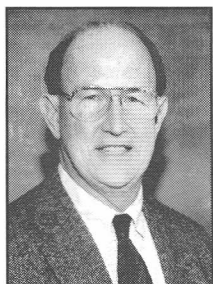
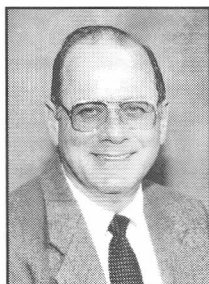




1993 IEEE MTT-S International Microwave Symposium June 14-18, 1993 Atlanta, Georgia, USA



Pete Rodrigue



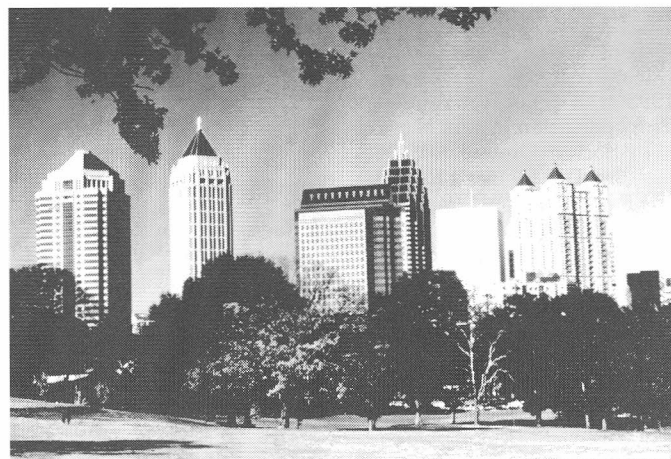
Charlie Rucker

Steering Committee Co-Chairmen

Welcome South!

The world political climate and the microwave industry are changing significantly. Against that background it is a special pleasure to invite you to Atlanta for IMS '93. Our theme, "The Global Reach of Microwaves," carries with it the promise to carry on the mission started last year in Albuquerque by Jerry Hausner and his Steering Committee. They asked: "Where do we go from here?", and some of the questions found answers. But for every answered question, there seems to be another waiting just around the corner. While we may not be clairvoyant in politics, we hope to help with some answers to questions on microwave industry trends at IMS '93 in Atlanta. And what better way than with over 300 technical papers, four rump sessions, 18 workshops, three panel sessions, and a highlight Plenary Session dedicated to our conference theme: "The Global Reach of Microwaves"? To address this theme we've invited experts on microwaves in telecommunications and the 1996 Olympiad, and we hope to touch on dual-use technology. But, technical sessions and the plenary aren't the only things available during Microwave Week '93.

Again this year, we will honor those who have made significant service or technical contributions to the Society or to our profession. Too often, we take for granted the diligence of some of our creative peers and the yeoman service freely given by so many volunteers. The 1993 Awards Banquet will be the centerpiece of a gala evening which begins with the



Located in Midtown, Piedmont Park is the site of the Arts Festival of Atlanta, concerts and other special events. The park offers a spectacular view of the contemporary Midtown skyline.

IMS/Exhibitor's Cocktail Reception in the Marquis Ballroom of the Marriott Marquis Hotel. The banquet follows in the Imperial Ballroom, then you can relax and enjoy a fast moving musical review that projects the spirit of Atlanta.

Following the Boston precedent, the local committee has arranged for some informal diversions on Tuesday night, June 15th, for those whose technical appetites are easily satiated. A limited number of tickets have been obtained for the Atlanta Braves-New York Mets baseball game that night. The package includes escorted transportation to and from the stadium. Come out and see the Braves move to their third consecutive National League Championship!

If baseball is not your bag, you might try an evening under the stars and lasers at Stone Mountain. Arrangements have been made for buses to transport attendees and guests to the nationally acclaimed Stone Mountain Laser Show.

Tickets to each of these options are quite limited, so if either of these appeals to you, make advance reservations!

In the following pages more details are given on the technical program and the guest program. There is also helpful advice on airport transportation and hotel arrangements. Room blocks and reservations for future symposia are based on history. It is important that you book rooms through the convention bureau. Rooms booked directly with hotels are not counted by the industry, and the cost to you and our society is increased. You help everyone when you reserve (early) through proper channels.

The Atlanta Steering Committee has developed a full technical and social program for the week. They are looking forward to seeing you for IMS '93, and their enthusiasm is warranted. Come, meet casually with your peers, discover the technical sense of the future and socialize. You will be glad you did, and we certainly will to.

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Master Calendar

MTT-S Sponsored Conferences¹

1993

• MIOP '93	May 25-27 Stuttgart-Sindelfingen Germany	(C)
• Microwave and Millimeter-Wave Monolithic Circuits Symposium	June 14-15 Atlanta, GA	(CS) (*)
• MTT-S International Microwave Symposium	June 14-18 Atlanta, GA	(S) (*)
• Automatic RF Techniques Group	June 17-18 Atlanta, GA	(C) (*) Affiliated
• International Microwave Conference/ Brazil (SMBO)	August 2-5 Sao Paulo, Brazil	(C)
• 23rd European Microwave Conference	September 6-9 Madrid, Spain	(C) (*)
• GaAs IC Symposium	October 10-13 San Jose, CA	(CS) (*)
• Microwaves in Medicine	October 11-14 Rome, Italy	(C) (*)
• Asia Pacific Microwave Conference	October 18-21 Hsinchu, Taiwan, China	(C) (*)
• 2nd Topical Meeting on Electrical Performance of Electronic Packaging	October 20-22 Monterey, CA	(S) (*)
• Automatic RF Techniques Group	December 2-3 San Jose, CA	(C) (*)

1994

• International Conference on Millimeter and Submillimeter Waves and Applications	January 10-14 San Diego, CA	(S) (Tentative)
• European GaAs Applications Conference	April	(C) (*)
• Topical Meeting on Electrical Performance of Electronic Packaging	April	(S) (*)
• Microwave & Millimeter Wave Monolithic Circuits Symposium	May 23 San Diego, CA	(S) (*)
• MTT-S International Microwave Symposium	May 24-26 San Diego, CA	(S) (*)
• Automatic RF Techniques Group	May 26-27 San Diego, CA	(C) (*)
• Asia-Pacific Microwave Conference	August	(CS) (*)
• IEEE Conference on the Computation of Electromagnetic Fields		(C) (*)
• European Microwave Conference	September	(C) (*)
• IEEE GaAs IC Symposium	October	(CS) (*)
• Automatic RF Techniques Group	December	(C) (*) Affiliated
• National Radio Science Meeting		(C) (*)

¹Meetings listed are those that have been officially sponsored by MTT-S (i.e., AdCom approved). There are many other microwave related meetings (chapter sponsored, commercial, etc.) that are not listed.

²MTT-S conference involvement:

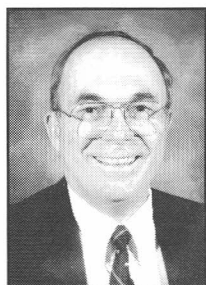
(S) Sponsor, (CS) Co-sponsor, (T) Technical Co-sponsorship, (C) Cooperate, (*) Continuous MTT-S involvement approved by AdCom

The MTT Newsletter staff is interested in obtaining feature articles dealing with current topics in the technical and professional areas of interest to MTT members. These articles should provide members with a general understanding of the topic and its significance in current and future activities in the microwave field. I would like to emphasize, however, that these special articles should cover topics in a broad, general sense. Specific design techniques and applications will be covered in the papers appearing at the MTT Symposium and in the *Transactions*.

If you know of a topic that is current and/or you are willing to contribute an article to the Newsletter, please contact:

John Eisenberg
25 Parson Way • Los Altos, CA 94022 • (415) 941-7426

January 1993 AdCom Meeting Highlights



by Jim Crescenzi

The rapid pace of change in our profession and in the microwave industry continues to be reflected in the Society's AdCom meeting and activities, and in IEEE activities in general. This January's AdCom meeting included new initiatives by President Peter Staecker, reports by IEEE President-Elect Troy Nagle and IEEE Division IV Director Kenneth Dawson on IEEE initiatives and long-range goals, and the normal packed agenda of budget considerations, motions and committee reports. There continues to be an expansion of cooperative sponsorship of new conferences on topics that overlap or extend traditional "microwave" coverage, of special issues of the MTT-S Transactions on Microwave Theory and Techniques, increased transnational activities and representation, and on development of a long term "strategy" or plan.

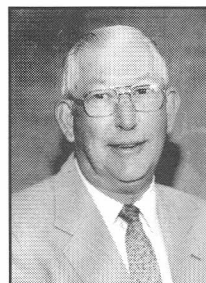
1993 MTT-S President Peter Staecker presented a summary of the MTT-S Society review that he had submitted to the TAB (IEEE Technical Activities Board) Society Review Committee last year. This comprehensive review covered all aspects of the Society's activities, and included statistics on membership and finances, number of chapters, publications, and conferences sponsored. The Society Review Committee observed that MTT-S strengths include its chapters and financial reserves. Areas suggested for increased emphasis included transnational activities and, in particular, preparation of a long range strategy or vision for the Society. Needless to say, several members felt that MTT-S definitely has a long term strategy, but it was agreed that emphasis had not been on formal documentation of said strategy!

MTT-S Treasurer R.E. "Skip" Bryan reported that, based on preliminary results, the overall budget objectives for 1992 had been met. 1992 MTT-S President Reynold Kagiwada's emphasis on conservative management of expenditures resulted in a healthy projected surplus in a time of great economic uncertainty. Skip has continually refined the presentation of budget statistics so that an accurate overview of financial matters is conveyed with great efficiency - a major contribution to AdCom meetings that is appreciated by all!

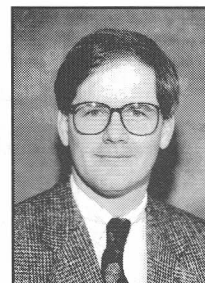
The AdCom had the unique privilege of presentations by both the IEEE President-Elect, Troy Nagle, and the newly elected IEEE Division IV Director, Kenneth Dawson. Both stressed new IEEE initiatives to increase transnational participation (new IEEE service centers are being established in Europe and in Asia) and to lead in modernization of publication services, including such novel areas as CD-ROM conference records. Troy Nagle solicited and received numerous comments and questions from the MTT-S members present. Areas covered included increasing transnational support and participation, more active solicitation of student involvement, membership satisfaction surveys, more low cost products, deemphasis of theoretical publications in favor of "applied" material, and increased lobbying of Congress on behalf of US

(Continued on page 35)

1993 MTT-S International Microwave Symposium Technical Program



Gordon R. Harrison



Paul R. Cox
1993 Chairpersons



H. Mike Harris

The Technical Program Committee (TPC) for the 1993 MTT-S International Microwave Symposium (IMS) met at the Atlanta Airport Hilton on January 10, 1993, to review contributed papers and to establish the technical program for the June 14-18, 1993, Microwave Week in Atlanta.

Of the 177 members of the TPC, 150 were present and were grouped into 25 technical subcommittees to review 614 contributed papers including 30 student competition papers.

Three hundred twenty-one (321) papers were received from U.S. authors and 293 from authors in 23 other countries. Three hundred thirty (330) of these papers were accepted for presentation at the conference, including 99 for the interactive forum. One hundred sixty-two (162) papers were accepted from U.S. contributors and 168 papers by international contributors from 19 countries. A total of 26 invited papers (most in special sessions) were added to the 330 papers selected by the TPC, bringing the total to 356 presentations available to attendees at the conference.

The resultant technical program is composed of 51 technical sessions including two interactive forum sessions and seven special or focused sessions.

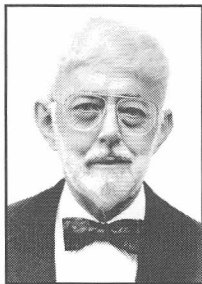
Microwave Week in Atlanta begins on Monday, June 14, 1993, with 11 special topic workshops and the MMWMC. The MTT-S IMS is scheduled for Tuesday through Thursday, June 15-17, beginning with the plenary session at 9:00 a.m. on Tuesday and continuing with 50 technical sessions through Thursday. The technical activities include four evening rump sessions on Tuesday, and lunch time panel sessions on both Tuesday and Wednesday. The National Telesystems Conference (NTC) (AESS sponsored) is co-located with the IMS and has scheduled technical sessions on Wednesday and Thursday. On Friday, June 18, activities available include 7 workshops and the ARFTG Conference.

All technical sessions of the MMWMC, MTT-S, and the NTC as well as the workshops on Monday, will be held in the Georgia World Congress Center. The Tuesday evening rump sessions, the Friday workshops, and the ARFTG sessions will be held in the Marriott Marquis Hotel, the conference headquarters hotel.

Effort has been made to cover all technical topics of current interest to the microwave community and to provide a complete international, global, perspective of research and applications of microwave technology.

We hope that the 1993 IMS will provide you with a global perspective of microwave technology, that you will be provided some special benefits from the content of some part of the technical program and that you will enjoy all the activities of Microwave Week in Atlanta.

In Memoriam Harry F. Cooke 1922-1993



Harry Forwood Cooke (S'46, M'55, LM'87) died March 13, 1993, at Stanford Hospital in Stanford, California, at the age of 71. His home was in Los Altos Hills, California.

Harry was born in Little Rock, Arkansas. In the early part of World War II he was in the RAF 60 Group and worked with ground and air radar systems. Following the U.S. entry to the war he became a U.S. Army Air Cadet,

flying navigation training missions.

He received a B.S.E.E. degree from the University of Arkansas in 1948 and later did graduate work at Southern Methodist University. He was a member of Tau Beta Pi honorary engineering fraternity. His senior paper on locked oscillators won the Southwestern IEEE student prize. Following his graduation he was with the Department of Agriculture where he developed techniques for electronic crop testing. Later he joined AR&T Electronics, now Baldwin Electronics, designing proximity fuses and low noise vacuum tube amplifiers.

In 1957, he joined the Circuit Development Branch of the Semiconductor Research and Development Laboratory of Texas Instruments as a Senior Member of the Technical Staff. Early work at TI included the development of FM receiver circuitry and collaboration with Roger Webster on the first solid state TV receiver. Later he was a key member of the team which developed the first silicon transistors capable of microwave amplification.

Shortly thereafter, Harry was part of the team that proposed and won the development of the MERA (Molecular Electronics for Radar Applications) phased-array radar program, the pioneering work using microwave integrated circuits. Along with team members Tom Hytlin and Britt Vincent, Harry holds the basic solid-state phased-array radar patent. After the initial MERA work, he led a group of engineers in developing state-of-the-art low-noise and power

silicon transistors for radar and communications applications.

From 1970 until 1979 he was manager of device design and analysis at Avantek where he developed the foundation for Avantek's broad line of bipolar and GaAs FET transistors. While at Avantek he published a number of tutorial papers including the 1971 classic paper "Microwave Transistors: Theory and Design."

Harry joined Varian Associates, Solid State Division (now Litton Solid State) in 1979 as a senior scientist responsible for GaAs FET design and testing. Following his 1987 retirement, he remained active as an independent consultant for several Bay Area companies designing microwave transistors and test systems for devices and amplifiers.

Harry published over 50 papers in the fields of VHF to millimeter wave devices and circuits. He was awarded 14 patents covering devices, circuits and systems. His last contribution is Chapter 5, "Thermal Effects and Reliability," in the 1993 definitive text, *High-Power GaAs FET Amplifiers* edited by John L. B. Walker. In 1989, he was given the Microwave Career Prize by the IEEE Microwave Theory and Techniques Society at the annual International Microwave Symposium in Long Beach, California.

Harry was an unselfish mentor to his colleagues at Texas Instruments, Avantek and Varian in both career development and aiding their understanding of solid-state microwave circuitry. Following the 1989 award of the career prize, many of this group, including Andy Anderson, John Archer, Frank Emery, Daniel Ch'en, Julius Lange, Bob Myers, Masa Omori, George Pierson, Gary Policky and George Vendelin, joined with Roger Webster, Tom Hytlin, Britt Vincent, Jim Sterrett and George Bechtel to amplify the honor granted by the MTT-S with a dinner at the Stanford Faculty Club.

Harry is survived by his wife, Lavinia; two daughters, Norma Cooke Jackson of Houston, Texas, and Gaynor Cooke Nelson of Boulder, Colorado; his sister, Alice Cooke Osborn; and one grandson, Maxwell Forwood Neslon. As a memorial, the family prefers contributions to the Friends of the Los Altos Library, Los Altos Library, 135 San Antonio Road, Los Altos, CA 94022.

—Frank E. Emery
Watkins-Johnson

A. Gardner Fox: Pioneer of Microwave Radio Transmission

A. Gardner Fox, 80, former head of the Communications Research Department at Crawford Hill, died Nov. 24, 1992. Fox joined the technical staff at Bell Labs in 1936, after earning a B.S. degree in 1934 and an M.S. degree in 1935 from MIT. During his 41-year career, he participated in the early exploration of waveguides, anti-aircraft radar, the prototype radio relay system, non-reciprocal ferrite devices and lasers.

During World War II, Fox worked on microwave design problems of the SCR-545 anti-aircraft radar and microwave amplifier circuits for radio relay systems. In 1945, Fox received the Naval Ordnance Development Award for these contributions. After the war, Fox helped develop AT&T's first transcontinental microwave relay system.

In 1959, Fox took an interest in optical research and joined with Tingye Li, who is now head, Lightwave Systems

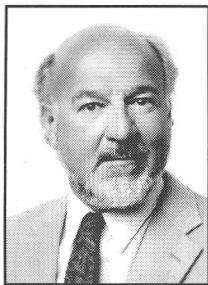
Research at Crawford Hill, in developing a basic theory of how light behaves within a laser resonator. Their analysis provided an understanding of the phenomenon and cleared the way for future development of laser technology. Virtually every modern textbook on lasers has a section on this theory and the two scientists' calculations are used as a standard for which research results are checked. Fox and Li shared the IEEE David Sarnoff Award in 1979 for their "discovery of modes in open structures and their application to laser resonators."

Fox held 53 patents in the field of microwaves and quantum electronics and authored several technical articles. A Fellow of the IEEE and the Optical Society of America, he was the recipient of the first Quantum Electronics Award from the IEEE Quantum Electronics and Applications Society in 1978. He received the 1978 Microwave Career Award from the IEEE Microwave Theory & Techniques Society.

Fox is survived by his wife Ellen, two daughters, two sons and five grandchildren.

—Reinhard Knerr
AT&T Bell Laboratories

In Memoriam: Octavius Pitzalis, Jr.



Octavius Pitzalis, Jr.

Octavius Pitzalis, Jr., 58, of Malibu, California, died in an automobile accident on January 11, 1993, in Malibu. To many of us in the RF and microwave community "Pitzi," as he was known, was a friend, mentor and colleague. We who knew him will remember him for his articulate story telling, his brilliance and his enthusiasm for technical work. He

was always willing to share and exchange ideas. Pitzi's outstanding career in the solid state and microwave fields spanned over 30 years.

After graduation from the University of Missouri in 1959, Pitzi went to work in the Army's Electronic Devices and Technology Laboratory at Fort Monmouth, New Jersey. While there, Pitzi pioneered the development of solid state RF and microwave amplifiers, authored and co-authored many papers on that subject. His design concepts and approaches for power combining and broadband matching are used routinely in many of the commercial and military power amplifiers built today.

For the past six years, Pitzi was actively engaged in device modeling at EEsof, West Lake Village, California. He was instrumental in establishing the EEsof User's Group and became its first president. He gained international recognition for his microwave expertise and has lectured throughout the world on device modeling and broadband amplifier design.

Pitzi's sons, William and Leonard, have established a scholarship fund in their father's memory. Contributions in Pitzi's name may be made to the IEEE Microwave Theory & Techniques. (See announcement, below.)

—Russ Gilson

U.S. Army Research Laboratory

Microwave Education Fund



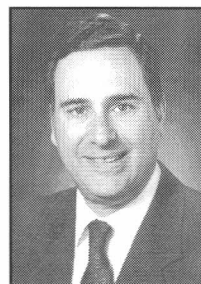
by Barry S. Perlman

The Microwave Theory & Techniques Society is in the process of setting up a new 'Microwave Education Fund.' Donations to this fund would be used to help support the education and accreditation of worthy future microwave engineers and may be made to honor a deceased eminent member of the Society. Scholarship grant recipients will be selected from those who show exceptional promise in microwave engineering and related disciplines. Contributions for this purpose should be made out payable to the "IEEE Foundation - MTT Education." A brief note may be included describing the donor's intentions, e.g. "to be used to award a microwave education scholarship in behalf of, or in memory of . . .", etc. It is important to note use for MTT education purposes in order to credit the MTT Education Account. Donations should be sent to:

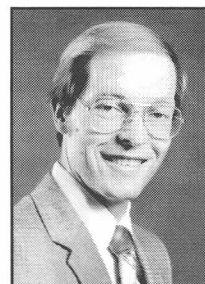
"The IEEE Fund" c/o IEEE Controller
445 Hoes Lane
P.O. Box 1331
Piscataway, NJ 08855-1331, U.S.A.

Donations from U.S. sources would be exempt from Federal income tax under IRS guidelines. The point of contact for this effort is Dr. Barry S. Perlman, Co-Chairman, MTT Education Committee, 908-544-4024, or fax 908-544-4024.

MTT-S Meetings & Symposia Committee Report



E. D. Cohen



E. A. Rezek

The structure of the Meetings & Symposia Committee announced in 1992 has been retained in 1993. The Committee has two chairmen: One individual is responsible for the MTT-S International Microwave Symposium and the 2nd individual is responsible for the other conferences and symposia that the Society has involvement with. The committee membership has changed since the fall 1992 AdCom elections. Eliot Cohen, one of the 1992 Co-Chairmen of the Committee, has been appointed as the Chairman for 1993 and is responsible for the dealings with the IMS. Ed Rezek, 1992 Secretary, has been appointed as Vice Chairman of the Committee and is responsible for the other conference activities. Jim Crescenzi, who was the other 1992 Co-Chairman, was elected Vice President of the Society. Jim accomplished some landmark changes in the operation of the Society during his time on the Committee, most importantly the establishment of definitive criteria for IMS site selection. We thank Jim for his contributions and hard work and wish him well in his challenging new assignment.

(Continued on page 34)

Call for MTT-S AdCom Nominations and Committee Appointments



by Kiyo Tomiyasu, Chairman
AdHoc Nominations and Appointments
Committee

This year, the nomination of candidates for election to the MTT-S Administrative Committee (AdCom) will be conducted by an AdHoc Nominations and Appointments Committee (N&A Committee) appointed by AdCom on January 11, 1993. The AdHoc N&A Committee will handle the nominations with the same procedure used in past years as specified in the MTT-S Bylaws. In addition, the N&A Committee will seek interested and qualified individuals who will be recommended to the incoming President for his consideration to serve on various MTT-S committees.

