency (ELF) fieldstrength measurements were taken continuously in Connecticut. The results of measurements taken from March through May 1978 are discussed in this report. During March, 5dB or greater, nighttime signal fades occurred during 46 percent of the measurement days. A comparison of the normal and abnormal Connecticut horizontal magnetic-field strengths during distributed propagation conditions were also taken before, during, and after the 29 April PCA event (9.8 dB riometer absorption).

INDEX TERMS: ELF, field-strength measurements, Connecticut

EMCABS: 17-12-84

General Electromagnetic Model for the Analysis of Complex Systems (GEMACS) Computer Code Documentation (Version 3) Volume 3, Part 3

D. L. Kadlec, and E. L. Coffey

BDM Corp., Albuquerque, NM

AD-A137 509/6 PC A19/MF A01 Final technical rept. Feb 81-Jul 83,

Contract F30602-81-C-0084

Sep 83, 445p, BDM/A-83-020-TR-VOL-3-PT-3, RADC-TR-83-217-Vol-3-PT-3. See also Volume 3, Part 4, AD-A 137-510

ABSTRACT: No abstract available.

INDEX TERMS: GEMACS

EMCABS: 15-12-84

Biological Effects of Microwave Radiation, 1975-January, 1984 (Citations from the International Information Service for the Physics and Engineering Communities Data Base).

National Technical Information Service, Springfield, VA

PB-84-859636 PC N01/MF N01 Rept. for 1975-Jan 84

Feb 84, 256p Supersedes PB83-864223

ABSTRACT: This bibliography contains citations concerning the short-and-long-term effects of microwave radiation. The physiological effects of thermal stress are considered. Experimental data, including methodology and evaluation, are also discussed. (This updated bibliography contains 303 citations, 26 of which are new entries to the previous edition.)

INDEX TERMS: Short-, long-term effects, microwave radiation

EMCABS: 18-12-84

General Electromagnetic Model for the Analysis of Complex Systems (GEMACS) Computer Code Documentation (Version 3). Volume 3, Part 4

D. L. Kadlec, and E. L. Coffey

BDM Corp., Albuquerque, NM

AD-A137 510/4 PC A24/MF A01 Final technical rept. Feb 81-Jul 83,

Contract F30602-81-C-0084

Sep 83, 567p BDM/A-83-020-TR-VOL-3-PT-4, RADC-TR-83-217-Vol-3-PT-4, See also Volume 1, AD-A137 461

ABSTRACT: No abstract available.

INDEX TERMS: GEMACS

6TH EMC SYMPOSIUM AND TECHNICAL EXHIBITION

The sixth annual Symposium and Technical Exhibition on EMC, sponsored by the Swiss Electrotechnical Association (SEV/ASE), will be held March 5-7, 1985, at the Federal Institute of Technology, Zurich. The conference promotes interdisciplinary contacts and information exchange of EMC problems. Workshops, exhibitions and lectures will include the following topics:

Automated EMC

Measurements

Lightning EMP

Statistical Aspects of

Noise and Limits

Computer Programs for
the EMC Engineer

Nuclear EMP Impact

Statistical Theory of EMC

Power Electronics

Key Problems of
Spectrum Use

Triggered Lightning
EMP

Printed Circuit

Board EMC

EM Wave Interaction with
Biological Systems

EMI Phenomena in Power
Transmission and
Distribution

EMI in Microelectronics

Power and Data Line
Transients

Spread Spectrum and Mobil
Communications

Systems EMC and
Protective Measures

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1985 HEART CONFERENCE CALL FOR PAPERS

The 1985 Annual Hardened Electronics and Radiation Technology (HEART) Conference will be held July 25-26, 1985, at the Naval Postgraduate School in Monterey, California. The purpose of the conference is to provide a high-quality scientific forum for research investigation of a classified or sensitive nature, covering nuclear and space radiation, and EMP effect on electronic devices, materials, circuits, and systems. Also addressed are hardened semi-conductor processing technology and techniques for producing radiation-tolerant (hardened) devices and integrated circuits.

