IEEE SOCIETY ON MICROWAVE THEORY AND TECHNIQUES

NEWSLETTER

EDITOR: Nat Pelner

Hughes Aircraft Co., Systems Division, Canoga Park, California 91304

Number 78, Spring 1975

'75 MICROWAVE SYMPOSIUM PALO ALTO, CALIFORNIA

RICKEY'S HYATT HOUSE

THE THEME

"MICROWAVES IN SERVICE TO MAN"

The San Francisco Chapter of MTT-S will be host to the 1975 International Microwave Symposium to be held May 12-14, 1975, at Rickey's Hyatt House in Palo Alto, California. This year's symposium steering committee has been chaired by E. Wesley Matthews of Philco Ford Corporation. Coordination of the technical program (inclusive of over 120 original papers) has been handled by the Smposium Technical Program Committee, chaired by Stephen F. Adam of Hewlett-Packard Company. During the symposium, a special Japanese session will be presented, with the cooperation of the Tokyo MTT Chapter. Professor Shigebumi Saito of the Institute of Industrial Science at the University of Tokyo has organized this session dealing with Millimeter Wave Communication in Japan.

In addition to the technical portion of the program there will be entertainment including a get acquainted cocktail party and a banquet in the peninsula foothills. The keynote address will be given by H. W. Cooper, President of MTT-S Administrative Committee. At the banquet, Professor Pritts of the University of Colorado, College of Music, will present a musical interlude featuring the Moog Synthesizer. The following awards will be presented at the banquet. Microwave Prize to Charles A. Liechti and Robert L. Tillman of Hewett Packard Company, Palo Alto, California; David Sarnoff Award to B. C. DeLoach of Bell Labs; Microwave Career Award to H. A. Wheeler; National Lecture Plaque to Robert W. Beaty; and two Microwave Applications Awards.

While attendees are involved in conference sessions, accompanying spouses may take advantage of an exciting social program which includes tours to various attractions in the San Francisco Bay Area (including some of the local wine tasting rooms). Professional babysitting can be arranged if needed by those who wish to bring children.

The cost of advance registration is $30 for IEEE members and $40 for nonmenbers. The cutoff date for advance registration is April 21, 1975. After that date registration fees will be $40 for members and $50 for non-members. Additional copies of the Symposium Digest will be available to registrants for $10 each.

Reservations for rooms at Rickey's Hyatt House can be guaranteed at the time of making conference reservations. The rooms are available at the conference rate of $20-22 for singles and $27-29 for doubles. Arrangements for facilities to any desired follow-on sessions or informal group meetings can be made by contacting Doug Gray of Hewlett-Packard Company, 1501 Page Mill Road, Palo Alto, California, 94304, telephone number 415-493-1501.

ADCOM HIGHLIGHTS

by Pete Rodrigue

On January 21, a good turnout of ADCOM members met at Palo Alto for the 1975 organizational meeting. Warren Cooper, ADCOM President, led the group briskly through a full agenda. Highlights of the meeting included the awarding of a special Microwave Applications Award to P. H. Smith for the legendary Smith chart and the naming of Dean F. Peterson of Lincoln Laboratories as receipient of the 1974 Microwave Applications Award for his work on IMPATT diodes.

The meeting opened with corrections and approval of the minutes of ADCOM's meeting of Sept. 9. Jim Degenford has been appointed ADCOM Secretary-Treasurer for 1975. President Cooper then set forth suggested dates for ADCOM meetings in 1975. Because of the late date for Intercon and the early date of the '75 Microwave Symposium the usual Spring meeting at Intercon will not be held, and the next ADCOM meeting is set for Sunday, May 11, at Rickey's Hyatt House.

Ken Button requested and received endorsement of ADCOM to co-sponsor a Second International Conference on Submillimeter Waves and their Applications, December 6-10 of 1976 in San Juan, P.R. This meeting would be similar to the very successful meeting held in Atlanta last June.

Steve Adam and Wes Matthews reported on arrangements for the '75 Microwave Symposium, as reported in greater detail elsewhere in this Newsletter. Marty Caulton representing the '76 Symposium Local Committee, reported on early arrangements for that meeting to be called "the Bicentenial Symposium."
G. P. Rodrigue gave a Final Report of the '74 Symposium at Atlanta. An attendance of 625 produced a surplus of approximately $12,800 excluding digest sales through IEEE (that normally adds an additional $25.00). More than one half of the surplus resulted from Exhibits and other Industrial Support. Comments were made on the non-negligible impact of Symposium surpluses on the overall budget.

