

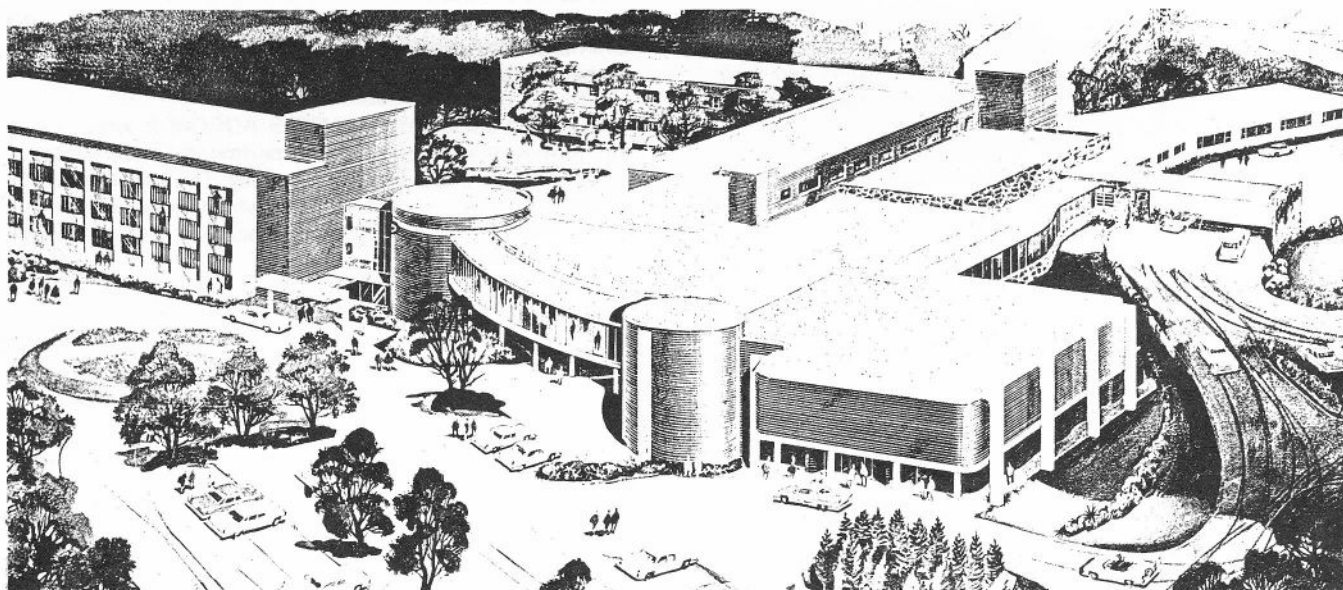


EDITOR: Nat Pelner

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

Number 82, Spring 1976

1976 MICROWAVE SYMPOSIUM THE PLACE



THE THEME "THE BICENTENNIAL CONVENTION"

The New Jersey-New York/Long Island-Jersey Coast and Philadelphia chapters of MTT with support from the Connecticut and Lehigh Valley chapters, will jointly host the 1976 International Microwave Symposium to be held June 14-16, 1976 at the Cherry Hill Inn in Cherry Hill, New Jersey, a suburb of Philadelphia. This year's Symposium Steering Committee is chaired by Bernard DeMarinis of Microwave Semiconductor Corporation. Technical Program Committee Chairman, Martin Caulton, of the David Sarnoff Research Center-RCA and his committee have screened the usual large number of contributed original papers and selected a well coordinated Symposium program. Prof. F. Gardiol has served as European contract for the Symposium. An industry exhibit is being held in conjunction with the Symposium. In addition to the technical portion of the program, there will be an associated social program which will provide

tours for the enjoyment of families of the Symposium participants.

The keynote address on Monday morning will be given by G. P. Rodrigue, president of the MTT Administrative Committee. The banquet, which will be held in the glamorous Starlite Ballroom, will feature an address by Astronaut William D. Lenoir.

In keeping with the theme, the "Bicentennial Convention," the Local Arrangements Committee headed by Frank Klawnsnik of RCA and the Social Program Committee headed by Lillis Caulton and Del Horton have arranged an outstanding program coordinated with the Philadelphia Bicentennial Celebration. A series of guided tours to various points of interest and historic significance has been arranged. In addition, the ladies are invited to attend a daily coffee hour which will be held in the Starlite Ballroom.



PRESIDENT'S MESSAGE

by Pete Rodriguez

The IEEE has undergone significant changes in recent years, principally in its move toward professional activities. This particular action resulted largely from membership pressure. Other evidence of a more politically active membership is seen in recent nominations-by-petition for national offices. I believe it a healthy sign that the members show sufficient interest in Institute leadership to play an active roll in determining both those leaders and their policies. Admittedly, IEEE is a complex organization, and the mechanism for making our feelings known is not obvious to many. Each of us has, however, two direct contacts with the hierarchy--our Divisional and Regional Board Representatives. They are our prime access to "the system." Parenthetically, IEEE is considering a relatively major reorganization plan to streamline the organization.

Our MTT Society also has undertaken and is undertaking some relatively major changes. These largely originate in ADCOM in response to what we sense (or divine!) as membership interests. One modification already implemented is an increased emphasis on applications in our Transactions. A survey of members was instrumental in bringing this about.

Presently ADCOM is negotiating a contract to have symposium exhibits handled on a continuing basis by Microwave Journal. We have had symposium exhibits since 1972, and each year's symposium has attracted more exhibits than its predecessor. But each local committee has had to "learn the exhibits business" and year-to-year continuity has been lacking. The move to continuing exhibits management is made with several advantages in mind: a) Providing greater recognition of our Symposium, b) Providing additional income to MTT-S, and c) Relieving the local committee of this business function.

Items (a) and (b) both are predicated on an increase in publicity and number of exhibits. ADCOM is aware that such changes are not without dangers. We feel very strongly that the technical program should be the center of attention. We would like anyone coming up with a new device or development in the microwave field to think first of the Microwave Symposium as a place to report it. At the same time, since the demise of the IEEE National Convention, there has been no real focal point for the microwave industry to present their latest products. With some increased attention our Microwave Symposium could fill that need. Our Symposium attendance has been holding at about 600 attendees for each of the past several years. That's about 10% of our membership (roughly 100 non-members attend on the average). This 600 forms a congenial group, and the symposium is a good opportunity to renew old acquaintances, etc. But we should

attempt to broaden the representation at this conference. We should be attracting the younger microwave engineers to our symposium. (I would not like to find that over the past five years the average age of those in attendance at our symposium has increased by five years!) In brief, a major goal of this move is to broaden interest in the Microwave Symposium without sacrificing the quality of the technical program. ADCOM believes that it is writing in sufficient safeguards to prevent the symposium from becoming a trade show.

The increased revenue mentioned as another advantage is a smaller factor. In the past two years exhibit net income has been about one half the conference surplus, and only about three percent of MTT-S' annual budget. Doubling or tripling this yield will not really change our standard of living.

Similarly item (c) is a rather small advantage, local committees have handled this function in the past and would, if required, do so in the future, but it is not really a local committee activity. Symposium organizing committees are happy to turn it over to someone else.

These are some changes MTT-S ADCOM is working out. Other changes are afoot in an experimental program to modify the page charge policy for the Transactions. More about that in the next Newsletter when procedures are better developed and some experience has been gained. Another area of interest and possible action by IEEE and its Groups and Societies is that of continuing training and education of mid-career engineers. This is an area of increasingly critical importance that impacts on many and involves individual engineers, professional societies, and educational institutions.

We welcome your suggestions, criticism, or comments on any or all of these subjects. Write to this Newsletter Editor or contact any ADCOM member listed in the MTT-S Directory.

The upcoming 1976 Microwave Symposium, being held at Cherry Hill, N.J., is in easy reach of Bicentennial Philadelphia. The many features of this meeting are described throughout this Newsletter. It will be an excellent opportunity to combine technical interests with a pleasant vacation. The Technical Program promises a well organized and stimulating three days. I hope to see you there!



ADCOM HIGHLIGHTS

by Larry Whicker

The January 27 ADCOM meeting was held at Cherry Hill, New Jersey. A large portion of the meeting was devoted to reviewing the tentative technical program of the upcoming 1976 Microwave Symposium and to planning for future symposia. Two of the meetings key items included (1) passage of a by-laws change allowing for more flexibility in choosing sites for future symposia, and (2) tentative selection of the Microwave-Journal-Horizon House firm as an exhibits manager for symposia beginning in 1977.

Pete Rodrigue, ADCOM President, presided over the 9:00 am — 4:30 pm meeting. After welcoming the newly elected ADCOM members (Hal Schrank, John Kuno, Jim Degenford and Harlan Howe), President Rodrigue reported that in an economy move there has been a reduction in staff personnel at IEEE Headquarters. Finance Chairman, George Oltman, reported that inflation has taken its toll within the MTT-Society also, and reviewed the financial report of the December ADCOM meeting in which it was decided that the 1976 Transactions page budget would be reduced from 1,200 pages to 1,000 pages.

Meetings and Symposia Chairman, Ken Button, reported on the various symposia which are now being planned including San Diego in 1977 and Ottawa in 1978. Ken indicated that a joint MTT-AP Sight Selection Committee has been formed to investigate Possible Joint Future Meetings. The Committee consists of:

AP—Raj Mittra
Bob Mailloux

MTT—Hal Schrank
Ken Button

In connection with meeting selection, an MTT by-laws change was approved. The new by-law states the proposals to sponsor symposia shall be submitted to ADCOM members between the 52nd and 23 months prior to the proposed meeting. This change will allow for selection of the meeting sites for 1979 and 1980 at the June ADCOM meetings. Ken Button indicated that Seattle and a Florida group of chapters are planning to submit proposals for the 1979 meeting. Other chapters are encouraged to bid for either of these dates. Details for preparing proposals can be obtained from Ken Button. Martin Coulton presented reports for himself and for Bernie De Marinis on the 1976 Microwave Symposium. Martin reported that the Technical Program Committee had met on January 26 and had reviewed 134 contributed papers with 31 of these from outside the United States. He reported that 88 of the contributed papers had been accepted and 15 invited papers are planned.