Papers in the following areas are solicited:

- Radiation Effects, SGEMP Phenomena, and Spacecraft Charging in Satellites
- Underground Test Results
- Directed Energy Phenomena
- Processing and Manufacturing Technology for Radiation-Hardened Electronic Devices and Integrated Cir-

cuits

- Radiation Effects on Electronic Devices, Integrated Circuits, Components, and Systems
- Radiation-Hardening Techniques for Electronic Systems
- EMP Phenomena, Coupling, and Simulation for Ground Systems, Aircraft, and Missiles in Flight
- New Developments and Topics of General Interest to the Nuclear and Space Radiation Effects Community

Five copies of the summary must be received no later than March 1, 1985, by the Sandia Technical Coordinator, Jerry A. Hood, Department 2150, Sandia National Laboratories, Albuquerque, NM 87185. Phone: (505) 844-3751.

Questions should be addressed to Technical Program Chairman, William A. Seidler, JAYCOR, P.O. Box 85154, San Diego, CA 92138. Phone: (619) 453-6580.

<p>Lightning Arresters for Domestic and Commercial Electric Power Supplies. 1970-1983 (Citations from the Engineering Index Data Base) National Technical Information Service, Springfield, VA PB84-859701 PC N01/MF N01 Rept. for 1970-1983 Feb 84, 168p Supersedes PB83-862813 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 241 citations, 48 of which are new entries to the previous edition.) INDEX TERMS: lightning arresters, power supplies</p>	<p>EMCABS: 19-12-84</p>	<p>General Electromagnetic Model for the Analysis of Complex Systems (GEMACS) Engineering Manual (Version 3). Volume 3 D. L. Kadlec, and E. L. Coffey BDM Corp., Albuquerque, NM AD-A137 463-6 PC A18/MF A01 Final technical rept. Feb 81-Jul 83, Contract F30602-81-C-0084 Sep 83, 424p BDM/A-83-020-TR, RADC-TR-83-217-Vol-3. See also Volume 3, Part 2, AD-A137 464 ABSTRACT: GEMACS solves electromagnetic radiation and scattering problems. The Method of Moments (MOM) and Geometrical Theory of Diffraction (GTD) are used. MOM is formalized with the Electric Field Integral Equation (EFIE) for wires and the Magnetic Field Integral Equation (MFIE) for patches. The code employs both full matrix decomposition and Banded Matrix Iteration (BMI) solution techniques. The MOM GTD and hybrid MOM/GTD techniques in the code are used to solve electrically small object problems, electrically large object problems and combination sized object problems. Volume III is the Computer Code Documentation Manual. This manual contains extensive software information of the code. INDEX TERMS: GEMACS</p>	<p>EMCABS: 22-12-84</p>
<p>General Electromagnetic Model for the Analysis of Complex Systems (GEMACS) User Manual (Version 3). Volume 1 D. L. Kadlec, and E. L. Coffey BDM Corp., Albuquerque, NM AD-A 137 461/0 PC A06/MF A01 Final technical rept. Feb 81-Jul 83, Contract F30602-81-C-0084 Sep 83, 117p BDM/A-83-170-TR, RADC-TR-83-217-Vol-1. See also Volume 2, AD-A137 462 and report dated Apr 77, AD-A040 026 ABSTRACT: GEMACS solves electromagnetic radiation and scattering problems. The Method of Moments (MOM) and Geometrical Theory of Diffraction (GTD) are used. MOM is formalized with the Electric Field Integral Equation (EFIE) for wires and the Magnetic Field Integral Equation (MFIE) for patches. The code employs both full matrix decomposition and Banded Matrix Iteration (BMI) solution techniques. The MOM, GTD and hybrid MOM/GTD techniques in the code are used to solve electrically small object problems, electrically large object problems and combination sized object problems. Volume I of this report is the User Manual. The code execution requirements, input language and output are discussed. INDEX TERMS: GEMACS</p>	<p>EMCABS: 20-12-84</p>	<p>Pulse Interference Cancelling System for Spread Spectrum Signals Frank