Bob Beatty reported on the painstaking and methodical efforts of several standards committes, and Hal Sobol gave a rundown on Technical Committee organization and activity. Details of these committee organizations are spelled out in the directory enclosed with this Newsletter. Two technical committees (13-Ferrites and 6-MIC's) are planning workshops to follow the May Symposium.

A written report from Bill Guy on COMAR Committee activity was read and discussed. The importance of COMAR as an interface between the profession and the public was emphasized.

Al Clavin reported that the highly successful Technology Forecasting and Assessment sessions held in Atlanta would be resumed at the Palo Alto Symposium. Also, a two day sumposium on T.F. & A. will be held following WESCON.

The Ad Hoc Committee on S-MTT Election Procedures, headed by Al Clavin, reported that general agreement was reached on broadening the eligible voting membership of ADCOM for elections by enfranchising the three ex-Presidents who now hold ex-officio status, but are not eligible to vote. A motion was passed directing the By-law Committee (Dick Sparks) to prepare such a By-law for the formal action at the next ADCOM meeting.

Kiyo Tomiyasu, for the Awards Committee, recommended that Philip H. Smith be voted a special Microwave Applications Award in recognition of his unique contribution--ubiquitous Smith Chart. He also recommended that the 1974 Microwave Applications award go to Dean Peterson, Lincoln Labs, for his device characterization of IMPATT diodes. Both recommendations were unanimously adopted.

Larry Whicker, Chairman, Membership Services, reported that the annual Chapter Chairman's meeting would be held during the Microwave Symposium. Some improvement in receipt of Chapter's meeting reports was noted, and the activities of Sy Okwit, '74 National Lecturer were summarized. Bob Beatty stated that his 1975 National Lecture series will open in Washington on April 1. Nat Pelner, Newsletter Editor, requested that all newsletter inputs be available one week from the date of the meeting, but the later agreed to a two week deadline. (Good Luck, Nat!)

Don Parker gave a detailed outline of the current status of transactions submissions, acceptances, special issues, etc. Four special issues covering "Integrated Optics," "Microwave Communications," ""75 Symposium," and "FET Devices and Circuits" are in the works. Implementation of the "Applications" section has begun. Some discussion was given over to the role of "short papers." Lamar Allen stated that the Microwave Encyclopedia was still in the formative stage with topics and authors being solicited.

George Oltman commented briefly on S-MTT's tentative '75 budget recently received from IEEE. A deficit of some $3,500 is budgeted, but this will be more than offset by the conference income in excess of that included in the budget. Some uncertainty still exists with respect to the actual fraction of transactions pages for which voluntary page charges are honored. A follow-up bookkeeping system is being inaugurated that should provide better information. George promised a comprehensive report in May at which time a decision on Society dues for '76 should be made.

Bob Knox reported on the activity of the Publicity and Public Relations Committee, and was encouraged to keep spreading the word.

With a few final remarks of a general nature Warren Cooper brought to a close a very efficiently run meeting at 4:30 p.m.--members scattered to airports and bars.

1974 MICROWAVE APPLICATION AWARD TO D. F. Peterson

H. W. Cooper, MTT ADCOM President, announced on January 21, that Dean F. Peterson of MIT, Lincoln Laboratory has been awarded the 1974 Microwave Application Award "for the application of microwave theory and techniques to the design of practical, reliable, high power IMPATT amplifiers." Dr. Peterson's award is based on his design and construction of Ka-Band transmitters for the LES-8 and -9 satellites. This achievement resulted in the publication of two papers (MTT Transactions, November 1973 and August 1974) and the completion of space qualified equipment for satellites. His work extended the state-of-the-art in reliable high-power IMPATT diode applications in the 30-40 HGz frequency range. Dr. Peterson will receive his award at the annual MTT awards banquet during the 1975 International Microwave Symposium in Palo Alto, California.

Dean F. Peterson was born in Melbourne Beach, Fla., on March 28. 1945. He received the B.S. degree in electrical engineering from Utah State University, Logan, Utah, in 1967, and the M.S. and Ph.D. degrees from Massachusetts Institute of Technology, Cambridge, in 1969 and 1971, respectively.

From 1968 to 1971 he worked as a Research Assistant in the Solid-State Microwave Electronics Group, Research Laboratory of Electronics, M.I.T., Cambridge, Mass., where he was engaged in the characterization and modeling of avalanche diodes for use in microwave amplifiers and oscillators.