Nominations to MTT-S Administrative Committee

Each year the MTT-S holds elections at its Annual Fall Meeting to elect members to serve on AdCom. The Bylaws state that the Nominations Committee will select a slate of at least two members of the Society for each vacancy in the elected membership, which will occur on the AdCom the following January 1. The Nominations Committee shall be guided in their selections by principles of efficiency, geographical, and organizational distribution. AdCom members who have served three consecutive terms by the following January 1 are ineligible for nomination by the N&A Committee. The Bylaws provide three means by which one may be nominated for AdCom. They are as follows:

- Nominations by the Nominations Committee
- Nominations by petition signed by 25 MTT-S members and submitted to the Nominations Committee Chairman prior to July 1, 1993.
- Informal Chapter nominations submitted by July 1, 1993

All nominees will be contacted to ascertain that they will accept the nomination, and will commit themselves for active participation to at least two meetings a year, held at various locations in the United States. The geographical and affiliation distribution of current AdCom members is given below:

Present AdCom (1993): Total = 18

Eastern U.S.	6	Industry	12
Central U.S.	1	Government	2
Western U.S.	8	University	4
Europe	2		
Japan	1		

The Nominations Committee needs your help in suggesting potential nominees to serve our membership as AdCom members. Please submit your suggestions to the Chairman of the AdHoc Nominations Committee and/or your local Chapter Chairman by July 1, 1993.

Recommendations for Appointments to MTT-S Committees

The second function of the AdHoc N&A Committee is to assist the incoming MTT-S President, by identifying indi-

viduals to be recommended for his consideration for appointments to the many MTT-S committees. Anyone interested in such appointments should contact (by July 1, 1993):

K. Tomiyasu, Chairman
AdHoc Committee on Nominations and Appointments
General Electric Company
366 Hilltop Road
Paoli, PA 19301
Tel. 215-571-5740
Fax 215-644-8521

TAB Report

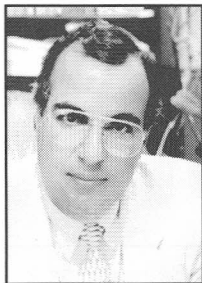


by Peter Staecher
MTT-S President

The Winter Technical Activities Board meeting was held from Thursday, February 25 through Sunday, February 28, 1993. Of interest to MTT were the following actions taken.

- TAB endorsed a proposal by the Components, Hybrids and Manufacturing Technology Society (CHMT) to change its name to Components, Packaging and Manufacturing Technology Society (CPMT). This change was sought to more closely represent the focus of the Society.
 - TAB endorsed proposals for an IEEE Robotics and Automation Society Magazine and an IEEE Signal Processing Society Letters journal.
 - TAB endorsed a change to the existing copyright policy applying to technical, educational and professional publications of the institute to include technical society/council Newsletters, but excluding section and chapter Newsletters. This change will transfer liability issues from IEEE to the authors of technical articles in Newsletters.
 - The RAB/TAB Transnational Committee recommended that Societies should
 - lead with active e-mail programs to capitalize on peer interaction world-wide,
 - either utilize Section e-mail coordinators or appoint an e-mail coordinator for each Chapter to bring the Chapters into closer contact with Societies and allow Societies to interface with their Chapters and members more easily,
 - be encouraged to provide electronic news and information services for their members and these should be e-mail and internet file transfer (FTP) accessible,
 - incorporate global volunteer participation in Society administration and activities,
 - simplify paper submission and world-wide review process.
- To facilitate benchmarking of IEEE journal prices, comparative prices of our periodicals with respect to other outside journals will be reported.

What Is Happening in CAEME?



by Magdy F. Iskander
Director, CAEME Center

I think it is time to share the latest in CAEME activities and report on recent developments. To begin with, I am very pleased to welcome two new corporate sponsors of the CAEME Center: Andrew Corporation and Hughes Aircraft Company. As CAEME approaches the end of the NSF grant, the corporate support is becoming crucial to the continued activities of the Center. CAEME now has six corporate sponsors including Hewlett-Packard, Motorola, Lockheed, Texas Instruments, Andrew Corporation, and Hughes Aircraft Company.

I am also delighted to announce that as a result of the CAEME efforts, engineering educators now have a new journal that focuses on use of computers and software tools in engineering education. This multidisciplinary journal, *Computer Applications in Engineering Education*, is being published quarterly by John Wiley & Sons. Two issues of the journal have already been published, and many agree that the people at John Wiley have done a great job in publishing this important and timely journal. Besides including software diskettes with each issue, the journal is being published in color and on high-quality paper. Tables I and II provide lists of the papers published in the first two issues. Table III lists the software distributed with the first two issues. You are encouraged to request your complimentary copies of the first, second, or even both issues together with the associated software by simply faxing your name and address to me at 801-581-5281. I will continue to respond as long as the supply lasts. I truly believe that John Wiley & Sons has provided us with a unique opportunity to sustain our efforts in this area of computer-based engineering education. It is now up to us to nurture it, support it, and bring it to the highest level of excellence and significant professional value. Subscriptions by individuals and our institutions are a first step, but equally important are our technical contributions to the journal. I am looking forward to receiving papers from you and from colleagues at your institution. Please let me know if I can be of assistance. Subscription rates are \$195 for institutions (\$225 outside the U.S.); \$75 for individuals in the U.S., Canada, or Mexico (\$105 outside North America); and \$30 for students worldwide.

I would like also to report on the third round of the CAEME funding of software development projects. We received 23 proposals, and the CAEME Policy Board decided to fund the eight projects listed in Table IV. Congratulations to the Principal Investigators of the successful proposals, and I am looking forward to working with them on the publication of the results of their projects in Vol. III of the CAEME software books.

I am delighted to report that the distribution of the CAEME Software Book, Vol. I, has been remarkably successful. Table V lists universities which have paid the membership fee in the CAEME Center. It may be seen from Table V that, in addition to the numerous universities in the U.S.A., institu-

tions from 23 other countries have joined CAEME. The list of foreign countries includes Canada, Belgium, Brazil, Sweden, England, Switzerland, France, Germany, Korea, The Netherlands, Finland, Spain, Australia, Romania, Italy, Poland, New Zealand, Greece, Malaysia, Ireland, Austria, Portugal, and Denmark. In all, CAEME has raised over \$55,000 from the sales of Vol. I of the software book. This includes the many individual copies that were distributed at cost (\$125). A brief description of the contents of Volume I was published in Vol. 33, No. 6, of this magazine (December 1991). Volume II is expected to be published in early 1993. Please let me know if you need additional information.

I would like to conclude by indicating that as we approach the ending of the NSF grant, CAEME is now at the crossroads between its federal funding and the continued self-supporting status. Under the NSF grant, CAEME limited its activities to undergraduate education. To help sustain the Center, the Policy Board is considering extending these activities to cover new markets in corporate training and K-12 science and math education. The Policy Board will consider business plans along these lines in its next meeting on March 19, 1993. Your thoughts, comments, and suggestions are wholeheartedly appreciated.

Until we meet again in a future CAEME column, I wish you all success. I am looking forward to your continued collaboration.

Table 1. List of Articles in the First Issue of *Computer Applications in Engineering Education*

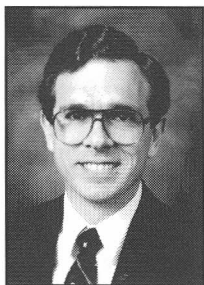
- "Computer Aids for Chemical Engineering Education: An Assessment of CACHE —1971-1992," W. D. Seider, University of Pennsylvania
- "Interactive Computer Modules for Undergraduate Chemical Engineering Instruction," H. S. Fogler, S. M. Montgomery, and R. P. Zipp, University of Michigan
- "Multimedia-Based Educational Applications of Computer Simulations of Chemical Engineering Processes," R. G. Squires, P. K. Andersen, G. V. Reklaitis, S. Jayakumar, and D. S. Carmichael, Purdue University
- "NSF/IEEE CAEME Center: An Exciting Opportunity to Align Electromagnetic Education with the Nineties," M. F. Iskander, University of Utah
- "Simulation of Electromagnetic Radiation and Scattering Using a Finite Difference-Time Domain Technique," K. Li, M. A. Tassoudji, R. T. Shin, and J. A. Kong, Massachusetts Institute of Technology
- "Visualization, Simulation, and Computing: New Tools for Learning, New Paradigm for Teaching," R. Cole and C. Brune, University of California-Davis
- "Discretization of Partial Differential Equations for Computer Evaluation," Z. Fazarinc, Hewlett-Packard Laboratories
- "Computer Use in a Multidisciplinary Control Laboratory," E. J. Mastascusa and M. F. Aburdene, Bucknell University
- "Interactive Video: Innovative Episodes for Enhancing Education," H. J. Bailey and N. E. Thornton, Bloomsburg University
- "Arrays: A Software Package for Analysis of Antenna Arrays," A. Z. Elsherbeni and P. H. Ginn, University of Mississippi

Table 2. List of Articles in the Second Issue of *Computer Applications in Engineering Education*

- "Unconventional Engineering Teaching Tools," S. E. McCormack and R. C. Compton, Cornell University
- "A Multimedia Laboratory," M. El-Sharkawy, Purdue University

(Continued on page 29)

The CAEME Software Book Volume 1



by Dan Swanson

Computer Applications in Electromagnetics Education (CAEME) is funded by the National Science Foundation (NSF), the AP, EMC, and MTT Societies, ACES and several industry sponsors. The goal of CAEME is to provide leadership in the area of computer-aided instruction in electromagnetics for both academia and industry. Although most students and engineers now have access to a personal computer, software for studying electromagnetics has not been widely available. With the right software we can visualize abstract mathematics, animate dynamic phenomena such as wave propagation, and provide one-on-one tutoring for difficult topics.

The first volume of CAEME software addresses these goals in some very intriguing ways. The various software packages cover five general categories: fundamentals of electromagnetics, transmission lines, waveguides, antennas and radiation, and numerical techniques. While writing this review it has been interesting to see the different approaches taken to illuminate the same problem. Although the primary audience for this work is the full-time undergraduate, working engineers may find useful material for self study.

Time and space do not allow me to cover all the software in this first volume, but I will try to touch on those chapters that may hold the most interest for MTT-S members. I apologize in advance to those authors whose worthy efforts are not reviewed here.

Fields&Operators

Martin Lapidus

Lascaux Graphics [1]

Fields&Operators is an interactive graphics program that allows users to experiment with surfaces and vector fields in two or three dimensions. In addition, there is a time variable which can be used to animate functions. And, the differential operators divergence, gradient, curl and Laplacian can also be computed and displayed as vector fields and surfaces.

The basic structure of Fields&Operators is the layer. A layer definition may be a single vector or curve, or it can be a complicated surface or vector field in three dimensions. The contents of a layer may be a function defined by the user, or it can be computed based on the contents of other layers. Functions can be displayed as surfaces, scalar fields, level curves, contour lines or vector fields.

Each layer has an operator that defines how computations in that layer depend on the functions or vector fields in other layers. The simplest operators are functional dependencies between layers. The dot product and cross product operators can be applied to vectors or vector fields in two layers and display the result in a third layer. Differential operators in one layer can also be applied to the functions in another layer. The user can work in rectangular, cylindrical or spherical coordinates, although the dot product, cross product and tangent operators are not available in cylindrical or spherical coordinates.

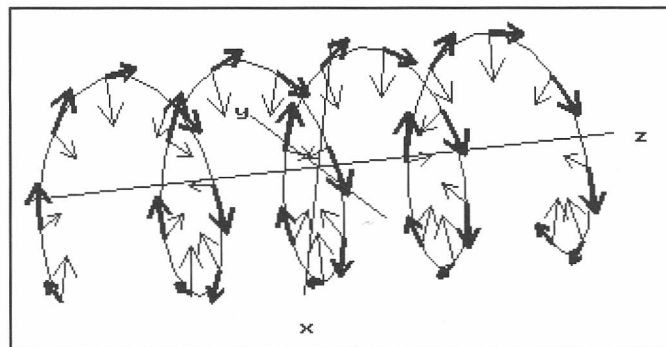


Fig. 1. Tangent and normal vectors to helical curve. Created by Fields&Operators.

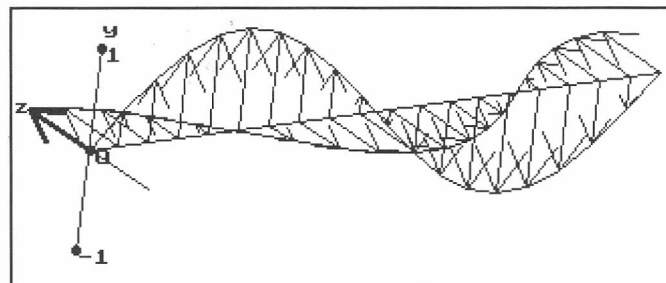


Fig. 2. The E field and H field components of a traveling wave. Created by Fields&Operators.

The examples shipped with Fields&Operators include tangent and normal vectors to a helical curve (Fig. 1), the E field and H field components of a traveling wave with a polarization vector (Fig. 2) and the antenna pattern for a five-element, half-wavelength spaced, uniformly excited linear array. If you are interested in exploring the mathematics of electromagnetics, I believe Fields&Operators is a good, low-cost, alternative to MathCAD or Mathematica. You can purchase Fields&Operators directly from Lascaux Graphics (see address at end of article) and I have also seen it listed by various mail order houses.

Companion to Elements of Engineering Electromagnetics

Nannapaneni Narayana Rao

University of Illinois

Today it is more and more common for text books to include computer exercises, although they are not always available on disk as is the case here. This software package is actually 15 submodules that cover a broad array of topics including coordinate conversion, plotting equipotential lines, traveling-wave concepts, Smith chart applications and antennas. The software supplements the text book with examples that the user can manipulate.

I was at first put off by the low-resolution graphics mode (CGA) used in this software, but I believe this was necessary to drive the early LCD display panels used in conjunction with an overhead projector. In the end, the low-resolution graphics do not distract the user from the presentation material. One disappointment was a bug in the Smith chart module that prevented me from completing the session.

Many of the modules in this package would be useful for an individual who wished to review the basics of electromagnetics or transmission line theory. They would also be useful as a supplement to an inhouse training program.

(Continued on page 31)

International Microwave Symposium 1993

Workshops and Panel, Rump or Focus Sessions



by Jim Wiltse
Special Session Organizer

These activities include 18 full-day or half-day workshops on Monday and Friday; four lunch-time panel sessions on Monday, Tuesday, and Wednesday; four rump sessions on Tuesday evening; and six special technical sessions on Tuesday and Wednesday. We hope you will be able to take advantage of the diverse array of topics.

Workshops—Monday and Friday

The all-day workshops include breakfast and lunch, while half-day workshops provide one meal. The cost also includes copies of handouts from the presentations. Following is a listing of workshop titles and organizers.

Monday, June 14, 1993

- High T_c Superconductivity in Microwave—*S. J. Fiedziusko, K. D. Breuer*
- High Power Microwave Generation and Its Commercial Applications—*J. Goel, D. Reid, W. C. Brown*
- Ultra Low Noise Microwave Sources—*B. McAvoy, R. Moore, J. Whelehan, Jr.*
- Picosecond and Femtosecond Electromagnetic Pulses: Analysis and Applications—*I. Wolff, E. Yamashita*
- Thermal Aspects of Microwave Device and Circuit CAD—*W. Curtice, V. Rizzoli*
- Wireless Communications Via Lightwave—*W. I. Way, H. Ogawa*
- Mobile Communications Systems—*B. Geller*
- Filters and Multiplexers for Mobile Communications—*R. Bonetti, A. Williams*
- Material Measurements—*R. Ham, J. Barr*
- Electromagnetic Wave Interaction with Water and Moist Substances—*A. Kraszewski*
- Critical Issues in Experimental Validation—*J. Rautio*

Friday, June 18, 1993

- Microwave HBTs and HEMTs: Circuit Applications and Reliability—*F. Ali, A. Gupta, B. Bayraktaroglu*
- Combined Self-Consistent Particle Transport Simulation and Full Wave Dynamic Field Simulation for Monolithic Solid-State Device and Circuit Calculations—*C. Krowne*
- EM Modeling of Microwave Packages and Interconnects—*K. Gupta, B. Perlman*
- The Art of Designing Power MMICs—*A. Shama, T. Itoh*
- Civil Microwave Packaging—*B. Berson, D. Maki*
- System Implications of Atmospheric Transmission Effects—*R. McMillan, A. VanderVorst*
- Surface Mount Packaging for High Volume MMIC Components—*M. Rosenstock*

(Continued on page 28)

Guest Program

by Mary Rodrigue and Mary Rucker

Atlanta, home of Margaret Mitchell and "Gone With the Wind," Martin Luther King and the Civil Rights movement, the Stone Mountain Laser Show and National League Champion Atlanta Braves, CNN and Coca-Cola, The Battle of Atlanta in 1864 and the Olympic Games in 1996 . . . as you can see from this short list Atlanta is a many faceted city. We hope the program we have planned for you will allow you to sample her many sights, sounds and moods.

The Guest Hospitality Suite will be on the tenth floor of the Marriott Marquis and will be open Monday through Friday from 8:00 a.m. till 5:00 p.m. We think you will find this a very pleasant place to renew old acquaintances, make new friends and gather to make plans for the day. A continental breakfast will be available in the morning and coffee, tea and soft drinks throughout the day. The Marriott Marquis is within easy walking distance of most other hotels. Alternatively, guests are invited to use the shuttle bus service to and from the Georgia World Congress Center. The Guest Suite will be staffed by local people ready to assist you in any way they can. The Atlanta Convention and Visitors Bureau has a staffed, permanent information booth in the main concourse of the Georgia World Congress Center. They will be available throughout the symposium to answer any questions about the area.

Organized tours are planned for each day of the International Microwave Symposium. The first group tour will leave from the Marriott at 9:30 a.m. Tuesday. Prior to departure (at 8:30 a.m.) a representative of Guidelines Atlanta will present an overview of the city. You will then leave for a tour of CNN and World of Coca-Cola Pavilion. You will also have an opportunity to enjoy the excitement of Underground Atlanta. Lunch will be served in the Sundial Restaurant 72 stories up in Atlanta's tallest hotel, the Westin Peachtree Plaza. You will have a panoramic view of the city while you enjoy your lunch. On your return trip you will drive by future 1996 Olympic sites, Georgia State University, the State Capitol and other Atlanta landmarks.

On Wednesday you start out with a drive down Peachtree Street passing such landmarks as the Fox Theatre, Colony Square and the Woodruff Arts Center. You will stop and tour the Cyclorama, a diorama depicting the Battle of Atlanta. You will also tour Inman Park, one of the country's best preserved Victorian neighborhoods, and you will drive by the Carter Library and the Martin Luther King Memorial Center.

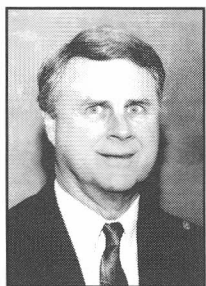
Lunch on Wednesday will be at one of Atlanta's finest restaurants, housed in an authentic plantation home built in 1817 in Washington, Georgia, and moved to Buckhead in the 1960's. After a delicious lunch you will take a leisurely drive through Atlanta's northwest residential area, noted for its magnificent homes and lush landscaping.

Your day will conclude with tours of the Swan House, a magnificent Anglo Palladian Villa with priceless original furnishings and Oriental rugs, and the Tullie Smith complex, an authentic antebellum plantation-plain farmhouse.

On Thursday you will take a trip back in time to Covington, Georgia, one of the few areas whose magnificent plantations and townhomes were spared by Sherman on his "March to the Sea." Here you will be greeted by a local guide who will take you down historic tree shaded streets lined with antebellum homes. You will visit a charming turn-of-the-century cottage furnished throughout with antiques and a breathtaking mansion furnished with an extensive collection of fine American Empire furniture from 1800-1840 period and Victo-

(Continued on page 28)

1993 MTT-S Local Arrangements



by Jerry Archbold

Atlanta Area Information

On behalf of IEEE and, as a native Atlantan, I would like to personally welcome you to Atlanta, home of the 1991 and 1992 National League Champion Atlanta Braves, and the site of the 1994 Super Bowl and the 1996 Olympic Games.

Atlanta in the '90s is the nation's most exciting city! In addition to the tremendous activities mentioned above, Atlanta is also the home of the new Georgia Dome, the largest cable-supported dome stadium in the world. Other world firsts include: largest toll-free telephone dialing area; largest suburban office park—Perimeter Center; largest bas-relief sculpture—Stone Mountain Park; largest 10K race—Peachtree Road Race with 45,000 runners; the tallest hotel—Western Peachtree Plaza, 73 stories, 723 feet tall. And, hang on to your credit cards, the largest mall in the Southeast—Lenox Square and, for added shopping pleasure, Atlanta has more shopping space per capita than any other city except Chicago.

In mid June one can expect warm and sunny days with an average temperature of about 78 degrees.

Symposium Hotels

Room blocks have been reserved for conference attendees in eight Atlanta hotels. All are top quality and basically within walking distance of the Georgia World Congress Center where most conference events are scheduled. However, bus shuttle service will be provided during the symposium.

Hotel Registration

All hotel reservations will be handled by the Housing Bureau (Atlanta Convention and Visitors Bureau). The Conference Housing Form must be used to make hotel reservations. It is recommended that you respond early to ensure availability of one of your first choices.

Dining and Areas of Interest

All attendees will receive an Atlanta Visitors Guide in their registration packets courtesy of the Atlanta Convention and Visitors Bureau. This guide contains information on area attractions, recreation, sightseeing, dining, accommodations, etc., with several maps. Any cuisine can be satisfied by the many excellent restaurants in the city or a short ride to the "burbs" on the northside. Some outstanding attractions include: Atlanta Botanical Gardens, Georgia State Capitol, Jimmy Carter Library and Museum, CNN Center, the World of Coca-Cola, Fernbank and SciTrek—The Science and Technology Museum of Atlanta just to name a few. Almost everything is just a short ride on Atlanta's rapid transit, MARTA, including to and from the inside of the Atlanta Airport, GWCC, Peachtree Center, CNN, and Lenox Square shopping.

While you are here, we invite you to relax and enjoy Atlanta's attractions, first-rate accommodations, award-winning restaurants, stimulating cultural life, and above all, the gracious people of this diverse and wonderful city.

Transportation

Travel Agency

Williamsburg Travel Company has been selected as the official travel agency for the 1993 International Microwave Symposium. Williamsburg Travel is an Atlanta based agency specializing in associations and conventions and will assist MTT IMS travelers with reservations on Delta Air Lines, Alamo Rent A Car, and other travel arrangements. Complimentary maps, MARTA passes, and restaurant coupons will be included with tickets which will be mailed or sent by overnight courier when necessary.

Contact Williamsburg Travel at:

1-800-952-9922 or 404-952-0430

Monday-Friday, 8:00 a.m.-6:00 p.m. E.S.T.

Please indicate that you are attending the International Microwave Symposium.

Airline

The 1993 International Microwave Symposium has selected Delta Air Lines, Inc., as the official air carrier. Delta is offering 5% and 10% discounts on selected round trip fares and a 40% discount on 100 pounds or more of air cargo. Delta is an Atlanta based carrier offering over 5000 flights daily to U.S. and international destinations.