S. Gutleber Department of the Army, Washington, DC PAT-APPL-6-423 751 PC A02/MF A01 Patent Application. Filed 27 Sep 82, 17p AD-D009 847/5 ABSTRACT: Cancellation of pulse interference with no loss in the received level of the desired signal is obtained for a spread spectrum system which utilizes orthogonal multiplexed noise codes which when orthogonally multiplexed, matched-filter detected and linearly added, compress to a lobeless impulse. The noise codes are comprised of binary noise codes which compress to a code bit width tau. The pulse interference is eliminated by means of a variable delay line, and a linear adder coupled to the output of a linear adder which operates in combination with a pair of matched filters to provide a lobeless impulse signal. The delay line is varied to provide a 180 degree phase shift for any pulse interference signal which occurs in time coincidence with the lobeless impulse. The original and phase shifted pulse interference signals are added together in the linear adder and, in the process, cancel one another while leaving the lobeless impulse signal with no reduction in signal amplitude. Availability: This government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS. INDEX TERMS: cancellation, pulse interference, spread spectrum system</p>	<p>EMCABS: 23-12-84</p>
<p>General Electromagnetic Model for the Analysis of Complex Systems (GEMACS) Engineering Manual (Version 3). Volume 2 D. L. Kadlec, and E. L. Coffey BDM Corp., Albuquerque, NM AD-A 137 462/8 PC A10/Mf A01 Final technical rept. Feb. 81-Jul 83, Contract F30602-81-C-0084 Sep 83, 221p, BDM/A-83-172-TR, RADC-TR-83-217-Vol-2. See also Volume 3, Part 1, AD-A137 463 and report dated Apr 77, AD-A040 027 ABSTRACT: GEMACS solves electromagnetic radiation and scattering problems. The Method of Moments (MOM) and Geometrical Theory of Diffraction (GTD) are used. MOM is formalized with the Electric Field Integral Equation (MFIE) for patches. The code employs both full matrix decomposition and Banded Matrix Iteration (BMI) solution techniques. The MOM, GTD and hybrid MOM/GTD techniques in the code are used to solve electrically small object problems, electrically large object problems and combination sized object problems. Volume II is the Engineering Manual. The theory and engineering approximations implemented in the code are discussed. Modeling criterion are given. INDEX TERMS: GEMACS</p>	<p>EMCABS: 21-12-84</p>	<p>CW Inteferece Cancelling System for Spread Spectrum Signals Frank S. Gutleber Department of the Army, Washington, DC PAT-APPL-6-413-953 PC A02/MF A01 Patent Application, Filed 1 Sep 82, 17p AD-D009 821/0 ABSTRACT: It is an object of the present invention to provide an improved noise coded communication system. Another object of the present invention is to provide an improved noise coded communication system which eliminates continuous wave or slowly varying continuous wave interfering signals. Still another object of the present invention is to provide an improved noise coded communication system which totally eliminates continuous wave or slowly varying continuous wave interference while experiencing no loss and substantially no degradation of the desired signal. Another object of the present invention is to provide a CW canceller for noise coded communication systems which is relatively small in size, weight and extremely low in cost. Accordingly, these and other objects are achieved by means of a variable delay line, and a linear adder coupled to the receiver output of a multiplexed noise coded transceiver. The noise code comprises a multi-bit binary code having a code bit width TAU. Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS. INDEX TERMS: CW, cancelling system, spread spectrum</p>	<p>EMCABS: 24-12-84</p>

