



EDITOR: Nat Pelner

Hughes Aircraft Co., Missile Engineering Labs, Canoga Park, California 91304

Number 85, Winter 1977



PRESIDENT'S MESSAGE

by Pete Rodrique

This past year the Administrative Committee has attempted to continue the development of the MTT Society to reflect the needs and interests of its members. The continuing program to introduce new, related, areas of technology was evidenced by special sessions on Integrated and Fiber Optics at the highly successful '76 Microwave Symposium in Cherry Hill. Further efforts in this regard include the special Transactions issue on Millimeter Waves and the sponsorship of the December Submillimeter Wave Meeting. At the December ADCOM meeting considerable discussion was given over to the operating philosophy of our Transactions and to the role of our Society in the area of biological effects of non-ionizing radiation. To better reflect current technical activities, Hal Sobol ('77 Vice-President) completed a reorganization of our Technical Committee structure in the past year.

Financial pressures caused the adoption this year of a quota system for "free" pages in the MTT-Transactions, modelled after that used by the American Institute of Physics. This experimental program is just now being fully implemented and will be carried on for three years to assess its effects on the type and quality of papers submitted as well as on the Society's operating budget. Incidentally, the AP-S has been given permission to institute a similar program by the IEEE Publications Board.

In an attempt to further develop the MTT Microwave Symposium and broaden its appeal the ADCOM has negotiated an agreement with Horizon House to handle the exhibit program on a continuing basis for a four year trial period. Every effort will be made to maintain a proper balance between the Technical Program and the Exhibits.

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1977 - 1978 MTTS NATIONAL LECTURER MICROWAVE RADIATION HAZARDS IN PERSPECTIVE

by J. M. Osepchuk

The well-publicized subject of "microwave" hazards is reviewed with a critical review of recent bioeffect research, a discussion of how these results "scale" to man, and the close relation of bioeffect research to ongoing developments in microwave heating applications. The importance of sound microwave engineering in establishing a realistic perspective in this field will be stressed (as well as its frequent absence in past research).

It will be shown that a logical definition of "microwaves" for this subject is 10 MHz to 100 GHz, including the frequencies of maximum penetration of non-ionizing radiation into the human body.

A review of research on microwave bioeffects will include a capsule historical review, a critical review of several examples of research including artifacts or poor dosimetry leading to false claims of nonthermal effects, and more detailed review of recent research on small animals and the problem of scaling to man. A basic factor in the scaling process is the absorption properties of biological bodies as a function of size, shape and frequency. In this sense "resonance" properties for man are found to be in the TV and FM broadcast range whereas small animals are resonant at frequencies close to the frequencies more commonly used for microwave heating in consumer and industrial applications. It will be shown that there are close and mutually beneficial relationships between problems in microwave bioeffect research and problems in microwave heating applications.

The adequacy of U.S. standards relative to Eastern European standards will be discussed relative to research

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ADCOM HIGHLIGHTS

by Larry Whicker

The December 13 ADCOM meeting was held at the Shoreham-Americana Hotel in Washington, DC. Highlights of this meeting included selection of next years' National Lecturer and a report by Ken Button on the very successful Submillimeter Wave Meeting held the previous week in San Juan, Puerto Rico.

Pete Rodrique, ADCOM President, presided over the 9:00-5:30 PM meeting. President Rodrique reported on the November 18 TAB meeting which was held in Chicago. He reported that the AP Society has been given authority to use the MTT page charge program on a trail basis. He reported, further, that we have given TAB a preliminary report on our efforts in this trial program.

Membership Services — Dick Sparks

Dick reported that the L.A. MTT Chapter and the Washington, DC MTT Chapter needed postage support from ADCOM. (This support should be provided by Sections). After discussion, this financial support was approved.

Dick reported that several people had nominated Dr. John M. Osepchuk as National Lecturer for the year June 1977 -- June 1978. His lecture will deal with High Power Microwave Radiation and resulting biological effects. After much positive discussion, ADCOM unanimously approved this appointment. It was pointed out that the timeliness of this subject made it a good candidate for Chapter-Section meetings and for presentation to University Seminars as well as normal Chapter meetings.

IEEE Councils -- Q.E.C. -- Ken Button reported for Paul Coleman

Ken Button reviewed the structure of the Q.E.C. and indicated that the Council is made up of four representatives from MTT and four representatives from E.D. Paul Coleman has served as Chairman for the past year. In addition to publishing the Journal of Quantum Electronics, the Council aids in sponsorship of IEEE conferences during the year. Ken reported that Gardner Fox is retiring as Editor of the Journal of Quantum Electronics and that A.J. deMaria of United Technologies is being asked to become Editor for a four-year term. Ken indicated that both he and Paul Coleman felt that more direction to Q.E.C. members from MTT ADCOM is needed. MTT ADCOM expressed a reasonably strong objection to Q.E.C. becoming a separate Group or Society.