Reservations on Delta for the International Microwave Symposium can be made through Williamsburg Travel at the numbers given above or through the Delta meetings reservation desk:

1-800-241-6760

(United States and Canada)

Please refer to file number:

H0571 (if dialing direct to Delta)

Car Rental

Alamo Rent A Car, Inc., has been selected as the official car rental agency for the meeting in Atlanta, Georgia. Rates offered by Alamo for conference attendees represent a substantial discount off their normal rental rates for six car sizes. In addition, Delta Air Lines frequent flyer mileage is accumulated when renting Alamo cars.

To reserve a car at the conference rate, call Alamo at:

1-800-732-3232

and reference group number 245583

and rate code G8

Transportation Services

During the symposium, frequent shuttle bus service will be provided daily to and from the Georgia World Congress Center and symposium affiliated hotels. The service will be available for registration on Sunday, June 13, and for all workshops, technical and panel sessions, and exhibits occurring Monday, June 14, through Friday, June 18. In addition, transportation will be provided for the *Microwave Journal* reception Monday evening, and the reception and banquet at the Marriott Wednesday evening.

Transportation From Atlanta Airport

The distance from the airport to the Georgia World Congress Center and conference hotels is 12 miles. Taxi and shuttle bus (Atlanta Airport Shuttle, 404-524-3400) services are available from the airport at a cost of approximately \$15 and \$8, respectively. The Atlanta transit system, MARTA, has train service from the airport to downtown Atlanta, and free passes are provided if reservations are made through Williamsburg Travel. Almost all of the national rental car agencies are present at the airport. We recommend that you use the special rates offered by Alamo Rent A Car, Inc.

MTT Society Ombudsman



by Ed Niehenke

I have been selected by the Microwave Theory and Techniques Society Administrative Committee (ADCOM) to continue serving as your Ombudsman for 1993. It was a pleasure to serve in 1991 and 1992 and I look forward to continuing in 1993. The purpose of the Ombudsman is to receive complaints and assist members in solving problems encountered in obtaining membership services from IEEE and MTT-S.

As your Ombudsman, I have received one inquiry from an MTT-S member since the last report in the Winter 1992 MTT-S Newsletter. This inquiry concerned a member who did not receive a 1987 issue of another society's transaction. In checking with IEEE, I learned that the member did not include his 1992 MTT-S dues with his previous invoice. He was a member in 1987 of the society that published the 1987 missing issue.

I checked with the IEEE concerning the policy of receiving back issues. IEEE carries back issues for two years. In January 1993, back issues for 1991 and 1992 are available. In June 1993, back issues from January 1991 through June 1991 are removed, and then back issues are available from July 1991. If a member received a damaged issue or did not receive a particular issue, IEEE will provide that issue free of charge, providing the person was a member of that society at the time of the requested issue and the issue is available. For situations when the issue is not available or the issue is past the two-year period, IEEE carries a microfiche copy of back issues which will be provided to a member free of charge under the same circumstances, as outlined above. If a member failed to pay his dues for the previous year, he can receive the back issues by paying the previous year's dues and requesting that the back issues be provided. In checking with IEEE, Walter J. Johnson, Inc. (201-767-1303) has older IEEE proceedings and transactions for sale up to December 1985.

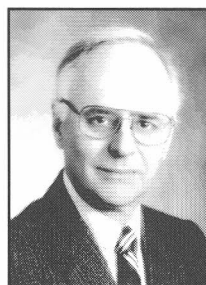
If a person wants to receive back issues and is not a member of that society, the issues are made available (periodical or a microfiche copy) at the subscription rate, which is higher than the member rate.

Concerning the person who made the request, I informed the member to submit his 1992 and 1993 MTT-S dues and request back issues. The 1987 periodical was not available from Walter J. Johnson, Inc., so a microfiche copy is being sent to him by IEEE.

Please feel free to contact me by letter or telephone concerning any complaint you may have or any assistance you may need in obtaining membership services from IEEE and MTT-S.

Ed Niehenke may be reached at 410-765-4573 or fax 410-993-7432.

Division IV Director's Report



by W. K. Dawson

Data without generalization is just gossip." Robert Pirsig's admonition is, I believe, an appropriate introduction to the results of last November's IEEE elections. The basic data are Dawson 2345, Johnson 2339. Clearly, the Board had nominated two equally acceptable candidates. If seven more had voted, or four had voted differently, the result could well have changed. So the first generalization is the well known adage that every vote counts. I thank all of you who made the effort to vote and ask for your help in making the IEEE better serve our technical and professional needs as well as be a stronger voice for the profession.

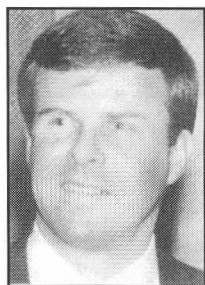
There are more data and, of course, a generalization. Inside the US the count was Dawson 1701, Johnson 2086, while outside the US the count was Dawson 644, Johnson 253. In percentage terms the numbers are quite striking. Inside the US Dawson got 45% of the vote, outside 74%. This difference of opinion is significant. The President-Elect results show a similar but slightly weaker trend. Troy Nagle received 48% of the US vote and 69% of the non-US vote. In both cases the outcome was determined by the non-US vote. This was not the case in the five other Divisional elections where the preferences of voters inside and outside the US differed in only two cases and by small, possibly insignificant, amounts.

Why should this be? (Here comes the generalization!) The position statements of the candidates in both the President-Elect and Division IV elections showed a clear difference in attitude towards a transnational IEEE. The difference could well have been the major deciding issue for non-US voters while playing a much lesser role for US voters. But the difference was crucial and it determined the outcome.

What can we learn from this? We must all be sensitive to the declared goal of the IEEE to strengthen its global character. A global IEEE must try to fairly and equitably represent the needs of all its members. In order to succeed the IEEE has to adapt its programs to fit the individual needs of many national groups. For some regions of the world this may be done by establishing agreements with existing national associations concerning joint membership and programs while in other places, such as the US, the IEEE can best serve its members by also taking on the role of a national organization which presents and represents members' needs and aspirations to governmental and other national agencies. And all this diversity must be made into a coherent structure.

Within IEEE we have engineering, scientific and technical pursuits that bind us into a strong organization. These important aspects of our work are shared through conferences, publications and educational programs. I hope that these ties are strong enough to overcome any differences caused by national concerns. I will work to promote the knowledge and understanding required to deal fairly with these issues. But this cannot be done without your assistance. Together we can make the IEEE serve all its members . . . everywhere.

IEEE Defense R&D Policy Committee



Glenn Thoren



Dave McQuiddy

The Defense R&D Policy Committee of the United States Activities Board met at the Dupont Plaza Hotel in Washington, D.C., on Monday, November 30, 1992. The Microwave Theory and Techniques Society was represented by Dr. David McQuiddy (Texas Instruments) and Dr. Glenn Thoren (Lockheed Sanders). It should be noted that over the past several years the MTT-S is the only society that has consistently had one or both of its representatives at these meetings.

With the pending change in administrations in Washington and the changing role of the Department of Defense, the issues that occupied most of the discussion at the meeting covered the Defense Conversion position paper and the Defense Reinvestment Legislation for the 103rd Congress (H.R. 5310 S.2803).

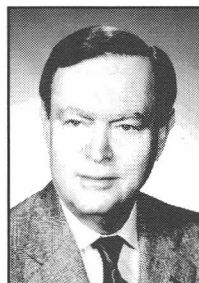
Al Nauda, with the help of several committeemen, prepared a broad-ranging position paper on Defense Conversion. Dave McQuiddy contributed revisions to be included in the final draft. The sections of the position paper recommend the following actions:

1. Integrate the Defense and Civilian Industrial Bases to Best Serve New Post-Cold War Economic Security and Military Security Requirements.
2. Cushion the Impact of Defense Budget Costs on Affected Communities and Individuals.
3. Remove Barriers to and Provide Assistance for Defense Industry Diversification and Conversion.
4. Expand Federal Support for Civilian Technology Development and Commercialization.

An important issue facing the defense industry is the availability and suitability of commercial parts for defense systems. Current DOD procurement regulations include the significant amount of accounting, paperwork and mil-spec requirements that do not facilitate the use of commercial off-the-shelf hardware or software. These barriers to the greater use of commercial products must be addressed. It is felt that a broad change in the procurement regulations will be necessary before significant, rapid insertion of commercial parts will be allowed. This will also involve a cultural change in the way commercial parts are considered for military systems. It is apparent, however, that the "six-sigma" practices of commercial operations such as Motorola do yield highly durable and reliable components. If these practices (if not the parts themselves) are migrated into a new system, the reliability of the system just may exceed the requirements for military use.

A new view of an integrated commercial and defense industrial base must emerge. Currently it appears that "commercial" companies are loath to acquire defense contractors

Progress and Change in Microwave Radio Communications



by Ferdo Ivanek

My plan for the remainder of 1992 has materialized as announced on page 17 of the Number 133 issue of the MTT-S Newsletter (Winter 1992), bringing the 1992 total to twelve lectures.

As of this writing I have presented three lectures in 1993:

- San Diego MTT/AP/ED Chapter on January 20;
- San Fernando Valley and Los Angeles MTT Chapters on January 21;
- Phoenix Waves and Devices Chapter (MTT/AP/ED/EMC/LEO/UFC-S) on February 9.

The rapid pace of technological progress and growth of wireless services required successive updating of my presentations. Looking back to my first lecture of 10 months ago, the content underwent substantial change, and the basic framework evolved as shown:

Fixed/Mobile Interrelations in Terrestrial Radio Communications

Fixed	Fixed/Mobile	Mobile
Radio-Relay	Wireless LAN	Vehicular
Local Loop	Wireless PBX	Pedestrian

Responding to the current interest of MTT-S audiences I focus on mobile communications for vehicular and pedestrian applications and on their derivatives, i.e. wireless PBX, LAN and local loop. I include mobile satellite communications at request.

My next firmly scheduled lectures are:

- Milwaukee MTT/AP/ED/IM Chapter on March 3, combined with the Colloquium of Marquette University Department of Electrical and Computer Engineering;
- Chicago MTT/AP Chapter on April 29;
- Philadelphia MTT/AP Chapter on May 1, within the program of the 11th Annual Benjamin Franklin Symposium.

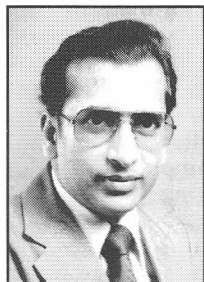
At the invitations of the Sweden and Finland MTT/AP Chapters, I have committed to lectures in the beginning of June. The exact dates remain to be determined.

I have started planning for the second half of 1993 based on the backlog of invitations from the United States, Canada and Europe, and the new invitation from Australia. In addition, I have already received invitations for 1994.

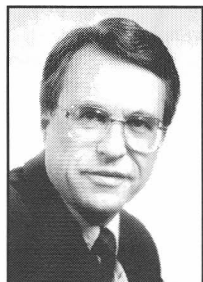
For updated scheduling information please write to P.O. Box 60862, Palo Alto, CA 94306, or fax to 415-328-8751; telephone: 415-329-8716.

(Continued on page 27)

Highlights from Winter Technical Committee Meeting with Emphasis On Advancing & Emerging Techniques



Jitendra Goel



Jorg Raue

The winter technical meeting was held on January 9, 1993, in Atlanta. This year the format was different as compared to last year, where all the sub-committees presented, and the meeting became more like a progress report rather than identifying the emerging technology. This time we invited the sub-committee chairs to submit their inputs in advance. All the inputs were evaluated by a committee and about 50% were selected for presentation with time allotted according to the importance of the material. Highlights of the meeting are provided here.

As we are all aware, the Defense budget has declined and will continue to do so in coming years and the commercial markets are growing. It was evident by the presentations and there was a great emphasis on the commercial applications of the microwaves.

John Day was an invited speaker for Microwave and Millimeter Wave Integrated Circuits (MTT-6), who reported on the changing world economies and growing demand of microwaves in commercial applications in the U.S. and elsewhere. He explained, "As the development of digital I.C. revolutionized the computer industry in the 60's and 70's, the new developments in RF and Microwave I.C. are revolutionizing the world of communications." In the 80's, microwave activities were dominated by the military applications and the commercial communication was limited to the centralized hardwired phones. Today we are in the middle of a transition from centralized systems to systems of distributed base stations connected to a large array of wireless hand sets. This is evident by the fact that while hardwired phones have only grown at the rate of 1.8% over the last 3 years, the number of cordless phones has jumped from 6 million in 1989 to 53 million in 1992, and cellular phones have jumped from 3 million to 11.8 million during the same period.

In addition to personal communication systems, RF product requirements include satellite receivers, wireless data networks, pagers, wireless LANs, GPs and wireless cable televisions. Microwave circuits are also required for DBS receivers and for small aperture terminal for inventory control of private corporate communications networks. Microwave high-tech radar technology is being transferred from military applications to family automobiles.

Satellite services are also on a sharp increase. While presently they are expensive and are sold out of capacity, the new low earth orbit systems promise even greater low-cost services to a broader profile of our society.

The conclusion is that an array of opportunities is available. The challenge is to re-direct the resources of a technical community that has been too long servicing the military high-performance, high-cost interests into a new set of commercial and consumer applications where cost and reliability dominate performance criteria.

Another area where microwaves can make big strides is in Medical Applications (MTT-10). Arye Rosen pointed out that passive radiometry and microwave hyperthermia have been used in the past for diagnostic and therapeutic medicine. Recently the FDA has approved a study on treating benign prostatic hyperplasia using microwaves.

Conventional angioplasty, although it has become an accepted tool in cardiology, has several unresolved issues. In about 30% of patients, second or third balloon inflations are needed due to vessel recoil, dissection, or thrombus. These complications exacerbate some of the instability of the vessel and can result in acute closure.

On the other hand, microwave angioplasty offers a promise for reduced artery recoil as well as intestinal proliferation, weld dissection, and can also treat intracoronary thrombus, all of which are major problems in both balloon and laser balloon angioplasty. Other areas of ongoing microwave research in cardiology are as follows:

- Microwave Ablation of Myocardial Tissue;
- Method of Measuring Blood Perfusion in Heart Muscle by the Use of Microwave Energy;
- Lumen Measurement of Coronary Arteries Utilizing Microwave Apparatus;
- The Effect of Microwave Therapy Upon the Functional State of the Cardiovascular System in Patients with Hypertension;
- Pacemaker Protective Undershirt;
- Control of Arrhythmia in the Isolated Heart by Means of Microwaves;
- The Application of Microwaves to Acupoints for the Treatment of Coronary Heart Disease.

Several new commercial applications of High Power Microwaves (MTT-5) are getting a lot of attention. Don Reid stated that hospital waste disposal, which is a big problem, is being solved by the scientists at Los Alamos National Laboratories. The ground hospital waste is placed over a conveyor belt, where it is exposed to the electron beam with 10 KW of average beam power. This beam is generated by the electron accelerators using 5 MWatt RF pulsed power at 2.998GHz. This provides a very clean method of waste disposal without violating the EPA standards associated with the conventional incinerator.

Other areas where exciting results were reported are:

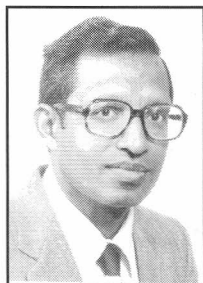
In the Lightwave Technology area (MTT-3), Alwyn Seeds reported that optical signals modulated at microwave and millimeter wave region can be generated using coherent techniques. Wider dynamic range systems using coherent detection with optical amplifiers were also reported.

In the Sub-Millimeter Wave area (MTT-4), Professor Gabriel Rebiez reported that using S-I-S detectors (Superconducting - Insulating - Superconducting) 20°K and 500°K noise figures were reported at 100GHz and 500GHz respectively. Microshield transmission technology, which offers very low loss in sub-millimeter wave region, was also reported. This technology offers the advantage of no dielectric loss, low radiation loss, no dispersion and no air bridges or via holes.

For the MMW and sub-MMWave (MTT-7), Madhu Sudan Gupta reported that In GaAs based HEMTs on InP substrate continues to show a great promise for low noise and high power area in frequencies up to 300GHz.

(Continued on page 30)

Your NEW IEEE Press: Have You Heard the Word??



by K. K. Agarwal
IEEE Press Liaison

How well do you know today's IEEE press? IEEE Press, the book publishing arm of the IEEE since 1971, has undergone a very vigorous expansion program. Since 1990, the Press has rebuilt and expanded its editorial staff by hiring experienced professionals from several major international publishing houses. Similarly, the IEEE Marketing Department has added an aggressive and experienced staff, including a dedicated Press Marketing Manager. Together, and with the option of Society participation, an ambitious program has been developed with the goal of publishing forty or more new books a year in 1993.

Over time, the Press had become a publisher almost exclusively of article reprint volumes. While this focus was never the explicit charter of the Press, it may have seemed an inexpensive and easy way for books of interest to be produced. Indeed, the Press continues to publish Selected Reprint books but has established much more rigorous requirements to ensure their success in today's markets.

The dramatic change is that today's Press, through its professional staff, seeks to publish a much broader range of original advanced textbooks, monographs, and practical guides or introductions to a technology. Already, good models of each type of book have been published with impressive sales.

The Press offers some clear advantages to authors:

A Close Working Relationship

Your IEEE Press provides authors with personal attention, on-line advice at any time in the writing process, and professional results. The editorial staff works as a team with authors from the day the contracts are signed. The Press also provides authors with an incomparable network of support. Besides the in-house development and production staff, the Press has access to numerous expert peer reviewers, the IEEE Press Board of leading engineers and successful authors, and IEEE Society/Council sponsorship, which entails additional technical reviews and participation in publicizing and promoting the published book.

An Author-Sponsor Partnership in Marketing the Book

Your IEEE Press works closely with its authors and sponsors to tailor a marketing plan that is right for each book. The capabilities of the Press have grown now to include direct mailings to IEEE members worldwide, professionals in related associations and industries, retail and university booksellers, the major library wholesalers, international distributors, and the university and industry libraries. In addition, the Press and Marketing Staff sell books at attractive discounts through IEEE conference and symposia exhibits, college textbook adoptions, book clubs, the author's own workshops and sales leads, and special bulk sales to industry, government and sister associations.

Shared Revenue and Incentives for Author and Sponsor

You may have thought that IEEE Press royalty rates are low or paid only to the sponsoring Society. In fact, your IEEE: Press shares financial rewards generously with its authors and with active Society sponsors. Royalty rates typically increase with sales volume on original books from 11% to a high of 23%. A good original text and reference, such as Collin's *Field Theory of Guided Waves*, has earned author and sponsor over \$20,000 in than two years. Annual surpluses from book sales go directly to the IEEE General Fund to help hold down dues increases. In 1992, for instance, the surplus was well over \$100,000.

The IEEE Press books which have been sponsored by the Microwave Theory and Techniques Society thru 1992 are shown below:

- Instrumentation and Techniques for Radio Astronomy
- Low-Noise Microwave Transistors and Amplifiers
- Medical Applications of Microwave Imaging
- Microwave and Millimeter-wave Mixers
- Modulation Doped Field Effect Transistors: Applications and Circuits
- Modulation Doped Field Effect Transistors: Principles, Design, and Technology
- Monolithic Microwave Integrated Circuits
- Planar Transmission Line Structures
- Numerical Methods for Passive Microwave and Millimeter-Wave Structures

There are two new book projects sponsored by the MTT Society in 1992:

- Quasioptical Systems by Goldsmith
- Planar Microwave Circuits by Gupta/Abouzahora

Both of these books illustrate the importance and growth of the areas of research and emphasize the directions where future research should take place. Clearly these books would be valuable reference sources for years to come with research engineers and scientists working in microwave to optical fields.

Currently MTT Society is reviewing three original proposals:

- Microwave Tube Transmitters by Leo Sivan (reviewer Dr. Don Reid, Los Alamos National Labs)
- Transform Methods for Solving Partial Differential Equations by Dean Duffy (reviewer Dr. K. C. Gupta, University of Colorado)
- Dyadic Green Functions in Electromagnetic Theory by Chen-To Tai (reviewer Dr. Kai Chang, Texas A&M University)

The review process consists of a brief review of the proposal, a more detailed review of a draft manuscript, and an in-depth review of the final manuscript. Reviewers will receive a free copy of the reviewed book, complimentary IEEE Press book(s) of their choice, and the reviewers' name(s) will appear prominently on the copyright page of the book (with reviewer's approval). In-depth reviews of final manuscripts may entail review honoraria.

Lately, the IEEE Press is emphasizing the concept of a Series Editor and Advisory Board, backed by the sponsoring Society in order to involve more people in planning subjects for new books and in stimulating the authors/editors to develop manuscripts. Series Editors earn royalty overrides for all books within the series and financial support for expenses is made available by the Press.

Microwave Theory and Techniques Society is seeking qualified Series Editors for topics in microwave engineering. Each series should consist of a cohesive set of books related to one

(Continued on page 15)

41st ARFTG Conference

Managing Information and Automated Testing

("Now That I Have All This Data,
What Do I Do With It?")

The 41st ARFTG Conference will be held in Atlanta, Georgia, on June 18, 1993, as part of MTT-S International Microwave Week. The theme of this one-day technical conference with concurrent manufacturer exhibits will be Managing Information and Automated Testing ("Now That I Have All This Data, What Do I Do With It?"). We live in an information-hungry world. Data generation and collection has become a major industry of its own. The proliferation of computers in both the laboratory and the field, inexpensive mass storage devices, imbedded controllers/software, and enhanced measurement speed have all played their part in the "Information Age." In some cases, the ability to produce data has outstripped our ability to process the information. Papers are invited that identify problems and solutions to the process of turning data into information. The topic areas include Visualization of Data, Data Processing Methods, and Information Management. Some potential interest areas are: Radar Cross Section, T/R Modules, Antenna Patterns, Process Control, and Computer-Enhanced Calibrations. In addition, papers concerning all other areas of automated microwave measurements and design are welcome.

Those interested in participating should contact Conference Chair J. Greg Burns, Johns Hopkins University—Applied Physics Lab, MS-12-N381, Johns Hopkins Road, Laurel, MD 20723. Deadline for paper submissions will be approximately March 15, 1993. See the IMS-1993 registration materials for more information concerning times and location.

Along with the technical presentations, the attendees will have ample time for informal discussion among themselves during the breaks and during the provided lunch. There will be time for discussion with vendors and viewing of exhibits to see the latest in automation and measurement products. The registration fee includes technical sessions, exhibits, lunch and break refreshments, one year membership in ARFTG and a post-conference digest of the presented papers.

Looking Forward to the Future

42st ARFTG Conference— RF and Microwave Testing for Commercial Applications

The 42st ARFTG Conference will be held in San Jose, California, on December 2 and 3, 1993. The theme of this one-day technical conference with concurrent manufacturer exhibits will be RF and Microwave Testing for Commercial. For applications such as personal, cellular and satellite communications, collision avoidance and navigation, and gigabit rate processors, expectations are that production costs will be continuously reduced. To meet this challenge automatic RF measurement techniques developed for the defense industry need to be distilled and merged with manufacturing techniques developed for the commercial electronics industry. Papers are invited on such topics as optimization and reuse of test plans, design for testability, automated calibration and verification, fast test algorithms and equipment, test executives, links to computer-aided design and manufacturing, and

fixturing and interconnects suitable for multiple connections. In addition, papers concerning all other areas of automated microwave measurements and design are welcome.

