IEEE SOCIETY ON MICROWAVE THEORY AND TECHNIQUES

NEWSLETTER

EDITOR: *S. L. March*

Compact Software, Inc., 1314 Sam Bass Circle, Round Rock, Texas 78664

Number 108, Winter 1984

OUTGOING PRESIDENT'S REMARKS

by C. T. Rucker

As I continue to watch MTT-S progress from the inside, as one of your officers, and from the outside, as an interested member, I keep pondering the question "What makes us tick?". I think we can all do a better job if we know. Where does the vitality within MTT-S originate? I may not have the total answer, but I have to be getting close with the simple answer: *Individual Effort*.

Consider for instance Steve March's effort in compiling this Newsletter almost single-handedly. Consider Dick Spark's organizing the recent MTT-S delegation to China. We are what we are because hundreds of Society members work diligently behind the scene. The extraordinary success of this year's MTT-S Symposium in Boston was no accident. Harlan Howe, Ralph Levy and all of the 1983 Symposium Steering Committee spent a year (more in fact) making it happen.

Perhaps another kind of individual effort and commitment is even more important than these. Without **technical** effort and commitment, where would we be? There would be little reason for our existence. This is why we honor people like Marion Hines with the Microwave Career Award. (He also received the IEEE Lamme Medal this year). This is why we commend those who make significant contributions, like Les Besser, who received this year's Microwave Applications Award. And this is why we can feel proud that six of our members were evaluated by MTT-S and awarded the grade of Fellow in the IEEE this year. MTT-S will have 19 IEEE Centennial medals to award in 1984, the Institute's Centennial year. These will be awarded on the basis of "loyal and dedicated service to the Institute and the profession." Again, individual effort.

Frankly, I don't sense that I have exerted that great an effort this year. To those of you who noticed, my apologies. To those of you who didn't, my thanks. It's possible that this job seems easy because so many individuals contribute unselfishly and with the underlying motive of helping the MTT Society to progress.

A note to our 1984 President, George Oltman:

George, all of the past Adcoms, Presidents, Symposium Committees, Transactions Editors and the entire MTT-S membership hand you a healthy Society to represent during 1984. I have no doubt that the individual participation and contributions of the entire membership will be encouraged and nurtured under your leadership during IEEE's Centennial year.

A note to the membership:

Now we have another opportunity to "let George do it." I sincerely hope we won't. Each of us can contribute to the quality growth of MTT-S. What will your contribution be?

I.E.C.E. AFFILIATION

Thanks for the efforts of past MTT Society President, Richard A. Sparks, and Dr. Yoshihiro Konishi, Past Chairman of the Tokyo MTT-S Chapter, Microwave Theory and Technique Society members can now become Affiliate Members of the Institute of Electrical and Communication Engineers (I.E.C.E.) of Japan.

A member of the MTT-S can become an Affiliate Member of the I.E.C.E. upon payment of $25 U.S. and forwarding proof of membership in the IEEE MTT-S to the I.E.C.E. An Affiliate Member receives copies of part E of the I.E.C.E. Transactions and the choice of one of the other four parts (A, B, C, or D) of the Transactions. Affiliate Members do not have any voting rights, may not serve on I.E.C.E. boards, nor are listed in the Membership Directory. Affiliate Members will also receive meeting notices (in Japanese) of the National Convention of the I.E.C.E. Japan and all Technical Groups related to the field of microwaves.

Applications for Affiliate Membership should be sent to the Institute of Electronics and Communication Engineers of Japan, Kikai-Shinko Kaikan, 3-5-8 Shiba-Koen, Minatoku, Tokyo 105, Japan. Application forms can be obtained either from the I.E.C.E. or from Richard A. Sparks, Raytheon Company, Mail Stop CF 1-41, Bedford, MA 01730.

EDITOR'S NOTE

by S. L. March

The Perils of Editorship

"Remember—You CAN'T Please All of the People, All of the Time" should be stenciled on the T-shirt that I wear while performing my duties as Editor of the MTT Society's Newsletter.

In the most recent issue of the Newsletter (Summer 1983, Issue Number 107), I published two articles which apparently have offended some readers. These were *A Historical Letter* and *Proposed Additions to the IEEE Dictionary*. Maybe I used poor judgement in publishing these articles; however, neither was original—both had previously appeared in other Society Newsletters prior to my usurping them and including them in the MTT-S Newsletter.

Both articles were meant to be humorous. The *Proposed Additions to the IEEE Dictionary* contained thirteen listings. Three were found offensive (phase-shift, floppy diskette, and broad band). The second article was strictly a satire on management consulting firms and was not meant to insult anyone's religious beliefs.

If, in the future, I should happen to again publish an article which offends someone, please believe that it was not intentional and please feel free to contact me regarding my errant ways.

MEMBERSHIP MATTERS

by E. C. Niehenke

The MTT-S membership drive held during the 1983 IEEE MTT-S International Microwave Symposium in Boston was very successful. Thirty-four new MTT-S members were recruited, including 18 new IEEE members.

Microwave Theory and Technique Society membership on August 31, 1983 was 6,707, an increase of 480 (7.7%) from the year before. This increase is more than double last year's 3.4%. The current growth rate is higher than the IEEE's growth (6.4%). Of the 33 Groups and Societies, MTT-S ranks fourth in growth rate.

HARRY GOLDIE

In Memoriam

The Microwave Theory and Techniques Society started 1984 poorer than it began December of 1983. This is because on December 20th, our Society and our industry lost a good friend and a talented engineer—Harry Goldie.

Harry Goldie was born in Brooklyn, New York on May 3, 1927. He received the B.E.E. degree from City College of New York in 1960 and the M.S.E.E. from the Polytechnic Institute of Brooklyn in 1963.

From 1960 to 1963, Harry was a Senior Research Associate at the Microwave Research Institute of the Polytechnic Institute of Brooklyn. At M.R.I., he worked on electromagnetic and guided wave interactions with weakly ionized plasmas.

Since 1963, he has been with the Microwave Operations Group at the Westinghouse Defense and Electronic Systems Center in Baltimore, Maryland. Harry's work principally involved high power microwave devices and components. At Westinghouse, Harry was a Supervisory Engineer in the Microwave Control Device Group, working primarily on receiver protectors and high power control devices, such as PIN diode limiters and switches, gas discharge devices, and ferrite limiters.

Harry Goldie served as Chairman of the MTT-S Technical Committee on High-Power Techniques since 1977 and was a member of Subcommittee P457 on *Standard Definitions of Terms for Nonlinear Active and Nonreciprocal Waveguide Components*. Harry served on the Technical Program Committee for nearly a dozen International Microwave Symposia.

Harry published or presented over 35 papers on microwave devices, components, or circuits and was awarded 35 United States patents for his innovative and creative ideas.

He was a Senior Member of the IEEE and a registered Professional Engineer in the state of Maryland.

We join with Harry's widow, Fritzi, and children, Warren J. and Rhonda, in grieving the untimely and tragic loss of a friend.

ADCOM HIGHLIGHTS

by H. G. Oltman, Jr.

The third and final 1983 meeting of the Administrative Committee of the Microwave Theory and Techniques Society was held in Las Vegas, Nevada on September 19 and 20. You might ask, why is AdCom meeting in "fun city?" Have they arranged a boondoggle? We have no Chapter in Las Vegas. It's not a "microwave" city.

No, Las Vegas is not a "microwave" city. The reason the AdCom met in Las Vegas was to check out convention facilities for our 1987 International Microwave Symposium. As reported in the last Newsletter, because of the absence of a proposal from MTT-S Chapters, we did not have a meeting site for the 1987 MTT-S Symposium, and furthermore, had lost our selection of preferred meeting dates in such cities. Preferred dates are typically taken about five years in advance of a convention. Las Vegas, being a "convention city" with numerous available sites, was a natural alternative.

We have investigated several convention hotels in Las Vegas and have chosen the MGM Grand. It has more than adequate meeting rooms and guest rooms. There are 2,800 guest rooms of which the hotel will commit 2,500 rooms to our members. For the first time, we should be able to house all attendees under one roof.

AdCom Elections

Elections were held as part of the annual meeting of AdCom. George Oltman of Hughes Aircraft Company was elected President for 1984; Harlan Howe of M/A-Com was elected Vice-President. From a list of fourteen nominees plus four nominations from the floor, AdCom also elected seven members to the committee for terms starting in 1984. Elected to three year terms on the Administrative Committee were:

- N. Walter Cox, Georgia Institute of Technology, Atlanta, Georgia
- Reinhard Knerr, Bell Telephone Laboratories, Allentown, Pennsylvania
- H. John Kuno, Hughes Aircraft Company, Torrance, California
- Edward C. Niehenke, Westinghouse Electric Corporation, Baltimore, Maryland
- Barry E. Spielman, Naval Research Laboratory, Washington, D.C.
- H. George Oltman, Jr., Hughes Aircraft Company, Torrance, California

Elected to a 2-year term vacated by outgoing President, Charlie Rucker, was Reynold S. Kagiwada of TRW Defense and Space Systems, Redondo Beach, California. Next year, at the end of George Oltman's term as President, his 3-year AdCom term will also be vacated. Past Presidents become ex-officio members of AdCom for three additional years.

Boston Symposium Sets Records

5,168 individuals attended the 1983 MTT-S Symposium in Boston. This number also includes exhibit attendees, exhibitors, and spouses; 2,306 individuals participated in the technical portion of the program. This is a new record surpassing the 1,900 attendance at the 1981 Symposium in Los Angeles. Attendance numbers that include exhibits and others for previous symposia are not readily available so further comparison is not practical.

John Pierce and Al Clavin to be Honored

The AdCom approved the recommendations of the Awards Committee and its subcommittees for certain special awards and will honor five people at our 1984 Microwave Symposium Banquet. They are:

- John R. Pierce, Microwave Career Award
- Alvin Clavin, Distinguished Service Award
- R. K. Hoffmann and J. Siegl, Microwave Prize
- Paul Meier, Microwave Applications Award

In addition, subcommittees made twenty nominations to the IEEE Awards Board for special awards. One of these was for the W.R.G. Baker Prize and nineteen were for IEEE Centennial Medals. The latter are the MTT-S fraction of total special IEEE awards to be made during the 1984 Centennial Year.

Many excellent candidates were considered for these awards. Only after many hours of deliberation were the above nominations made. The Awards Committee really has a tough, laborious job. They strive hard to make proper, correct and fair decisions.

New Technology Summary Feature For Transactions

MTT-S Technical Committees Chairman, Barry Spielman, has organized a special issue of the Transactions summarizing the microwave technology. Members of each of the 16 MTT-S Technical Committees will summarize the recent technology in their respective fields and publication will occur in a 1984 issue. It is planned that this will be an annual special issue.

MTT Sponsored Study Group Visits China

Dick Sparks reported the final details on the MTT-Society sponsored Microwave Study Group to visit the People's Republic of China for technical exchange. Group members will tour Chinese universities and industries and make 45 minute technical presentations at selected locations. AdCom approved the list of visitors at its June meeting.

(continued on page 9)

ADCOM ELECTIONS

At its recent meeting in September, the Administrative Committee of the Microwave Theory and Techniques Society held its elections for six Administrative Committee members for a term of three years and one member for a two year term. Elected for three year terms were incumbent Reinhart Knerr, H. John Kuno, Edward C. Niehenke, H. George Oltman, and Barry Spielman. Newly elected Adcom members are N. Walter Cox, for a three year term, and Reynold S. Kagiwada, for a two year term.

N. Walter Cox served as MTT-S Adcom Secretary-Treasurer in 1983. For a biographical sketch, please see Microwave Theory and Techniques Society Newsletter, Issue 105, page 8.

REYNOLD S. KAGIWADA

Dr. Reynold S. Kagiwada received his bachelor of science, master of science, and doctorate in 1960, 1962, and 1966 respectively, all from the University of California in Los Angeles and all in physics.

Dr. Kagiwada joined TRW in July 1972 as a member of the professional staff to establish a research group on surface acoustic wave develoopment and applications. Eventually the group expanded to include work on III-V material growth and characterization, Josephson junctions, millimeter-waves, acousto-optic modulators, and shallow bulk acoustic waves. In February 1977, these activities were combined into the new Solid State Technology Department under Dr. Kagiwada. In June 1980 he became the manager of the Microwave Products Department of the Microelectronics Center in Redondo Beach, California. As manager, Dr. Kagiwada must coordinate the department's activities in millimeter-wave silicon, gallium arsenide, and indium phosphide device development, acoustic devices (surface wave, magneto static wave, and bulk wave), GaAs microwave integrated circuits, and millimeter-wave integrated circuits.

Dr. Kagiwada has served on the physics faculties of both UCLA and the University of Southern California.

Dr. Kagiwada is a Senior Member of the IEEE, a member of the American Physical Society, the Acoustical Society of America, the Association of Old Crows, the American Institute of Aeronautics and Astronautics, Sigma Pi Sigma, and Sigma Xi.

Dr. Kagiwada serves the MTT Society as the Chairman of the Technical Committee on Microwave Acoustics. In addition, he will be serving as Technical Program Committee Chairman for the 1987 IEEE MTT-S International Microwave Symposium, a position he held for the 1983 IEEE Ultrasonics Symposium.

He is the author or co-author of 40 technical papers and has presented an additional 13 papers at technical conferences. He has received four patents and has submitted 15 patent disclosures on acoustic wave devices.

SYMPOSIUM IN PHILADELPHIA

The Philadelphia Chapter of the Microwave Theory and Techniques Society/Antennas and Propagation Society will hold its fourth **Annual Benjamin Franklin Symposium** on Saturday. May 5, 1984 from 8:30 AM to 4:30 PM. The theme of this one-day symposium will be *Advances in Antenna and Microwave Technology*. The conference will include exhibits by various microwave equipment and instrumentation suppliers. The symposium will be held at the Sheraton-University City, 36th and Chestnut Streets in Philadelphia, Pennsylvania.

Papers are invited in the areas of antennas and propagation (phased array technology, antenna design, imaging, antenna applications, radiometry, radiating elements, phase-shifters, etc.), and microwave theory and techniques (solid-state devices and circuits, monolithic technology, millimeter-waves, microwave networks, filters, microwave applications, etc.). Authors are requested to send a camera-ready summary (one to three 8½ x 11 pages), by March 12, 1984 to:

Dr. Ali Afrashteh,
RCA MSR
Mail Stop 101-105
Borton Landing Road
Moorestown, NJ 08057.

Dr. Afrashteh can be reached at (609) 778-7755

Prospective exhibitors should contact Jeff Bull, Flam & Russell, Inc. at (215) 674-5100 to reserve space and to determine the payment of fees.

Conference registration fees have been set as follows: IEEE Member—$45; Non-Member—$60; Student or Retired Member of IEEE—$25; Student or Retired Non-Member—$35. In addition, registrations received after April 23, 1984 will cost an additional $5 for a late fee. Checks should be made payable to the IEEE Philadelphia Section and sent to Ms. Helen Yonan, IEEE Office, Moore School of Electrical Engineering, University of Pennsylvania, Philadelphia, PA 19104. Priority will be given to the first 200 registrations. The fee includes the symposium digest, lunch, and coffee.

For additional information, contact either Ms. Helen Yonan, (215) 898-8106 or Dr. Dwight Jaggard, (215) 898-4411.

ELECTRO '84

The Board of Directors for Electro, meeting in Boston, selected new officers at its annual meeting in June. Theodore S. Saad, Life Fellow of the MTT Society, was elected treasurer for Electro '84, to convene May 15-17, 1984 in Boston.

NEW BOOKS

New books are continually being published. The following list is only a sample of recent publications. Hopefully, these books are of interest to some of the members of the MTT Society.

The PN Junction Diode—Volume 2 is a 1983 publication of the Addison-Wesley Publishing Company, Reading, Massachusetts. The 120 page book was written by Gerold W. Neudeck ($7.95).

Also available from Addison-Wesley Publishing Company is **Field Effect Devices—Volume 4** by Robert F. Pierret. The 116 page volume also sells for $7.95.

Field and Wave Electromagnetics by David K. Cheng is a 576 page book published in 1983 by Addison-Wesley Publishing Company, available for $34.95.

Velimir Ristic is the author of **Principles of Acoustic Devices,** published this year by John Wiley and Sons, Inc., Somerset, New Jersey. The 359 page book is priced at $37.50.

A. Barone and G. Paterno have authored **Physics and Applications of the Josephson Effect,** which has been published (1983) by John Wiley and Sons. The 529 page book is available for $49.50.

For $39.95, interested parties can purchase **Circuit Design Using Personal Computers** by Thomas R. Cuthbert. The 494 page volume was published this year.