Solid State Circuits Council -- Don Parker reported that the Solid State Circuits meeting will be alternated between the East and West Coast on a trial basis. Don felt that the MTT ADCOM has been well represented in this Council within the past few years.

COMAR

Bill Guy was not able to attend the ADCOM Meeting; however, a discussion of the MTT-S in the area of Radiation-Biological effects did take place. A recommendation arising from correspondence between Pete Rodrique and John Osepchuk was unanimously adopted. The recommendation states that:

The MTT-Society of the IEEE has and does play a more prominent role as an organization in this field than any other organization. The MTT-Society should take action to continue this role and take specific action to accomplish more effective interdisciplinary communication and cooperation involving many organizations in this field.

A specific proposal is for MTT-Society to organize a special interdisciplinary meeting as NIR Bioeffects and organizational involvement in this field. This would be directed only to professional societies and not special-interest groups such as those in government or industry. This meeting could be held at the 1978 joint meeting of MTT-S and IMPI in Ottawa.

Standards Coordinating Committee -- Steve Adam

Steve Adam reported that the work of the various sub-committees is progressing at a slow but good pace. He did point out one possible problem area. Through reorganization, the National Bureau of Standards in Boulder, Colorado has reduced its work force in the area of Microwave Standards. Steve has agreed to act as a collector of data for people who might experience problems in this area.

Chapter Reports

An outstanding attendance from various chapters was obtained at this ADCOM meeting. Chapters represented included:

1. Washington, DC (Host Chapter)
2. Orange County, CA (AP/MTT)
3. Los Angeles, CA
4. St. Louis, MO
5. Denver, Boulder, CO
6. Boston, MA
7. North East Jersey ED/MTT (Princeton)
8. Dallas, TX

Most chapters are doing well but commonly report that they have cycled through various people who will serve as officers. Solutions to these problems may be recycle people or come up with multiyear terms.

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CHAPTER ACTIVITIES

by Dick Sparks

WHY DID YOU INVEST?

Membership in the IEEE and more specifically the Microwave Theory and Techniques Society is an investment. Membership probably will require some investment of time and most certainly a small investment of money. The motivation to spend either time or money in order to participate in the IEEE and/or MTTs is strictly up to the individual.

For this author it is a hope that, by participating, a personal contribution can be made to the benefit of the principal professional society in the Microwave field. For ones career valuable knowledge and knowledgeable acquaintances can be obtained via MTTs.

But what are your motivations?

Comparing 1976 membership with last year, student membership is up while non-student membership has decreased slightly (Table 1). The membership trend of MTTs over the past eleven years is included to emphasize the positive and negative fluctuations. These fluctuations represent a reflection of your motivation to invest yourself in MTTs. What investment?

The best advertisement for MTTs is:

A face to face recommendation to your colleagues. This is an opportunity for every member to invest in building a better society.

One of the most difficult facts to obtain, and yet probably the most critical, is, WHY ARE YOU AN MTTs MEMBER?

Here is your chance to invest a little more time and probably 13 cents to impact the MTTs membership program. Write your motivation and concerns to me at my office.

WHAT DID YOU INVEST?

WHY DID YOU INVEST IN MTTs?

Glenn R. Thoren
Chairman-Membership Subcommittee
Raytheon M.S.D
C-59 Hartwell Rd.
Bedford, Ma. 01730

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development in both the U.S. and abroad. The roles of professional groups such as ANSI C95, IEEE, and IMPI in developing a critical and realistic perspective are shown to be important. This perspective is critically important in the establishment of factual information and improved standards. The misinformation which abounds in the general press is one of the reasons for the founding of the IEEE Committee on Man and Radiation (COMAR).

The outlook in this field includes:

- a. Restoration of a realistic common-sense perspective on microwave hazards for frequencies below 10 GHz.
- b. Speculative possibility of truly non-thermal effects in the millimeter-wave range above 30 GHz.
- c. New applications of microwave heating in cancer therapy.
- d. Exciting possibilities for future development in consumer and industrial microwave heating applications (including new ISM frequency allocations).

The National Lecturer may be scheduled by writing or calling:

J. M. Osepchuk
Raytheon Co.
28 Seyon St.
Waltham, MA. 02154
(617) 899-8400 X2475

JOHN M. OSEPCHUK, Consulting Scientist, Research Division, Raytheon Company, Waltham, Massachusetts

BA and MA—Engineering Science and Applied Physics
Ph.D.—Applied Physics, Harvard University

Upon joining Raytheon in 1950, Dr. Osepchuk conducted research studies on the properties of ridge-waveguide and anomalies in magnetrons. He also participated in the development of the first high-power backward-wave oscillator to be constructed in the United States. During 1956 and 1957, he was technical liaison for Raytheon at the microwave tube research laboratories of Compagnie Generale de Telegraphie sans Fil at Paris, France. From 1957 to 1962, Dr. Osepchuk was head of several research projects on millimeter-wave backward-wave oscillators, crossed-field amplifiers, and sorting in M-type traveling-wave tubes.

