IEEE ELECTROMAGNETIC COMPATIBILITY GROUP

NEWSLETTER

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SEATTLE '77

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Len Carlson, Chairman
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SPECIAL ISSUE ON MINIATURIZED FILTERS
CALL FOR PAPERS

A special issue of the Proceedings of the IEEE on MINIATURIZED FILTERS is planned for January 1979. This issue will be devoted primarily to invited and contributed papers on the design, development, and manufacture of electrical filters in miniaturized form which either are in current production or are planned to be in production in the near future. All types of electrical filters, such as lumped passive and active filters, crystal and ceramic filters, switched filters, surface wave filters, digital filters, charge coupled filters and distributed filters, are to be considered in this issue. Papers emphasizing what is practical in filter technology are encouraged, along with papers stressing aspects of the manufacturing technologies that have a major impact on the economics of filter production. Specially solicited are well written tutorial papers describing the state-of-the-art of miniaturized filters belonging to each of the above types.

Authors are invited to submit 500 word summaries on or before January 15, 1978 to either of the guest editors: Sanjit K. Mitra, Dept. of Electrical Engineering and Computer Science, Univ. of California, Santa Barbara, CA 93106 or Desmond F. Sheahan, GTE Lenkurt Electric Co., 1105 County Rd., San Carlos, CA 94070. This will aid planning and allow a recommendation to be made concerning further efforts. Full manuscripts without the benefit of initial summaries are not precluded, but potential authors will run the risk of producing a good or even excellent paper that falls beyond the scope of this special issue. Notice of selection for potential inclusion in the special issue will be given around February 15, 1978. Full manuscripts in triplicate will be due May 1, 1978.

ANSI TO ASSIST OSHA

The Occupational Safety and Health Administration (OSHA) and ANSI have signed a memorandum of understanding to improve coordination between OSHA and the voluntary standards system, facilitate OSHA use of consensus standards, and expedite the promulgation and updating of OSHA regulations. Under the agreement, ANSI will furnish technical assistance and support to OSHA in the development, promulgation, and application of OSHA standards.

★ CALL FOR ADCOM NOMINATIONS ★

Election of six members of the G-EMC Administrative Committee will be held in September 1977. Nominations of candidates for these six positions are solicited. In order to be nominated, a Nomination Petition signed by at least 15 members of G-EMC and a short biographical sketch of not more than 125 words must be submitted to the undersigned by July 25, 1977.

Andy Nalbandian, Chairman
Nominations Committee
20617 Debbie Lane
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EMC PERSONALITY PROFILES

by William G. Duff

JOHN J. O'NEIL

John O'Neil recently retired from his position as leader of the EMC Team at the U.S. Army Electronic Command and has joined Breeze-Illinois, Inc. as a consultant to military organizations on the East Coast. John is very familiar to most of us in the EMC community, and I hope that he does not retire from the IEEE-EMC Group. In fact, I hope that he will now have even more time to devote to IEEE activities.

John began his EMC career in 1935 as a member of the engineering staff for the Ford Motor Co., Lincoln Division, Detroit, Michigan. In this capacity, he was concerned with the design and evaluation of EMC systems and specialized radio installations in custom built motor vehicles. During this time, he also attended Lawrence Institute of Technology, Detroit, Michigan.

In 1942, John became involved in the Department of the Army EMC Program. In this capacity, he was responsible for supervision of internal and external R&D programs in the area of EMC, and for the design, test, and evaluation of the EMC systems applied to all Department of the Army interference producing devices.

John established a Field Station in Milwaukee, Wisconsin in 1957 to provide optimum compatibility services to Department of the Army contractors of internal combustion powered equipment in the mid-west. He initiated an in-house effort which resulted in the standardization of interference reduction techniques and general purpose components. This permitted the transfer of this effort to inspection organizations and the closing of the Field Station.

Later, John developed shielding effectiveness techniques and supervised their application to the Ballistic Missile Early Warning System (EMEWS) in Thule, Greenland and Clear, Alaska during the period of 1959 - 1961. This 4800' long series of passageways and buildings was completely RF shielded due to the extremely high RF power utilized. These techniques were utilized for the evaluation of the NIKE-ZEUS facilities in the Marshall Islands.

More recently, John has held a number of responsible positions with the U.S. Army Electronics Command. These include: Team Leader; Chief, Technical Staff, EMC Division; and, Deputy Director EMC Division. In these positions, he was involved in conducting and sponsoring exploratory, advanced and engineering development programs relating to the Department of the Army Electromagnetic Compatibility Program, as described in AR 11-13. This work included DoD responsibility for Measurement Techniques and Instrumentation; Dept. of the Army responsibility for the Specifications and Standards area; and, EMC Analysis, including methodology of future field army C-E equipment/systems.

John prepared a number of manuals and specifications concerned with various aspects of radio interference reduction and electromagnetic compatibility. In particular, he prepared the following specifications which for the first time controlled radio interference from the indicated devices: MIL-S-12348 - Suppression, Radio Interference, General Requirements for Railway Rolling Stock and Maintenance of Way Equipment, dated 25 November 1952, and MIL-S-13237 - Suppression, Radio Interference Requirements for Watercraft (less than 250'), dated 29 June 1954.

(Cont'd. on page 4)

In addition, he prepared the first tri-service coordinated radio interference suppression specification, MIL-S-10379, "Suppression, Radio Interference General Requirements for Vehicles," dated 6 July 1951, MIL-E-55301, "Electromagnetic Compatibility," dated 1 April 1965, which combined the requirements and permitted the suppression of three other specifications dealing with interference reduction. John also has prepared a number of other papers, articles and reports dealing with EMC.

John is a senior member of the IEEE and he has been very active in IEEE activities. He has served in the following capacities:

- Treasurer and President of the IEEE-EMC Group
- Treasurer, Vice Chairman,Chairman, of New Jersey Coast Section of IEEE
- Organizer and first Chairman, New Jersey Coast Chapter of IEEE, EMC Group
- Chairman, IEEE International Symposium on EMC, Asbury Park, NJ
- Member of Administrative Committee, IEEE EMC Group
- Keynote Speaker, IEEE International Symposium on EMC, June 1972, Chicago, Illinois

The IEEE has awarded John six certificates of appreciation for his contributions.

