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Number 105, Winter 1983



OUTGOING PRESIDENT'S REMARKS

by R. A. Sparks

In looking back over 1982, there were many activities and experiences that are noteworthy to recall. One of the earliest events to occur was the first IEEE-sponsored satellite teleconference. Promoted as a new technique to foster continuing education simultaneously across the continental United States, the subject chosen for the first teleconference was *Project Management*. More than 650 people attended the five hour seminar at 39 sites around the country. The contributions of microwave technology to this new broadcasting medium include the hardware used in the uplink transmitter, the satellite transceiver, and the numerous earth stations.

A second teleconference, on the subject of Robotics, was held in December 1982. Plans are being implemented for at least three additional teleconferences for 1983 on technological subjects in which there is widespread engineering interest.

Cellular radio and direct broadcast satellites (DBS) for home TV reception are two other burgeoning areas of commercial microwave activity that have made significant progress in 1982. Many members of the MTT Society are participating in the various aspects of design, development, and implementation of these important systems.

1982 also represents the first year that the MTT-S President has traveled overseas to participate in IEEE Regional activities. As a member of the Technical Activities Board (TAB) Delegation to Region 10, I had the opportunity to visit IEEE Sections in Japan, India, and Hong Kong. The delegation was headed by TAB Chairman, Dr. Jose Cruz, and included five Society Presidents. IEEE President Robert Larson and other staff members joined us at various locations on the itinerary.

(continued on page 3)



NEW MTT-S PRESIDENT'S MESSAGE

by C. T. Rucker

About ten years ago, the chief problem encountered by the Microwave Theory and Techniques Society was that of maintaining financial solvency. In those days, your Administrative Committee met long and hard on issues such as increasing the Transactions' page budget by a page or two. Those days are gone, forever I hope. The introduction of exhibits at our Symposia has led to a healthy financial picture envied by many of our sister Societies.

Where do we go from here? Expand the Transactions? We have. Expand the Newsletter? Again, we have. Reduce Society dues. We haven't. But does anyone seriously feel that a reduction of the \$8.00 fee to \$5.00 would be a bonanza? Of course not; your \$8.00 fee already buys Transactions costing over \$50.00 per year.

Where do we go from here? How about scholarships? How about more review articles and tutorials in the Transactions or more special issues?

. . . . How about?

How about you? Are you ready to make use of MTT-S resources to further the interests of the microwave community in general and of each MTT-S member? I wonder. You may wonder too after reading Steve March's editorial in this Newsletter. Steve comes on strong, but his points are valid.

Let me encourage you to read the foreword to the directory included with this Newsletter. You will sense there my hopes for a two way communication link between all the membership and your Administrative Committee. And, by the way, I hope you bury Steve March with responses to his latest editorial.

1984 CENTENNIAL ACTIVITIES

The highlight of the IEEE centennial year activities will be the May 14, 1984, Centennial Day program at ELECTRO in Boston, Mass. Activities will include the IEEE awards presentation and reception for representatives of 100 invited societies or associations from around the world, and a major address and presentation of the Centennial Medal to past and present Institute Presidents, Medal of Honor recipients, and others.

Other key centennial year activities already scheduled include:

• Jan. 30, 1984: Ceremonies at the IEEE Power Meeting in Dallas, Texas.

 May 13, 1984: A special program to celebrate the anniversary of the May 13 founding of the American Institute of Electrical Engineers in 1884 and of the Institute of Radio Engineers in 1912, to be held in New York City with the help of the IEEE New York Section.

• Oct. 7-8, 1984: A centennial convocation at the Franklin Institute in Philadelphia, Pa., with a series of meetings and a convocation of former Medal of Honor recipients.

Plans also include a Technical Activities Board Centennial Conference and a West Coast Celebration, but the exact days and locations for these events have not yet been determined.

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EDITOR'S

NOTES

by S. L. March

I was wrong! In the previous issue of the MTT-S Newsletter, I chided the academians in our Society for not supporting the New Theses column which I felt would be a welcome addition to the Newsletter. I insinuated that maybe academians can not read or do not read the MTT-S Newsletter. It appears that academians, in general, can read better than the rest of the MTT-S membership. With more than 6100 MTT-S members, only 139 reply cards (approximately 2.25%) concerning the utilization of the MTT-S surplus were returned. And they were pre-addressed and postage-paid! On a percentage basis, more academians returned the reply cards than MTT-S members in industry or with government organizations.

Fourteen cards were returned from MTT-S members residing outside the United States. Three were received from Australia and an equal number from India. Two were received from Belgium. New Zealand, France, Switzerland, England, Israel, and West Germany each had one return.

I guess the majority of the MTT Society membership does not care how its Administrative Committee spends the Society's surplus funds. Well, the Adcom has not decided yet either. However, a decision will probably be reached at one of the 1983 Administrative Committee meetings. I hope the membership will approve of their Adcom's decisions. If you do not, remember only 139 of you had voices loud enough to be heard.

A breakdown of the responses (first choice, second, and third in popularity only) appears at the end of this column. A number of additional suggestions were written in by the respondents. These include: refund cash to the members, increased Chapter support, free copy of MTT Symposium Digest, contribute \$50 to book of member's choice, more symposia at more places, abolish or reduce Transactions page charges to members, reduce Symposium Digest cost, publish practical design tips, videotape National Lecturer and distribute, keep as a cushion against future dues increases, publish "basic" microwave book for new engineers, assistance to students presenting papers at MTT-S Symposium, generate educational material which could be borrowed by members, expand to two National Lecturers per year, and begin publication of MTT-S Letters for quick turnaround short articles.

Possibility	First	Second	Third
Reduce MTT-S dues	25	14	6
Expand MTT Transactions	24	10	9
Vicrowave Foundation	21	8	1
Book of classic articles	12	15	11
Graduate scholarships	10	15	11
Free book	12	9	11
Educational video tape	7	8	13
Undergraduate scholarships	8	6	11
Research fellowships	2	12	12
Copy MTT-related standards	5	7	10
University endowments	5	7	6
Expand MTT-S Newsletter	1	5	6
Reduce symposium fees	1	5	3
			<u> </u>
TOTAL	133	121	110

SPECIAL ISSUE OF MTT TRANSACTIONS

The July 1984 issue of the IEEE Transactions on Microwave Theory and Techniques will be a special issue devoted to *Electromagnetic Wave* Interactions with Biological Systems. The Guest Editor will be Dr. James C. Toler, Georgia Institute of Technology, Atlanta, GA 30332, (404) 894-3322.

OUTGOING (continued from page 1)

The purpose of the trip was to foster communications with the members of our Societies and the local Sections within Region 10, the fastest growing Region of the IEEE for the past several years. I was deeply impressed by the intense dedication of the local leaders to the IEEE and the fostering of continued technical education for the members. There is a tremendous thirst for technical data and exchange among individuals in these countries. The IEEE has become a major factor in supporting these efforts and providing the publications for information dissemination. This was true in every one of the cities we visited, including Tokyo, Bombay, Hyderabad, Bangalore, New Delhi, and Hong Kong.

The culmination of the trip was participation at the annual Region 10 Meeting in New Delhi where representatives from nearly every nation in the Far East, New Zealand, and Australia were in attendance. It is anticipated that the MTT Society President will participate in subsequent IEEE Regional delegations around the world.

While on the subject of international activities, our National Lecturer this past year, Ferdo Ivanek, was invited to give his presentation in several overseas cities including Geneva, Milan, Rome, Osaka, and Tokyo. Our National Lecturer is increasingly becoming an "International Lecturer." At the 1982 IEEE MTT-S International Micro-

At the 1982 IEEE MTT-S International Microwave Symposium, we were privileged to hear an address by Dr. Huang Hung-chia, Chairman of the Society of Microwaves of the Chinese Institute of Electronics, People's Republic of China. As a follow up to his visit, plans are currently being formulated to assemble a Microwave Study Group to visit the PRC in the Fall of 1983. A call for delegates appears elsewhere in this issue of the MTT-S Newsletter.

Another event that stands out was the election of Leo Young, former MTT Society President and IEEE President, as an Honorary Life Member of the Society. The MTT-S has also initiated a new Distinguished Service Award, the first recipient of which will be announced at the 1983 International Microwave Symposium in Boston.

The Society has continued to make progress in many spheres of activity. More than twenty of our Chapters have availed themselves of the \$300 grants to promote local technical programs, and the concept of a Microwave Foundation, initiated by Past President Fred Rosenbaum, has been formalized in a preliminary draft for review by the MTT-S Administrative Committee and all interested parties. The prospect of a Microwave Foundation to coordinate all of the grants-in-aid, scholarships, educational activities, and career opportunities in the microwave field is a worthy objective to achieve.

I would like to take this opportunity to thank all of the members of Adcom for their support during this past year and I look forward to working with them in the future. Congratulations to our recently reelected Adcom members and a special welcome to our first time members, Ferdo Ivanek, Yoshihiro Konishi, George Jerinic, and David McQuiddy. Dr. Konishi, who will be serving a one year term, is the first MTT Society Adcom member elected from Region 10.

I would also like to congratulate our newly elected officers for 1983—Charlie Rucker as President of the MTT Society and George Oltman as Vice President. You will have the unconditional support of the entire Adcom during your tenure in office.

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PLANS FOR 1983 MICROWAVE STUDY GROUP TO CHINA

During the 1982 IEEE MTT-S International Microwave Symposium, discussions were held between Richard Sparks, MTT-S Administrative Committee President, and Dr. Huang Hung-chia, Chairman of the Society of Microwaves, Chinese Institute of Electronics, on the subject of an MTT Society-sponsored Microwave Study Group to the People's Republic of China in the Fall of 1983.

Inter-Pacific Tours International has been contacted to coordinate all travel plans. A number of details have to be worked out to coordinate visits, meals, and accommodations provided by the travel agency with those which would be provided by the Chinese Society of Microwaves. The trip is expected to last two to two and one-half weeks with visits to Shanghai (Shanghai University of Science and Technology, 26th Factory of Radio Equipment, East China Normal University, Shanghai Tumour Hospital), Nanking (Nanking Solid-State Research Institute, Nanking Institute of Technology, Nanking University, Nanking Factory of Electronic Devices, Nanking Research Institute of Electronics Technology), Peking (Institute of Acoustics, Research Institute of Electronic Devices, Institute of Electronics, Peking Institute of Radio Measurements, National Institute of Metrology, Da-Hua Factory of Radio Measurement Devices) and Shijiazhang (Shijiazhang Institute of Communications, Hebei Semiconductor Research Institute). Other possible cities include Chengdu (Chengdu Institute of Radio Engineering, Chengdu Ya-Guang Electric Factory) and Si-An (Research Institute of Microwave Technology, Research In-stitute of Navigation Technology, Northwestern Institute of Radio Engineering, Research Institute of Electronic Equipment). Time will be available at each location for sight-seeing. It is estimated that a seventeen day trip will cost \$2600 per person including air transportation from New York, all hotel accommodations, three meals daily, sightseeing, transportation in China, etc.

Anyone desiring additional information or wishing to be included in the Microwave Study Group should contact Richard A. Sparks, Raytheon Company, Missile Systems Division, Mail Stop CF 1-41, Hartwell Road, Bedford, MA 01730, (617) 274-7100, extension 4708.

The deadline for submission of applications is March 1, 1983.



MTT AWARDS

by Hal Sobol

The Awards Committee of the Microwave Theory and Techniques Society is pleased to report that the MTT-S Administrative Committee at its October 1982 meeting approved the major awards of the Society for 1983.

The 1983 Microwave Career Award has been bestowed upon Marion E. Hines of M/A-COM, Inc. "for a career of meritorious achievement and outstanding technical contribution in the field of microwave theory and techniques."



Marion É. Hines was born on November 30, 1918 in Bellingham, Washington. He received a B.S. degree in Applied Physics and an M.S. degree in Electrical Engineering in 1940 and 1946, respectively, from the California Institute of Technology.

From 1946 to 1960, Mr. Hines was a Member of the Technical Staff at Bell Telephone Laboratories, where he worked with traveling-wave tubes, microwave triodes, and digital storage tubes and made contributions to beam focusing, amplification theory, and practical tube development. In 1957, he helped demonstrate the first negativeresistance varactor parametric amplifier and in 1960 published a comprehensive theory for tunnel diode microwave amplifiers and oscillators.

In 1960, Mr. Hines joined Microwave Associates, Inc. In the period to 1963, he helped establish many of the fundamental principles of varactor harmonic generation and developed numerous microwave power sources using this principle. In 1964, he published a paper on microwave diode switching and phase-shifting which led to the development of semiconductor switches, duplexers, and phase-shifters. From 1965 to 1974, Mr. Hines concentrated on IMPATT and Gunn-effect diodes, where he made important contributions to a quantitative understanding of their electron dynamics and to their application as microwave oscillators and amplifiers. These include the small-signal impedance theory (1966), the nonlinear theory of power amplification and oscillation (1970), theories for excess large-signal noise, parametric instabilities, and intermodulation (1972), and a new method of phase-lock power amplification.

Since 1970, Mr. Hines has added contributions to ferrite devices, particularly his analysis of a new class of components using the "edge-guided mode." In addition, he has contributed papers on computer-aided microwave network analysis and mixer theory. As Technical Director for M/A-COM, Inc., he is currently working on CAD techniques for microwave network synthesis and phase equalization and on IMPATT diode power amplification and combining.

Mr. Hines has contributed more than 50 technical and oral presentations and has been awarded more than 40 patents in the microwave area.

He was elected a Fellow of the IEEE in 1968. Mr. Hines received the Best Paper Award from the International Solid State Circuits Conference in 1967. He was the recipient of the Microwave Prize for his 1971 paper on ferrite propagation and was co-recipient of the same award in 1978 for a paper on phase-locked amplification. In 1976, Mr. Hines was awarded the J. J. Ebers Award from the IEEE Electron Devices Society. He is a member of Tau Beta Pi.

The Microwave Applications Award is presented to an individual for outstanding application of microwave theory and techniques. The award requirements are the creation of a new device, component or technique, novel use of a device or component, or a combination of the above. Les Besser has been selected as the recipient of the 1983 Microwave Applications Award "for the development and application of COMPACT, a computer program for microwave circuit design."



Leslie Besser was born in Budapest, Hungary on August 27, 1936 and emigrated to the United States in 1961 after spending five years in Canada. He received a combined BS degree in Electrical Engineering and Business Administration from the University of Colorado in 1966

and an MSEE from the University of Santa Clara in 1972.

From 1966 to 1970, Mr. Besser worked for Hewlett-Packard Company where he developed broadband, thin-film microwave components. In 1970, he joined the Microwave Division of Fairchild Semiconductor Corporation, where he became the Manager of Circuit Development, concentrating on MICs, CATV systems, and low noise GaAs FET amplifiers. Mr. Besser holds the basic patent for the first thin-film amplifier circuit used in the CATV industry. At Fairchild, he authored SPEEDY, one of the first microwave circuit design computer programs. From 1972 to 1976, Mr. Besser directed the microcircuit design and development effort at Farinon Electric Company.

In 1976, Mr. Besser founded Compact Engineering, Inc., a firm which provided computeraided design software in the form of COMPACT, FILSYN, AMPSYN, CADSYN and SUPER-COM-PACT for the microwave engineer. He served as the President of the firm until its purchase in 1980 by Communications Satellite Corporation. Mr. Besser then became Senior Vice President of the newly formed Comsat General Integrated Systems. He relinquished that position at the end of 1982, but remains with CGIS as President of the Compact Division.

Mr. Besser has published over fifty papers on CAD and microwave circuit design. He is a contributing author to two books—*Electronic Measure*- ments and Instrumentation (McGraw-Hill Book Co., 1971) and Computer-Aided Design of Microwave Circuits (Artech House, 1981).

Mr. Besser is a member of Sigma Tau, Tau Beta Pi, and Eta Kappa Nu and is a Senior Member of the IEEE. He is the past Chairman of the San Francisco Bay Area IEEE Circuits and Systems Society Chapter and of the Santa Clara Valley Chapter of the Microwave Theory and Techniques Society.

The Microwave Prize is awarded annually to the paper making the most significant contribution in the field of interest of the Microwave Theory and Techniques Society and which appeared in an official IEEE publication during the period of July 1 to June 30 of the following year. The 1982 Microwave Prize has been awarded

The 1982 Microwave Prize has been awarded to Mr. Kazuhiko Honjo and Dr. Yoichiro Takayama for the paper "GaAs FET Ultrabroad-Band Amplifiers for Gbit/s Data Rate Systems," which appeared in the IEEE Transactions on Microwave Theory and Techniques, Volume MTT-29, July 1981, pp. 629-636.

The paper describes a novel, ultra-broadband GaAs FET amplifier. The amplifier circuit operates as a resistor-capacitor coupled amplifier in the low frequency range and as a lossless, impedance matching circuit in the microwave region. Using this technique, 800 KHz to 9.5 GHz GaAs FET amplifier modules having 8.6dB gain have been realized. By cascading two amplifier modules, 19 dB gain over 800 KHz to 8.5 GHz has been obtained. The 50 picosecond risetime of the amplifier makes it useful for very high speed data applications.

Kazuhiko Honjo was born in Saitama, Japan



was born in Saitama, Japan on October 28, 1951. He received the B.E. degree from the University of Electrocommunications, Tokyo, Japan and the M.E. degree from the Tokyo Institute of Technology, Japan, both in electrical engineering, in 1974 and 1976, respectively.

Mr. Honjo joined the Cen-

tral Research Laboratories of Nippon Electric Company, Ltd., Kawasaki, Japan in 1976. Since then, he has been engaged in the research and development of TRAPATT oscillators, high power GaAS FET amplifiers, and ultra-broadband GaAs FET amplifiers. He is currently concerned with GaAs monolithic ICs.

Mr. Honjo is a member of the Institute of Electronics and Communication Engineers (IECE) of Japan and the IEEE.

Yoichiro Takayama was born in Kanagawa,



Japan on January 3, 1943. He received the B.E., M.E., and Dr. Eng. degrees from Osaka University, O s a k a, Japan in 1965, 1967, and 1973, respectively.

Dr. Takayama joined the Nippon Electric Company, Ltd., Kawasaki, Japan in 1967 and is currently the Research Manager of the Ultra High Speed Device Research Laboratory in the Central Research Laboratories. He has been engaged in the research and development of microwave solid-state oscillators and amplifiers, as well as modulators and sensors. Dr. Takayama is currently managing the gallium arsenide integrated circuit research group.

Dr. Takayama is a member of the IEEE and of the Institute of Electronics and Communication Engineers of Japan.