Larry Whicker reported that the Ad hoc committee established at the December ADCOM meeting has had two meetings with Howard Ellowitz of Horizon House and have formulated, in principle, an agreement with Horizon House for management of exhibits in future symposia. After some discussion, the committee's recommendations were approved. Key items in the agreement include:

- Three-year contract with additional two year option
- Horizon House will manage exhibit area and furnish free coffee break refreshments for meeting attendees
- ADCOM will review all publicity related to the symposium/exhibition
- A short section of the Digest will be devoted to a listing of exhibitors
- Horizon House has agreed to provide MTT with 4,000 or 25% of gross exhibit revenues (1977 — 1978) based on 12,000 square feet of exhibit space
- Horizon House has agreed to provide MTT with 5,000 or 35% of gross exhibit revenues (1979 — 1981) based on 16,000 square feet of exhibit space

Don Parker reported that the MTT-Transactions are now complete through June 1976. He reported that three special issues are underway:

June 1976 — Microwave FET's
Guest Editor: C. Liechti

Nov., 1976 — Millimeter Waves--Circuits, Components
& Systems
Guest Editor: H.J. Kuno

Dec., 1976 — Symposium Issue

Additional possible special issues were discussed. Jim Degenford reviewed a page charge letter which will be forwarded to MTT Transactions authors. The letter contains provision for mandatory page charges for overlength papers (charges for pages in excess of five) and advises authors of the Transactions budgeted minimum percentage of pages for which page charges must be paid.

Hal Sobol reporting of Technical Committees indicated that an MTT-7, Microwave Active and Non-Linear Circuits Committee, will hold a One-Day Workshop immediately following the 1976 MTT Symposium. The morning session will be devoted to tutorial talks on systems and components with informal afternoon discussions. Fred Rosenbaum indicated that MTT-13--Microwave Ferrites--indicated that several technical committees may sponsor a Millimeter Circuit-Ferrite Workshop in 1977.

Steve Adam reported that in the Standards area, the entire committee work with all three subcommittees will be reviewed and proposals made. Steve reported that Larry Wilson has resigned as co-chairman of the Microwave Magnetic Standard Committee due to his election to the IEEE Board of Directors. Russ West will take on the full chairmanship.

Warren Cooper and John Horton indicated that nominations for the various microwave awards are now due. These include: 1) Fellow Nominations (due by April 30, 1976), 2) The Microwave Career Award, 3) The Microwave Applications Award, and 4) The Microwave Prize for Best Paper in 1975. Persons desiring to make nominations should contact Warren or John.

Dick Sparks reported that Steve Temple has taken over from Barry Spielman as Chairman of Chapter Records. Barry Spielman presented a summary report indicating that only four MTT chapters are presently reporting on their chapter meetings. These include: Los Angeles, Phoenix, South East Michigan, and Washington.

The meeting was adjourned at 4:30 pm by President Rodrigue. The next ADCOM meeting is scheduled at the Cherry Hill Inn at 10:30 am on June 13, 1976.



DIVISION IV DIRECTOR'S REPORT

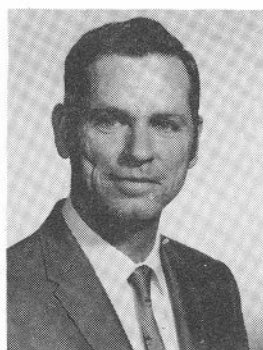
by Bob Rivers

Many changes are occurring within the IEEE. The recent budget cycle has resulted in the same level of dollar support as last year and then only after a hard battle. The reduction in staff that occurred January 9th will probably result in a reduction of real services in the technical areas. Both staff support of the committees will probably be reduced as well as editorial services for the publications.

My analysis of the budget indicates that most of the general dues increase went into administrative areas such as Accounting, Computers, Administration and Corporate services. A smaller amount went into Regional activities for distributing to sections.

In the Professional activities area, the budget was approved, as well as a change in by-laws to permit expansion of USAB done by adding 6 at large members to be appointed for staggered two year terms by the USAB Chairman with the concurrence of the Director Members.

Programs of USAB have been revised to stress goal orientation. Some 15 goal oriented programs have been approved already with another 10 in the planning or development phase. I have been appointed OMBUDSMAN to be responsible for getting suggestions of members or organizational units into the system for consideration or implementation. I also have responsibility for advance planning for the programs for 1977 and beyond. Contact me if you have any suggestions or ideas.



CHAPTER ACTIVITIES

by Dick Sparks

AT THE 1976 SYMPOSIUM

With this issue of the Newsletter containing the Advance Program of the 1976 International Microwave Symposium, every MTT-S member should be forming his plans to attend. Chapter Officers, in particular, should make a concerted effort to be present in order to attend the ADCOM meeting on Sunday, June 13 and the Chapter Chairman's Meeting scheduled for Monday evening, June 14.

Keep in mind that the sites of the 1979 and 1980 Microwave Symposia will be selected at the June ADCOM meeting. Those Chapters preparing proposals for submission at that time should have a representative available to give a summary presentation and to answer questions. Proposals should be mailed to all ADCOM members several weeks in advance. Names and addresses are contained in the MTT-S directory you received in the previous Newsletter.

Chapter Chairmen will receive an agenda shortly of topics to be discussed at the Monday evening Chapter Chairman's Meeting. Both outgoing and incoming Chapter Officers, or their representatives, are encouraged to attend this session in order to:

- Discuss plans for your 1976 - 1977 technical program of topics and speakers
- Receive updated Check List for Chapter Officers
- Consider lecture series that may be of interest to your Chapter members
- Review the process whereby nominees to ADCOM may be submitted for the September elections
- Submit candidates names for the FY 1978 National Lecturer.

Please plan to attend. Details of the time and place will be posted at the registration desk in Cherry Hill in June.

MICROWAVE WORKSHOP/LECTURE SERIES

Harold E. Stinehelfer, former Boston MTT-S Chapter Chairman, has organized a microwave workshop, titled "Solving Everyday Microwave Problems Using a Scientific Pocket Calculator". At the 3-session Workshop, scheduled for April 13, 20, 27, 1976, the engineer will be given a quick and accurate method of calculating design information and circuit analysis. Mr. Stinehelfer's lecture will include several topics which include transmission parameters for coaxial, stripline, microstrip; and slab transmission lines, Smith chart analysis problems, lumped element, cascaded lines and two- and three-port networks for power division. A \$65 fee is being charged IEEE members which includes a supper on each of the 3 Workshop nights. If your Chapter would be interested in having such a workshop held locally, inquiries should be directed to Harold E. Stinehelfer, Microwave Associates, Burlington, MA. (617) 272-3000.

(continued on page 11)

MEMBERSHIP?

What is all this talk I hear about membership? "What talk?" you ask.

That may be exactly the problem. As busy as we are, is enough attention being paid to gaining and retaining members? Active members offer lively professional exchange at chapter meetings, symposia, and conferences. Larger active membership in MTT means greater benefits to all.

As the new Membership Expansion Chairman of MTT/S, I need your help. The goal is to develop an all encompassing membership campaign for this year and possibly for years to come. This program for membership expansion will include:

- (1) Communication with all MTT Chapter Chairmen explaining and stressing the membership expansion program.
- (2) Follow-up on Student IEEE MTT members.
- (3) A greater awareness at the technical universities about MTT, through correspondence and information dissemination.
- (4) A message on membership in every Newsletter.
- (5) Replies to all non-members of IEEE, that publish work in MTT transactions, explaining MTT and IEEE membership and benefits.
- (6) Business response cards for easy inquiry about IEEE and MTT.

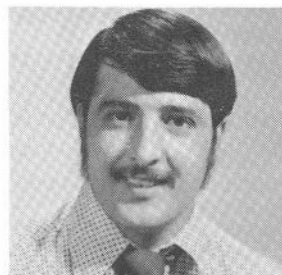
Every avenue of communication will be explored. Each MTT local chapter is receiving "quick reply" tear-off, sign-up sheets for distribution. All that need be done is tear off and fill out a short information request form and mail it to the IEEE return address. An IEEE information sheet and membership application, along with an MTT information sheet will be promptly sent.

The quick sign-up sheets can be posted on any bulletin board. You can help by posting a sign-up sheet. Drop me a short note on what worked to expand membership in your MTT chapter.

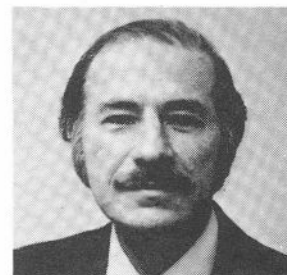
An innovative, faithful and efficient response to the challenge of membership expansion will strengthen the MTT and earn many technical and financial benefits.

Write: Glenn R. Thoren
Raytheon M.S.D.
C-58
Hartwell Road
Bedford, Mass. 01730

Thank you, and "Remember Membership"!