Since 1971 he has been a Staff Member at M.I.T. Lincoln Laboratory in the satellite communications group. At Lincoln he has been involved in the development of flight-qualified multiple-diode millimeter wave IMPATT amplifiers and the characterization and testing of tracking antennas for the IES 8/9 communications system.

DAVID SARNOFF AWARD TO C. B. De Loach, Jr.

The 1975 David Sarnoff Award goes to **Bernard C. De Loach, Jr.** (F), head of the Gallium Arsenide Laser Department at Bell Laboratories, Murray Hill, J.J., "for contributions to and leadership in the development of the impact avalanche and transit time IMPATT) device." Presentation of the award will take place at the International Microwave Symposium, Palo Alto, Calif., May 12–14, 1975.

A native of Birmingham, Ala., Dr. De Loach joined Bell Labs in 1956 after receiving the Ph.D. degree in physics from Ohio State University. He previously had been awarded the B.S. and M.S. degrees in physics, in 1951 and 1952, respectively, by Auburn University. He initially was a member of Bell's Radio Research Department in Homdel, J.J., and assumed his present post in 1973. Dr. De Loach has been granted ten patents for his inventions. He is a member of Pi Mu Epsilon, Sigma Xi, and Sigma Pi Sigma, and was an Ohio State University Fellow for 1955–56.

1974 SPECIAL RECOGNITION MICROWAVE APPLICATION AWARD TO P. H. Smith

The MTT ADCOM has awarded a special award to Phillip H. Smith "for the application of microwave theory and techniques to the practical realization of a circular transmission line chart for analyzing microwave circuits, the SMITH CHART". Mr. Smith's award is a special recognition for the invention and application of one of the most widely used design tool in the microwave field, the SMITH CHART. The SMITH CHART was invented in 1939 and has since continued to grow as one of the basic tools for understanding and developing microwave circuits. Mr. Smith will receive his award at the annual awards banquet during the 1975 International Microwave Symposium in Palo Alto, California.

Phillip H. Smith (A30, SM'46, F'52, L.F. '70) was born in Lexington, Mass. on April 29, 1905. He received the BSEE degree from Tufts University in 1928, majoring in electrical communications.

In 1928 he joined the technical staff of Bell Telephone Laboratories with the Radio Research Department, Deal, N.J., where he became involved in the early development of transmission lines and directional antennas for the Bell System's shortwave overseas radio telephone. During this time he developed early forms of the "Smith Chart".

From 1935 to the outbreak of World War II, Mr. Smith was engaged in the design and installation of directional antenna equipment for commercial AM radio broadcasting, and during the World War II with the design and development of microwave antennas and components for a number of Navy radar systems. Following World War II he worked on commercial FM radio broadcasting antenna designs and invented the "Cloverleaf" antenna merchandised by Western Electric Company. Subsequently he has been involved in military weapon system studies, and supervised groups responsible for their high-frequency components.

Mr. Smith has 20 U.S. patents in the microwave field including the basic patent on the transmission line matching stub, the Cloverleav antenna, and the optimum power ratio coaxial transmission line. He has published more than 35 papers on antennas and transmission lines, and is the author of a book entitled "Electronic Applications of the Smith Chart - in Waveguide, Circuit, and Component Analysis", published by McGraw-Hill Book Co. in 1969. He also authoried an article on the "Smith Chart" for '.The Encyclopedia of Electronics" published by Reinhold Publishing Company in 1962.

Mr. Smith has served on and chaired numerous IEEE committees, including technical standards Committee 2 on Antennas and Waveguides. In 1952 he was elected to the Fellow grade "for his contributions to the development of antennas and graphical analysis of transmission line characteristics". He is a past member of Commission 6 of URSI, and a member of the Delta Chapter of Tau Beta Pi.

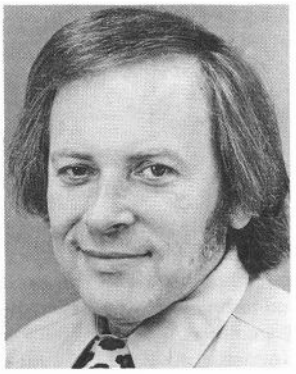
Since his retirement from Bell Laboratories in 1970 Smith has organized a small company - Analog Instruments Company of New Providence, N.J. - who initially merchandised simple navigational instruments for light aircraft, but more recently his charts and a dozen or more chart related items. His charts, currently selling at the rate of about a ton per year (9 million copies to date) reach nearly every civilized country on earth.