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SPECIAL ISSUE ON VOICEBAND DATA TRANSMISSION

A Special Issue of the **IEEE Transactions on Communications** will be dedicated to advanced modulation and signal processing techniques for data transmission on voiceband telephone channels. The issue is scheduled for publication in 1984. Papers are solicited in topics such as:

- Comparative evaluation of modems in the presence of channel impairments
- Modulation, coding and signal design
- Adaptive signal processing, including equalization and echo cancellation
- Synchronization: carrier recovery and bittiming
- Nonlinear distortion and compensation
- Full-duplex two-wire modem techniques
- Fast start-up and recovery from channel transient disturbances
- Application of digital signal processing in voiceband modems
- Limited-distance modem techniques
- Integrated voice/data communication on voiceband telephone channels

The dealine for submission is February 1, 1983. Prospective authors should prepare manuscripts in accordance with the "Information for Authors" published on the inside back cover of the IEEE Transactions on Communications and forward the complete manuscript, along with a signed IEEE Copyright Release Form to one of the following Guest Editors:

Dr. D. D. Falconer, Department of Systems and Computer Engineeering, Carleton University, Ottawa, Canada K1S 5B6 or Dr. R.D. Gitlin, Bell Telephone Laboratories,

Holmdel, NJ 07733

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ADCOM ELECTION RESULTS

At its October meeting in San Francisco, California, the MTT-S Administrative Committee held its annual election. Six three-year terms and a one year vacancy were filled. Reelected to three year terms were Charles T.

Reelected to three year terms were Charles T. Rucker of Georgia Institute of Technology, Vladimir G. (Walt) Gelnovatch of U.S. Army ERADCOM, and Paul T. Greiling of Hughes Aircraft Company.



Ferdo Ivanek



George Jerinic



Adcom elected three new members to the MTT-S governing body. They are **Ferdo Ivanek** of Farinon Operation, Harris Corp., **George Jerinic** of Raytheon Company, Research Division, and **David N. McQuiddy, Jr.** of Texas Instruments. Ferdo recently completed a year and onehalf as the 1981/1982 MTT-S National Lecturer. George was the Administrative Committee Secretary / Treasurer for 1982, while Dave served as the Steering Committee Chairman for the 1982 IEEE MTT-S International Microwave Symposium.

Adcom has elected its first member from the Far East. **Dr. Yoshihiro Konishi** of NHK Technical Research Laboratories, Tokyo, Japan, was elected to a one-year term on the Society's Administrative Committee.

Society Officers for 1983 were also decided at the meeting. Charlie Rucker was

David N. McQuiddy, Jr. meeting. Charlie Rucker was elected MTT-S Adcom President for 1983 and George Oltman of Hughes Aircraft Company was selected the Society's 1983 Vice-President.

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IEEE LAMME MEDAL



In addition to being the recipient of the 1983 Microwave Theory and Techniques Society's Career Award (see page 4), **Marion E. Hines** has also been selected by the IEEE Board of Directors to receive the IEEE Lamme Medal. Mr. Hines, Vice President and Chief Scientist for

the M/A-COM Corporate Technology Center, is cited for "sustained, innovative contributions to microwave device applications of semiconductor diodes."

JOURNAL OF LIGHTWAVE TECHNOLOGY

The IEEE has announced the publication of the **IEEE Journal of Lightwave Technology**, dedicated to the expanding field of guided wave technology. The first issue is scheduled for publication in March 1983 and quarterly thereafter for the remainder of 1983. In 1984, bimonthly publication is planned. This new journal is intended to be the principal forum for publication of guided light technology papers and recognizes the growth and importance of this technology area. Participating IEEE Societies include: Aerospace and Electronic Systems, Circuits and Systems, Communications, Computers, Electron Devices, Instrumentation and Measurement, Microwave Theory and Techniques, Quantum Electronics and Applications, and Sonics and Ultrasonics. Wide distribution is planned through the Optical Society of America and the IEEE, and the pricing of the journal to subscribers will further ensure a circulation to a large number of individuals and institutions.

As the principal forum for publication in optical guided wave technologies, it is intended that both research and development, and application topics be covered in the subject matter presented in this journal. Topics of interest include the following:

- Fiber and cable technologies (waveguide phenomena, strength, fabrication techniques, materials, characterization, installation technology, reliability testing and prediction, cable design and testing, coupling and splicing).
- Componentry active and passive (light sources, detectors, repeater technologies, component and subsystem characterization, modulation and multiplexing formats, test equipment, switches, filters, modulators, multiplexers/demultiplexers, etc.).
- Integrated optics and optoelectronics (planar waveguide theory, fabrication and evaluation, switches/modulators, circuits, and applications).
- 4) Systems, subsystems and new applications (commercial and military, data transmission, optical communication networks [data buses, computer, integrated services, etc.], unique field trials which demonstrate technological advances, and other uses such as fiber optical sensors and signal processors).

Investigators in the guided wave field and related technologies are invited to submit original contributions, either as regular papers or letters, which report and/or illustrate state-of-the-art capabilities and advances. Contributions to this new journal, consisting of the original manuscript plus two copies, should be submitted directly to the Editor, Dr. Thomas G. Giallorenzi, Naval Research Laboratory, 4555 Overlook Avenue, Washington, D.C. 20375.

TAB HIGHLIGHTS



by C. T. Rucker

The Technical Activities Board (TAB) Operating Committee (OpCom) met on July 16 and TAB met on July 17 in San Francisco, California. Selected items of interest to the Society follow.

Restructuring the Board of Directors

TAB OpCom was informed of a joint meeting of the Regional Activities Board (RAB) and TAB ad hoc Committees on Board Restructuring. RAB was in favor of adding a Vice President for Computers and Information, while TAB and TAB Op-Com seemed to favor working toward ten Delegates/Directors as a long range goal. A motion was passed that TAB recommend to the IEEE Board of Directors to increase the number of Divisional Director for the Computer Society and that TAB urge its representatives on the Board of Directors to vote likewise.

Accounting and Administrative Services Costs

Discussions were held pertaining to the reimbursement to the IEEE General Fund by TAB for accounting and administrative services performed by Headquarters for the benefit of member Societies. The TAB membership felt that the Board of Directors had, in effect, balanced its budget by necessitating increases in the Society/ Council fees instead of increasing IEEE dues. It was further suggested that a concerted effort should be made to see to it that, if necessary, Institute dues are raised in small annual increments instead of larger sums every few years. TAB voted to reimburse the Institute for accounting and financial charges in the amount of \$371K for 1983, and to instruct the Membership Development Committee to work on determining the portion of new IEEE members which is Society/ Council generated. The motion also required the TAB Finance Committee to develop a rationale for rebate from the General Fund for services provided by the Societies/Councils which benefit the General Fund, such as generation of new IEEE memberships, in time for the 1984 budget development cycle.

Society Affiliates

Dr. Allan C. Schell, Division IV Director and Chairman of the ad hoc Committee on Society Affiliates opened discussion on the subject. Dr. Oscar N. Garcia, President of the IEEE Computer Society which has about 10,000 Affiliate members, stressed that the existing program is working and that it has not hurt the Society or the IEEE. In fact, the Computer Society has been able to convert many Affiliates to full IEEE memberships. Dr. Garcia agreed to provide a "white paper" on the Affiliate program and, on that basis, action on changing the Affiliate program was deferred.

TAB Centennial Conference

The Chairman of the TAB Centennial Task Force reported that the TAB Centennial Conference would be held in Washington, DC on February 21-22, 1984 during Engineers Week and contiguous with the U.S. Technology Policy Conference. TAB approved the budget, plan, and schedule submitted by the TAB Centennial Task Force, subject to minor changes resulting from the TAB discussions.

IEEE Position Paper

The final draft of the IEEE Position Paper on Freedom of Technology Transfer had been distributed to TAB OpCom and TAB for approval. The Chairman of the ad hoc Committee on Technology Transfer explained that this was the first of two papers which the Committee was preparing, this being a general IEEE statement and the second being a U.S. policy statement only. The TAB OpCom approved the proposed IEEE Position Paper on Freedom of Technology Transfer. At the TAB meeting the following day, the Position Paper was again approved.

Journal of Lightwave Technology

TAB was informed that prices have been set, the editors picked, and the title finalized. Although the Journal will begin publication in 1983, there was still the question of the Journal's governing body to be settled. The Presidents of the nine Societies involved will be contacted with further details and asked either to reaffirm their appointees to the new Committee or to appoint new representatives. The MTT-S representatives are Dr. Fred J. Rosenbaum and Dr. Reinhart H. Knerr. A motion was approved in which TAB reaffirmed its approval of the formation of a Fiber Optics Council and directed the chairman of the newly formed committee to submit a charter and financial plan for review and approval by the supporting Societies and action by TAB OpCom and TAB at the November 18-19, 1982 meetings in New Orleans, Louisiana. Details of the TAB meeting will be reported in the next Newsletter.

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BOOK REPRINTED

Field Computation by Moment Methods by Prof. Roger F. Harrington of Syracuse University has been reprinted by Krieger Publishing Company, Krieger Drive, Malabar, FL 32950, (305) 724-9542. The cost of the book is \$14.50. There is, in addition, a \$3.00 charge for shipping and handling.

NEW IEEE FELLOWS

The IEEE recently announced the names of the members elected by the Board of Directors to the grade of Fellow. Of the 110 new Fellows, six were evaluated by the Microwave Theory and Techniques Society. An additional twelve new Fellows were cited for their contributions to technology of interest to members of our Society. These new IEEE Fellows and their citations are:

MTT-S EVALUATED

John A. Copeland, Sangamo Weston, Inc., for contributions to the development of optically-coupled semiconductor logic circuits.

Hatsuaki Fukui, Bell Telephone Laboratories, for contributions to the understanding and design of low noise microwave transistors and transistor amplifiers.

Takanori Okoshi, University of Tokyo, for contributions to lightwave and microwave engineering and, in particular, for the development of techniques for the analysis and synthesis of propagation in multimode fibers.

H. George Oltman, Jr., Hughes Aircraft Company, for contributions to antenna, microwave, and measurement technology.

P. Peet Silvester, McGill University, for contributions to the development of finite element methods and their application to electromagnetic field problems.

Robert J. Wenzel, Wenzel/Erlinger Associates, for contributions to the theory and synthesis of microwave filters and multiplexer networks.

OTHER NEW FELLOWS

Noach Amitay, Bell Telephone Laboratories, for contributions to the design and application of satellite-based phased array antennas.

Chalmers M. Butler, University of Mississippi, for contributions to aperture theory and to numerical techniques for solving electromagnetic boundary value problems.

Richard C. Eden, Giga Bit Logic, Inc., for contributions to the development of high speed gallium arsenide integrated circuits and III-V alloy photodetectors.

Thomas K. Gaylord, Georgia Institute of Technology, for contributions to the fields of grating difraction, optical data storage and processing, and engineering education.

Takeshi Kawahashi, Nippon Electric Company, Ltd., for developments in microwave communications and satellite communication earth stations.

Alfred R. Lopez, Hazeltine Corporation, for contributions to the design and application of electronically scanned antennas.

A. Roy McCord, Texas Instruments, for contributions to the development of radar and infrared reconnaissance systems and leadership in the electronics industry. John E. Midwinter, British Telecom Research Laboratories, for leadership of a major research and development effort on optical fiber transmission.

Tsuneo Nakahara, Sumitomo Electric Industries, Ltd., for contributions to the development of microwave transmission lines, traffic control systems, and fiber optics.

Stewart D. Personick, TRW Technology Research Center, for contributions to the theory and application of optical fiber transmission systems.

Alan W. Rudge, ERA Technology, Ltd., for contributions to the design and analysis of reflector antennas.

Calvin T. Swift, University of Massachusetts, for contributions to the area of microwave remote sensing of the oceans.

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SECRETARY/TREASURER

The MTT-S Administrative Committee has approved the appointment of **Dr. N. Walter Cox** as Secretary/Treasurer for 1983.



Dr. Cox received his B.S.-E.E., M.S.E.E., and Ph.D. degrees from Georgia Institute of Technology, Atlanta, GA in 1964, 1965, and 1967, respectively.

From 1964 to 1969, Dr. Cox was associated with Georgia Tech, first as a Research Assistant (1964-1967) and later as an Assistant

Professor in the Electrical Engineering Department (1967-1969). In 1969, he joined the staff of the Sperry Rand Microwave Electronics Division where he was engaged in research and development related to microwave solid-state devices and circuits. Dr. Cox has been on the staff of the Georgia Institute of Technology Engineering Experiment Station since 1973. As Chief of the Physical Sciences Division, he is involved in research programs related to microwave solid-state materials, devices, and circuits.

Dr. Cox has published and presented numerous technical papers in the general areas of network synthesis and microwave solid-state devices and circuits.

He is a Senior member of the IEEE and has served as Secretary/Treasurer (1974), Vice-Chairman (1975), and Chairman (1976) of the Atlanta MTT-S/AP-S Chapter. Dr. Cox also served on both the Local Arrangements Committee and the Technical Program Committee for the 1974 International Microwave Symposium.

THE 1983/1984 MTT-S DISTINGUISHED LECTURE

Beginning in 1983, the MTT-S National Lecture will be changed to The MTT-S Distinguished Lecture. The first MTT-S Distinguished Lecturer will be Dr. Stephen F. Adam, who has entitled his talk **Modern Microwave Measurements.**

Modern Microwave Measurements

The use of digital computers has changed many measurement techniques and has improved the accuracy and speed of microwave measurements since the late 1960s and early 1970s. Onboard microprocessors are now being designed into measurement systems, providing additional flexibility and accuracy. Automated spectrum analyzers now perform a multitude of sophisticated measurements from modulation analysis to phase noise measurements. Automatic network analyzers are expected to undergo further improvements as improved and enhanced microprocessors are designed into them.

A number of measurement techniques, including those for power, frequency, noise, and scattering parameters, will be discussed.

Stephen F. Adam



Stephen F. Adam was born in Budapest, Hungary. He received the B.S. and M.S. degrees in mechanical and electrical engineering and a Ph.D. in electrical engineering in 1952, 1955, and 1965, respectively.

From 1951 to 1956, Dr. Adam was a Member of the Technical Staff of the Re-

search Institute for Telecommunications in Budapest, performing research and development work in the field of microwave measurements. Since 1957 he has been a Member of the Technical Statf of Hewlett-Packard Company where he continued the development of microwave measurement systems. Dr. Adam has held various project and section management positions at Hewlett-Packard Company and is currently in charge of Integrated Products Research and Development in the Microwave Semiconductor Division.

Dr. Adam is the author of *Microwave Theory and Applications*, published by Prentice-Hall in 1969, and of numerous articles which have been published in the MTT Transactions and the trade literature.

Dr. Adam is a Fellow of the IEEE and a member of five IEEE Societies including the Microwave Theory and Techniques Society. He has been a member of the MTT-S Administrative Committee since 1973 and was its President in 1980. Dr. Adam was Technical Program Committee Chairman for the 1975 IEEE MTT-S International Microwave Symposium and will be the General Chairman for the 1984 International Microwave Symposium. He has also served on the Executive Committee and as Technical Program Committee Chairman for the Conference on Precision Electromagnetic Measurements. Dr. Adam is also a member of the IEEE Technical Activities Board, Transnational Relations Committee, the MTT Transactions Editorial Board, and the Association of Old Crows. He is the past secretary to IEC-TC66-WGS, the committee involved with the standardization of microwave measurements.

To contact Dr. Stephen Adam with regard to his Distinguished Lecture, his address is Hewlett-Packard Company, Microwave Semiconductor Division, 350 West Trimble Road, San Jose, CA 95131, (408) 263-7500, extension 2820.

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THE \$20M CODE

If you're good at code-breaking, you might want to try your hand at the Beale Ciphers. Solve them, and you'll walk off with \$20 million in buried treasure. But be forewarned: The ciphers have baffled cryptanalysts for more than a century.

They are the work of the prospector Thomas Jefferson Beale, who shared in a huge gold and silver strike in the Colorado Territory in 1818. Beale carried the treasure back to his native Virginia and buried it near present-day Montvale. Four years later, he returned west but left behind a pad-locked chest in care of innkeeper Robert Morriss, instructing him to open it in 10 years.

Morriss waited 23 years before opening the box. Inside, he found three mysterious sets of numbers and a letter from Beale promising to send the keys to the encoded messages—but he never did. For 10 years, Morriss tried on his own to decode the numbers before finally relinquishing them to his friend James B. Ward.

Ward figured out that one of the ciphers was based on a consectuve numbering of all 1322 words of the Declaration of Independence. The message, when decoded, revealed the contents of the treasure—2921 pounds of gold, 5100 pounds of silver, and jewels worth \$13,000. The two other codes, it said, would reveal the 30 heirs named by Beale and, more importantly, the treasure's precise location.

Since then, cryptanalysts have employed every known deciphering device—and invented others—to crack the two remaining codes. No one, including computer experts and clairvoyants, has had any luck. For more information and copies of the ciphers, send \$1 and a large stamped, self-addressed envelope to Beale Cipher Association, P.O. Box 216, Medfield, Mass. 02052.

1983 IEEE AWARDS

Now is the time to begin considering nominations for IEEE Major Medals and Field Awards for 1983.

The Microwave Theory and Techniques Society has a large number of IEEE Senior Members and Fellows among its membership—MTT ranks fifth in the number of IEEE Fellows. However, MTT-S ranks twelfth in its recipients of IEEE Major Medals (only five since 1972).

The IEEE awards appropriate to members of MTT-S are as follows:

- IEEE Medal of Honor for a particular contribution which forms a clearly exceptional addition to the science and technology of concern to the Institute
- Alexander Graham Bell Medal for exceptional contributions to the advancement of telecommunications
- Edison Medal for a career of meritorious achievement in electrical science, electrical engineering, or the electrical arts
- Founders Medal for major contributions in the leadership, planning, and administration of affairs of great value to the electrical and electronics engineering profession
- Lamme Medal for meritorious achievement in the development of electrical or electronic apparatus or systems
- Education Medal for excellence in teaching of courses in electrical or electronic engineering
- Cledo Brunetti Award for outstanding contributions in the field of miniaturization in the electronic arts
- Harry Diamond Memorial Award for outstanding technical contributions in the field of government service in any country
 Morris E. Leeds Award for outstanding con-
- Morris E. Leeds Award for outstanding contribution in the field of electrical measurement. Special consideration given to the value of contributions made prior to candidate's 36th birthday
- Morris N. Liebmann Memorial Award for important contribution in emerging technologies recognized during preceding three calendar years
- Jack A. Morton Award for outstanding contributions in the field of solid-state devices
- Frederik Philips Award for outstanding accomplishments in the management of research and development resulting in effective innovation in the electrical or electronics industry
- David Sarnoff Award for outstanding contribution in the field of electronics preferably recognized within the last five years

Normination forms can be secured from Miss Una Lennon at IEEE Headquarters, (212) 705-7882.

If you have any questions, contact Arthur N. Chester, 1983 Chairman of the IEEE Candidate Search Committee, P.O. Box 902, Building E51, Mail Stop A271, El Segundo, CA 90245, (213) 616-7503.

PRINCETON SECTION SARNOFF SYMPOSIUM

The first IEEE Princeton Section Sarnoff Symposium will be held on Friday, March 25, 1983 at RCA Laboratories, Princeton, New Jersey. The subject of the 1983 symposium will be "GaAs FET Devices and Circuits." Papers describing original work or reviews on the subject are solicited. The areas of device technology, analog and digital circuits, GaAs materials, and reliability are particularly appropriate.

Authors are requested to send one to two page summaries explaining the contribution and relevance to the state-of-the-art. Three copies of the summaries, suitable for reproduction, must be received on or before January 24, 1983 by Dr. Ho Huang, RCA Laboratories, 201 Washington Road, Princeton, NJ 08540. Notice of acceptance or rejection will be mailed to all authors by February 11, 1983.