1976 MTTS INTERNATIONAL
MICROWAVE SYMPOSIUMMEET SOME OF THE PEOPLE WHO ARE MAKING
IT HAPPEN

Bernie De Marinis
Chairman



Marty Caulton
Vice Chairman



Fred Sterzer
Technical Program



*Louis Moose (Center)
and Friends,*
Publicity

TECHNICAL PROGRAM COMMITTEE



Back Row (Left to Right) — F. J. Rosenbaum; T. S. Chu;
E. A. Mariani; H. Howe; P. Steensma; J. White;
J. B. Horton; E. J. Denlinger; W. H. From; R. V. Garver;
L. R. Whicker; R. Levy; B. E. Spielman; R. W. Shillady;
H. W. Cooper; R. W. Waugh
Front Row (Left to Right) — D. C. Hogg; R. C. Williamson;
R. V. Snyder; S. F. Adam; M. Caulton; S. Okwit;
A. A. Oliner; F. Arams; J. Taub; R. H. Knerr



Back Row (Left to Right) — R. A. Weck; H. Sobol; V. K. Prabhu;
M. V. Schneider; R. L. Camisa; W. P. Ernst; P. Torriano;
S. Y. Narayan; B. E. Berson; H. J. Kuno; C. P. Wen
Front Row (Left to Right) — M. Gliden; V. G. Gelinovatch;
B. S. Perlman; S. W. Rosenthal; B. De Marinis;
K. Tomiyasu; F. Sterzer; H. Goldie; H. C. Bowers;
G. Whitman

1976 MTTS INTERNATIONAL MICROWAVE SYMPOSIUM

MONDAY MORNING, JUNE 14

INTRODUCTORY SESSION

0845-0955

Presidential Suite

INTRODUCTION: B. De Marinis, Chairman, Symposium Steering Committee
 KEYNOTE ADDRESS: G. P. Rodrigue, President MTT/S Administrative Committee

SESSION 1. OPTICS

0910-0955 Presidential Suite

- 1-1 INVITED: Review of the Status of Optical Fiber Transmission and Integrated Optics
 S. E. Miller, Bell Telephone Laboratories, Inc., Holmdel, NJ

0955 Coffee Break

SESSION 2. INTEGRATED OPTICS AND FIBER OPTICS

1015-1200 Independence Room

Chairman: A. A. Oliner, Polytechnic Institute of New York, Brooklyn, NY

- 2-1 A BROAD BAND GaAs MICROSTRIP MODULATOR AT 16 GHz FOR CO₂ LASER RADIATION
 M. Gilden and P. Cheo, United Technology Corp., East Hartford, CT
- 2-2 SIGNAL PROCESSING USING GUIDED-WAVE ACOUSTIC-OPTIC BRAGG-DIFFRACTION IN LiNbO₃ WAVEGUIDES
 I. W. Yao and C. S. Tsai, Carnegie-Mellon University, Pittsburgh, PA
- 2-3 THEORY FOR ELECTROOPTICAL GRATING MODULATORS
 R. S. Chu, GTE Sylvania, Inc., Needham, MA, and J. A. Kong and D. Lee, MIT, Cambridge, MA
- 2-4 NETWORK METHODS FOR DIELECTRIC-GRATING APPLICATIONS
 T. Tamir and S. T. Peng, Polytechnic Institute of New York, Brooklyn, NY
- 2-5 AN IDEAL REFRACTIVE-INDEX-DISTRIBUTION AND MODE FILTER FOR BAND BROADENING OF MULTIMODE OPTICAL FIBERS
 K. Furuya, Y. Suematsu, T. Tanaka and S. Ishikawa, Tokyo Institute of Technology, Tokyo, Japan
- 2-6 PROPAGATION IN INHOMOGENEOUS SLAB WAVEGUIDES
 S. Choudhary and L. B. Felsen, Polytechnic Institute of New York, Farmingdale, NY

SESSION 3. SOLID-STATE MICROWAVE SOURCES

1015-1200 Jefferson Room

Chairman: H. C. Bowers, Hughes Aircraft Co., Torrance CA
 Organizer: H. J. Kuno, Hughes Aircraft Co., Torrance, CA

- 3-1 A HIGH-POWER 50 GHz DOUBLE-DRIFT IMPATT OSCILLATOR WITH LOW SIDE-BAND NOISE
 Y. Hirachi, Y. Toyama, Y. Fukukawa and Y. Tokumitsu, Fujitsu Laboratories, Ltd., Kawasaki, Japan
- 3-2 TIME VARYING IMPATT IMPEDANCE MEASUREMENTS
 Robert L. Eisenhart, Hughes Aircraft Company, Culver City, CA
- 3-3 BARITT DEVICES FOR SELF-MIXED DOPPLER RADAR APPLICATIONS
 J. E. East, N. Nguyen-Ba and G. I. Haddad, University of Michigan, Ann Arbor, MI
- 3-4 SERIES INTERCONNECTION OF SIX TRAPATT DEVICES ON A DIAMOND SUBSTRATE
 N. W. Cox, G. N. Hill, J. W. Amoss and C. T. Rucker, Georgia Institute of Technology, Atlanta, GA
- 3-5 YIG-TUNED GaAs FET OSCILLATORS
 Timothy L. Heyboer and Frank E. Emery, Watkins-Johnson Co., Palo Alto, CA



Seated (Left to Right) — Nat Lipetz; Bernard De Marinis; Bertram Aaron; Frank Klawnsnik

Standing (Left to Right) — John Horton; Richard Snyder; William Glendinning; Robert Shillady; Martin Caulton; Nikolai Eberhardt; Louis Moose

SESSION 4. PASSIVE MICROWAVE COMPONENTS

1015-1200 Lincoln Room

Chairman: E. J. Denlinger, RCA Laboratories, Princeton, NJ

- 4-1 A 4, 6, 20 AND 30 GHz BAND BRANCHING NETWORK USING A MULTILAYER DIELECTRIC FILTER FOR A SATELLITE COMMUNICATION EARTH STATION
 Isao Ohtomo, Shuichi Shindo, and Masaki Koyama, Nippon Telegraph & Telephone Public Corp., Yokosuka-shi, Japan
- 4-2 NEW HIGH PERFORMANCE 3.5 MM, LOW COST, UTILITY COAXIAL CONNECTOR WITH MODE-FREE OPERATION THROUGH 34 GHz
 S. F. Adam and G. R. Kirkpatrick, Hewlett-Packard Co., Palo Alto, CA
- 4-3 ON SOME INTEGRAL RELATIONSHIPS FOR COMMENSURATE TRANSMISSION-LINE NETWORKS
 Edward G. Cristal, Hewlett-Packard Co., Palo Alto, CA
- 4-4 COMMENTS ON A 2-GAP WAVEGUIDE MOUNT
 Robert L. Eisenhart, Hughes Aircraft Co., Culver City, CA
- 4-5 SYMMETRICAL 2N-PORT DIRECTIONAL COUPLERS
 M. E. Hines, Microwave Associates, Inc., Burlington, MA

MONDAY AFTERNOON, JUNE 14

1330-1770

SESSION 5. MICROWAVE IN COMMUNICATION SYSTEMS

1330-1700 Independence Room

Chairman: J. B. Horton, GE Valley Forge Space Center, Philadelphia, PA

- 5-1 INVITED: Dual Polarization Antenna System Design and Performance
 J. Kiegler, RCA, Astro-Electronics Div., Princeton, NJ
- 5-2 INVITED: Problems & Challenges in Satellite Communications Frequency Reuse—Antennas and Components
 D. O. Reudinck, Bell Telephone Laboratories, Inc., Holmdel, NJ
- 5-3 INVITED: Digital Telecommunication Systems
 P. R. Hartmann and J. A. Crossett, Collins Radio Group, Rockwell Int., Dallas, TX
- 5-4 INVITED: Implementation of a Military Digital Microwave System
 G. Lippencott, H. van Gelder and P. Villaseñor, US Army Communications Command, Ft. Huachuca, AZ

1505 Coffee Break

1976 MTTS INTERNATIONAL MICROWAVE SYMPOSIUM

- 5-5 INVITED: NASA Microwave Propagation and Inter-
1525 ference Studies
E. A. Wolff, NASA Goddard Space Flight Center,
Greenbelt, MD
- 5-6 INVITED: Communication Technology Satellite
1550 Systems, Space and Ground Segments
J. N. Sivo and D. L. Wright, NASA, Lewis Research
Center, Cleveland, OH
- 1615 Panel Discussion

SESSION 6A. LOW-NOISE RECEIVERS

- 1330-1700 Jefferson Room
- Chairman: R. L. Camisa, RCA Laboratories, Princeton, NJ
- Organizer: S. Okwit, LNR Communications, Inc.,
Hauppauge, NY
- 6-1 ULTRA-LOW-NOISE, KU-BAND PARAMETRIC
1330 AMPLIFIER ASSEMBLY
H. C. Okean, J. A. DeGruyl and E. Ng, LNR
Communications Inc., Hauppauge, NY
- 6-2 AN EXPERIMENTAL STUDY OF IMAGE TERMINA-
1350 TION METHODS FOR LOW-NOISE MIXERS
Ben R. Hallford, Collins Radio Group, Rockwell Intl.,
Dallas, TX
- 6-3 FET MIXERS FOR COMMUNICATIONS
1410 SATELLITE TRANSPONDERS
P. Bura and R. Dikshit, RCA Limited, Montreal,
Quebec, Canada
- 6-4 A CRYOGENICALLY-COOLED GaAs FET AMPLIFIER
1430 WITH A 1.1-dB NOISE FIGURE AT 5.0 GHz
John Pierro, AIL, Div. Cutler-Hammer, Melville, NY