<p>Numerical Solution of Electromagnetic Field Problems in Two and Three Dimensions C. W. Trowbridge Science Research Council, Chilton (England). Rutherford and Appleton Labs. DE82701933 PC A03/MF A01 1981, 27p RL-81-075 U. S. Sales Only ABSTRACT: Recent developments in algorithms for solving electromagnetic field problems carried out at Rutherford Appleton Laboratory (RAL) are reviewed. The interaction of electric and magnetic fields provides many examples of coupled problems which have been solved by the Finite Element method. This paper concentrates on static and low frequency problems using the differential operator approach. The status of computation for 2D fields is discussed. The use of scalar potentials for 3D static fields for economy is emphasized, and the importance of selecting potential types carefully to minimize numerical cancellation errors is also discussed. Some formulations for the vector 3D field problems for eddy current fields are derived with analytic and experimental field measurement comparisons. Results using software packages built at RAL are presented to illustrate the methods. (Atomindex citation f3:672125). INDEX TERMS: numerical solution, electromagnetic field problems, two and three dimensions</p>	<p>EMCABS: 25-12-84</p>	<p>Signal Reconstruction from Fourier Transform Amplitude Patrick L. Van Hove, Jae S. Lim, and Alan V. Oppenheim Massachusetts Inst. of Tech., Cambridge. Research Lab. of Electronics AD-A124 865/7 PC A02/MF A01 Contract N00014-81-K-0742, Grant NSF-ECS80-07102 1982, 7p ABSTRACT: No abstract available. Published in Proceedings of Topical Meeting on Signal Recovery and Synthesis with Incomplete Information and Partial Constraints, pThA15-1-ThA15-4, 12-14 Jan 83. INDEX TERMS: signal reconstruction, Fourier Transform Amplitude</p>	<p>EMCABS: 28-12-84</p>
<p>Radio Wave Propagation: A Handbook of Practical Techniques for Computing Basic Transmission Loss and Field Strength M. Weissberger, R. Meidenbauer, H. Riggins, and S. Marcus Electromagnetic Compatibility Analysis Center, Annapolis, MD AD-A122 090/4 PC A17/MF A01 Contract F19628-80-C-0042 Sep 82, 378p Rept no. ECAC-HDBK-82-049 ABSTRACT: This handbook contains a set of validated models for the computation of the basic transmission loss between a transmitter and a remotely sited receiver. Emphasis is on terrestrial, air-ground, air-air, and earth-satellite circuits in the 10 kHz band. The effects of the imperfectly conducting, irregularly-shaped earth's surface, the troposphere, and the ionosphere are accounted for, as are meteorological variations and ray path obstruction by vegetation and urban structures. Only one model is presented for each type of circuit. The rationale for the selection is discussed. In most cases a version of this model is presented in the form of graphs, tables, or formulas that can be evaluated with hand-held calculations. (Author) INDEX TERMS: radio wave, propagation, handbook</p>	<p>EMCABS: 26-12-84</p>	<p>Method to Quantify the Radiation Characteristics of an Unknown Interference Source Mark T. Ma, and Galen H. Koepke National Bureau of Standards, Washington, DC, National Engineering Lab. PB83-165274 PC A04 Technical note Oct 82, 63p TN-1059 Portions of this document are not fully legible ABSTRACT: A new method for determining the radiation characteristics of leakage from electronic equipment for interference studies is described in this report. Basically, an unintentional leakage source is considered to be electrically small, and may be characterized by three equivalent orthogonal electric dipole moments and three equivalent orthogonal magnetic dipole moments. INDEX TERMS: radiation characteristics, leakage, electronic equipment</p>	<p>EMCABS: 29-12-84</p>
<p>Walsh Functions: Signal Processing. 1975-1982 (Citations from the International Information Service for the Physics and Engineering Communities Data Base) National Technical Information Service, Springfield, VA PB83-857748 PC N01/MF N01 Rept. for 1975-Dec 82 Dec 82, 75p ABSTRACT: This bibliography contains citations concerning applications of Walsh Functions in signal processing. Techniques of Walsh transformations, spectral analysis, and error control are discussed. Properties of Walsh Functions, fast transformations, and data communications are considered. (Contains 71 citations fully indexed and including a title list.) INDEX TERMS: Walsh functions, signal processing, citations</p>	<p>EMCABS: 27-12-84</p>	<p>Analysis Techniques for Power-Substation Grounding Volume I Design Methodology and Tests. Final Report E. B. Joy, A. P. Meliopoulos, and R. P. Webb Georgia Inst. of Tech., Atlanta. School of Electrical Engineering DE83900151 PC A09/MF A01 Oct. 82, 185p EPRI-EL-2682-V-1 ABSTRACT: Procedures for analysis of performance of complex grounding grids are presented. Included are both comprehensive computerized analysis procedures applicable to general grounding systems and simplified graphical procedures which produce accurate results for simple grid structures and which can be used in preliminary analysis of more complex systems. The computerized analysis procedures comprise two computer programs: one which computes ground grid resistance and the step and touch potentials near the grounding system as a percentage of the potential rise of the grounding system; and, one which computes the maximum current emanating from the grounding system and flowing into earth. For a given grounding configuration, the fault location in the substation or on connecting lines which will result in maximum earth current is determined and step and touch potentials computed. INDEX TERMS: analysis techniques, power-substation grounding</p>	<p>EMCABS: 30-12-84</p>