In addition to his IEEE activities, John has served on a number of committees and working groups for DoD, ANSI, EIA, SAE, CCIR and CISPR. We all owe John a vote of thanks for his service to the EMC community.

EDWIN (ED) L. BRONAUGH

Southwest Research Institute
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EMCABS

In this issue we are publishing 12 abstracts. Six of these are remaining from earlier EMCABS work and six are current production of the committee.

We have had one more volunteer to serve on the Information Retrieval Committee, but we still need several more members so that the load can be divided into reasonable shares and more publications can be reviewed. The present committee is comprised of myself and the following members:

L.F. Babcock	J.S. Hill
R.N. Hokkanen	J.R. Janoski
M. Kant	D.R. Kerns
G.R. Redinbo	R.B. Schulz
R.M. Showers	

We are always open to suggestions about how to improve the EMCABS. Please let us hear from you.

SUREMENTS AND COMPUTATIONS OF ELECTRIC FIELD INTENSITY AND
ER DENSITY

ACCESSION NO.
EMCABS 06-77-01

uel Y. Liao
ool of Engineering, California State Univ., Fresno, CA
E Transactions on Instrumentation & Measurement
26, No. 1, March 1977, pp. 53-57

TRACT:
Conversion equations for converting the tranmitting power, receiving
er, or receiving voltage to electric field intensity and power density
derived and discussed. If the antenna factor, antenna gain, and
cable parameters are known, the electric field intensity or power
sity at some distance from the transmitting antenna may be determined
means of a specific conversion equation for a given signal frequency.
developed conversion equations may aid the electronics engineer to
pute the electric field intensity and power density in a quick way.

EX TERMS: antennas, calibration

ROVING THE FREQUENCY CHARACTERISTICS OF RF STANDARD
NETIC-FIELD GENERATOR EMPLOYING LOOP ANTENNA

ACCESSION NO.
EMCABS 06-77-02

oshi Nakane, S. Omori, & I. Yokoshima
pt. of EES, Univ. of Tokyo & Radio Electronics Section,
Electrotechnical Lab., Tokyo, Japan
EE Trans. on Instrumentation & Measurement, Vol. IM-26, No. 1, March 1977
pp 25-28

TRACT:
In the HF and VHF region, the standard magnetic-field generator having
loop antenna has been generally used for the calibration of a radio re-
iver or a field-strength meter. Presented are new standard magnetic
eld generators which are able to produce a constant magnetic field over a
de band frequency range by means of measuring the loop current through a
npensation transmission line and a compensation termination resistor.
A magnetic-field generator in which a thermistor was used as both a
npensation resistor and a current sensor was constructed and examined over
e frequency range 10 to 50 MHz. The measured values were agreed with
eoretical values within ± 0.1 dB.

EX TERMS: Calibration, loop antenna

NOSECOND PASSIVE VOLTAGE PROBES

ACCESSION NO.
EMCABS 06-77-03

trick A. McGovern
ysics Dept., University of Newcastle, Australia
EE Transactions on Instrumentation and Measurement
-26, No. 1, March 1977, pp 58-61

TRACT: Passive voltage probes with megohm input impedance at dc are
aditionally understood as RC compensated dividers, but this is inadequate
en for system rise times as slow as 100 ns. Qualitative understanding
faster probes is generally in terms of resistive damping of resonances,
t this has been notably successful in practice only with the use of resis-
ve conductor probe cable as introduced by Kobbe. This paper demonstrates
at nanosecond probes can be understood and designed for a systematic
ansmission line viewpoint. The properties of the resistive conductor
obe cable as a transmission line are an essential feature, and the
iginal motivation for the use of resistive cable as damping of a
sonance is seen to be largely irrelevant for nanosecond probes.

NTY TERMS: voltage probes

NEAR-FIELD GAIN CORRECTION FOR TRANSMISSION BETWEEN HORN
ANTENNAS

ACCESSION NO.
EMCABS 06-77-04

John D. Hunter and I.F. Morgan
National Measurement Lab., CSIRO, Chippendale, Australia
IEEE TRANS on Instrumentation & Measurement
IM-26, No. 1, March 1977, pp. 58 -64

ABSTRACT:
When the gain of a horn antenna is to be measured from the power transmission loss between it and a standard horn, the Friis transmission formula must be corrected if the horn separation is not considerably greater than $2d^2/\lambda$. Expressions for the correction between dissimilar pyramidal horn and a conical horn, and between dissimilar pyramidal horns, are presented with sample results. A method of applying these corrections to minimize the errors in the horn gain measurements is described.

INDEX TERMS: calibration, antennas

Amplifiers, Type Acceptance -- FCC's Latest Proposals

ACCESSION NO.
EMCABS 06-77-05

Hal Steinman, Assistant Manager,
Membership Services Dept., Am. Radio Relay League
QST, Vol. LXI, No. 4, American Radio Relay League,
Apr. '77, pp. 61-63.

ABSTRACT:
FCC Notices of proposed rule making, Dockets 21116 and 21117, affecting the manufacturers of external power amplifiers operating between 24 and 35 MHz are discussed. Considerations are potential interference to television reception caused by illegal use of such amplifiers in citizens band service. Type Acceptance and its effects, the Testing Procedure, and Exceptions are discussed. Comments by FCC Chairman Richard E. Wiley on the dockets are included.

INDEX TERMS: FCC Rules, Interference Control, Test Procedure, Citizens' Band

Walsh Analysis of Power-Law Systems

ACCESSION NO.
EMCABS 06-77-06

Mohammad Maqusi
College of Engineering, University of Jordan, Amman, Jordan
IEEE Transactions on Information Theory
Vol. IT-23 No. 1, January , 1977, pp. 144-146

ABSTRACT:
Walsh-type signals exciting memoryless power-law systems are considered. The input is assumed to consist of a sum of weighted Walsh functions. A method is given for finding the weights of the Walsh functions in the output when the input is a finite Walsh series. It is shown that the fast Walsh transform can be used to facilitate the necessary computation.