W. F. Croydon and E. H. C. Parker authored **Dielectric Films on Gallium Arsenide.** The 150 page book was published by Gordon and Breach Science Publishers, Inc., New York, New Ycrk in 1981 ($22.50).

Springer-Verlag in Heidelberg, West Germany has published **Fast Fourier Transform and Convolution Algorithms.** Authored by H. J. Nussbaumer, the 276 page volume published in 1982 sells for $28.00.

McGraw-Hill Book Company, New York, New York has published **An Introduction to Optical Fibers.** The 326 page book, written by Allen H. Cherin, sells for $34.95.

Chris Bowick has written **RF Circuit Design,** a 1982 publication by Howard W. Sams and Co., Inc., 4300 West 62nd Street, Indianapolis, IN 46208. The softcover book (ISBN 0-672-21868-2) retails for $22.95.

Four other new books from John Wiley and Sons, Inc., One Wiley Drive, Somerset, New Jersey 08873 are worth noting. One of these is **MOS (Metal Oxide Semiconductor) Physics and Technology** by Edward H. Nicollian and John R. Brews. This 920 page volume from 1982 sells for $74.50. Erich Christian has authored **LC Filters,** a 242 page book available for $25.00. For $37.50, you can purchase **Microwave Imaging with Large Antenna Arrays** (296 pages) by Bernard D. Steinberg. Lastly, the 180 page book, **Burn-In,** was authored by F. Jensen and N. E. Petersen and sells for $39.95.

Principles & Practice of Laser Technology has been authored by Hrand M. Muncheryan. His 294 page, hardbound book has been published by TAB Books, Inc., Blue Ridge Summit, PA 17214, (800) 233-1128. The cost of the book is $21.95.

CONGRESSIONAL FELLOWSHIPS

The IEEE has announced the twelfth annual competition for Congressional Fellowships. Applications must be postmarked no later than March 31, 1984 to be eligible for consideration for one year Fellowships beginning on September 1, 1984 or January 1, 1985. The IEEE plans to award at least two Congressional Fellowships for the 1984-1985 term.

Electrical or electronic engineers or scientists in allied fields are competitively selected to serve a one year term on the personal staff of individual U.S. Senators or Representatives or on the professional staff of Congressional committees. The program includes an orientation session with other Fellows sponsored by the American Association for the Advancement of Science.

Fellows shall be selected based upon technical competence, on ability to serve in a public environment, and on evidence of service to the Institute and the profession. Specifically *excluded* as selection criteria shall be age, sex, creed, race, ethnic background, and partisan political affiliations. However, the Fellows must be U.S. citizens at the time of selection and must have been in the IEEE at Member grade or higher for at least four years. Additional criteria may be established by the selection committee.

Further information and application forms can be obtained by calling W. Thomas Suttle at (202) 785-0017 at the IEEE office in Washington, D.C. or by writing to Secretary, Congressional Fellows Program, IEEE, 1111 Nineteenth Street, N.W., Suite 608, Washington, D.C. 20036.

MTT-S AWARDS

by D. Parker

The Microwave Theory and Techniques Society's Administrative Committee at its recent meeting in September selected the recipients of its awards for 1984. The recipients of the Microwave Career Award, the Distinguished Service Award, the Microwave Applications Award, and the Microwave Prize were chosen. Brief information on the awards and the awardees is as follows.

Microwave Career Award

The Microwave Career Award is presented to an individual "for a career of meritorious achievement and outstanding technical contribution in the field of microwave theory and techniques." The 1984 Microwave Career Award has been awarded to Dr. John Robinson Pierce.

John Robinson Pierce was born March 27, 1910 in Des Moines, Iowa. He received the B.S., M.S. and Ph.D. degrees in electrical engineering in 1933, 1934, and 1936, respectively. All degrees were conferred by California Institute of Technology, Pasadena, California.

Dr. Pierce was employed by Bell Telephone Laboratories from 1936 to 1971. He progressed from a Member of the Technical Staff to Director of electronics research (1952-55), and eventually to Executive Director of the research and communications sciences division (1965-1971). From 1971 to 1980, Dr. Pierce was a professor at the California Institute of Technology. From 1979 to 1982, he served as Chief Technologist at the Jet Propulsion Laboratory. As of mid-December, Dr. Pierce has been with the Department of Music at Stanford University.

Dr. Pierce has made major and fundamental contributions to the development of high-frequency electron tubes, particularly traveling wave tubes. He has been granted more than eighty patents for his inventions in electron tubes and communication circuits, especially electron multipliers, electron guns, and microwave tubes. The "Pierce gun," built to design principles laid down by him, is an ubiquitous device in modern electronics.

In 1954, Dr. Pierce analyzed the possibilities of radio relay by way of an artificial satellite and in 1955, two years before the first satellite, offered the first concrete proposals for satellite communications. The Echo I satellite embodied his ideas. He was instrumental in initiating the Echo program and the East coast ground station was constructed in his department. Telstar resulted from satelliate work that he initiated.

His career interests, responsibilities, and influence spanned such fields of interest as radio, electronics, acoustics and vision, mathematics, economic analysis, psychology and even computer music. Dr. Pierce has published nearly four hundred papers and articles, a number of science fiction stories, some published under the name of J. J. Coupling.

Some of his published books include: Theory and Design of Electron Beams (1949); Traveling Wave Tubes (1950); Electrons, Waves and Messages (1956); Symbols, Signals and Noise (1961); Electrons and Waves (1964); Quantum Electronics (1966); Waves and Messages (1967); The Beginnings of Satellite Communications (1968); Science, Art and Communication (1968); Almost All About Waves (1974); Introduction to Communication Science and Systems (1980); Signals, the Telephone and Beyond (1981); and Information Technology and Civilization (1983).

Dr. Pierce is a Life Fellow of the IEEE, a Fel-low of the American Physical Society, a Fellow of the Acoustical Society of America, a member of the American Academy of Arts and Sciences, the American Philosophical Society, the National Academy of Engineering, the National Academy of Sciences and is a foreign member of the Royal Academy of Sciences (Sweden). He is also a member of Tau Beta Pi and Eta Kappa Nu. From 1963 to 1966, he served as a member of the President's Science Advisory Committee. He has been a Trustee of the Aerospace Corporation and of the Battelle Memorial Institute. Dr. Pierce has been granted ten honorary degrees, including a doctor of engineering from the University of Bologna in Italy in 1974.

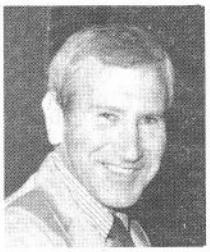
Dr. Pierce has received a number of honors and prizes during his 46 year career. These include the IRE Morris N. Liebmann Memorial Prize in 1947, the IEEE Edison Medal in 1963 and the IEEE Medal of Honor in 1975. He also received the Stuart Ballentine Medal from the Franklin Institute (1960), the Certificate of Achievement from the American Astronautical Society (1961), the H. H. Arnold Trophy as the Aerospace Man of the Year from the Air Force Association (1962), the Golden Plate Award of the Academy of Achievement (1962) and the General Hoyt S. Vandenberg Trophy from the Arnold Air Society (1963). Dr. Pierce also received the National Medal of Science in 1963, the Valdemar Poulsen Gold Medal from the Danish Academy of Technical Sciences in 1963, the H. T. Cedergren Medal in 1964, and the John Scott Award from the Franklin Institute in 1974. He has also been the recipient of the Marconi Award (silver medal) in 1974, the National Academy of Engineering Founder's Award in 1977, and the Marconi International Fellowship in 1979.

Distinguished Service Award

The *Distinguished Service Award* is a relatively new award, initiated by the Microwave Theory and Techniques Society in 1983 with Theodore S. Saad as its first recipient.

The award is presented to honor an individual who has given outstanding service over a period of years for the benefit and advancement of the Microwave Theory and Techniques Society.

The Administrative Committee of the Microwave Theory and Techniques Society has selected **Alvin Clavin** as the recipient of the 1984 Distinguished Service Award "for his outstanding and dedicated service to the Society."



Al Clavin was elected to the MTT-S Administrative Committee in 1967 and served as Chairman of the Operating Committee and Editor of the MTT Newsletter. In the latter capacity, he was responsible for initiating the MTT Committees Directory. Al also served as the Chairman of the Membership Services Committee and was elected Vice-President in 1971 and President of the Society in 1972.

Al Clavin has served on the Technical Program Committee for many of the MTT Symposia and, when the International Microwave Symposium was held in Boulder, Colorado in 1973, he was its keynote speaker. Mr. Clavin has also been Publicity Committee Chairman for the 1970 Microwave Symposium and Chairman of the Steering Committee for the 1981 MTT-S Symposium.

Al has served as the MTT Society's representative to the IEEE Technical Activities Board (TAB) and has been a member of the MTT Society Awards Committee and the President's Advisory Committee under several Society Presidents.

Mr. Clavin is a Fellow of the IEEE. The Microwave Theory and Techniques Society has awarded Al Clavin the MTT Certificate of Recognition and its Distinguished Service Certificate.

In addition, Al Clavin has served as Vice-Chairman and Chairman of the Los Angeles Chapter of the Microwave Theory and Techniques Society.

Al Clavin's technical career began in 1948 as a member of the technical staff of Hughes Aircraft Company, Culver City, California after receiving the B.S.E.E. from the University of California at Los Angeles as a Hughes Fellow also in 1948. His duties included the design of radomes, antennas, and other microwave components. Mr. Clavin received the M.S.E.E. in 1954, also on a Hughes Fellowship and also from UCLA. In 1956, he helped found Rantec Corporation, Calabasas, California, where he served as Manager of the Microwave Department and a Corporate Director. He rejoined the Hughes Aircraft Company, Missile Systems Division in 1966 and became the Manager of the Radar Laboratory. In 1981, Mr. Clavin was appointed Manager of the Technology Development Staff in the Missile Development Division. Al Clavin retired from Hughes Aircraft Company on July 1, 1983 at the "old age" of 59 years, 14 days.

Microwave Applications Award

The *Microwave Applications Award* is presented to an individual for outstanding application of microwave theory and techniques. The eligibility requirements are creation of a new device, component or technique, novel use of a device or component, or a combination of all of the above.

The recipient of the 1984 Microwave Applications Award is **Paul J. Meier** of the AIL Division of Eaton Corporation. Mr. Meier is cited "for pioneering development of fin-line transmission medium and related components using photolithographic techniques."

Paul J. Meier was born in New York, NY in 1936. He received the B.E.E. degree from Manhattan College, New York, NY in 1958 and the Master of Science from Long Island University, Greenvale, NY in 1969.

From 1958 to 1965, Mr. Meier was employed by Wheeler Laboratories (now part of Hazeltine Corporation), first as a Development Engineer and then as a Senior Development Engineer. At Wheeler Laboratories his work included the study of dielectric-lined and periodically-loaded circular waveguides and their application to phased-array radiators and polarization converters.

In 1966, Mr. Meier joined Airborne Instrument Laboratories, now the AIL Division of Eaton Corporation. As a Project Engineer in the Radar Techniques Department, he was responsible for the development of phased-array antenna elements and ferrite phase-shifters. He later served as a Project Engineer in the Applied Electronics Division, where he was engaged in the development of a high-power solid-state switch, an X-band sweeping receiver, and a multibeam quasi-optical millimeter-wave receiver. He is currently a Staff Consultant in the Receiver Systems and Technology Department, where he is developing millimeter-wave hybrid and monolithic integrated circuits.

Mr. Meier appropriately holds the U.S. patent for Integrated Fin-Line and has developed switches, mixers, filters, oscillators, circulators, and attenuators using fin-line in the 30 to 100 GHz range.

Mr. Meier has published over 30 papers on microwave and millimeter-wave components. He is a member of the IEEE, its Microwave Theory and Techniques Society, and Eta Kappa Nu. He served on the Executive Committee of the New York/Long Island Chapter of MTT-S from 1970 to 1975 and was its Chairman in 1972-1973. Mr. Meier served on the MTT-6 Technical Committee from 1977 to 1980 and is currently a member of the Standards Committee on Planar Transmission Lines.

Microwave Prize

The *Microwave Prize* is awarded annually to the paper making the most significant contribution to the field of interest of the Microwave Theory and Techniques Society. The paper must have been published in an official IEEE publication during the year ending June 30.

The 1984 Microwave Prize is awarded to **Reinmut K. Hoffmann** and **Johann Siegl** for *Microstrip-Slot Coupler Design—Part I: S-Parameters of Uncompensated and Compensated Couplers* and *— Part II: Practical Design Aspects*. The pair of articles appeared in the IEEE Transactions on Microwave Theory and Techniques, Volume 30, Number 8, August 1982, pages 1205-1215.

Reinmut K. Hoffmann was born in Hof/Saale, West Germany on July 9, 1942. He received the Dipl.-Ing. degree in electrical engineering from the Technical University of Munich, West Germany in 1967.

In October 1967, Mr. Hoffmann joined the Central Communications Laboratories of Siemens AG in Munich, where he was engaged in the development of microwave integrated circuits and in research on microstrip lines and couplers. Since 1973, Mr. Hoffmann has been in charge of a development group designing MIC components, such as mixers, amplifiers and phase-shifters, for radar and communications equipment and for developing computer-aided design methods for microwave integrated circuits.

Johann Siegl, born on June 5, 1947, received the graduate Ing. degree from the Ingenieurschule Munchen in Munich, West Germany in 1970 and the Dipl.-Ing. degree from the Technical University Berlin in 1973. In 1978, he received the Dr.-Ing. degree from the Technical University Berlin.

From 1973 to 1978, while at the Institute of High-Frequency Engineering, Dr. Siegl was a Research and Teaching Assistant at the Technical University in Berlin. During this time, he was engaged in the investigation of the properties of slot lines and fin lines in the millimeter-wave region.

At the beginning of 1979, Dr. Siegl joined the Communications Group at Siemens AG in Munich, West Germany. After initially working on the computer-aided design of MICs, Dr. Siegl has been involved in the development of digital transmission systems since 1981.

CALL FOR PAPERS

1984 Global Telecommunications Conference
When: November 26-29, 1984
Where: Atlanta Hilton Hotel, Atlanta, Georgia
Deadline: February 19, 1984 (international)
March 1, 1984 (USA)
Submission: Six typed, double-spaced copies of manuscript plus one page abstract in English and not to exceed 3,000 words
Submit to: R. W. Moss, GLOBECOM '84, Georgia Institute of Technology, Engineering Experimental Station, Atlanta, GA 30332, (404) 894-3544

Sixth Electromagnetic Compatibility Symposium and Technical Exposition
When: March 5-7, 1985
Where: Federal Institute of Technology, Zurich, Switzerland
Deadline: March 15, 1984
Submission: English abstracts and summaries of up to 5 pages (10 copies). Affiliation and telephone numbers of all authors should be on a separate sheet.
Submit to: Dr. T. Dvorak, ETH Zentrum-IKT, 8092 Zurich, Switzerland, telephone (01) 256-2790

Fourth Annual Benjamin Franklin Symposium
When: May 5, 1984
Where: Sheraton-University City, Philadelphia, Pennsylvania
Deadline: April 12, 1984
Submission: Camera-ready copy of one to three page summary on 8½x11 paper
Submit to: Dr. Ali Afrashteh, RCA MSR, Mail Stop 101-105, Borton Landing Road, Moorestown, NJ 08057, (609) 778-7755

TECHNOLOGY UPDATE

The IEEE Educational Services will be offering a technology-update video conference on February 20, 1984. The teleconference will complement the IEEE Spectrum Magazine's January 1984 issue, *Technology '84*. Featured will be four industry experts: Taylor L. Booth, University of Connecticut (computers); Thomas L. Powers, Bell Telephone Laboratories (communications); James M. Early, Fairchild Camera and Research Corporation (solid-state); and Robert A. Bell, Consolidated Edison Company (power and energy).

For further information, contact Robert Wlezien, IEEE Educational Services, 445 Hoes Lane, Piscataway, NJ 08854 or telephone (201) 981-0060.

DIVISION IV DIRECTOR'S REPORT

by Emerson Pugh

The IEEE Board of Directors took several important actions at its meeting in August The restructuring of technical societies into ten technically cohesive divisions was formally approved. The impact on Division 4 is substantial with the loss of four of our Societies: Components, Hybrids and Manufacturing Technology; Electron Devices; Quantum Electronics and Applications; and Sonics and Ultrasonics. I wish these Societies and their members continued success in their new division. Simultaneously, I welcome the Electromagnetic Compatibility Society and the Nuclear and Plasma Sciences Society to Division 4 and am pleased to be able to continue to serve the Antennas and Propagation Society, the Microwave Theory and Techniques Society, and the Magnetics Society as their IEEE Division 4 Director.