IEEE MEMBERS ELECTED TO FELLOW GRADE AS OF JANUARY 1, 1975 FOR CONTRIBUTIONS TO THE MICROWAVE FIELD

John M. Anderson	For contributions to the understanding of electromagnetic wave and plasma interaction
Mark R. Barber	For contributions and leadership in microwave, medical, and digital electronics.
Erwin F. Belohoubek	For contributions to microwave solid-state amplifiers and to microwave tubes.
E. Folke Bolinder	For contribution to microwave transmission line theory.
Aaron D. Bresler	For leadership in antenna engineering, and for contributions to the theory of propagation in anisotropic waveguides.
John de Klerk	For contributions to the development of ultrasonic technology.
Gordon R. Harrison	For contributions and technical leadership in the development of microwave ferrimagnetic compounds and their application in microwave components and integrated circuits.
Aditya K. Kamal	For leadership in establishing post-graduate teaching and research facilities and research contributions in microwave and quantrum electronics.
Kenneth E. Mortenson	For contributions to the field of microwave semiconductor devices and components and to engineering education management.
Herman C. Okean	For contributions to microwave integrated circuit techniques.
J. Francis Reintjes	For contributions to the fields of radar and automation.
George P. Rodrigue	For contributions to the characterization and application of ferrimagnetic garnets in microwave devices.
Monte Ross	For leadership and contributions to the development of high-data-rate optical communications systems.
Adam K. Smolinski	For achievements in research, development, and teaching of electronic engineering.
George W. Stroke	For contributions to holography, coherent optics, and application to optical computing.
Jean G. Van Bladel	For contributions to electromagnetic theory.
Thomas A. Weil	For contributions to radar system technology.

Last year we goofed and left out

J. C. Wiltse, Jr.	For contributions to microwave and millimeter wave technology in the areas of radar, radiometry, and transmission line research.



EDITORS NOTES

by Nat Pelner

Pete Rodrigue's is a hard act to follow, but we will try. I have been involved in some fashion with the NEWSLETTER since Al Clavin was editor, so I know the work and effort Pete expended in putting together this fine publication. I will try to do as well. We all owe Pete our thanks and wish him well in his new MTT position as Vice President S-MTT.

The "Editor's Notes" column is where I get the opportunity to sound-off with the goal of receiving in return the "sense" of the membership. With this, AdCom can make policy in your behalf based on your needs and desires. Some of the topics I plan to address in future editorials will be:

1. IEEE Chapter budgets — how they are distributed.
2. How the proposed copyright law amendments now before Congress affects the scientific community.
3. Portable pensions.
4. IEEE and the engineer's socio-environment.

I believe the NEWSLETTER should be a reciprocal device — information from AdCom to Membership and Membership to AdCom. The Membership to Adcom path needs more emphasis. Toward this end, the "Letters to the Editor" section will be enlarged. Your comments, beefs, and suggestions are solicited. They will be published.

Leo Young, I think stated it properly in his column in the Summer Issue of NEWSLETTER where he wrote, "Remember your Board of Directors and your AdComs represent you, and don't let them forget it!" We won't, Leo.

REPORT OF DIVISIONAL DIRECTOR

by Bob Rivers

At this initial stage of my term as Divisional Director, I have been concerned with a move to force all elected to receive their Fellow Awards in their Section. Contrary to some news releases a Fellow may elect to receive his Award at a Group or Society Activity. Within TAB, growing expenses of present staff and a need for additional staff has increased the allocated support and Headquarters charge against the Group or Society approximately 20%. The partial move to Piscataway, N.J. is under way with a computer move ending the first week of February. The TAB Committee on Man and Radiation and others have reviewed a Spectrum Article on Microwave Radiation that appeared to be biased and had an effect on its modification.

The Technical Activities Board and its Publication Committee have an annual procedure for reviewing about one third of the publications. These reviews have an objective and subjective part. I have voiced some objection to the subjective reviews because they do not seem to address a consistant set of criteria. Each of the transactions of course, has a somewhat different audience that it addresses. At one end of the spectrum, is the Journal that gets and publishes all of the contributions to the basic theory.

Another portion of the spectrum is what is sometimes called applications information. It includes how to interconnect and use components to solve a system problem and information that would be classified as approximations, or limited range solutions to problems.

Another portion of the spectrum of information needs is the characteristics of available components or materials. This information is available through evaluation or review articles and through advertising or supplier data sheets. My contention is that before we do any more evaluating we should define the criteria and then evaluate with respect to the criteria. Your comments would be appreciated.