<p>Unification of Electromagnetic Specifications and Standards, Part I - Evaluation of Existing Practices E. F. Vance, W. Graf, and J. E. Nanevich SRI International, Menlo Park, CA AD-A121 700/9 PC A08/MF A01 Contract DNA001-79-C-0206 31 Oct., 80, 156p SRI-8411-P-1, DNA-5433F-1, SBI-AD-E301 068</p> <p>ABSTRACT: To establish a basis for evaluating standards, specifications, and codes by which electronic equipment and systems are procured and installed, a review of electromagnetic interference control has been made. It is concluded that effective interference control is achieved by establishing an impervious barrier between the offending source and the circuit to be protected. This concept is developed and applied to practical control requirements for equipment and facilities. Over 70 standards, specifications, and codes have been reviewed to assess where they are incompatible with these principles. It is postulated that a set of documents compatible with each other and with requirements for electromagnetic pulse (EMP) hardening, interference control, and communications security can be developed. This report documents Phase I of this project which was limited to the development of a general interference control model and its application to the review of existing standards and practices. In Phase II alternatives to the incompatible requirements found during the review will be developed and demonstrated.</p> <p>INDEX TERMS: evaluating, standards, specifications, electromagnetic interference control</p>	<p>EMCABS: 31-12-84</p>	<p>Railroad Electromagnetic Compatibility: Component Susceptibility George W. Goodwyn Electromagnetic Compatibility Analysis Center, Annapolis, MD Final rept. PB83-127761 PC A06/MF A01 Mar 82, 109p ECAC-CR-82-030, DOT/FRA/ORD-82/15</p> <p>ABSTRACT: Reported in this document are the results of electromagnetic interference (EMI) susceptibility tests performed at the Electromagnetic Compatibility Test Facility, (EMCTF), Pueblo, CO, in February and September 1981. The items tested were a broken joint and overrun detector (BJORD), a TRU-II receiver, two-phase selective track circuits, a single-rail track circuit, and an induction neutralizing transformer.</p> <p>INDEX TERMS: railroad, electromagnetic compatibility, component susceptibility</p>	<p>EMCABS: 34-12-84</p>
<p>Electric and Magnetic Field Measurements at the Wisconsin Test Facility in Support of the Soil Arthropod and Oxygen Consumption Studies during 1972-77 J. R. Gauger IIT Research Inst., Chicago, IL AD-A124 309/6 PC A04/MF A01, Contract N00039-76-C-0141 Apr. 78, 51p Rept. no. IITRI-TR-E6357-14</p> <p>ABSTRACT: During the summers of 1972-77, extremely low frequency (ELF) electric and magnetic fields have been measured at selected biological test and control plots in the Chequamegon National Forest in northern Wisconsin. Each summer, the magnetic field and the low impedance electric field (the field in the earth) were measured at each site. In addition, in 1975 the high impedance electric field (the field in air) was also measured, due to increasing interest in this type of field. In 1976 and 1977, the high impedance electric field was not measured. This was due to malfunction of the high impedance electric field probe in 1976, and time limitations imposed by the other field work requirements and the operating schedule of the WTF in 1977. The lack of these measurements does not degrade the validity of the studies, as the high impedance electric field is due to the voltage of an overhead antenna with respect to ground and will not be generated by a buried ELF antenna system. Further, the high impedance field is not present in the ground.