INDEX TERMS: Walsh Analysis, Square-Law Devices, Power-Law Devices

ROTECT YOUR TRANSISTORS AGAINST TURN-ON OR ESTING TRANSIENT DAMAGE

. D. Motchenbacher
Honeywell, Inc., Hopkins, Minnesota

ELECTRONICS
Vol. 44, No. 25, December 6, 1971, pp. 92-94

ACCESSION NO.
EMCABS 02 75 70

TRACT:

The specter of transistor avalanche damage caused by transients constantly haunts the circuit designer, usually without his knowledge. Turn-on signal transients are the usual culprits, but even routine reverse-bias tests can inadvertently ruin a transitor, degrade its performance, or even result in total circuit failure. For instance, a bipolar transistor's gain can be drastically reduced and its noise increased by a factor of 10 if the base-emitter junction is reverse-biased beyond the knee of the current-vs-voltage (I-V) characteristic where avalanche occurs.

DEX TERMS: Transistors, Transients, Susceptibility, Turn-on, Protection

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CHOOSE THE RIGHT COMMUTATION DIODE FOR SWITCHING REGULATORS

Ed Eby
TRW Semiconductor Division

EDN/EEE
Vol. 16, No. 24, December 15, 1971, pp. 22-24

ACCESSION NO.
EMCABS 02 75 71

STRACT:

Improved diodes with extremely fast recovery times have an important application in switching regulators. The design engineer should understand the effects of diode speed on circuit behavior.

Excessively large current pulses will almost certainly cause noise elsewhere in the system. (For the circuit described using a 200 nsec diode, a stray inductance of 0.1 μH could cause a 32-V noise spike at the input.)

DEX TERMS: Diodes, Regulators, Switching, Power Supplies, Transients, Suppression

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RELIEF FOR URBAN CONGESTION

ACCESSION NO.
EMCABS 02 75 72

COMMUNICATIONS DESIGNER'S DIGEST
November-December 1971, pp. 36-38

STRACT:

To ease transportation and service headaches, city officials are turning more and more to automatic vehicle location systems, and by so doing risk aggravating yet another urban problem-spectrum congestion. In selecting which AVL technique to use, spectrum-conscious officials might be tempted to opt for the system that occupies the least bandwidth or displaces the fewest spectrum users.

The Other Pollution Problem

Richard T. Davis

Microwaves
Microwaves
November 1971, p. 29

ACCESSION NO.
EMCABS 02 75 64

ABSTRACT:

This editorial points out the needs of the microwave engineer when he is forced to fix electromagnetic interference problems. It recommends that electromagnetic interference design and test be part of the engineer's basic practices to reduce the "quick fix" crisis to manageable levels.

INDEX TERMS: electromagnetic interference

AVOIDING NOISE IN DIGITAL TRANSMISSION

W. L. Gill
Westinghouse Electric Corporation

INSTRUMENTS & CONTROL SYSTEMS
November 1971, pp. 42-43

ACCESSION NO.
EMCABS 02 75 67

ABSTRACT:

Digital transmission is ultimately limited by noise, which enters the system through power or ground lines or is induced directly on signal cables. Transmission can also be degraded by signal reflections caused by impedance mismatch at line terminations, especially in long cables. Noise is particularly critical at the junctions between electrical subassemblies. At these interfaces lines are open and exposed to reactive pickup from other signal sources, and ground potential differences may occur between elements.

INDEX TERMS: Digital Transmission, Noise, Susceptibility, Coupling, Grounds, Mismatch

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DIGITAL SYSTEM TRANSFIXES NANOSECOND TRANSIENTS

Glen S. Mills and R. Keith Treece
Sandia Laboratories, Albuquerque, N. M.

ELECTRONICS
Vol. 44, No. 25, December 6, 1971, pp. 80-85

ACCESSION NO.
EMCABS 02 75 69

ABSTRACT:

Sandia Labs often needs to record two fast transients simultaneously, however, and has developed a two-channel data acquisition system that captures microsecond signals, translates them immediately into digital form, and stores the data in a digital computer for display at the experimenter's convenience. All this takes the system only 3 seconds, in contrast to the hours, if not days, that it takes to produce a comparable analysis of a photographic trace.

OCULAR HAZARDS AND POTENTIAL USES OF NEAR-ULTRAVIOLET LIGHT

When adult albino mice were maintained in an environment of black light (N-UV) at one-tenth the intensity of sunlight outdoors on a cloudless summer day, for 12 hours a day, eye lens opacities and skin cancer were found to result after about one year of time.[1] At this time, lens epithelial cells exhibited impaired ability to differentiate into fiber cells, and they accumulated abnormally throughout the cortex so as to scatter light. None of these changes occurred in the dark or controls exposed to visible light. Highly aggregated lens proteins also reached a much greater concentration in the N-UV light exposed mice than in the control animals, while lens weight and low molecular weight soluble proteins both were found to be present at lower levels. Retinal photoreceptors of N-UV exposed animals become thin, were engulfed by wandering cells, and eventually disappeared.

Another consequence of long-term exposure of these mice to N-UV light was the development of skin cancer in most animals after one year. The skin of the ears and tails, being hairless, were the sites of tumor development. While human skin is quite different from mouse skin, it has long been known that overexposure of humans to sunlight often results in the growth of similar tumors.

Some studies with human ocular tissues were done in vitro, using simple media such as physiological salt solutions. When fresh human lenses were thus exposed to intensities of N-UV light about one-half that of sunlight, increased brown pigmentation was induced within a few days.[2] N-UV sensitive material was thus shown to be present in the lens, whose greater pigmentation mimicked age-related human lens changes. The reducing agent, ascorbic acid, was an inhibitor of this photooxidation and tryptophan was an accelerator under the experimental conditions.

N-UV light and its oxidation products are implicated as hazards to the skin and eyes of humans; but, under appropriate control, can be used experimentally and clinically to alleviate medical problems, perhaps, more easily and readily than by some of the more common procedures.

REFERENCES

1. Zigman, S. and Vaughan, T.: "Near Ultraviolet Light Effects on the Lenses and Retinas of Mice." Invest. Ophth. 13.462, 1974.
2. Zigman, S., Griess, G., Yulo, T., and Schultz, J.: "Ocular Protein Alterations by Near-UV Light." Exp. Eye Res. 15:255, 1971.

(Reprinted from the Newsletter of the Center for Light Research, Vol. 6, No. 1, 1977.)