In Professional areas, I have been appointed to the newly reorganized U.S. Activities Board. It appears as though the IEEE is committed to respond promptly to the unemployment threat of the recession with an action program. In December the IEEE Board approved an IEEE code of Ethics. This is a major milestone since we could hardly call this a professional society without a code of ethics. The IEEE is also taking a friend of the court position in the Bart Case. This is another milestone. In the IEEE, there is a significant effort to reduce expenses. Many outside purchased materials have had price rises. Paper, of course is the major cost item in our products. There is some threat to income due to the recession; such as advertising, exhibits and registration fees. One meeting seems to have already experienced a 20% decline in registrations. There is an Engineering Employment Decline and it can be expected to have some effect upon G/S Membership. It is encouraging to find the IEEE operating in the predictive mode rather than just reacting to crisis.

CHAPTER ACTIVITIES

by Larry Whicker

CHAPTER OFFICERS – ADCOM MEETING

As has become the custom in the last few years, Chapter Officers are invited to meet with ADCOM members and officers of other chapters at the 1975 MTT Symposium. The meeting has been scheduled for 8:00 PM, 11 May 1975 at Ricky's Hyatt House, Palo Alto, California. An agenda for the meeting will be mailed to Chapter Officers shortly.

NATIONAL LECTURER

a) 1974: Si Okwit has lectured at sixteen chapters thus far and has agreed to lecture at two more this Spring. A partial listing of Si's schedule is as follows:

Ft. Wayne, IN	Apr. 1, 1974
Atlanta, GA	May 21, 1974
San Diego, CA	Sep. 10, 1974
Seattle, WA	Oct. 14, 1974
Palo Alto, CA	Oct. 15, 1974
Orange County, CA	Oct. 16, 1974
Los Angeles, CA	Oct. 17, 1974
Long Island, NY	Oct. 30, 1974
Orlando, FL	Nov. 12, 1974
Florida West Coast	Nov. 13, 1974
Canada Chapter	Nov. 26, 1974
St. Louis, MO	Dec. 10, 1974
Schenectady, NY	Spring 1975
Milwaukee, WI	Spring 1975

b) 1975: Bob Beatty has thus far scheduled four talks for this Spring including Atlanta, New Jersey, Boston, and Washington. Chapters desiring the 1975 National Lecture should contact Bob. Bob's address and telephone number are as follows:

Title: 1975 MTT-S National Lecture
The Development of Modern Automatic Systems
For the Measurement of Network Parameters

Address: Dr. R. W. Beatty
2110 – 4th Street
Boulder, Colorado 80302
Telephone (303) 443-6188

c) National Lecture Movie: The 1973 National Lecture Movie by John Allen on "Transistor Reliability" is available for loan to chapters or other organizations. Interested persons should contact Barry Spielman at (202) 767-3526.

It is expected that the 1974 National Lecture will be filmed and available for distribution this Spring.

ONE-DAY SYMPOSIUMS

Harold Stinehelfer has agreed to chair the committee on One-Day Symposiums. In this capacity he will either organize or assist chapters in organizing one-day meetings. Harold will review his plans at the Chapter Officers – ADCOM meeting in May.

CHAPTER MEETINGS

Over half of our chapters are now providing us with reports of their meetings. We are proud of this response. Keep up the good work!

Wes Matthews
Steering Committee
Chairman

1975 IEEE/S-MTT INTERNATIONAL MICROWAVE SYMPOSIUM

Rickey's Hyatt House
Palo Alto, California

Steve Adam
Technical Program
Committee Chairman

CONDENSED SCHEDULE OF EVENTS

Sunday, May 11, 1975

1000	ADCOM Meeting – Rickey's Hyatt House
1600-2200	Registration – Lobby at Rickey's Hyatt House
1700-1900	No Host Cocktail Party – Pool, Rickey's Hyatt House