All questions or inquiries for further information should be directed to Dr. Chainulu Upadhyayula, RCA Laboratories, Building 3-152, 201 Washington Road, Princeton, NJ 08540, (609) 734-2048.

STAYING ALIVE

The following article is a "user review" of an item which may save your life—a portable ground fault interrupter (GFI). The article first appeared in the September/October 1982 Engineering Management Society Newsletter and relates a firsthand, fortuitous (but fortunate) testing of the equipment by its Editor, Irwin Gray, Flushing, NY.

You are probably conversant with ground fault interrupters used in fixed receptacles and, of course, on larger equipment than might be found in the home. Their function is to protect against personal injury due to line-to-ground shock. Understand that a line to ground fault involving a short circuit should blow the fuse or circuit breaker protecting the circuit. The current draw of the circuit rises well beyond the rating of the breaker in milliseconds and the unit opens the circuit. However, in the case of a line to ground fault involving humans, one runs into currents in the milliamps passing from the hot side of the circuit, through the human, to ground. Under exceptional circumstances, at one end of the hazard list, a person can be killed by a microampere shock if a catheter carries the current directly to the heart (in a hospital setting, for example). At the other end of the hazard spectrum, while the exact amount of current to do the job is a point of discussion, there is little doubt that milliamperes passing from one hand to another, for example,

through the heart will inflict death even on healthy, large individuals.

Thus, an individual may be given a lethal dose of current without coming even remotely within the range needed to blow the fuse or circuit breaker protection. Enter the ground-fault interrupter mechanism to do the job that has heretofore been undone. New construction embodies ground fault interrupter receptacles in bathrooms, kitchens, outdoor, and other circuits in which a human has exposure to using equipment which might get wet, etc. The device under discussion in this column is something that has not been available until fairly recently: a portable ground fault current interrupter that is made for the protection of portable equipment—that goes into an extension cord, or the applicance cord itself.

The device is 2" x 2" x 5" long and comes with a two foot cord/plug. The user adds a cord to screw terminals provided on the other end. The unit is then used to protect any piece of apparatus on the user's cord against line to ground faults. As mentioned earlier, when I received this item, I did not know how to test it and was, quite frankly, a bit scared to do so. So I set it up for use as an extension cord with a long cord and receptacle on the "user" end. I plugged a saw into it and started working in my backyard one day. I was so absolutely intent on the project involved, that I did not notice the fine spray rain shower that started to fall. An electric saw I was using was an old one lacking double insulation or any of the other new-fangled methods of protecting people against their own folly. The rain put a heavy coating of moisture on the saw and I picked it up. I noticed that the saw would not operate. I checked the wall receptacle, the place where the saw plugged into the protected extension cord, and finally, checked the interrupter. Sure enough, the device had "blown" the circuit.

I don't know what might have happened to me had I picked up the saw without the protection that was present. I do know what happened many years ago to my father in similar circumstances when he was working in a wet basement, using an electric saw, cutting pipes that were dripping water on him. Suddenly he discovered that he was being electrocuted. He felt the current passing through him. It froze his hands to the saw he was using and he was unable to release the trigger or throw away the appliance. Fortunately he had the presence of mind to use his legs which were still free. He spun his body around several times, wound the extension cord around himself and yanked it out of the wall receptacle just as he was feeling a darkness coming over him. He was able to recover with nothing more than a good story to tell, but I believe in that rain shower, I was duplicating many of the conditions that almost "got" my father. I was truly fortunate that I had the ground fault interrupter for testing.

The device lists for approximately \$55.00, but there may be discounts available. It is made by Sotcher Measurement, Inc., 1120-J Stewart Court, Sunnyvale, CA 94086, 408-732-9171. It is model 1740, in-line GFI. Model 1740 is supplied with a

2 ft. 14/3 SJT cord and molded plug and is rated at 120 volts, 15 amperes. The model 1741 is identical to the 1740 except it is supplied without the cord and is rated at 120 volts, 20 amperes. Housing is rugged, flame retardant, thermoplastic housing, operates from -30 degrees F to 150 degrees F. Trip level is .5 milliamps in .025 seconds. It comes with self contained test and retest buttons. If you do work involving exposure to ground fault currents, don't depend on the device built into the circuits to protect wiring and property. Get this device-built to protect the human using it. If you specify equipment which might expose humans to shock hazard bear in mind that product liability court rulings will go against firms which have not incorporated in their equipment designs the latest "state-of-the-art" in protection. This is true even if the consumer/user was foolish enough to stand in a pool of water, careless enough to have water pipes dripping on him while using it, or allowed the rain to fall on him. It is up to the manufacturer to incorporate the protection the user needs even when the user does not know he/she needs it. It would appear that Sotcher has provided that mechanism for protection.

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LIMITING ENROLLMENT SUPPORTED

Engineering schools are to be encouraged to limit or even decrease their enrollments to bring them into balance with instructional resources and to protect the quality of education states a resolution passed unanimously by the American Society for Engineering Education's (ASEE) Engineering Deans Council and endorsed by the ASEE Board.

The call for limiting enrollments was sent to 240 ASEE-member schools, and none objected to endorsement by the society. This resolution reflects a change in attitude among engineering deans, who have traaditionally kept the doors of engineering schools open to all who are qualified, compared with medical school administrators, who view limited enrollments as a fact of life.

The resolution says in part: "The Engineering Deans Council is committed to maintaining the quality of education as our foremost priority. We recognize that unless resources can be brought into better balance with enrollments, the result will have to be a reduction of engineering enrollments nationwide to assure the level of quality we consider imperative. We endorse the activities of all schools seeking to balance enrollments and resources, even though this may lead to a decrease of new engineering student enrollments. We urgently seek strong actions by universities, industry, and various levels of Government to ameliorate the present situation."

AWARD TO DR. KONISHI



The Medal of Honor with Purple Ribbon (Shi-ju Hosho) is awarded annually by the Emperor of Japan to persons who have demonstrated remarkable achievements and contributions by invention, improvement or creativity in science or art. The Medal

was awarded to sixteen individuals in April 1982. One of the awardees was Dr. Yoshihiro Konishi, Chairman of the Tokyo Chapter of the Microwave Theory and Techniques Society.

The accomplishment specifically mentioned in the award is the development of the lumpedelement Y-circulator, sometimes called "the Konishi Circulator". The idea originated from his desire to have small, high-performance circulator available while adjusting VHF or UHF transmitters every day during his service at Nippon Hoso Kyokai's (NHK) Ikoma Broadcast Station about 1956. By the end of the year, the "Konishi Circulator" will have been installed in more than one million automobile telephones in Japan.

Dr. Konishi is also the inventor of a satellite television (STV) receiver which bears his name. After five years of work, the invention was successfully completed in 1966. The performance of the inexpensive receiver has been confirmed by cooperative joint experiments involving NASA and NHK. The broadcast satellite, scheduled for launch in two years, will contain both the Konishi system and one using FETs. However, Dr. Konishi has already installed his system in the attic of his Sagamihara residence and is eagerly awaiting the beginning of the satellite broadcasting.

During his thirty-one years of employment at Japan Broadcasting Corporation (NHK), he has conceived 198 inventions of which 170 have been patented. When he was asked about a clue to his productivity, Dr. Konishi replied, "Always keep at least three ideas in your mind. Create intensity dictated by necessity." He also stated, "After playing, I can work very efficiently. Around four o'clock, when I get up in the morning, my brain is most productive." When asked about his objective for the coming years, Dr. Konishi desires "to plant technical seeds for the 21st century."

Yoshihiro Konishi was born in Nara, Japan in 1928. He received the Bachelor of Engineering and the Doctor of Engineering degrees from Kyoto University, Japan in 1951 and 1961, respectively.

He joined Nippon Hoso Kyokai (Japan Broadcasting Corporation) in 1951 where he has been engaged in the research of VHF, UHF, and microwave circuits and components and low noise amplifiers for satellite broadcasting. From 1976 to 1978, he was the project manager and principle investigator for the joint NASA/NHK program, Advanced Ground Receiving Equipment Experiment. Dr. Konishi is currently the Director for Research at the NHK Technical Research Laboratories.

From 1962 to 1963, Dr. Konishi was at the Microwave Research Institute, Polytechnic Institute of Brooklyn, New York as a visiting scholar. For the past nine years, he has been teaching an advanced course on microwave circuits as an Adjunct Lecturer at Osaka University.

Dr. Konishi has received the achievement awards from the Institute of Television Engineering of Japan in 1974 and from the Institute of Electronics and Communication Engineers of Japan in 1975. In addition to the Medal of Honor with Purple Ribbon, he has received awards from the Post Office Ministry of Japan (1978), from the Minister of the Patent Bureau (1977), and from the Minister of State for Science and Technology (1979).

Dr. Konishi is the author of several looks, two of them being **Electromagnetic Wave Circuits** and **Microwave Integrated Circuits**. He is a member of the Editorial Review Board of the IEEE Transactions on Microwave Theory and Techniques and is the chief editor for Asia of IEEE BC.

Dr. Konishi is the 1981/1982 Chairman of the Tokyo Chapter of the MTT Society and is currently serving as Administrative Secretary of the Institute of Electronics and Communications Engineers of Japan. He has been elected a Fellow of the IEEE.

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1984 IEEE CANDIDATES ANNOUNCED

For the second consecutive year, the IEEE Board of Directors has ensured a contested election for the post of President-Elect in 1984 by nominating both **Donald D. King** and Jerrier A. Haddad. Dr. King, an Honorary Life Member and a past President of MTT-S, is President of Philips Laboratories, Briarcliff Manor, N.Y. He lost the most recent contest for President-Elect to Richard J. Gowen by only 944 votes out of 39,652 votes cast. The winner will serve a one year term as President-Elect during 1984 and will automatically become IEEE President in 1985.

The Board of Directors have also named **G. P.** (**Pete)** Rodrigue and Henry L. Bachman to run for the position of 1984 Executive Vice President of the IEEE. Dr. Rodrigue is a past President of the Microwave Theory and Techniques Society (1976) and currently serves on the IEEE Board of Directors and the Executive Committee as Vice President of Publications.

BECOME A SENIOR MEMBER

Each member renewing 1983 IEEE membership will have mailed to them a Member Record Confirmation form. This Autumn, members who may qualify for Senior Member grade will also have included with this mailing a Senior Member application request form. These members are urged to return the request form with their Member Record Confirmation form to assure receiving Senior Member grade information and application.

IEEE is interested in encouraging all members to hold the highest grade of membership for which they are qualified. If you're a Senior in the profession, you should be a Senior in your professional society.

When you renew membership and receive this important mailing, be sure to request a Senior Member grade application with the enclosed form.

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1982/1983 MTT-S NATIONAL LECTURE

As of October 13, Dr. Joseph A. Giordmaine has scheduled his MTT-S National Lecture at nine locations. Three of these were scheduled for October, two for November, and the remainder in March 1983. The last four were as follows:

March	21	Chicago MTT/AP Chapter	Chicago, Illinois
March	22	Florida West Coast MTT Chapter	Gainesville, Florida
March	23	St. Louis MTT Chapter	St. Louis, Missouri
March	24	Dallas MTT Chapter	Dallas, Texas

Any others wishing to schedule Dr. Giordmaine's talk, Integrated Optics, should contact him at Bell Telephone Laboratories, 600 Mountain Avenue, Murray Hill, NJ 07974, (201) 582-2173.

HALLEY'S COMET

A European consortium plans to build a satellite to track Halley's comet when it returns in 1986.

British Aerospace said it had been appointed prime contractor for a \$61 million program to assemble the satellite for the European Space Agency.

Budgetary cuts forced NASA to drop the Halley project from their program.

GaAs FET PRINCIPLES

Drs. James V. Di Lorenzo of Bell Telephone Laboratories and Deen D. Khandelwal of Martin Marietta have edited GaAs FET Principles and Technology, a 773 page volume divided into nine chapters. The book consists of eighteen contributed sections by some of the field's leading experts. Published in 1982 by Artech House, Inc., Dedham, MA, the book retails for \$45.00.

The following review of GaAs FET Principles and Technology was performed by Prof. Lester F. Eastman of the School of Electrical Engineering, Cornell University, Ithaca, NY and originally appeared in the November 1982 issue (Volume 25, Number 11, page 140) of the Microwave Journal.

This book is an excellent cross section of the leading work in gallium arsenide materials, microwave devices, and circuits. It covers the fundamental physical electronics as well as the circuit models; and the physical assessment of the materials as well as the means of processing the materials into devices. The authors have not withheld opposing points of view, as they knew them. This will allow readers to keep up with future developments to the degree that they have been anticipated.

Most of the novel devices being studied in the past two years have not been covered due presumably to writing and publication delays. The modulation doped HEMT devices, the heterojunction bipolar and its ballistic versions, the permeable base transistor, ballistic short FET and vertical devices, and finally the vertical ballistic injection and drift devices. Some anticipation of these devices has been included in the chapter by Barker, but not nearly in as positive a manner as now seems justified.

The chapters on bulk crystal growth and properties, as well as on epitaxy are guite strong, but still could have used more coverage. Some details of the use of photoluminescence, deep level transient spectroscopy, and far infrared, low temperature photoconductance might have been included.

The chapters on low noise and high power FET devices are more complete, for the devices covered. The ultimate limits of power FET breakdown voltage between drain and gate (90-100V), now found in two laboratories, was not covered. The existence, cause and possible cure for low efficiency with increased operating voltage in these devices was also not fully covered. New materials such as GalnAs are not included, although little was known until recently.

In short, about 90% of what is known or deduced about gallium arsenide materials, microwave FET devices and circuits has been included for the first time, in one volume. That alone is an outstanding accomplishment. The array of expert authors is impressive and broad. This book will be a valuable reference in the field for years to come.

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CHAPTER LIAISON



by H. J. Kuno

Recently, the Membership Services Committee of the MTT-S Administrative Committee appointed liaison representatives to each MTT-S Chapter. These representatives are current Administrative Committee members, whose responsibility is to establish or strengthen lines of communication between the chapters and the Administrative Committee. The addresses and telephone numbers for the Adcom members can be found in the MTT-S Committees Directory.

CHAPTER

Albuquerque Atlanta **Baltimore** Benelux Boston Boulder-Denver Canaveral Central Illinois Chicago Columbus Dallas Florida West Coast Houston India Kitchner-Waterloo Milwaukee Montreal New Jersey Coast New York/Long Island Northern New Jersey Orlando Ottawa Philadelphia Phoenix Princeton San Diego Santa Clara Valley Schnectady Seattle South Bay Harbor Southeastern Michigan St. Louis Syracuse Tel Aviv Tokyo Utah Washington, D.C.

ADCOM LIAISON

P. T. Greiling C. T. Rucker E. C. Niehenke R. H. Knerr H. Howe, Jr. D. N. McQuiddy, Jr. S. L. March T. Itoh T. Itoh J. M. Roe R. B. Hicks S. L. March T. Itoh G. Jerinic H. Howe, Jr. R. B. Hicks H. Howe, Jr. R. H. Knerr V. G. Gelnovatch V. G. Gelnovatch S. L. March B. E. Spielman J. E. Degenford H. G. Oltman, Jr. J. E. Degenford H. J. Kuno F. Ivanek G. Jerinic F. Ivanek H. J. Kuno P. T. Greiling J. M. Roe G. Jerinic E. C. Niehenke Y. Konishi H. G. Oltman, Jr. B. E. Spielman

Any changes to these liaison assignments will be noted in future issues of the MTT-S Newsletter.



History of MTT

by T.S. Saad

R.E. Henning, Chairman

L. Young, Vice Chairman L. Swern, Secretary-

Treasurer

ADCOM XVI JANUARY 1, 1968 THROUGH DECEMBER 31, 1969

ADMINISTRATIVE COMMITTEE:

F.R. Arams R.W. Beatty J.H. Bryant P.J.B. Clarricoats A.C. Clavin M. Cohn S.B. Cohn G.I. Haddad

HONORARY LIFE MEMBERS:

EX OFFICIO MEMBERS: R.C. Hansen D.D. King A.A. Oliner R.A. Rivers P.A. Rizzi T.S. Saad K. Tomiyasu F.G.R. Warren

A.C. Beck A.G. Clavier W.W. Mumford G.W. Southworth

H.M. Altschuler R.H. Kingston S. Okwit S.W. Rosenthal E.N. Torgow G. Wade

The Chairman of the XVIth Adcom was Rudy Henning. The Vice Chairman was Leo Young and the Secretary-Treasurer was Leonard Swern. Sy Okwit continued as Editor of the Transactions and Al Clavin took over as Editor of the Newsletter. Other committee chairmen appointed by Rudy Henning included: Frank Arams, Meetings and Symposia; Pete Rizzi, Membership Services; Sy Okwit, Publications; Gene Torgow, Administration; Bob Hansen, Bylaws and Procedures; Ted Saad, Awards; Gene Torgow, Nominations; John Bryant, Finance; Bob Beatty, Standards; Leo Young, Planning Coordinator; D.D. King, Long Range Planning; Kiyo Tomiyasu, Q.E.C. Representative; H.W. Cooper, S.S.C. Representative; Saul Rosenthal, Headquarters, TAB and other Professional Groups; Leo Young, Liaison to IEEE New Technical and Scientific Activities Committee; Bob Beatty, Liaison to IEEE Standards Committee.

Four meetings of the Administrative Committee were held that year in three different cities. On March 20th, a meeting was held at the New York Hilton Hotel in conjunction with the IEEE Convention. In May, the meeting was held in Detroit during the Symposium; in September, the meeting was held at IEEE Headquarters in New York City. The December meeting was held at the Hughes Aircraft Company in Los Angeles.

As he had promised, Rudy Henning presented a new organizational structure at the first Adcom meeting in March. The new structure consisted of six basic committees: Meetings and Symposia, Publications, Membership Services, Administration, Finance, and Standards. All of the other subcommittees of the Group would report to one of the six. For example, the Newsletter Editor, the Chairman of the Chapter Relations Committee, the Chairman of the Membership Committee, and the National Lecturer would report to the Chairman of the Membership Services Committee. In addition to the six primary functions, the Vice Chairman would function as the Technical Planning Coordinator and would have reporting to him the Chairman of the Long Range Planning Committee and the Technical Committees. Finally, the various liaison representatives would report directly to the Chairman. The basic structure was a matrix in which all of the functions were clearly delineated and clear lines of responsibility were identified.

Although the financial conditon of the Adcom was at about a break-even position for 1968, there was concern for the growing cost of the Transactions. The Adcom was advised to watch both page and cost budgets. Headquarters advised the Group that if the Group's Transactions exceed its budget and the Group did not have reserves to cover its deficits, the TAB office would have to hold up publication.

In the meantime, the budget for 1969 was prepared by TAB and submitted to the Adcom. Based on that budget, which was presented at the September meeting, it appeared that there would be a projected deficit of over \$18,000. This led to a lengthy discussion on the matter of budgets, economics, and additional income. At least five sources of new income were considered: raising the membership fee, introducing page charges, raising registration fees at the annual Symposium, introducing advertising in the Transaction, and having paid exhibits at the Symposium. After considerable discussion, a motion was made by D.D. King that page charges be introduced. The motion passed by a vote of 14-2.