8324 Sanderling Road
Sarasota, Florida 33581
January 17, 1977

Honorable Paul G. Rogers, Chairman
Sub-Committee on Public Health
and Environment
House of Representatives
Washington, D. C. 20515

Dear Paul:

Since my last visit to Washington with Mr. Connolly, I have come across additional information with regard to measuring low levels of X-radiation that I believe should be brought to your immediate attention.

Mr. David Katzman, Manager Technical Liaison for Teledyne Isotopes, 50 Van Buren Avenue, Westwood, N.J. (201-664-7070), advises me that this company is manufacturing a thermoluminescent dosimeter that is being extensively used to detect any slight leakage of gama radiation (X-rays) in and around nuclear power plants.

Mr. Katzman further informed me that the crystals in this dosimeter are so sensitive to X-rays that they are affected by fluorescent lights and clearly show X-rays being emitted from this source. Mr. Katzman further stated that their manual of instructions for using this dosimeter states that it cannot be used in any room or area where fluorescent lights are on, but that incandescent lights do not affect it.

Apparently, the state of the art in measuring low levels of radiation in the nuclear industry is far ahead of that in the electrical illumination industry, and levels of radiation considered potentially hazardous in nuclear power plants are being totally ignored or overlooked as far as the lighting in the schools, offices, hospitals and all the other areas where the general public is being subjected to fluorescent light.

As it seems to me, the nature of this apparent paradoxical inconsistency in not recognizing the equal dangers of similar radiation hazards from different sources is of such a magnitude that I am sending a copy of this letter to some of the people I believe more qualified than I am in this area and with whom I have had contact over the past few years, asking for their comments.

I will send you copies of all replies received and hope that some explanation will be forthcoming that will put this whole matter into a better perspective.

Very sincerely,

John Ott

CHAPTER CHATTER

Chapter Chairmen/Secretaries: I'm repeating my new address at the end of this column, as I'm still getting some of your inputs via New Jersey!

Bay Area

Just a little too late for the Spring Issue came a report of the Chapter's March meeting. Arthur L. Whitson, of Stanford Research Institute, presented a talk on "EMP Design Considerations in Electronic Systems." Attendance totaled 25, of whom 12 were guests. Elections for the '77-'78 term were held on the 18th of May with the following results:

Chairman: Wilson Chu (Sylvania)
Vice Chairman: Sam B. Shankle (Aeroneutronics-Ford)
Treasurer: Evangelos Tanos (ESL, Inc.)
Secretary: Jesse Marques (ICORE)

The Chapter's June 5th meeting featured PAC Chairman, Al Baranek, speaking on "Professional Activities-Where Do We Go From Here?" Following the dinner and talk, a mideastern dancing and rhythms entertainment was provided by the Andy Nalbandian Group. There were 35 attendees, of whom 18 whre guests.

Thanks to Bay Area Chapter's retiring Secretary, Evangelos Tonas, for a good job in getting meeting reports to me!

Central New England

Vice Chairman John Clarke reports the Chapter had a meeting on March 15th. Speakers were Q. Wilson (MITRE) and C. Smith (GTE-Sylvania). The topic was "A Report on WARC-79." They discussed the latest formulation of proposed allocations from 10 kHz to 300 GHz per FCC's Third Notice of Inquiry on Docket 20271. The Government mechanism for preparing the document was described and also the procedures for incorporating proposed changes.

John also reported that Art Haskins will serve as Secretary-Treasurer for the '77-'78 term.

Washington Chapter

The Washington Chapter has been very busy during the past few months. They held a luncheon meeting on March 17, 1977 and 54 people attended. The speaker was Janet Healer from the Executive Office of the President, Office of Telecommunication Policy. She talked about recent events that have stimulated public concern about the compatibility of microwave and other RF radiation with man and his environment. Her talk provided an overview of the the federal government program being coordinated by OTP to assess biological effects and potential, and discussed associated issues and implications.

The next meeting was held on May 19th and 35 people attended. Walter Coari the Director of Policy and Operations, Office of the Deputy Assistant Secretary of Defense for Telecommunications, talked about a new position of "Assistant Secretary of Defense (Communications, Command, Control and Intelligence)" which was established in March of this year. Responsibilities of this position include monitoring military EMC programs and the provision of technical guidance to ECAC. Mr. Coari is the key individual in that office directly concerned with the EMC responsibilities and he discussed the impact which the new office will have on the EMC community.

by Charles F. W. Anderson

The Washington Chapter elected officers for the next year and they are:

Chairman: Alvin W. Paul
Vice Chairman: William G. Duff
Secretary: Bernhard E. Keiser

The new officers have very ambitious plans for next year.

Southern California

George Ufen, who chaired the nominating committee, reports the following slate of officers for 1977-78:

Chairman: Steve Jensen (Genisco Technology)
Vice Chairman: Warren Eberlin (Hopkins Engineering)
Secretary: Mile Malinick (Hughes Aircraft)
Treasurer: Tom Perry (GRU Associates)

(Haven't had any meeting reports from this area; but, it appears they are alive and well.)

Atlanta

(Called Gene Knowles about a technical problem and picked up the following - in addition to the info I was after.)

The Chapter is in process of reactivation. A meeting was held on May 28th, at which Gene presented a talk on cable shielding effectiveness testing. There were about 15 attendees. Jim Toler is heading up the nominating committee for the new slate of officers. They are looking forward to having meetings every other month, starting in September, with guest speakers, if possible.

New Jersey Coast

Don Heirman, as Chairman and Chapter Newsletter Editor, keeps me well informed on the activities of my former Chapter. Their March meeting had Dave Shaff, of Cannon, speaking on "Practical EMI/RFI Protection with Hybrid Filter Contact Connectors."

The Spectrum Engineering Seminar, which the Chapter sponsored on March 30th, was a great success, judging from response to the questionnaire which was given to each of the participants. Apparently, everyone felt that the Seminar was well run and they wanted to have a follow-up seminar, probably in the form of a spectrum engineering workshop. Don promises a full report - probably at the ADCOM in Seattle. Congratulations to Don Jansky, the instructor; and, to the steering committee (Herb Bennett, Mike Carrio, Joe Chislow, Herman Franke, Don Heirman, Paul Major, John Prorok and Marge Stone)!