From 1962 to 1964, Dr. Osepchuk was chief microwave engineer for Sage Laboratories in Natick, Massachusetts.

Since 1964 he has been a principal research scientist and manager of electron-beam devices in the Raytheon Research Division in Waltham, Massachusetts. He has directed proj-

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History of MTT

by Ted Saad
MTT Historian

INTRODUCTION

When the IRE was formed in 1912, it provided radio engineers with an international forum for the exchange of ideas and information. At that time, engineers were interested in one another's activities, perhaps to a greater extent than is possible today. As the field grew, interests began to diverge and specialization began to set in. Today, the world of radio engineering embraces many new technologies such as data processing, communication, computers, solid state, micro-electronics, etc. Radio techniques have been combined with other specialties such as acoustics, infra-red, nucleonics, optoelectronics, etc. In 1948, the IRE recognized the divergence and sensed the wisdom of forming smaller, more compact groups on the basis of professional interests and in March of that year adopted the professional group principle of operation.

The object of the professional group system was designed not only to provide concentrated attention in various fields of specialization, but also to provide the means of organization and communication between specialties, by virtue of the IRE umbrella. The principle and the actual operation has been a success, and has operated effectively for over twenty-five years. Formation of the individual groups was left to the initiative of individual IRE members. On the basis of this individual effort, over thirty-two groups have been formed, combined and re-combined over the years, most of which have been successful and only a few of which have been marginal in operation.

One of the most vigorous and innovative of the professional groups has been the group on Microwave Theory and Techniques. In what follows, an attempt will be made to describe some of the events that took place during the years since the Microwave group was formed. Highlighted will be some of the key actions that helped bring the group to its present position.

FORMATION OF THE GROUP

The prime mover in the formation of the group was Ben Warriner IV, who at the time was a Microwave Engineer with General Precision Labs in Pleasantville, New York. During the 1951 National Convention, Ben discussed with Larry Cummings, the IRE Technical Secretary, the possibility of promoting a professional group for microwave electronics. Despite a lack of enthusiasm from headquarters, Ben circulated a letter dated July 9, 1951 to a group he addressed as "Members of the IRE Interested in Forming a Professional Group for Microwave Electronics". Included with the letter was a petition for the formation of the group. The letter stated a concern for possible conflicts with the group on Antennas and possible conflict with the group on Instrumentation. Subsequently, the necessary petitions were signed by a sufficient number of distinguished workers in the field.

The original petition stated that, "the scope of the group, if approved, would encompass: microwave theory, microwave circuitry and techniques, microwave measurements and microwave tubes". The scope would also include "scientific, technical, industrial or other areas that contribute to the field of interest, or to utilize techniques or products of the field where necessary to advance the art and science in the field, subject, as the art develops, to additions, subtractions, or other modifications directed or approved by the Institute committee on Professional Groups". There was no problem in getting enough people to sign the original petition and the group was approved on March 7, 1952, by the Professional Groups Committee.

Although there were misgivings by the Professional Groups Committee Chairman, Dr. Heising, at the time, the first meeting of the Administrative Committee was held on May 1, 1952 at IRE Headquarters. Present at the first meeting was the organizer and first Chairman, Ben Warriner IV, Dr. A. G. Clavier, Vice Chairman, P. D. Coleman, D. D. King, H. P. Marvin, W. W. Mumford, H. Schutz, and G. C. Southworth. Elected members not present at the first meeting included J. G. McCann, and G. A. Rosselot.

At that first meeting the point was brought up that the professional group on Electron Devices had objections to the title of the group since many people interpreted the title as an intention to include the internal phenomena of tubes in the charter. After some discussion relative to the wording of the field of interest, it was changed to eliminate both internal phenomena and microwave measurements. To further satisfy the possible dangers of conflict, the group name was changed to the Professional Group on Microwave Theory and Techniques and both the new name and modified scope were approved on June 3, 1952 by the Executive Committee of IRE. There were later changes to the name, but only with regard to the prefix in the title. It started as a Professional Group, then became the Professional Technical Group, the new prefix adopted at the time of the merger with the AIEE. Later it became the IEEE Group on Microwave Theory and Techniques and still later it achieved Society Status when it became the IEEE Microwave Theory and Techniques Society, as it is today. With time, there have been modifications in the Charter and in the intent of the group but the basic premise on which the group was first organized, remains substantially the same as it was in 1951.

The history of any group is influenced by a number of factors. For MTT perhaps most important have been the strong members of the Administrative Committee and the individual Chairmen, who have served each year. In addition, there has been the impact of a constantly growing technology, which in the last few years may have begun to mature. And there has been the external influence of

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BOOK REVIEWS

COMPOUND SEMICONDUCTOR TECHNOLOGY

by D. J. Colliver
Artech House, 1976

This book has a somewhat unique format in that the author has combined a fairly brief tutorial treatment of his subject with a collection of reprints of key papers covering primary research and development activities in important areas of the field. Of the 282 pages compressing the text, approximately 202 are devoted to reprints. In view of the \$30.00 price of this book, this amount of reference material is perhaps excessive.