1450 Coffee Break

SESSION 6B. SOLID-STATE POWER AMPLIFIER

- 1510-1700 Jefferson Room
- Chairman: Bert Berson, Hewlett-Packard Assoc., Palo Alto,
CA
- 6-5 A QUASI-LINEAR APPROACH TO THE DESIGN OF
1510 MICROWAVE TRANSISTOR POWER AMPLIFIERS
K. L. Kotzebue, University of Calif., Santa Barbara, CA
- 6-6 X-BAND MIC GaAs FET POWER AMPLIFIER
1530 H. Q. Tserng, V. Sokolov, H. M. Macksey, W. R.
Wisseman, Texas Instruments, Dallas, TX
- 6-7 PROCESSING AND MODELING OF LOW-NOISE
1600 SILICON BIPOLAR TRANSISTORS WITH SUB-
MICRON EMITTER WIDTHS
Craig P. Snapp, Tzo-Hwa Hsij, and Roger W. Wong,
Hewlett-Packard Company, Palo Alto, CA
- 6-8 A 12-18 GHz HIGH GAIN AMPLIFIER DESIGN
1620 USING SUBMICRON GATE GaAs FIELD EFFECT
TRANSISTORS
Martin G. Wiker and E. James Crescenzi, Jr., Watkins-
Johnson, Palo Alto, CA

SESSION 7. FILTERS

- 1330-1700 Lincoln Room
- Chairman: Richard V. Snyder, Frequency Engineering
Laboratories, Farmingdale, NJ
- 7-1 DESIGN FORMULAS FOR BANDPASS CHANNEL
1330 DIPLEXERS
J. D. Rhodes, University of Leeds, Yorkshire, England
- 7-2 NARROWBAND CONTIGUOUS MULTIPLEXING
1350 FILTERS WITH ARBITRARY AMPLITUDE AND
DELAY RESPONSE
R. J. Wenzel and W. G. Erlinger, Wenzel/Erlinger Assoc.,
Woodland Hills, CA
- 7-3 PRACTICAL REALIZATION OF BROADBAND
1410 MICROWAVE DIPLEXERS
A. J. Anselmo and A. F. Hinte, AIL/Cutler-Hammer,
Melville, NY
- 7-4 AN IMPROVED LOW-PASS HARMONIC ABSORBER
1425 R. V. Snyder, Frequency Engineering Laboratories,
Farmingdale, NJ

- 7-5 EXACT DESIGN OF WIDEBAND EQUAL-RIPPLE
1445 BANDPASS FILTERS WITH NON-ADJACENT
RESONATOR COUPLINGS
R. J. Wenzel, Wenzel/Erlinger Assoc., Woodland Hills, CA

1505 Coffee Break

- 7-6 INVITED: Synthesis of Optimum Waveguide Impedance
1525 Transformers
Henry Riblet, Microwave Development Labs, Natick, MA

EVENING

SESSION 8. PANEL DISCUSSION

- 2000-2200 Jefferson Room
- Organizer: R. H. Knerr, Bell Telephone Laboratories, Inc.,
Allentown, PA
- Moderator: L. F. Moose, Bell Telephone Laboratories, Inc.,
Allentown, PA
- Panelists: Y. W. Chang, Hughes Aircraft Company,
Torrance, CA
Paul Meier, AIL, Div. of Cutler-Hammer,
Melville, NY
R. M. Knox, Epsilon Lamda Electronics Corp.,
Batavia, IL
M. V. Schneider, Bell Telephone Laboratories,
Inc., Holmdel, NJ
T. Okoshi, University of Tokyo, Tokyo, Japan
T. Oxley, General Electric Company Ltd.,
Wembley, Middlesex, England

SESSION 9. SOLID-STATE MICROWAVE DEVICES

- 2000-2200 Lincoln Room
- Chairman: Lester F. Eastman, Cornell University, Ithaca, NY
- 2000 Rump Session on Solid-State Microwave
Devices and Amplifiers

TUESDAY MORNING, JUNE 15 0845-1200

SESSION 10. MICROWAVE HIGH-POWER TECHNIQUES

- 0845-1200 Independence Room
- Chairman: K. Tomiyasu, GE Valley Forge Space
Center, Philadelphia, PA
- Organizer: H. Goldie, Westinghouse Defense &
Electronic Systems, Baltimore, MD
- 10-1 A 400 KW LONG PULSE X-BAND PLANETARY
0845 RADAR
Rob Hartop and Dan Bathker, Jet Propulsion Labora-
tory, Pasadena, CA
- 10-2 PERFORMANCE OF A HIGH-POWER, 2.388 GHz
0915 RECEIVING ARRAY IN WIRELESS POWER
TRANSMISSION OVER 1.54 Km
R. M. Dickinson, Jet Propulsion Laboratory, Pasadena,
CA
- 10-3 OPTIMIZATION OF THE EFFICIENCY AND
0935 OTHER PROPERTIES OF THE RECTENNA
ELEMENT
William C. Brown, Raytheon Co., Waltham, MA
- 10-4 HIGH POWER MONOPULSE TRACKING FEED
0955 FOR LINCOLN LABORATORY SOSI RADAR
A. F. Sciambi, Jr., Aeronutronic Ford, Corp., Palo
Alto, CA

1015 Coffee Break

- 10-5 A 2-KILOWATT AVERAGE POWER X-BAND
1035 RECEIVER PROTECTOR FOR THE SOSI RADAR
H. Goldie, Westinghouse Defense & Electronic
Systems Center, Baltimore, MD
- 10-6 CHARACTERISTICS AND EFFECTS OF HIGH
1055 POWER BREAKDOWN IN WAVEGUIDES
Robert E. May, Hughes Aircraft Co., Culver City, CA
- 10-7 FAST, HIGH POWER, OCTAVE BANDWIDTH
1115 WAVEGUIDE MICROWAVE SWITCH
Paul E. Bakeman, Jr., and Albert L. Armstrong,
RRC International, Inc., Latham, NY

1976 MTTS INTERNATIONAL MICROWAVE SYMPOSIUM

SESSION 11. GIGABIT LOGIC

0845-1200 Lincoln Room

Chairman: M. N. Yoder, Office of Naval Research, Wash., D.C.

Organizer: S. Y. Narayan, RCA Laboratories, Princeton, NJ

0845 INTRODUCTORY REMARKS
M. N. Yoder, ONR, Washington, D.C.11-1 MESFET LOGIC FOR HIGH-SPEED SIGNAL
0855 PROCESSING
Rory L. Van Tuyl and Charles A. Liechti, Hewlett-Packard Co., Palo Alto, CA11-2 GBIT/S PULSE REGENERATION AND AMPLIFICA-
0915 TION WITH GaAs MESFETs
Heinz Beneking and Wilhelm Filensky, Technical University Aachen, Templergraben, Federal Republic of Germany11-3 RECENT DEVELOPMENT OF TRANSFERRED
0930 ELECTRON LOGIC DEVICES IN JAPAN
H. Yanai and T. Ikoma, University of Tokyo, Tokyo, Japan11-4 TRANSFERRED ELECTRON LOGIC DEVICES
0950 (TELDs) FOR GIGABIT RATE SIGNAL PROCESSING
L. C. Upadhyayula, R. E. Smith, J. F. Wilhelm, S. T. Jolly and J. P. Paczkowski, RCA Laboratories, Princeton, NJ

1010 Coffee Break

11-5 MULTIPLEXING AND DEMULTIPLEXING TECHNI-
1030 QUES WITH GUNN DEVICES IN THE GBIT/S RANGE
Klaus Mause, Forschungsinstitut der Deutschen Bundespost Darmstadt, West Germany11-6 A SILICON MONOLITHIC TECHNOLOGY FOR 1-2
1050 GHz ANALOG SIGNAL PROCESSING
D. Breuer, D. Claxton and A. Cosand, TRW Systems, Redondo Beach, CA11-7 CLOCKED DIODE PULSE AMPLIFIERS FOR MICRO-
1105 WAVE BIT RATES
B. G. Bosch, U. Barabas, U. Wellens, and U. Langmann, Institut für Elektronik, Ruhr-Universität Bochum, Federal Republic of Germany**SESSION 12. MILLIMETER AND MICROWAVE INTEGRATED CIRCUITS**

0845-1200 Jefferson Room

Chairman: R. H. Knerr, Bell Telephone Laboratories, Inc., Allentown, PA

12-1 THE ELLIPTICAL DIELECTRIC WAVEGUIDE-A
0845 VERY USEFUL MODEL FOR SOME MICROWAVE AND MILLIMETER WAVE INTEGRATED CIRCUITS AND COMPONENTS
J. Citerne, S. Toutain, P. Choteau and L. Raczy, Université de Lille I, Villeneuve d'Ascq, France12-2 FERRITE PLANAR CIRCUIT IN MICROWAVE IC
0905 Tanroku Miyoshi, Kobe University, Kobe, Japan12-3 PASSIVE MILLIMETER-WAVE IC COMPONENTS
0925 MADE OF INVERTED STRIP DIELECTRIC WAVEGUIDES
T. Itoh and R. Rudokas, University of Illinois at Urbana-Champaign, Urbana, IL12-4 MILLIMETER-WAVE DOWNCONVERTER WITH
0945 SUBHARMONIC PUMP
T. F. McMaster, M. V. Schneider, and W. W. Snell, Jr., Bell Telephone Laboratories, Inc., Holmdel, NJ

1005 Coffee Break

12-5 MICROWAVE INTEGRATED CIRCUIT RECEIVERS
1025 AT MILLIMETRIC WAVELENGTHS
K. J. Ming, B. J. Climer and T. H. Oxley, General Electric Co., Ltd., Wembley, England12-6 MIC TRANSCEIVER MODULE FOR AN L-BAND
1045 ADAPTER ARRAY ANTENNA
Mark E. Davis, General Electric Co., Utica, NY12-7 DESIGN TECHNIQUES FOR BAND-PASS FILTERS
1105 USING EDGE-COUPLED MICROSTRIP LINES ON FUSED SILICA
William H. Childs, Comsat Laboratories, Clarksburg, MD12-8 LATE PAPER
112512-9 LATE PAPER
1140**TUESDAY AFTERNOON, JUNE 15
1330-1700****SESSION 13A. COMPUTER-AIDED DESIGN AND MEASUREMENT**