In 1984 IEEE will celebrate its Centennial Year. Each Society has special plans to commemorate this event and I urge each member to participate. As an incentive to recruit new members during the last few months of 1983, special centennial gifts are being offered to members who recruit new IEEE members. You will be doing yourself and your friends a favor by urging them to join IEEE at this time. Also, beginning now and during 1984, affiliate members may upgrade their status to full IEEE membership without paying the usual $15 initiation fee—watch for an official announcement of this program.

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

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

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

ADCOM HIGHLIGHTS (from page 3)

The group will visit five major Chinese cities spending approximately half of their time in technical exchange and half in scenic and cultural tours. The visit will last a little more than two weeks. [See article on page 17; Ed.]

Past Presidents Put to Pasture

Al Clavin, past President of MTT (1972) and recipient to be of the 1984 MTT Distinguished Service Award, expressed his interest in further serving MTT and his frustration in having only limited discussion rights at AdCom meetings that he attends. Similar comments have been voiced by other past Presidents.

Past Presidents are a valuable resource to the Society, having gone through many committee chairs, through the IEEE Technical Activities Board (TAB), and having developed friends and connections throughout the IEEE and its Society structure. We need to develop ways for MTT-S to take advantage of their knowledge and abilities.

Affiliate Memberships in IECE of Japan

Dick Sparks reported to AdCom on his negotiations to establish Affiliate Membership in The Institute of Electronics and Communication Engineers of Japan for interested MTT-S members. On his return home from this meeting, a letter was waiting from their President, Hisayoshi Yanai, agreeing to the following terms:

1. An IEEE MTT-S member may apply for Affiliate Membership in the IECE of Japan by sending dues payment of $25 and a copy of his IEEE membership card or its equivalent.
2. An Affiliate Member of the IECE of Japan who is also a member of the IEEE MTT Society will receive The Transactions of the IECE of Japan, Section E (in English), and meeting notices (in Japanese) of the National Convention of IECE of Japan and all Technical Groups related to the field of microwaves.
3. An Affiliate Member may not vote for the election of officers of the IECE of Japan or be elected an officer and is not listed in the Membership Directory.

An application form is now being prepared. When available, we will publish the form in the Newsletter and make it available to Chapters.
[See article on page 1; Ed.]

DISTINGUISHED MICROWAVE LECTURERS

by H. J. Kuno

The IEEE MTT-S National Lecturer program has been serving the local Chapters by providing reviews of the technology of current interest to the MTT Society membership. Currently, Dr. Stephen F. Adam is serving as the Lecturer for the 1983/84 season. His lecture is entitled *Modern Microwave Measurements.*

To reflect the international nature of the MTT-S activities and membership composition, the name of the lecturer was changed to the **Distinguished Microwave Lecturer.** The lecturers have been in high demand, delivering 30 to 50 presentations each year. For the 1984/85 season, we are fortunate to have two Distinguished Microwave Lecturers: Dr. Sander Weinreb of the National Radio Astronomy Observatory and Dr. Paul T. Greiling of Hughes Aircraft Company. Dr. Weinreb's lecture is titled *Radio Astronomy — A Challenge to the Microwave Engineer* and Dr. Greiling's lecture is entitled *High-Speed Digital Integrated Circuits.* Both lectures are of great interest to the MTT-S membership and the lecturers are well known experts in their respective fields. The iecturers' outlines and biographies follow. To arrange for the Distinguished Microwave Lecturers, please contact:

Dr. Sander Weinreb
National Radio Astronomy Observatory
2015 Ivy Road
Charlottesville, VA 22903
(804) 296-0231

Dr. Paul T. Greiling
Hughes Research Laboratory
3011 Malibu Canyon Road
Mail Stop 250/240B
Malibu, CA 90265
(213) 456-6321

RADIO ASTRONOMY—A CHALLENGE TO THE MICROWAVE ENGINEER

Since literally the dawn of time, radio waves of cosmic origin have been incident upon the earth. During the past 50 years, the development of the technology to measure the spectra, angle of arrival, polarization, and time variation of these waves has greatly increased our knowledge of the universe and led to the discovery of objects such as quasars, pulsars, the cosmic background, and interstellar molecules.

The lecture will begin with a brief classification of radio astronomy sources in terms of their spectra and angular size. A few slides will illustrate the view of the sky a person would see if he or she could see at radio wavelengths. The current status and limitations of the search for signals from extraterrestrial civilizations will be reviewed. This will be followed by an introduction to the use of antenna arrays and a description of some recent or in-construction radio astronomy facilities. Finally, the current status and future challenges in the areas of antennas, low-noise receivers, wide-band communications, and high-speed data processing will be discussed.

Sander Weinreb was born December 9, 1936 in New York, NY. He received his B.S.E.E. and Ph.D. in electrical engineering from Massachusetts Institute of Technology in 1958 and 1963, respectively. His thesis topic was a search for the galactic deuterium line using digital autocorrelation techniques.

From 1960 to 1963, Dr. Weinreb was a Research Assistant at M.I.T. engaged in investigations of varactor frequency multipliers and digital autocorrelation techniques. In 1963 he joined Lincoln Laboratory where he was responsible for the radiometric equipment for the Haystack antenna.

In 1965 he joined the National Radio Astronomy Observatory (NRAO) where, until 1977, he was Head of the Electronics Division and responsible for the development of radio astronomy equipment for the Green Bank, West Virginia and Tucson, Arizona observatories. In 1976 he took a two year leave at the Radio Astronomy Laboratory of the University of California and then returned to NRAO to specialize in the development of low noise devices.

Dr. Weinreb is the author of over 50 publications in the areas of radio astronomy observations, millimeter-wave receivers, and low-noise technology. He is a Fellow of the IEEE and a member of Sigma XI, Eta Kappa Nu, Tau Beta Pi, and the International Scientific Radio Union. He is also an advisor to the European Institute for Millimeter-Wave Radio Astronomy and is a Research Professor at the University of Virginia.

HIGH SPEED DIGITAL IC PERFORMANCE OUTLOOK

To meet the functional throughput requirements of future high speed signal processing systems and commercial computers, GaAs digital integrated circuits are being developed. Applications for frequency counters, correlators, multiplexers, demultiplexers, time interval counters, and A/D converters with on-chip clock frequencies exceeding 1 GHz exist in the near-term. Such circuits are of MSI complexity, i.e., several hundred gate equivalents. Future applications for high speed ICs in more complex computational systems, such as radar signal processors, will require static random access memories, read only memories, high density logic arrays, and special purpose chips, such as the multipliers used in fast Fourier transform (FET) processors. For these future applications, integration levels exceeding

1000 gates per chip are essential. In these advanced signal processors, the required system clock speed will be in the range from 250 MHz to 2.5 GHz.

Logic gates with tens of picosecond gate delay, tens of microwatts power dissipation, cryogenic to hundredths of a degree operating temperatures, and greater than 10^7 rads radiation tolerance, will provide performance enhancements of one to two orders of magnitude for digital communications, memories, and computers. The implementation of this technology in MSI/LSI chips requires stringent control on material and process parameters for tight tolerances on device and circuit characteristics and high yields, and extremely short gate delays with large fanouts and low power dissipation for increased throughput rates.

In order to assess GaAs technology, this talk will review the device technology and issues related to device/circuit design and fabrication of MSI/LSI complexity circuits operating at gigahertz clock frequencies, will discuss the limitations of the technology, will compare the technology with competing silicon technologies, and will present applications where the technology will have a significant impact.

Paul T. Greiling, (S '64 - M '69 SM '82) received the B.S.E.E. degree in 1963 and B.S. degree in mathematics in 1963, the M.S.E.E. degree in 1964 and the Ph.D. degree in 1970 from the University of Michigan, Ann Arbor, Michigan.

He joined the faculty of Electrical Engineering at Northeastern University, Boston, Massachusetts in 1970. While at Northeastern he consulted for M.I.T. Lincoln Laboratory in the area of IMPATT diodes. In 1972, he joined the faculty of Electrical Sciences and Engineering at the University of California, Los Angeles, where he did research on the theoretical analysis and experimental characterization of microwave solid-state devices. He consulted for local industry on millimeter-wave semiconductor devices. In 1976, he did research on GaAs FETs at Sandia Laboratory, Albuquerque, New Mexico, as a Visiting Faculty Member. In 1976, he joined the staff at Hughes Research Laboratory, Malibu, California, where he has been responsible for the design, modeling, and testing of GaAs digital integrated circuits. At present he is an Adjunct Professor in the Electrical Sciences and Engineering Department at UCLA and is Head of the GaAs IC Design and Analysis Section at Hughes Research Laboratories, working on both photolithography and electron-beam fabricated high-speed GaAs logic circuits.

Dr. Greiling plays a leading role in GaAs IC technology as evidenced by his list of invited talks, papers, and conference organizer/chairman positions. Dr. Greiling is a member of the Administrative Committee of the Microwave Theory and Techniques Society, Eta Kapp Nu, Tau Beta Pi, Sigma Xi, and is a Senior Member of the IEEE.

H-P FOSTERS FACULTY

In an attempt to bolster engineering faculties, Hewlett-Packard Company has announced a program that will provide selected graduate students with financial incentives to encourage them to become full-time faculty members. Coordinated through the American Electronics Association (AEA), the program will provide students fully paid tuition plus a living stipend totalling $36,000 during a four-year degree program. Half the funds provided will be in the form of outright grants. The other half will be provided in loans owed by the student to the university. After three years of teaching at the university, the loans would be dropped, or forgiven. H-P plans to have one student at each of 10 major universities during the current school year, with candidates selected from students already in advanced degree programs. The students will also have to work at least one summer in industry and two years as a teaching or research assistant.

GADGETRY

Readers who live near or plan to visit New York or San Francisco will not want to miss the store Star Magic. It carries an abundance of articles based on outer space and scientific fact, such as telescopes, photovoltaic cells, astronomy maps/books, and books on UFOs and the philosophy of science. Entertainment items can also be found. There are pens that write upside down (or in zero gravity); holographic transparencies mounted so that they can be illuminated from behind; freeze-dried foods that simulate the cuisine of NASA space flights; optical illusion games; posters, models, games, and paperweights, all keying on the space shuttle; light-emitting-diode jewelry that changes colors and readouts when activated by nearby sounds; photovoltaic toys and experiment kits; and NASA slides taken during the Viking, space shuttle, and other missions. Their best sellers, though, are records and cassettes of electronic and digital music. Prices range from 50¢ to $1,000. A mail order catalog is available.

The New York store is located on 8th Street at the corner of Astor Place; the San Francisco outlet can be found at 4026A 24th Street.

FELLOWS

There are currently 279 Fellows and Life Fellows (LF) of the IEEE who are members of the Microwave Theory and Techniques Society. Geographically, they are:

ARIZONA
Al Gross
William G. Howard, Jr.
Irving Kaufman
J. A. Nurad
T. E. Tice
J. R. Wait

CALIFORNIA
Stephen F. Adam
Dean B. Anderson
D. J. Angelakos
Nicholas A. Begovich
W. B. Bridges
William S. C. Chang
Marvin Chodorow
Alvin Clavin
Seymour B. Cohn
Edward G. Cristal
Louis J. Cutrona (LF)
R. H. du Hamel
J. W. Duncan
W. A. Edson (LF)
A. Fong
James E. Goell
R. C. Hansen
Jay H. Harris
W. D. Hershberger (LF)
W. H. Kummer
H. John Kuno
Peter D. Lacy
Vincent Learned (LF)
Charles A. Liechti
George L. Matthaei
K. K. Mei
Robert G. Meyer
James H. Mulligan, Jr.
H. George Oltman
Don Parker
O. T. Purl
L. J. Ricardi
H. A. Rosen
S. Sensiper
R. S. Symons
Eugene N. Torgow
C. H. Townes
Shyh Wang
Max T. Weiss
Robert J. Wenzel
J. R. Whinnery (LF)
L. T. Zitelli

COLORADO
J. Lamar Allen
Helmut M. Altschuler
Frank S. Barnes
Leonard Lewin
N. S. Nahman

CONNECTICUT
Nathan Marchand (LF)

WASHINGTON, DC
Howard S. Jones, Jr.
W. K. Kahn
Lawrence R. Whicker

FLORIDA
A. C. Beck (LF)
M. R. Donaldson
R. E. Henning
Hugh E. Webber (LF)
Edwin L. White (LF)

GEORGIA
H. A. Ecker
James J. Gallagher
Thomas K. Gaylord
Gordon R. Harrison
R. C. Johnson
D. T. Paris
John E. Pippin
George P. Rodrigue
Charles T. Rucker
James C. Wiltse, Jr.

ILLINOIS
Paul D. Coleman
G. A. Deschamps (LF)
J. D. Dyson
P. E. Mayes
Raj Mittra
C. T. Sah

KANSAS
Fawwaz T. Ulaby

LOUISIANA
James A. Cronvich (LF)

MAINE
C. C. Cutler (LF)

MARYLAND
R. J. Adams (LF)
Morris Cohn
H. Warren Cooper
H. V. Cottony (LF)
Lawrence E. Dickens
Carl L. Frederick, Sr. (LF)
Robert V. Garver
William J. Getsinger
C. D. Hardin
Louis Pollack
Wilbur L. Pritchard
Harald Schutz (LF)
Gustave Shapiro (LF)
G. Strull
Bruno O. Weinschel
E. A. Wolff
Leo Young

MASSACHUSETTS
Andrew Alford (LF)
Frank A. Brand
William C. Brown (LF)
Kenneth J. Button
Paul H. Carr
Richard W. Damon
Marion E. Hines
Harlan Howe, Jr.
Ronald W. P. King (LF)
Ralph Levy
R. J. Mailloux
John M. Osepchuk
Paul Penfield, Jr.
Robert A. Pucel
Herbert J. Reich (LF)
Henry J. Riblet (LF)
Robert A. Rivers
W. Rotman
Theodore A. Saad
Allen C. Schell
Ernst F. Schloemann
James E. Shepherd (LF)
A. J. Simmons
D. B. Sinclair (LF)
Calvin T. Swift
Arthur Uhlir, Jr.
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Kun-Mu Chen
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George I. Haddad
Ralph E. Haitt (LF)
J-A-M Lyon (LF)
A. B. MacNee
Chen-To Tai (LF)

MINNESOTA
Murray Olyphant, Jr.

MISSOURI
Fred J. Rosenbaum
D. L. Waidelich (LF)

NEW JERSEY
A. D. Ballato
Edwin F. Belohoubek
Martin Caulton
Sven H. M. Dodington
A. G. Fox (LF)
Hatsuaki Fukui
Vladimir G. Gelnovatch
Joseph A. Giordmaine
Harold Jacobs
S. E. Miller
William W. Mumford (LF)
Leon S. Nergaard (LF)
W. T. Patton
I. Reingold
R. M. Ryder (LF)
Martin V. Schneider
Harold Seidel
W. M. Sharpless (LF)
William Sichak (LF)
Phillip H. Smith (LF)
Fred Sterzer
Chao C. Wang (LF)

NEW YORK
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E. M. Bradburd
A. D. Bresler
Herbert J. Carlin (LF)
G. C. Dalman (LF)
Lester F. Eastman
A. B. Giordano (LF)
Peter W. Hannan
Roger F. Harrington
Eric Herz
A. Hessel
Donald D. King
Matthew T. Lebenbaum (LF)
Theodore G. Mihran
Kenneth E. Mortenson
Herman C. Okean
Seymour Okwit
Arthur A. Oliner
John F. Ramsay (LF)
Donald Richman
Edward W. Sard
S. P. Schlesinger
T. Tamir
Jesse J. Taub
Harold A. Wheeler (LF)

NORTH CAROLINA
Frederick J. Tischer
E. Weber (LF)

OHIO
Alexander B. Bereskin (LF)
R. A. Chipman (LF)
R. E. Collin
Lyon Peters, Jr.
Gary A. Thiele
C. H. Walter

OREGON
R. M. Emberson

PENNSYLVANIA
Horst W. Gerlach
J. W. Gerartowski
Reinhard H. Knerr
H. C. Nathanson
W. C. Shen
Kiyo Tomiyasu

RHODE ISLAND
Gerald S. Heller

SOUTH CAROLINA
Rufus G. Fellers

TEXAS
J. R. Biard
Chalmers M. Butler
A. A. Collins (LF)
Arwin A. Dougal
Tatsuo Itoh
Harold Sobol
James O. Weldon (LF)

UTAH
Om P. Gandhi
Richard W. Grow

VIRGINIA
Thomas F. Curry
John Granlund
James S. Hill (LF)
William G. Schmidt
Sidney T. Smith
Sander Weinreb

WASHINGTON
A. W. Guy
A. Ishimaru
Donald K. Reynolds
BELGIUM
Vitold Belevitch
J. G. Van Bladel
CANADA
M. P. Bachynski
John W. Bandler
R. Bartnikas
Michael Hamid
R. J. McIntyre
George Sinclair (LF)
EGYPT
A. El-Samie Mostafa (LF)
FEDERAL REPUBLIC OF GERMANY
Werner Kleen (LF)
L. Rohde (LF)
Rudolf Saal
K. J. Schmidt-Tiedemann
Manfred R. Schroeder
Hans Severin
H. G. Unger
FRANCE
P. A. Grivet (LF)
P. M. LaPostolle
F. Mayer
G. Mourier
E. Roubine
ISRAEL
U. Galil
Samuel Hopfer
JAPAN
Masaru Ibuka (LF)
Hisao Kimura (LF)
Yoshihiro Konishi
Nobuaki Kumagai
K. Kurokawa
Akio Matsumoto
Fumio Minozuma
Shota Miyairi
Kiyoshi Morita (LF)
Tsuneo Nakahara
J. Nishizawa
Tatsuji Nomura (LF)
Kanichi Ohashi (LF)
Sogo Okamura
T. Okoshi
Y. Oono
S. Saito
Risaburo Sato
Isao Someya
Y. Suematsu
Ikuo Tanaka
Tatsuo Udo
Michiyuki Uenohara
NETHERLANDS
C. A. Muller
NEW ZEALAND
R. H. T. Bates
POLAND
A. K. Smolinski
SWEDEN
E. F. Bolinder
SWITZERLAND
M. Strutt (LF)
UNITED KINGDOM
E. A. Ash
A. H. W. Beck (LF)
J. Brown
P. J .B. Clarricoats
J. H. Collins
A. L. Cullen
John D. Rhodes
Peter N. Robson
A. W. Rudge

SHORT COURSES

A number of organizations are offering short courses this Winter which will be of interest to some of the members of the Microwave Theory and Techniques Society.