Chapter one deals at length with the materials technology of gallium arsenide and indium phosphide. Both liquid and vapor phase epitaxy of these two materials are discussed in detail. Particular attention given to how specific details and problems of material growth relate to some of the more important microwave devices fabricated from these materials. These include transferred electron (Gunn) devices, field effect transistors and IMPATT diodes. In addition, molecular beam epitaxy, and ion implantation doping are surveyed briefly, however the author seems to regard these newer technologies as being further in the future than they really are.

An extensive cataloging of the methods of material characterization and assessment is presented in Chapter Two. Separate sections are devoted to chemical, physical and electrical analysis of both bulk material and epitaxial layers. There is also recognition of a significant problem in material characterization for microwave devices; namely that currently available characterization techniques and procedures are not adequate to insure consistent correlation of material properties with device performance.

Chapter three is titled "Device Technology". However it deals almost entirely with the theoretical and practical aspects of ohmic and barrier contacts. The importance of the latter in certain devices such as high efficiency InP transferred electron devices is pointed out. More generally, the significance of the contact on both device performance and, just as importantly, on reliability is rightly stressed.

The remaining chapters are devoted to other aspects of device technology. Chapter four provides an extensive treatment of the theory and technology of the heatsink, including a thirty page reprint. Chapter five deals very briefly with packaging and encapsulation. Finally Chapter six presents a one half page commentary on device reliability and failure analysis. In the reviewer's opinion this important area definitely should have been given more attention in a book of this type.

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MICROWAVE DIODE CONTROL DEVICES

by R. V. Garver
Artech House

This book is a tutorial presentation of principles and techniques involved in the design of microwave diode control devices, including switches, limiters, and phase shifters. It is meant for the component engineer for his convenience, in addition to theory, specific design equations, charts and design examples which are given throughout. The book is also useful to the systems engineer who must understand the basic operation, capability and limitation of the components. A knowledge of microwave fundamentals on the part of the reader is assumed.

The introductory chapter (Ch. 1) includes some historical notes about early work on diode switches. Systems applications are also briefly discussed in this chapter. The next four chapters deal with topics common to all diode control devices, but with specific reference to the switch. Chapter 2 discusses basic switch concepts including series and shunt operation of diodes, application of diode package parasitic resonances to switching absorption type switches and variable attenuators. A more detailed treatment of control element design is postponed to Chapter 5 entitled "Control Element Design". Most of this chapter deals with stripline and microstrip circuits, although a brief discussion of waveguide circuits is also given. Of special interest in biasing circuits for switching diodes are bandwidth and switching speed. These are covered in Chapter 3 along with some specific modulation and demodulation circuits and designs for gigabit modulation rates, which are becoming increasingly important in communication systems. Basic diode characteristics place limits on switching element performance parameters such as insertion loss, isolation bandwidth, switching speed and power handling capacity. Chapter 4 is devoted to a consideration of these limitations.

Chapter 6 discusses the use of multiple diode circuits in achieving bandwidths, insertion loss and isolation capabilities much in excess of those possible with a single diode. The next few chapters are devoted to multiple throw switches, matched switches and attenuators, phase shifters and limiters respectively. The final chapter (Ch. 11 — Other Control Devices) gives a brief treatment of a doubly balanced mixer/modulator, a vector generator, sampling gates and bulk diode switches.

The book is self-contained. It covers the basic material on related techniques, important to control device design. Specifically, measurement of diode characteristics, diode junction theory, filter theory, matrix relationships useful in circuit calculations and basic transmission line concepts are discussed in Appendices. References are included at the end of each chapter and appendix.

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1977 International Conference on Integrated Optics and Optical Fiber Communication

July 18 – 20, 1977

Tosho Building (Tokyo Chamber of Commerce and Industry) Tokyo, Japan

The 1977 International Conference on Integrated Optics and Optical Fiber Communication (IOOC '77) will be held on July 18-20, 1977, at Tosho Building (Tokyo Chamber of Commerce and Industry) in downtown Tokyo. The technical program will consist of both original and invited papers on integrated optics and optical fiber communication. The official language of the Conference is English.

A Post-Conference Meeting on relevant fabrication technologies will be held in Osaka, Japan, on July 22. Technical visits are scheduled after the Conference (on July 21) in Tokyo area and after the Osaka Meeting (on July 23) in Osaka area. A Technical Exhibition will also be held concurrently with the conference.