1330-1700 Washington Room

Chairman: V. G. Gelinovatch, USAECOM, Ft. Monmouth, NJ

Organizer: B. S. Perlman, RCA Laboratories, Princeton, NJ

13-1 INVITED: An Introduction to Simulation and
1330 Optimization
J. W. Bandler, McMaster University, Hamilton, Ontario, Canada13-2 AUTOMATED THIRD-ORDER DISTORTION
1410 MEASUREMENTS
S. M. Perlow, RCA Laboratories, Princeton, NJ13-3 LARGE-SIGNAL DEVICE CHARACTERIZATION FOR
1430 BROADBAND KA-BAND AVALANCHE DIODE AMPLIFIER DESIGN
F. J. Bayuk and J. E. Raue, TRW Systems, Inc., Redondo Beach, CA13-4 THIRD GENERATION AUTOMATIC MICROWAVE
1450 MEASUREMENTS
W. R. Boley, General Dynamics, San Diego, CA

1510 Coffee Break

SESSION 13B. MICROWAVE MEASUREMENTS AND TECHNIQUES

1530-1700 Washington Room

Chairman: Stephen F. Adam, Hewlett-Packard Co., Palo Alto, CA

13-5 A NEW LOAD-PULL CHARACTERIZATION METHOD
1530 FOR MICROWAVE POWER TRANSISTORS
Yoichiro Takayama, Nippon Electric Co., Ltd., Kawasaki, Japan13-6 A V-BAND NETWORK ANALYZER/REFLECTION
1550 TEST UNIT
L. T. Yuan, G. M. Yamaguchi and J. E. Raue, TRW Systems Group, Redondo Beach, CA13-7 AN IMPROVED SOLID-STATE NOISE SOURCE
1610 Motohisa Kanda, National Bureau of Standards, Boulder, CO13-8 AUTOMATED SPECTRAL ANALYSIS OF MICROWAVE
1630 OSCILLATOR NOISE
J. Robert Ashley, University of Colorado, Colorado Springs, CO, and Thomas A. Barley, Gustaf J. Rast, Jr., US Army Missile Command, Redstone Arsenal, AL13-9 LATE PAPER
1650**SESSION 14. MILLIMETER AND SUBMILLIMETER WAVE TECHNIQUES**

1330-1700 Jefferson Room

Chairman: William P. Ernst, Princeton University, Princeton, NJ

Organizer: Jesse Taub, AIL Div. Cutler Hammer, Inc., Melville, NY

14-1 INVITED: Present and Future Capability of Millimeter
1330 Wave Receivers
J. Whelehan, AIL/Div. Cutler Hammer, Inc., Melville, NY

1976 MTTS INTERNATIONAL MICROWAVE SYMPOSIUM

- 14-2 CONTROL OF MANUFACTURING DISTORTIONS IN
1400 THE WT4 MILLIMETER WAVEGUIDE MEDIUM
V. J. Tarassov, Western Electric Co., Princeton, NJ
D. J. Thomson and L. W. Hinderks, Bell Telephone
Laboratories, Inc., Murray Hill, NJ
- 14-3 SURFACE CHARACTERISTICS OF METALS AND
1420 WAVEGUIDE ATTENUATION AT MILLIMETER-WAVE
FREQUENCIES BETWEEN 25 AND 180 GHz
Frederick J. Tischer, Raleigh, NC
- 14-4 LOW-NOISE TRAVELING-WAVE MASER RECEIVER
1440 FOR THREE MILLIMETER WAVELENGTH
A. G. Cardiasmenos, J. F. Shanley and K. S. Yngvesson,
University of Massachusetts, Amherst, MA
- 14-5 INFLUENCE OF LONGITUDINAL MAGNETIC FIELD
1500 ON THE CW SUBMILLIMETER WAVE OUTPUT FROM
HCN GAS LASER
M. Kawamura, M. Makiuchi, J. Yamada, and H. Hagsawa,
Tokyo Institute of Technology, Tokyo, Japan

SESSION 15. FERRITE COMPONENTS

1330-1700 Lincoln Room

Chairman: F. J. Rosenbaum, Washington University, St.
Louis, MO

- 15-1 INVITED: EGV Five Years Later
1330 Pietro De Santis, Selenia, Rome, Italy
- 15-2 NEW EDGE-GUIDED MODE ISOLATOR USING
1400 FERROMAGNETIC RESONANCE ABSORPTION
Tsutomu Noguchi and Hidehiko Katoh, Nippon Electric
Company, Ltd., Kawasaki, Japan
- 15-3 FIELD DISTRIBUTIONS OF THE NEW TYPE OF E.G.
1415 MODE ISOLATORS
Kiyomichi Araki and Yoshoyuki Naito, Tokyo Institute
of Technology, Tokyo, Japan
- 15-4 THE EDGE-GUIDED OR PERIPHERAL MODE ON
1430 FERRITE LOADED STRIPLINES
D. M. Bolle, Brown University, Providence, RI
- 15-5 A NEW TEMPERATURE STABILIZED WAVEGUIDE
1455 CIRCULATOR
Yasuvuki Tokumitsu, Toshikazu Kashara, and Hidemitsu
Komizo, Fujitsu Laboratories, Ltd., Kawasaki, Japan

1505 Coffee Break

- 15-6 LOW-LOSS BROADBAND EHF CIRCULATOR
1525 W. S. Pitotrowski and J. E. Raue, TRW, Systems
Group, Redondo Beach, CA
- 15-7 UHF-BAND LUMPED-ELEMENT CIRCULATOR
1545 FOR MEDIUM-POWER APPLICATIONS
Sohji Okamura and Takao Okata, Tokyo Shibaura
Electric Co., Ltd., Kawasaki, Japan
- 15-8 MICROWAVE PERMEABILITY TENSOR OF
1605 PARTIALLY MAGNETIZED FERRITES
Mitsuru Igarashi, Oyama Technical College, Oyama,
Japan, and Yoshijuki Naito, Tokyo Institute of
Technology, Tokyo, Japan
- 15-9 FREQUENCY SELECTIVE HIGH POWER YIG
1620 LIMITERS
S. N. Stitzer, and H. Goldie, Westinghouse Defense
and Electronics Labs, Baltimore, MD
P. R. Emtage, Westinghouse Research Labs,
Pittsburgh, PA
- 15-10 DESIGN AND PERFORMANCE OF AN INTE-
1635 GRATED THREE-CHANNEL TRACKING YIG
PRESELECTOR
R. A. Sparks and R. DiBiase, Raytheon Co.,
Bedford, MA
R. A. Craig, Addington Laboratories, Santa Clara,
CA

SESSION 16. SURFACE-ACOUSTIC-WAVE RESONATORS

1330-1700 Independence Room

Chairman: E. A. Mariani, USAECOM, Ft. Monmouth,
NJOrganizer: R. C. Williamson, MIT Lincoln Laboratory,
Lexington, MA

- 16-1 THE PHYSICS AND EQUIVALENT CIRCUIT OF
1330 THE BASIC SAW RESONATOR
R. C. M. Li, J. A. Alusow, and R. C. Williamson,
MIT Lincoln Laboratory, Lexington, MA
- 16-2 INVITED: Acoustic-Surface-Wave
1350 Resonators for Bandpass Filter
Applications
G. L. Matthaei, University of California, Santa Barbara,
CA
- 16-3 SURFACE-ACOUSTIC-WAVE RESONATOR FILTERS
1420 Lawrence H. Ragan, Texas Instruments, Inc., Dallas, TX
- 16-4 SURFACE-ACOUSTIC-WAVE DEVICE FOR
1440 DOPPLER FILTERING OF RADAR BURST
WAVEFORMS
J. Melngailis and R. C. Williamson, MIT Lincoln
Laboratory, Lexington, MA

1500 Coffee Break

- 16-5 INVITED: SAW Transom Signal Processing
1520 R. M. Hays, Texas Instruments, Inc., Dallas, TX
- 16-6 THE SURFACE ACOUSTIC WAVE REFLECTIVE
1610 DOT ARRAY (RDA)
Leland P. Solie, Sperry Research Center, Sudbury, MA
- 16-7 WEIGHTED UNIDIRECTIONAL TRANSDUCER
1630 SAW FILTER AT 328 MHZ
B. R. Potter and C. S. Hartmann, Texas Instruments,
Inc., Dallas, TX
- 16-8 PERIODIC FREQUENCY RESPONSE SAW
1650 FILTERS FOR A TREE APPROACH TO MANY-
TONE FREQUENCY SYNTHESIS
A. J. Slobodnik, Jr., and K. R. Laker, Air Force,
Cambridge Research Laboratory (AFSC), Hansom
Air Force Base, MA

**WEDNESDAY MORNING, JUNE 16
0845-1200****SESSION 17. GENERAL JOINT INVITED SESSION**

0845-0955 Presidential Suite

Chairman: S. Okwit, LNR Communications, Inc.,
Hauppauge, NY

- 0845 INVITED: Future Microwave Markets in Tele-
communications and Aviation
Arthur H. Solomon, Arthur D. Little, Inc., Cambridge,
ME

0945 Coffee Break

**SESSION 18. ACOUSTIC WAVE DEVICES AND
TECHNIQUES**

1015-1200 Washington Room

Chairman: R. C. Williamson, MIT Lincoln Laboratories,
Lexington, MA

- 18-1 INVITED: Scanning Acoustic Microscope
1015 Calvin F. Quate, Stanford University, Stanford, CA
- 18-2 INVITED: Acoustic Surface Waveguides, With
1045 Similarities in Optics
Arthur A. Oliner, Polytechnic Institute of New York,
Brooklyn, NY
- 18-3 INVITED: Commercial Application of a Surface-Wave
1115 Television IF Filter
Robert L. Heller and Adrian J. DeVries, Zenith Radio
Corp., Elk Grove Village, IL

**SESSION 19. COMMERCIAL APPLICATIONS OF
MICROWAVES**

1015-1200 Jefferson Room

Chairman: J. White, Microwave Associates, Burlington, MA

Organizer: H. Howe, Microwave Associates, Burlington,
MA

1976 MTTS INTERNATIONAL MICROWAVE SYMPOSIUM


**ASTRONAUT WILLIAM D. LENOIR
TO SPEAK AT MTT AWARDS BANQUET**

Dr. William B. Lenoir, NASA Astronaut and currently leader of NASA's POWERSAT program will be the guest speaker for the annual MTT Awards Banquet, June 15, 1976. Dr. Lenoir's talk will be centered around his role as astronaut and task leader for advanced energy concepts.