</p> <p>INDEX TERMS: ELF, electric, magnetic fields, measured, Wisconsin</p>	<p>EMCABS: 32-12-84</p>	<p>Solid State EMC Technology Development John G. Mohr, and Richard W. Stroud Magnavox Co., Fort Wayne, IN Final technical rept. 13 Mar 80-1 Jul 82 AD-A123 705/6 PC A07/MF A01 Contract F30602-80-C-0136 Nov 82, 127p FWD82-4284A, RADC-TR-82-280</p> <p>ABSTRACT: Critical superheterodyne receiver parameters were studied and evaluated to extend the dynamic range and reduce the spurious responses of UHF receivers operating in a high-level RF environment. An up-conversion receiver front end using a surface acoustic wave filter for initial IF selectivity was assembled and evaluated. A single conversion receiver was evaluated using high-level, low-distortion elements. Also, a low-noise, high-level, synthesizer/VCO was designed for receiver local oscillator injection and transmitter frequency excitation. A solid state transmitter was modified to minimize the spurious output and broadband noise levels. A solid state demonstration receiver/transmitter suitable for airborne testing was assembled using the optimized circuits and electrical tests were made on the completed transceiver. (Author)</p> <p>INDEX TERMS: solid state, EMC, technology, development</p>	<p>EMCABS: 35-12-84</p>
<p>Skin Effect in Electrical Conductors. 1975-January, 1983 (Citations from the International Information Service for the Physics and Engineering Communities Data Base Rept. for 1975-Jan 83 National Technical Information Service, Springfield, VA PB83-859355 PC N01/MF N01 Jan 83, 176p Supersedes PB82-869231</p> <p>ABSTRACT: This bibliography contains citations concerning the theory, effects, and calculations of skin effect in various types of electrical conductors. The skin effect phenomenon in conductors of several cross-sectional shapes, transmission lines, coaxial cables, and semiconductors are discussed. Some reference is made to the effect of frequency level and magnetic field strength on skin effect. (This updated bibliography contains 158 citations, 28 of which are new entries to the previous edition.)</p> <p>INDEX TERMS: skin effect, electrical conductors</p>	<p>EMCABS: 33-12-84</p>	<p>A Review of the Current State of European Research and Knowledge Concerning the Biological Effects of Radiowaves and Microwaves R. J. Sheppard, E. H. Grant, and Frank Harlen Queen Elizabeth Coll., London (England). Dept. of Physics Final scientific rept. Jan 81-Sep 82. AD-A125 205/5 PC A06/MF A01 Grant AFOSR-81-0065 15 Sep 82, 107p EOARD-TR-83-3</p> <p>ABSTRACT: This report details work being carried out in various European laboratories concerning the possible biological effects of radiowaves and microwaves. It also details the safety limits for exposure to RF and microwaves in various European countries. (Author)</p> <p>INDEX TERMS: review, European research, biological effects, radiowaves & microwaves</p>	<p>EMCABS: 36-12-84</p>