At the September meeting, the 1969 MTT budget was approved with the page charge income added. Later, in December, based on the MTT approval of pages charges, TAB submitted a revised budget to the Adcom, which included \$30,000 income from projected page charges. In the process of preparing the budget, however, support from IEEE funds had been cut by \$6,900. As a consequence, the motion to approve the budget was defeated and the Chairman of the Finance Committee was instructed to obtain more information relative to the decreased support. In any event, the budget itself indicated a projected surplus of over \$5,000 for the year.

The Transactions was in its second year of

monthly publication. There was concern over accurately projecting the number of pages. During the year, Sy Okwit told the Adcom that he desired to be relieved of his responsibilities as Editor at the end of the calendar year. George Haddad was selected to replace Sy in January 1969.

In September, a special issue on noise was published with Bill Mumford was Editor. The rejection rate for the Transaction continued at about 50%. One significant piece of information came as the result of a survey of all 45 IEEE publications taken during 1965. In measuring the value of the publications, the IEEE and IRE Proceedings ranked first in the number of citations with 1,982. The AIEE Transactions was second with 820 citations and the MTT Transactions came in third with 513 citations, ahead of all other IEEE Transactions.

A great deal of attention was paid to the Planning Committee. Rudy Henning suggested that the committee use a 5-10 year period as a planning base and that government and industry planning information be used as a basis for the committee work. In May, D.D. King prepared a report on MTT long range plans in which he made a number of suggestions. Perhaps the most important recommendation he made was that MTT should chart a general course based on a broader definition of the then defined scope. The broader definition would be designed to keep the MTT in step with the scientific and engineering programs contemplated by government, industrial, and university laboratories.

During the year, possible areas of specialization for the MTT Technical Committes were discussed. In September, Leo Young presented a report on G-MTT Technical Committes. He pointed out that the first technical committee was formed at the MTT Symposium in Detroit in May 1968. By the end of the year nine technical committes had been established, including (1) computer-oriented microwave practices, (2) microwave acoustics, (3) millimeter-waves, (4) microwave aspects of optoelectronics and holography, (5) microwave high power, (6) microwave integrated circuits, (7) microwave active and non-linear circuits, (8) microwaves in space, (9) gigahertz logic.

There was some activity in the Standards Committee during the year. The Waveguide Standards Committee under Pat Loth submitted definitions of terms to the IEEE Dictionary Committee and participated in a coordinating effort to bring various IEEE entities which were formulating definitions into agreement. The Committee agreed to participate in a review of some of the IEC definitions of terms.

After about 10 years of editorship by Gus Shapiro, the MTT Newsletter was taken over by Al Clavin. His first concern was long delays taking place in getting the Newsletter to the membership, primarily because of delays in getting the printed Newsletter out of IEEE Headquarters. As a consequence, Clavin was authorized to prepare and to distribute one issue of the Newsletter without going through IEEE Headquarters and using first class mail. As a result of that approach, he saved 4-6 weeks in getting the Newsletter into the hands of the membership, although the procedure was more expensive then the traditional one. Despite the added expense, a motion was made and unanimously passed that the MTT continue to send the Newsletters on the same basis.

The general reaction to the idea of having a new MTT National Lecturer was very positive. The Adcom was highly pleased with the performance of Art Oliner, the first National Lecturer. The Lecturer for 1968 was Leo Young. He offered two talks, either "What are Microwave Filters?" or "Systems of Electromagnetic Units". In soliciting for a possible National Lecturer for 1969, it was felt that the matter should not be discussed by Adcom in public. As a consequence, a motion was made and passed unanimously that a nominating committee of four members, not necessarily members of the MTT Administrative Committee, be appointed by the Chairman of Adcom, with the Chairman of the Membership Services Committee, who would also serve as the Chairman of the Nominating Committee, to recommend a National Lecturer to the Administrative Committee.

Although the Quantum Electronics Council continued to show a surplus in its budget, it appeared that the surplus was declining. The surplus came about because of subsidies to the Journal of Quantum Electronics which the council had been receiving from ED and MTT.

At the International Quantum Electronics Conference, held in Miami early in the year, there were over 1,000 registrants and about 49 exhibitors. The surplus generated by the conference helped to defray the costs of the Journal for the remainder of the year. The 6th International Quantum Electronics Conference was scheduled to be held in Kyoto, Japan, in 1970. The Journal of Quantum Electronics published two special issues in October and November of 1968, covering the papers that were presented at the Miami meeting. However, it was decided that the Journal would no longer publish conference issues.

The 1969 IEEE Conference on Laser Engineering and Applications was sponsored by the Quantum Electronics Council and co-sponsored by the Optical Society of America. There was some discussion about the possibility of discontinuing the Journal of Quantum Electronics and sponsoring a new journal jointly sponsored by the IEEE and the Optical Society of America

During the year some of the Adcom members expressed concern that the new Journal of Solid State Circuits was interested in papers dealing with microwave topics and, therefore, would compete for good papers that would normally appear in the MTT Transactions. Others felt that anything that would be of service to IEEE members should be in our best interest and, hence, MTT should support the Solid State Circuits Council. The debate continued during the year until the last meeting, when Warren Cooper presented a proposal for Group participation. Until that time MTT had been an affiliate member of the Solid State Circuits Council, which implied no financial involvement other than substantial technical interest. However, by a successful vote taken in the December meeting, the MTT Adcom agreed to become a full member of the Solid State Circuits Council, with implied financial involvement and equity in the Council's assets in proportion to the Group's financial contribution. Also, the Journal of Solid State Circuits would be made available at a reduced price to members of MTT.

A new IEEE Information Services Committee was formed. Jessie Taub represented MTT on that committee. One meeting was held during the year. One of the main questions that was brought up was that the committee should explore more fully the alternative forms of information services that might be provided to IEEE members. Discussions were held on IEEE indexing practices, bibliographic tapes, microfilm, selective reprinting services and the like.

Although the bylaws received very little attention during the course of the year, one significant change was made. The Administrative Committee voted to hold an annual meeting each year during September. Another bylaw matter that was discussed with no decision was that of having the Adcom Chairman serve more than one term.

A recurring problem that was dealt with was the annual election of new Adcom members. The bylaws required that the election be by a plurality of the hold-over elected members. However, there was no provision in the bylaws defining the mechanics by which the election should be held. Gene Torgow proposed a six-point procedure for holding the election. The procedure passed unanimously. There was also ongoing discussion of the MTT Constitution, particularly relative to the field of interest statement. Leo Young offered a new statement on the field of interest, which broadened the field considerably. Included were such items as acousto-magnetic, domain, and other types of waves. However, no action was taken. Rudy Henning then appointed an adhoc committee, charged with the responsibility of looking into the possibility of amending the Constitution relative to the field of interest.

As a result of the affiliate program previously instituted, there were seven societies that had been approved to receive affiliate privileges with MTT. These included La Societe des Radio-Electriciens, The British Institute of Radio Engineers, The Institution of Electrical Engineers, Associazione Electrotecnica Italiana, the Institution of Radio Engineers Australia, Verband Deutscher Electrotechnica e.v., and the American Physical Society.

At the December meeting, Leo Young suggested the possibility of a microwave scholarship. He proposed that MTT set up a microwave scholarship committee to award scholarships. Grants of \$1,000 would be made to selected students who proposed to pursue research work in a microwave subject at a university. The details of the proposal were to be worked out by the MTT Scholarship Committee. At the same meeting, it was also suggested that some steps be taken to see if the history of MTT could be recorded and published in a suitable publication, perhaps the MTT Transactions.

Among other items that came up for discussion was the matter of multiple sessions at MTT Symposia. Also, the question was raised as to whether there should be exhibits at the Symposia. This latter was treated rather briefly. The feeling was that we had not as yet had to resort to this source of revenue, although we may be compelled to do so in the future.

The 1968 MTT Symposium was held in Detroit. M.C. Horton and Joe Rowe were the Co-chairman of the Symposium and George Haddad was the Chairman of the Technical Program Committee. Dr. Jeffrey Voss, who was then Chairman of the Board and Executive Vice President of the International Microwave Power Institute (IMPI), was the banquet speaker. Also at the banquet, Robert Wenzel received the Microwave Prize for 1967 for his paper entitled "Theoretical and Practical Applications of Capacitance Matrix Transformations to TEM Network Design", which had appeared in the December 1966 MTT Transactions. The Symposium showed a surplus in excess of \$4,500. Attendance was 493.

The 1969 MTT Symposium was scheduled for Dallas and a number of changes were being planned. Specifically, the Dallas Committee decided that they would have parallel sessions for the first time at any Symposium. The Technical Program Committee was urged to expand the Symposium into new technical areas. Some of the areas that were solicited were Gunn effect and avalance diodes, megneto-elastics and acoustics, computer-aided design, millimeter-waves, microwave integrated circuits, and superconductivity.

At the September meeting of Adcom, the matter of the 1970 Symposium was discussed. Presentations were made by the Washington Chapter, by the Los Angeles Chapter, and by the Long Island Chapter. After considerable discussion, the Adcom voted to select the Los Angeles proposal and hold the 1970 MTT Symposium aboard the Queen Mary, then anchored at Long Beach, California.

Based on an agreement with IEEE Headquarters and the convention management, four microwave applications-oriented sessions were held at the IEEE Convention in March. The sessions, held in the New York Coliseum, were well attended.

On the basis of the 1968 success, plans for the 1969 IEEE Convention in New York were discussed in great depth. Don Temme was made chairman of the microwave presentations. Although initially there were discussions about holding the sessions in the Hilton Hotel, accomodations were made at the Coliseum for a better room than the one used in 1968. The plans for the 1969 Special Microwave Presentations included sessions on computers, microwave measurements, low noise receivers, and high power microwave tube sources.

MTT sponsored a session at Wescon entitled "Microwave Solid State Receivers Designed for Increased Dynamic Range". It was very well received with an attendance of over 200. There was also a session on "Recent Developments in Microwave Integrated Circuits and Solid State Technology".

During the year there had been some discussion about the possibility of cooperation between MTT and IMPI, the International Microwave Power Institute. IMPI held its symposium in Boston during March 1968. There was an attendance of 283 and 37 papers were delivered. The topics centered around microwave ovens and industrial microwave applications. There was some consideration for IMPI scheduling its symposium to coincide with the date and location of the MTT This consideration was further Symposium. strengthened by the fact that Jeffrey Voss, the newly elected President of IMPI, was invited to be the guest speaker at the MTT Symposium banquet.

The annual elections occurred at the September meeting of Adcom. Sy Okwit, Warren Cooper, M.C. Horton, John Horton, Al Clavin and Leo Young were elected or reelected to Adcom. In addition, Leo Young was elected Chairman for 1969 and John Bryant was elected Vice Chairman.

1969 was a year of planning, organization and consolidations. Although the finances of the Adcom were not in a precarious situation, there was still apprehension about the future. Also, the matter of "turf" was under serious consideration and the expansion of ares of interest through the Symposium and the Transactions was clear evidence that MTT was not planning to be passive in the matter of technical areas of interest. Perhaps most importantly MTT was aware of the changes that were going on in technology and in business and was making changes of its own to accomodate the future.

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GSA vs. CONGRESS

Congress buys very little from the government's purchasing agent, the General Services Administration, so it should not be surprising this exclusivity extends to toilet paper. Members of Congress, according to the Capitol's contract branch, prefer the "facial quality, two-ply kind," to the standard "medium-soft, single-ply" the GSA provides. But Congress actually spends less per case of toilet paper (\$22.77) than the GSA (\$26.56). A GSA official, asked about this, said, "We feel that our medium soft is as good as their facial quality." **MTT-S MEMBERSHIP**



by E. C. Niehenke

For the twelve month period ending September 30, 1982, membership in the Microwave Theory and Techniques Society increased 3.9% (236 members) to 6298. While the growth rate is greater than that from 1980 to 1981, total membership is still 337 below the final figure for calendar year 1981.

Forty new MTT-S members were recruited in the membership drive during the 1982 IEEE MTT-S International Microwave Symposium in June.

FIBER OPTICS

Optical Fiber Transmission Systems by S. D. Personick (Plenum Press, New York, NY, 1981, 179 pages, \$25.00) was reviewed by Peter K. Cheo of United Technologies Research Center, East Hartford, CT 06108. The review is reprinted from the IEEE Journal of Quantum Electronics, Vol. QE-18, Number 7, July 1982, pp. 1171-1172.

This book has been written primarily for optical communication system engineers whose interest is in the design concepts of fiber optical transmitters and receivers. However, it is not a text on fiber optical waveguides and the optical transmission characteristics of the fibers. In fact, the lack of discussion on the fundamentals of optical fibers makes this book less attractive to the broader audience. But within the intent of the author, this book is outstanding, is written in a unique fashion, and is very easy to read. It gives very good illustrations on a variety of practical optical communications systems and points out clearly the fundamental limitations of the performance of these systems. For engineers who are seriously interested and involved in communications system design, this book is a must.

The major emphasis of this book is on telecommunication systems, with a rather thorough discussion on the system requirements and tradeoff considerations. Fiber transmission channels are only treated casually in terms of a linear filter model that avoids all the details of waveguide structures.

Chapter 1 gives a very brief description of all fiber optical components including fibers, optical sources, and detectors. Although this chapter is very short (25 pages), it gives a very good introduction to the field by providing many relevant device concepts required to carry out the discussions on the subsequent topics.

Chapter 2 deals with the basic communication system requirements. Practical constraints, such as power limitations and environmental and dynamic range requirements for both digital and analog systems, are discussed in great detail.

Chapter 3 deals again with the three major components—fibers, transmitters, and receivers from the system point of view. In this chapter, an excellent exposition of the theory of receivers is presented. This is the subject in which the author is considered to be an expert.

Chapter 4 deals with the system tradeoffs and interactions between the subsystems. Here the problems such as mode coupling, losses, source fluctuations, delay distortion, intersymbol interference, etc., are treated. Some practical examples are given.

The last chapter deals with telephone trunk and loop applications, video distribution, and interactive video systems as well as telemetry and data bus systems.

The book provides a fairly complete reference list and also provides a list of problems at the end of each chapter. It is a highly recommended book to those who are interested in optical communication fields. The book can also be used as a text for a one-semester course in fiber optical communication systems.

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NEW BOOKS

Marcel Dekker, Inc., 270 Madison Avenue, New York, NY 10016 has announced the publication of **Magnetic Core Selection for Transformers and Inductors** by Col. William T. McLyman of the Jet Propulsion Laboratory, Pasadena, California. Published in March, 1982, this 768 page volume (ISBN 0-8247-1873-9) is available for \$65. Col. McLyman has compiled the specifications of over 12,000 cores—all converted to cgs units—information to assist engineers in selecting the configuration that best suits their design requirements. The volume also offers 57 manufacturers' core loss data curves, plus manufacturers' cross references for toroidal core retainers and various types of magnetic cores, ferrites, laminations, and mounting brackets.

George W. Ewell is the author of **Radar Transmitters**, a 338 page book published by Mc-Graw-Hill Book Co., 1221 Avenue of the Americas, New York, NY 10020. The \$24.50 volume covers the following topics: radar transmitter requirements, microwave sources, modulators, pulse transformer design and fabrication, pulse-forming networks, design of charging chokes, switches, specification of transmitters, and sample designs. There are two appendices.

Wiley-Interscience has announced the publication of the second edition of High-Frequency Amplifiers by Ralph S. Carson. The 291 page volume is available for \$29.95. Coherent Spread Spectrum Systems by Jack K. Holmes contains 624 pages and retails for \$62.50. Both books can be ordered from Wiley-Interscience, 605 Third Avenue, New York, NY 10158, (800) 526-5368. In New Jersey call (201) 797-7809 collect.

Academic Press has recently announced the publication of two books of interest to those engaged in optical technology. Introduction to Nonlinear Laser Spectroscopy by M. Levenson of IBM is a volume in the Quantum Electronics: Principles and Applications Series. The book presents a unified description of the theory and practice of spectroscopic applications of nonlinear optics. The 256 page volume (ISBN 0-12-444720-1) is available for \$29.50. Bell Telephone Laboratories' I. Kaminow authored An Introduction to Electrooptic Devices (409 pages, \$38.00). This book presents the important aspects of the subject and the many uses for the devices making use of the linear and guadratic electrooptic effects. These books can be ordered from Academic Press, Inc., P.O. Box 733, Old Chelsea Station, New York, NY 10113.

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CALL FOR PAPERS

Fifth International Telecommunications Energy **Conference, INTELEC '83**

When: October 18-21, 1983 Where: Hotel Pacific, Tokyo, Japan Deadline: March 15, 1983 Submission: abstracts Submit to: Mr. K. Yamamura, International Congress Service, Inc., Chikusen Building, fifth floor, 2-7-4 Nihombashi, Chuo-ku, Tokyo 103, Japan

Eighth Annual IEEE International Conference on **Infrared and Millimeter Waves**

When: December 12-17, 1983 Where: Carillon Hotel, Miami Beach, Florida Deadline: June 30, 1983 Submission: 40 word abstract Submit to: Mr. Kenneth J. Button, Massachussets Institute of Technology, National Magnet Laboratory, Building NW-14, Cambridge, MA 02139, (617) 253-5561

ANSI METRIC STANDARD

The American National Standards Institute (ANSI) has just approved a new Standard Metric Practice. This revised document, the first American National Standard Metric Practice approved since 1976, is now being considered for adoption by the U.S. Department of Defense.

The new document recognizes the unit for dose equivalent (the sievert), the use of "L" for liter, and the use of " μ " with liter. The definition of candela and the section on torque and work have been revised.

The treatments of radian, steradian, Celsius temperature, and the International Practical Temperature Scale have been updated to conform with new international recommendations.

Other modifications have been made to clarify some points, update references, and improve the table of conversion factors.

The standard includes listings of the base units, supplementary units, and units derived therefrom. Guidance is provided on application of prefixes, other units in use with metric units, and unit selection. A section on style and usage covers the writing of unit symbols and names, pronunciation, and recommendations for treatment of numerical values. Background information on the development of the International System of Units is provided in an appendix.

American National Standard Metric Practice, ANSI/IEEE 268-1982, is published by the IEEE and may be purchased from either the IEEE or the American National Standards Institute. The standard is priced at \$5.00 and may be ordered from the IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854 or from ANSI, 1430 Broadway, New York, NY 10018.

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REPORT OF THE DIRECTOR, DIVISION IV

by Allan C. Schell

One of the activities that I am delighted to see move forward is the creation of the Journal of Lightwave Technology. This is a joint enterprise of the IEEE and the Optical Society of America, and it has taken some time and effort to gain agreement on the partnership. However, with the able leadership of Henry Kressel, the representatives of nine IEEE Societies (four of which are Division IV) have developed a suitable organizational structure. Tom Giallorenzi, the Editor of the new journal, is off and running with what will soon be the premier publication in the area of fiber optics technology and applications.

One aspect of the vitality of the IEEE technical structure is the ability to form new entities to address emerging technology areas. At the November meeting, the Technical Activities Board approved the formation of the Oceanic Engineering Society. Don Bolle has made an outstanding contribution to the profession through his leadership of this activity, which had previously been organized as a Council.