SUBJECT AREAS

Subject areas of the Conference include, but are not restricted to:

1. Optical planar waveguides:
theoretical considerations, materials, new structures, fabrication techniques, transmission characteristics, coupling, connection, measurements.
2. Optical fibers:
theory and design, materials, new structures, fabrication techniques, transmission characteristics, coupling, connection, splicing, testing and measurements.
3. Optical fiber cables:
design, structures, transmission characteristics, physical characteristics, installation, cable jointing, testing and measurements, reliability.
4. Physical phenomena associated with guided optical waves:
nonlinear interactions, nonlinear materials, physical interpretation, new phenomena, new measuring methods.
5. Passive devices:
waveguide components, modulators, detectors, switches, deflectors, frequency converters, polarizers, mode converters, mode filters, materials, fabrication techniques.
6. Active devices:
semiconductor lasers, LED's, miniaturized solid-state, dye and gas lasers, amplifiers, materials, fabrication techniques.

July 22, 1977

OSAKA POST-CONFERENCE MEETING

Senri Hankyu Hotel
Toyonaka, Osaka, Japan

7. Other devices for optical fiber transmission:
new materials, new devices, new applications.
8. Integration of optical circuits:
monolithic integration, hybrid integration, coupling between optical circuits and fibers, materials, fabrication techniques.
9. Optical fiber transmission systems:
system considerations, system configurations, system design, transmitter-receivers and repeaters, system performance, reliability, testing and measuring equipment, economical considerations.
10. Applications of integrated optics and optical fibers in various fields:
information processing, special measurements, other applications.

CONTRIBUTED PAPERS

Papers describing original, unpublished work on the conference subject are solicited. Presentation time for a contributed paper will be 20 minutes including discussion.

The authors are requested to submit the original and four copies each of 4-page summary and 50-word abstract. Papers will be reviewed upon the basis of the summary.

The 4-page summary must be prepared in camera-ready form; it will be used as the original in printing the Conference Digest. The maximum limitation of 4 pages is strictly enforced. It should be typed in single space on one side of A4-size (21 cm x 29.7 cm) papers with 3 cm margins on top and bottom and 2 cm margins on both sides. The title of the paper, name(s) of the author(s), company affiliation, mailing address and 50-word abstract must appear at the top of the first page, as shown in the sample attached. (See the reverse side.) The name of the first author and the abbreviated title must be typed in the top margin of each subsequent page.

The 50-word abstract should also be typed on another separate sheet, prefaced by the paper's title, name(s) of the author(s), company affiliation and mailing address. These abstracts will appear in the Advance Program.

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WANT ADDS

MICROWAVE DESIGN ENGINEERS

Senior project engineers for the development of precision microwave components for quantity production of high reliability commercial end use. BSEE or equivalent and 8-10 years industrial design experience with some coaxial devices to 18 GHz or beyond: variable attenuators, step attenuators, directional couplers, crystal detectors and bolometers, mixers, terminations. Familiar with all necessary manufacturing processes. Salary commensurate with experience and ability up to 30K. Send resume to:

WEINSCHEL ENGINEERING CO., INC.

1 Weinschel Lane
Gaithersburg, Md. 20760
ATTN: K. Peddicord
(301) 948-3434

Equal Opportunity Employer

Positions are available for senior coax technicians

SHORT COURSES

TITLE:

Microwave Semiconductor Devices, Circuits, and Applications

DATE:

August 15 - 19, 1977

LOCATION:

University of Michigan

CHAIRMAN:

George I. Haddad

DESCRIPTION:

Provides understanding of operating principles and design techniques for microwave devices and circuits utilizing solid-state elements. Includes varactors, pin diodes, detectors, mixers, avalanche diodes, Gunn devices, BARITT devices, and FET and bipolar transistors. Presents recent advances.

FEE: \$375

For further information write to the University of Michigan, Continuing Engineering Education, 300 Chrysler Ctr., North Campus, Ann Arbor, Mich. 48109.

TITLE:

Electromagnetic Compatibility

DATE:

February 28 - March 4, 1977

LOCATION:

George Washington University
Continuing Engineering Education
Washington, D. C., 20052

DESCRIPTION:

This course is designed for engineers, managers, and others who need a working knowledge of electromagnetic

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MTTS WINTER 1977

NOTICE

13TH ELECTRICAL/ELECTRONICS INSULATION CONFERENCE

The 13th Electrical/Electronics Insulation Conference will be held in Chicago, September 26-29, 1977. Two distinct conferences are involved . . . the Electrical Materials and Processing Symposium . . . and the Electronic Materials and Processing Symposium. Technical Programming is under William W. Wareham, Phelps Dodge Magnet Wire Company, E/EIC Vice-Chairman: Technical; and by Harry R. Sheppard, Westinghouse Electric Corporation, Director: Technical Programs.

The Electronics Symposium of E/EIC will include 2 separate Technical Divisions organized under the Chairmanship of Ronald N. Sampson, Westinghouse Research Labs.

Dr. James J. Licari, Autonetics/Rockwell, is serving as Manager of the Electronic Materials and Processes Division, and is organizing three separate sessions. These include a session on NEW DEVELOPMENTS IN ELECTRONIC INSULATION MATERIALS being organized by Doug Hutchins, Air Force Materials Lab; a session on MICROWAVE MATERIALS, PACKAGING, PROCESSES AND APPLICATIONS being organized by Harold Sobol of Collins Radio, and Frank Sullivan of Raytheon; and a separate session on HYBRID MICROELECTRONICS being organized by Donald B. Patterson, GTE Syvania.