Those interested in participating should contact Conference Chair Kevin Kerwin, Hewlett-Packard MWTD—1 US, 1400 Fountaingrove Parkway, Santa Rosa, CA 95403. Deadline for paper submissions will be approximately September 15, 1993. See Call for Papers in the back of the Newsletter for more information.

EXCOM Activities

At the Orlando meeting elected or re-elected to three year EXCOM terms were: Gary Simpson, Mike Caldwell, Kevin Kerwin and Pat Nolan. In addition, EXCOM officer elections were held and officers elected were: Bill Pastori as President, Gary Simpson as Vice-President, J. Greg Burns as Treasurer, and Pat Nolan as Secretary.

Measurement Professional? or Just Interested in Learning More?

We will be looking forward to discussing the latest in measurement automation and accuracy with you in Atlanta or San Jose. ARFTG brings you the latest in RF, microwave and millimeter-wave analysis, design and measurement. State-of-the-art papers are presented twice a year. If you are involved in automated measurement techniques, come and join your peers and keep current with our ever-evolving technology. For more information on ARFTG or future conferences, write: John Barr, Santa Rosa System Division—3US-V, Hewlett-Packard, 1400 Fountaingrove Parkway, Santa Rosa, CA 95403.

Your New IEEE Press

(Continued from page 14)

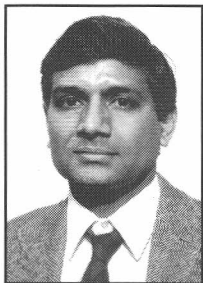
subject area. A series is initiated with a predefined list of book titles, usually four or more in number, with the initial volumes to appear within one year of each other. Subsequent volumes may then be added to the series in a reasonable time to keep the continuity. A strong series usually, although not always, contains a "flagship book" which provides a general introduction to the subject area and serves as a knowledge foundation for the specialized books to follow. Most often, the flagship book is authored or coauthored by the Series Editor, and is the first or one of the first in the series to be published.

Call for Authors, Series Editors, and Reviewers

Authors are sought for reprint volumes and original books to be sponsored by the MTT Society and published by IEEE Press. Series Editors are sought for new series in specific subjects which are of interest to the members of the Society. Volunteers are sought to serve as reviewers for books which are proposed for MTT Society sponsorship. Interested individuals should contact Kris Agarwal, who is your Microwave Society Liaison to the IEEE Press, at the address shown below:

Dr. Krishna K. Agarwal
E-Systems, Inc., Garland Division
3928 Wilshire Drive
Plano, Texas 75023
(214) 205-2563 (w); (214) 867-3947 (h)
Fax: (214) 272-8144

MTT-S Bylaws Amendments



by Aditya Gupta

Changes to the Society's Bylaws approved by the Administrative Committee at the January 1993 meeting in Atlanta are summarized in this section. In accordance with Article IX, Section 2, of the MTT-S Constitution and Section VIII of the Bylaws, these amendments will take effect thirty days after they have been publicized to all MTT-S members unless objections are received from a minimum of ten percent of the members. The Constitution and Bylaws were last published in the Summer 1992 Newsletter. The proposed changes are outlined below. Changes to the MTT-S Bylaws may be requested by anyone. However, they must be approved by a two-thirds vote of the Administrative Committee members voting. Once approved, such changes take effect after the IEEE Technical Activities Board (TAB) has been notified and 30 days after the change has been publicized to the MTT-S membership.

The AdCom approved the creation of a new section of the Bylaws (VIII) to make room for a section on MTT-S Awards. In addition, since an Honorary Life Membership of the Society is an award, the entire contents of the existing Section I.B-4 have been moved to the new Section VI. All these changes are summarized in the following Bylaws amendment. The added text is underlined.

MTT-S Bylaws Change (Sections 1, VI, VII and VIII)

1. Create a new section, VIII, to make room for a section on awards (as Section VI—MTT-S Awards).
2. Change the number of the current Section VI to Section VI with indicated content as follows:

Section (VI)¹ VII Miscellaneous Committee Business

A. Administrative Year

The Administrative Year of the Society shall be January 1st through December 31st of the same year.

The remainder of present Section VI will remain in the new Section VI. See Change 4 below.

3. Move the entire contents of existing Section I.B-4 (Honorary Life Member) to the new Section VI (see Change 4). This change is proposed since an Honorary Life Membership of the Society is an award.

4. Create a new section as Section VI and include all awards now in the present Section VI.

MTT-S AWARDS

After approval by MTT-S AdCom and IEEE, MTT-S awards are documented in this section of the Bylaws (see Section

III, para. A.10).

Paragraphs of present Section VI become paragraphs of the new Sections VI and VII as follows:

A. Administrative Year (Old Section VI)

New: Section VII, paragraph A.

Honorary Life Member (Old Section I.B-4)

A. Honorary Life Member (New Section VI)

B. The Microwave Prize (Old Section VI)

- E. The Microwave Prize (New Section VI)
- C. Microwave Career Award (Old Section VI)
- B. Microwave Career Award (New Section VI)
- D. Microwave Applications Award
- D. Microwave Applications Award
- (Old Section VI—New Section VI)
- E. Distinguished Service Award
- F. Distinguished Service Award
- (Old Section VI—New Section VI)
- F. Pioneer Award (Old Section VI)
- C. Pioneer Award (New Section VI)

The content of all above paragraphs is unchanged by this amendment.

4. Transfer the name and entire contents of present Section VII—Changes to the Bylaws, to the new Section VIII.

5. Change Section III, paragraph A.10, as follows:

The term of office of the Awards Committee Chairman shall normally begin on October 1 of the year in which that Chairman is appointed. The term of office shall normally be more than 1 year. The Chairman of the Awards Committee should be a past President of MTT-S and shall hold the grade of Fellow of the IEEE. This committee shall cooperate with the IEEE in recommending members of the Society for IEEE awards and shall nominate to the Administrative Committee candidates for the Microwave Career Award, Microwave Application Award, Microwave Prize and Distinguished Service Award MTT-S awards as identified in Section VI—MTT-S Awards.

The Awards Committee shall serve as the focal point for considering new award proposals to be considered by the AdCom through the Bylaws Amendment procedure. The Awards Committee will provide follow-through to obtain appropriate IEEE Institute approval(s) of any awards approved by the AdCom. After IEEE approval is received awards will be documented in Section VI of the Bylaws. The Awards Committee shall also review awards listed in Section VI every five years (as recommended by the IEEE) for revision or removal. Review can be on a rotating basis.

The Chairman of the Awards Committee is empowered to submit to IEEE Headquarters the names of the candidates for IEEE Awards with approval of the President of the Administrative Committee.

The AdCom approved changes to Section III—Committees, to add the duties of the Microwave and Guided-Wave Letters (MGWL) Editor and to make the MGWL Editor an ex-officio member of AdCom, if not already a member of AdCom. This privilege is currently enjoyed by the Transactions editor. These changes are summarized in the following Bylaws Amendment.

SECTION III—COMMITTEES

2. PUBLICATIONS COMMITTEE

The Publications Committee shall be responsible for publication and dissemination of technical information of interest to the Society. The Committee shall be responsible for publishing (a) the Transactions on Microwave Theory and Techniques and (b) the Microwave and Guided-Wave Letters. The Committee is also responsible for notifying the technical community of meetings, special publications and other information of interest to the Society through its publications.

- (a) Transactions Editor

The Transactions Editor is responsible for the technical editorial content of the IEEE Transactions on Microwave Theory and Techniques. The Editor is also responsible for coordination with the IEEE facilities for publication. The Transactions Editor shall appoint and be Chairman of the Transactions Editorial Board. The Transactions Editorial Board shall consist of Associate Editor(s) and Reviewers as are needed by the Editor to perform his duties. The Transac-

tions Editor is recommended by the Chairman of the Publications Committee and approved by the Administrative Committee, nominally for a three-year term. The Transactions Editor will continue to serve until such time as a successor is appointed, named by the President of the Administrative Committee, and for such time thereafter as may be necessary for a successor to assume the duties of Editor.

(b) Eliminate present 2(b). The contents have been absorbed in (a), above.

(b) Letters Editor

The Letters Editor is responsible for the technical editorial content of the IEEE Microwave and Guided-Wave Letters. The Editor is also responsible for coordination with the IEEE facilities for publication. The Letters Editor shall appoint and be Chairman of the Letters Editorial Board. The Letters Editorial Board shall consist of Associate Editor(s) and Reviewers as are needed by the Editor to perform his duties. The Letters Editor is recommended by the Chairman of the Publications Committee and approved by the Administrative Committee, nominally for a three-year term. The Letters Editor will continue to serve until such time as a successor is appointed.

SECTION II—ADMINISTRATIVE COMMITTEE MEMBERSHIP

E. Transactions and Letters Editors

The Transactions and Letters Editors, if not an Elected Members of the Administrative Committee, shall be an Ex-Officio Members of the Administrative Committee during the their tenures in that those offices and for a period to terminate on a December 31st ranging from at least one to less than two years thereafter. The Transactions and MGWL Editors shall be a members of the Society.

The Distinguished Educator Award was approved by AdCom in 1992. At the winter meeting, AdCom approved the following formal description / requirements of this award to be included in Section VI.

SECTION VI—MTT-S AWARDS

G. Distinguished Educator Award

The Society shall present an award known as The Distinguished Educator Award. This award was inspired by the untimely death of Prof. F. J. Rosenbaum (1937-1992), an outstanding teacher of microwave science and a dedicated MTT-S AdCom member/contributor. It will be presented to a distinguished educator in the field of microwave engineering and science who best exemplifies the special human qualities of Fred Rosenbaum who considered teaching a high calling and demonstrated his dedication to MTT-S through tireless service.

The Distinguished Educator Award will be considered annually and may be presented if a suitable candidate is identified. The candidate must be a member of IEEE and MTT-S at the time of nomination.

The nomination of the recipient of the Distinguished Educator Award will be the responsibility of the MTT-S Awards Committee which will make its recommendation to the MTT-S AdCom at the annual meeting. The award shall consist of a plaque, an honorarium of \$1000 and a feature publication in the MTT-S Transactions. The award shall be presented at the annual IMS Awards Banquet.

1. GUIDELINES FOR DISTINGUISHED EDUCATOR AWARD

The award shall be made to an individual who must be a distinguished educator, recognized, in general by an academic career. It is desirable for the candidate to have received other teaching awards. The effectiveness of the educator should be supported by a list of graduates in the field of microwave science, who have become recognized in the field. Relevant letters of support are encouraged. The candidate shall also

have an outstanding record of research contributions, documented in archival journals. The candidate shall have a record of many years of service to MTT-S.

The AdCom also approved a proposal by Jorg Raue, Chairman of the Technical Coordinating Committee, to change the name of the "Emerging Technologies Workshop" to "Winter Technical Committee Meeting (WTCM)." Jorg stated that the new name more closely reflected the actual purpose of this meeting. In accordance with this amendment, the old name has been replaced by the new one where ever it appears in the Bylaws.

Bi-isotropics '93— Notes from the Novel Microwave Materials Workshop

by Ari Sihvola

During the first week of February, 1993, Helsinki University of Technology hosted a workshop on novel microwave materials. Bi-isotropics '93 was the name of the four day-and-night workshop that attracted 17 participants from six countries: Finland, Russia, Belorussia, France, United Kingdom and Germany. The focus of the talks was intended to be the theory and applications of bi-isotropic materials (chiral and nonreciprocal) in electromagnetics and microwave engineering, but it may be due to the nature of this rapidly progressing field that also results on more general, bianisotropic materials were discussed. The workshop was sponsored by IEEE MTT Society, URSI Finnish National Committee and the Electromagnetics Laboratory of Helsinki University of Technology.

Why this workshop? Well, electromagnetics and microwave technology are progressing these years with considerable pace. One of the frontiers at which major conquests are being made is that of new materials. It is only during the latest years that the microwave community has recognized the potentialities of novel, more complicated material effects in the design of new components and systems. Chiral materials may be the most popular example of these complex media, and quite a lot of time in the workshop was devoted to the theory, applications and measurement principles of chiral media.

One highlight in Bi-isotropics '93 was the lecture Covariant Methods in the Theory of Electromagnetic Waves, by 82 year-old Academician Fedor I. Fedorov from Minsk, Belorussia, who is one of the greatest physicists of the former Soviet Union, and a pioneer of the research on optical activity.

A Book of Abstracts of the workshop has been compiled. For a copy, please contact the Workshop Organizer,

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1993 IEEE MTT-S International Microwave Symposium—Schedule of Events

SUNDAY, JUNE 13	Registration MMWMC Reception		5:00 PM–9:00 PM 7:00 PM–10:00 PM	Georgia World Congress Center, Level Two, East Concourse Stockholm, Copenhagen and Amsterdam Rooms, Mariott Marquis Hotel	
MONDAY, JUNE 14	Registration		8:00 AM–5:00 PM	Georgia World Congress Center, Level Two East Concourse	
8:00 AM–5:00 PM	WSMA	High T _c Superconductivity in MW Systems	Room 202	WSME	MW Device and Circuit CAD Room 218
	WSMB	MW Generation & Its Commercial Appls	Room 304	WSMF	Wireless Communications Via Lightwaves Room 219
	WSMC	Ultra Low Noise Microwave Sources	Room 305	WSMG	Mobile Communications-Satellite Systems Room 205
	WSMD	Ps and Fs EM Pulses:	Room 306	WSMK	Critical Issues in Experimental Validation Room 307
8:00 AM–12:00 PM	WSMH	Filters & Multiplexers for Mobile Comm	Room 215	WSMI	Material Measurements Room 217
1:00 PM–5:00 PM	WSMJ	Electromagnetic Wave Interaction with Water and Moist Substance Room 217			
6:00 PM–8:00 PM	Microwave Journal/ MTT-S Reception		SCITREK		
8:30 AM–5:00 PM	MMWMC Symposium		Georgia World Congress Center		
TUESDAY, JUNE 15	Registration		8:00 AM–5:00 PM	Georgia World Congress Center, Level Two East Concourse	
9:00 AM–10:30AM	Plenary Session		Richard Snelling and John Day	Georgia World Congress Center, Auditorium	
	AUDITORIUM		ROOM 216/217	ROOM 202	ROOM 218/219
11:00AM–12:00 PM	B: Advanced MMIC Technology		C: Intelligent Vehicle Highway Systems (<i>Special Session</i>)		E: Manufacturing Methods, Production and Packaging
12:00 PM–1:30 PM	PSTA		Direct Broadcast Satellite (DBS) Market Technology and Trends		Rooms 306/307
1:30 PM–3:00 PM	PSTB		MMICs in Commercial Markets		Rooms 304/305
	F: Broadband MMIC Circuits (Joint with MMWMC)	G: mm-Wave Systems and Techniques		H: Miniaturized and Active Filters	I: Status of Microwave Ferrite Technology (<i>Special Session</i>)
2:30 PM–5:00 PM	Interactive Forum I		W.H. Prather		Georgia World Congress Center Ballroom
3:30 PM–5:00 PM	J: MMIC Control Circuits (Joint with MMWMC Symposium)		K: Analysis of Quasi-Planar and Quasi-Optical Structures		L: High Q Filters for Communication Systems
8:00 PM–10:00 PM	RSTA		High Efficiency MMIC, Power Amplifiers		Salon I
	RSTB		GPS/GLONASS Applications		Salon II
	RSTC		Markets & Apps of MW Digital/DSP Circuits		Salon III
	RSTD		Innovative Use of Computers in Education		Salon IV
WEDNESDAY, JUNE 16	Registration		8:00 AM–5:00 PM	Georgia World Congress Center, Level Two, East Concourse	
	ROOM 202		ROOM 216/217	ROOM 218/219	ROOM 205
8:30 AM–10:00 AM	N: Phased Arrays		O: mm-Wave Amplifier and Receiver Technology		P: Solid-State Devices and Circuits
	Q: Developments in Global Communications (Focused Session)		R: Passive Components		
10:30 AM–12:00 PM	S: Phased Arrays II		T: Nonlinear Modeling and Analysis		U: Solid-State Oscillators
	V: Wireless LANs (Focused Session)		W: Coplanar Structures		
12:00 PM–1:30 PM	PSWA:		Multifunction MMIC Design		Rooms 304/305
1:30 PM–3:00 PM	X: High Speed Fiber-Optic Link Systems		Y: Field Theoretical CAD		Z: Low Noise mm-Wave Receivers
	AA: Microwave Systems Consumer and Commercial Applications		BB: Planar Structures		
2:30 PM–5:00 PM	Interactive Forum II		W.H. Prather		Georgia World Congress Center Ballroom
3:30 pm - 5:00 pm	CC: High Speed Fiber-Optic Link Components		DD: CAD of Passive Components		EE: Receivers Components
	FF: Selected Russian Microwave Technologies		GG: Biological Effects and Medical Application		
	Industry Reception		5:30 PM–7:15 PM		Marriott Marquis Ballroom
	Symposium Banquet		7:30 PM–10:00 PM		Marriott Imperial Ballroom
THURSDAY, JUNE 17	Registration		8:00 AM–5:00 PM	Georgia World Congress Center, Level Two, East Concourse	
	ROOM 218/219		ROOM 202	ROOM 216/217	ROOM 215
8:30 AM–10:00 AM	HH: Device Modeling and CAD		II: Coupling and Packaging Effects		JJ: High Power Sources and Control Components
	KK: Microwave Measurements		LL: Superconducting Filters		MM: New Structures and Leaky Modes
10:30 AM–12:00 PM	NN: Microwave Integrated Circuits		OO: Microwave Probe Measurements		
1:30 PM–3:00 PM	RR: Superconducting Subsystem Technology		QQ: Optical Characterization and Device Modeling		PP: Transistor Power Amplifiers I
	SS: EM Analytical and Numerical Techniques		VV: Acoustic Filters and Resonators		UU: Simulation and CAD Frameworks
3:30 PM–5:00 PM	TT: Transistor Power Amplifiers II		WW:EM Analytical and Numerical Techniques		
FRIDAY, JUNE 18	Registration		8:00 AM–5:00 PM	Marriott Marquis, Conference Level	
	ARFTG Conference		8:30 AM–5:00 PM	Marriott Marquis Hotel	
8:00 AM–5:00 PM	WSFA	MW HBTs and HEMTs	Bonn & London	WSFC	Modeling of MW Packages & Interconnects
	WSFB	Combined Simulation	Salon III, Marriott	WSFD	Designing Power MMICs: Salon IV, Marriott
8:00 AM–12:00 PM	WSFE	Civil MW Packaging	Sydney, Marriott	WSFF	Atmospheric Transmission Effects Summit, Marriott
1:00 pM–5:00 PM	WSFG	Surface Mount Packaging for MMIC	Sydney, Marriott		

Advance Conference Registration



1993 IEEE MTT-S INTERNATIONAL MICROWAVE SYMPOSIUM

June 14-18, 1993 • Atlanta, Georgia • MTT-S • MMWMC • ARFTG • NTC

Each Conference Attendee must submit a separate registration form. A copy of this form may be used.
To ensure advanced registration, this form and payment must be received by May 21, 1993

On-site fees will be approximately 30% higher.

NAME	<div style="display: flex; justify-content: space-between;"> Last First </div>	JOB CATEGORY
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TEL. NO.	<div style="display: flex; justify-content: space-between;"> </div>	
IEEE MEMBER	<input type="checkbox"/> Yes <input type="checkbox"/> No	IEEE Membership No.*
		*Must be given to qualify for member discount

Check ☒ each function for which you wish to register.

Check ☒ the appropriate fees and enter the fees in the Remittance column.

	IEEE Member	Non-Member	Remittance
• MTT-S Symposium Tue., Wed. & Thur.			
<input type="checkbox"/> All MTT-S Sessions (Includes MTT-S Digest)	<input type="checkbox"/> \$210	<input type="checkbox"/> \$295	\$ _____
<input type="checkbox"/> Single-Day Registration (No Digest)	<input type="checkbox"/> \$100	<input type="checkbox"/> \$140	\$ _____
<input type="checkbox"/> Student, Retiree, Life Member (No Digest)	<input type="checkbox"/> \$25	<input type="checkbox"/> \$25	\$ _____
• MMWMC Symposium,	<input type="checkbox"/> \$85	<input type="checkbox"/> \$110	\$ _____
Mon. & Tue., (Includes MMWMC Reception and Digest)			
• Automatic RF Techniques Conference, Fri., (Includes breakfast, lunch, and ARFTG Digest)			
<input type="checkbox"/> ARFTG Member	<input type="checkbox"/> \$125	<input type="checkbox"/> \$125	\$ _____
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<input type="checkbox"/> \$145	<input type="checkbox"/> \$175	\$ _____	
• Additional Digests			
MTT-S Qty _____ @	<input type="checkbox"/> \$60	<input type="checkbox"/> \$75	\$ _____
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ARFTG (Member) Qty _____ @	<input type="checkbox"/> \$20	<input type="checkbox"/> \$20	\$ _____
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NTC Digest Qty _____ @	<input type="checkbox"/> \$25	<input type="checkbox"/> \$30	\$ _____

• Panel Sessions See reverse side for complete titles, schedules and locations. (Check only one per set) *\$20 Includes lunch	
<input type="checkbox"/> PSMA: PCN ICs	Mon. Lunch \$ _____*
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<input type="checkbox"/> PSTB: MMICs Commercial	
<input type="checkbox"/> PSWA: Multi-Function MMIC	Weds. Lunch \$ _____*

• Awards Banquet Wed. Evening, Marriott Marquis Qty _____ @ \$45 \$ _____	
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Fees	Attendee	Student/Retiree Life Member
Full Day (AM & PM)	<input type="checkbox"/> \$75	<input type="checkbox"/> \$40
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Monday		
<input type="checkbox"/> WSMA (AM & PM): Superconductivity		\$ _____
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Friday		
<input type="checkbox"/> WSFA (AM & PM): HBTS/HEMTS		\$ _____
<input type="checkbox"/> WSFB (AM & PM): Combined Simulation		\$ _____
<input type="checkbox"/> WSFC (AM & PM): EM Modeling		\$ _____
<input type="checkbox"/> WSFD (AM & PM): Art/Dsg. Power MMIC		\$ _____
<input type="checkbox"/> WSFE (AM): Civil Packaging		\$ _____
<input type="checkbox"/> WSFF (AM): Atmospheric Trans		\$ _____
<input type="checkbox"/> WSFG (PM): Surface Mount Pkg		\$ _____

• Guest Programs (*Lunch is included, †transportation is included) See reverse side for complete information.			
GA: Atlanta Hits (Tues.)	Qty _____ @	\$40	\$ _____*†
GB: Around the Town (Wed.)	Qty _____ @	\$40	\$ _____*†
GC: The Old South (Thurs.)	Qty _____ @	\$40	\$ _____*†
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Fax Number: (410) 647-5136. If this form is sent by FAX do NOT also mail; a Credit Card Number must be included.