Seven courses will be offered this Winter and next Spring by the Technology Service Corporation. They are: **Radar Cross-Section,** Phoenix, Arizona, January 10-13, 1984; **Intercept Receiver Systems,** San Diego, California, January 17-20, 1984; **Electronic Warfare,** Palo Alto, California, February 7-10, 1984; **Modern Microwave Techniques,** San Diego, California, February 14-17, 1984; **Advanced Radar Technology,** Orlando, Florida, February 14-17, 1984; **Phased Array Antenna Design,** Atlanta, Georgia, May 10-13, 1984; and **Modern Antennas,** Bethesda, Maryland, May 8-11, 1984. Technology Service Corporation can be reached at 8555 16th Street, Suite 300, Silver Spring, MD 20910, (800) 638-2628 or (301) 565-2970.

Five courses have been announced by Georgia Institute of Technology, Department of Continuing Education, for presentation this Winter. January 10-12, 1984 are the dates for **Radar Cross-Section Reduction.** The course is being co-sponsored by the U.S. Army Missile Command and the fee is $525 per pupil. **Millimeter-Wave Systems and Technology** will be presented January 31-February 2, 1984. The four day session costs $715 per student. During the following week, February 8-9, 1984, **Microwave Devices and Sources** will be presented. Its fee is $475 per person. In March, two courses will be presented consecutively. On March 5-6, 1984, G.I.T. will present **Laser Technology and Systems Applications.** On March 7-8, 1984, the offering will be **Infrared Technology and Applications.** The fees for the courses will be $460 and $525, in the same order as the presentations. Additional information can be obtained from Elaine Hadden Nicholas at G.I.T. Department of Continuing Education, Atlanta, GA 30332, (404) 894-2547.

A number of short courses of interest will be offered by the UCLA (University of California at Los Angeles) Extension in the first quarter of 1984. These include: **Microwave Circuit Design,** course number 881.39, January 23-27, 1984, $895 per pupil, instructors are Les Besser, Robert Wenzel, and Steven March; **Microwave Solid-State Devices and Circuits,** course number 881.51 February 21-24, 1984, $895 per student, instructors include George I. Haddad, Paul T. Greiling, Douglas Maki, Robert Eisenhart, and Dean Peterson; **ECM/ECCM/ESM,** course number 867.48, February 27-March 2, 1984, $895 per participant, coordinator is Cornelius Leondes, ten lecturers; **Spread Spectrum Systems and Interference Rejection Techniques,** course number 867.36, February 27-March 2, 1984, $895 per student, instructors are Robert C. Dixon, D. R. Anderson, F. P. Kaiser, W. K. Masenten, and G. D. O'Clock. Other upcoming courses will include **Advanced Microwave Circuit Design,** course coordinator is Les Besser, April 23-28, 1984 and **Microwave Circuit Design,** May 21-25, 1984. For further information on these short courses, contact UCLA, Engineering Short Courses, P.O. Box 24901, 6266 Boelter Hall, Los Angeles, CA 90024, (213) 825-1295 or 825-3344.

A number of interesting short courses will be offered later this Winter by the George Washington University. They include **Modern Receiver Design** (1079 DC), February 13-15, 1984; **Applying Remote Sensing Techniques to the Marine Environment** (947 SD), February 13-17, 1984; **Applied ECM** (651 DC), M arch 5-9, 1984; **ELINT: Analyzing Radar Signals** (1022 OF), March 12-14, 1984; **Fiber Optic Systems Design** (541 OF), March 12-14, 1984; and **Radiowave Propagation for Communications System Design** (249 OF), March 12-16, 1984. Additional information is available from Continuing Engineering Education, George Washington University, Washington, DC 20052, (202) 676-6106 or (800) 424-9773.

ARFTG HIGHLIGHTS

by Mario A. Maury, Jr.

The Automatic RF Techniques Group (ARFTG) is a professional Society that is affiliated with MTT-S. It is primarily concerned with computer-aided microwave measurements and design. The following is a summary of its recent activities.

21st Conference

The Spring 1983 ARFTG Conference was held in Burlington, Massachusetts, on June 6 and 7 directly following the MTT-S International Microwave Symposium in Boston. The conference's main topic was *Automated Spectrum Analysis* and was chaired by Dick Swartley of General Electric Company, Philadelphia, Pennsylvania. The local host was Harold Stinehelfer, Sr. of Made-it Associates, Burlington, Massachusetts.

H. George Oltman, Jr. of Hughes Aircraft Company, Canoga Park, California, and President of ARFTG's Executive Committee (EXECOM) opened the meeting and introduced Richard A. Sparks of Raytheon Company, Bedford, Massachusetts, who is a member and past President of MTT-S Adcom. Dick welcomed the conference attendees and in his address mentioned that he felt that "workshops like this (ARFTG Conference) perhaps offer a lot more opportunity for interchange between individuals and can be perhaps a better learning experience as well . . ."

There were a total of fifteen papers presented and a panel discussion entitled *The Automatic Spectrum Analyzer in ATE Systems,* moderated by H. Richard Irwin, Hewlett-Packard Company, Santa Rosa, California. This panel discussion was later reported in a news article in Microwaves and RF Magazine, October 1983 by Walter J. Bojsza, Editor, and entitled *New Generation ASA's Could Use Refinements.*

Formal EXECOM elections were held during the business meeting, using secret ballots for the first time. The following were elected:

Robert E. Nelson — National Bureau of Standards, Boulder, Colorado
Dr. Barry S. Perlman — RCA Corp., Princeton, New Jersey
Jim L. Taylor — Bendix Corporation, Kansas City, Missouri (re-elected)

The banquet held on the evening of June 6th was a great success. The following awards were presented during the banquet:

- Best Paper Award (20th conference)
  Cletus A. Hoer, National Bureau of Standards, Boulder, Colorado, *Calibrating A Four Port or Six Port Reflectometer*
- Host Award (20th conference)
  Robert E. Nelson, National Bureau of Standards, Boulder, Colorado
- Two Technology Contribution Awards were presented:
  Cletus A. Hoer for *Concept and Development of the Dual Six Port;* H. Richard Irwin for *Contributions to Automated Spectrum Analysis Measurements*
- ARFTG Service Award
  Richard W. Swartley, General Electric Company, Philadelphia, Pennsylvania

A tour of the MIT Lincoln Laboratories, Haystack Radio Observatory in Westford, Massachusetts concluded the conference.

At the EXECOM meeting, Lee Saulsbery of National Bureau of Standards, Boulder, Colorado, was elected President of ARFTG and Ray Tucker was elected Vice-President.

ARMMS England

Lee Saulsbery, ARFTG EXECOM President, attended the second ARMMS (Automatic Radio-Frequency and Microwave Measurement Society) meeting on September 27 at the University of Warwick in Coventry, England. ARMMS is ARFTG's counterpart in England. Lee indicated that the papers presented were excellent and that they are in the process of setting up a traveling experiment similar to what ARFTG has done.

Those wishing additional information on ARMMS, please contact their Secretary:

Dr. Roger D. Pollard
The University of Leeds
Leeds, LS2 9JT, United Kingdom
(532) 431751, extension 348

22nd Conference

The fall 1983 conference was held on November 3rd and 4th at the Four Seasons Inn in Albuquerque, New Mexico. Jim Taylor of Bendix Corporation, Kansas City, Missouri, was the conference Chairman and the local host was Dennis Martin of Sandia National Laboratories, Albuquerque, New Mexico. The main conference theme was *Calculator Controlled Measurement Systems.*

The conference was opened by Lee Saulsbery, ARFTG EXECOM President, who introduced Bob L. O'Nan of Sandia National Laboratories, who, in turn, welcomed the attendees. Bob made several interesting remarks, including . . . "the largest room in the world is the room for improvement" and "one of the things that makes this country great is the free exchange of information."

A total of eleven papers were presented. One of the highlights of the conference was a lively panel discussion moderated by Dr. Allen Carlson of M/A-COM, Burlington, Massachusetts, entitled *Controller Alternatives for Automatic RF Measurement Systems.* No conclusion was reached as to the "best controller" since the application is always the determining factor and there are applications for the full spectrum of controllers currently available ,i.e., desktops, minicomputers, etc.).

EXECOM elections were held and the following were elected or re-elected:

Mario A. Maury, Jr., Maury Microwave, Cucamonga, California (re-elected)
Frank Mendoza, TRW, Redondo Beach, California
Lee Saulsbery, National Bureau of Standards, Boulder, Colorado (re-elected)

One of the main objectives is to have a uniform geographical representation of EXECOM

members. Current composition is as follows: East-3, Central-3, and West-4.

The ARFTG Banquet was held on the evening of November 3rd. Edward L. Burgess of Sandia National Laboratories gave a very interesting talk on *Solar Energy Conversion* and entertainment was provided by a Mariachi band and dance troupe. Awards, as usual, was a key point of the program and the following were the recipients:

- Best Paper (21st conference)
  H. Richard Irwin, *Amplitude Accuracy Enhancement Techniques for the HP 8566A and HP 8568A Spectrum Analyzers*
- Host Award (21st conference)
  Harold E. Stinehelfer, Sr., Made-It Associates, Burlington, Massachusetts
- Automated Measurement Technology Award
  Nick Kuhn, Hewlett-Packard Company, Palo Alto, California, for *Contributions to Automated Noise and Power Measurements*
- ARFTG Service Award
  Richard E. Dolbec, MIT Lincoln Laboratories, Lexington, Massachusetts
- Automated Measurement Career Award
  Robert W. Beatty, Boulder, Colorado (retired)
- ARFTG Distinguished Service Award
  Mario A. Maury, Jr., Maury Microwave Corporation, Cucamonga, California

The last two awards were newly created by the Awards Committee and this was the first time they had been presented.

The final event of the conference was a very interesting tour of the Atomic Museum at Kirtland AFB and the photovoltaic facilities at Sandia National Laboratories.

Announcement 23rd Conference

The next ARFTG Conference will be held on June 4 and 5, 1984 (Monday and Tuesday), in Santa Rosa, California, directly following and in conjunction with the MTT-S International Microwave Symposium to be held in San Francisco. The conference host is James Fitzpatrick of Hewlett-packard Company, Santa Rosa. A tour of the H-P Network Measurements Division facilities is planned.

The conference theme is *Millimeter Automated Network Analyzers* and papers are solicited on recent hardware and software developments. Submit 500 to 1,000 word abstracts by March 30, 1984, to the Technical Program Chairman:

M. A. Maury, Jr.
Maury Microwave Corporation
8610 Helms Avenue
Cucamonga, CA 91730
(714) 987-4715, extension 21

For further information, contact the ARFTG Conference Chairman:

Wendell Seal
TRW Defense and Space Systems
Mail Stop S-2471
One Space Park
Redondo Beach, CA 90278
(213) 535-5155

1984 DUES UP

Following five hours of debate over which member services should be funded for 1984, the IEEE Board of Directors voted on August 15 to increase the general membership dues from $48 to $52 per year. At the same time, the Board of Directors voted to maintain the U.S. regional assessment at the 1983 level of $13. The assessments for region 7 (Canada) and for region 8 (Europe and Africa) were also maintained at their 1983 levels of $7.

The proposed 8.3% increase in the basic dues received a strong margin of support from the IEEE's Directors, passing by a vote of 26 to 2.

The dues for Society Affiliates has been increased for 1984 to $24 from $22 for 1983. U.S. Student Members will pay $17 per year dues in 1984. This is an increase of $2 over the 1983 dues. Non-U.S. Student Members, however, will continue to pay $12 per year, the same as for 1983. The reduced fees for new graduates has been increased by $2 to $26 for 1984.

It should be noted that the $2 increase in dues for U.S. Student Members will be used to fund a fourth issue of the student magazine, *Potentials*. Non-U.S. student members pay less than their U.S. counterparts because they do not receive *Potentials*, unless they choose to subscribe to it at $5 per year.

MEMORY DEVELOPMENT

The IEEE has just announced the fourth in its *Successful Management Series* of self-study courses. The latest, **How to Build Memory Skills,** is aimed at increasing your powers of retention. The course is designed to be completed in twenty hours.

The fee for the course which includes a text, examinations, instructional programming, a bibliography, and a tab-indexed three-ring binder is $75 for IEEE members or $90 for nonmembers. Orders can be charged to Master Card, VISA, or American Express cards.

The material can be ordered from the IEEE Service Center, Department CP, 445 Hoes Lane, Piscataway, NJ 08854.

NSF PUBLICATIONS

All official publications and announcements of the Foundation may be obtained by writing: Publications Office, National Science Foundation, 1800 G Street, N.W., Washington, DC 20550.

DISTINGUISHED LECTURER CHANGE OF ADDRESS

Dr. Stephen F. Adam, the 1983-84 MTT-S Distinguished Lecturer has recently changed positions at Hewlett-Packard Company. In order to schedule the 1983-84 MTT-S Distinguished Lecturer, contact Dr. Adam at Hewlett-Packard Company, Mail Stop 20BY, P.O. Box 10301, Palo Alto, CA 94303-0890 or call him at (415) 857-3075.

MILEAGE COSTS

The cost of driving cars in America's 20 largest cities last year ranged from almost 58¢ per mile in Los Angeles down to 42¢ per mile in Detroit. The national average expense was about 45¢ per mile; highest, lowest and average in car costs in cents-per-miles:

- Insurance—highest in Los Angeles, 19.7; lowest in Dallas, 7.9; average, 11.3
- Depreciation—New York, 13.7; Detroit, 12.6; average, 13.3
- Loan Interest—Los Angeles, 10.7; Washington, 9; average, 9.7
- Repairs—San Francisco, 4.7; Atlanta, 2.9; average, 3.8
- Gasoline—Seattle, 9.7; Atlanta, 8.2; average, 8.9

DRIVING COSTS IN 20 U.S.A. CITIES

Here is a list of driving costs per mile for the 20 USA cities in a Hertz Corporation study. The cities are ranked according to expenses:

City	1982 (per mile)	1981 (per mile)
1. Los Angeles	57.08 cents	56.36 cents
2. New York	56.05 cents	55.16 cents
3. San Francisco	54.33 cents	53.17 cents
4. Miami	50.04 cents	48.40 cents
5. Chicago	49.81 cents	47.29 cents
6. Seattle	47.91 cents	46.37 cents
7. St. Louis	47.61 cents	46.37 cents
8. Denver	46.98 cents	45.36 cents
9. San Diego	46.39 cents	45.17 cents
10. Boston	46.33 cents	45.14 cents
11. Houston	45.62 cents	45.33 cents
12. Milwaukee	45.60 cents	44.67 cents
13. Minneapolis	45.58 cents	44.73 cents
14. Cleveland	45.36 cents	43.81 cents
15. Pittsburgh	44.75 cents	44.53 cents
16. Washington, D.C.	43.73 cents	43.48 cents
17. Cincinnati	43.63 cents	41.75 cents
18. Dallas	43.11 cents	42.46 cents
19. Atlanta	42.15 cents	41.48 cents
20. Detroit	41.68 cents	40.87 cents

Ph.D. DEGREES UP

The number of doctoral degrees awarded in engineering and science increased over 2% in the United States between 1980 and 1981, according to the *Survey of Earned Doctorates* conducted annually by the National Research Council. A total of 17,600 degrees were awarded, but that was still 7% below the 1973 peak.