John D. Kresge, IBM, is serving as Manager of the Electronic Circuitry Division, which is presenting 2 sessions: INNOVATIONS IN CIRCUIT TECHNOLOGY, being organized by Gordon Wheaton, Hewlett Packard Corporation, and F. Bachner, MIT Lincoln Laboratories; and a session on SYSTEM PACKAGING CONCEPTS being organized by J. W. Balde, Western Electric Co., and Dr. William Schumacher, AMP, Inc.

The Electronics Symposium will also feature individual workshops, and separate rap sessions. Two Electronic Workshops are being organized by Manager J. M. Rausch, Bell Laboratories. These will include workshops on: COVER COAT MATERIALS AND TECHNIQUES FOR PRINTED WIRING to be developed by G. B. Fefferman of Bell Laboratories; and a second workshop on: ENCAPSULATION MATERIALS AND PRACTICES, under the direction of Leonard S. Buchoff, Technical Wire Products, Inc.

Separate informal Evening Rap Sessions are being organized by P. J. Koppe, Zenith Radio Corp. Topics under consideration for the Evening Rap Sessions include: FIRE PREVENTION: SAFETY CONCERNS OF ELECTRONICS; MOISTURE PROOFING DEVICES; NEED FOR INTERNATIONAL ELECTRONIC INSULATION STANDARDS; DRILLING OF PRINTED BOARDS; HOW CAN EIC BETTER SERVE THE ELECTRONICS INDUSTRY?; CURING OF MULTILAYER BOARDS; and HYBRID PACKAGING.

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A final touch to the comprehensive programming of E/ EIC, will be 4 separate Short Courses being organized under the Chairmanship of John A. Tanaka, University of Connecticut. These short courses will include: MATCHING MATERIALS TO PRODUCT AND PROCESS, by Charles Harper, Western Electric Co.; DESIGN, FABRICATION, AND APPLICATION OF PRINTED CIRCUIT ASSEMBLIES, by Donald P. Schnorr, RCA; SELECTION OF WIRING AND CABLING FOR TODAY'S PRODUCTS, by Ramesh Sheth, and Frank Short, Belden Corp.; and COMPATIBILITY AND ENVIRONMENTAL PERFORMANCE OF PLASTIC MATERIALS, by Otto Fenner, Monsanto Company.



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ects on propagation in anisotropic media, secondary electron emission phenomena, nonlinear phenomena in microwave tubes; introduction of ferrite technology into tubes, and electro-optic correlator tubes. In recent years he has consulted for Amana and other Raytheon Divisions on radiation hazards, and investigated various aspects of Radarange technology, especially those involving leakage and safety. He was appointed Consulting Scientist in December, 1974.

He has published and presented many papers in the fields of microwaves (tubes, ferrites, plasmas, pacemaker interference) and radiation hazards. He was guest editor for the special issue (February 1971) on Biological Effects of Microwaves of the IEEE Transactions on Microwave Theory and Techniques. He was editor of the Journal of Microwave Power (1970-1971). He has contributed to one book and holds over ten patents.

Dr. Osepchuk is a senior member of the IEEE, the International Microwave Power Institute, the American Physical Society, Phi Beta Kappa, Sigma XI and the American Association for the Advancement of Science. He is a past chairman of the Boston Section of the IRE Professional Group on Electron Devices, a past member of the National Administrative Committee of the IEEE Group on Microwave Theory and Techniques and is presently a member of the IEEE Committee on Man and Radiation (COMAR). He is also a member of various committees of ANSI C95, the Association of Home Appliance Manufacturers (AHAM), and is presently serving on the Board of Governors of the International Microwave Power Institute.

NEW TAX LAW DEDUCTIONS FOR ATTENDING FOREIGN CONVENTIONS SEC 602

The Tax Reform Act of 1976, Sec 602 will impact the deductions we can take. The letter Ken Button sent to Roy Van Koughnett, printed below describes the steps that must be taken to avail ourselves of this law. If there is sufficient interest, the revision will be printed in its entirety in a future NEWSLETTER.

11 January 1977

Dr. A. L. Van Koughnett
Dept. of Communications
Comm. Research Centre
Box 11490, Stn. H
Ottawa, Ontario K2H 8S2 Canada

Dear Roy:

We have a new tax law in the USA. It does not concern Stateside delegates whose full expenses are being reimbursed by their employer or by a grant. Only those who are paying part or all of their own expenses are required to follow the enclosed regulations. They will normally deduct their out-of-pocket expenses from their taxable income before computing their federal income tax liability.

What does this mean to you? (1) You must have at least six hours of sessions for each day of the conference. (2) You would help the MTT-S members if you indicate that you know about this tax regulation when you send out one of your conference mailings. (3) You should be prepared to provide a few delegates with a certificate that they attended the conference and fill in blanks showing how many hours each day that they spent in sessions. Only those delegates who need the certificate will ask for it. My guess would be 5% but that means you had better have a form ready on your letterhead because you can't make up that many original certificates on the spot.