Over the past decade, the IEEE PRESS has published about eight books annually. Most of these have been selections of reprints, although there are some volumes of specially written material. Now there is to be a substantial expansion of the IEEE PRESS, so that it can serve as the consolidated book publishing arm of the Institute. There are to be book series based on reprints, tutorials, and special issues of the Transactions and Proceedings. Both the volunteer and staff structure will be expanded, and a simpler and better royalty system will be used. Only hardcover books will be published, with a significant price discount for members.

The subject of conference activity has generated considerable debate at the IEEE Board meetings over the past two years. As the number of conferences increases, the perceived conflicts multiply by overlaps in time, location, and technical area. The large regional shows have highlighted these problems. At the November Board of Directors meeting, the recommendation was made that an IEEE Conference Board be established, with appropriate staff support. With this mechanism, professional support to conference and symposium organizers could be provided, and conflicts could be arbitrated, with uniform treatment of all entities.

A major concern of those engaged in scientific and engineering disciplines is the transfer of technology. Recent actions by the U.S. Government have generated debate on the effect of limiting the flow of information. In June 1982, IEEE Spectrum magazine held a round-table meeting on this subject with participants from industry and government. A report of this meeting is now available. It is titled *Managing the Flow of Technical Information*. You can obtain a copy by writing to Ellis Rubenstein, Senior Editor, IEEE Spectrum, 345 East 47th Street, New York, NY 10017.

Several of the Societies are well along with their special activities for the IEEE Centennial year, 1984. Among the plans are histories of the Societies, plenary sessions at the annual conferences, special sessions on notable achievements, and historical exhibits. This is an excellent opportunity to involve the Life Members of the Societies as a resource to develop Centennial programs; very often they were at the birth of the Society or of some of the major technical accomplishments. I encourage you to aid your Society in its Centennial activities.

Congratulations are in order for the IEEE Fellows that have been selected this year. Looking toward next year, it is time to plan the submission of candidates for consideration in 1983. It takes a lot of time, so don't put off the start. I have enjoyed serving as your Division Director for the last two years. I have met alot of dedicated and talented individuals who devote an extra-ordinary amount of time and effort to IEEE activities. I appreciate the help I have been given, and I hope that I have contributed to furthering the interests of the Institute and its members. Thanks for the opportunity.

IRA UPDATE

Almost all mutual funds catering to individual investors now offer Individual Retirement Accounts. In choosing among them, you should consider whether there is a sales charge, whether you can switch money to one type of fund from another, and how well the fund has performed over short and long terms. *Money* magazine has published a special publication, IRAs: Your Complete New *Money* Guide, in which virtually all publicly available mutual funds with assets over \$10 million that were in operation for at least one year as of June 30, 1982 and are suitable for IRAs (tax-exempt bond funds, for example, are not) are listed. Included are most of the funds of Dreyfus Corporation and T. Rowe Price, the companies endorsed by the IEEE.

This publication presented performance figures on 355 mutual funds as percentage gains or losses with all dividends and capital-gains distributions reinvested, as they would be in an IRA. The results, which are net of sales charges, were compiled for the *Money* Guide by Schabacker Investment Management of Gaithersburg, MD.

The funds are grouped by their investment objective. Maximum-Capital-Gain Funds take extra risks in quest of those gains, usually by holding shares of emerging growth companies that reinvest most of their profits back into the business. The shares held by Growth and Income Funds tend to pay higher dividends than longterm growth stocks, but the fund managers look for issues that are likely to continue rising in price as well. The prospectuses of Income Funds permit them to invest in either stocks or bonds in quest of high yields, while Bond Funds invest only in fixed-income securities. Government Bond Funds aim at producing income with the least possible risk or default on interest or principal. Gold Funds invest in precious metals, mining companies and related enterprises.

For each of the seven fund types, the performance of Dreyfus and T. Rowe Price are shown, where applicable, along with the funds which have performed best over the last one year, five years, and ten years, The data for the best performing funds are shown in **boldface.** Losses are shown by enclosing the data in parentheses, i.e., ().

IRA UPDATE

FUND ADDRESS	% SALES CHARGE	1 year	% GAIN OR (LOSS) 5 years	10 years
	MAXIMUM-CAPITAL-GAINS FU	NDS		
Dreyfus Leverage Fund 767 Fifth Avenue New York, NY 10153	81/2	(14.1)	72.5	80.3
Fidelity Magellan Fund 82 Devonshire Street Boston, MA 02109	2	(5.5)	297.8	263.8
Sequoia Fund 1290 Ave. of Americas New York, NY 10104	0	9.7	128.2	326.2
T. Rowe Price New Horizons 100 East Pratt Street Baltimore, MD 21203	0	(22.0)	125.5	23.1
	LONG-TERM GROWTH FUND	DS		
Dreyfus Number 9 Fund	0	(28.0)	102.3	144.7
address above Dreyfus 3rd Century Fund	0	(32.7)	60.9	114.9
Lindner Fund	0	9.3	232.5	397.0
200 South Bemiston St. Louis, MO 63105				
T. Rowe Price Growth Stock Fund	0	(18.3)	27.1	(8.4)
T. Rowe Price International Fund	0	(18.9)		
T. Rowe Price New Era Fund address above	0	(25.1)	86.1	102.1
	GROWTH AND INCOME FUN	DS		
Dreyfus Fund address above	81⁄2	(19.5)	60.0	82.0
Franklin Utilities Series 155 Bovet Road San Mateo, CA 94402	71⁄4	9.3	31.6	54.5
Value Line Fund 711 Third Avenue	0	(8.4)	145.4	184.0
Mutual Shares Corp. 26 Broadway New York NY 10004	0	(5.6)	112.0	393.0
Droutus Crassial Income Fund	INCOME FUNDS	(4.0)	04.4	C1 4
address above	U	(4.0)	34.4	01.4
Fidelity Equity Income Fund 82 Devonshire Street Boston, MA 02109	0	(0.3)	109.9	235.6
USAA Mutual Income Fund 9800 Fredericksburg Road San Antonio, TX 78288	0	11.9	23.8	
Value Line Income Fund	0	4.9	110.3	194.0

IRA UPDATE (continued)

FUND ADDRESS	% SALES CHARGE	1 year	% GAIN OR (LOSS) 5 years	10 years
	CORPORATE BOND FUNDS			
Dreyfus A Bonds Plus address above	0	11.9	29.5	
Fidelity Thrift Trust address above	0	14.5	47.9	
Lord Abbett Bond Fund 63 Wall Street New York, NY 10005	81⁄2	(6.8)	19.7	87.2
Putnam Convertible Fund 1 Post Office Square Boston, MA 02109	81⁄2	(10.9)	64.9	_
T. Rowe Price New Income Fund address above	0	12.5	34.1	
	GOVERNMENT BOND FUNDS			
John Hancock U.S. Gov't Fund Hancock Place P.O. Box 111 Boston, MA 02117	8	(2.9)	16.6	51.3
Vanguard GNMA Portfolio P.O. Box 2600 Valley Forge, PA 19482	0	16.0		
	GOLD FUNDS			
International Investors 122 East 42nd Street New York, NY 10108	81⁄2	(27.9)	235.3	294.8
United Services Gold Shares P.O. Box 29467 San Antonio, TX 78229	0	(25.0)	_	

One alternative to mutual funds for Individual Retirement Accounts is money-market funds. *Money* magazine's Guide also includes the vital statistics on 66 money-market funds whose performance statistics were compiled by Money Fund Safety Ratings, Fort Lauderdale, Florida. The essential difference is that money-market funds invest only in short-term debt, i.e., corporate IOUs, bank CDs, Treasury Bills, and notes of government agencies. All of the funds listed in the Guide have assets of at least \$100 million. For the twelve months ending September 1982, the funds with the greatest effective yields (adjusted for sales charge or load) and those of Dreyfus and T. Rowe Price are:

FUND	LOAD / NO LOAD	EFFECTIVE % YIELD
Dreyfus Government Series 600 Madison Avenue New York, NY 10022	no load	12.8
Dreyfus Liquid Assets address above	no load	14.2
Kemper Money Market 120 South LaSalle Street Chicago, IL 60603	load	14.5
T. Rowe Price Prime Reserve address above	no load	14.1
Value Line Cash Fund address above	no load	14.4

Copies of IRAs: Your Complete New Money Guide can be obtained for \$2.95 each from Money IRA Guide, P.O. Box 999, Radio City Station, New York, NY 10019.

SYMPOSIUM INDEX

From 1952 through 1982, over 2200 papers have been published in thirty-one Microwave Theory and Techniques Symposia Digests. One -hundred forty two papers were presented in the first nine years, approximately 700 papers from 1961 through 1972, and about 1370 papers subsequent to 1972.

The Microwave Theory and Techniques Society has decided to publish an index of all of those papers which have been presented at past MTT-S Symposia and which have appeared in the Digests of those conferences. The format and crossreferencing would be identical to that of the 28year MTT Transactions Index (MTT-29, June 1981). The Symposium Index will be published as a future special issue of the MTT Transactions and should be available in September 1983.

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OPTICAL WAVEGUIDES

The review of An Introduction to Optical Waveguides by M. J. Adams (John Wiley and Sons, New York, NY, 1981, 401 pages, \$51.95) was performed by Dennis G. Hall of the Institute of Optics, University of Rochester, Rochester, NY 14627. The review originally was published in the IEEE Journal of Quantum Electronics, Volume QE-18, Number 11, November 1982, page 1984.

The emergence of fiber optics as an important technology for telecommunications has stimulated a growing interest in the study of propagation in optical waveguides. As the author points out in the Preface to this book, many of the previous theor-etical treatments of this subject emphasize geometries of special significance for integrated optics, semiconductor lasers, or fiber optics, but do not provide a unified treatment of all of the important guided-wave structures. In this book, Adams presents in eight chapters and a consistent notation a comprehensive analysis of propagation in planar waveguides (five chapters), waveguides with rectangular cross sections (one chapter), and optical fibers (two chapters). The discussion of each geometry begins with a brief description of waveguides with conducting boundaries, and continues with extensive treatments of both step-index and graded-index dielectric waveguides.

To his credit, the author has used a common notation to facilitate comparisons of the various geometries. As an example, consider the familiar V-parameter, which is usually defined in terms of the waveguide thickness in integrated optics and in terms of the radius of the core region in fiber optics. Adams defines V for planar waveguides in terms of the layer's half-thickness, so that it is more in keeping with the fiber optics definition. While this definition of V is at odds with the published literature, it will most likely prove helpful to those using the book to study the subject for the first time.

The author has chosen to limit his treatment to an exposition of the theory of perfect waveguides. This has been carried out from points of view based on both ray optics and Maxwell's equations, with a good discussion of perturbation theory, the WKB approximation, and variational methods. A brief introduction to semiconductor lasers serves to motivate such topics as gaininduced guiding and multilayer waveguides. Because of the author's decision to concentrate on perfect waveguides, the text does not explore areas such as far-field radiation, bending losses, mode-coupling in multimode fibers, evanescent coupling, and input-output coupling. Admittedly, the book would have needed expansion beyond its 396 pages to include such material, but a treatment of these additional topics within the context of the author's unified notation would have been a welcome and worthwhile undertaking in the opinion of this reviewer.

All things considered, the book provides a careful and thorough discourse on the fundamentals of propagation in optical waveguides. Although the text provides a theoretical treatment of its subject matter, it does so with an eye toward practical matters, and so it should become a valuable resource for the practicing optical engineer. The level of presentation is appropriate for advanced, senior-level undergraduate, or first-year graduate students, and so, although there are no problems at the end of each chapter, the book could conceivably be used as principal or supplementary text for a course involving optical waveguides.

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STAMPS TO HONOR EEs

The U.S. Postal Service has announced that a block of four commemorative stamps honoring great electrical engineers will be issued in 1983. The release of these stamps, which was sparked by a request by the IEEE Centennial Task Force, will be the first of the IEEE's 1984 centennial year activities.

The four electrical engineers to be honored are Edwin H. Armstrong, inventor of frequency modulation; Nikola Tesla, inventor of the induction motor; Philo T. Farmsworth, inventor of the first workable all-electronic television system; and Charles P. Steinmetz, developer of alternatingcurrent systems. The date and city of release have not yet been determined, though IEEE President Robert E. Larson has written to the U.S. Postmaster General requesting that the stamps be released from New York City on May 13, 1984-the birthplace of the IEEE's predecessor organizations. (The American Institute of Electrical Engineers was founded on May 13, 1884, and the Institute of Radio Engineers was founded on May 13, 1912).

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ΤT	S	WINTER 1983			ner"
YEARLY REPORI (1981-1982)	TOPIC	"Millimeter-Wave Subharmonic Mixers," "Dielectric Waveguide Techniques for Millimeter-Wave Circuits," "Millimeter-Wave Integrated Circuit Technology" "Low Sidelobe Phased Array Antennas" "Near Millimeter-Wave Propagation" "Millimeter-Wave Integrated Synthesizer/Network Analyzer System"	"Voyager II — Saturn Flyby" "Microwaves in Nuclear Fusion" "Microstrip Antennas" "Microwave Communication Technology" Phased Array Symposium Phased Array Symposium	"Characterization of Microwave and Millimeter-Wave Impatt Diodes and Amplifiers" "Millimeter-Wave Transistors: What Are The Options?" "GaAs Power FETs: Two Successful Technologies" "Localized Hyperthermia Treatment of Cancer" "Localized Hyperthermia Treatment of Cancer" "Design of Modern TVRO Earth Stations" "An Integrated Front-End for the 4-GHz-TVRO" "An Integrated Front-End f	"Primary for Rylector Antennas" "Recent Advances in Computer-Aided Design for the Microwave Design "The Use of Electromagnetic Energy in Cancer Therapy" "Accoustic Microscopy: Methods, Applications, Outlook" "Moisture Measurement Using Microwave Techniques" Tour of Cablevision of Chicago
CHAPIER MEELINGS	SPEAKER	R. E. Forsythe Dr. T. Itoh H. S. Jewitt W. T. Patton Dr. J. J. Gallagher E. C. Burdette R. W. MacMillan J. Seals	W. Webster Dr. Goldman K. Carver Dr. F. Ivanek (National Lecturer) E. Brookner H. Schrank R. Sudbury H. Nethanson	G. C. Dalman H. Kondoh C. A. Lee Dr. L. F. Eastman Dr. B. S. Hewitt Dr. F. Sterzer Dr. R. S. Posner Y. Sayoda R. K. Gupta D. Brown Dr. E. Schloemann Dr. E. Schloemann Dr. F. Ivanek (National Lecturer) A. Chu	A. W. Rudge Dr. W. H. Childs J. W. Strohbehn L. W. Dessler I. Pakulis R. J. Dattner Br. F. Ivanek (National Lecturer)
S-IIW	DATE ATTENDANCE	Atlanta, Georgia 10/06/81 11/10/81 12/08/81 01/19/82 02/09/82 13 03/09/82 18	aditimore, Maryland 09/29/81 121 11/04/81 40 12/03/81 36 03/15/82 76 06/15/82 143	Boston, Massachusetts 09/24/81 43 10/22/81 35 11/19/81 35 01/14/82 25 01/22/82 25 01/28/82 25 01/28/82 25 02/04/82 25 02/04/82 25 02/04/82 25 02/04/82 25 02/04/82 25 03/10/82 25 03/20/82 35	nicago, Illinois 09/21/81 19 10/19/81 19 02/08/82 25 03/08/82 9 04/17/82 42 05/17/82 42
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DATE	ATTENDANCE	SPEAKER	TOPIC
India Council			
05/08/81	47	Dr. S. C. Jain	"VLSI - VHSIC - A System Approach"
06/26/81	42	T. V. Balakrishan	"Technological Trends in Power Equipment"
06/27/81	31	Col. B. K. Rai	"Future Trends in Micro-Electronics"
07/09/81	21	Dr. S. M. Rao	"Electromagnetic Scattering and Radiation of Arbitrarily Shaped Surfaces by Triangular Patch Modelling"
08/25/81	40	Prof. W. J. Eccles	"Consumer Micro-Electronics"
08/28/81	48	Dr. S. N. Verma	"Satellite Communication System"
09/01/81	34	Dr. H. Jansen	"Quality and Reliability in Micro-Electronics with Particular Reference to Fail-Safe Aspects"
09/04/81	30	Dr. M. Kuhn	Visit and Technical Discussions, at BARC-Bombay
09/05/81	32	Dr. M. Kuhn	Visit and Technical Discussions on Computer-Aided Design of LSI, at TIFR-Bombay
09/07/81	47	Dr. M. Kuhn	"Applying Digital Technology to Telecommunications Network — A Successful Canadian Initiative"
09/09/81	24	Dr. M. Kuhn	Visit and Technical Discussions on Charge Coupled Devices, etc. at ITT-Delhi
09/09/81	24	Dr. M. Kuhn	Visit and Technical Discussions on Solid State Device Developments, at CEL-Sahibabad
09/10/81	32	Dr. M. Kuhn	"Current Trends in Electron Device Research and Their Implications on Future Developments in Solid State Electronics"
09/10/81	27	Dr. M. Kuhn	"Optical Fibre Communication"
09/11/81	52	Dr. R. W. Damon	"Microwave, Magnets and Springs"
09/11/81	50	Prof. C. M. Srivastava Shri Pran Kishan	"Present and Future of Microwave Garnet Materials" "Techniques and Characterization of Microwave Ferrites"
09/11/81	50	Prof. C. M. Srivastava Prof. Bharti Bhat	"Magnetic Bubble Memories" "Phase Shifters"
09/11/81	50	Prof. C. M. Srivastava	"Measurement in Ferrites"
09/12/81	43	Dr. B. V. Rajeshwari Prof. R. V. S. Sitaram	"Importance of Ferrite Devices in Microwave Communication Systems"
09/12/81	43	Dr. T. S. Vedavati Gp. Capt. K. V. Padmanabhan	"YIG Oscillators" "Ferrite Magnetically Tuned Oscillators"
09/12/81	43	Shri S. Sundaram	"Miniature Isolators and Circulators"
09/13/81	22	Dr. M. Kuhn	Discussions on Recent Developments in Solid-State Devices for Communication Equipment, at HAL-Hyderabad
09/14/81	30	Dr. M. Kuhn	"Digital Technology for Telecommunication Network"
09/16/81	27	Dr. M. Kuhn	"Current Trends in Electron Devices Research and Their Implications on Future Developments in Solid State Electronics"
10/17/81	24	Dr. S. L. Johnston	"Millimeter-Wave Radars"
11/07/81	24	Dr. R. Khosla	"Advances in Solid-State Imaging"
11/09/81	37	Prof. A. B. Bhattacharya Shri K. C. Chhabra	"Modelling; Interactive Computer Aided Design in Electron Devices"

MTT-S • WINTER 1983

(1981-1982)
REPORT
YEARLY
MEETINGS
CHAPTER
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SPEAKER	
ATTENDANCE	(cont.)
DATE	Council
	India