Dr. Lenoir was selected as a scientist-astronaut by NASA in 1967. He was backup science-pilot for Skylab 3 and Skylab 4, the second and third manned missions in the Skylab Program. During Skylab 4, he was co-leader of the visual observations project and coordinator between flight crew and the principal investigators for Apollo telescope mount solar science matters. He is presently supporting the Space Shuttle Program in the area of payload accommodations. His interests are in remote sensing of the earth and its resources, and in investigating advanced energy concepts such as the POWERSAT experiment for transfer of solar energy from space to earth.

Dr. Lenoir is a graduate of MIT, receiving his BSEE, MSEE, and Ph. D. from MIT in 1961, 1962, and 1965, respectively. He was a Sloan scholar at MIT and winner of the Carleton E. Tucker Award for Teaching Excellence at MIT; he received the NASA Exceptional Service Medal in 1974. While at MIT he taught electromagnetic theory, systems theory and performed research in the remote sensing of planetary atmospheres and surfaces.

- 19-1 INVITED: Practical MLS Design
1015 Dick Cox, Bendix Corp., Baltimore, MD
- 19-2 A 20-WATT C-BAND SOLID-STATE TRANSMITTER
1045 FOR MLS APPLICATIONS
W. C. Tsai, R. E. Gray and M. I. Grace, Raytheon Co., Waltham, MA
- 19-3 A PASSIVE L-BAND RADIOMETER FOR REMOTE
1100 SENSING OF EARTH RESOURCES
T. Flattau, S. Becker and A. Leber, AIL, Division of Cutler-Hammer, Melville, NY
- 19-4 COOPERATIVE SIGNAL PROCESSING BEACON
1115 TRANSPONDER FOR AIRPORT TRAFFIC CONTROL
Ashok K. Gorwara, Stanford Research Institute, Menlo Park, CA
- 19-5 INVITED: Microwave Engineering Problems in the
1130 Microwave Oven
John M. Osepchuck, Raytheon Research Division, Waltham, MA

SESSION 20. PHASED-ARRAY COMPONENTS

- 1015-1200 Lincoln Room
Chairman: L. R. Whicker, Naval Research Laboratory, Washington, D.C.
- 20-1 VARIABLE POWER DIVIDERS IN SATELLITE
1015 SYSTEMS
E. W. Matthews, Aeronutronic Ford, Palo Alto, CA
- 20-2 ANTENNA ARRAY FOR LIMITED SCAN
1035 APPLICATIONS
R. A. Stern and J. Borowick, U.S. Army Electronics Command, Ft. Monmouth, NJ
- 20-3 LITHIUM FERRITE C-BAND LATCHING PHASE
1055 SHIFTER
S. Gaglione and G. Hanley, Sperry Gyroscope, Great Neck, NY
- 20-4 DIGITAL PHASE SHIFTER ELEMENTS FOR A KU-
1115 BAND PHASED ARRAY RADAR
A. R. Wolfe and M. E. Davis, General Electric Co., Utica, NY

SESSION 21. TECHNOLOGY FORECASTING

- 1015-1215 Independence Room
Chairman: A. Clavin, Hughes Aircraft Company, Canoga Park, CA
- 21-1 MICROWAVE SOLID-STATE POWER
1015 Tom Midford, Hughes Aircraft Co., Torrance, CA
- 21-2 MILLIMETER-WAVE-INTEGRATED CIRCUITS
1045 John Kuno, Hughes Aircraft Co., Torrance, CA
- 21-3 MICROWAVE PACKAGING TECHNIQUES
1115 Harlan Howe, Microwave Associates, Burlington, MA
- 21-4 MICROWAVE TRANSMISSION OF ENERGY
1145 William Brown, Raytheon Corp., Waltham, ME

**WEDNESDAY AFTERNOON, JUNE 16
1330-1530**
SESSION 22. MICROWAVE ACTIVITIES IN GOVERNMENT LABORATORIES

- 1300-1530 Jefferson Room
Chairman: L. R. Weisberg, Department of Defense, Washington, D. C.
Organizer: L. Young, Department of Defense, Washington, D.C. and F. Sterzer, RCA Laboratories, Princeton, NJ
- 1300 PANEL DISCUSSION
W. Eppers, Air Force Avionics Lab, Dayton, OH
K. Fisher, USA Electronics Command, Ft. Monmouth, NJ
H. Gerlach, Harry Diamond Labs, Washington, D.C.
N. Lieetz, USA Electronics Command, Ft. Monmouth, NJ
E. Maynard, Naval Electronics Laboratory, San Diego, CA
C. J. Sletten, Air Force Cambridge Research Laboratory, Bedford, MA
L. Strom, Defense Advanced Research Projects Agency, Arlington, VA
L. R. Whicker, Naval Research Lab, Washington, D.C.

1976 MTTS INTERNATIONAL MICROWAVE SYMPOSIUM

SESSION 23. REVIEW AND STATE-OF-THE-ART BIOLOGICAL EFFECTS AND HAZARDS OF MICROWAVE RADIATION

1300-1530 Independence Room

Chairman: S. W. Rosenthal, Polytechnic Institute of
New York, Farmingdale, NY

23-1 INVITED: A Biological Effects and Experimental
1300 Techniques
A. W. Guk, University of Washington, Seattle, WA

23-2 INVITED: Behavioral and CNS Effects
1320 D. R. Justesen, Veterans Administration Hospital,
Kansas City, MO

23-3 INVITED: Measurements and Dosimetry
1340 R. Baird, National Bureau of Standards, Boulder, CO

23-4 INVITED: Medical Surveillance
1400 P. E. Tyler (M.D.), Naval Medical R & D Command,
Bethesda, MD

23-5 INVITED: Effects Other Than Biological
1420 J. Thiel, Texas Department of Health Resources,
Austin, TX

1440 PANEL DISCUSSION

SESSION 24. ELECTROMAGNETIC THEORY

1300-1530 Lincoln Room

Chairman: Gerald Whitman, New Jersey Institute of
Technology, Newark, NJ

Organizer: Stephen F. Adam, Hewlett-Packard Co.,
Palo Alto, CA

24-1 INVITED: Evanescent Waves
1300 Leopold B. Felsen, Polytechnic Institute of New
York, Brooklyn, NY

24-2 INVITED: Propagation in a Rectangular Waveguide
1330 Periodically Loaded with Resonant Irises
T. E. Rozzi, Phillips Research Laboratories, Eindhoven,
The Netherlands, and M. S. Navarro, University of
Illinois at Urbana-Champaign, Urbana, IL

24-3 SCATTERING BY PERIODIC METAL SURFACES
1400 WITH SINUSOIDAL HEIGHT PROFILE, A NEW
THEORETICAL APPROACH
G. Whitman, N.J. Institute of Technology, Newark,
NJ, and F. Schwering, USAECOM, Ft. Monmouth, NJ

24-4 THEORETICAL ANALYSIS OF OPEN RING LINE
1420 C. Fray and A. Papiernik, Universite de Limoges,
France

24-5 PULSE BROADENING IN MULTIMODE OPTICAL
1440 FIBERS, NUMERICAL RESULTS
J. A. Arnaud, Bell Telephone Laboratories, Inc.,
Holmdel, NJ

24-6 PROTOTYPE NETWORKS IN BROADBAND
1500 PARAMETRIC AMPLIFIER SYNTHESIS
Joseph L. Tauritz, Microwave Laboratory, Delft
University of Technology, Delft, The Netherlands

CHAPTER ACTIVITIES

by Dick Sparks

(continued from page 4)

This workshop/lecture series is an excellent example of how the individual Chapters can supplement their lecture schedule.

If your Chapter is planning a similar lecture series on a topic of general interest, or if you desire assistance in arranging a lecture series, contact either Dick Sparks, Chapter Activities or Steve Temple, Chapter Records, Tel. (617) 274-7100, Ext. 3791.

NATIONAL LECTURER

Dr. Fred Sterzer, FY 1977 MTT-S National Lecturer is currently planning his speaking schedule. His topic is "Microwave Solid State Devices", and will deal with the rapid progress being made in improving the performance of microwave solid state devices used for signal processing and power generation.