In April, Erik Lindgren, President of Erik A. Lindgren & Associates, addressed the regular luncheon meeting on "RF Measurements and Constructions of Contemporary RF Enclosures."

The May meeting presentation was by Julian J. Soltys, of Technical Wire Products, whose topic was "Maintaining EMI/EMP/RFI Integrity of Equipment Enclosures with Shielding Materials."

New Chapter Chairmen:

Dr. Carl Baum, for the AP/MTT/EMC Albuquerque Chapter; Dr. David Chang, of the Univ. of Colorado, for the Denver/Boulder Chapter.

BOOK REVIEWS

BOOK REVIEW

by Jim Hill, RCA Service Company

It is our pleasure to review a book by our Newsletter Associate Editor, William G. "Bill" Duff. Bill has authored "Mobile Communications," a handbook published by Don White Consultants, Inc. In dealing with mobile communications, he wisely has avoided the citizens band morass with its stereotyped engineering and multitude of problems. The mobile system for commercial, industrial, or government use requires careful engineering and Bill has addressed his book to this need.

In the last issue of this Newsletter, our introduction mentioned two reviews. Newsletter editor, Bob Goldblum, ran short of space and cut out our second review. If space will permit in this issue, there will be a second review of a book outlining the fascinating history of electronic invention.

"Mobile Communications"

BY

William G. Duff

293 pages, $29.50, clothbound
Publ. by Don White Consultants, Inc.
Germantown, Maryland 1977

Mobile communications has become increasingly important in recent years as the population has become more mobile and as commerce and industry have recognized the importance of maintaining a line of communication with all members of the organization even, and most importantly, those in transit. The author has recognized the importance of mobile communications together with the lack of an organized source of design information for system planners. Accordingly, the author has brought together information to help the newcomer and others seeking tutorial or how-to-do-it knowledge. While the text underscores the tutorial throughout, it includes also the how-to-do-it with illustrative examples figures, tables, and charts. A synopsis on a chapter by chapter basis follows.

The introductory chapter gives an overall picture of mobile communication systems characteristics and introduces the Federal Communications Commission Rules and Regulations and the Electronics Industries Association's standards. An important part of this chapter is the section on how to use the handbook.

The second chapter explains the system design equation and enumerates the system parameters which must be considered. The design equation is based on the Egli propagation model which, in turn, is based on data obtained from the Federal Communications Commission. A number of illustrative examples have been worked out to illustrate varying degrees of complexity.

The chapter on rules and regulations is quite comprehensive in providing an overview of the international and national regulatory agencies with a summary of the important applicable portions of the Rules and Regulations of the Office of Telecommunications Policy and the FCC. Particularly helpful is the section on applying for an FCC mobile radio station license.

Chapter four discusses spectrum considerations including the selection of a frequency band as influenced by availability, propagation characteristics and costs. The suitability of the various frequency bands for specific mobile applications is assessed.

Then there is the matter of trade-offs as considered in chapter five. The trade-offs are based on operational requirements, system considerations, basic system configurations, and mobile relay configurations.

(continued)

Propagation, the topic of chapter six, is considered in terms of probability that various losses will be exceeded. Various modes of propagation are considered and mathematical models are presented which describe the propagation loss resulting from these modes. A number of illustrative examples are given.

The subject of environmental noise is explored in chapter seven. A rather broad general treatment will allow the reader to place the various noise sources into proper prospective and will help to solve isolated problems which result from these noise sources. A number of illustrative examples help the reader apply this information to his system design.

One of the most important considerations, EMC, is dealt with in chapter eight. This chapter reviews the various types of EMI which are encountered in mobile communication system applications. Specific topics include: general EMC considerations; RF spectrum; types of EMI; system design for EMC transmitter emission characteristics; receiver susceptibility characteristics; antenna characteristics; and system design for EMC.

Mobile radio hardware is the subject of chapter nine. It summarizes the pertinent characteristics of typical equipment used for mobile communications. Transceivers and antennas for base station operation are described. A complex base station operation may require computer assistance, as, for example, in the New York City Police Department SPRINT system. Mobile equipment systems may rely on minicomputers and digital information transmission to sort out the various requirements of the system user. Selective calling and information retrieval systems are discussed.

The final chapter provides recommended basic radio operating techniques and procedures for licensees in the various land-mobile services. Failure to comply with pertinent FCC Rules and Regulations can jeopardize the user's license. This chapter will assist the user in protecting his right and in getting the most out of his investment.

Five useful appendices contain conversion tables, logarithms, antenna isolation data, tunnel and building propagation data, and the Bullington propagation model. An adequate index completes this volume.

Your reviewer recommends it to the serious mobile communications system planner. A bibliography at the end of each chapter gives additional source of information for each chapter subject heading.

"Electronics Inventions 1745-1976"

BY

G. W. A. Dummer

163 pages, $7.50

Fairview Park, Elmsford, NY: Pergamon Press

Maxwell House

Here is a book that traces the rise of the electronics technology, by way of its inventors and their inventions.

Inventions are listed in chronological order and actually start with Pascal's invention of the mechanical calculating machine in 1642. This is followed by Leibniz's invention of the "Leibniz Wheel" in 1672, a significant improvement over Pacal's basic invention. The first electronic invention noted is the Leyden jar capacitor in 1745. In these early years of electronic development,names like Galvani, Volta, Herschel, Henry and Faraday are mentioned with a description of each of their inventions. Descriptions of the inventions are necessarily brief in a book of this size. With each description, sources of more detailed information are listed so that the reader may do further investigation of interest to him.

In all, there are 295 inventions listed and described in this book. The reader is struck by the early dates on many basic inventions which have more recently come into use. The time required to develop the applied technology after the original invention often spans the inventor's lifetime.

The history of electronics is a fascinating story of developments changing from electricity into electronics with no readily definable dividing line. The early 18th and 19th century inventors, Faraday, Rutherford, Thompson, and Maxwell, and others, usually had time to develop their ideas. The pace of life was slower then.

Later, the theoretical physicists, Planck, Bohr, Lorentz, Einstein and others quantified the earlier work and delved into the reasons why, rather than achieving practical results. Since the 1920's, a host of inventors have been developing ideas which are in use today. Since WWII, the pace of inventiveness increased to a peak in 1960 with 9 significant electronics inventions that year. There has been falling off since then with zero significant electronics ics inventions in 1973.