Dr. T. K. Sexena	37	06/04/82
Dr. T. K. Sexena	37	06/03/82
Dr. T. K. Sexena	35	06/02/82
K. B. Subramanian	41	04/30/82
C. McDonough	32	04/30/82
Prof. M. S. Tyagi	35	04/17/82
Prof. M. S. Tyagi	35	04/16/82
P. J. Joglekar	33	03/31/82
Dr. R. M. Mehra	34	03/20/82
A. Dhir	20	03/13/82
V. Godbole	29	03/09/82
A. Berrada	46	02/19/82
Dr. S. Chandra	53	02/18/82
Dr. A. Prabhaker	37	11/10/81
Shri V. Venkateswarlu		
Shri P. R. Apte	37	11/10/81
Prof. S. C. Dutta Roy	37	11/09/81

Los Angeles, California

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Philadelphia, Pennsylvania

09/24/81 25 10/27/81 30 11/19/81 30 01/21/82 30 02/14/82 30 03/16/82 30 03/16/82 30 03/15/82 30	T. Miller	Dr. M. Skolnik	N. Farhat	J. Plourde		Dr. F. Ivanek (National Le	Dr. R. Harrington	
09/24/81 10/27/81 11/19/81 01/21/82 02/14/82 03/16/82 04/21/82 05/15/82	25	30	30	30	30	30	30	
	09/24/81	10/27/81	11/19/81	01/21/82	02/14/82	03/16/82	04/21/82	05/15/82

TOPIC

"Working and Applications of Scanning Electron Microscopes" "Ultra-Purification of Semiconductor Materials for IR Devices" "Large Scale Integrated Circuits for Telecommunications" "Electrical Transport in Bulk Amorphous Chalcogenides" "Micro-Electronics in the Service of the Power Engineer" "Development of High Power Semiconductor Devices" "Microprocessor Hardware and Software Strategy" "Interconnect Systems Technology and Tools" "Communication via CDMA Satellite Network" "Available CAD Programs and CAD Facility" "Atmospheric Noise and Sun Spot Activity" "Physics of Schottky Barrier Devices" "VLSI-VHSIC Architecture and Design" "Basic Developments in IR Detectors" "Mask Generation for VLSI Circuits" "Circuit Synthesis—Filter Design" "IFRB-Spectrum Manager"

"Microwave Techniques for Impedance Matching Arrays" "Computer-Aided Layout of Microwave Circuits" "GaAs FET Applications to Communications and Military Electronics Systems" "Microwave Communication Technology" Millimeter-Wave Technology Symposium "Introduction to Adaptive Arrays" "Applications of Antenna Technology to Radar Systems" "High Resolution 3-D Microwave Imaging" "Microwave Therapy" "Microwave Communication Technology" "Method of Moments" Second Annual Benjamin Franklin Symposium "Advances in Antennas, Propagation, and Microwave Technology"

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TOPIC		"Magnetic Fusion" Tour of TOKOMAK	"Monolithic Microwave Integrated Circuits"	Tour of TOKOMAK	Microwave Communication Technology'	"State-Of-The-Art Microwave Receivers with Application to Microwave Repeaters"		"Theory, Experiment, and Applications for Microstrip Antennas"	"Long Wavelength Imaging System"	"Active Wave Circuits"	 "Microwave Communication Technology" 	"Scrambling Techniques and Direct Broadcast Satellites"	"The Compact Range and Radar Cross-Section Measurement"		"GaAs Microwave IC Design Techniques for Increasing Circuit Density and Reducing Costs"	"Recent Advances in Broadband Microwave Mixers"	"Thin Film Technology for Microwave Circuits"	r) "Microwave Communication Technology"	"High Volume Microwave Applications—The Productivity	"Most Recent Developments in Millimeter-Wave Solid State Components"	"A 2-6 GHz Channelized Baseband Receiver Using MIC Techniques"	"Computer Directed Alignment of Amplifiers"		"Introduction to Electronic Warfare"	"Electronic Warfare Active Detection/Location Concepts and Subsystems"	"Electronic Warfare Jamming and Deception"	"Passive Location/Detection Concepts and Subsystems for Electronic Warfare"	"Antennas for Electronic Warfare Systems"	"Electronic Warfare Processing"	"Electronic Warfare, et cetera"
SPEAKER		Dr. H. Hsuan	M. Yoder		Dr. F. Ivanek (National Lecturer	W. H. Yocom		Ү. Т. Lo	G. Tricoles	J. Rave	Dr. F. Ivanek (National Lecturer	H. Faller	D. Hess	ornia	A. F. Podell	B. C. Henderson	G. Henry	Dr. F. Ivanek (National Lecturer		Dr. C. Sun	H. M. Stewart	Dr. M. G. Walker		L. B. Van Brunt	F. E. Nathanson	W. H. Weatherbee D. Coon	C. B. Hofman	G. S. Hardie	Dr. D. J. Spencer	L. A. Cosby
ATTENDANCE	Jersey	21	23 5	35	39	10	fornia	24	23	23	15	37	42	lley, Calif	44	49	100	115	140	31	40	2	IJ	153	191	120	160	150	110	06
DATE	Princeton, New	11/81	01/82	02/82	03/82	05/82	San Diego, Calii	09/24/81	10/22/81	01/27/82	02/18/82	03/18/82	04/15/82	Santa Clara Va	09/17/81	10/15/81	11/19/81	01/14/82	03/20/82	04/22/82	05/20/82	06/09/82	Washington, D.	10/13/81	11/10/81	12/08/81	01/12/82	02/09/81	03/09/82	04/13/82

OPTICAL WAVEGUIDE GLOSSARY

The rapid transition of optical waveguide communications from the laboratory into commercial systems has been accompanied by the growth of a specialized vocabulary. To eliminate ambiguity of terms, the National Bureau of Standards has published **Optical Waveguide Communications Glossary**, NBS Handbook 140. It updates the National Telecommunications and Information Administration's September 1979 SP-79-4, with a listing of 447 terms ranging from "absorption" through "window." The handbook is available for \$6.50 prepaid from National Technical Information Service, Springfield, VA 22161. Order by PB #82-166257.

REMOTE SENSING

Microwave Remote Sensing: Active and Passive; Volume 1: Microwave Remote Sensing Fundamentals and Radiometry was written by Fawwaz T. Ulaby, Richard K. Moore, and Andrian F. Fung and was published by Addison-Wesley Publishing Company, Reading, MA 01967 in 1981. The 456 page book (\$46.50) has been reviewed by Eni G. Njoku of Jet Propulsion Laboratory, Pasadena, CA 91109 and was originally published in the IEEE Geoscience and Remote Sensing Society Newsletter, Volume XXI, Number 3, September 1982.

During the past few decades microwave remote sensing has evolved from an interesting offshoot of military radar imaging and radio astronomy into a rapidly growing field with a bewildering array of applications in the solid earth, ocean, and atmospheric sciences. The time thus appears ripe for an up-to-date documentation of the fundamental principles, state-of-the-art techniques, and new research applications of microwave sensing. This is what the new book by Ulaby, Moore and Fung sets out to do and is most welcome in this respect. By incorporating active and passive microwave sensing under the same heading, the authors have attempted to bring together these hitherto rather divergent fields into a more unified approach.

The book is divided into three volumes (of which the first is the subject of this review), and is intended both as a graduate level text and also as a reference for practicing scientists and engineers. Although intended primarily as a threesemester graduate course sequence, the authors point out that relevant chapters may be selected from each volume to cover specific topics more appropriate to a one-semester course. It is here however that the problem of organization becomes apparent: no one volume forms a coherent unit, and even for a one-semester course it appears necessary to purchase all three volumes. Volume I covers introductory material, including a short history and applications of active and passive sensing, and basic treatments of electromagnetic wave theory, antennas, and microwave interactions with atmospheric constituents. The rest of the volume is devoted to radiometry, covering receiver principles, radiative transfer, and elementary surface emissivity and scattering theory (although several references to radar backscattering and reflectivity are made). Volume II deals in one part with principles of radar backscattering measurements, real and synthetic aperture radar systems, and radar calibration techniques. The following part concerns microwave interactions with surfaces to a more sophisticated level than in Volume I. Volume III starts off with a chapter on volume scattering and emission, and continues with discussions of specific radar system configurations - scatterometers, altimeters and synthetic aperture radars. Finally, applications of passive and active sensors to remote sensing of atmosphere, ocean and land are treated in some detail. While admirable in scope, the sequencing of chapters in the three volumes appears rather arbitrary and unconnected, an impression that might have been modified by providing more information in each chapter relating its relevance to previous and forthcoming topics. This is somewhat of a drawback to the use of the book as a student text, although its usefulness as a reference is perhaps less affected.

Turning our attention to volume I, there is a very interesting introduction covering the history and applications of microwave remote sensing. Here, however, as elsewhere, the authors' bias towards surface remote sensing is evident. Surface imaging, land, and ocean applications are discussed at length, whereas less attention is paid to the various aspects of atmospheric sensing.

The next two chapters provide a background on electromagnetic plane waves and antenna theory. It is not clear at the outset what assumptions have been made about the reader's background. Chapter 2 summarizes plane waves, from the derivation of the wave equation, through propagation in media, polarization, coherence, Poynting vector, reflection, transmission and layered media. The Riccati equation is stressed, without reference to other techniques for determining wave propagation in inhomogeneous media, as discussed for example in the book by Wait. The treatments in this chapter are necessarily brief, and one might refer a serious student of microwave sensing to a more thorough prior or companion course on E-M theory. More space might have been devoted to emphasizing the relevance of the topics covered to practical problems in remote sensing. The same general comments apply also to chapter 3 on antenna systems. However, several useful antenna concepts are introduced in this chapter and some specific aspects of dipoles, aperture antennas, and arrays are well presented. Several references to more complete works on antenna theory are provided.

Chapters 4 and 6 focus on radiometery and radiometer systems respectively. Under radiometry are included concepts of thermal radiation, radiative transfer, and elementary surface emission and scattering. Radiometer systems covers noise properties of components, various radiometer receiver types, their operation and calibration, and radiometer imaging considerations. The treatment of these topics is admirably complete within the present scope. The discussion on coherent and incoherent effects of inhomogeneous and layered media on emitted radiation is a bit confusing however. Much is made of the oscillatory behavior caused by approximating continuous dielectric profiles by discrete layers, with the suggestion that these phase effects can be avoided by treating the reflections as an incoherent process. This may not always be necessary or advisable.

Between the two chapters relating to radiometry is chapter 5 on interactions of microwaves with atmospheric constituents, including absorption and emission by gaseous molecules and interactions with ice and water droplets. Missing from the discussion is a treatment of weighting functions which form the basis for much of passive atmospheric remote sensing. Also, recent developments in remote sensing of minor atmospheric constituents and their effects on pollution and climate are not mentioned. Admittedly these applications are somewhat esoteric, but they should be included for completeness perhaps in volume III. The strong point of chapter 5 is the detailed discussion of absorption and scattering by hydrometeors and the extensive list of references.

As is commonly the case in a field which brings together developments in several different areas, the notation and symbols are not always those with which one is familiar. However, the appendix contains a very useful list of symbols and their explanations.

The book is well produced, and the text and diagrams are very readable. In conclusion, the authors have used their considerable expertise to bring together the many disparate topics involved in microwave remote sensing. Volume I succeeds in being useful reference and a good introduction to the subject for the interested student. Its ultimate value will become more evident however when viewed in conjunction with volumes II and III.

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PREPAY IEEE DUES

When IEEE members receive their dues bills this year, they will have the option to pay membership fees for as many years as they wish at 1983 rates.

This inflation-fighting measure has been a part of the IEEE bylaws (109.6) for many years, but was not widely promoted before now.

Any member above Student grade paying full dues, or a permanently retired member over age 62, is eligible. Regional assessments and Society fees can also be prepaid. No refund will be made of dues or fees paid in advance.

The Board of Directors has formed an adhoc committee to determine whether in future years it will be possible to give members discounts for prepaying dues.

FELLOW GRADE NOMINATIONS

Nominations for the IEEE Fellow grade must be received by the Fellow Committee by April 30, 1983 to be considered. The IEEE bylaws define the Fellow grade as one of unusual professional distinction. It is conferred only by invitation of the Board of Directors upon a person of outstanding qualifications and extraordinary experience in and individual contributions to the fields of electrical engineering, electronics, computer engineering and sciences, allied branches of engineering, and relatd arts and sciences. A nominee must be a Senior Member of the Institute and have been a member in any grade for at least five years prior to January 1 of the election year.

Selections, based on the consensus of committee judgments, are submitted to the Board of Directors for consideration and election. Fellows elected for 1982 will be announced in November.

The nomination form has been revised; only the new form having the year code "1983" will be accepted by the Fellow Committee. The nomination kit may be used for new submissions as well as for resubmissions of nominations. All members are encouraged to actively participate in the nomination process. The new kits for nominating Senior Members to be considered by the 1983 Fellow Committee are available from the Staff Secretary, IEEE Fellow Committee, 345 E. 47th Street, New York, NY 10017, (212) 694-1150.

In addition, nomination kits can be secured from the MTT-S Awards Committee Chairman, Dr. Hal Sobol, Rockwell International, Mail Stop 402-100, P.O. Box 10462, Dallas, TX 75207, (214) 996-5881.

When completed, all of the information should be returned to the IEEE Fellow Committee and a copy sent to Hal Sobol. Remember, all completed nominations are due April 30, 1983.

NEW THESES

Dr. Roger F. Harrington served as the thesis advisor for Yehuda Leviatan, whose dissertation, *Electromagnetic Transmission Through Apertures in a Cavity in a Thick Conductor*, was accepted by Syracuse University, Department of Electrical and Computer Engineering, Syracuse, NY 13210 in May 1982.

Rollin H. Koontz recently completed his M.S.E.E. thesis at California State University, Northridge, California 91330 under the guidance of Dr. Edmond S. Gillespie. His thesis is entitled *Planar Analysis of the Above-Resonance Direct-Coupled Junction Circulator*.

MICROSTRIP CIRCUIT DESIGN

The following book review by B. C. Barnes appeared in Volume 1, Number 2, July 1982 of British Telecommunications Engineering. **Foundations for Microstrip Circuit Design** by Terry C. Edwards was published in 1982 by John Wiley and Sons (265 pages).

Microstrip and its various derivatives are becoming increasingly important in the design of microwave and millimetrewave circuits, since they offer circuit integration at low-cost. This book presents an extremely good introduction to the subject, one that enables undergraduates or graduates to reach the stage where they could begin to design their own circuits. The basic theory is well covered, and all relevant formulae are quoted or derived without recourse to complex mathematics. The author has directed his book at the practicing design engineer, and to this end the many design algorithms are welcome.

Most books on this subject begin with transmission line theory, and this book is no exception. Chapter 2 briefly surveys, and discusses the merits of various microwave, integrated circuit techniques such as microstrip, slotline, finline and imageline. Monolithic microwave integrated circuits are only briefly mentioned, but in view of their future significance more attention is warranted.

The fundamental aspects of microstrip analysis are covered in Chapters 3 and 4 in an excellent section on microstrip impedance, and, as with all the chapters, the text is supported by many upto-date references.

The latter half of the book translates the theory into practical designs by first considering the characterization of microstrip discontinuities such as series gaps, short circuits, bends, junctions and impedance transformations. A design for a microstrip coupler is worked through, as an example; however, broadband multi-section couplers are omitted. Appendix A suddenly appears at the end of chapter 6 and, although it is relevant to this chapter, it would be more appropriate if it were placed with Appendix B at the end of the book.

Chapter 7 is mainly devoted to measurement techniques and, as waveguide is still the principal transmission medium at frequencies above 10 GHz and as a microstrip to waveguide transition is essential, a short section is addressed to this topic. The final chapter reviews some practical component designs involving couplers, filters and amplifiers. It is not surprising that most of the chapter is devoted to filter design as it is in this field that the author is currently working—at the Royal Military College of Science, Shrivenham.

This book is based on material which the author gathered while he was lecturing on a design-oriented microwave course and pursuing research into microstrip technology; however, there is sufficient practical data in it to make the book an essential tool for the practicing microwave engineer. The text is well presented and easy to read; the excellent diagrams compensate for a lack of photographs. Although a book for the specialist, it is likely to appeal to lecturers, graduates and design engineers.

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MORE NEW BOOKS

Artech House, Dedham, Massachusetts, has announced the availability or future availability of five new books. **Shipboard Antennas** by Preston E. Law, Jr. (400 pages, \$50.00) provides a complete background and technical description, including physical and electrical characteristics, of every representative type of antenna currently in the U.S. Navy inventory. Each of the 250 antennas is illustrated with photographs and diagrams. Antennas for EW, navigation, radar, communications, and IFF are included.

In **Radar Propagation at Low Altitudes** (100 pages, \$28.00), M. L. Meeks gives a tutorial review of the physics of radar propagation at low altitudes over various kinds of terrain in the frequency range from VHF to millimeter waves. The objective of this book is to present what is known about the propagation phenomena that determine the detection performance of ground-based radars against aircraft flying at low altitudes. A comprehensive bibliography is included.

Artech House has also announced Interference Suppression Techniques for Microwave Antennas and Transmitters by Ernest R. Freeman (350 pages, \$40.00), Radar Calculations Using the TI-59 Programmable Calculator by William Skillman (\$40.00), and Electronic Intelligence: The Analysis of Radar Signals (\$40.00). Artech House is located at 610 Washington Street, Dedham, MA 02026.

FIBER OPTICS AT OLYMPICS

An all-digital TV lightwave system that links remote television cameras and radio microphones to a central broadcasting station via a fiber-optic cable network will make its first appearance at the 1984 Summer Olympic Games in Los Angeles, California.

A complete communications system built by Western Electric Co. (New York, NY), the manufacturing arm of AT&T, transmits and receives TV signals at the rate of 90 Mbits/s, plus radio, analog telephone, and digital computer-station traffic at 45 Mbits/s over a proprietary fiber-optic link.

The separate receivers and transmitters in the system employ 9- and 14-bit analog-to-digital and digital-to-analog converters, resulting respectively in very high-quality TV video and stereo audio signals. Video images are synchronized to a clock frequency of 10.7 MHz, which is three times higher than the basic color TV subcarrier frequency. Audio is controlled by a 32-kHz clock.

The receivers and transmitters will be located in 24 trailer trucks scattered around the Olympics site, with each trailer being hard-wired into the nearest TV, radio, telephone, and computer sources. In addition to monitoring all communications traffic, each vehicle will accommodate as many as 1000 channels of information.

Up to several hundred miles long, the fiberoptic link between the transmitters and receivers will be a multimode, graded-index cable with a 50- μ m core diameter. Repeater stations will be set up at 5-mile intervals throughout the Los Angeles area, including within the central offices of the telephone company there. Broa dcasts will be carried over the cables to the ABC network's official broadcast outlet, the International Broadcast Center in Hollywood, California.

Western Electric will use existing fiber-optic cables and will add spur lines whenever needed.

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LASER THEORY AND APPLICATIONS

Written by K. Thyagarajan and A. K. Ghatak, Lasers; Theory and Applications was published in 1981 by Plenem Press, New York, NY (431 pages, \$39.50). The book has been reviewed by Robert T. Brown of the United Technologies Research Center, East Hartford, CT 06108. The review originally appeared in the IEEE Journal of Quantum Electronics, Volume QE-18, number 11, November 1982, pp. 1983-1984.