U.S. citizens have been receiving fewer and fewer of the engineering and science doctorates during the last decade. Citizens got 78% of all the doctorates in 1981, compared with 81% in 1971. Engineering had the highest proportion of noncitizen doctorate recipients in 1981—51%. One half of the noncitizens with engineering doctorates and temporary visas had commitments to remain in the U.S. for postdoctoral study or employment.

The number of new doctorate holders going into academic jobs declined. Of the citizens and noncitizens who are permanent residents with employment commitments, 43% indicated in 1981 that they would teach after graduation compared with 60% in 1971.

ENGINEERING MUSEUM

The Stanford Fleming Foundation, a charitable organization associated with the University of Waterloo in Ontario, Canada, is converting a retired hydroelectric plant in Niagara Falls into an engineering museum planned to open next summer.

Called the Engineerium, the museum will emphasize energy and electric power and is expected to have a fairly large collection of antique electrical appliances.

Although the details of the museum are not yet fully worked out, Director John Carr sees the Engineerium also as a science center and he intends to include interactive displays and a miniature, computer-operated energy-dispatch center. Among the artifacts in the museum are one of the earliest motors—General Electric Company's serial no. 4—as well as one of the first steam turbines made by the Parson Company of Newcastle, England.

The museum is expected to gradually develop over 10 years. The total cost is estimated at 12 million dollars. The foundation is seeking support from Ontario Hydro, the Toronto-based utility, from the Niagara Parks Commission, a public body in Ontario, and from the provincial government of Ontario. For more information write to Mr. John Carr, Director, Engineerium, P.O. Box 895, Niagara Falls, Ontario L 2E6V6, Canada.

MICROWAVE STUDY GROUP VISIT TO CHINA

by R. A. Sparks

Background

Eight delegates of the IEEE Microwave Theory and Techniques Society recently returned from a 16 day Microwave Study Group visit to the People's Republic of China. Five wives and one son accompanied the delegates. Our principal technical host was Professor Huang Hung-chia, Chairman of the Society of Microwaves, Chinese Institute of Electronics, who had previously visited the United States and attended the 1982 IEEE MTT-S International Microwave Symposium in Dallas, Texas. Travel arrangements were coordinated by the US-China Peoples Friendship Association, Eastern Region in Cambridge, Massachusetts and the China International Travel Service (CITS) in Peking. Visits to technical organizations in five cities (Shanghai, Nanking, Chengdu, Xian and Peking, see map), were meshed with sight-seeing tours that included the Great Wall, the Terracota Army, the Ming Tombs and Sun Yat-sen Mausoleum. A summary of the travel activities in each of the cities is described in the following paragraphs.

The delegates included:

- Mr. and Mrs. Richard A. Sparks, Raytheon Company
- Mr. and Mrs. Theodore S. Saad, Sage Laboratories
- Mr. and Mrs. Harold Stinehelfer, Sr., Made-It Associates
- Mr. and Mrs. James Roe, McDonnell-Douglas Corporation
- Dr. and Mrs. Joseph White and son, Chris, M/A-COM, Inc.
- Mr. Ed Niehenke, Westinghouse Electric Corporation
- Mr. Don Landry, M/A-COM, Inc.
- Mr. Bob Duggan, Lockheed-Georgia Company

Delegates left the U.S. on September 28 from both San Francisco and New York and rendezvoused in Tokyo. The delegation departed for Shanghai on September 30th.

Shanghai

It was nearly 1900 hours (7:00 PM) Friday evening when we arrived in Shanghai. After clearing customs and meeting our CITS local and national guides we boarded a bus and traveled about 45 minutes to the new Shanghai Hotel which was to be our residence for the next few days. Professor Huang and some of his associates greeted us at the hotel and we received our planned itinerary in Shanghai.

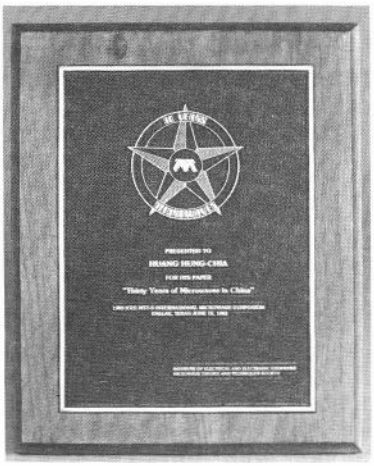
The next day, Saturday, October 1, was celebrated as National Day in China and this was everywhere evident by the many banners commemorating the 34th anniversary of the People's Republic of China. Unexpectedly, there were no firework displays during the celebration which lasted several days. We departed from the hotel at 0800 hours by bus and arrived at Shanghai University of Science and Technology an hour later, where we were greeted once again by Prof. Huang and several of the faculty. No students were present because of the holiday. Following a short reception with introductions and tea, our tour of the university began. Visits were made to several laboratories, including the Institute of Radio Engineering, Institute of Electronic Physics and the Wave Sciences Laboratory (of which Prof. Huang is also the Director). Most of the equipment we saw was designed for teaching undergraduate and graduate students in electrical engineering.

We returned to the hotel for lunch about 1230 hours and spent the afternoon on a city tour which included shopping, arts and crafts stores, and sightseeing. Dinner at the Shanghai International Club was followed by a dance/drama performance at the Beijing Theater.

Sunday morning was taken up by a delightful cruise on the Huang pu River which carried us down to the Yangtze River and returned. The afternoon included a visit to the Shanghai Industrial Exhibition Hall for lunch and shopping, followed by a tour of a carpet factory.

Monday was to be our last day in Shanghai so we checked out of the hotel following breakfast and had our bags packed for transport to the train station. The morning was spent touring Shanghai No. 26 Radio Factory. The facility manufactures coaxial and waveguide microwave test instrumentation for frequencies through K-band. Our tour was rather hurried because of the 1130 hours banquet that had been scheduled with Prof. Huang and his colleagues at the Yan Yun Lou restaurant. This event proved to be a very memorable occasion with much picture taking and warm friendships established. Our departure for Nanking abbreviated the festivities, but Dr. Huang was able to join us on the bus for the trip to the

train station. The area outside the station was crowded with people who, we were told, were waiting to greet some arriving athletes. Our luggage had arrived and had been placed on the train so that we were able to relax, say our final good-byes and prepare for the 3½ hour trip to Nanking. The countryside as viewed from our train window appeared as a continuum of small farms and cottages, fish ponds and rivers, occasional villages and passing trains. People working the fields or carrying their produce on bicycles or carts were evident everywhere.



Plaque presented to Dr. Huang by MTT-S while visiting Shanghai.

Nanking

Our arrival in Nanking at 1730 hours Monday evening was precisely on schedule and our local CITS guide was waiting to take us directly to the Nanking Hotel. We later learned that Nanking had been the capitol city during Chiang Kai-shek's presidency. Following hotel registration, we had dinner in the hotel, met our technical host, Professor Zhang Wen-xun, and attended an acrobatic exhibition at a local theater.

The next morning at breakfast we had the pleasure of greeting Dr. Ferdo Ivanek and his wife. As the 1982 MTT-S National Lecturer, Ferdo had been invited by members of the Chinese Institute of Electronics to give talks in several cities in China. Nanking was the only place where our itineraries overlapped. That morning we toured the Zijin Purple Mountain Observatory, completed in 1934. A number of ancient Chinese astronomical instruments had been brought here, along with 0.4, 3.0 and 10.0 cm. radio telescopes and several optical telescopes, one of which was used for satellite tracking.

The next stop was Sun Yat-sen's Mausoleum and the Tomb of the First Emperor of the Ming Dynasty. After lunch we visited Lingu Park and the Temple Pagoda, a favorite scenic spot in Nanjing which was originally built in 1381.

That afternoon we spent at the Nanking Solid State Devices Research Institute (NSR for short) where much advanced microwave semiconductor research work is in progress. In addition, they produce deliverable hardware including InP and GaAs single crystal boules, broadband detectors, low-noise mixers, PIN diodes, and Gunn diode oscillators. Our overall assessment was that device technology was perhaps 3 to 5 years behind U.S. state-of-the-art, but is improving rapidly. Many of the current products were on display in glass cases with brief descriptions printed in Chinese and English. A subsequent tour of the laboratories demonstrated several telecommunication products including upconverters, dielectric stabilized oscillators and FET amplifiers under development. Pulsed silicon IMPATT devices up to 130 GHz and CW oscillators up to 60 GHz were displayed. A short video tape was also shown to us at NSR. Its topic was microwave drying ovens made by the Microwave Power Technology Development Center, a separate factory also located in Nanking. Applications included drying leather, furniture, printed paper and fabrics and for the aging of wine.

That evening a reception and banquet was held at the Nanking Hotel and we met Professor Wang Yung-nien, Vice President of the Nanking Institute of Technology (NIT) and Professor Li Si-fan, Chairman of the Department of Radio Engineering. Professor Li had presented a paper at the 1983 IEEE MTT-S International Microwave Symposium in Boston, Massachusetts and also attended the MTT-S AdCom meeting.

The next day, October 5, we visited NIT and toured the Departments of Radio Telecommunications and Electronic Engineering, including the Microwave Electronics, Microwave Measurements, and Solid State Devices Laboratories. All equipment and instrumentation had been made in China. Several TWT amplifier and BWO development efforts were exhibited; also two centimeter gyrotrons and fiber optic experiments were shown. A complete photolithographic and chemical etching facility for stripline and microstrip circuit fabrication was also observed.

Later in the morning we visited the Nanking University's Institute of Acoustics, where experiments in SAW devices and acousto-optics were demonstrated.A separate experiments in Josephson junction devices was shown in the Superconducting Laboratory.

A tour of Xuan Wu Lake, a Bonsei Museum, and a short visit to the Yangtze River Bridge were completed in the afternoon. Following dinner we packed our bags in preparation for an early Thursday morning flight to Chengdu.

Our Antonov 24 Flight, CAAC 4512, was boarded at 0700 hours and departed a short time later with heavily overcast skies. Each of us had a carry-on box breakfast consisting of two hard-boiled eggs, a small meat sandwich, and a tangerine-type fruit. Hot tea was also served. The first stop was at Wuhan where we stretched our legs, reboarded, and departed for Chongquing arriving at 1215 hours. Following lunch at a nearby Chongquing restaurant, we boarded a new flight at 1430 hours and landed at Chengdu about 50 minutes later.

Chengdu

Our local guide and technical host, Professor Yuan Ke-xu, arrived with our bus transportation and we visited the Temple of Marquis Wu, or Wise Prime Minister, on the way to the Wang Jiang Hotel. The rooms in this Russian designed, former guest house for officials were huge and the accommodations included a large sitting room, bedroom with twin four-poster beds, and a bathroom.

On Friday, 7 October, we visited the Chengdu Institute of Radio Engineering (CIRE) and were greeted by its President, Gu Deren. After a short reception, we toured the Departments of Electromagnetics, Integrated Optics, and Electronic Engineering. The laboratories included microwave measurement instrumentation, horn and dish antennas, lasers, TV vidicons, and bistatic radar experiments. There are nearly 13,000 students at CIRE including about 300 graduate students.

We also visited a SAW device laboratory where dispersive delay lines, Barker code devices, and reflective-array compressors (RACs) were under development in the 30-100 MHz range. The tour of the Microwave Research Institute at CIRE included the gyrotron laboratory and exhibits of quasi-optical cavities at 4 and 8 mm. We were told that these latter projects were being performed by Ph.D. graduate students.

A tour of the Hong Ming Electronic Components Factory had been arranged for after lunch. This is the largest factory of its kind in China (about 5,000 employees) and their product line included a tremendous range of components extending from huge high voltage capacitors to tiny magnetic core inductors, for which they had received many awards for excellence in quality and performance. All of these products were on display in a large showroom. Their microwave products included L-, S- and X-band mixer/preamplifiers in microstrip with integrated filters and attenuators.

The major attraction on the tour of the Hong Ming Factory was the visit to R & D Building #1. We were the first foreigners to visit this facility, which included a vacuum deposition laboratory, diffusion furnaces, and a photo-etching room on the first floor, and telecommunication product development on the second floor. The workmanship on the alumina microstrip amplifiers, mixers, multipliers and filters which we were shown were as fine as will be found in the U.S.

Subsequent discussions with ten to twelve of their microwave engineers indicated a keen interest in the direction of future technology developments, especially monolithic microwave circuits and devices.

That evening we met with several CIRE and Hong Ming Factory officials at the East Wind Road Restaurant. Many expressions of friendship and warm enthusiastic discussions were held over dinner.

The entire next day was spent travelling to and from the Dujiang Yan Dam and visiting the many engineering construction marvels that had been implemented over 2,000 years ago to provide irrigation waters for the surrounding region. A short visit to see the pandas at the zoo was also included along the way. Pandas are native to the Chengdu area of China and much research is underway to prevent their extinction. On returning to the hotel that evening we had dinner and packed our luggage for a morning departure to Xian.

Xian

Sunday morning, 9 October, we were scheduled to take off at 0940 hours, but our plane had not arrived. There were very few flights each day, so it was very easy to determine when an arrival or departure took place. Finally, when the aircraft did arrive it was decided that all passengers should eat lunch at the airport and the plane would wait for us. At 1220 hours we departed for Xian. We landed about 1430 hours. Again, we were met by our CITS local guide and also by our technical host, Professor Bao Yushu of the Institute of Microwave Communications. While our baggage was being forwarded to the hotel, we toured Xian by bus. Our itinerary included a stop at the Big Wild Goose Pagoda and a Cloissone Factory. Following dinner our bus took us on a 1½ hour drive to the adjacent city of Xianyang, where we were to spend one night at the Qingdu Guest House. Monday was a sightseeing day with visits to the Joint Tomb of the Tang Emperor and Empress and the Tomb of Princess Yangtai. On the return trip to Xian, we visited a Jade Factory and were able to observe many intricate pieces being carved and polished.

Our accommodations in Xian were at the People's Hotel, but because of the crowded tourist season we could not get our rooms until 1630 hours. Following dinner a reception with about 15 members of the Chinese Institute of Communications (CIC) was held in the hotel. Dr. Li Shihe served as our interpreter. He introduced himself as a member of the MTT Society, having joined while residing as a visiting scholar in Canada during the previous two years. Following one of our technical presentations, we had a social hour, during which the major topic of conversation was microwave telecommunications. Most of the men present were either from the 4th Research Institute of the Ministry of Post and Telecommunications or the Northwestern Polytechnic University.

On Tuesday, 11 October, one of the high points of the trip was achieved when we arrived at the Qin Shi Huang Tomb and its associated Museum of Terracotta Soldiers. That afternoon we toured the Xian Microwave Equipment Factory and two presentations were delivered. Complete microwave radio systems are manufactured at this factory with many of the components and sub-assemblies built in-house, including receivers, transmitters, waveguides, and antennas. We were told there were 1,900 employees (500 engineers) working at this facility. There was considerable interest expressed in buying microwave low-noise and power FETs from the U.S. This factory has been supplying about 70% of the telecommunications equipment within the PRC and the management

is anxious to retain that share. We learned that within the last year, a competitive procurement process has been established by the government replacing the previous strict quota system that had been used. With an expected burgeoning market in TVRO by 1986, the Xian Microwave Factory is planning to be prepared with the finest performing equipment. Xian may be one of the best business opportunities for foreign component suppliers to participate in the PRC market.

The next day included a short tour of the Northwest Polytechnic University and the ladies were invited to visit a kindergarten. Since the major interest at NPU is in aeronautics and avionics, our host, Professor Hu, asked each member of our group to present his perspective on airborne microwave applications of the future. This was followed by a tour of several of the microwave and radar laboratories in which we saw an early Russian airborne radar that was used for teaching purposes. Following lunch in Xian we were bussed to the airport for the 1530 hour departure for Peking.

Peking (Beijing)

The flight to the capitol was on a British Trident, similar to the Boeing 727. It was nearly 1700 hours when we landed at Peking, and our local CITS guide arrived a short time later. Mr. Xu, the national guide provided by CITS, who had been accompanying us throughout our trip, had also been designated as our technical host in Peking. He is one of four deputy chief engineers at the Beijing Institute of Radio Measurement and is a recognized expert in the field of ferrites and ferrite devices.

We arrived at the Peking Hotel at 1815 hours. After dinner we had a few hours of free time to become familiar with our new environment. The accommodations were quite comfortable and there were many stores, both in the hotel, and nearby that offered all types of consumer products, clothes, food and souvenirs.