(Cont'd.)

The book is cross referenced in a number of ways. Charts of several types describe the progress of inventions. The inventions are listed in chronological order as well as by subject. Inventors are listed alphabetically as are inventions in an index. In addition, Appendix I lists useful books on inventions while Appendix II lists useful books on inventors.

While this book is organized as a reference book, it has so many interesting facts in it that it is hard to put down once you have started to read it. It might be compared with Ripley's "Believe It or Not" as the reader encounters the early dates on some inventions. For example, electronic television was invented in 1908 by A. A. Campbell-Swinton, and the crystal pulling technique used to make single crystal silicon used for P-N junction devices was developed in 1917 by J. Czochralski.

If the history of electronic invention intrigues you, this is a book to indulge that interest.

G-EMC BOOK REVIEW POLICIES

The G-EMC Newsletter has been publishing a series of book reviews over the last few years. Most of these have been prepared by our book review editor, Jim Hill. At times, other reviewers have also participated.

Most books published on EMC and related topics offer value to some segment of our discipline. At times, it is necessary to point out their drawbacks and limitations. Obviously, not every book that is published is going to have a good review.

The following is the G-EMC Newsletter position on book reviews:

1. IEEE book reviewers are sought for their individual opinions, never as spokesmen for their employers.
2. IEEE book reviewers are asked and expected not only to give their opinions; but, specifically, to point out strengths and weaknesses, as they see them, in the books they review.
3. Only to the extent that IEEE publications are open to publishing the best efforts of their reviewers, do the review sections of the publications have any validity.
4. Just as complimentary book reviews may not be construed as promotion or support of a given book by IEEE or the reviewer's organization, so a negative review is understood to express the reviewer's opinion only.
5. Freedom to express publicly negative as well as complimentary opinions about books is accepted by the entire publishing community, and is the same freedom whether the vehicle is the New York Times or the EMC Newsletter.
6. Critical discussion has been the keystone of the entire scientific publishing enterprise for 300 years and currently is practiced by literally thousands of scientific and scholarly publications.

Reader comments on this matter are welcome.

IEEE PRESS WELCOMES PROPOSALS FOR NEW BOOKS

With 45 titles already in print, the IEEE Press is attaining the stature of an established book publisher. PRESS books, which for the most part are carefully edited collections of reprinted papers, have been well received, particularly by the IEEE membership.

The PRESS Editor and his Editorial Board are constantly on the lookout for new Books of Selected Reprints, especially on subjects that are of wide interest to the profession. Book proposals, either from individuals or from Groups or Societies, are always welcome. Such proposals should be submitted on a standardized form, copies of which are available from the Managing Editor, IEEE PRESS (345 E. 47th St., New York, NY 10017).

Each proposal for a new book is reviewed carefully by the PRESS Editorial Board and by others to determine the need and marketability for the book and to ascertain its likely quality. Books on most subjects require the endorsement and sponsorship of the appropriate IEEE Group or Society, so a proposal normally should be submitted to the proposed sponsor before or at the same time it is submitted to the IEEE PRESS.

Any reader wishing a copy of a brochure describing the books published so far should request one from the Managing Editor of the IEEE PRESS at the address above.

The following article was contributed by Professor Robert Britton, California State University, Chico, California. It is significant with respect to non-sinusoidal functions in two ways. The internal structure of the array of computers may use Sequency Division Multiplexing for intercomputer communications; the tessellated computer is ideally suited for extremely fast computation of large two-dimensional transforms using bases such as Walsh, Slant or Fourier.

by
G. R. Redinbo

THE USE OF WALSH FUNCTIONS FOR COMMUNICATION WITHIN A TESSELLATED COMPUTER

Introduction

Tessellated computers are computer structures consisting of a large array of interconnected identical cells, wherein each cell is capable of executing its own instructions. The computer architecture proposed by John Holland, called the "Holland Machine", and the computer described by vonNeumann in his paper "Theory of Self-Reproducing Automata" are examples of tessellated computers.[1] A large network of inexpensive microcomputers connected together in some regular fashion could be considered a tessellated computer. The technology of integrated circuits has brought us to a point where a microcomputer can be purchased for less than $100. Thus we are motivated to consider the idea of connecting thousands of them together to produce a super computer. The basic problem with this idea is that no one has developed an effective control structure, in other words we have not figured out how to make such a network of processors work in cooperation. Another problem is that programmers are not experienced at developing algorithms that take advantage of parallism. And yet we observe that the most advanced computer, the human brain, which consists of a very large array of interconnected cells operating in parallel and in cooperation appears to work quite successfully. Thus, we are motivated to consider the concept of a tessellated digital computer.

I have no specific solutions or suggestions as to how to control a tessellated computer. What I do have to offer at this time is a cost effective method to provide the intercommunication within a three-dimensional tessellated computer. To provide direct intercommunication between thousands of microcomputers by conventional methods such as a cross-bar switch would be quite expensive. I propose that each mcirocomputer be packaged within a cube, and that this tessellated computer would be constructed by arranging the microcomputer cubes (nodes) together within a three-dimensional matrix of communication and utility conductors. Each node would be located geometrically at the intersection of three physically orthogonally oriented communication buses. Each bus will consist of only two wires, a transmission conductor, and a reception conductor. Within each microcomputer cube (node) would be a communication module. I would suggest that this communication module could be designed to implement either time division multiplexing (TDM) or sequency division multiplexing (SDM). TDM would be the easier method to implement, but SDM would have certain advantages to offer. Namely, greater immunity to impulse noise, and in the situation where utilization of the communication channel is below 50% a greater signal to noise ratio could be realized using SDM. Within this system serial information would be transmitted simultaneously between many different microcomputers by way of modulated mutually orthogonal Walsh functions.