This book is a presentation of the basic physics behind the working of lasers along with some important laser applications. A major portion of the book has evolved from lectures given by the authors to senior undergraduate and graduate students at the Indian Institute of Technology, New Delhi, and the book has been used in a number of summer/winter schools organized by the Institute.

The first of the three major portions of the book deals with basic laser theory and introduces preliminary laser principles, including quantum mechanics, the Einstein A and B coefficients, the rate equation approach to studying laser action, the semiclassical theory of Lamb, and the phase-coherent nature of the stimulated emission process. The rather advanced treatment of some of these topics, combined with the absence of exercises and the failure to reference some of the standard texts in these areas, make this portion of the book of more use as a reference summary rather than as an introductory text for someone new to the field.

The second portion of the book summarizes a number of important laser applications, including holography, laser-induced fusion, lightwave communications, lasers in science, and lasers in industry. These treatments, while necessarily brief, are well written and clearly illustrated, and are surprisingly current, considering the rapid evolution of this technology.

The final section of the book is a reproduction of the Nobel lectures concerning coherent radiation, quantum electronics, semiconductor lasers, and holography by Townes, Prochorov, Basov, and Gabor, respectively. In addition to giving an excellent summary of relevant physical concepts, these lectures provide the reader with an historical perspective of some of the key developments in the laser field.

In all, the book is well written, very clearly illustrated, and will serve as a useful reference to students and practicing professionals in the quantum electronics fields.

1983 IM CONFERENCE

The IEEE Instrumentation and Measurement Society has announced that the first IM Conference will be held in Kansas City, November 1983. The Conference Planning Coordinator, Mr. Harold Goldberg is soliciting members to participate in the program activities which include:

- formulating the technical program
- publicity/speakers
- session arrangements
- conference procedures
- "calls for papers" coordinator
- etc., etc., etc.

If you are interested, please contact Harold S. Goldberg at Data Precision Corporation, Electronics Ave., Danvers, MA 01823, (617) 246-1600.

INTEGRATED CIRCUITS

Integrated Circuits: Materials, Devices and Fabrication has been reviewed by Prof. Charles J. Alajajian of the Department of Electrical and Computer Engineering, Clemson University, Clemson, SC. Written by William C. Till and James T. Luxon, the book has been published by Prentice-Hall, Inc. (1982, 452 pp.)

As its title suggest, this book is an attempt to bring together in a single volume the study of materials, devices, and fabrication of integrated circuits. In the preface, the authors state that the intended audience is primarily junior and senior engineering students who have taken a course in basic electronic circuits. The authors acknowledge that they have relied heavily on three classics [1-3] which already cover the material well. What then is new about this book? "We lay no claim to originality in any of the fundamental aspects of the subject matter," write the authors. "If there is any originality, it is in the emphasis, format, and level of presentation of the subject matter." This is a reasonable assessment of the text.

The first chapter is a cursory overview of microelectronics in which the fabrication of integrated circuits and thick/thin film circuits is discussed. The next four chapters describe the materials and processes required in the fabrication of monolithic circuits made of silicon. These chapters strongly resemble chapters 1 and 5 of Ghandi's text [1]. In this reviewer's opinion, the concepts which are presented are not elaborated upon in sufficient detail to be readily understood by the authors' intended audience. Terms are frequently introduced before they are defined, and many of the definitions are not carefully explained. Indeed, some terms are left undefined. For example, in the chapter on phase diagrams and solid solubility the term "amorphous" is used freely, but an amorphous solid is never defined in this or previous chapters; oddly, neither is the phase of a material defined. Recombination rate and mobile charge carrier lifetimes are referred to in chapter 4 but are not defined until chapter 6.

Chapters 6 through 9 consider many of the properties of the p-n junction diode, the bipolar transistor, the silicon surface, and field effect devices. These are perhaps the most clearly written chapters in the entire book and are well illustrated. An error appears in section 6-3. The continuity equation as given by the author is

$$\frac{dn}{dt} = -\frac{n_p - n_{po}}{T_p} \tag{6-22}$$

The solution given for this equation is

$$(n - n_{po}) = (n_p - n_{po}) e^{-t/T_n}$$
 (6-23)

Instead, (6-22) should read

$$\frac{dn}{dt} = -\frac{n - n_{po}}{T_n}$$

with the initial condition $n(0+) = n_p$, in which case (6-23) is correct. Similarly, (6-24) must be correct by changing p_n to p, with initial condition $p(0+) = p_n$ in order for (6-25) to be correct.

The Ebers-Moll model is well developed and the simplifying assumptions used are clearly stated. Approximations are found for various regions of operation and the limitations of the model and appropriate modifications are considered. The small-signal hybrid-pi model is then deduced from this model and includes first-order representation of charge-storage effects and ohmic resistance. The charge-control model is not mentioned, and the hybrid-pi model does not incorporate sources to account for base-width modulation effects. Coverage of the Gummel-Poon model is entirely omitted [6].

The operation of the MOSFET and the JFET is carefully explained, both descriptively and analytically. The MOSFET large-signal model is derived under the assumption that the charge Q_g in the depletion region is constant; the case of nonconstant Q_g is not considered. No mention is made of the effect of substrate bias on the threshold voltage (Body effect). The section on the oxidation of silicon does not include Henry's law, and a differential equation desribing oxide growth is not developed.

Lithography, fabrication, bonding, testing and packaging of silicon integrated circuits, and hybrid thin-film and hybrid thick-film circuits are discussed in chapters 10-13. Only a short portion is devoted to the fabrication of thin-film circuits while there is considerably greater coverage of thick-film circuits. This material should be especially useful to the student if a hybrid thickfilm lab accompanies the lecture. Little mention is made of thick and thin film capacitors, and hybrid microwave structures are not discussed.

The chapter on basic bipolar processing does not explain how the characteristics of practical devices can be predicted from a consideration of the surface geometry and doping profiles. For example, no mention is made of the calculation ofthe base Gummel number or the emitter figure of merit [4].

In the section on bonding and packaging, hybrid assembly techniques are not described. Passive and active add-on components for hybrid circuits, such as molded Domino[®] tantulum electrolytic packages, or Microtab[®] and Minibloc[®] transistor configurations are not mentioned [4].

The final chapter is a good discussion and analysis of digital logic families which include T²L, ECL, I²L, NMOS, and CMOS. Noise margin is explained well and a novel means of studying fan out, using a simple resistor-switch model, enchances understanding. On pp. 410-412 some phrases are tangled. The phrase on pp. 410-411

should read, "Because x and y are wired together, if one of them is pulled lo by a transistor in saturation, they are both lo. Thus, if x and/or y is lo, transistor Q_3 is off and z is hi." The phrase on pp. 411-412 should read, "If we look at NMOS logic structures for a moment, a depletion-load device can be modeled as a resistor and enchancement devices can be modeled as switches.'

In this reviewer's opinion, this book does not offer in-depth coverage of integrated circuit engineering. Given the intended audience, the authors, almost out of necessity, devote a large segment of the text to an introductory coverage of semiconductor materials and device physics. These topics are presented more clearly and in more detail in other texts [5, 6]. Fortunately, each chapter, except the first, contains an adequate bibliography. Indeed, without supplementary reading, it will be difficult for the newcomer to fully understand the material as the authors have presented it. In this reviewer's opinion, the authors have attempted to accomplish too much in a single volume.

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(Reprinted from the IEEE Circuits and Systems Magazine, Volume 4, Number 3, September 1982).

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ANSI RADIATION DOCUMENTATION

Four documents dealing with RF radiation, prepared by the American National Standards Institute (ANSI), are available from the IEEE.

Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 300 kHz to 100 GHz, ANSI document C 95.1-1982, is a thorough revision and expansion to the 1974 publication. The document sets forth recommended radiation protection guides to prevent possible harmful effects in human beings exposed to electromagnetic fields in the aforementioned frequency range. Major revisions to the 1974 document have been made to reflect significant expansion of the data base, improvement in the dosimetry, and the increasing number of people in the general population exposed to radio frequency fields. Changes in the standard include a wider frequency coverage, frequency dependence resulting from the recognition of whole body resonance, and incorporation of dosimetry, expanded application to the general population, and guidelines, based upon the present data base, are also included.

Radio-Frequency Hazard Warning Symbol, ANSI C 95.2-1982 defines the design and colors of a symbol denoting the incidence of electromagnetic energy in the frequency range from 300 kHz to 100 GHz. This symbol is intended to be used to warn workers or the general public of potentially hazardous levels of non-ionizing electromagnetic radiation. Definitions and references are also included in the document.

ANSI C 95.3-1973, Techniques and Instrumentation for the Measurement of Potentially Hazardous Electromagnetic Radiation at Microwave Frequencies, adopted by the U.S. Department of Defense, sets forth evaluation techniques and instrumentation to determine the existence of a potentially hazardous situation due to electromagnetic radiation. The emphasis of the document is on techniques suitable for measuring power density at microwave frequencies. Generally applicable in the far field, these techniques will provide reasonably accurate measurements in the near field when conditions outlined in the standard are satisfied.

A fourth ANSI document, Recommended Practice for the Measurement of Hazardous Electromagnetic Fields-RF and Microwave, describes techniques and procedures for the measurement of potentially hazardous electromagnetic fields in both the near field and the far field. The techniques and instrumentation described in ANSI C 95.5-1981 apply to the measurement of electromagnetic fields in the neighborhood of flammable materials, explosive devices, and personnel. The specifications set forth in the document are intended for use over the frequency range of approximately 1 MHz to 100 GHz.

Any of these documents can be ordered from the IEEE, Standard Sales Department, 445 Hoes Lane, Piscataway, NJ 08854. IEEE document numbers and member prices are as follows: C95.1-1982, IEEE number SH08631, \$4.50; C95.2-1982, IEEE number SH08607, \$4.50; C95.3-1973, IEEE number SH70037, \$4.50; C95.5-1981, IEEE number SH08284, \$5.40. There is also a \$2.00 shipping and handling charge per order.

RADAR IMAGING

R.L. Mitchell has reviewed **High Resolution Radar Imaging**, a 1981 publication by Artech House. The 198 page volume by Dr. Dean L. Mensa retails for \$40.00

The way in which a radar signal is reflected from a target is often reduced to a single number, the radar cross section (RCS), or at most an RCS pattern as a function of target aspect. Measurements are easily obtained, and the information is occasionally useful, generally in lowresolution applications. Numerous books are available on the subject.

Modern radars, however, are becoming very sophisticated. It is not at all unusual for a radar to have a resolution capability that is finer than the target extent. In other words, the radar will be able to image the target. Because of this capability there has been considerable recent activity in the development of high-resolution measurement ranges and techniques for processing and interpreting the data. But until this book, nothing very useful on this subject has been available in the opening literature.

One of the better ranges is at the Navy's Pacific Missile Test Center, Point Mugu, California. Dr. Mensa has been primarily responsible for its success, and in this book he presents a very readable account of how one goes about obtaining highresolution images of targets. The procedure is conceptually simple. One uses large bandwidth signals to obtain high resolution in the range dimension, one rotates the target to utilize Doppler information in order to obtain high resolution in the cross-range dimension. Achieving High resolution is straightforward on paper, as Dr. Mensa shows us, but in practice it is not simple. The few-centimeter resolution obtained at PMTC and illustrated in his book is a remarkable achievement.

I predict (or at least I hope) that all range facilities will soon adopt such high resolution procedures. There is strong justification for this. First, the imaging process is a direct and obvious measure of data quality. Poor data samples will not image properly. Second, the data will be almost universally applicable, at least within a given radar band. As it is now, we often have to repeat the measurement at greater expense for a slightly different application.

In order to obtain such high resolution, the measurement system must be very stable, especially in terms of the rf phase. One must also collect a large amount of data in 10⁶ samples for any interesting target is probably a lower bound. Once the sample is collected, however, the processing required to obtain an image is straight forward and can be done with relatively modest computing resources.

Dr. Mensa begins with the fundamentals of resolution theory in range and Doppler, and then

he discusses conventional synthetic aperture processing in some detail. This material is a useful background for the main topic of this book, which is the two-dimensional imaging of rotating targets. Dr. Mensa gives a very complete treatment of the subject, including derivations, examples, numerous figures, potential hardware problems, and other limitations. He also gives a thorough treatment of focused synthetic aperture process and an iterative method of image reconstruction.

While the use of Fourier analysis is unavoidable in such a subject, Dr. Mensa minimizes the mathematics and concentrates on physical interpretations. He also provides numerous illustrations and images that are especially useful to the reader. I highly recommend this book to anyone interested in radar target measurements and signature analysis.

(Reprinted from the Microwave Journal, Volume 25, Number 8, August 1982)

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MOBILE RADIO EMI

Owners and operators of vehicles with mobile radios will be interested in a new publication from the National Bureau of Standards that describes methods of suppressing electromagnetic interference (EMI) affecting mobile radio equipment. EMI caused by the vehicle's own electrical system can seriously degrade the performance of mobile radios. The report discusses sources of EMI within vehicles and the latest techniques for suppressing this interference. Copies of **Methods of Suppressing Automotive Interference** (SP 480-44) are available for \$6 prepaid from the National Technical Information Service, Springfield, VA 22161. Order by PB #82-165259.

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STUDENTS TO OWN COMPUTERS

Three universities have announced they will be requiring students to own a personal computer.

A portion of this fall's first-year students at the Stevens Institute of Technology in Hoboken, N.J., are being required to purchase personal computers from that school. Science and systems planning and management students must buy Atari 800 microcomputers at a cost of \$747. Included are a compatible cassette recorder and a Sharp black and white television. Students also have access to any Atari material, from disk drives to Pac-Man cartridges, at reduced cost. Stevens plans to phase in the requirement to all other students as time goes on.

Clarkson College of Technology in Potsdam, N.Y., will be issuing personal computers to its 1000 freshmen beginning next fall. The Zenith Z-100 desk-top computer, based on an Intel microprocessor, has a retail value of \$5000 including software, but will cost students only \$200 per semester plus a one-time maintenance deposit fee. Upon graduating, title will also pass to the students. Clarkson's program will be expanded to include eventually all of its 3800 undergraduates.

Proclaiming a "revolution in education," Carnegie-Mellon University in Pittsburgh, Pa., outlined a program to wire the entire school to the university's main computer and library. By 1985, all of Carnegie-Mellon's 8000 to 9000 students and teachers will own terminals. Students will buy them at a cost of about \$750 a year and keep them when they graduate. IBM will install the system, and will work with Carnegie-Mellon University to develop a new personal computer unique to the university's needs.

Each of the schools staunchly claims that the trend they are starting will catch on like wildfire.

"Every major institution will be following us in a few years, if they are able," said Richard M. Cyert, president of Carnegie-Mellon University.

"It's going to happen at many places very soon, I'm sure," according to Joseph Moeller, who is in charge of implementing Stevens's system.

And Robert A. Plane, president of Clarkson, agrees also. "The computer is clearly the same kind of tool now that the slide rule and the calculator have been in the recent past."

BOOK REVIEW

Electromagnetic Field Theory by Marcus Zahn has been published by John Wiley and Sons, Inc., 605 Third Avenue, New York NY 10158. The 723 page book has been reviewed by Charles A. Harper, Westinghouse Electric Corporation, Systems Development Division, Baltimore, MD 21203.

This instructional text is an introductory treatment for a two-semester electrical engineering course starting from the Coulomb-Lorentz force law on a point charge. The theory is extended by the continuous superposition of solutions from previously developed simpler problems leading to the general integral and differential field laws. Often the same problem is solved by different methods so that the advantages and limitations of each approach becomes clear. Sample problems and their solutions are presented for each new concept with great emphasis placed on classical models of such physical phenomena as polarization, conduction, and magnetization. A large variety of related problems that reinforce the text material are given at the end of each chapter for exercise. An instructions manual is included.

It is expected that readers have had elementary courses in calculus that allow them to easily differentiate and integrate simple functions. The text tries to keep the mathematical development rigorous but simple by typically describing systems with linear, constant coefficient differential and difference equations.

The text is essentially subdivided into three main subject areas: (1) charges as the source of the electric field coupled to polarizable and conducting media with negligible magnetic field; (2) currents as the source of the magnetic field coupled to magnetizable media with electromagnetic induction generating an electric field; and (3) electrodynamics where the electric and magnetic fields are of equal importance resulting in radiating waves. Wherever possible, electrodynamic solutions are examined in various limits to illustrate the appropriateness of the previously developed quasistatic circuit theory approximations. There are nine separate chapters incorporated in the three subject areas.

This text and the accompanying instructor's manual can be recommended as an excellent, thorough and well organized book, especially suited for instructional objectives.

Reprinted from the Electrical Insulation Society Newsletter, Volume 18, March 1982.

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PAC GIFTS

Various unions, societies, associations, etc. have political action committees which donate campaign contributions to "worthy" candidates. The following list shows the top ten contributing organizations to the 1980 U.S. congressional candidates. It is estimated that the sum of all PAC contributions was \$55 to \$60 million.

National Association of Realtors	\$1,532,105
United Auto Workers	1,514,981
American Medical Association	1,348,585
National Automobile Dealers Ass'n	1,034,875
Machinists & Aerospace Workers	836,910
AFL-CIO	791,092
Associated Milk Producers, Inc.	778,289
United Transportation Union	724,693
National Association of Life Underwrite	rs 637,192
Carpenters & Joiners of America	555.008

SHORT COURSES

Spread Spectrum Communications Systems will be presented January 24-28, 1983 in Washington, D.C. by the George Washington University. The instructor for Course No. 302 DC is Robert C. Dixon, President of R. C. Dixon and Associates, Cypress, CA. The fee for this course is \$855 per student. Contact Continuing Engineering Education Program, George Washington University, Washington, DC 20052, (202) 676-6106 or (800) 424-9773 for additional information.

Other short courses which will be offered by George Washington University this winter include: **Fiber and Integrated Optics** (Course 378 SD and 378 OF), January 24-28, 1983 and February 7-11, 1983; **Modern Data Communications** (Course 241 OF), February 7-11, 1983; **Fiber Optic Systems Design** (Course 541 DC), February 9-11, 1983; **Radar Signal Processing** (Course 351 DC), February 14-18, 1983; and **Wideband Communications** (Course 537 DC), March 1-4, 1983. Contact the university at (202) 676-6106 or (800) 424-9773 for more details.

Georgia Institute of Technology are offering a variety of short courses for early 1983, including:

Modern Microwave Solid-State Devices and Sources is being offered February 1-2, 1983. The course will review transmission line theory, consider design for ferrite or diode devices, such as switches, isolators, and phase-shifters, and will discuss Gunn and IMPATT sources. \$425 per student is the course fee.

Two separate two day courses are scheduled to be presented consecutively from March 7 through 10, 1983. The first of them, Laser Technology and Systems Applications will present the fundamentals necessary for design of laser systems. Dr. Donald C. O'Shea and Dr. W. Russell Callen will teach the major portions of the course. The fee is \$430 per person. The last two days are devoted to Infrared Technology and Applications. The course will examine the problems and methodologies relative to infrared technology and application. Course fee: \$525.

Information on any of these courses can be obtained from the Department of Continuing Education, Georgia Institute of Technology, Atlanta, GA 30332, (404) 894-2547.