Workshops

	Number	Time	Title
Monday Workshops World Congress Center	WSMA	8AM/5PM	High T _c Superconductivity in Microwave Systems: A Technology Assessment
	WSMB	8AM/5PM	High Power Microwave Generation and Its Commercial Applications
	WSMC	8AM/5PM	Ultra Low Noise Microwave Sources
	WSMD	8AM/5PM	Picosecond and Femtosecond Electromagnetic Pulses-Analysis and Applications
	WSME	8AM/5PM	Thermal Aspects of Microwave Device and Circuit CAD
	WSMF	8AM/5PM	Wireless Communications Via Lightwaves
	WSMG	8AM/5PM	Mobile Communications-Satellite Systems
	WSMH	8AM/Noon	Filters and Multiplexers for Mobile Communications
	WSMI	8AM/Noon	Material Measurements
	WSMJ	1PM/5PM	Electromagnetic Wave Interaction with Water and Moist Substances
	WSMK	8AM/5PM	Critical Issues in Experimental Validation
Friday Workshops Marriott Marquis	WSFA	8AM/5PM	Microwave HBTs and HEMTs: Circuit Applications and Reliability
	WSFB	8AM/5PM	Combined Self-Consistent Particle Transport Simulation and Full Wave Dynamic Field Simulation for Monolithic Solid State Device and Circuit Calculations
	WSFC	8AM/5PM	EM Modeling of Microwave Packages and Interconnects
	WSFD	8AM/5PM	The Art of Designing Power MMICs
	WSFE	8AM/Noon	Civil Microwave Packaging
	WSFF	8AM/Noon	System Implications of Atmospheric Transmission Effects
	WSFG	1PM/5PM	Surface Mount Packaging for High Volume MMIC Component

Panel Sessions • World Congress Center

12:00 Noon to 1:30PM

PSMA	Monday	What MMIC Technology Will Win The PCN Race?
PSTA	Tuesday	Direct Broadcast Satellite (DBS) Market Technology and Trends
PSTB	Tuesday	MMICs in Commercial Markets
PSWA	Wednesday	Multi-Function MMIC Design: Issues and Trade-offs

Guest Programs

9:30 AM to 3:30 PM Unless Otherwise Noted

GA	Tuesday	Atlanta Hits - Tour Includes Coca Cola, CNN, Underground Atlanta
GB	Wednesday	All Around the Town - Peachtree Street, The Cyclorama, MLK, Carter Center, Swan House and Buckhead
GC	Thursday	The Old South - Ante-bellum Homes of Covington and Social Circle, Georgia
GD	Tuesday Evening	Baseball Game - Braves vs. New York Mets
GE	Tuesday Evening	Stone Mountain Laser Show



CONFERENCE HOUSING

1993 IEEE MTT-S INTERNATIONAL MICROWAVE SYMPOSIUM



June 15-17, 1993 • Atlanta, Georgia

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233 Peachtree St., N.E.
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COMPLETED FORMS MUST BE
RECEIVED AT THE HOUSING BUREAU
BEFORE MAY 14, 1993

SEND NO CHECKS OR MONEY TO THE HOUSING BUREAU

Hotel locations and rates are shown on the reverse side of this form.

INSTRUCTIONS AND HOUSING BUREAU POLICY

1. Please print or type all data requested.
2. All room reservations must be made by mail. No telephone calls will be accepted.
3. All reservations will be processed on a first-come, first-served basis.
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5. Before 5/14/93 contact MTT-S Housing at the above address in writing to arrange cancellations and changes.
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7. Copies of this form may be used to reserve more than the three rooms for which it provides.
8. **Send no checks or money to the housing bureau!**

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To guarantee, provide the following credit card information: (Do not send any money to the Housing Bureau)

CARD NAME: ☐ AM. EXP. ☐ M'CARD ☐ VISA ☐ OTHER _____

CARD HOLDER NAME _____

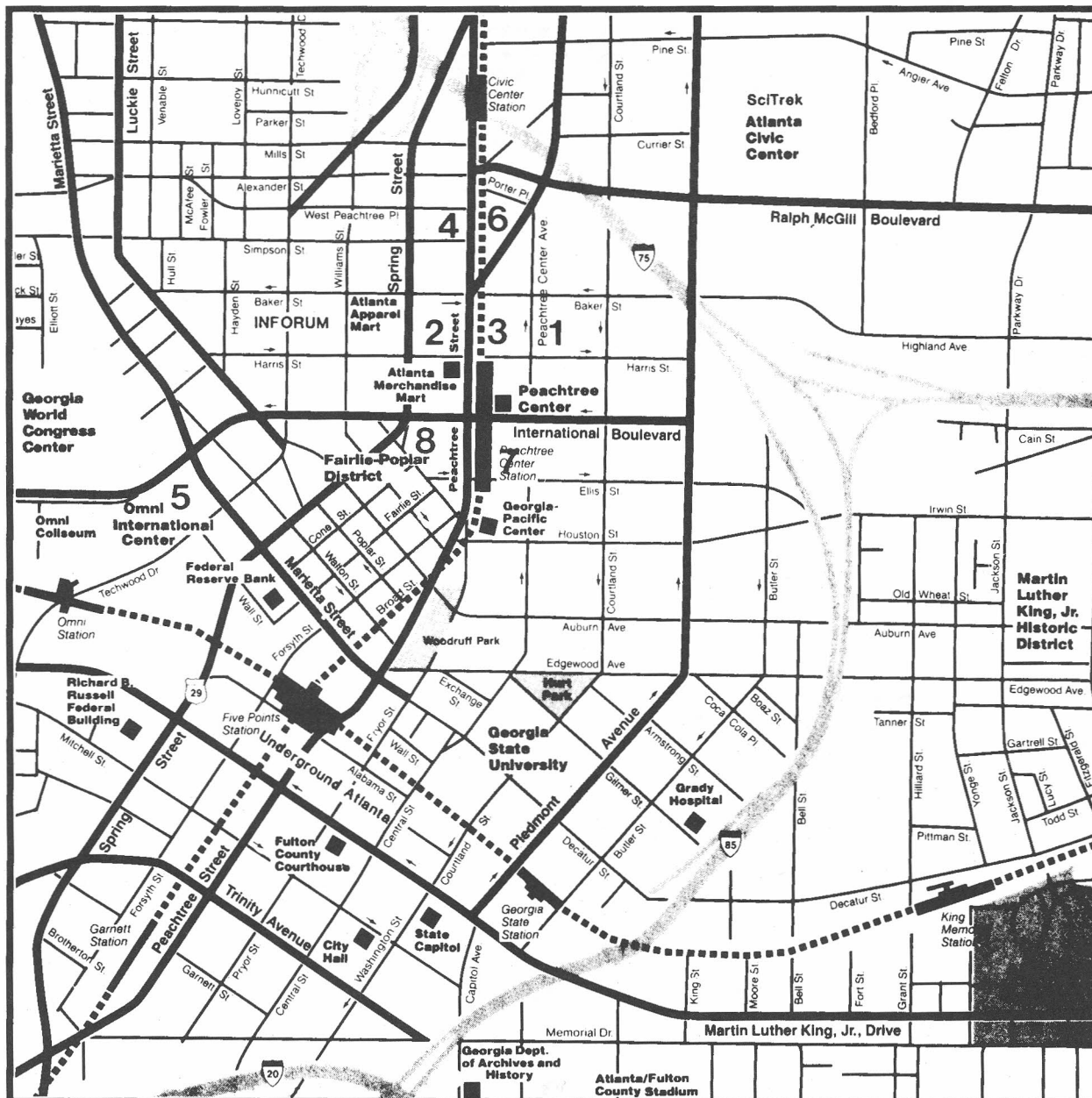
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Occupants (last name first)

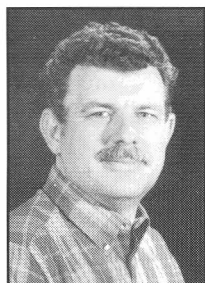
ROOM NO. 1	1.	Check one: <input type="checkbox"/> Single <input type="checkbox"/> Double <input type="checkbox"/> Twin Arr. Date _____ Dep. Date _____
	2.	<input type="checkbox"/> Smoking <input type="checkbox"/> Non-smoking <input type="checkbox"/> Handicap <input type="checkbox"/> King
ROOM NO. 2	1.	Check one: <input type="checkbox"/> Single <input type="checkbox"/> Double <input type="checkbox"/> Twin Arr. Date _____ Dep. Date _____
	2.	<input type="checkbox"/> Smoking <input type="checkbox"/> Non-smoking <input type="checkbox"/> Handicap <input type="checkbox"/> King
ROOM NO. 3	1.	Check one: <input type="checkbox"/> Single <input type="checkbox"/> Double <input type="checkbox"/> Twin Arr. Date _____ Dep. Date _____
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REF #	CONFERENCE HOTELS	SINGLE	DOUBLE
1	*ATLANTA MARRIOTT MARQUIS	\$119.00	\$119.00
2	DAYS INN	\$ 62.00	\$ 72.00
3	*HYATT REGENCY ATLANTA	\$115.00	\$115.00
4	INN AT THE PEACHTREE	\$ 49.00	\$ 59.00
5	*OMNI HOTEL AT CNN CENTER	\$105.00	\$115.00
6	QUALITY INN HABERSHAM	\$ 59.00	\$ 59.00
7	*THE RITZ CARLTON	\$115.00	\$115.00
8	*WESTIN PEACHTREE PLAZA	\$110.00	\$110.00

* A small number of rooms at reduced rates are available at this hotel for bona-fide Government employees. Valid identification will be required at check-in to claim reservations for these rooms.

ARFTG Highlights Spring '93



by John T. Barr, IV

The Automatic RF Techniques Group (ARFTG) is an independent professional society that is affiliated with MTT-S as a conference committee. ARFTG's primary interests are in computer-aided microwave analysis, measurement and design. ARFTG holds two conferences each year, one in conjunction with the MTT-S International Microwave Symposium and a second later in the fall of the year.

40th ARFTG Conference Measurement and Design of Packages and Interconnects

The 40th ARFTG Conference was held in Orlando, Florida, on December 3 and 4, 1992. The theme was Measurement and Design of Packages and Interconnects. In attendance were 71 paid technical attendees. There were 11 tables in the concurrent exhibitors' room. The conference focused on design, measurement and test of microwave and high speed digital packages. A wide variety of packages are being used including MCM, MHMIC, Flip Clip, LTCC and traditional MMIC packages. Speakers addressed package effects, multi-conductor PCB effects and transitions to/from circuits in the packages. Below is a list of the presented papers:

- *Planar Resistors for Probe Stations*, D. K. Walker
- *Surface Wave Phenomenon in Wafer Probing Environments*, E. M. Godshalk
- *Accuracy Considerations in Internal Node Timing Measurements of High-Performance MCMs*, Reed Gleason
- *Coplanar Versus Microstrip Measurements of Millimetre Wave Devices*, P. C. Walters
- *Modeling, Simulation and Design of Dissipative, Dispersive Uniform and Nonuniform Multiconductor Interconnects*, V. K. Tripathi
- *Accurate Modeling of MHMIC Passive Elements Yields a Successful Design and Packaging of a 20 GHz to 5 GHz MHMIC/MMIC Low-Noise Downconverter*, J. Fikart
- *Automating Test Operations to Improve Quality and Productivity*, S. Williamson
- *T/R Models for Automated Assembly and Test Using Flip Clip and LTCC Packaging*, D. K. Sakamoto
- *A Frequency Domain Analysis of Multi-Conductor Transmission Line Interconnect Topologies*, T. Rahal-Arabi
- *Using Microwave Coupled Resonator Filter to Characterize Thick Film Interconnects for High Frequency Signal Propagation*, R. R. Gryzbowski
- *Measuring Package and Interconnect Model Parameters Using Distributed Impedance*, B. Janko
- *Interconnection Transmission Line Parameter Characterization*, R. B. Marks
- *Time Domain Measurements and Characterization and Modeling of Interconnects*, V. K. Tripathi
- *Frequency Domain Characterization of High Speed Digital Circuit Interconnects in a Multilayer Printer Circuit Board*, A. P. Agarwal

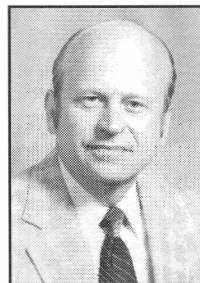
- *Save the "Thru" in ANA Calibration*, A. Ferrero
- *Calibrating Microwave Probes to the Probe Tips*, D. F. Williams
- *Characterizing Blind Mate Connectors*, W. Oldfield
- *Temperature Dependent Characterization of GaAs MESFETs*, L. P. Dunleavy
- *Microwave Characterization of Microshield Lines*, R. F. Drayton
- *An Efficient Temperature-Dependent S-Parameter Calibration Routine*, J. R. Martin
- *Extracting the Required Reflection to Compensate the Sealed Connector of a Microstrip Fixture*, H. Stinehelfer
- *Measurement of Dynamic Current in Switching CMOS Buffer*, O. Pedersen

plus

- Panel Discussion: *Interconnecting to the Future*
Mark Failburn, Reed Gleason, Lindi P. B. Katehi, Bill Oldfield, Vijai Tripathi, Dylan Williams

The Conference Chair was James C. Rautio, Sonnet Software, Inc., 135 Old Cove Road, Suite 203, Liverpool, NY 13090-3746, phone (315) 453-3096; Conference TPC was Bert Berson, Berson and Associates, 655 Castro Street, Suite 3, Mountain View, CA 94041, phone (415) 968-2101. A post-conference digest is available. Contact Henry Burger, ARFTG, 1008 East Baseline Road, No. 955, Tempe, AZ 85283-1314. Cost is \$20.00 for an ARFTG member and \$35.00 for a non-member. An additional \$9.00 is requested for airmail outside the US.

Special Issue Distribution



by N.R. Dietrich

A copy of the Institute of Electronics, Information and Communications Engineers (IEICE) Transactions on Electronics including a special issue titled "Optical/Microwave Interaction-Devices, Circuits and Systems" was recently distributed to all MTT members who have expressed an interest in lightwaves on their IEEE membership interest profile. The distribution has been arranged by MTT-3, the MTT Technical Committee on Lightwave Technology. It is financed through the support of the MTT Administrative Committee, AdCom.

A limited number of extra copies is available free of charge (while they last) to any additional MTT members who may also have an interest in the topic. Written, faxed or e-mail requests (one copy per request, include IEEE membership number, please) should be directed to:

Ms Marsha Tickman
IEEE Technical Activities
445 Hoes Lane
P.O. Box 1331
Piscataway, NJ 08855-1331
fax: 908-562-1571
e-mail: m.tickman@ieee.org

We hope you find the issue interesting and informative, and that you will continue to support the growing interest in lightwave technology within the microwave community.

Viewpoints

The following correspondence and response were noted in the IEEE Instrumentation and Measurement Society Newsletter, issue No. 118, Winter 1993 and is reprinted with the kind permission of the editor, Tom Garver.

Dear Editor,

During discussions with friends and colleagues, questions concerning video display terminal emissions have been raised. Professor Ashley has written recent articles in the I & M Society Newsletter on this subject. If possible, it would be helpful and informative to have Prof. Ashley address some of the following topics, possibly in a future issue of the I & M Newsletter.

In the Summer 1992 I & M newsletter, Prof. J. Robert Ashley discussed emissions from computer monitors. In his article, Prof. Ashley did not discuss the Swedish standards that are sometimes referenced in advertisements. How do the Swedish standards compare to the IEEE standards that were discussed?

Since many keyboards, CPU cases and work stations are constructed of ferrous and nonferrous materials and from plastics, will these materials and their placement effect measurements? If these materials influence the measurements, will they also effect the fields to which the computer users are exposed?

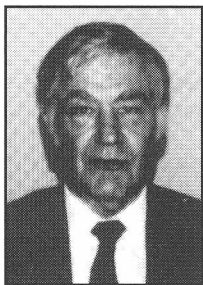
The statement "A suitable method for measuring the AC electric field near CRT faceplate has not been published" seems strange considering all the TV and computer monitor research. In the Winter 1991 Newsletter, Ashley discussed the IEEE Standards Project P1140. What is his criticism of those measurement methods?

Finally, would Prof. Ashley comment on what defines a low radiation monitor and how this is achieved by manufacturers. Is it worthwhile to purchase low radiation monitors based on low radiation specifications? When would it be recommended to replace existing equipment with low radiation monitors? Do liquid crystal displays (LCD) have the same levels of emissions as VDTs and would these be a viable alternative to low emission VDTs?

Sincerely,

Dennis Destefan
Broomfield, CO

Video Display Terminal Political Science



by J. Robert Ashley

Introduction

The provocative letter from I & M member Dennis Destefan in the Fall 1992 I&M Society Newsletter raises questions which are essentially "political" in nature. Although the term "politics" has some unpleasant connotations, I think the definition "the total complex of relations between men in society" has merit here. The men and women involved in this issue include reporters, lawyers, government officials, labor union leaders, etc.—most of whom have no formal education or skill

in college level physics. If students in EM theory classes consider the study of fields and waves as deep as the ocean, how can we hope that those without their several courses in calculus and physics can comprehend the issue of power line or appliance electrical safety?

The factor I personally find most frustrating is that engineers are not respected for their ethics. People are pleased to use the computer monitors we have provided; yet, when some tabloid journalist makes a claim about monitor safety, other reporters dismiss engineering replies debunking that claim as "bought by the industry."

Another public relations problem in this issue is a natural instinct for engineers and other workers in "hard" science not to be "dogmatic." Such a tendency is taken as "being uncertain" or "not understanding" by non scientists. Those who have an ax to grind or an ego position to justify take advantage of us here. Thus, in my current writing for 5 non-engineering people, I tend to be dogmatic. I will do so here and if anyone wants to challenge my science, my choice of weapon is a Poynting Vector at one meter.

Jargon vs. True Science

The "questions concerning video display terminal (VDT) emissions" are first answered by correcting terminology. I first read of VDTs in the entertainment magazine, The New Yorker. I now consider "VDT" the terminology of the enemy and avoid the acronym. The appliance of concern is a magnetically deflected, raster scan cathode ray tube first widely used in black and white television receivers starting after World War II. The safety engineering was well done for TV and the results still hold. The only true "emission" is X-ray. We know how to control CRT voltage and glass composition to make this a truly negligible health hazard. Thus, I dogmatically state the following:

1. There is no radiated or emitted ELF or VLF electromagnetic wave from any cathode ray tube display (CRTD).
2. The fringing ELF and VLF magnetic field is caused by the deflection yoke. The magnitude is so low that a biological interaction with human tissue is physically impossible. CRTD magnetic fields are harmless.
3. The fringing ELF and VLF electric field is caused by the high voltage power supply "ripple" found on the CRT face plate. The only situation where the magnitude is sufficient to cause concern is for a child putting finger prints on the face plate of a 25 inch console TV.
4. The ELF and VLF magnetic fields near any computer monitor cannot cause a miscarriage, cancer, or any other health effect.
5. Epidemiology cannot determine if magnetic fields or electric fields alone are a public or occupational health risk.
6. The epidemiology studies I have read are seriously flawed in determining exposure—that is, in making decent electronics measurements!
7. There are no peer reviewed papers to give a physics basis for what you might read about VDTs in the entertainment media or trade press.
8. Electromagnetic fields near CRTDs and power lines are harmless because they are non-existent.
9. The theory of power line fringing fields is totally different than for CRTD fringing fields. There is no way to relate power lines, CRTDs, cellular telephones, police radars, etc., in terms of health hazard. The amazing thing is that none of the above are hazardous.

In the past, the knowledge above has led to the kind of a statement by engineers "CRTDs have not been proved to be

hazardous." This is commendable engineering science but poor political science. One must be dogmatic CRTDs are electrically safe!

CRTDs Do Not Have Emissions

Now for the questions raised by Dennis Destefan. First, "How do the Swedish standards compare with the IEEE Standards that were discussed?" There are two Swedish documents involved in the media phobia about "low radiation VDTs." The methods for making measurements are discussed in "Test Methods for Visual Display Units"¹. I will comment later on the measurements in answering the questions about P1140. The use of the measurements is discussed in "User's Handbook for Evaluating Visual Display Units"². There is much good material about visual ergonomics in these documents. However, the material on "Emission Characteristics" is the source of what you usually read about the Swedish Standards.

The word "emission" is the start of the troubles. CRTDs or VDUs DO NOT emit or radiate! In the measurement methods, the documents do correctly speak of alternating electric field and magnetic field with the correct SI units of volts per meter and microtesla. But, by using this word emission synonymously to "radiation," fears and phobias related to X-radiation and H bombs are stirred up.

In the BACKGROUND section of [2], we read:

The work environment debate on visual display units (VDUs) started in earnest during the first half of the 1980s. It was concerned not only with stress and monotonous work, but also with visual ergonomics and the effects of electromagnetic fields. The symptoms of poor work environment that were raised in the debate were mainly the possible risks of an increased number of miscarriages by pregnant women, skin problems associated with VDU work and hypersensitivity to various types of light sources. There was then, as now [1990] no scientific proof of any of these effects.

The part we see quoted in the entertainment media is the GUIDELINES section of [2] which gives the results of measurements on the "best" VDUs available in 1990. The actual numbers are for the magnitudes of the fields about 50 cm in front of the screen of a CRTD. No assertion in [2] can be interpreted to indicate the magnitudes given are harmful, "standard," or needed as performance limits.

CRTD Magnetic Fields Are Harmless

The magnetic field guidelines are illustrated by Fig. 2.04A of [2]. The illustration is accurate in that the magnetic fields do originate in the deflection yoke near the center of a CRTD. The part lacking is that there are both "vertical direction" lines as shown and "horizontal direction" lines that are not shown. Ironically, the laws of electron optics tell us the vertical direction lines are related to the horizontal deflection of the beam in a CRT—and would be in the 3 to 300 kHz VLF spectrum. Also, the waveshape is sawtooth. The horizontal direction lines are related to the 3 to 3,000 Hz ELF vertical deflection.

The figure is accurate in indicating that the presence or absence of the human operator makes no difference in the magnetic field shape or geometry. However, the popularized interpretation of this theory is that magnetic lines "cut" the human body and penetrate the interior regions to have an effect. Of course, the "effect" is assumed to be harmful. Maxwell's laws debunk this assumption. The point form of Maxwell's curl equations tells us nothing about current flowing in the human tissue. The integral forms must be used; specifically, Faraday's law is needed for computing the electric fields and current densities. We sketched the theory in [3]. Doing the computations correctly leads to my dogmatic

assertion that a fetus will not feel the CRTD fringing magnetic fields. Although the magnetic field does cut the fetus, it cannot in any way contribute to the mother having a miscarriage.