This proposed communication system provides for a multitude of relatively inexpensive communication buses and the ability for simultaneous direct communication between all microcomputers connected to the same communication bus. Any microcomputer within this three-dimensional structure can select to communicate over one of three different adjacent orthogonally arranged buses. Although only two physical wires make up an individual communication path, simultaneous direct communication is possible among any combination of microcomputers connected to a bus by way of phase modulation of individually selected binary orthogonal waveforms (Walsh functions) generated by the special communication circuits associated with each microcomputer. The information is spearated in sequency instead of in space. Each node can be programmed with the appropriate information so that any combination of simultaneous intercommunication can be effected and be dynamically changed, depending upon the results of operations within the processor. We simply have an organization where in general some of the nodes can be transmitting information on one of three selected communication mediums at certain sequencies, and other nodes are receiving information over selected buses at selected sequencies, all being determined by the current state of each node. The maximum number of separate simultaneous nodal intercommunication transaction that can be accomplished is determined by the size of the Walsh function generator that is implemented and associated with each of the nodes. One node can transmit the same information to all or any number of other nodes connected to an associated bus depending upon how many of these nodes are tuned to that transmitting sequency. Also it would be possible for one node to inhibit another node by transmitting at the same sequency exactly the same bit pattern inverted. Basically this system provides a crossbar switching circuit in function space. In general the signal on a bus will be a multi-level analog step function which would be the arithmetic sum of a set of Walsh functions.

Characteristics of a Node

A node, which would be one microcomputer and a commun cation controller, could probably be packaged in a cu with dimensions of one centimeter on a side. A node needs only eighteen external connections. Figure 1 i a sketch showing the physical arrangement of these external connections. In addition to communication over the buses, each node will have a direct connection to each of its' six adjacent neighboring nodes. A control bus is provided to facilitate the process c configuring the processor, that is, loading the individual programs into each node. Different sequency Walsh functions transmitted over the control bus coul be interpreted by the nodes as control information forcing them into specified modes, such as a normal run mode or a dormant mode or a program load mode.

The basic elements of a node would be a microprocess a memory unit, and a communication controller, which would control the transfer of information from the memory unit of one node to the memory unit of anothe node upon initiation by the microprocessor. The communications controller will control the following functions after being initiated by the microprocesso

I. The transfer, over one of three buses at a particular sequency, of a specified block of info mation from local memory to the memory of some receiving node. The communications controller will interrupt the microprocessor upon complet of transmission.

MEETINGS & EVENTS

1978 WROCLAW SYMPOSIUM ON EMC

SEPTEMBER 13-15

Aim of the Symposium: The Symposium is open to scientists and engineers concerned with scientific, technical, operational and economic aspects of EMC in theory and practice. Its aim is to present and discuss significant new results and recent developments and it is hoped that it will help to expand knowledge and understanding of electromagnetic processes.

Topics: The EMC is understood in a broad sense as an ability of a device to function satisfactorily in its electromagnetic environment without introducing intolerable disturbance to that environment (or to other devices). More detailed topics are:

Social and economical impact of EMC - Electromagnetic pollution, control and enforcement - Spectrum economy and management- Radio systems planning - National and International cooperation in EMC - Interference propagation, source-to-receptor coupling - Antenna patterns impact on EMC - EMC of electric power, automotion and communications - Immunity of electronic devices and systems, analog and digital - EMC of medical electronics - Biological effects of RF energy - Measuring methods and instrumentation - Design of compatible equipment, suppression methods and devices - Regulations, limits, standards and specifications - Interference statistics - Computers in EMC prediction and analysis - New Techniques

Exhibition: A specialized exhibition will be organized during the Symposium. Prospective exhibitors in the following topics are invited:

Suppressed and high immunity equipment for use in RF exposed environment - Suppressors for household, industry and transport - Screened and anechoic enclosures - Modern measuring instrumentation, mobile and fixed facilities for interference testing and investigation - Cables, connectors, special components and devices - Shielding and absorptive materials

On request, exhibitors will be given the possibility of film showing.

Participation: Prospective participants are invited to fill out and return, as soon as possible, the form found below. This form should rapidly give an idea of the interest in the Symposium and furnish useful information to the Organizing Committee.

Language: The official languages of the Symposium are English and Russian. Simultaneous interpretation will be provided.

Symposium Record: The full texts of papers presented will be printed in the Symposium Record in one of the official languages (as presented by author) and made available to the participants immediately before the Symposium.

Papers: Original papers are invited on all aspects of EMC and, in particular, on the topics listed above. English and Russian summaries* up to 1 typed page per language in 5 copies with the full address of the author(s) and telephone and telex number should be sent by October 30, 1977 to: Prof. R. Struzak, EMC Symposium, Box 2141, 51-654 Wroclaw, Poland. Authors will be notified and receive an author kit by December 31, 1977. Manuscripts in the English or Russian language should be received by March 15, 1978.

Meeting Place: The Symposium and Exhibition will be held in convenient conditions on the premises of the Wroclaw Technical University. The city of Wroclaw is the scientific and cultural capital of the southwest region of Poland with a population of over 600,000.

It is situated 400 km from Warsaw, 250 km from Berlin, 200 from Prague and 450 km from Vienna. It may be conveniently reached by plane, train or car. The climate in Wroclaw is usually mild and pleasant in September with an average day temperature about 18°C.

Further Information: A second announcement is scheduled for January, 1978. Special inquiries may be directed to: Mr. W. Moron, Secretary General (EMC Symposium, Box 2141,51-654 Wroclaw, Poland).

Special requests concerning the Exhibition should be directed to: Mr. W. Stawski, Exhibits (the address as above).

- -

Send to: EMC Symposium
Box 2141
51-654 Wroclaw
Poland

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SYMPOSIUM ON BIOLOGICAL EFFECTS OF EM WAVES TO BE HELD IN AIRLIE, VIRGINIA

On October 30-November 4, 1977, an International Symposium on Biological Effects of Electromagnetic Waves will be held at Airlie House. Airlie House is a self-contained conference facility in Airlie, VA, located about 50 miles west of Washington, D.C. The symposium is being organized by Commissions A and B of the International Union of Radio Science (URSI) and sponsored by URSI and the United States National Committee for URSI in cooperation with the International Radiation Protection Association (IRPA). The Symposium Steering Committee is under the chairmanship of S. W. Rosenthal, Polytechnic Institute of New York, Route 110, Farmingdale, NY 11735. The Symposium Committee is chaired by Dr. Morris Shore, Bureau of Radiological Health, 5600 Fishers Lane, Rockville, MD 20852. Prospective Symposium participants may contact one of these individuals to indicate their interest, or for additional information.