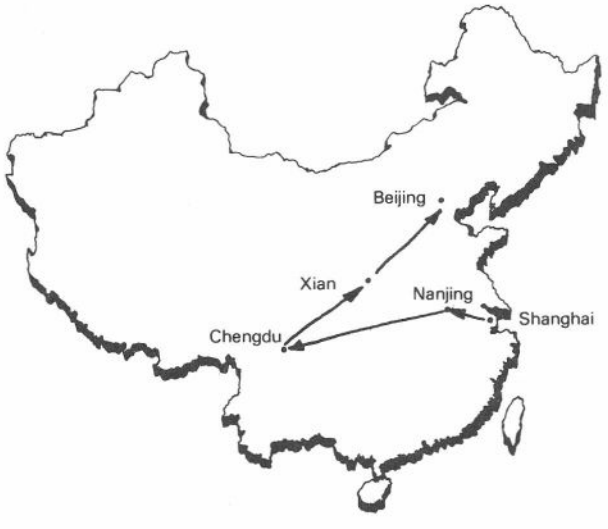
Thursday morning we toured the Summer Palace, located north of the city. In the afternoon, we visited the Institute of Acoustics. Our host at the Institute, Professor C. F. Ying, described the principal continuing research activities in the areas of underwater and classical acoustics and ultrasonics. The laboratory tour included experiments in ultrasonic scattering, hypersound generation in quartz, SAW convolvers and reflective-array compressors, the latter devices operating at below 100 MHz. All design fabrication and testing is largely self-contained within the Institute, with little or no dependence on outside facilities.

Friday proved to be another high point (literally) in our China itinerary with a tour of the Great Wall at Badaling Mountain. Everyone had the opportunity to climb a section of the wall, take photos and absorb the beautiful Fall colors in the countryside. The trip also included a short stop in the valley of the Ming Tombs where 13 of the dynasty emperors had been laid to rest. The Chinese are proceeding very slowly in their archeological excavations until they have developed and refined their preservation techniques in order to maintain the ancient relics in their original condition as they are uncovered.

Saturday concluded our technical activities with visits to the Institute of Posts and Telecommunications (IPT) and to the Institute of Metrology. The morning at IPT was largely used for our technical presentations in the main auditorium to an audience of about 75 engineers and students followed by detailed questions and answers on a wide range of microwave topics. Three of the members in our group, Duggan, Landry and Stinehelfer, also had an opportunity to visit the Chinese Radio Sport Association, BY1PK, one of only two in China.

The function of the Institute of Metrology corresponds very closely to the National Bureau of Standards in the U.S. We were shown several instrumentation standards for attenuation, impedance, power and phase measurement covering frequency bands from 30 MHz to 18 GHz. Virtually all of the equipment was of Chinese manufacture, and the primary standards are used to calibrate secondary standards in the various factories around the country.

Our final day in China was marked by a visit to the huge Tian'anmen Square, site of Mao's Memorial Hall, followed by an extensive tour of the Forbidden City. As it was a Sunday, and most people were off from work, both places were very crowded but the people were quite friendly and many individuals were anxious to practice their English and learn about our home towns. This had also been true in the other cities which we visited.



ITINERARY IN PEOPLE'S REPUBLIC OF CHINA

Conclusions

The days and evenings in China were filled with many new sights, tastes, and experiences. Perhaps the most significant impressions we were left with were: 1. the progress that is taking place, and 2. the freedom that the professional people appear to have in furthering these gains. The

stores are filled with all manner of merchandise and the people are purchasing all the consumer goods. There was a great deal of "free market" activity in the cities we visited, especially in agricultural products where every farmer who desires may sell the surplus produce he grows in his own private garden. The thousands of bikes that comprise the major means of transportation have helped the establishment of many individual repair shops that operate along the roadsides. It would not be a surprise to see these entrepreneurial beginnings lead to more organized private businesses in the next few years. Something of a surprise was the large number of American tourists that we encountered in all the places visited. This source of foreign exchange is obviously an important factor in the economic development of China. Perhaps on our next visit in a few years we will be able to view these developments with a better perspective.

FEDERAL DIRECTORY

The U.S. Government has published a 263 page document, **Federal Laboratory Directory 1982,** which is available from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402. The volume, stock number 003-003-02473-2, is available for $8 prepaid.

Three hundred eighty-eight federal research and development laboratories are included in a new directory prepared by the National Bureau of Standards in cooperation with the Federal Laboratory Consortium for Technology Transfer. Information on the mission and special equipment at each of the facilities is included, along with details about staff size and a point of contact for information about research and technology applications.

SALARIES UP

Growth in opportunities for engineers in the electronics industry is significantly outpacing the general economy, according to a study recently completed by *Engineering Carèer Associates* of Mountain View, California. The study reviewed compensation for 17 professional positions, including engineers who are individual contributors, in management, or in sales or marketing, and also reviewed emerging trends and new technologies. It concluded that electronics engineer salary hikes far exceed the annual 4.6% inflation rate recently reported by the U.S. Bureau of Labor Statistics.

For a free copy of the results of the study, write to: Engineering Career Associates, Department DX-80, Box 7100, Mountain View, CA 94042.

SARNOFF SYMPOSIUM

The 1984 IEEE Princeton Section Sarnoff Symposium is scheduled to be held at RCA Laboratories, Princeton, New Jersey on March 23, 1984. The subject of the second Sarnoff Symposium is *Microwave and Millimeter-Wave Solid-State Devices and Circuits.* Papers describing original work or reviews on the subject are solicited. The following areas are particularly appropriate:

- Materials
- Device technology
- Analog and digital circuits
- Reliability

Prospective authors are requested to send three copies of a two to three page summary explaining the contribution and its relevance to the state-of-the-art. The summary must be suitable for reproduction in a digest and must be received by January 23, 1984. Submit to:

Dr. Chainulu Upadhyayula
RCA Laboratories
201 Washington Road
Princeton, NJ 08540

Notice of acceptance or rejection will be mailed to the authors by February 13, 1984. Selected papers will be considered for publication in a special issue of the RCA Review.

All questions or inquiries for further information should be directed to Dr. Walter Slusark at RCA Laboratories, 201 Washington Street, Princeton, NJ 08540, (609) 734-2946.

DEFINITIONS

The following "definitions" have been submitted for inclusion in the next edition of the IEEE Dictionary.

byte clock. It's calibrated in 12 bytes. One byte is made up of 60 nibbles. Twenty-four bytes equal one nosh.

cascade development. A movement to promote the welfare of waterfalls.

cassegrainian feed. Dinner at the Cassegrainian's.

compensated semiconductor. A semiconductor that got paid off.

compound-wound generator. A cluster bomb.

dummy antenna. You've heard of "smart terminals"? Well these are stupid antennas.

mean life. Method of existence midway between the IEEE and the IRS.

reactive volt-amperes. Those amperes in favor of a new form of government.

semiconductor. A part-time ticket-puncher on the Long Island Railroad.

space-charge generation. That generation of people who get a charge out of space.

OPTICAL FIBER CHARACTERIZATION

For several years the National Bureau of Standards has been developing systems for measuring optical fiber parameters. A new NBS publication, the first of a series, describes the design and performance of some of these systems. The publication will be of interest to optical fiber and cable manufacturers, users, and researchers. *Optical Fiber Characterization—Volume 1* (SP 637-1) describes systems and methods for measuring backscatter, bandwidth (time domain), and index of refraction profile (refracted near field). The descriptions are representative of current industry practice and much of the material will be relevant to future systems. The 205-page hard-bound volume is available for $15 prepaid from: National Bureau of Standards, Division 360.2, Boulder, CO 80303. Make checks payable to "NBS Dept. of Commerce." Media contact: Collier Smith, (303) 497-3198.

SATCOM JOURNAL

John Wiley and Sons recently announced the inauguration of a new periodical, the **International Journal of Satellite Communications.** The chief editors are Prof. B. G. Evans, University of Surrey, Surrey, England and Dr. R. Colby, INTELSTAT, Washington, D.C. The Editorial Advisory Board consists of thirty-one experts from the United States, the United Kingdom, France, India, Federal Republic of Germany, Ireland, and Japan.

The magazine will be a quarterly technical journal to act as a focus for workers in, and other parties interested in, satellite communications. The journal will span the various disciplines applicable in the field of satellite systems and will provide rapid communication of new results and trends in this expanding area. As well as new research and development results and applications, the journal will also contain general interest articles of a review or tutorial nature.

The journal will cover all aspects of the theory and practice of satellite systems and networks, e.g., telecommunications, remote sensing, data collection, and broadcasting. Topics will include:

- Network philosophy and planning
- Communication systems and equipment
- Earth station and satellite antennas
- Space craft technology and control
- Earth station equipment and planning
- Applications of satellite systems
- User aspects
- Regulatory matters
- Propagation aspects including interference

The journal will consist of refereed papers, short communications, letters to the editor, book reviews, and news items. Volume 1 (1983) will consist of two issues and will cost US: $42.50 or UK: £25. For 1984, Volume 2 will contain four issues at twice the 1983 subscription price. Volumes 1 and 2 can be purchased together (valid to 31 December 1983) for US: $106 or UK: £62.50.

For further information, write to Journals Department, John Wiley and Sons, Ltd., Baffins Lane, Chichester, Sussex PO19 1UD, England or John Wiley and Sons, Inc., 605 Third Avenue, New York, NY 10158.

ANTENNA MEASUREMENT

National Bureau of Standards (NBS) engineers have developed a compact, simple, and inexpensive method of measuring the antenna factor of electrically small antennas. Antenna factor is a transfer function that converts received signal level to field strength. The method utilizes a loop cell capable of generating known fields, over a physically small antenna aperture, that are accurate to within ±2 dB in the range for 1.25 MHz to 1000 MHz. The loop cell uses two intersecting metal sheets joined at a 36 degree angle. A section of loop is placed between two coaxial panel jacks which are mounted on each metal sheet at a distance equal to the loop radius from the intersection. A known current passed through this section of loop produces calculable electric and magnetic fields between the sheets in the plane of the loop. These known fields are used to determine the antenna factor of small electric and magnetic antennas placed in the field. Further refinement should improve the accuracy to within ±1 dB. A paper is available. Contact: R. G. Fitz-Gerrell, Division 723.04, National Bureau of Standards, Boulder, CO 80303. Media contact: Fred McGehan, (303) 497-3246.

OPERATION "DIPSCAM"

As part of its "Operation Dipscam" the FBI will seek indictments of 38 mail-order colleges for allegedly awarding undercover agents phony academic certificates.

Five FBI agents received 23 degrees and paid more than $25,000 for the phony certificates, including degrees for medical doctors, psychiatrists, master of business administration and master of criminal justice. They ranged in price from $1,000 for a bachelor's degree to $5,000 for a Ph.D.

MORE NEW BOOKS

Ultrasonics, edited by P. D. Edmonds of S.R.I. International, is a volume in the *Methods of Experimental Physics* series published by Academic Press, New York, NY. The 624 page book (ISBN 0-12-475961-0) sells for $80.00.

Heterostructure Lasers is a two volume set by H. Casey and M. B. Panish of Bell Telephone Laboratories. Both books are volumes in the *Quantum Electronics* Series published by Academic Press. Part A is Fundamental Principles (272 pages, $47.00) and Part B is Materials and Operating Characteristics (330 pages, $58.00). The two volume set is prcied at $89.25.

T. J. Coutts has edited **Active and Passive Thin Film Devices,** another Academic Press publication. The 858 page book (ISBN 0-12-193850-6) is available for $147.95.

Another recent book published by Academic Press is **Radiometric Calibration: Theory and Methods.** Authored by C. L. Wyatt, Utah State University, the 208 page volume costs $42.00.

Another volume in the Academic Press *Quantum Electronics* Series is **Semiconductor Lasers and Heterojunction LEDs** by H. Kressel of R.C.A. Laboratories and Jerome K. Butler of Southern Methodist University. The 608 page book retails for $74.50.

One more recent Academic Press offering is **NMR Imaging in Biodmedicine,** Supplement 2, Advances in Magnetic Resonance, by P. Mansfield and P. Morris of the University of Nottingham. The 368 page book (ISBN 0-12-025562-6) is available for $49.50.

Artech House, 610 Washington Street, Dedham, MA 02026 recently announced the publication of two new books of interest to the microwave engineer. Prof. Fred E. Gardiol is the author of **Introduction to Microwaves** (ISBN 0-89006-134-3). The book was originally published in French and is intended to provide the practicing engineer with a "refresher course" in the fundamentals of microwave theory and applications. The 425 page book sells for $45.00.

Also available from Artech House is **Techniques of Radar Reflectivity Measurement,** edited by Nicholas C. Currie. The 480 page, hardcover volume (ISBN 0-89006-131-9), is available at a cost of $60. The book discusses the measurement of the radar reflectivity of clutter and man-made targets from a practical, easy-to-understand point of view.

Originally published by Artech House in 1975, **Radar Reflectivity of Land and Sea** has been revised and updated with a foreword containing an extensive bibliography and appendices. The new material by the author, Maurice W. Long, includes discussions on temporal and spatial statistics of radar echo, comparisons between lognormal and Weibull distributions, and dependencies of tree echo spectra on wavelength. The 400 page, hardcover book (ISBN 0-89006-130-0) retails for $40.

P. Rohan has written **Surveillance Radar Performance Prediction,** Volume 17 in the IEE Electromagnetic Wave Series. The 336 page, casebound book (ISBN number 0-906048-98-2), published in 1983, sells for $68.00. The book can be purchased from the IEEE Service Center, PPL Department, 445 Hoes Lane, Piscataway, NJ 08854. There is a $2.25 per book freight charge on all USA and Canada non-prepaid orders. New Jersey residents must add 6% sales tax. Books can also be ordered by Master Card, VISA, or American Express.

Wiley-linterscience, a division of John Wiley and Sons, Inc., 605 Third Avenue, New York, NY 10158 has published Bernard D. Steinberg's **Microwave Imaging with Large Antenna Arrays.** The 296 page book (1983) retails for $37.50.

MERRILL LYNCH IS BULLISH ON EEs

The Wall Street brokerage firm of Merrill Lynch & Company has donated $50,000 to the Department of Electrical Engineering at Columbia University, enabling the department to pursue research in telecommunications as it applies to the needs of the financial community, and to award a Merrill Lynch Fellowship in Telecommunications.

LASER CALIBRATION

A new National Bureau of Standards report describes in detail the systems and operating procedures used by NBS to calibrate transfer standards and privately-owned calorimeters for laser power and energy measurements. Calibratians are made in the range from 1 microwatt to 1 kilowatt and from 0.1 to 10 joules for wavelengths of 514.5, 632.8, 647.1, 1060, and 10600 nanometers. The report also outlines the Measurement Assurance Programs (MAPs) offered to participants on an annually renewable basis to ensure that their laser measurements always remain accurate. Copies of the report, *Documentation of the NBS C, K, and Q Laser Calibration Systems* (NBSIR 82-1676), are available for $10 prepaid from: The National Technical Information Service, Springfield, VA 22161. Order by PB #83-125633. Media contact: Collier Smith, (303) 497-3198.

INTERFERENCE BULLETIN

The Engineering Department of the Electronic Industries Association has made available its new microwave interference criteria bulletin, "EIA Telecommunications Systems Bulletin 10-D: Interference Criteria for Microwave Systems in the Private Radio Services." TSB 10-D replaces bulletin IEB 10-C, in use since 1976. The new version includes both digital and video criteria in addition to analog message interference criteria. Analog message interference criteria used in Bulletin 10-D are the same as those of 10-C, but more accurate methods of calculation have brought about revisions in recommended C/I ratios. The new version may be particularly useful to licensees who have been displaced from the 12.2-to-12.7-GHz band because of FCC Docket 82-334. The document is available for $17 from the Electronic Industries Association, 2001 Eye St., NW, Washington, DC 20006.

TAB NEWS

A recent meeting of the IEEE Technical Activities Board (TAB) was held November 17-18, 1983.

Outside Consultant — TAB reiterated its support for a centennial study of the organizational structure of the IEEE and is encouraging each of the ten technical divisions to appropriate $5,000 each toward the study.

MTT Awards — The MTT Society's request for approval of its proposed awards program for scholarships and grants-in-aid was endorsed for approval by the IEEE Executive Committee, with the authorization to allocate four percent of its total annual budget for scholarship and grants-in-aid for 1984, 1985, and 1986.

IEEE PREXY-ELECT

Dr. Donald D. King, President of Philips Laboratories Division of North American Philips Corporation, has been elected to the position of President-Elect for the Institute of Electrical and Electronics Engineers. Dr. King will serve as President-Elect during 1984 and will assume the office of President on January 1, 1985.