I will try to get this published in our newsletter or somewhere. It is possible that you need only add a remark to your Call for Papers which indicates that certificates will be available for delegates from the USA.

This is not a big deal but we should try to keep informed.

Merry Christmas if you are on the Julian calendar.

Yours sincerely,

Kenneth J. Button



(Continued from Front Cover)

This will, no doubt, take considerable negotiating skill. I extend to Larry Whicker my sincerest best wishes in this and his other endeavors as MTTS ADCOM President for 1977.

It has been a privilege to serve as ADCOM President in '76.

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Divisional Director's Report -- Dick Damon

The newly elected Division 4 Director, Dr. R.W. Damon, reported on the IEEE elections and on the recent Board of Directors Meeting. Dick congratulated the ADCOM members newly elected as Fellows in the IEEE. They include:

Lamar Allen

Bill Guy

John Kuno

Congratulations!

Divisional Director's Report -- cont'd.

Dick reported further that a new tear-out News Section (Two-week turnaround) will be included in future IEEE Spectrum publications.

Meetings and Symposia -- Ken Button

Submillimeter Conference -- Ken Button reported that a most successful Submillimeter meeting was held the past week in San Juan, Puerto Rico. Ken reported that one hundred and thirty five (135) papers were presented and that the meeting was both technically and financially a success. I had the pleasure of attending the meeting and I can only second Ken's comments and add my congratulations to General Chairman Jim Gallagher and to Technical Program Chairman Ken Button.

1977 Symposium -- A written report from Dave Rubin indicated that plans for the San Diego Meeting are proceeding in good fashion.

1978 Symposium -- Roy Van Koughnett, General Chairman, presented a complete report outlining the 1978 meeting in Ottawa. The meeting is scheduled to be held with some joint involvement with IMPI and the CPEM.

Operations -- Warren Cooper

John Horton discussed new awards for outstanding service on MTT ADCOM and for work in Chapter Activities. The awards structure was approved by ADCOM.

Transactions -- Don Parker

Don Parker reported on the status of the Transactions and indicated that a total page count of 1042 had been realized in 1976. Don led a discussion on how the Transactions may be made even more useful and distributed a new review form which will be more useful to both reviewer and author. It was decided that the distinction between regular and short papers will be dropped in the future and a better defined "short communication" or "engineering note" type of article will be included. John Kuno was commended for his outstanding job as editor on the Special Issue of the Transactions on Millimeter Waves which was published in November 1976.

Finance -- G. Oltman

George recommended frugality.

Technical Committees -- Hal Sobol

Hal reported that several committees are planning Workshops immediately following the 1977 International Microwave Symposium.

Before the meeting adjourned at 5:30 P.M., the ADCOM expressed its deepest appreciation to President Rodrigue for his outstanding year as President of MTT-ADCOM.



History of MTT

(Continued from page 4)

industry and world events which have affected the economics of the group.

Judging from the names of the men who made up the first administrative committee and the individuals who were involved in those early days, it is clear that what the group lacked in numbers and financing, it more than made up for in talent.

The remainder of this history will be a chronological discussion of each of the successive administrative committees and some of the actions that took place during each of the committee terms that have had a bearing on the history of the Administrative group and microwave technology.

ADCOM I — July 1, 1952 through June 30, 1953

Administrative Committee:

B. Warriner, Chairman

A. G. Clavier, Vice Chairman

W. W. Mumford, Secretary-Treasurer

P. D. Coleman

H. B. Marvin

H. Schutz

D. D. King

J. G. McCann

G. C. Southworth

G. Rosselot

(to be Continued in next Issue)

(Continued from page 2)

Divisional Director's Report -- Dick Damon

The newly elected Division 4 Director, Dr. R.W. Damon, reported on the IEEE elections and on the recent Board of Directors Meeting. Dick congratulated the ADCOM members newly elected as Fellows in the IEEE. They include:

- Lamar Allen
- Bill Guy
- John Kuno

Congratulations!

Divisional Director's Report -- cont'd.

Dick reported further that a new tear-out News Section (Two-week turnaround) will be included in future IEEE Spectrum publications.

Meetings and Symposia -- Ken Button

Submillimeter Conference -- Ken Button reported that a most successful Submillimeter meeting was held the past week in San Juan, Puerto Rico. Ken reported that one hundred and thirty five (135) papers were presented and that the meeting was both technically and financially a success. I had the pleasure of attending the meeting and I can only second Ken's comments and add my congratulations to General Chairman Jim Gallagher and to Technical Program Chairman Ken Button.

1977 Symposium -- A written report from Dave Rubin indicated that plans for the San Diego Meeting are proceeding in good fashion.

1978 Symposium -- Roy Van Koughnett, General Chairman, presented a complete report outlining the 1978 meeting in Ottawa. The meeting is scheduled to be held with some joint involvement with IMPI and the CPEM.