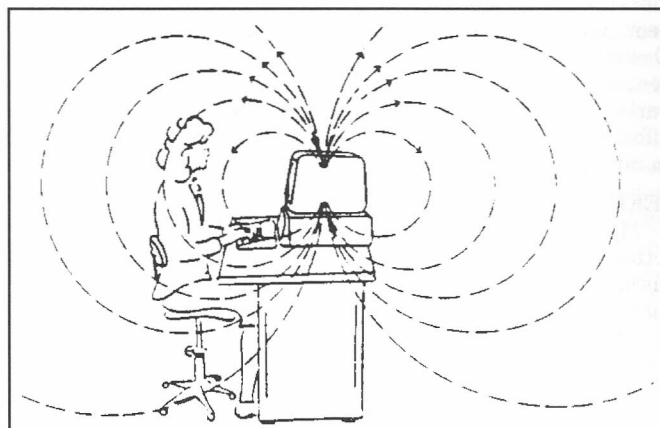


Figure 2.04A, The low-frequency magnetic field around a VDU.

Those who understand the physics of using a magnetic loop to measure a time varying magnetic field can appreciate how the difficulty of making this measurement indicates how negligible the currents in tissue must be. Consider using a 10 cm (4 in) diameter pickup coil located where a fetus might be located. To obtain sufficient ELF signal to view on a modern digital oscilloscope (say a few millivolts peak-to-peak), that pickup coil needs to have about 10,000 turns! If one integrated the CRTD ELF magnetic field around the contour of a first trimester fetus, the resulting electric field would be in the order of nanovolts per meter—totally negligible!

Consider a hypothetical experiment for measuring magnetic fields. Build a pick-up coil with a ferrite core and closely located operational amplifier integrator. Such a coil could comfortably fit in a person's mouth. Carefully and firmly mount this coil near a CRTD and check the output with an oscilloscope. Now, have a person carefully open his/her mouth and enclose the coil therein, without moving the coil. There will be absolutely no change seen on the oscilloscope. Since the magnetic field has not changed, there has been no loss of energy density in the surrounding human tissue. Again, ELF magnetic fields near CRTDs and under power lines DO NOT have a biological effect, good or bad, on human tissue.

The numbers given in [2, p. 57] are 25 nT at VLF, 250 nT at ELF. To indicate the absurdity of the media propagated phobia, the 250 nT number has been interpreted as a "Swedish 2.5 milligauss standard for power lines." Such possible misinterpretation is the consequence of a "political" based standard. As a result of this and the even more serious financial consequences of the "prudent avoidance" basis of the Florida EMF Rule [4], I am firmly opposed to any other than health (physics) based EMF standards for maximum exposures or for measuring methods.

Television Electric Fields

I first learned of CRTD electrical field measurements in connection with the P1140 Working Group which is trying to adapt [1] to be an IEEE measurement standard for VDTs. My first reaction was "bullfeathers—there ain't no ELF electric field from the vertical deflection electronics!" However, I have learned NOT to publish such reactions until I have tried a measurement. What a surprise I received when I used the E-field sensor from a commercially available power frequency equipment with my old Tektronix 647A oscilloscope. There is all sorts of E field "garbage" in front of my 1976 Heathkit 25 inch console color TV. There are two sources: 1) power supply

ripple applied to the face plate; and, 2) the 50-50 chance that the power cord plug is inserted to put 120 V, 60 Hz on the CRT face plate. Yes, that is a "crude and uncalibrated" measurement. I did learn enough to state "A suitable method for measuring the AC electric field near a CRT face plate has not been published" which rightfully seemed "strange" to Dennis Destefan. The criticisms of the Swedish methods [1] are essentially: 1) A time domain indication is not used; 2) No variation of the field change with distance is obtained; 3) The effect of the keyboard on VDU electric fields is ignored. I stick to my Poynting Vector about electric field measurements!

IEEE Standards Project P1140

My previous criticism of P1140 in the Winter 1991 Newsletter was technically based on the measurement factors just discussed. In answer to Dennis Destefan's request for information about P1140, I will try to bring you up to date. A strong minority on the working group made it apparent that the document would never be completed with the "Appendix D" reference to the Swedish numbers in [2]. Thus, the 9th DRAFT circulated for a ballot contained only the measurement methods. Still, I voted "do not approve" and gave five pages of technical reasons to explain my vote.

The magnetic field measurement technique given in [1] is essentially the use of two separate commercially available instruments, one for ELF and one for VLF. Each instrument has a three-axis pick-up coil assembly and uses baseband filters to separate ELF and VLF. The equipment itself is of reasonable design. The problem is possible misuse by those who have inadequate knowledge of magnetic field and CRTD theory. Practically, I fear that technicians supporting epidemiology studies will take repeatable data that will be considered useful because the measurements are in accordance with a "Standard." At this stage of medical and epidemiological research, the methods of [3] are quite adequate and give much more information to the researchers.

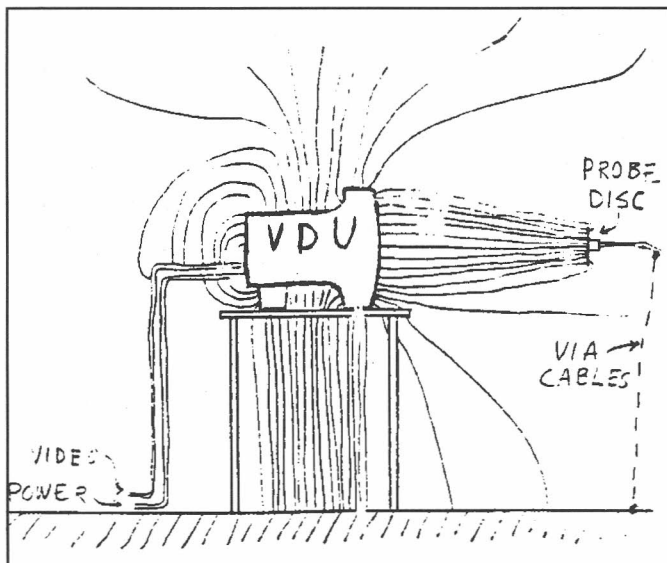


Figure 2. Suggested sketch of E fields

The real problem I see with the P1140 DRAFTs is in regard to the electric field measurements. Neither [1] nor [2] contains an illustration for alternating electric fields corresponding to the illustration for magnetic fields near a VDU. After 14 years of university level teaching of EM theory, I doubt that a single one of my many fine students could come up with a sketch to illustrate the measurement without first hitting the books for a couple days. The classroom snow about Laplace's equation, tangential and normal displace-

ment flux boundary conditions, surface charge density, etc., has long since melted in their minds. For a big telephone committee meeting of P1140, I faxed the sketch of Fig. 2 for consideration.

During the telephone conference, one of the P1140 members told me the sketch could not be used because it would "frighten people." Yet, this sketch answers another question from Dennis Destefan. The keyboard and other materials in both the computer monitor and other equipment do establish the shape of the electric field. Electric fields behave much differently than magnetic fields. Without understanding these facts of electromagnetic theory, it is impossible to write a scientifically valid electric field measurement standard. I have advised P1140 to abandon their electric field efforts until a research paper similar to [3] has been written.

Low Radiation Monitor Purchase Questions

The final paragraph of the letter from Dennis Destefan is loaded with good questions.

What defines a low radiation monitor and how is this achieved by manufacturers? Is it worthwhile to purchase low radiation monitors based on low radiation specifications? When would it be recommended to replace existing equipment with low radiation monitors? Do liquid crystal displays have the same levels of emission as VDTs and would these be a viable alternative to low emission VDTs?

My answers are: 1) I don't know. 2) No. 3) Never. 4) No and No. Let me justify those answers.

Since I cannot measure ELF or VLF "radiation" from a CRTD display, I have no idea of what a manufacturer would do to achieve lower radiation. To put numbers to this question, consider equipment from Hewlett-Packard, a former of employer of mine for whom I have great technical respect. The HP xyz is called a low radiation version of the HP wxy and costs \$50 more. No true radiation specifications are given probably because no engineer at HP can measure CRTD radiation, let alone the difference between two equipments. I see no need to spend the \$50.

There is, of course, a difference between the magnetic field specifications between these two HP equipments. Which would I recommend? If I were advising the purchasing and human relations managers for a company, I would definitely say to choose the "high radiation" version. The reason is political. By buying the "low radiation" equipment, you are speaking by actions that you might believe in radiation from VDTs. If, in the future, there is a workman's compensation claim for miscarriage or other health effect by a person using an older equipment, the company's lawyers will have a very hard time defending the claim. Yet, the old equipment is just as safe as the new equipment and not responsible for the alleged health effect. My free advice is to NOT purchase computer monitors advertised as "low radiation!"

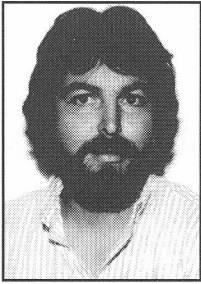
The question about liquid crystal displays has interesting answers. For true radiation, one could use a zero = zero argument to say the levels are the same. For magnetic fields, the levels are lower. For electric fields, when plugged into a battery charger, the levels could be considerably higher for a portable computer than for a monitor with a proper three-wire power cable.

The real decision basis is political. Do not concede that a liquid crystal display or any computer equipment is being considered for "low radiation." We can defend the safety of computer monitors and TVs with Poynting Vectors at one meter!

References

- ¹MPR 1990:8 "Test Methods for Visual Display Units"
- ²MPR 1990:10 "User's Handbook for Evaluating Visual Display Units"
- ³Sapashe, D. & Ashley, J. R., IEEE Trans IM April 1992
- ⁴Ch. 17-274 ELECTRIC AND MAGNETIC FIELDS, Florida Administrative Code.

After a Bad Day



by Mike Golio

I tell you it's do or die!" The voice of Leary McFly boomed toward me. It was early Monday morning and I had just walked into the building (without having had any coffee, I might add). I just wasn't ready for this. McFly was talking at someone in the hallway and they were standing directly in front of the door to my office. I thought about turning back then and I should have. But I didn't. As I got closer to my office I recognized the person McFly was with. It was Bo Cambert. In the most recent reorganization-to-end-all-reorganizations (or was it in the mother-of-all-reorganizations) Bo had been made Vice President of Strategic Stuff and Principle Power Broker. It seems that last year Bo had been given spending authority over a huge amount of money and had managed not only to spend it all, but to go over budget by a record amount. Naturally, this qualified him for promotion.

"Do or die!" McFly was repeating himself. I was now standing face to face with Cambert so I initiated a conversation: "What kind of new and exciting programs have you got planned for us, Bo?" As soon as I asked I knew that it was a mistake, but it was too late.

Bo responded immediately, "You know, Mike, I wanted to talk to you about launching an effort to combine what we know about microwave devices with recent scientific advances in other areas—keeping in mind the nature of the global economy and our corporate initiatives to protect the environment." McFly was nodding agreement. The fact that Bo had said this with a straight face should have tipped me off that he was serious. Unfortunately, I decided to carry what I had perceived to be a joke to a higher level of absurdity. "Perhaps we could develop a room temperature superconducting microwave device that would convert air pollution into raw energy while beaming a message of tranquility throughout the planet."

McFly recognized an opportunity to provide us with his opinion. "My philosophy is that tranquility is good, but not as good as low VSWR," he said.

"Thank you." I said looking at McFly. I have learned that thanking McFly for his "philosophy" often keeps him from explaining it to you. The strategy seemed to work this time because McFly only grunted and looked away.

But McFly was the least of my worries. Bo was becoming seriously excited. "Great," he said handing me a sheet of paper with a meeting agenda printed on it, "have a status report on that program ready for presentation to the Company Steering Committee by 3:00 PM this afternoon." As if that wasn't bad enough, Bo went on, "I realize that this program may be on very shaky technical ground and we will probably lose a significant sum of money on it, but focus on the positives for this presentation. Oh . . . and by the way, try to come up with a catchy program title." As Bo turned and walked away briskly, I wondered just what positives I could possibly focus on—maybe a catchy title was the best bet.

My attempts to develop a presentation that morning were thwarted at every turn. First, our computer network went down. Then, the air conditioning to the building went out.

When they finally fixed these problems, the only thing my computer seemed to do was adjust the temperature of the lab next door. Finally, late in the morning I discovered that by cleverly adjusting the thermostat in my office, I was able to prepare vu-foils.

That afternoon, as I struggled to complete a presentation that would satisfy Bo without causing personal embarrassment, I received additional discouraging information. A call from our legal department informed me that the patent committee had approved one of the disclosures I had submitted while working on Government contract. That sounded like good news at first. It seems, however, that the idea was conceived while I was working on proposal preparation charge numbers. "Thinking of new ideas while charging these accounts is strictly forbidden by government regulations," the secretary informed me. "In fact, thinking in general is discouraged when these numbers are being charged." She went on to inform me that although I would probably receive a patent bonus, I might have to spend 3 to 5 years in jail. At this point in the afternoon I wondered if it would be possible to incarcerate me before I had to go to the Steering Committee Meeting.

By late afternoon I was beginning to think I might never recover from the day. But then I remembered that tonight was the night of our local MTT chapter meeting. The thought was at least a little uplifting. I would go to the meeting, listen to a stimulating presentation, share stories with colleagues and feel better about everything.

I tried it and it worked for me. You might want to try it too.

Defense R&D Policy Committee

(Continued from page 12)

while some defense companies such as Martin-Marietta are bolstering their defense capabilities (note: the GE Aerospace Acquisition).

A second area of discussion was presented by an IEEE Congressional Fellow, Ken Wagner, on the Defense Workers Economic Reinvestment Act (official title: A Bill to Mitigate the Adverse Effects on Defense Contractors and Defense Workers of Reductions in Defense Spending). Key aspects of this proposed legislation are:

1. Alleviation of adverse economic effects on defense contractors and workers.
2. Investments in advanced technology projects to benefit the national technology infrastructure.
3. Creation of critical technology consortia.
4. Commercially available systems, supplies, and services.
5. Retraining, placement, and transition assistance.
6. Commercialization of new technologies and discoveries.
7. Fast response grants for technological competitiveness.

The funding and implementation of these programs is not yet specified except to say that the intent to promote a conversion to a more competitive commercial industrial base from a highly funded defense industrial base is clear.

The Defense R&D Policy Committee joined the Engineering R&D Policy Committee at lunch for an informative discussion with Jim Turner, a staff member on the House of Representatives Science and Technology Committee. Jim described the same proposed legislation that Ken Wagner had presented to us earlier, but from the perspective of one responsible for drafting the document. It is clear that Congress is serious about transitioning the primary R&D investment focus from the defense sector to the commercial sector. There is still a major debate concerning the best way to accomplish this. Jim was non-committal in his response to several questions concerning speculation about Clinton's plans (policies, organizational changes, staff reductions, etc).

IMS Workshops, Panels . . .

(Continued from page 9)

Panel Sessions

Monday, June 14; Tuesday, June 15; and Wednesday, June 16. These are held at lunch time.

- Which MMIC Technology Will Win the PCN Race?—*Monday—S. Moghe*
- Direct Broadcast Satellite (DBS) Market: Technology and Trends—*T—R. Gupta*
- MMICs in Commercial Markets: More Than a Viewgraph Projection—*T—F. Ali, M. Golio, D. Maki*
- Multifunction MMIC Design: Issues and Tradeoffs—*W—F. Ali, Y. Ayasli, R. Pengelly*

Rump Sessions

Held Tuesday Evening, June 15

- High Efficiency MMIC Power Amplifiers—Watt's Up?—*F. Sullivan, F. Ali*
- GPS/GLONASS: State of the Art and Applications—*H. Meinel, B. Geller, T. Jacob*
- Commercial and Consumer Markets, and Application of Microwave Digital and DSP Circuits—*R. Bayruns*
- Computer-Based Education and Corporate Training—*M. Iskander*

Special Technical Sessions

Tuesday, June 15, and Wednesday, June 16

These sessions are interspersed in the main technical program and provide focused presentations on specific topics of interest. A brief summary of titles follows.

- Intelligent Vehicle Highway Systems (IVHS)—*T—R. A. Sparks*
- Microwave Power Modules (MPM)—*T—R. K. Parker*
- Status of Microwave Ferrite Technology—*T—J. E. Pippin*
- Developments in Global Communications—*W—G. L. Heiter*
- Wireless Local Area Networks—*W—J. B. Horton*
- Selected Russian Microwave Technologies—*W—G. W. Ewell*

Guest Program

(Continued from page 9)

rian and Empire Revival furniture from the 1870-1885 period. There is a marvelous collection of antiques and fine porcelain.

You will enjoy a delicious southern buffet lunch amid the splendor of the Blue Willow Inn, an antebellum home converted into a wonderful restaurant.

On the drive back to Atlanta you will be able to sit back, relax, sip a glass of wine and relive the high points of an exciting day.

All three group tours should be over between 3:00-3:30 p.m. In addition to these tours, guest suite personnel can help you to locate other attractions which you may wish to visit privately, such as Zoo Atlanta, the Botanical Gardens, Fernbank Museum of Natural History, or the shopping malls, such as Phipps Plaza and Lenox Square. Atlanta's rapid transit system, MARTA, offers clean, safe, convenient and economical transportation to most of Atlanta's attractions.

The weather in Atlanta is apt to be hot and humid in June, but everything is comfortably air-conditioned, so discomfort is minimal.

We feel we have planned an exciting program to entertain you, and we are looking forward to showing you our city and extending our hospitality.

See you in June.

1993 MTT-S Symposium: Open Forum

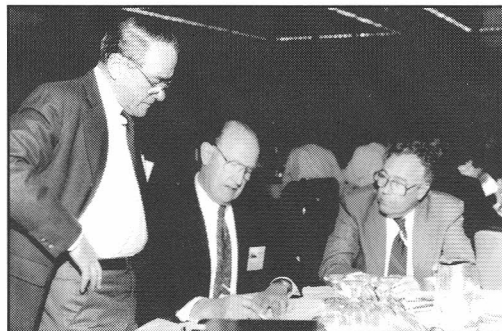


by Horton Prather
Open Forum Chairperson

This year's Open (Interactive) Forum promises to be one of the best yet! The Technical Program Committee has carefully selected 99 excellent technical papers providing interest ranging from highly analytical subjects to very practical hardware and systems. The interactive format includes computer simulations, hardware demonstrations, and video presentations along with easy-to-view presentation layouts. The opportunity for a one-on-one discussion with the author makes this format highly effective.

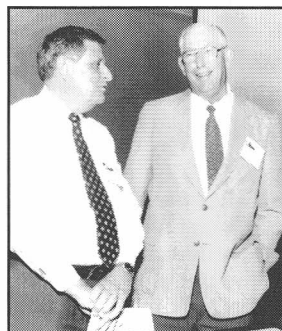
We have tried to make the Open Forum as effective as possible by providing an open, spacious layout and common areas to promote discussion among attendees. The Ballroom at the World Congress Center is easy to find and it's worth the walk to participate in these presentations. Knowing that it is often difficult to schedule time around multiple parallel sessions, we have decided not to have any opening speakers. Come at the time best for your schedule; you won't miss anything!

The individual papers in the Open Forum will be grouped together in sessions, and related sessions will be held on the same day. We hope this will improve interaction with other attendees and authors, making the Open Forum one of the most valuable you can attend. There will be a generous amount of wine, cheese and snacks to stimulate your thinking!



January Technical Programs Meeting

Pictured above: Howard Ellowitz, Pete Rodrigue, and Harland Howe. At left: Larry Whicker and Gordon Harrison.



What's Happening in CAEME?

(Continued from page 7)

- "User-Controlled Design and Collaboration," G. Gay, F. E. Mazur, and S. Masclat, Cornell University
- "Interactive Video Lessons for Electromagnetic Education," M. F. Iskander, T. Reed, and J. Breen III, University of Utah
- "Multimedia and Case Studies in Structural Engineering," G. G. Deierlein, M. L. Valenzuela, and R. N. White, Cornell University
- "Using Current Artificial Intelligence Techniques to Advise Students," J. R. Mallory, Rochester Institute of Technology
- "Using Student Projects to Develop Instructional Applications and Teach Computer Graphics Programming," K. Mink, Cornell University

Table 3. List of Software Distributed With the First Two Issues of *Computer Applications in Engineering Education*

- "Arrays: Analysis of Antenna Arrays," described in "Arrays: A Software Package for Analysis of Antenna Arrays," A. Z. Elsherbeni and P. H. Ginn, University of Mississippi, Vol. 1, No. 1
- "Focus on Developing Innovative Engineers—Chemical Engineering Module Sampler," described in "Interactive Computer Modules for Undergraduate Chemical Engineering Instruction," H. S. Fogler, S. M. Montgomery, and R. P. Zipp, University of Michigan, Vol. 1, No. 1
- "Finite Difference-Time Domain Simulation of EM Phenomena," described in "Simulation of Electromagnetic Radiation and Scattering Using a Finite Difference-Time Domain Technique," K. Li, M. A. Tassoudji, R. T. Shin, and J. A. Kong, Massachusetts Institute of Technology, Vol. 1, No. 1

Table IV. List of EM Software Development Projects Funded by CAEME in 1992

- Interactive Exercises for Visual Electromagnetics—*R. Cole, University of California, Davis*
- Development of a PC-Based Simulation of Electromagnetic Wave Propagation—*T. Kao, Loyola-Marymount University*
- Radiation Characteristics of Phased Array Antennas and Mutual Coupling of Microstrip Antennas—*A. Kishk, University of Mississippi*
- Application of the Finite Element Method for Quasi-Static and Dynamic Analysis of 2D Arbitrarily Shaped Inhomogeneous Anisotropic Multiconductor and Multidielectric Waveguiding Structures Utilizing the Classical Elements and Edge Elements—*M. Salazar-Palma, Polytechnic University of Madrid*
- Reflector Antenna Analysis Software: An Educational Approach—*Y. Rahmat-Samii, University of California, Los Angeles*
- Analysis and Design of Antenna Arrays—*A. Elsherbeni, University of Mississippi*
- Use of Matlab to Solve EM Problems—*J. Lebaric, Rose-Hulman Institute of Technology*
- Development of Interactive Video Lessons—*M. Iskander, University of Utah*

Table V. List of Universities Who Have Joined CAEME

Air Force Academy
California State University-Chico
California State University-Northridge