Chapter representatives should contact Dr. Sterzer promptly, concerning National lecturer scheduling by writing or calling;

F. Sterzer
RCA Corp.
David Sarnoff Research Lab.
Princeton, N.J. 08540
(609) 452-2700 Ext. 2633

Among the first tentatively scheduled National Lecturer presentations are:

Palo Alto, California	May 20, 1976
Santa Barbara, California	May 27, 1976

CORRECTION

The short course titled "Micro-wave Semiconductor Devices, Circuits, and Applications" published in the Winter Newsletter showed an incorrect location. It should have read:

University of Michigan

AWARDS TO BE PRESENTED AT THE 1976 MTT SYMPOSIUM

One of the highlights of the 1976 annual MTT Symposium banquet will be the presentation of the MTT Society Awards and service recognitions. These are:

Henry J. Riblet — MICROWAVE CAREER AWARD

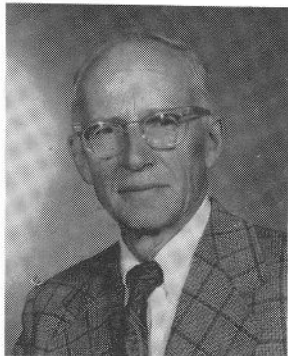
T. E. Rozzi
W. F. G. Mecklenbräuker } — MICROWAVE PRIZE

J. F. White — MICROWAVE APPLICATION AWARD

R. W. Beatty — National Lecturer Plaque

H. W. Cooper — Past President's Pin

MICROWAVE CAREER AWARD

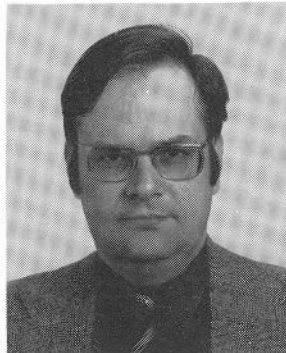


H. J. Riblet

MICROWAVE PRIZE

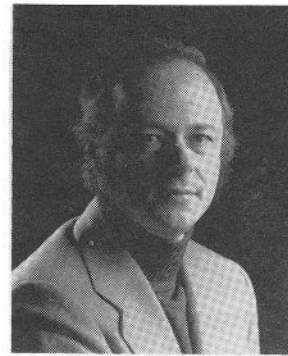


T. E. Rozzi



W. F. G. Mecklenbräuker

MICROWAVE APPLICATIONS AWARDS



J. F. White

MICROWAVE CAREER AWARD

The Microwave Career Award is presented aperiodically to an individual for a career of meritorious achievement and outstanding technical contributions in the field of microwave theory and techniques. Dr. Henry J. Riblet is the 1975 recipient of the MTT Microwave Career Award for "a career of meritorious achievement and outstanding technical contribution in the field of microwave theory and techniques." Dr. Riblet is one of the pioneers of the microwave industry. He is founder and President of Microwave Development Laboratories (MDL), Needham, Mass., and has been active in Microwaves since 1942, when he joined the staff of Radiation Laboratory of MIT. Some of his major contributions include invention of the short slot hybrid coupler in both side-wall and top-wall versions and publication of many papers on Microwave network synthesis. Dr. Riblet will receive a certificate, a plaque, and a cash sum of \$500.

Henry J. Riblet received the B. S. Degree in 1935, a Masters Degree in 1937 and the Ph.D. Degree in 1939, all from Yale University and all in mathematics.

(continued on page 13)

MICROWAVE PRIZE

The microwave Prize is awarded annually for the best paper on microwave subject published during the previous year. Drs. T. E. Rozzi and Wolfgang F. G. Mecklenbräuker are recipients of the 1975 Microwave Prize for their paper "Wide-band Network Modeling of Interacting Inductive Irises and Steps," published in the MTT Transactions, Vol MTT-23, pp. 235 - 246, February 1975. The authors are with Philips Research Laboratories, Eindhoven, The Netherlands. Drs. Rozzi and Mecklenbräuker will each receive a certificate and a cash sum of \$150.

Tullio E. Rozzi was born in Civitanova, Italy on September 13, 1941. In 1965 he obtained the degree of "dottore" in physics at the University of Pisa, Italy and in 1968 the Ph.D. degree in Electrical Engineering at the University of Leeds, U.K.

While at Leeds University, he was engaged in research in the synthesis of microwave directional couplers in TEM-line and waveguide as well as in the synthesis of coaxial low-pass filters.

(continued on page 13)

MICROWAVE APPLICATIONS AWARDS

The Microwave Applications Award is presented aperiodically to an individual for an outstanding application of microwave theory and techniques. Dr. Joseph F. White will be presented the 1975 Microwave Application Award "for the development practical high-power PIN Diode Phase Shifters utilized in various phased array radars." Dr. White is the Technical Director - Microwave Devices Group, Microwave Associates, Inc., Burlington, Mass. He will receive a certificate and a cash sum of \$100.

Joseph F. White is the Technical Director of the Device Group at Microwave Associates, Burlington, Mass. He is best known for inventing the high power periodically loaded line phase shifter, a low loss technique that enabled semiconductor diodes to steer phased array antennas with tens of kilowatts of power per element. He directed the refinement of this method and it was chosen for the steering element control in the U.S. Safeguard System, Missile Site Radar (MSR) and later for the Perimeter Acquisition Radar (PAR). He has also performed

(continued on page 13)

MICROWAVE CAREER AWARD (continued from page 12)

He taught mathematics for three years at Adelphi College and then at Hofstra College, both on Long Island. It was then that he received his introduction to microwave circuits from W. W. Hanson for whom he made some of the first calculations of the resonant frequencies of Klystron cavities. At Bill Hanson's suggestion, he joined the Radiation Laboratory where he worked under L. C. Van Alta as head of that section of the antenna group specializing in linear arrays. When the war ended, he joined the Submarine Signal Co. as head of their antenna group. When the Submarine Signal Co. was merged into Raytheon, he, with three of his associates — T. S. Saad, N. Tucker and R. Williston, formed the Microwave Development Laboratories where he has been employed since as President and Treasurer. He has also served since (at various times) as an officer and director of the Ferrotec Corp. Parametric industries and American Microwave in the formation of each, of which he played some part. From 1960 to 1963 he taught at Harvard University with the title of Professor of Engineering Practice.

His interest in electromagnetic theory, mechanical devices and applied mathematics has resulted in papers concerned with the theory and design of microwave circuits, as well as a number of patents for antennas and R. F. components. This includes the design and/or work on the theory of omni-directional antennas, the slotted dipole, multi-hole topwall directional couplers, side and topwall 3 dB hybrids, crossguide couplers, rotary joints, waveguide switches, stepped impedance transformers, direct coupled and inter-digital filters and stepped waveguide twists.

More recently he has written a series of notes concerned with the characteristic impedance of coaxial structures in which one or both of the conductors is rectangular and has just completed the development of a class of reactively compensated optimum impedance transformers.

MICROWAVE PRIZE (continued from page 12)

Since 1968, Dr. Rozzi is a research scientist at the Philips Research Laboratories, Eindhoven, The Netherlands. In this institute, he has worked at various problems in the field theory of guided waves and in circuit theory, such as: the nonlinear propagation on an optical waveguide, the wide-band network representation of waveguide discontinuities and the algebraic invariants of multiport networks in a linear embedding.

During 1975, Dr. Rozzi has spent a sabbatical year as a visiting Research Professor at the Electromagnetics Laboratory, University of Illinois at Champaign-Urbana. At Illinois he has worked on the problems of transverse field confinement in a d.h. stripe geometry laser, of coupling between two antennas on an infinite ground plane and of propagation in a waveguide loaded with resonant irises.

Since 1974, Dr. Rozzi is a senior member of the IEEE.

Wolfgang F. G. Mecklenbräuker was born in Dortmund, Germany on June 16, 1938. In 1964 he received the Dipl. - Ing. degree in electrical engineering from Aachen University, Aachen, Germany, and in 1969 the Dr. - Ing. degree in electrical engineering from Darmstadt University, Darmstadt, Germany.

He was Research Associate at Darmstadt University from 1964 to 1970, where he worked on network theory and system theory. In 1971 he joined the Philips Research Laboratories, Eindhoven, The Netherlands. During 1975 he was a Visiting Scientist on sabbatical leave at the Massachusetts Institute of Technology, Cambridge. His research interests are in network theory and digital signal processing.

Dr. Mecklenbräuker is a member of the Nachrichtentechnische Gesellschaft (NTG), Germany.

MICROWAVE APPLICATIONS AWARDS (continued from page 12)

advanced developments with numerous other microwave semiconductor devices such as duplexers, switches, multipliers, Gunn and Avalanche diode sources. These projects include the first megawatt semiconductor duplexer, the highest power (100 KW) switch and a temperature stabilized Gunn source for communication systems.

His doctoral thesis, completed in January 1968 at Rensselaer Polytechnic Institute, described the first application of bulk semiconductor properties for phase shifting. In addition to numerous IEEE papers for Conferences, Proceedings and Transactions he has presented many lectures and talks both in the United States, and Europe. These include the Chalmers University Phased Array Seminar, Gothenburg, Sweden and the Microwave Semiconductor Intensive Course given annually at the University of Michigan. He is a member of Eta Kappa Nu, Sigma XI, and the IEEE and a Technical reviewer for the Microwave Journal and the MTT Transactions. Currently he is completing a book entitled "Introduction to Microwave Semiconductor Control".

Recently he was the program Manager for a project to design and build over 15,000 very high pulse energy diode phase shifters. All of these have been completed and are being installed on Shemya Island in the Aleutian Islands in the Cobra Dane Radar for the U. S. Air Force.

ANNOUNCEMENTS

IMPI SYMPOSIUM

On July 27th through 30th 1976, the International Microwave Power Institute's 11th Annual Microwave Power Symposium will be held at the Katholieke Universiteit Leuven (Louvain), Belgium. Representatives from science, industry and commerce will gather to discuss the latest developments and growing applications of microwave energy for use in the food, rubber, chemical, agricultural, medical, biological, power transmission, and instrumentation fields. Short courses, workshops and new technical papers based on research done in the USSR, Europe and America will be presented during the 4-day program.