Operations -- Warren Cooper

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(to be Continued in next Issue)

BOOK REVIEW

*(Continued from page 5
Microwave Diode Control Device)*

Until recently much of the information on microwave diode control devices was scattered in numerous trade and professional journals and in application notes published by diode manufacturers. Most of the material was concerned with specific applications. The author has done an excellent job of fulfilling the need for a general treatment of the subject in a single, comprehensive text.

Reviewed by:
Dr. A. Talwar
Manager, Microwave Sources
Micromega—Bunker Ramo Corp.
Westlake Village, California

*(Continued from page 5
Compound Semiconductor Technology)*

This book presents a comprehensive treatment of GaAs and InP microwave device technology. Much of the author's contribution is drawn from his own work and that of colleagues at the Royal Signals and Radar Establishment in England. A problem with the book is the timing of its publication. The extensive set of reprinted papers as well as the cited references are confined to pre 1973 works. The material presented is not obsolete, however recent developments, such as rapidly advancing field effect transistor technology and the increasing importance of ion implantation doping in device fabrication are absent.

Reviewed by:
T. A. Midford
Manager, Torrance Research Center
Hughes Aircraft Company
Torrance, California



CONTRIBUTED PAPERS

(Continued from page 6)

One original and four copies of both summary and abstract must be received before February 15, 1977, by the following Program Committee Chairmen. Notification on acceptance will be made to the authors by middle of April 1977.

(1) Papers from areas other than the U.S.A., Canada and Europe:

Prof. S. Saito
Chairman, IOOC '77 Program Committee
Institute of Industrial Science
University of Tokyo
22-1 Roppongi 7-chome
Minato-Ku, Tokyo 106
Japan

(2) Papers from the U.S.A. and Canada:

Dr. R. V. Pole
Chairman, IOOC '77 USA/Canada Program
Subcommittee
San Jose Research Laboratory
IBM Corporation
Monterey and Cottle Roads
San Jose, Ca. 95114
U.S.A.

(3) Papers from Europe:

Prof. Dr. Ing. W. Harth
Chairman, IOOC '77 European Program
Subcommittee
Institut für Allgemeinelektrotechnik
Technische Universität München
8 München 2
Federal Republic of Germany



SHORT COURSES

(Continued from page 7)

interference and compatibility, and who have only a limited background in the field. The basic principles, theory, and techniques will be presented, enabling the participant to gain a solid understanding of electromagnetic interference and compatibility. Ideas will be illustrated with examples portraying actual interference situations and their solutions. Broader matters, such as spectrum management, will be discussed if there is interest on the part of participants. Participants will have the opportunity to acquire a broad perspective of both the principles and practice of electromagnetic compatibility without the excessive use of mathematics.

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CHAPTER MEETINGS

Chapter	Date	Attendance	Speaker	Topic
Atlanta	September 28	22	Mr. Gerry Hanley	Theory and Development of the DOME Antenna
	October 27	17	Mr. Tom Hedges	Microprocessors and Their Applications to Automated Testing of Antennas
	December 14	18	Mr. Allen Newell Dr. Paul Wacker	Theory and Techniques of Spherical Near Field Measurements
Columbus	May 25	39	Mr. David Voltmer	Space Colonization: The development of Industry and Permanent Human Habitation of Space
Los Angeles	June 10	24	Dr. Elsa Garmine	Integrated Optics and Infrared Waveguide
	October 21	25	Mr. Charles Green	Viking Mission Data and Control Link
	December 9	40	Dr. Ulrich Gysel	Wideband Mixers in the Millimeter Wave Region via Planar Techniques
Milwaukee	September 28	—	Mr. Thomas Ishii	Analysis of a Coherent Radar for Vehicular Speed
	September 28	52	Mr. Richard Halbach	Design of an Improved Receiver for the Detection of X-Band Radiation
	October 14	24	Mr. Ron Renaud	Tour of Midwest Video Switching Site of Midwest Relay Co.
	November 30	34	Mr. Jerry Meyerhoff	Citizen Band Radio The old and the new
Montreal	October 27	28	Prof. Raj Mittia	"Now you too can learn to use the GTD (Geometrical Theory of Diffraction) for fun and Profit"
	November 9	35	Dr. Fred Sterzer	National Lecture; Microwave Solid-State Devices
New Delhi, India	September 24-25			Workshop on Solid State Devices and Circuits in Microwave Systems
Phoenix	September 21	26	Dr. Charles Backus	Solar Cells Today
	October 19	29	Mr. Robert Jacobson	Radar Altimeters
	November 16	32	Dr. Fred Sterzer	National Lecture — Microwave Solid-State Devices
St. Louis	September 21	24	Dr. W. Chang	Signal Processing and Integration of Optical Devices in thin Film Waveguides
	November 9	18	Mr. James Roe	Integrated Circuit Susceptibility to High Power Microwave Radiation

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