Dr. King, who had been nominated by the IEEE Board of Directors, received 15,664 votes to 12,375 votes for petition candidate Hans C. Cherney. Jerrier A. Haddad, also a Board nominee, received 9,317 votes. A total of 1,064 write-in ballots were cast.

A total of 179,761 members of the IEEE were eligible to vote in the election, of whom 21.7 percent voted.This compares with 23.9 percent who voted in last year's election.

During his campaign, Dr. King focused on the need to improve the status of IEEE members and cited continuing education for employed engineers as the most important issue facing the Institute. According to Dr. King, the possibility of obsolescence for older engineers is significant and he promised to work to encourage retraining and continuing education in industry. In line with this, he proposes that government should grant a tax credit to help industry provide such programs. He also believes that IEEE technical publications should become increasingly valuable in aiding the educational process. Here, he calls for more coverage of practical applications to balance that on research results, and for an examination of the possibilities of electronics publications for selective distribution and for rapid editorial processing and feedback.

Dr. King is a Fellow of the IEEE and has been a member since 1946. Among his many activities, he has served on the Awards, Publications and Technical Activities Boards and on a number of major committees including those concerned with Individual Benefits and Services (Vice Chairman, 1980, Chairman, 1981-82), Pensions, Fellow, Group/Society Awards (Chairman, 1974-75) and Nominations and Appointments. Dr. King is a member of the Microwave Theory and Techniques Society and the Antennas and Propagation Society, and has served on their Administrative Committees. He served as Vice Chairman and then as Chairman of the MTT Administrative Committee in 1963 and 1964, respectively, and is now an Honorary Life Member of the Committee. He also served as Editor of the MTT Transactions from 1959 through 1962.

Prior to joining Philips Laboratories in 1967, Dr. King was Director of Electronics Research Laboratory, Aerospace Corporation. Previously, he was responsible for organizing the Research Division of Electronic Communications, Inc. in Timonium, Maryland, where he managed a series of research programs. Dr. King received his A.B. and Ph.D. degrees (physics, 1946) from Harvard University where he subsequently held a number of research and teaching positions, including Assistant Professor of Applied Physics in 1948. Prior to joining Electronic Communications, he taught at Johns Hopkins University where he also became Director of the Radiation Laboratory. He is a registered Professional Engineer in the state of Maryland.

BALTIMORE CHAPTER PICNICS

The Baltimore MTT-S Chapter held its annual *Membership Drive Picnic* on Father's Day, June 19. Four new MTT Society members came free. Sixty people enjoyed the activities. They consumed five bushels of steamed crabs along with barbecued chicken, corn on the cob, hot dogs, and hamburgers accompanied by beer and wine. The activities at the Chesapeake Bay site included volleyball, swimming, and boating. The MTT musical ensemble under the leadership of the Chapter Chairman, Dan Buck, performed. Ed Niehenke, the ADCOM Chapter liaison, congratulated all the Chapter officers on their excellent job and presented each officer with a special gift. Although the event is three years away, this Chapter is already planning events for the 1986 IEEE MTT-S International Microwave Symposium which will be held in Baltimore, Maryland.

CREDIT CARD FRAUD

Do you know where your credit cards are?

Credit-card crimes are surging, with estimated losses this year alone topping $2M. Approximately seven credit cards exist for every single person a statistic that merely hints at the size of the problem.

In 1977, industry losses due to counterfeited bank cards were calculated at $66,000. Since then, the total has shot up astronomically: $3.5M in 1980; $15M in 1981; $40M in 1982. MasterCard estimates that its losses from counterfeiting hit $8.5M in 1982; Visa's losses were put at $10M. All segments of the industry are now examining their practices and making changes to fight the staggering threat.

A task force of the American Bankers Association (ABA) is drawing up guidelines for banks, consumers, and merchants. This task force is identifying existing safeguards and working on new, cost-effective and efficient ways to make cards safer and more tamper-proof.

Legislative action is being considered to plug perceived gaps in existing laws and to clarify some of the crimes, such as using valid account numbers for fraudulent purposes.

The card companies aren't waiting to introduce changes. Some cards have been found easy to tamper with and counterfeit. American Express, although it has reported few problems with counterfeiting because of the particular shade of green used and the complicated background of its cards, is introducing another feature to discourage counterfeiters. Imprinted on the back of all cards will be the cardholder's number, the same one embossed on the front. The number will be machine readable; anyone trying to alter a card will have to change the flipside, too.

Among the safety devices on MasterCard are: two holograms, imprinted on a silver-foil strip using laser technology to produce three-dimensional effects, will overlap the silver strip with part of the account number; anyone who tampers with the number will destroy the hologram. Moreover, only one company now has the equipment to produce the holograms, which are expensive and complicated—the whole idea, of course. The company estimates full conversion to the new card by 1986. In addition, fine-line printing of a delicate, hard-to-duplicate background and use of fluorescent inks are intended to reduce counterfeiting.

Visa will introduce its Electron Visa Card, which will have no embossed numbers. Instead, the number will be encoded in a universal product code, such as those found on virtually all products. It will be on a magnetic strip and will be readable by an optical character-recognition machine. Visa is developing a network of automatic teller machines where cardholders can use the new cards.

All this is vitally important, but making cards more secure won't solve credit card crimes. Theft and the use of lost and stolen cards and card data still account for a major percentage of the losses.

What this means is: 1) tougher authorization procedures, and 2) more vigilance on your part with your valuable cards and card numbers. Fundamentally, you are the first line of defense.

(Reprinted from IEEE Instrumentation and Measurements Society Newsletter, Issue No. 81, September 1983)

IRA FEES

United States taxpayers who itemize deductions can maximize their Individual Retirement Account contributions by paying IRA administrative and trustee fees separately.

By private letter ruling, the Internal Revenue Service has taken the position that separately paid IRA fees are deductible as expenses incurred for the production or collection of income, rather than as IRA contributions. Thus, a taxpayer would be allowed both a $2,000 deduction for an IRA contribution and an additional itemized deduction for the separately paid fees.

The letter ruling does not address the fee deduction issue for nonitemizers. Presumably, when IRA fees are not paid separately the nonitemizer remains entitled only to a deduction equal to the full amount paid (that is, the cantribution and the fees charged) up to the $2,000 limit.

MEMBERSHIP DIRECTORY

The IEEE Membership Directory is published annually. The next Directory will be available in Summer, 1984. The Directory (JH 64709) can be ordered at a special prepublication price of $30.00. Payment by check or major credit card (Master Card, VISA, American Express, or Eurocard) must accompany order. If ordered when available, the Membership Directory will cost $35.00 plus a $2.00 billing charge. The publication can be ordered from the IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854.

BOOK REVIEW

Microwave Devices and Circuits by S. Y. Liao was published in 1980 by Prentice Hall, Englewood Cliffs, New Jersey. The retail price for the 530 page book is $27.95.

The book has been reviewed by Dr. M. S. Gupta and Dr. S. R. Laxpati, both of who are associate professors of electrical engineering at the University of Illinois at Chicago. Each of them is a Senior Member of the IEEE, a member of MTT-S, and each has taught microwave engineering for more than ten years.

The author states, in his preface, that this book is intended as a text for the first course in microwave devices and circuits at the Senior or beginning graduate level in electrical engineering. This book was used as a textbook by one of the reviewers (SRL) to teach a course in linear, passive microwave components, and by the other (MSG) in a course on nonlinear and active microwave devices and circuits at the Senior undergraduate level. Based on these actual trials, our principal conclusion is that the book is of somewhat low level for the audience addressed, both in terms of the scope and demands of the text, and the level of difficulty of the solved and unsolved problems contained in the book. In addition, the book is error-ridden. These comments are elaborated upon below.

Approximately the first third of the book is devoted to linear, passive microwave components. However, a sizable fraction of this material is essentially a review of the basic electromagnetic theory and transmission lines. In most electrical engineering curricula, these are taught in courses which usually serve as prerequisites for the first course in microwave engineering. About one half of the remainder of the book is then devoted to microwave tubes and solid-state devices. Some parts of this material are well-written and comprehensive, although it is not clear why infrared detectors are included, but microwave resistive mixers and detectors are not. The remainder of the book contains miscellaneous topics.

It is clear that the book attempts to cover a wide range of topics in a limited number of pages. As the writing style is not particularly efficient, the economy of length is achieved by cursory treatment in places, by quoting a final result without discussion of its basis or limitations, and by omission of many basic topics. For example, noise figure is defined and discussed in about half a page. The discussion is so superficial that it cannot lead to any understanding of the concept at all, apart from the fact that it is also invalid except in special circumstances. Although the selection of topics is an author's prerogative, and no list of topics can be 'complete', the author's omissions are particularly noticable because so many pages are devoted to peripheral topics. These include the last two chapters (one on shielding and enclosures, and the other on field intensity calculations), and section 2.6 (on plane waves in metallic films coated on plastic substrates). The only rationale behind these peripheral topics seems to be that the author had the text for these topics available from some articles he had published earlier.

The book contains numerous errors. Firstly, there are many typographical errors, often in subscripts and equations, and are too numerous to list here. For example, there are many sign and j errors in equations (3-2-28) through (3-2-43) and (3-2-67) through (3-2-72). Secondly, there are errors due to imprecision, such as due to confusion between two terms or due to omission of the restrictions under which a result applies. For example, a single reflection coefficient is defined as the ratio of reflected to incident voltage **or** current, and the restriction on source noise temperature is not mentioned in defining noise temperature. Finally, there are factual and conceptual errors, such as exemplified by the following statement (on p. 169): "If a microwave junction satisfies a reciprocity condition, or if there are no active devices at the junction, the junction is a linear passive circuit."

The chapters contain short bibliographies, with the exception that the chapter on solid-state devices contains a long one with many recent references. There are many homework problems at the end of the book, although a large fraction of them require little more than substituting numerical values into equations contained in the book. The book attempts to be "practical" by including many graphs and tables, not all of them central to the discussion or necessary for understanding, including a 2½ page table for converting between ratios and decibels! The writing suffers from oversimplifications and is unnecessarily obscure at places.

The book is perhaps suitable for self-study by those wishing a broad overview of solid-state microwave devices. The reviewers are unable to recommend it for classroom use or for careful quantitative work with superior engineering students.

AGE DISCRIMINATION

An engineer can often feel helpless and hapless when confronted by age discrimination on the part of a large corporate employer. A recent guide by the IEEE U.S. Activities Board Age Discrimination Task Force attempts to address this problem by outlining a number of actions the engineer may take to help counteract such discrimination.

Among the suggestions in the report, entitled *Age Discrimination: A Serious Constraint to Lifetime Careers in Engineering*, are that EEs should contact lawyers specializing in age discrimination and proceed to outline their cases to congressmen and state legislators.

In addition, the guide advises engineers to speak to colleagues and collect factual data to confirm their cases. Requesting help from the professional engineering societies and filing an age-discrimination charge with the state Human Rights Commission are also possibilities.

Copies of the report are available from the IEEE Washington Office, 1111 19th St., N.W., Washington, DC 20036; telephone (202) 785-0017.

LASERS

A review of **Lasers, Theory and Applications** appeared in the Journal of the Optical Society of America (Volume 73, Number 11, November 1983, page 1612) and is reprinted below. Authored by K. Thyagarajan and A. K. Ghatak, the 431 page book was published in 1981 by Plenum Press, New York and London.

The book was reviewed by Donald C. O'Shea of the School of Physics, Georgia Institute of Technology, Atlanta, Georgia.

This textbook on lasers is somewhat different from other laser texts. In the preface the authors state that the book is "an attempt . . . to present, in a coherent fashion, the basic theory behind laser operation . . . to discuss, in reasonable detail, some important applications of lasers," and "to convey the development of the subject . . ." by reproducing the Nobel Lectures of Townes, Basov, and Gabor. Thus the book is an attempt to derive theory, report on applications, and provide technological history, a tall order that is not quite filled.

About one third of the text is given over to basic quantum mechanics and the semiclassical and quantum derivations of the Einstein *A* and *B* coefficients. The balance of the book is divided equally among elementary discussions of the laser rate equations, optical resonators and properties of lasers, and brief descriptions of laser applications.

The survey on laser types is 10 pages long. This gives the student little feel for current technology. The sections on laser application are uneven. The brief chapter on light-wave communications is nicely done, but the chapters on lasers in industry and science are too sketchy to provide the student much insight into the use of the laser in these fields.

I doubt that the book would be useful for self-study, as the authors propose in the preface. The chapters are not developed in a way that ties things together well. Also the text lacks references to other texts that are at a comparable level, such as Svelto,[1] Sargent *et al*,[2] and Yariv,[3] that students could compare for different insights and use for further study. However, as a textbook for a course in applied quantum mechanics, in which the student could see the fruits of this field in an area of technology that is relevant and exciting, this book has the right level and approach.

References

1. O. Svelto, *Principles of Physics*, translated by D. C. Hanna (Plenum, New York, 1976).
2. M. Sargent III, M. O. Scully, and W. E. Lamb, Jr., *Laser Physics* (Addison-Wesley, Reading, Mass., 1974).
3. A. Yariv, *Quantum Electronics*, 2nd ed. (Wiley, New York, 1975).

NEW NSF AWARDS

The National Science Foundation (NSF) announced a new program of research awards to the nation's most outstanding and promising young science and engineering faculty. It is expected that these awards will help universities meet a wide demand for highly qualified personnel for academic and industrial research and for teaching. Approximately 100 of the total 200 Presidential Young Investigator Awards for 1983/1984 will go to engineering, and about 30 will be assigned to ECSE. Guidelines for the award are:

- Competition limited to tenure track young investigators (within seven years of the Ph.D.)
- Awards based on curriculum vitae of candidate.
- Awards will be for up to five years with NSF providing $25,000 per year initial award with additional NSF funds provided based on one-to-one matching for any industrial funds provided the grantee, up to a total award (including industry) of $100,000 per year.

For further information write Presidential Young Investigator Awards, NSF, Room 414, Washington, DC 20550, or telephone (202) 357-7536.

WR-10 CALIBRATION

The National Bureau of Standards has extended to higher frequencies its calibration services for attenuators, bolometer mounts, phase-shifters, and termination in WR-10 waveguide. The new special test service uses a dual 6-port to measure attenuation, phase-shift, complex reflection coefficient, and effective efficiency at 94 to 96 GHz. The service will cost about $900 per frequency. This special test has not completed formal internal NBS reviews, so it is not yet considered an official NBS calibration service with the usual NBS certification. However, results are documented with known accuracy tolerances similar to other National Bureau of Standards calibrations. Duplicate systems for these measurements are being supplied to the U. S. Air Force calibration laboratory at Newark, Ohio, and the U. S. Army laboratory at Redstone Arsenal, AL. For further information, contact: Manly Weidman, Mail Code 824.01, National Bureau of Standards, Boulder, CO 80303; telephone: (303) 496-3210.

THE COMPUTER AGE

Sometime in the future, an historian writing about technology in the 20th Century is going to want to define the beginning of the computer age. After thinking about Pascal, Babbage, von Neumann, Non von Neumann, and other greats, he or she will realize that defining the beginning of something is harder than it sounds. Did the computer age begin with the first computer, the first practical computer, the first widely used computer, or what?

We suggest that the computer age truly began when the machine—along with its foibles—was accepted as a normal part of everyday life. But when was that? Some would suggest that the fateful day occurred the first time a consumer received an incorrect computer-generated bill and, when he or she questioned it, was told, "I'm sorry, but the computer doesn't make mistakes." Others would no doubt opt for the first time someone mildly agreed to "call back later, our computer is down right now and there's nothing we can do to help you."

For us, the computer age is much more precisely defined. It began a few months ago when a new lie joined the two great untruths that people tell each other: "I was just going to call you" and "The check is in the mail." The third prevarication comes from a writer working on a word processor and goes something like this: "It's not my fault that the story is going to be late; my disk crashed."

Welcome to the computer age.

(Reprinted from Electronic Design, August 4, 1983)

MEETINGS OF INTEREST

The following compilation represents nearly one year's worth of potential meetings of interest to members of the Microwave Theory and Techniques Society. Additions, deletions, or corrections should be addressed to the MTT-S Newsletter Editor.