Monday, May 12, 1975

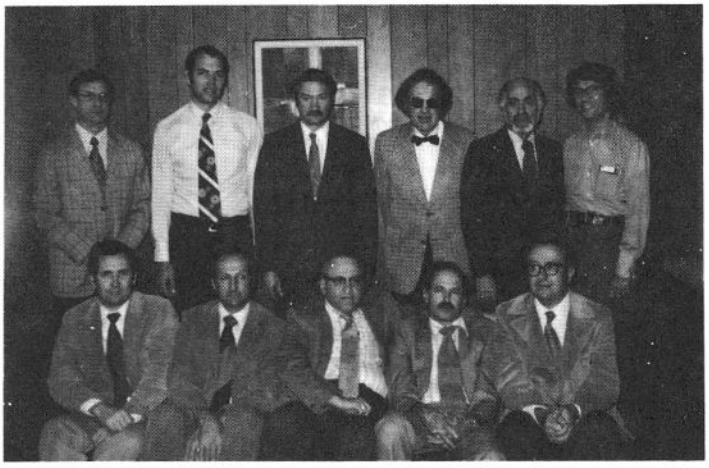
0730-1600	Registration – Rickey's Hyatt House
0830-0915	Welcoming Remarks – E. W. Mathews, Chairman, Symposium Steering Committee Keynote Address – H. W. Cooper, President MTT-S Administrative Committee
0915-1700	Exhibits – Everyday, next to session rooms.
0915-1200	1. Microwaves in Earth Sensing – Room B, Kiyo Tomiyaso 2. Microwaves in Communication – Room A, C. Ryan 3. Microwave Filters and Components – Room C, E. G. Cristal
1330-1700	4. Microwave Generation and Amplification – Room B, K. Kennedy 5. Microwave Measurements – Room A, R. W. Beatty 6. Microwave Filters and Components II – Room C, R. Levy
2000-2200	7. Professional Action Panel – Room B, Dr. Leo Young
0930-1800	Social Program – San Francisco, Golden Gate Bridge, Muir Woods, Sausalito, Lunch at Chinatown

Tuesday, May 13, 1975

0830-1200	8. Microwave Intergrated Circuits – Room B, Martin Caulton 9. Technology Forecasting Panel – Room A, W. Cooper and A. Calvin 10. Microwave Control Devices – Room C, J. White
1330-1700	11. Computer Aided Microwave Practices – Room B, R. Hall 12. Millimeter Wave Communications in Japan – Room A, Invited Session S. Saito and S. Okamura 13. Microwave Ferrite Control Devices – Room C, L. Whicker
1000-1600	Social Program – Stanford University, Lunch at Allied Arts, Menlo Park
1800	Cocktails
1930	Banquet – Adobe Creek Lodge, Los Altos

Wednesday, May 14, 1975

0830-1200	14. Millimeter Wave Systems and Components – Room B, J. Wiltse 15. Microwaves in Medicine – Room A, P. Polso 16. Noise in Microwave Transmission and Applications of Gunn and IMPATT Diodes – Room C, Panel, F. Ivanek
1330-1700	17. Reduction and Measurement of Noise – Room B, J. Kuno 18. Microwaves in Transportation and Navigation – Room A, H. Chuit 19. Microwave Acoustics and Delay Lines – Room C, R. Williamson
1700	Go Home



1975 MTT-S

International Symposium Steering Committee

Top left-right; Don Chambers, Doug Gray, Bob Ruttenberg, Pete Lacy, Marv Waldman, Jack Lepoff.

Sitting left-right; Don Parker, Don Messer, Wes Matthews, Jay Stone, Steve Adam.

1975 IEEE/S-MTT INTERNATIONAL MICROWAVE SYMPOSIUM
MONDAY, MAY 12

INTRODUCTORY SESSION 0830-0915

Welcoming Remarks — E. W. Mathews, Chairman, Symposium Steering Committee

Keynote Address — H. W. Cooper, President, MTT-S Administrative Committee

SESSION 1. MICROWAVES IN EARTH SENSING

0915-1200 Room B

Chairman: Kiyo Tomiyasu, General Electric, Co., Philadelphia, PA.

1–1 0915 PASSIVE MICROWAVE SENSING OF THE EARTH
David H. Staelin, Massachusetts Institute of Technology, Cambridge, Mass.

1–2 0950 SATELLITE ALTIMETRY APPLICATIONS
J.T. McGoogan, NASA Wallops Flight Center, Wallops Is., VA.

1025 Coffee Break

1–3 1035 MICROWAVE SCATTERING FROM THE OCEAN
W. Jones, W. Grantham, L. Schroeder, J. Johnson, C. Swife, NASA Langley Research Center, Hampton, Virginia

1–4 1110 IMAGING RADAR POTENTIALS FOR EARTH RESOURCES
W. Brown, J., C. Elachi, Caltech Jet Propulsion Laboratory, Pasadena, CA.