<p>EMC Studies of the ERS-1, Initial Evaluation R. J. Chignell, G. A. Jackson, and A. McHale ERA Technology Ltd., Leatherhead (England) N83-13347/0 PC A06/MF A01 Final Report. Contract ESA-4998/82/DD(SC) May 82, 116p ERA-82-24, ESA-CR(P)-1619 ABSTRACT: An EMC design philosophy and procedures for RF EMC system qualification of ERS-1 are presented. Particular EMC problems arise because of the two high power radars in its payload, which are mounted adjacent to sensitive receivers. Mutual coupling between antennas is a major potential source of incompatibility. It is shown that the achievement of EMC in the flight model can only be assured if potential sources of incompatibility are identified at an early stage and remedial action is initiated. For this the emissions and susceptibilities of all the subsystems are required, together with their mutual transfer functions. An EMC data bank that can be dynamically updated as more experimental data becoming available is advocated. INDEX TERMS: EMC studies, ERS-1</p>	<p>EMCABS: 37-12-84</p>	<p>Aircraft Lightning-Induced Voltage Test Technique Developments K. E. Crouch Lightning Technologies Inc., Pittsfield, MA N83-26829/2 PC A04/MF A01 Contract NAS4-2930 June 83, 71p NAS 1.26:170403, LT 82-132 NASA-CR-170403 ABSTRACT: High-voltage safety, fuels safety, simulation, and response/measurement techniques are discussed. Travelling wave transit times, return circuit conductor configurations, LC ladder network generators, and repetitive pulse techniques are also discussed. Differential conductive coaxial cable, analog fiber optic link, repetitive pulse sampled data instrumentation system, flash A/D optic link system, and an FM telemetry system are considered. INDEX TERMS: aircraft, lightning-induced voltage, safety</p>	<p>EMCABS: 40-12-84</p>
<p>Railroad Electromagnetic Compatibility: Environmental Tests and Coupling Measurements Thomas Freeman Electromagnetic Compatibility Analysis Center, Annapolis, MD PB83-127753 PC A04/MF A01 May 82, 58p ECAC-CR-82-010, DOT/FRA/ORD-82/14 ABSTRACT: Measurements were conducted at the Electromagnetic Compatibility Test Facility (EMCTF) at Pueblo, CO, and documented for relevant characteristics of the environment, such as earth resistivity, resistance to remote earth (resistance to ground) of installed grounds and the dc resistance of the cables that will be used for component testing. Measurements were conducted and documented for the voltage coupled to, i.e., induced into, representative cable conductors and between conductor pairs due to the voltage and current in the catenary. The applicability of analytical coupling models for calculating coupling between the catenary and the parallel communication and signal cables at the EMCTF was investigated. INDEX TERMS: railroad electromagnetic compatibility, environmental tests, coupling measurements</p>	<p>EMCABS: 38-12-84</p>	<p>RF Radiation from Lightning Correlated with Aircraft Measurements During Storm Hazards-82 D. M. Levine National Aeronautics & Space Administration, Greenbelt, MD Goddard Space Cntr. N83-27537/0 PC A03/MF A01 Mar 82, 27p NAS 1.15:85007, NASA-TM-85007 ABSTRACT: During the Storm Hazards Experiment 1982, the Goddard Space Center monitored radiation from lightning from a site at the Wallops Flight Facility, Wallops Island, VA. Measurements were made while the NASA F106 penetrated thunderstorms to obtain data on lightning strikes to the aircraft. The objective of the ground-based measurements was to help determine if the events recorded by the F106 were part of the lightning discharges. During the experiment, 53 cases were obtained in which events were recorded aboard the aircraft while reliable quality RF radiation was recorded on the ground. These cases came from 12 different storms occurring from June through August 1982. The data confirms that the aircraft was measuring events which were part of lightning and indicates that the events recorded on the aircraft tend to occur early in the flash. INDEX TERMS: RF radiation, lightning, aircraft measurements</p>	<p>EMCABS: 41-12-84</p>
<p>Railroad Electromagnetic Compatibility: Electric Locomotive Emissions, Final Report Daniel J. O'Neill Jul 82, 184p ECAC-CR-82-060. DOT/FRA/ORD-82/16 ABSTRACT: Empirical models of electric and magnetic field strengths external of the AEM-7 and E-60 locomotives are presented, as well as representations of main transformer primary and rail currents. Additional sections of the report detail measurement procedures followed and data collected, along with a discussion of the data. INDEX TERMS: railroad electromagnetic compatibility, electric locomotive emissions</p>	<p>EMCABS: 39-12-84</p>	<p>Electromagnetic Shielding Plastics. 1978-November, 1983 (Citations from the Rubber & Plastics Research Assoc. Data Base) Rept. for 1978-Nov. 83 National Technical Information Service, Springfield, VA Nov 83, 91p Supersedes PB83-857193 ABSTRACT: This bibliography contains citations concerning electromagnetic shielding by means of electrically conducting plastics. Emphasis is placed on composite materials, vacuum metalizing, graphite-epoxy laminates, metal filled urethanes, and sprayable shielded coatings. Applications include shielding of electronic assemblies, cabinets for business machines and televisions, as well as domestic appliances. (This updated bibliography contains 126 citations, 48 of which are new entries to the previous edition.) INDEX TERMS: bibliography, electromagnetic shielding, plastics</p>	<p>EMCABS: 42-12-84</p>