- The Tokyo Ryustu Centre is the site for the **Electro-Optics and Laser International Exposition.** For more information on the February 16-18, 1984 meeting, contact Cahners Exposition Group, Cahners Plaza, 1350 East Touhy Avenue, P.O. Box 5060, Des Plaines, IL 60018, (312) 299-9311.
- The 1984 edition of the **International Solid-State Circuits Conference** will be held February 22-24, at the San Francisco Hilton Hotel, San Francisco, California. For additional information, contact Lewis Winner, 301 Almeria Avenue, Coral Gables, FL 33134, (305) 446-8193.
- **The Sixth Electromagnetic Compatibility Symposium and Technical Exhibition** will be held at the Federal Institute of Technology in Zurich, Switzerland, March 5-7, 1985. Additional information is available from Dr. T. Dvorak, ETH Zentrum-IKT, 8092 Zurich, Switzerland, telephone (01) 256-2790.
- March 6-8, 1984 are the scheduled dates for the **1984 International Zurich Seminar on Digital Communications.** The meeting will be held in Zurich, Switzerland. Contact Secretariat 84 IZS, R. Agotai, ETZ F88, ETH-Zentrum, CH-8092 Zurich, Switzerland for further information.
- Atlanta, Georgia is the site for the **1984 National Radar Conference,** scheduled for March 13-14, 1984. For further details, contact Dr. Edward K. Reedy, Georgia Institute of Technology, Engineering Experiment Station, Radar and Instrumentation Laboratory, Atlanta, GA 30332, (404) 424-9621.
- Atlanta, Georgia is the site for the March 13-15, 1984 **National Radar Conference—1984.** The conference theme is Radar Technology for the Eighties. Additional information can be obtained from Dr. Edward K. Reedy, Georgia Institute of Technology, Engineering Experimental Station, Radar and Instrumentation Laboratory, Atlanta, GA 30332, (404) 424-9621.
- **The Tenth AIAA Communication Satellite Systems Conference** is scheduled for March 18-22, 1984 at the Sheraton Twin Towers Hotel, Orlando, Florida. F. J. Dietrich, Ford Aerospace and Communications Company, 3939 Fabian Way, Mail Stop T97, Palo Alto, CA 94303, (415) 852-7190 can supply additional information.
- The third annual **Phoenix Conference on Computers and Communications** will be held March 19-21, 1984 in Phoenix, Arizona. The conference theme is *The Challenge of Change*. For additional information, contact Susan C. Brewer, Honeywell LCPD, Mail Stop Z22, P. O. Box 8000F, Phoenix, AZ 85066.

- Brooks Hall in San Francisco, California is the site for the **Third Annual Test and Measurement World Expo.** For more information on the April 3-5, 1984 meeting, contact Test and Measurement World Expo, 215 Brighton Ave., Boston, MA 02134, (617) 254-1445.
- Philadelphia, Pennsylvania is the site for the April 3-5, 1984 **International Teleconference Symposium.** For more information, contact the conference administrator, International Teleconference Symposium, Communications Satellite Corporation, 950 L'Enfant Plaza, SW, Washington, DC 20024.
- The Galt House Hotel in Louisville, Kentucky is the site for **Southeastcon '84,** an April 8-11, 1984 gathering. For additional information, contact Mr. Robert T. Coomes, 1104 Wood Wynd Way, Louisville, KY 40223, (502) 429-1108.
- The **1984 IEEE Region 5 Conference** will be held in Wichita, Kansas, at the Downtown Holiday Inn Plaza, April 9-13, 1984. Contact Merv Bontrager, Litwin E & C, Inc., P.O. Box 282, Wichita, KS 67201, (316) 265-0731, ext. 206.
- April 10-12, 1984 are the dates for the **Second International Conference on Metal—Organic Vapor Phase Epitaxy.** For further information, contact Dr. P. A. Houston, University of Sheffield, Department of Electronic and Electrical Engineering, Mappin Street, Sheffield S1 3JD, United Kingdom. Telephone 44(0742)78555.
- **The International Magnetics Conference (INTERMAG)** will be held April 10-13, 1984 at the Hamburg Conference Centre, Hamburg, West Germany. For additional details, contact either Prof. Dr. Walter E. Proebster, IBM Deutschland GmbH, D-3280, B-7030-45, Schoenaicherstrasse 220, 7030 Boeblingen, Federal Republic of Germany, tel. (0) 7031-16-3929 or F. B. Hagedorn, Bell Telephone Laboratories, Room 2-D348, 600 Mountain Avenue, Murray Hill, NJ 07974, (201) 582-6415.
- April 24-26, 1984 are the dates for the **Seventh Topical Meeting on Integrated and Guided-Wave Optics.** The meeting will be held at the Orlando Hyatt Hotel, Kissimmee, Florida. Contact Optical Society of America, Integrated Optics Meeting, 1816 Jefferson Place, N.W., Washington, DC 20036 for more details.
- **The IEEE 1984 National Symposium on Electromagnetic Compatibility** will be held April 24-26, 1984 at the Hyatt Regency Hotel in San Antonio, Texas. Additional information is available from Melvin Johnson, Southwest Research Institute, P.O. Drawer 28510, San Antonio, TX 78284, (512) 684-5111, extension 2009.
- May 5, 1984 is the date for the **Fourth Annual Benjamin Franklin Symposium,** sponsored by the Philadelphia Chapter of MTT-S/AP-S. The conference theme is *Advances in Antenna and Microwave Technology*. The meeting site is the Sheraton-University City in Philadelphia, Pennsylvania. Contact Ms. Helen Yonan, IEEE Office, Moore School of Electrical Engineering, University of Pennsylvania, Philadelphia, PA 19104, (215) 898-8106 for further information.
- May 7-9, 1984 are the dates for the **1984 Microwave Power Tube Conference,** to be held at the Naval Postgraduate School, Monterey, California. Due to facility limitations, attendance will be by invitation only and will be restricted to U.S. nationals only. Requests for invitations should be addressed to R. Roberts, Invitations Chairman, Raytheon Company, Microwave Tube Division, Foundry Avenue, Waltham, MA 02254, (617) 899-8400, extension 4831. U.S. Department of Defense Secret clearance must be submitted by all invitees prior to the meeting. For additional details on the conference, contact Leonard H. Klein, Palisades Institute for Research Services, Inc., 201 Varick Street, 11th floor, New York, NY 10014, (212) 620-3377.
- The 1984 edition of the **International Symposium on Circuits and Systems** will take place May 7-10, 1984 at the Queen Elizabeth Hotel, Montreal, Quebec, Canada. Additional information can be obtained from Dr. M. N. S. Swamy, Dean of Engineering, Concordia University, 1455 de Maisonneuve Boulevard West, Montreal, Quebec, H3G 1M8, Canada, (514) 879-5926.
- The Hyatt Regency Hotel, New Orleans, Louisiana is the selected location for the **34th Electronic Components Conference,** scheduled for May 14-16, 1984. Diana Bendz, IBM Corporation, Department 648, 1701 North Street, Endicott, NY 13760, (607) 755-2862 can supply additional information.
- May 14-17, 1984 at the RAI Conference Center in Amsterdam, The Netherlands are the scheduled dates for the **1984 IEEE International Conference on Communications (ICC '84).** Further information can be received from Dr. T. A. C. M. Classcen, Philips Research Laboratories, WY-2, 5600 MD Einghoven, The Netherlands.
- **Electro '84** will be held at the Boston-Sheraton Hotel and the Hynes Auditorium, Boston, Massachusetts. Contact Dale Litherland, Electronic Conventions, Inc., 8110 Airport Boulevard, Los Angeles, CA 90045, (213) 772-2965 for more information on the May 15-17, 1984 conference.
- Rochester, New York is the site for the May 21-23, 1984 **Custom Integrated Circuits Conference.** Contact Dr. Aris Silzars, Tektronix, Inc., Mail Stop 59-543, P.O. Box 500, Beaverton, OR 97077, (503) 627-6980.
- **The National Aerospace and Electronics Conference (NAECON '84)** will be held May 22-24, 1984 at the Dayton Convention Center, Dayton, Ohio. Contact NAECON '84, 110 East Monument Avenue, Dayton, OH 45402, (513) 223-6266 for further details.
- The MTT Symposium will be preceded by the **1984 IEEE Microwave and Millimeter-Wave Monolithic Circuits Symposium.** For additional details on the May 29-30, 1984 conference, contact Dr. Barry E. Spielman, Naval Research Laboratory, Code 6851, Washington, DC 20375, (202) 767-3526.
- **THE 1984 IEEE MTT-S INTERNATIONAL MICROWAVE SYMPOSIUM** is scheduled to be held at

the Hyatt Regency Hotel, San Francisco, California, May 30-June 1, 1984. Contact Nicholas Kuhn, Hewlett-Packard Company, 1501 Page Mill Road, Palo Alto, CA 94303, (415) 857-3387 for further information.

- **The Second Seoul International Symposium on Electrical and Electronics Engineering** will be held June 5-7, 1984 at the Hotel Shilla in Seoul, Korea. Additional information is available from Prof. Z. H. Cho, Department of Electrical Science, Korea Advanced Institute of Science, P.O. Box 150, Chong Yang Ri, Seoul, Korea.
- **Machine Processing of Remotely Sensed Data** is scheduled to be held June 12-14, 1984 at Purdue University in West Lafayette, Indiana. The meeting is sponsored by the Laboratory for Applications of Remote Sensing at the University. For additional information, contact Douglas B. Morrison, Purdue University/LARS, 1291 Cumberland Avenue, West Lafayette, IN 47906, (317) 494-6305.
- **The Thirteenth International Quantum Electronics Conference** will be held at the Anaheim Convention Center and the Anaheim Marriott Hotel, Anaheim, California, June 18-22, 1984. The Optical Society of America, 1816 Jefferson Place, N.W., Washington, DC 20036, (202) 223-8130 can supply further information.
- June 25-29, 1984 are the dates for the **IEEE International Antennas and Propagation Symposium.** The conference will be held jointly with the USNC/URSI meeting at the Westin Hotel, Copley Place, Boston, Massachusetts. Contact Dr. Allen C. Schell, RADC/EE, Hanscom Air Force Base, MA 01731, (617) 861-3700 for further information.
- The Delft University of Technology, Delft, The Netherlands is the location for the **1984 Conference on Precision Electromagnetic Measurements.** Contact Dr. C. Beekhuizen, Delft University of Technology, Department of Electrical Engineering, Postbox 5031, 2600-GA Delft, The Netherlands, telephone 01 (388) 3071 for further data on the August 20-24, 1984 conference.
- **The 1984 International Geoscience and Remote Sensing Symposium** is scheduled to be held August 27-30, 1984 at the Council of Europe, Strasbourg, France. For further information, contact Prof. P. Gudmandsen, Technical University of Denmark, Lyngby, Denmark; telephone (02) 880588.
- **EASCON '84, the Electronics and Aerospace Systems Conference** is scheduled to be held September 10-12, 1984 at the Shoreham Hotel in Washington, D.C. Contact William E. Bearry, Satellite Business Systems, 8003 Westpark Drive, McLean, VA 22102, (703) 442-6072 for more data.
- September 11-13, 1984 are the dates for **MIDCON '84.** The conference will be held in Dallas, Texas. Further information can be obtained from Dale Litherland, Electronic Conventions, Inc., 8110 Airport Boulevard, Los Angeles, CA 90045, (213) 772-2965.
- **ISHM '84,** the annual meeting of the International Society of Hybrid Manufacturers, will take place September 17-19, 1984 at the Loew's Anatole Hotel in Dallas, Texas. For more information, contact Dale W. Williams, Cermalloy, Inc., P.O. Box 1039, Wylie, TX 75098.
- Tokyo, Japan will be the location for the **1984 International Symposium on Electromagnetic Compatibility.** The meeting will be held October 16-18, 1984 at the Hotel Pacific. Contact Prof. T. Takagi, Tohoku University, Department of Communications, Sendai, Japan 980, telephone 0222-22-1800, extension 4266 for further details.
- **The 1984 International Test Conference** will be held October 16-18, 1984 at the Franklin Plaza Hotel in Philadelphia, Pennsylvania. Contact Harry Hayman, P.O. Box 639, Silver Spring, MD 20901, (301) 589-8142 for additional information.
- **MILCOM '84—Military Communications Conference** will take place October 21-24, 1984 in Los Angeles, California. Contact Dr. Nicholas Yaru, Hughes Aircraft Company, P.O. Box 3310, Building 618/D405, Fullerton, CA 92634, (714) 732-4849 for more details.
- October 22-26, 1984 are the dates for the **Ninth Annual International Conference on Infrared and Millimeter Waves,** to be held in Takarazuka City, Japan. Kenneth J. Button, Massachusetts Institute of Technology, National Magnet Laboratory, Building NW 14, Cambridge, MA 02139, (617) 253-5561 can provide further information.
- Japan (Tokyo) was also selected for the October 23-25, 1984 **International Symposium on Clutter in Radars and Imaging Sensors.** Contact Prof. Toshimitsu Musha, Department of Applied Electronics, Tokyo Institute of Technology, Nagatsuta Midoridu, Yokohama 227, Japan for additional data.
- **The Western Electronic Show and Convention (WESCON '84)** will be held October 30-November 1, 1984 in Los Angeles, California. Contact Dale Litherland, Electronic Conventions, Inc., 8110 Airport Boulevard, Los Angeles, CA 90045, (213) 772-2965 for more information.
- The Sheraton Washington Hotel in Washington, D.C. has been selected for **AUTOTESTCON '84.** Contact M. D. Myles, Naval Air Systems Command, Code Air 552, Washington, DC 20361, (202) 692-3146 for additional details on the November 2-4, 1984 conference.
- **The 1984 IEEE Ultrasonics Symposium** will be held November 14-16, 1984 at the Dallas Hilton Hotel, Dallas, Texas. Contact Dr. Lewis T. Claiborne, 920 North Lake, Richardson, TX 75080, (214) 238-2426 for further information.
- November 25-29, 1984 are the dates for the **1984 Global Telecommunications Conference (GLOBECOM '84).** The conference will be held at the Atlanta Hilton Hotel in Atlanta, Georgia. Additional information is available from Allen H. Cherin, Bell Telephone Laboratories, 200 Northeast Expressway, Norcross, GA 30071, (404) 447-2619.

EMB MAGAZINE

In addition to its regularly published Transactions, the IEEE Engineering in Medicine and Biology Society is also publishing the *IEEE Engineering in Medicine and Biology Magazine*, a quarterly journal containing news, new product developments, profiles on prominent personalities, latest patents in the field, and refereed articles.

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MICROWAVE HEATING

Industrial Microwave Heating by A. C. Metaxas and R. J. Meredith is the fourth volume in the IEEE Power Engineering Series. The book was published in paperback by Peter Peregrinus, Ltd. in 1983 (ISBN 0-906048-80-3). The eleven chapter book contains 357 pages. In the United Kingdom, the book can be ordered for £34 from IEE, Market Department, P.O. Box 8, Southgate House, Stevenage, Herts, SG1 1HQ, United Kingdom. In the United States, order through IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854 ($78.00). Elsewhere the book can be ordered from England at £44 per copy.

Industrial Microwave Heating was reviewed by Prof. W. A. G. Voss of the University of Alberta, Edmonton, Alberta, Canada.

This is the first text on the subject to appear in fifteen years. That it will fulfill a need is without doubt; how well is another matter. The main problem is that the authors take until the last chapter to get to the industrial applications, which they then cover very well, if briefly. The book is surprisingly theoretical and does not, as the authors *hope in the preface*, bring together the theory and practice of industrial microwave heating. Rather, the book gives an overview of the theoretical aspects of dielectric materials and applicator design, but never an actual heating result or photograph, an actual drying cost or economic advantage.

The real value of this book lies in its commentary, the way in which it draws material from the literature together and presents ideas. In that respect it does succeed, but not without some problems, many of them due to poor editing. There are, for example, two Figures 5.17; the second one is exceedingly difficult to follow with the text owing to its layout. Two pages later Altman's equation is stated for the attenuation of a web of material in a waveguide—without the simplifying assumptions being given. Door seals and wavetraps are treated well and the sections on special applicators will be particularly useful to R and D system designers.

The book is strongly recommended for its ideas, philosophy, references, and general information.

BIOEFFECTS

Biological Effects of Electromagnetic Energy is a new IEEE Press reprint volume edited by John M. Osepchuk of the Raytheon Corporation's Research Division. The clothbound volume (ISBN 087942-165-7) containing 608 pages was sponsored for publication by the IEEE Committee on Man and Radiation (COMAR).

The goal of this book is to bring together a collection of key papers, carefully selected to reflect the spectrum of subjects and schools of thought, so that the reader is given a coherent history and overview on the interaction of nonionizing radiation with living systems, particularly with humans.

The papers, one of which was specially written for this volume, one arranged by subject into seven parts. The editor and his six associate editors each concentrated on organizing one of these parts. The reprints in each part are preceded by specially written material giving introductory, background, and bibliographic information. The resulting book contains 61 reprinted papers.

The price of the book is $47.95 for IEEE members or $79.95 for nonmembers. Order by product number PCO1594 from the IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854.

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