1200 Lunch

SESSION 2. MICROWAVES IN COMMUNICATION

0915–1200 Room A

Chairman: C. Ryan, Motorola-Ged., Scottsdale, Arizona

2–1 0915 MICROWAVE DEVELOPMENT IN BRAZIL
J.T. Senise, Escola de Engenharia Maua, San Paulo, Brazil

2–2 0950 BI-POLAR IC'S FOR MICROWAVE SIGNAL PROCESSING, INVITED
C. Ryan, Motorola-Ged., Scottsdale, Arizona

1020 Coffee Break

2–3 1035 MICROWAVE QPSK DEMODULATION TECHNIQUES AT THE RECEIVER FRONT END, INVITED
L. Cuccia, Philco/Ford, Palo Alto, CA.

2–4 1100 ELECTRONICALLY-TUNABLE LO-NOISE KA-BAND PARAMP-DOWN-CONVERTER SATELLITE COMMUNICATIONS RECEIVER
H.C. Okean, LNR Communications Inc., Farmingdale, New York

2–5 1120 DE-POLARIZATION MEASUREMENTS ON THE ATS-6 20 GHz DOWN LINK
C.W. Bostian, Virginia Polytech Institute, Blacksburg, VA.

1200 LUNCH

SESSION 3. MICROWAVE FILTERS AND COMPONENTS I

0915–1200 Room C

Chairman: E.G. Cristal, Hewlett-Packard Co., Palo Alto, CA.

3–1 0915 APPROXIMATION PROBLEM FOR FILTERS WITH ARBITRARY AMPLITUDE & PHASE, INVITED
J. Wenzel, Wavecom, Northridge, CA.

3–2 0945 TEMPLATE METHODS FOR EFFICIENT MICROWAVE FILTER DESIGN
G.R. Hoffman, Laboratory for Electromagnetism, University of Ghent, Belgium

3–3 1005 MICROWAVE FILTERS WITH SINGLE ATTENUATION POLES AT REAL OR IMAGINARY FREQUENCIES
R. Levy, Microwave Development Laboratories, Natick, Mass.

1025 COFFEE BREAK

3–4 1040 ON THE FIELD ENERGY AND POWER OF WAVEGUIDES AND CAVITIES SYNTHESIZED WITH NON-SEPARABLE SOLUTIONS OF HELMHOLTE WAVE EQUATION
P.J. Luypaert, Katholieke Universiteit, Leven, Belgium

3–5 1100 GENERALIZED TE_{011} MODE WAVEGUIDE BANDPASS FILTERS
A.E. Williams and A.E. Atia, COMSAT Laboratories, Clarksburg, MD.

3–6 1120 MICROWAVE BANDPASS FILTERS CONTAINING DIELECTRIC RESONATORS WITH IMPROVED STABILITY AND SPURIOUS
K. Wabino, T. Nishikawa, S. Tamura, Y. Ishikawa, Muvata Mfg. Co., Kyoto, Japan

1200 LUNCH

SESSION 4. MICROWAVE GENERATION AND AMPLIFICATION

1330–1700 Room B

Chairman: K. Kennedy, Watkins-Johnson, Palo Alto, CA.

4–1 1330 SURVEY OF SOLID STATE DEVICE PERFORMANCE, INVITED
B. Bersan, Hewlett-Packard Company, Palo Alto, CA.

4–2 1410 MICROWAVE OCTAVE-BAND GaAs FET AMPLIFIERS
W. Ku, M. Mokari-Bolhassan, W. Peterson, Cornell Univ., Ithaca, New York; A. Podell, B. Kendall, Hewlett-Packard Assoc., Palo Alto, CA.

4–3 1425 X-BAND SILICON POWER TRANSISTOR
H. Yuan, J. Kruger, Y. Wu, Texas Instruments, Dallas, Texas

0240 COFFEE BREAK

4–4 1500 WIDEBAND, HIGH GAIN, DUAL DIODE GUNN AMPLIFIER CIRCUITS
J. de Koning, R. Goldwasser, R. Hamilton, Jr., Varian Assoc., Palo Alto, CA.

4–5 1515 C-BAND SOLID STATE TWT REPLACEMENT
M.R. Harris, W. Tsai, S. Paik, Raytheon Co., Waltham, Mass.

4–6 1530 A HIGH POWER WAVEGUIDE IMPATT AMPLIFIER
P. Ruella, Hewlett-Packard Company, Palo Alto, CA.

SESSION 5. MICROWAVE MEASUREMENTS

1330–1700 Room A

Chairman: R.W. Beatty, National Bureau of Standards, Boulder, Colorado

5–1 1330 THE EVOLUTION OF AUTOMATED MICROWAVE MEASUREMENTS, INVITED
J. Meyer, Hewlett-Packard Company, Palo Alto, CA.