<p>Workshop on Electrical Contact and Contact Materials Held at Vadodara on September 4, 1980 Sponsored in part by Institute of Engineers (India), New Delhi Electrical Research & Development Assoc., Makapura (India) Technical Papers 1980, 409p</p> <p>ABSTRACT: This workshop was organized to provide a forum for exchange of ideas and to identify the technology gaps which exist in the manufacture and use of contact materials. This volume contains 15 technical papers presented in the workshop. These papers have been grouped under three main headings: medium, high, and light duty contacts.</p> <p>INDEX TERMS: electrical contact, contact materials</p>	<p>EMCABS: 43-12-84</p>	<p>Protection of Gas Insulated Substations Against Lightning Overvoltages G. Bernard Electricite de France, Clamart. Div. Appareillage Transl into English RPT. HM-71-04737, 21 Apr 1982 52p Aug 82, 52p HM-71-04797</p> <p>ABSTRACT: Selection of protection devices (air gaps, open arresters, encapsulated arresters) and their locations so as to bring lightning overvoltages below tolerances for electricity substations is discussed. A calculation method for evaluating the statistical risk of these tolerances being exceeded is presented. Methods for representing substation system elements in computerized simulation models are outlined.</p> <p>INDEX TERMS: protection, gas insulated substations, lightning</p>	<p>EMCABS: 46-12-84</p>
<p>Basic EMC Technology Advancement for C3 Systems, Volume 2A. Macromodels of Op Amps for CADA Applications James C. Bowers Southeastern Center for Electrical Engineering Education, St. Cloud, FL Final Technical Rept. June 81-Sep 83, Contract F30602-81-C-0062 Apr 83, 82p RADC-TR-82-286-VOL-2A See also Volume 4A, AD-A124861</p> <p>ABSTRACT: A macromodel of an AMP is considered which will simplify circuit analysis. The macromodel, the selection of device parameters within the model and mode realization are considered. Some examples of application are considered. This is Volume IIA of a six-volume final report. Volumes IVA, B, and C have already been published. These volumes deal with: Vol I-methodology to relate EMI criteria to microelectronic circuit performance measures; Vol II-methods to analyze these circuits; Vol III-defining method for writing EMC specifications related to performance measurements, Vol IV-EM coupling and testing - mostly near-field coupling; Vol V - coupling between wires and boxes when the distance are greater; Vol VI - the FORTRAN IV computer code implementation of the modules developed in Vol V.</p> <p>INDEX TERMS: EMC technology advancements, C3 systems</p>	<p>EMCABS: 44-12-84</p>	<p>Skin Effect in Electrical Conductors. 1975-November, 1983 (Citations from the International Information Service for the Physics and Engineering Communities Data Base) Rept. for 1975-Nov 83 National Technical Information Service, Springfield, VA Nov 83, 141p Supersedes PB83-859355</p> <p>ABSTRACT: This bibliography contains citations concerning the theory, effects, and calculations of skin effect in various types of electrical conductors. The skin effect phenomenon in conductors of several cross-sectional shapes, transmission lines, coaxial cables, and semi-conductors are discussed. Some reference is made to the effect of frequency level and magnetic field strength on skin effect. (This updated bibliography contains 172 citations, 14 of which are new entries to the previous edition.)</p> <p>INDEX TERMS: skin effect, electrical conductors</p>	<p>EMCABS: 47-12-84</p>
<p>Guide for Studies of the Protection of Insulated Substations Against Lightning Guide G. Bernard (Text in French) Electricite de France, Clamart, Div. Appareillage N83-34527/2 PC A02/MF A01 18 Jan 82, 23p HM-71-04672, EMTTP-G-7</p> <p>ABSTRACT: Methods for representing the elements of electricity substations in numerical models used for lightning protection studies are described. System configurations are classed according to the chances of insulation capacity being exceeded. For configurations at risk, an analysis based on distributed parameter system techniques is performed. Overhead power lines, cables, insulated sections, transformers, spark gaps, lightning conductors, and junctions are represented.</p> <p>INDEX TERMS: protection, insulated substations, lightning</p>	<p>EMCABS: 45-12-84</p>	<p>Performance of the Sandia Lightning Simulator During F-14A & F/A-18 Aircraft Lightning Tests R. I. Ewing Sandia National Labs., Albuquerque, NM 1983, 13p SAND-83-0816C, CONF-830618-1 Contract AC04-76DP00789 Portions are illegible in microfiche products</p> <p>ABSTRACT: Two Navy aircraft (F-14A and F/A-18) were subjected to high level lightning tests using the Sandia Lightning Simulator. The peak pulse currents applied were varied from 9 to 170 kiloamperes. The nominal rise time to peak was 2 microseconds. Double pulses and continuing currents were also applied. Several high current, high voltage pulses were also obtained. Ninety-six test pulses were applied to the F-14A and sixty-four pulses were applied to the F/A-18. Approximately 80 percent of these pulses met the test specifications and essentially all pulses produced useful data.</p> <p>INDEX TERMS: aircraft, lightning tests, Sandia Lightning Simulator</p>	<p>EMCABS: 48-12-84</p>

INSTITUTIONAL LISTINGS

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

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