California State University-Sacramento
Carleton University, Canada
Case Western Reserve University
Catholic University of Louvain, Belgium
CETUC-PUC/Rio, Brazil
Chalmers University of Technology, Sweden
Clemson University
Colorado State University
Communications Research Centre, Canada
Concordia University, Canada
Cooper Union
Corning Community College
Dartmouth College
Ecole Polytechnique Federale de Lausanne, Switzerland
Ecole Polytechnique de Montreal, Canada
Ecole Supérieure D'Electricite, France
Ecole de Technologie Supérieure, Canada
Eindhoven University of Technology, The Netherlands
Electronics & Telecommunications Research Inst., Korea
Florida International University
Florida State University
Forsvarets Forskningsanstalt, Sweden
Fraunhofer-Inst. fur Natur.-Tech. Trendanal., Germany
Gannon University
George Mason University
Georgia Institute of Technology
Georgia Tech Research Institute
Gonzaga University
Hampton University
Hellenic Air Force Technology Center, Greece
Helsinki University of Technology, Finland
Howard University
Illinois Institute of Technology
Illinois Wesleyan University
Indiana University-Purdue University, Fort Wayne
Instituto Maua de Tecnologia, Brazil
Instituto Superior Tecnico, Portugal
Iowa State University
Johns Hopkins University
King's College, University of London, England
Loyola Marymount University
Massachusetts Institute of Technology
McGill University, Canada
Michigan Technological University
Mississippi State University
Monash University, Australia
Naval Postgraduate School
New Mexico Technical University
North Carolina A&T State University
North Carolina State University
North Dakota State University
Northern Arizona University
The Numerical Methods Laboratory, Romania
Oklahoma State University
Oregon State University
Parks College, St. Louis University
Politecnico di Torino, Italy
Polytechnic College
Polytechnic University
Purdue University
Queen's University, England
Rochester Institute of Technology
Royal Melbourne Institute of Technology, Australia
Rutgers University
San Jose State University
South Dakota State University
Southern Illinois University-Carbondale

Staffordshire Polytechnic, England
 State University of New York at Binghamton
 State University of New York at Buffalo
 State University of New York at New Paltz
 Stevens Institute of Technology
 Technical Research Centre of Finland
 Technical University of Denmark
 Technical University of Gdansk, Poland
 Technical University Graz, Austria
 Technical University of Nova Scotia, Canada
 Telefunken Systemtechnik GMBH, Germany
 Texas A&M University
 Union College
 Universidad Politecnica de Madrid, Spain
 Universidade Federal Da Paraiba, Brazil
 Universiti Kebangsaan Malaysia
 University of Akron
 University of Alabama
 University of Alberta, Canada
 University of Auckland, New Zealand
 University of Birmingham, England
 University of Bristol, England
 University of Bundeswehr Munchen, Germany
 University of California, Irvine
 University of California, Los Angeles
 University College Dublin, Ireland
 University College London, England
 University College of Swansea, England
 University of Denver
 University of Evansville
 University of Florence, Italy
 University of Florida
 University of Hawaii
 University of Houston
 University of Illinois at Chicago
 University of Kansas
 University of Leeds, England
 University of Liverpool, England
 University of Louisville
 University of Manitoba, Canada
 University of Michigan
 University of Mississippi
 University of Missouri-Rolla
 University of Nebraska-Lincoln
 University of Nevada-Reno
 University of New Brunswick, Canada
 University of New Hampshire
 University of New Mexico
 University of Nottingham, England
 University of Ottawa, Canada
 University of Rochester
 University of Salemo, Italy
 University of Saskatchewan, Canada
 Univ. of Sci. and Tech. of Lille Flandres Artois, France
 University of Sherbrooke, Canada
 University of South Alabama
 University of South Carolina
 University of Southern Maine
 University of Technology-Sydney, Australia
 University of Texas at Arlington
 University of Texas at Austin
 University of Texas-El Paso
 University of Toledo
 University of Victoria, Canada
 University of Washington
 University of Waterloo, Canada
 University of Western Ontario, Canada

University of Wisconsin
 University of Wyoming
 University of York, England
 Utah State University
 Villanova University
 Virginia Polytechnic Institute and State University
 Warsaw University of Technology, Poland
 Washington State University
 West Virginia University
 Wright State University

Highlights from Winter Technical Committee Meeting

(Continued from page 13)

In the Microwave Measurements (MTT-11) area, John Barr discussed several techniques with their advantages and disadvantages. This field faces several problems, but precision algorithms show promise to solve some of them.

Ed Neihenke of Microwave & Millimeter Wave (MTT-12) discussed the important issues of packaging. Now that the MMIC chips offer multiple functions on a single chip, low cost packing is the next issue for making the commercial communications or military systems affordable. Several new materials to solve the problem were discussed. Metal matrix composite as well as low temperature cofired ceramics, show great promise.

Microwave and Communication Systems (MTT-16) made four different presentations.

- In the area of technology insertion, Klaus Breuer projected that emergence of high temperature superconductors will open doors for ultra sensitive receivers and GHz processing will result in ultra fine resolutions. These receivers will advance the technology of deep-space Communication and Radio Astronomy.
- For Global Communications, George Heiter stated that emergence of MMIC, integrated antennas and miniature filters technology will result in smaller and low cost spacecraft, which can be used for low earth orbiting satellites (1000km - 3000km).
- For phased and optical arrays, David Rudledge summarized that the passive array technology is well developed and active array technology, which has the advantage of graceful degradation, is emerging.
- Another important commercial application of microwaves is in the Intelligent Vehicle Highway Systems (IVHS), which is defined as the advanced communications, navigation, sensor control systems, and information systems. Dick Sparks pointed out that these systems can be used to increase throughput on existing roadways, improve the safety of the traveling public, and improve the productivity of commercial vehicle operations. Microwave is finding its way into all the above mentioned applications.

The words most often heard in this meeting are clearly the common denominator that point to the future; MMIC, packaging, low cost and microwave communication.

We would like to thank Dr. Bert Berson for moderating the meeting.

CAEME Software

(Continued from page 8)

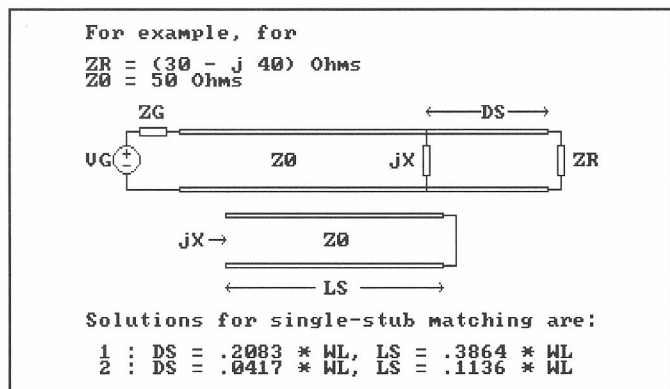


Fig. 3. An example of single-stub transmission line matching from Companion to Elements of Engineering Electromagnetics.

ElectroCard and SilverHammer

Rodney Cole, David Krull, Monica Sweitzer,
Steven Finch and Terry Palmer
University of California, Davis

While some programs merely automate calculations, these two programs for the Apple Macintosh present material in a very clever and appealing fashion. ElectroCard is a set of HyperCard Stacks which cover electrostatics, dynamics, circuits and radiation. These topics serve as a tutorial introduction to SilverHammer which is a 2-D field mapping program for charges at rest (statics) or accelerating charges (radiation). The program is based on the Lienard-Wiechert potentials for a point charge with the restriction that all accelerations start at $t=0$. The resulting radiated fields can be plotted using contour plots, 3-D surface plots, psuedo-color plots, and field line plots.

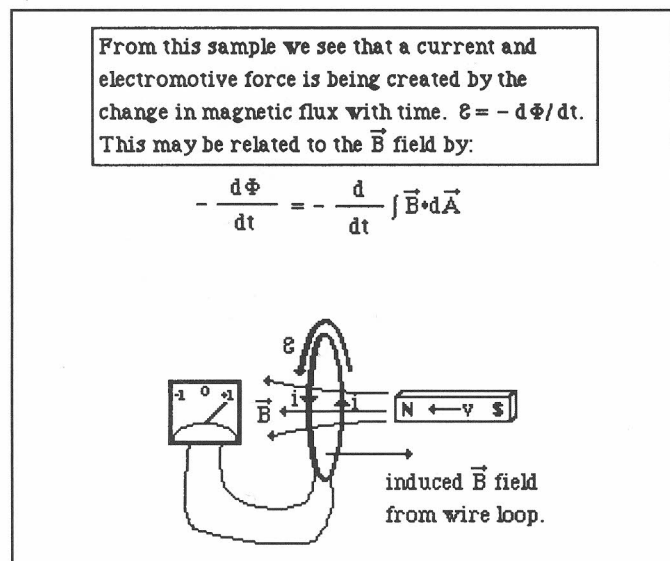


Fig. 4. One figure from the tutorial on Faraday's Law. Created by ElectroCard.

ElectroCard uses animated sequences of moving particles and animated derivation of equations much like those in the popular PBS series "The Mechanical Universe." In Fig. 4, the student can move the bar magnet in and out of the coil while observing the ammeter. In Fig. 5, the analogy between a mechanical system and a resonant circuit is developed.

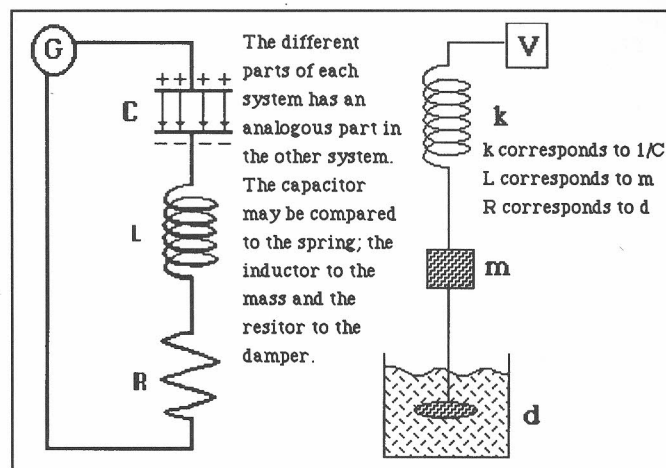


Fig. 5. In the discussion on resonant circuits, the analogy to a mechanical system is developed. Created by ElectroCard.

Electromagnetic Waves—A Video Tutor Graphics Package

Warren L. Stutzman, Alison Garrett and Michael Cerny
Virginia Polytechnic Institute and State University

This program is an excellent example of using the computer in a tutorial fashion. The topics covered fall into two areas: traveling-wave behavior and wave behavior at interfaces. Under traveling-wave behavior, the topics are: forward and backward waves, electric and magnetic fields, attenuation, velocity, and polarization. Figure 6 is one of the tutorial screens from the unit on polarization. Under wave behavior at interfaces, the topics are: interference, reflection and refraction. This logical progression of topics follows closely my own experience in my first two courses in fields and waves.

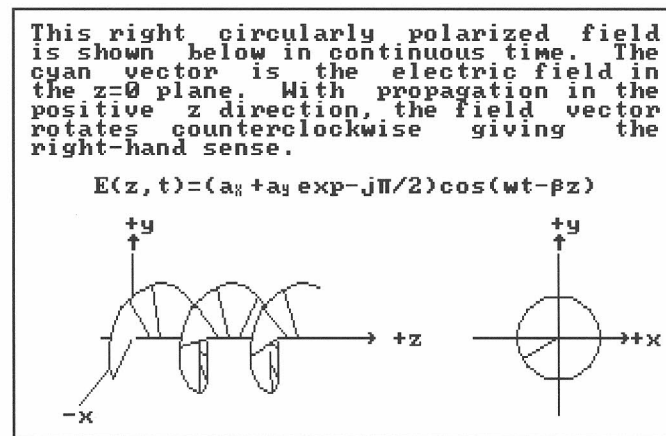


Fig. 6. One of the tutorial screens on polarization from Electromagnetic Waves—A Video Tutor Graphics Package.

Each topic is covered in a tutorial section and an exercise section. The tutorial introduces the student to terms, concepts and notation. Animated graphics are used very effectively to illustrate concepts. The exercises are used to reinforce what has been learned in the tutorial. Many of the exercises include interactive graphics where the student has control of the parameters. It is also possible to freeze the animation and print a copy of the screen to a graphics printer. I was again put off by low-resolution graphics (CGA), but in the end it did not seriously detract from the presentation of the material.

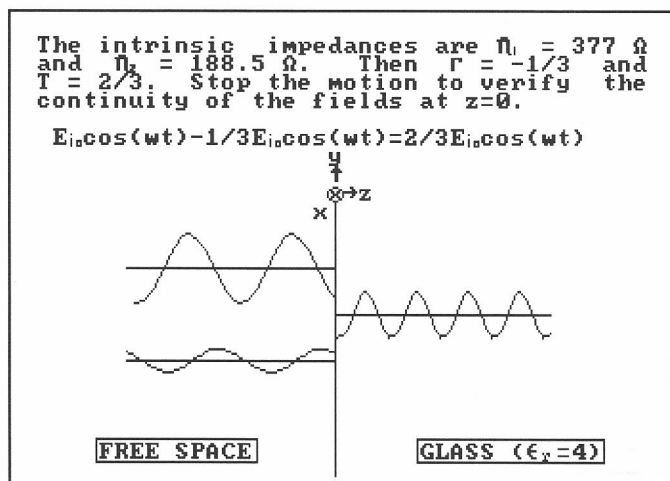


Fig. 7. One of the tutorial screens on reflection at a dielectric interface from *Electromagnetic Waves—A Video Tutor Graphics Package*.

Electromagnetic Software for Solving Static and Dynamic 2-D Field Problems on a Personal Computer

Mark Melton, Jens Engel and Jovan Lebaric
Rose-Hulman Institute of Technology

ROSEM (ROSe-Hulman ElectroMagnetics software) is undoubtedly one of the more ambitious programs in this collection. ROSEM uses the finite difference method to explore 2-D electrostatic and magnetostatic problems. It also uses the finite difference time domain method to explore 2-D transient problems.

ROSEM has a sophisticated user interface which allows the user to draw the desired 2-D cross section and display the results on top of the same drawing. The other software packages in this collection that allow an arbitrary geometry require the user to define the desired geometry in a file of XY locations. I believe there is more potential here for "what if" types of exploration by the user.

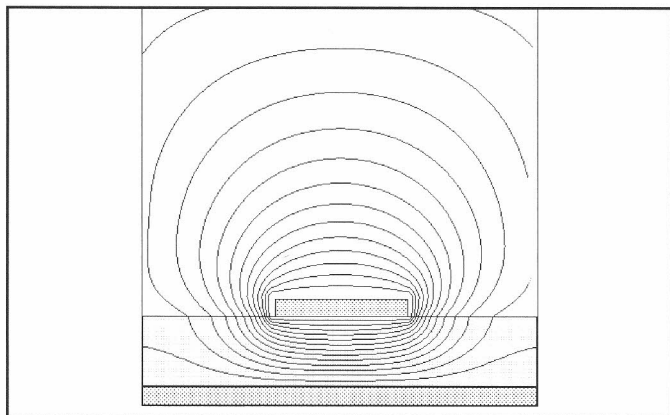


Fig. 8. Electric potential lines around a microstrip line created by ROSEM.

My biggest disappointment with ROSEM is that there is no facility for computing an integral around a path. The user can create field plots around various transmission line structures but there is no easy way to compute impedance and phase velocity information.

Antenna Software

Although I will not review them here, there are several chapters in the CAEME Software Book dedicated to antennas. There is one package for linear array theory and design, a package for displaying three-dimensional equations and a

copy of MININEC, a moment method code for antenna design.

Computational Electromagnetics—Software for an Introductory Course

Magdy F. Iskander and Octavio M. Andrade
University of Utah

This software provides interactive exercises to students in an introductory course on computational electromagnetics. The finite difference method is used to demonstrate the differential formulation while the moment method is used to present the integral formulation. The mathematical basis for both methods is presented in a well written tutorial. By using high-resolution graphics (VGA), the authors were able to include equations and figures in a quite legible format.

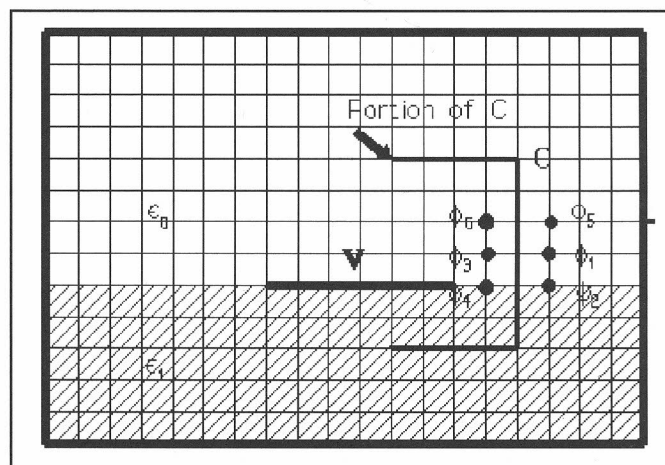


Fig. 9. One of the figures on applying the finite difference method to microstrip lines from *Computational Electromagnetics—Software for an Introductory Course*.

After viewing the introductory material on the finite difference method, the student has the option of calculating the characteristic impedance and velocity of propagation in microstrip or analyzing the propagation characteristics of ridged waveguide. The method of moments examples include the charge distribution on and the capacitance of a parallel-plate capacitor and two-dimensional scattering by an inhomogeneous dielectric object.

Simulation of EM Phenomena Using a Finite Difference-Time Domain Technique

K. Li, M. A. Tassoudji, R. T. Shin and J. A. Kong
Massachusetts Institute of Technology

This program is a two-dimensional finite-difference time-domain code (FD-TD) and is one of my personal favorites in the CAEME collection. The FD-TD technique is very useful for visualizing electromagnetic phenomena, since fields are calculated everywhere in the desired domain as a function of time. This code assumes a two-dimensional geometry superimposed on a rectangular grid with second-order absorbing boundary conditions. The scattering objects may be dielectric, magnetic and conducting materials, while the sources are sinusoidal plane wave, Gaussian pulse plane wave, and single or multiple line currents. This program can be used to generate color animations of various electromagnetic phenomena including: leading edge, trailing edge, and slit diffraction, creeping waves, cavity mode excitation, propagation through dielectric and lossy media, and radiation patterns of arrays of line current sources.

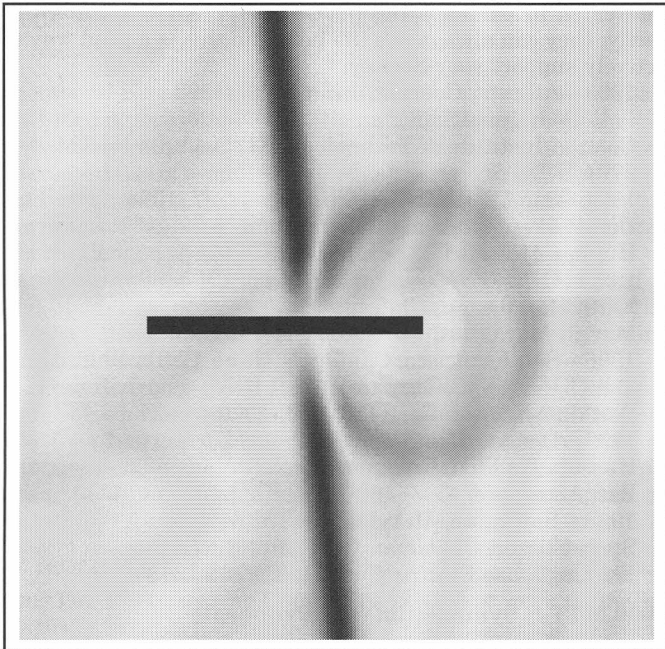


Fig. 10. A Gaussian pulse plane wave striking a metallic plate. Created by the MIT FD-TD code.

Figure 10 is one frame of an animation created by the MIT FD-TD code. A Gaussian pulse plane wave is traveling from right to left and strikes a metallic plate. In the original, the incident wave is shaded in red while the reflected energy is shaded in blue, which indicates a change in polarity. The original animation is quite striking; it is difficult to do it justice with a B&W representation.

Experimental Demonstrations for Teaching Electromagnetic Fields and Energy

*Markus Zahn, James R. Melcher and Hermann A. Haus
Massachusetts Institute of Technology*

While not strictly software, this collection of lecture demonstrations on video tape sets a high standard for others to follow. The experiments are quite clever in their design and presentation. Any engineer who is getting involved in math and science education in his local school system can find a wealth of ideas here for demonstrations or science fair projects.

Summary

I believe the goals of the CAEME project have been met and exceeded by this first set of software. The educators and students who have shared their talents with us are to be commended. I have tried to give the readers of this article a feeling for what is available in this software collection within the limits of B&W printing technology. All of the software reviewed here uses color very effectively and I encourage you to examine this software for yourself in order to appreciate its full impact. There are also three articles²⁻⁴ related to CAEME in the new *Computer Applications in Engineering Education* journal. Also, CAEME has recently been involved in the development of multimedia lessons⁵. Some of these lessons will be included in Volume II of the CAEME Software Book which will be published soon.

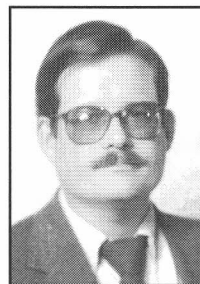
Individual MTT-S members interested in purchasing this software should contact Dr. Magdy Iskander⁶. The price for MTT-S members is \$150.

References

1. Lascaux Graphics (800) 338-0993
7601 N. Calle Sin Envidia—#31
Tucson, AZ 85718

2. M. F. Iskander, "NSF/IEEE CAEME Center: An Exciting Opportunity to Align Electromagnetic Education with the Nineties," *Computer Applications in Engineering Education*, Vol. 1, No. 1, 1992, pp. 33-44.
3. K. Li, M. A. Tassoudji, R. T. Shin, and J. A. Kong, "Simulation of Electromagnetic Radiation and Scattering Using a Finite Difference-Time Domain Technique," *Computer Applications in Engineering Education*, Vol. 1, No. 1, 1992, pp. 45-62.
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5. M. F. Iskander, T. Reed and J. Breen III, "Interactive Video Lessons for Electromagnetic Educations," *Computer Applications in Engineering Education*, Vol. 1, No. 2, 1993, pp. 147-158.
6. Dr. Magdy Iskander (801) 581-6944
CAEME Director
Electrical Engineering Department
University of Utah
Salt Lake City, Utah 84112

MTT-S Historical Collection Committee



*by Steven N. Stitzer
Chairman*

We are looking forward to displaying the MTT-S Historical Collection at the International Microwave Symposium in Atlanta. This year, we will be located in the middle of the commercial exhibit hall. We hope that many of you who would not normally seek out the Historical Exhibit will find us and enjoy the Collection.

Since last year, we have added a number of artifacts and more than a dozen books. I have found three of the original edition MIT Radiation Laboratory series, and two of the later BTL edition. Since the Rad Lab series forms a significant part of the history of the microwave industry, I think it would be worthwhile to build a complete set. Perhaps some of you who have used these books and are nearing retirement would consider giving them as a tax-deductible donation to the Historical Collection.

As usual, I will make a general call for donations of unique artifacts from the early years of microwaves. (The "early years" can be as recent as the 1960s!) Both laboratory models and production items, as well as books, are of interest. Background information on the significance of artifacts is especially appreciated.

The Historical Collection has moved into the newly relocated Historical Electronics Museum near Baltimore. The new facility has 8,000 square feet of exhibit space, twice that of the old building. Besides the MTT collection, the Museum houses several other radar displays, the Old Crows exhibit on electronic warfare, telegraph, phonograph, radio, cryptographic, and electronic test equipment, and an extensive technical library. The MTT collection is displayed at the Museum year round, except for a few weeks around the IMS. The museum is open free to the public 9 a.m. to 3 p.m. on weekdays and 10 a.m. to 2 p.m. on the first Saturday of each month. For information, call (410) 765-2345.