IEEE TESTIFIES AGAINST PROFESSIONAL SALARY BUSTING AT CONGRESSIONAL HEARING

IEEE was invited to present testimony before the U.S. House of Representatives Subcommittee on Labor Relations. John J. Guarrera, Vice President of IEEE, represented the Institute at hearings on June 14-15. IEEE supported passage of the Service Contract Act Amendment (H.R. 314) which would eliminate salary busting of professional employees working on technical support service contracts.

Commenting on the need for this legislation, Guarrera stated, "I am extremely pleased that IEEE, with the full support of its Board of Directors, is now in a position to be so responsive to the needs of the engineering profession in this area." Congressman Frank Thompson, Jr., Chairman of the House Subcommittee on Labor Management Relations, announced that hearings would be held on June 14-15 on H.R. 314, an amendment to the Service Contract Act of 1965. IEEE members and staff have worked closely and effectively with Congressmen and their staff to encourage early hearings on this bill. Co-sponsored by Congressman James C. Corman of California, H.R. 314 has the bipartisan support of over twenty-five Congressmen and Senators.

The proposed legislation is designed to end "salary busting" as well as "salary erosion" of professional employees working on Service Contracts. Salaries as well as wages of all other Service Contract Employees have already been protected against such abuses by prior legislation.

Salary busting occurs when the total compensation paid to an employee for performing the same or similar duties under the service contract is substantially reduced below the original compensation level (or below the national norm) by the incumbent employer or a successor employer, following renegotiation or recompetition of the contract.

Salary erosion occurs when the total compensation paid by an employer for the performance of duties by an employee under the service contract is proportionately reduced over a period of time with respect to the national norm established for such duties and when such reduction is due to efforts by the employer to gain an advantage during subsequent renegotiation or recompetition of the contract.

Authority to administer the Service Contract Act is placed by law in the Department of Labor. Trying to solve the salary busting problem through the procurement process would, in the words of former Acting Administrator of the Office of Federal Procurement Policy James Curry, "place the procurement officer in the Solomon-like position of having to assure that fair and equitable salaries are paid for the services performed while also having to obtain the lowest bid."

OMB officials present stated that the problem could not be completely solved by amending the procurement process without statutory authority for an independent third party salary determination. The GAO has confirmed this by ruling that a contract may not prescribe a minimum rate of wages to be paid by a contractor in the absence of specific statutory authority.

BOARD PICKS CANDIDATES TOUGHENS IEEE POSITION ON REGISTRATION AND VOTES DOWN PROPOSED DUES INCREASE FOR 1978

Action was the byword at the first meeting of the year of IEEE's Board of Directors. Working largely in open sessions for the first time in Institute history, the Board moved on several fronts. It:

- Nominated candidates for the 1978 IEEE Presidency and Executive Vice Presidency
- Made major changes in IEEE Policy Statement 7.3, Registration of Engineers
- Rejected a proposed $5 increase in the general dues for 1978
- Lent its support to the lobbying effort of the United States Activities Board in behalf of service contract reform
- Opened the door to a potential IEEE withdrawal from the Engineers Council for Professional Development by year's end
- Approved a joint USAB/Technical Activities Board position concerning the role of the U.S. Government in civilian communications satellite research and development

A detailed discussion of the Board's debate on revision in IEEE's policy regarding registration and the Institute's dues structure appeared in the April Spectrum (p. 17). The Spectrum account will be useful to all Institute officers, in light of the potential impact on IEEE that Board decisions on both issues could have in the near future.

DR. EMBERSON ACTING GENERAL MANAGER OF IEEE

Dr. Richard M. Emberson, a Staff Director of the IEEE, has been named Acting General Manager of the Institute effective June 1. Dr. Herbert A. Schulke, Jr., who has resigned as General Manager and Executive Director of IEEE effective July 22, will serve as a Consultant to Dr. Emberson after June 1. Dr. Saunders, President of IEEE, explained that the Institute's Search Committee, which is seeking a permanent replacement for Dr. Schulke, may take from 90 to 180 days to find such a qualified individual.

Dr. Emberson has been serving since January 1976 as Staff Director of Educational, Field, Standards and Technical Services. In anticipation of the January 1963 merger of the American Institute of Electrical Engineers and the Institute of Radio Engineers to form IEEE, he joined IRE in September 1962. Throughout his career with IEEE, he has always been closely identified with Technical Activities, including the amalgamation of the AIEE and IRE technical entities into a unified system that has evolved into seven Technical Divisions, thirty-three Groups, Societies, and Councils, a vigorous Standards program.

INSTITUTIONAL LISTINGS

The IEEE Electromagnetic Compatibility Group 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.

AEL SERVICE CORP., Subs. of American Electronic Labs., Inc., Richardson Rd., Colmar, PA 18915

EMI/EMC, shield, enc. consult. test. & anal.; Scrn. rm. (incl. for large veh.); Comp. instr. for Mil. EMI test.

LECTROMAGNETICS, INC., 6056 W. Jefferson Blvd., Los Angeles, CA 90016
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RF shielded enclosures, modular, prefabricated & all welded. RFI/EMI power line filters; signal line filters.

SINGER INSTRUMENTATION, 5340 Alla Road, Los Angeles, CA 90066

Automatic/manual EMI test systems, EMI meters, impulse generators, antennas, and components.

SPECTRUM CONTROL INC., 152 E. Main, Fairview, PA 16415
Telephone (814) 474-5593

MIL-STD-461 testing, L, Pi, and T filters, capacitors fixed and variable in stock at HALLMARK.

An Institutional Listing recognizes contributions to support the publication of the IEEE Newsletter and TRANSACTIONS ON ELECTROMAGNETIC COMPATIBILITY. Minimum rates are $75.00 for listing in one issue; $200.00 for four consecutive issues. Larger contributions will be most welcome. No agency fee is granted for soliciting such contributions. Inquiries, or contributions made payable to the IEEE, plus instructions on how you wish your Institutional Listing to appear, should be sent to R. M. Emberson, The Institute of Electrical and Electronics Engineers, Inc., 345 East 47 Street, New York, N.Y. 10017.