Microwave Circuit Design will be presented January 31-February 4, 1983 at the University of California, Los Angeles. The course instructors are Les Besser, Steven March, and Robert Wenzel. For reservations and/or registration information, contact Short Course Program Office, UCLA Extension, P.O. Box 24901, Los Angeles, CA 90024, (213) 825-1295 or 825-3344. Enrollment is limited to 40 and the course fee is \$845 per student.

Also available through UCLA will be **Microwave Solid-State Devices and Circuits.** The course is scheduled for February 22-25, 1983 at a fee of \$845 per pupil. The course lecturers include George Haddad, Paul Greiling, Robert Eisenhart, Douglas Maki, and Dean Peterson.

BIOLOGICAL EFFECTS BULLETIN

The FCC regulates the use of radio waves and microwaves for communications. Because of its responsibilities in this area, the Commission often receives inquiries concerning potential hazards to human health and to safety from radio frequency and microwave radiation. In recent years, there has been a noticeable increase of public awareness and concern over this issue. Increased publicity about new uses of RF and microwave technology has generated much discussion and speculation concerning the alleged "electromagnetic pollution" of the environment. OST Bulletin #56 dated July 1982 is a short publication designed to provide information on some of the most commonly asked questions about RF and microwave radiation. It is titled "Questions and Answers About Biological Effects and Potential Hazards of Radio Frequency Radiation."

The publication provides a distinction between ionizing and non-ionizing radiation. It discusses what bological effects can be caused by RF radiation and briefly describes current and future US standards, as well as some of the lower standards used by Soviet bloc nations. It contains a brief discussion about the safety of microwave ovens; but, refers the readers to the Bureau of Radiological Health (BRH) of the Food and Drug Administration. Their safety standard of 5mW/cm² measured at approximately two inches from the oven's surface is stated. A brief discussion of RF radiation effects on electronic cardiac pacemakers also is presented.

The bulletin addresses the radiation emitted by radio and television broadcasting towers, as well as microwave point-to-point relay towers. Although the safety levels are to be defined by the Environmental Protection Agency and the Occupational Safety and Health Administration, the bulletin points out that workers and maintenance personnel should only work on such towers with reduced power or with the power turned off. Of particular importance is the emphasis made that the human body absorbs the most RF radiation in the frequency range of 30-300 MHz. Copies of OST Bulletin #56 may be obtained from the FCC Office of Science and Technology, Technical Analysis Division.

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THE COHAN RULE LIVES

Back in 1930, when entertainer George M. Cohan could not produce records to support his travel and entertainment deductions, a federal court of appeals concluded that he could reasonably be expected to have incurred such expenses. It allowed part of his deductions despite the absence of written substantiation. This court-made law became known as the Cohan rule.

In the 1960s Congress outlawed the Cohan rule in the travel and entertainment area. However, courts have continued to use Cohan-rule reasoning in other tax areas.

In one recent U.S. Tax Court case, a father could not produce records of wages he had paid his children and other teen-agers to help in his newspaper delivery business. The court allowed about half of such wages claimed on his tax return.

If you cannot substantiate all of your expenses with the "best" evidence, the Cohan rule can work for you-provided the circumstances strongly indicate you have incurred the expenses involved.

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MEETINGS OF INTEREST

The following list of meetings of potential interest to members of the Microwave Theory and Techniques Society covers a period of nearly a year. All efforts will be made to maintain a complete compilation of IEEE-sponsored and non-IEEE-sponsored meetings. Any additions should be sent to the MTT-S Newsletter Editor.

- WINCON '83, the Aerospace and Electronic Systems Winter Convention is scheduled for February 8-10, 1983 at the Disneyland Hotel, Anaheim, California. Contact George Hage, Northrop Corporation, Electro-Mechanical Division, 500 East Orangethorpe Avenue, Anaheim, CA 92801, (714) 871-5000, ext. 418 for additional details.
- Marseilles, France is the site of the Seventh Annual Conference on Infrared and Millimeter Waves. For additional details on the February 14-18, 1983 conference, contact Kenneth J. Button, General Chairman, M.I.T. National Magnet Laboratory, Building NW-14, Cambridge, MA 02139, (617) 253-5561.
- Sun Valley Lodge in Sun Valley, Idaho is the site of the February 19-26, 1983 Aerospace Applications Conference. Contact Dr. Russell A. Gaspari, Hughes Aircraft Co., Space and Communications Group, Technology Division, 512/V305, P.O. Box 92919-Airport Station, Los Angeles, CA 90009, (213) 648-1325 for more details.

- Data and Telecommunications Japan '83 will be held February 16-19, 1983 at the Tokyo Ryutsu Centre, Tokyo, Japan. The conference and exhibition, with a special exhibit area for microwave technology, will be held in the same facility. For more information, contact Cahners Exposition Group, 222 West Adams Street, Chicago, IL 60606, (312) 263-4866.
- The 1983 International Solid State Circuits Conference will be held February 23-25, 1983 at the Sheraton Center in New York, New York. For additional information, contact Lewis Winner, 301 Almeria Avenue, Coral Gables, FL 33134, (305) 446-8193.
- OFC '83, the topical meeting on Optical Fiber Communication is scheduled for February 28 -March 2, 1983 at the Hyatt Regency Hotel in New Orleans, Louisiana. There will be a technical exhibition. For additional information, contact OFC '83, Optical Society of America, 1816 Jefferson Place, N.W., Washington, D.C. 20036, (202) 223-8130.
- Two conferences on microlithography will be held sequentially March 14-15, 1983 and March 16-17, 1983 in Santa Clara, California. For additional information, contact SPIE Microlithography '83 Program Committee, P.O. Box 10, Bellingham, WA 98227, (206) 676-3290.
- The Built-in Self Test Workshop is scheduled for March 15-16, 1983 in Charleston, South Carolina. Further information is available from Richard M. Sedmak, BIST Workshop, Sperry Univac, Mail Stop C1-NE15, P.O. Box 500, Blue Bell, PA 19424, (215) 542-3638.
- The 1983 IEEE Region Six Conference will be held March 16-18, 1983 at the Marriott Hotel in Albuquerque, New Mexico. Contact Prof. Roy A. Colclaser, EECE Department, University of New Mexico, Albuquerque, NM 87131, (505) 277-5628 for more information.
- Intermag the International Conference on Magnetism will be held April 5-8, 1983 at the Franklin Plaza Hotel, Philadelphia, Pennsylvania. For more details, contact Prof. C. D. Graham, Dept. of Material Science, University of Pennsylvania, 3231 Walnut Street, Philadelphia, PA 19104, (215) 243-8509.
- April 10-14, 1983 are the dates for Southeastcon The conference will be held at the Sheraton Twin Towers Hotel in Orlando, Florida. For more information, contact Russell E. Theisen, Martin Marietta Aerospace, 2667 Fitzhigh Road, Winter Park, FL 32792, (305) 352-3177.
- The University of East Anglica in Norwich, England is the site of the Third International Conference on Antennas and Propagation. Contact IEE Conference Secretariat, Savoy Place. London WC2R OBL, England for more information on the April 12-15, 1983 conference.
- The 1983 International Society for Optical Engineering Technical Conference will be held April 18-22, 1983 in Geneva, Switzerland. Contact Joe Yaver, SPIE 1983 Conference, P.O. Box 10, Bellingham, WA 98227, (206) 676-3290 for further information.

MTT-S • WINTER 1983

- Electro will be held at the New York Coliseum and the Sheraton Centre in New York, NY, April 19-21, 1983. Contact Dale Litherland, Electronic Conventions, Inc., 999 North Sepulveda Boulevard, El Segundo, CA 90245, (213) 772-2965 for additional information.
- The 1983 IEEE Region 5 Conference will be held at the Hilton Hotel at the University of Houston, Houston, Texas. For more information on the April 20-22, 1983 meeting, contact Douglas White, Houston Lighting and Power Company, P.O. Box 1700, Summit Tower, Room 1180, Houston, TX 77001, (713) 960-1920, ext. 5127.
- April 25-28, 1983 are the dates for the Jordan International Electrical and Electronic Engineering Conference, Amman, Jordan. Contact Dr. M. Maqusi, Electrical Engineering Department, University of Jordan, Amman, Jordan.
- Versailles, France is the site for the April 27-29, 1983 Satellite and Computer Communications International Symposium. For further information, contact Jacques-Louis Lions, INRIA, Domaine de Voluceau-Rocquencourt, B.P. 105-78153 Le Chesnay Cedex, France, tele (3) 954-9020.
- The Newporter Inn in Newport Beach, California is the site of the 1983 IEEE International Symposium on Circuits and Systems. For more information on the May 2-4, 1983 conference, contact the Symposium Chairman, Dr. George Szentirmai, Compact Engineering Division, C.G. I.S., 1131 San Antonio Road, Palo Alto, CA 94303, (415) 966-8440.
- Test and Measurement World Expo is a conference scheduled for May 2-5, 1983 in the San Jose Convention Center, San Jose, California. The conference/exposition is sponsored by *Test and Measurement World* magazine. For additional information contact the magazine at Interfield Publishing Company, 215 Brighton Avenue, Boston, MA 02134.
- **NORTHCON '83** will be held May 10-12, 1983 at the Portland Memorial Coliseum, Portland, Oregon. Additional information can be obtained from Larry Brown, 7719 Southwest Capitol Highway, Portland, OR 97219, (503) 245-2283.
- way, Portland, OR 97219, (503) 245-2283.
 Walt Disney World in Orlando, Florida is the site of the 33rd Electronic Components Conference. For additional details on the May 16-18, 1983 conference, contact Thomas G. Grau, Bell Telephone Laboratories, Whippany, NJ 07981, (201) 386-3303.
- The 1983 National Aerospace and Electronics Conference (NAECON) will be held May 17-19, 1983 at the Dayton Convention Center, Dayton, Ohio. Contact NAECON, 140 East Monument Avenue, Dayton, OH 45402, (513) 223-6266 for additional information.
- May 17-20, 1983 are the dates for CLEO '83, Conference on Lasers and Electro-Optics. The conference will be held at the Baltimore Convention Center, Baltimore, Maryland. Additional information can be obtained from CLEO '83, Optical Society of America, 1816 Jefferson Place, N.W., Washington, D.C. 20036, (202) 223-8130.

- The 1983 IEEE Antennas and Propagation Society Symposium and the U.S. National Committee of URSI Meeting will be held at the University of Houston, Houston, Texas, May 23-26, 1983. Contact Dr. Stuart A. Long, Department of Electrical Engineering, University of Houston, Houston, TX 77004, (713) 749-2511 for more information.
- The 1983 Mediterranean Electrotechnical Conference (MELECON '83) will be held in Athens, Greece. Additional information on the May 24-26, 1983 conference can be obtained from Prof. E. N. Protonotarios, National Technical University, 42 October 28th Street, Athens (147), Greece.
- THE 1983 IEEE MICROWAVE AND MILLI-METER-WAVE MONOLITHIC CIRCUITS SYM-POSIUM will be held May 31-June 1, 1983 at the Boston Sheraton Hotel, Boston, Massachusetts. Contact Dr. Paul T. Greiling, Hughes Aircraft Co., 3011 Malibu Canyon Road, Malibu, CA 90265, (213) 456-6411 for additional information.
- THE 1983 IEEE MTT-S INTERNATIONAL MIC-ROWAVE SYMPOSIUM will be held June 1 -June 3, 1983 at the Boston Sheraton Hotel, Boston, Massachusetts. For additional information, contact Harlan Howe, Jr., M/A-COM, Inc., South Avenue, Burlington, MA 01803, (617) 272-3000, extension 1637.
- The URSI Commission F 1983 Symposium, Wave Propagation and Remote Sensing, will be held in Wepion-Namur, Belgium, June 9-15, 1983. The conference languages are English and French. Contact the Symposium Secretariat, URSI Commission F 1983 Symposium, Laboratoire de Telecommunications U.C.L., Batiment Maxwell, B-1348 Louvain-la-Neuve, Belgium for additional information.
- Ottawa, Canada is the site for the 1983 Satellite Communications Conference. SCC-1983 will be held June 15-17, 1983. Additional details can be furnished by Dr. Kamilo Feher, University of Ottawa, 770 King Edward Avenue, Ottawa, Ontario K1N 9B4, Canada, (613) 231-2288 or 231-2495.
- June 19-22, 1983 are the dates for the 1983 International Conference on Communications. The convention site is the Boston Sheraton Hotel, Boston, Massachusetts. Contact C. William Anderson, New England Telephone and Telegraph, 350 Cochituate Road, Framingham, MA 17101, (617) 879-9000 for additional information.
- The Fourth International Conference on Integrated Optics and Optical Fiber Communication (IOOC '83) will be held June 27-30, 1983 at the Keio Plaza Hotel in Tokyo, Japan. Contact Dr. Melvin I. Cohen, Bell Telephone Laboratories, Room 6D-325, 600 Mountain Avenue, Murray Hill, NJ 07974, (201) 582-6623 or Prof. Humio Inaba, Research Institute of Electrical Communication, Tohoku University, 2-1-2 Katahira, Sendai 980, Japan for more information.
- August 22-24, 1983 are the dates for the fifth annual Satellite Communications Users Conference to be held at Stouffer's Riverfront Towers, St. Louis, Missouri. For further information, con-

tact Satellite Communications Magazine, 6430 South Yosemite Street, Englewood, CO 80111, (303) 694-1522.

- August 31-September 2, 1983 are the dates for the 1983 International Geoscience and Remote Sensing Symposium. The conference will be held at the San Francisco Hilton Hotel, San Francisco, California. Further details can be supplied by Mike Beuttner, Lawrence Livermore National Laboratory, Mail Stop L-156, P.O. Box 5504, Livermore, CA 94550, (415) 422-7888.
- The University of Kent, Canterbury, England is the location for the 13th European Solid State Device Research Conference. Contact Dr. Clive Jones, Institute of Physics, 47 Belgrave Square, London SW1X 8QX, United Kingdom, tel: 01-235-6111 for additional information on the September 13-16, 1983 meeting.
- EASCON, the Electronic and Aerospace Systems Convention, will be held at the Shoreham Dunfy Hotel, Washington, D.C., September 19-21, 1983. Contact Dr. John M. Walker, Westinghouse Electric Corp., Mail Stop 3200, P.O. Box 1521, Baltimore, MD 21203, (301) 765-7491 for more information.
- The Sixth International Conference on Digital Satellite Communications will be held September 19-23, 1983 at the Hyatt Regency Hotel, Phoenix, Arizona. Requests for information should be directed to Howard B. Briley, Comsat, 950 L'Enfant Plaza, S.W., Washington, D.C. 20024, (202) 863-6248.
- The **1983 Electrical and Electronics Conference** and Exposition will be held in Toronto, Canada at the Automotive Building of the Canadian National Exhibition, September 26-28, 1983. Contact IEEE Canadian Region Office, 7061 Yonge Street, Thornhill, L3T 2A6, Ontario, Canada, (416) 881-1930 for more details.
- Chicago, Illinois is the site for MIDCON '83, a conference with exhibits. For more details, contact Dale Litherland, Electronic Conventions, Inc., 999 North Sepulveda Blvd., El Segundo, CA 90245, (213) 772-2965. The conference is scheduled for September 27-29, 1983.
- Bangalore, India is the site of the October 10-13, 1983 International Radar Symposium, India— 1983. Additional information can be obtained from N. L. Krishnan, Bharat Electronics Ltd., 29 Race Course Road, Bangalore 560-001, India.
- The **1983 International Test Conference** will be held October 18-20, 1983 in Philadelphia, Pennsylvania. Contact Harry Hayman, P.O. Box 639, Silver Spring, MD 20901, (301) 589-3386.
- Silver Spring, MD 20901, (301) 589-3386.
 The Pacific Hotel, Tokyo, Japan is the site for the Fifth International Telecommunications Energy Conference, INTELEC '83. The conference is scheduled to be held October 18-21, 1983. Additional information can be obtained from Mr. K. Yamamura, International Congress Services, Inc., Chikusen Building, Fifth Floor, 2-7-4 Nihombashi, Chuo-ku, Tokyo 103, Japan.
- October 23-26, 1983 are the dates for the 1983 IEEE Military Communications Conference (MILCOM '83). The conference will be held at the Sheraton National Hotel, Arlington, Virginia.

Contact Fred W. Ellersick, Communications Division, Mitre Corporation, Bedford, MA 01730, (617) 271-3343 for additional data.

- The IEEE 1983 International Symposium on Electromagnetic Compatibility will be held October 24-26, 1983 at the Shoreham Dunfey Hotel, Washington, D.C. Because this will be the Silver Anniversary of the EMC Society, the theme of the symposium will be "A Quarter Century of EMC Progress." Additional details can be received from William G. Duff, Atlantic Research Corporation, 5390 Cherokee Avenue, Alexandria, VA 22314, (703) 642-4049.
- Forum '83, the 4th World Telecommunication Forum, is organized by ITU and will be held October 29-November 1, 1983 in the Conference Center in Geneva, Switzerland. Contact Forum '83 Secretariat, International Telecommunication Union, Place des Nation, CH-1211, Geneva 20, Switzerland for more information.
- October 31-November 2, 1983 are the scheduled dates for the 1983 Ultrasonics Symposium. For additional information on the conference, to be held at the Marriott Hotel in Atlanta, Georgia, contact Dr. R. S. Kagiwada, TRW Space and Defense Systems, Building R6, Room 2033, One Space Park, Redondo Beach, CA 90278, (213) 535-2500.
- The Fifth Digital Avionics Systems Conference will be held October 31-November 3, 1983 at the Seattle Sheraton Hotel, Seattle, Washington. Additional details can be obtained from Cary R. Spitzer, Mail Stop 472, NASA Langley Research Center, Hampton, VA 23665, (804) 827-3318.
- November 1-3, 1983 are the dates for Autotestcon '83, to be held at the Hyatt Regency Hotel in Fort Worth, Texas. For more information, contact W. T. Beard, General Dynamics Co., Mail Stop 24-65, Fort Worth, TX 76101, (817) 732-4811.
- The Pittsburgh Hilton Hotel, Pittsburgh, Pennsylvania is the site of the November 6-11, 1983
 Magnetism and Magnetic Materials Conference. Contact Fred J. Werner, Westinghouse R and D Center, 130 Beulah Road, Pittsburgh, PA 15235, (412) 256-3556 for more information.
- WESCON, the Western Electric Show and Convention is scheduled to be held November 8-10, 1983 in Los Angeles, California. Dale Litherland, Electronic Conventions, Inc., 999 N. Sepulveda Boulevard, El Segundo, CA 90245, (213) 772-2965 can supply more information.
- San Diego, California will be the site of The Global Communications Conference, GLOBE-COM '83, scheduled to be held November 27-December 2, 1983. C. Horn, P.O. Box 1347, Naples, FL 33939, (813) 775-2633 can supply additional details.
- The Eighth Annual International Conference on Infrared and Millimeter-Waves is scheduled for December 12-17, 1983 at the Carillon Hotel, Miami Beach, Florida. Contact Prof. Kenneth J. Button, Massachusetts Institute of Technology, National Magnet Laboratory, Cambridge, MA 02139, (617) 253-5561 for more information.



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