This meeting is particularly timely because microwave energy, which has already received very rapid acceptance in the home, in the form of the microwave oven, uses only a fraction of the energy needed for processing by conventional means. At the same time, its cleanliness offers significant potential in response to today's pollution problems.

The International Microwave Power Institute (IMPI) was founded for the purpose of furthering the use and understanding of microwave power as a new tool for man to use in energy related applications. It accomplishes these objectives by bringing together scientists, engineers, industrial representatives and interested individuals from around the world for conferences and by publishing "The Journal of Microwave Power" and the "IMPI Newsletter".

The major event of the year is the annual Symposium. Anyone interested in receiving an advance program booklet covering the 1976 Symposium should write to either of the addresses mentioned above.

FIRST ANNOUNCEMENT SECOND INTERNATIONAL CONFERENCE AND WINTER SCHOOL ON SUBMILLIMETER WAVES AND THEIR APPLICATIONS San Juan, Puerto Rico, December 6 - 10, 1976

The 1976 Submillimeter Wave Conference and Winter School will be held with the joint sponsorship of the Optical Society of America and the IEEE Society on Microwave Theory and Techniques and with the cooperation of the International Commission for Optics.

Any work concerned with submillimeter wave and far infrared theory, techniques, devices, systems, spectroscopy, and applications will be considered. The wavelength range of interest is loosely defined as 25 micrometers to one millimeter. The following subject areas are particularly appropriate:

APPARATUS

Coherent sources, tunable and fixed frequency: Discharge lasers, optically pumped lasers, difference frequency mixing, electron-beam devices, parametric oscillators, semiconductor sources, harmonic generators, spin-flip lasers, IR and visible lasers for optical pumping.

Detectors, all types, including: Photoconductor, bolometer, heterodyne, Josephson junction, pyroelectric, diode.

Modulators: Electro-optic, magneto-optic, ferrite.

Instruments and Devices: Spectrometers, interferometers, filters, integrated optics: waveguides.

MEASUREMENTS

Spectroscopy: Laser, Fourier, magnetic resonance, double resonance, cyclotron resonance, lattice dynamics, impurities and imperfections.

Astronomy and Astrophysics: Cosmic background, line emission.

Nonlinear Optics; Radiometry; Plasma diagnostics: Laser interferometry; Ellipsometry; Atmospheric Propagation; Standards: Frequency standards, radiation standards.

APPLICATIONS

Communications; Radar; Pollution Detection; Analysis; Plasma Interactions; Isotope Separation.

Authors of contributed papers must submit a 35-word abstract (for publication in the preliminary program) to the Program Chairman, (K. J. Button, MIT) by August 2, 1976. A summary of 500 to 1000 words with up to 4 illustrations must also be submitted on special camera-ready paper for publication in the Conference Digest of Technical Papers. The special paper may be obtained from the Publications Chairman (S. Perkowitz, Emory) and the summaries should be returned to him by October 1, 1976.

Authors may also wish to submit a manuscript for publication in the Conference Proceedings. These must be restricted to less than 4 journal pages and should be sent to the program chairman by November 1, 1976. Accepted manuscripts will be collected and published in Applied Optics or in the IEEE Transactions on Microwave Theory and Techniques.

The contributed-paper sessions and the tutorial review seminars will be held during the mornings and evenings of the five days. Panel discussions and directed discussion groups will convene in parallel sessions in the open air during the afternoons. Hotel reservations must be made through the office of the General Chairman (J. J. Gallagher, Georgia Tech.).

General Chairman

James J. Gallagher
Engineering Experiment Station
Georgia Institute of Technology
Atlanta, Georgia 30332 USA

Program Chairman

Kenneth J. Button
Massachusetts Institute of
Technology
National Magnet Laboratory
Cambridge, Massachusetts
02139 USA

Publications Chairman

Prof. Sidney Perkowitz
Physics Department
Emory University
Atlanta, Georgia 30322 USA

SOLUTIONS MANUAL FOR "TIME-HARMONIC ELECTROMAGNETIC FIELDS"

A solutions manual for R. F. Harrington's book "Time-Harmonic Electromagnetic Fields" has been prepared by T. K. Sarkar and D. T. Auckland and printed by the Electrical and Computer Engineering Department, Syracuse University. Copies can be obtained for \$3.00 to defray printing and mailing costs by writing to Professor R. F. Harrington, 111 Link Hall, Syracuse University, Syracuse, New York 13210.

CALL FOR PAPERS

The IEEE International Symposium on Circuits and Systems is the annual international conference sponsored by the IEEE Circuits and Systems Society. It will be held in Europe in 1976 and is cosponsored by the German Section of IEEE Region 8, with the participation of the Nachrichtentechnische Gesellschaft (NTG).

The symposium will be devoted to all aspects of the theory and design of circuits and systems in the widening field of electrical engineering science. Particular emphasis will be placed on links between theory and practice, novel approaches to analysis and synthesis, circuits involving newly emerging technologies, and computer oriented methods for design, layout, and manufacturing.

Authors are invited to submit papers suitable for a 20 minute presentation. The format of the papers should be in accordance with the "Information for Authors" which are printed on the back cover of each issue of the IEEE Transactions on Circuits and Systems. The preferred language for the conference is English, but papers in German will also be accepted.

Four (4) copies of each paper should be submitted by October 1, 1976, to:

Alfred Fettweis
Lehrstuhl für Nachrichtentechnik
University of Bochum
Postfach 2148
D-4630 Bochum, F. R. Germany.

Each paper will be reviewed by an international panel of experts in the respective field. Authors whose paper has been accepted will be invited to submit a short version in English for publication in the Proceedings of the symposium.

As in the past, the symposium will include tutorial and special sessions on topics of current interest. Suggestions and proposals for such sessions should be sent by September 1, 1976 to the above address.

POLYSILICON LINES A HUNDREDTH OF A HAIR'S BREADTH FOR INTEGRATED CIRCUITS

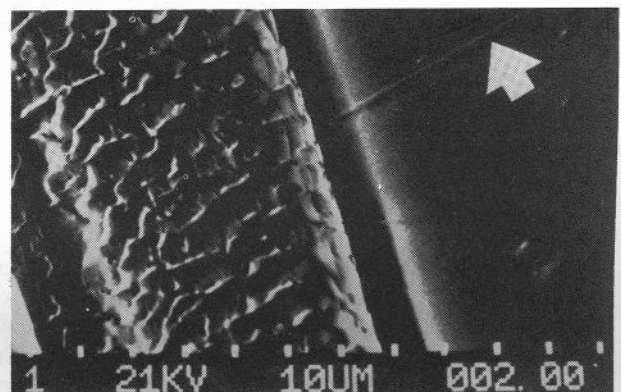
At the Mullard Research Laboratories, Redhill, England (which form part of the international Philips research), preferential etching of polysilicon has been used to make very thin lines for interconnections and transistor gates; no special apparatus is required to incorporate the lines in transistors and integrated circuits.

Using conventional methods, line widths in integrated circuits are between five and ten μm but, using the new method, 1.0 μm lines have been incorporated into transistors, and lines 0.3 μm wide have been made. The still narrower 0.3 μm lines have cross sections of only 600 x 600 silicon atoms and, as this width is comparable with the wavelength of light they cannot be studied using an optical microscope. The technique considerably improves the transistor packing density and ultimately may reduce the cost of electronic circuits and products.

The technique involves conventional definition of one side of the line with a masking layer on top. Boron is diffused into the edge of the polysilicon underneath the mask, to a depth equal to the width of the line required. The masking layer is then removed, followed by removal of the undoped region of polysilicon by a selective etch to leave the fine boron doped line.

The width of lines defined by methods such as photolithography, electron beam lithography and X-ray lithography are directly affected by the roughness of both edges but, in the new process, the line width is determined by diffusion from one edge and is little affected by irregularities in the original edge.

The results described refer to laboratory experiments; they do not necessarily imply a follow-up in production or marketing.



SEM PHOTOGRAPH

The illustration is a scanning electron micrograph of a just visible 1 μm line of polysilicon (arrow) crossed by a human hair (the "rough" object on the left of the picture).

UPDATE YOUR 1976 COMMITTEE DIRECTORY

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Telephone (215) 439-7505

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INSTITUTIONAL LISTINGS

The IEEE Microwave Theory and Techniques Society is grateful for the assistance given by the firms listed below, and invites application for Institutional Listing from other firms interested in the microwave field.

PRD ELECTRONICS, INC.

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1200 Prospect Ave., Westbury, N. Y. 11590
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An Institutional Listing recognizes contributions to support the publication of the IEEE Transactions on MICROWAVE THEORY AND TECHNIQUES. Minimum rates are \$60.00 for listing in one issue; \$260.00 for six consecutive or alternate issues; \$440.00 for twelve consecutive issues. Larger contributions will be most welcome. No agency fee is granted for soliciting such contributions. Inquiries, or contributions made payable to the IEEE, plus instructions on how you wish your Institutional Listing to appear, should be sent to R. M. Emberson, The Institute of Electrical and Electronic Engineers, 345 East 47 Street, New York, N. Y. 10017.

MTTS SYMPOSIUM PROPOSALS ARE BEING SOLICITED

Your ADCOM is soliciting Symposium Proposals for the 1979 and 1980 Symposiums.

Those Chapters who are interested may submit their proposals to Pete Rodrigue at the following address:

G. P. Rodrigue
School of Electrical Engineering
Georgia Tech.
Atlanta, Georgia 30332

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