Meetings & Symposia Committee Report

(Continued from page 5)

January 1993 AdCom Meeting

Following is a summary of the Committee business concluded at the January 10-11, 1993, AdCom meeting in Atlanta, Georgia.

- Final sponsorship of the 1994 International Conference on Millimeter and Submillimeter Waves and Applications was denied, reversing the conditional approval granted in September 1992 in Albuquerque, NM. Approval was denied due to the inability of the conference organizers to produce the financial and technical documentation required by the Society and the IEEE. This event in no way diminishes the active interest of the Society in the millimeter and submillimeter waves technical area.
- Cooperative sponsorship was approved for the 1993 International Semiconductor Device Research Symposium (ISDRS-93) to be held in Charlottesville, Virginia, on December 1-3, 1993. The ISDRS is an exploratory, university-oriented device research conference which emphasizes new semiconductor devices, including microwave, millimeter wave and photonic devices. The first ISDRS was held in 1991 and drew ~300 attendees from 12 countries. The deadline for submission of extended abstracts for ISDRS-93 is September 20, 1993. The deadline for receipt of late news abstracts is November 15, 1993. The point of contact for all correspondence and additional information is Michael Shur, University of Virginia, at (804) 924-6109, Fax (804) 924-8818, email: msgn@virginia.edu.
- The fee structure for the IMS was reviewed and compared with that of 12 similar conferences. The data summary showed that the approved 1993 IMS fees are very close to the average fees of these other conferences.
- Anaheim, California, was approved to be the site for the 1999 IMS. This decision is highlighted below.
- Initial discussions on the site for the 2000 IMS were held. Barry Perlman discussed ongoing activities of the New Jersey Coast and New Jersey Chapters to prepare a joint letter of intent for the Symposium. In addition, the Philadelphia Chapter is in the process of preparing a letter of intent. Other sites are also expected to be considered (see discussion of 2000 MTT-S Symposium site proposals below).

1999 MTT-S Symposium

The location of the 1999 MTT-S International Microwave Symposium was approved at the January 1993 meeting of the Society Administrative Committee. Excellent proposal packages were submitted by both the cities of Long Beach, CA, and Anaheim, CA. After due deliberation, Anaheim was selected as the host city for 1999. Mario Maury, Jr., is the Chairman of the 1999 IMS, which will be held from June 14-18, 1993. If you are interested in obtaining further information, please contact Mario at the address below:

Mario A. Maury, Jr.

Maury Microwave Corporation
2900 Inland Empire Blvd.
Phone (909) 987-4715, x201
Fax (909) 987-1112

Special thanks to George Oltman, Chairman of the Negotiating Committee, and the rest of his team for doing another outstanding job in supporting this important site selection process.

Future MTT-S Symposium

Following is a listing of the International Microwave Symposium sites through 1998 with their chairmen. If you are

interested in participating please contact the chairman directly; they can always use the help and this is a good way to actively support your Society.

- 1993—Atlanta, Georgia, June 14-18, 1993
Pete Rodrigue, Chairman
Georgia Institute of Technology, EE Dept., (404) 894-2994
- 1994—San Diego, California, May 23-27, 1994
Don Parker, Chairman
Hughes Aircraft Co., (310) 615-2576
- 1995—Orlando, Florida, May 16-18, 1995
Keith Huddleston, Chairman
Martin Marietta Corp., (407) 356-7201
- 1996—San Francisco, California, June 17-21, 1996
Jim Crescenzi, Chairman
Watkins-Johnson Co., (415) 813-2506
- 1997—Denver, Colorado
Hussain Haddad, Chairman
Ball Aerospace, (303) 460-2114
- 1998—Baltimore, Maryland
Steve Stitzer, Chairman
Westinghouse Electric Corp., (301) 765-7348

2000 MTT-S Symposium Site Proposals

We have received letters of intent from the following sites:

Location	Chairman
St. Louis, MO	B. Spielman
Dallas, TX	K. Agarwal

MTT-S Symposium Proposals Requested

The following is a listing of future MTT-S International Microwave Symposia. We are requesting letters of intent from the prospective host chapters by the deadlines noted.

Letter of Intent			
Year	Location	Deadline	Selected By
2001	East	June 30, 1993	June 1994
2002	West	June 30, 1994	June 1995
2003	Middle	June 30, 1994	June 1996

Chapters wishing to host any of these Symposia are encouraged to submit their proposals to:

Eliot D. Cohen
MTT-S Meetings & Symposia Committee Chairman
DARPA
3701 North Fairfax Drive
Arlington, VA 22203-1714
(703) 696-2214
Fax (703) 696-2203

Electronics Engineer

The U.S. Army Research Office is seeking an individual to aid in the administration of an extramural research program in the field of electronics engineering with emphasis on MIMIC's and electromagnetics. Duties include analyzing and evaluating proposals and reports; maintaining liaison with contractors; analyzing contractor performance; maintaining familiarity with the status of research programs relevant to Army needs; and disseminating program policies, procedures and results to interested parties. This is a Federal civilian position at the GS-12 grade level (\$40,298 - \$52,385 per annum). Applicants must possess a doctoral degree in electronics engineering or a closely related field. For further information and application forms, contact U.S. Army Research Office, ATTN: AMXRO-CP, P.O. Box 12211, Research Triangle Park, NC 27709-2211, Ph. 919-549-4212. An Equal Opportunity Employer. U.S. Citizenship Required.

AdCom Meeting Highlights

(Continued from page 3)

members! Ken Dawson gave an informal presentation which included a perceptive evaluation of IEEE services and publications from the member's viewpoint. He strongly advocated increased use of e-mail for affordable access to IEEE services, and emphasized the need to improve our technical society's coverage of "applied" material of practical value to members. He challenged the MTT-S AdCom to place more emphasis on services rendered to members than is currently allocated to the budgeting process. These presentations by such distinguished IEEE officers were thought provoking, enlightening and appreciated.

Pete Rodrigue (1993 IMS Steering Committee Chairman) and Gordon Harrison (1993 IMS Technical Program Committee Co-Chairman) presented up-to-the-minute reports on preparation for the Atlanta International Microwave Symposium in June, 1993. Clearly, members can anticipate an outstanding event with exceptional facilities and organization in Atlanta. Continuing the traditional of excellence, Don Parker presented the 1994 IMS report for San Diego, California. The 1994 Steering Committee is hard at work to finalize facilities arrangements and initiate planning of the technical program. A brief 1995 IMS report was given by Rudy Henning (Steering Committee Co-Chairman with Keith Huddleston) on the preparations in Orlando, Florida.

Ed Niehenke showed justifiable pride in reporting conclusion of last minute editing and publication of a new MTT-S International Microwave Symposium Guidelines and Procedures Manual. Contributors included fourteen consultant staff members with previous experience organizing successful IMS. Fifty manuals were printed, and nearly all have been distributed. The manual will be of great assistance for future organizers of our symposia.

The AdCom is clearly supportive of increased meetings sponsorship. Cooperative sponsorship of two conferences was proposed by Derry Hornbuckle, including the 1993 Topical Meeting on Optical Microwave Interactions (LEOS sponsored) and the February, 1994 Workshop on Microwave Electronic Circuits. Ed Rezek proposed cooperative sponsorship of the ISDR-93 Conference (sponsored by URSI and the University of Virginia). Eliot Cohen proposed (on behalf of MTT-16 Technical Committee Co-Chairmen Klaus Breuer and George Heiter) support of a Workshop on Digital Receivers. These proposals for cooperative sponsorship were all passed, after some debate regarding the virtues of expanding sponsorship beyond the cooperative (non-financial) level. John Horton also presented a status report on discussions with the organizers of the AES-S sponsored National Telesystems Conference regarding possible future co-sponsorship by MTT-S. The 1993 National Telesystems Conference will be co-located with the MTT-S in Atlanta this year. A proposal for sponsorship of the proposed 1994 International Conference on Millimeter and Submillimeter Waves and Applications (approved on a tentative basis in September) was not passed after considerable deliberation (based in part on concerns regarding the financial viability of the specific proposal).

An enthusiastic proposal for hosting the 1999 IMS (International Microwave Symposium) in the greater Los Angeles area was presented by Mario Maury as Chairman of the proposed 1999 IMS Steering Committee. George Oltman, Site Negotiating Committee Chairman, presented an overview of the attributes of the competing sites of Long Beach and Anaheim (followed by Convention Bureau presentations from both cities). The AdCom voted to accept the proposal, and specifically selected Anaheim, California as the 1999 IMS site. Richard Snyder made an informal presentation of the

North Jersey Section's efforts to encourage selection of a site in their area (potential sites include Philadelphia and Atlantic City) for the IMS in the year 2000. It is understood that Boston will also propose for the year 2000, and selection is scheduled for the June 1993 AdCom meeting in Atlanta (contact Eliot Cohen, Meetings and Symposia Committee Chairman for more information).

Dan Masse, MTT-S Transactions Editor, proposed a May 1995 special issue on "Microwave and Millimeter-Wave Photonics", Peter Staecker proposed continuation of MTT-S sponsorship (with seven other IEEE societies) of the Journal of Lightwave Technology.

Technical Coordinating Committee Chairman Jorg Raue presented an updated MTT-S Field of Interest statement. He also reported on an especially successful Winter Technical Committee Meeting held two days prior to the AdCom meeting (before the TPC meeting). An amendment to the By-Laws was offered by Jorg Raue to change the meeting name from the prior Emerging Technologies Workshop to Winter Technical Meeting. Operations Chairman Bob Moore presented motions to amend the MTT-S By-Laws to reflect current committee structures, incorporate the Distinguished Educator Award in the By-Laws, and to include the Microwave and Guided Wave Letters Editor. John Wassel presented a motion for streamlining the IEEE Press sponsorship decision and approval process, for the purpose of increasing IEEE Press publications. These motions were all adopted by the AdCom.

Ferdo Ivanek, Chairman of the Long Range Planning Committee, presented an outline of the committee's intended activities. Membership of the committee includes one European, one Asian and three US representatives. This year's agenda includes a number of far-reaching policy areas, and the deliberations will be instrumental in shaping the MTT-S strategic plan and vision of its future.

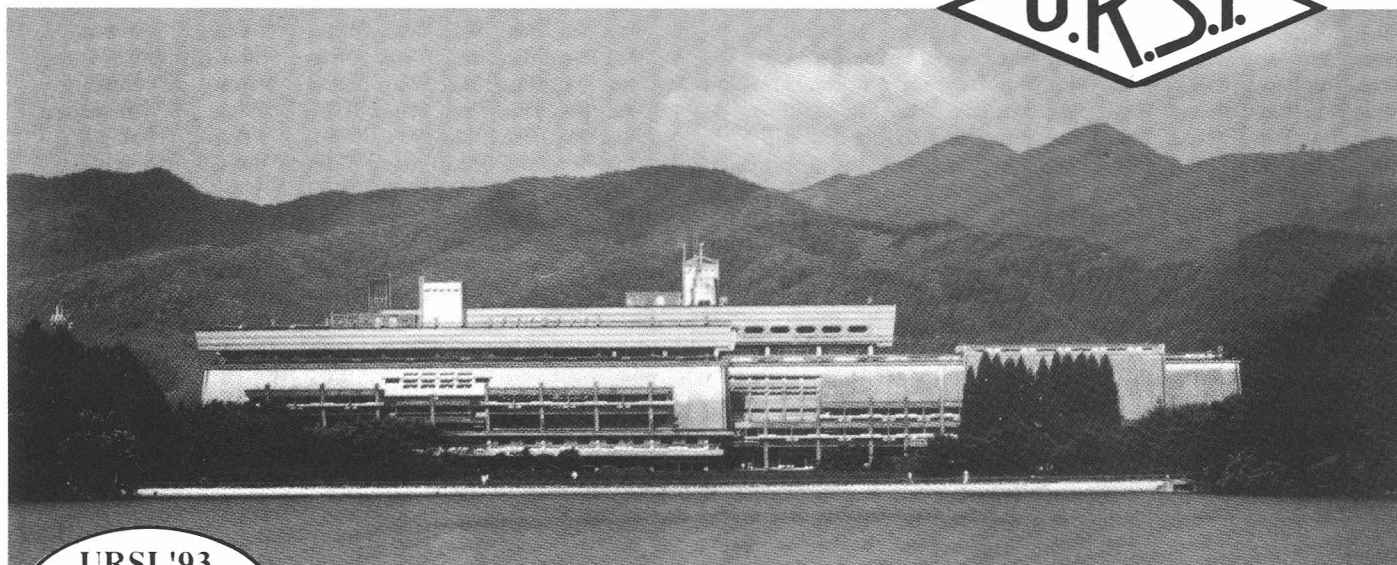
Dan Swanson, Co-Chair of the Education Committee, presented a proposal for a new Outstanding Young Author Award, which received strong support from the AdCom. "Young" in this case means 35 years old or less, and the intent of the award is clearly to increase acknowledgment of the contributions of our members in the initial period of their careers. Several steps remain in the process of formalizing this new award, and the earliest implementation is projected to be in 1994. Barry Perlman, Education Committee Co-Chair, reported organizing activity to facilitate establishment of a new scholarship fund with the means to accept member contributions, to potentially increase financial support of students in the microwave field.

Rolf Jansen presented the Transnational Liaison report, and reviewed the numerous activities in the transnational area. There is a particular need to encourage MTT-S and IEEE participation by members in Eastern Europe and Russia. Financial obstacles are clearly a major problem, and Peter Staecker asked Rolf Jansen to head an Ad Hoc committee to formulate specific actions. This objective, increased representation from these areas, is very much in line with IEEE policy.

Ed Niehenke presented the Ombudsman's report. Although the number of inquiries to the ombudsman have been limited, Ed's response has been prompt and effective. He continues to bring to AdCom's attention the problems and concerns voiced by members through this effective avenue of communication.

The January 1993 meeting of your society's administrative committee adjourned after ten active hours of deliberation.

ANNOUNCEMENT



EXHIBITION

XXIVth GENERAL ASSEMBLY OF THE INTERNATIONAL UNION OF RADIO SCIENCE

Kyoto International Conference Hall (Event Hall), Kyoto, Japan

August 30 - September 1, 1993

Areas Covered by the Exhibition:

- Radio Science
- Telecommunications
- Electronics

Period of General Assembly:

25 August - 2 September, 1993

Organizer:

Japanese Organizing Committee
for XXIV General Assembly of URSI
Chairperson: Prof. T. Okoshi

Address for Correspondence:

Dr. Yoji. Furuhami
Chairperson of the Exhibition Committee
ATR Optical and Radio Communications
Research Laboratories
Seika-cho, Soraku-gun, Kyoto, 619-02 Japan
TEL: +81-7749-5-1511, FAX: +81-7749-5-1509

Hot Lines

Beware . . .

New Tax Rules Affect 401(k) Funds

Planning a job change in 1993? Be aware that new tax rules will affect your 401(k) funds distribution. Under the new rules, if you change jobs or retire and take a lump sum distribution, instead of leaving the funds with your old employer or doing a trustee-to-trustee transfer into a new Individual Retirement Account or new 401(k), 20 percent of your funds will be withheld.

Why the new rule? The government's official word is that the new taxes collected will be used to extend jobless benefits and that discouraging spending will ensure that an individual's pension is protected. The unofficial word is that this rule may be an easy way to raise taxes. Many people will not even be aware of the rule change. If job changes are involuntary, workers may overlook the new rule while trying to deal with lay-offs or forced retirements. The rule could lead to more people losing pensions instead of saving them.

Many employers are establishing procedures to handle trustee-to-trustee transfers. If you are changing jobs or retiring, consult a financial adviser about the best way to handle your 401(k) funds.

USAB Chairman Promotes U.S. Competitiveness

USAB Chairman Charles K. Alexander recently wrote a letter to the U.S. Department of Commerce (DOC) endorsing DOC's investigation into the national security implications of U.S. dependence on foreign imports of integrated circuit (semiconductors) ceramic packages. The investigation is being conducted in accordance with Section 232 of the Trade Expansion Act of 1962.

Alexander urged efforts to promote the competitiveness of the U.S. ceramic packaging industry. "Ceramic packaged semiconductors are incorporated in almost every U.S. defense system employing modern electronics and play a critical role in ensuring our national security," he said. Further, Alexander expressed IEEE-USA's belief that national security in the technological age requires the maintenance of strong, competitive domestic capabilities to meet U.S. defense needs in the event foreign supplies are disrupted.

Tort Reform Needed to Help Boost U.S. Economy

Citing critical insurance problems, frivolous lawsuits, and excessive jury awards, IEEE-USA is urging federal and state lawmakers to enact significant tort reform legislation. In a recently approved position statement, IEEE-USA said that if such legislation is not enacted, the entire economy of our nation will be affected.

Engineers are seriously affected by these concerns, especially those in private practice, due to excessive costs and inability to obtain adequate liability insurance. These problems are threatening to reduce engineers' ability to provide services needed to help sustain the nation's economic growth. Not only are insurance premiums increasing significantly each year, but also such important services as the cleanup of hazardous waste and the removal of asbestos are being excluded from any coverage.

IEEE-USA believes that our nation's legal system should provide prompt, just, and full compensation to injured victims at a reasonable cost. In order to have such a legal system, IEEE-USA recommends eliminating joint and sev-

eral liability, so that defendants pay damages only in proportion to their responsibilities. In addition, comparative negligence should be revised, so that plaintiffs cannot receive awards if they are more responsible for their injuries than the defendants. IEEE-USA recommends returning to a rational—not arbitrary—basis for distribution of punitive damages.

USAB Approves Position Statements

IEEE's United States Activities Board recently approved these position statements. Copies are available from the IEEE-USA Office in Washington, D.C.

Human Exposure to Radio Frequency Fields from Portable and Mobile Telephones and Other Communication Devices

Recognizing public concern about the safety of exposure to radio frequency (RF) energy, IEEE and such organizations as the American National Standards Institute, the National Council on Radiation Protection and Measurements, and the International Radiation Protection Association, have published guidelines outlining safe limits for human exposure to RF fields. Based on present knowledge, prolonged exposure to RF fields from portable and mobile telephone devices at or below the recommended levels is not hazardous to human health, according to IEEE-USA and its Committee on Man and Radiation.

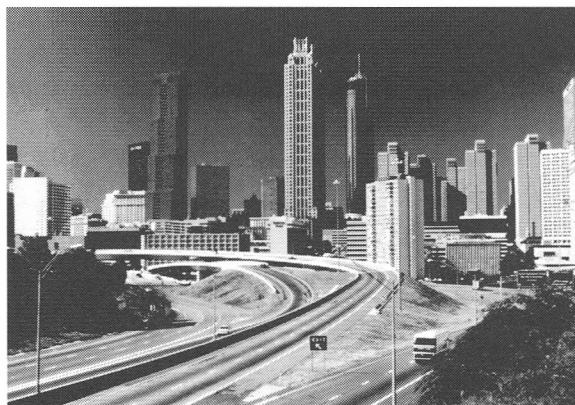
Engineering Manpower Policy in the United States

Recognizing that members of the engineering community operate within an increasingly complex national economy, IEEE-USA believes that business and government can and must do more to prevent major fluctuations in the demand for scientific, engineering, and technical resources. Further, IEEE-USA believes that decision-makers must improve the utilization and productivity of these resources and support the improvement of engineering education programs, in order to produce and maintain competent engineers.

Energy Efficiency

IEEE-USA concludes that energy efficiency must form an integral component of a comprehensive national energy policy designed to ensure a reliable, economical, and environmentally sound energy supply. Further, IEEE-USA recommends that the government and the energy-consuming public give a high priority to promoting aggressive research, development, commercialization, and use of efficient energy conversion technologies.

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Atlanta, Georgia, site of the 1993 IMS.



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THE JOURNAL OF LIGHTWAVE TECHNOLOGY is published by the Optical Society of America and the following seven societies of the IEEE:

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AUTOMATIC RF TECHNIQUES GROUP

CALL FOR PAPERS

The Automatic Radio Frequency Techniques Group will hold their 42nd Conference in San Jose, California on December 2 and 3, 1993. The Conference theme is:

RF and Microwave Testing for Commercial Applications

For applications such as personal, cellular, and satellite communications, collision avoidance and navigation, and Gigabit rate processing, expectations are that production test costs will be continuously reduced. To meet this challenge automatic RF techniques developed for the defense industry need to be distilled and merged with manufacturing techniques developed for the commercial electronics industry. Papers are invited on such topics as optimization and reuse of test plans, design for testability, automated calibration and verification, fast test algorithms and equipment, test executives, links to computer-aided design and manufacturing, and fixturing and interconnects suitable for multiple connections. Papers on other RF measurement or computer-aided design topics will also be considered.

Technical presentations should be informal 20-minute talks using viewgraphs or 35 mm slide illustrations. For early acceptance and preconference publicity, authors are requested to submit two copies of both a one-page abstract and a 500 to 1000 word summary with illustrations providing sufficient technical content for proper evaluation and explaining the paper's usefulness to the conference attendees before September 3, 1993. The deadline for submission of finished papers with abstracts is October 1, 1993. All accepted papers will be published in the conference digest, to be distributed at the conference. Manufacturers interested in exhibiting at the conference should contact the Exhibits Chairperson for information and applications forms. Contact the Conference Chairperson, Mr. Kevin J. Kerwin, (Phone (707) 577-4061, FAX (707) 577-4787) for any additional information.

Submit abstracts and papers to:

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Hewlett-Packard Company
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1212 Valley House Drive
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Phone (707) 794-4474
FAX (707) 794-3844

For exhibits information contact:

Dr. James C. Rautio
Sonnet Software, Inc.
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135 Old Cove Road
Liverpool, NY 13090-3746
Phone (315) 453-3096
FAX (315) 451-1694

Call for Nominations to MTT-S Awards

Reminder!

The deadline for submission of all nominations for our MTT Awards is July 1.

Nomination forms can be obtained from:

Dr. Reinhard H. Knerr
AT&T Bell Laboratories
Route 222

Breinigsville, PA 18031

Tel: 215-391-2346

Fax: 215-391-2246

E-mail: rhknerr@aluxpo.att.com
or r.knerr@ieee.org



January Technical Programs Meeting

Glen Hopkins, Tatsuo Itoh, and Theresa Brunaso.

1994 IEEE Microwave Theory & Techniques Society Graduate Fellowship Awards

- \$5,000 fellowship awards are given each year
- For full-time graduate research studies in microwave engineering
- Applicants must have achieved high academic standing in engineering or physics
- The awards are granted in addition to any other support received by the student
- Awards cannot be used for travel supplies, equipment purchases, etc.
- Awards are made to the institution for support of the students
- The Faculty Supervisor must be an MTT-S member

Please note:

The application deadline is October 22, 1993

For applications please contact:

Dr. Glenn R. Thoren

Lockheed Sanders

P.O. Box 868

PTP2-B001

Nashua, NH 03061

Telephone 603-885-2988

Requests for applications must be received by September 30, 1993.



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