5–2 1405 AUTOMATED CALIBRATION OF DIRECTIONAL-COUPLER-BOLOMETER-MOUNT ASSEMBLIES
G.F. Engen, National Bureau of Standards, Boulder, Colorado

5–3 1430 USING AN ARBITRARY SIX-PORT JUNCTION TO MEASURE COMPLEX VOLTAGE RATIOS
C.A. Hoer and K.C. Roe, National Bureau of Standards, Boulder, Co.

5–4 1455 NON-DESTRUCTIVE RESONANT TECHNIQUE FOR THE MEASUREMENT OF COMPLEX PERMITTIVITY THEORETICAL ANALYSIS AND EXPERIMENTAL RESULTS
M.C. Dereton and M.S. Ramachandraiah, Ecole Polytechnique Federale De Lausanne, Lausanne, Switzerland

1520 COFFEE BREAK

5–5 1550 MEASUREMENT OF THE EQUIVALENT CIRCUIT PARAMETERS OF DISCONTINUITIES IN A RESONANT MICROSTRIP RING
W.V.R. Hoefer and A. Chattopadhyay, University of Ottawa, Ottawa, Canada

5–6 1615 RESONANCE MEASUREMENT OF EVEN- AND ODD-MODE PROPAGATION CONSTANTS IN COUPLED MICROSTRIPS
V. Rizzoli, University of Bologna, Bologna, Italy

SESSION 6. MICROWAVE FILTERS AND COMPONENTS II

1330–1700 Room C

Chairman: R. Levy, Microwave Development Labs, Natick, MA

6–1 1330 TAPPED LINE COUPLED TRANSMISSION LINES WITH APPLICATIONS TO COMBLINE AND INTERDIGITAL FILTERS
E.G. Cristal, Hewlett-Packard Company, Palo Alto, CA.

6–2 1350 MULTISECTION INHOMOGENEOUS COUPLED-LINE FILTERS WITH LARGE MODE-VELOCITY RATIOS
J.L. Allen, University of Florida, Tampa, Florida

6–3 1410 A NEW N-WAY POWER-DIVIDER/COMBINER SUITABLE FOR HIGH POWER APPLICATIONS
U.H. Gysel, Stanford Research Institute, Menlo Park, CA.

1430 COFFEE BREAK

6–4 1450 CHARACTERISTICS OF ASYMMETRICAL BROADSIDE COUPLED STRIPS IN AN INHOMOGENEOUS DIELECTRIC MEDIUM
C.L. Chao, TRW Systems Group, Redondo Beach, CA.

6–5 1510 WIDEBAND, TOTALLY COUPLED DIRECTIONAL TRANSFORMERS
R.A. Speciale, Tektronix, Beaverton, Oregon

6–6 1550 HIGH DIRECTIVITY MICROSTRIP COUPLERS USING DIELECTRIC OVERLAPS
C. Buntschuh, Microwave Associates, Burlington, Mass.

EVENING

SESSION 7. PROFESSIONAL ACTION

2000–2200 Room B, PANEL SESSION

Chairman: Dr. Leo Young, Department of Defense, Washington, D.C.

7–1 THE NEW PENSION LAW AND HOW YOU MIGHT BENEFIT FROM IT

1975 IEEE/S-MTT INTERNATIONAL MICROWAVE SYMPOSIUM

TUESDAY, MAY 13

SESSION 8. MICROWAVE INTEGRATED CIRCUITS

0830–1200 Room B

Chairman: Martin Caulton, RCA Laboratories, Princeton, New Jersey

8–1 0830 TAPERED ASYMMETRIC MICROSTRIP MAGIC TEE
M.H. Arain and N.W. Spencer, Rockwell Interamonic, Anaheim, CA.

8–2 0850 AN EFFICIENT MICROSTRIP UPCONVERTER FOR KA-BAND
D. Henry, Bell Telephone Laboratories, Crawford Hill Labs, Crawford Hill, N.J.

8–3 0910 DESIGN & PERFORMANCE OF A BROADBAND LOW NOISE KA-BAND MICROSTRIP BALANCED MIXER & RELATED COMPONENTS
A.K. Gorawa, Dr. Chambers, U. Gysel, Stanford Research Inst., Menlo Park, CA.

8–4 0930 NEW DEVELOPMENTS WITH INTEGRATED FINE-LINE AND RELATED PRINTED MILLIMETER CIRCUITS
P.J. Meier, AIL, Deer Park, Long Island, New York

0950 COFFEE BREAK

8–5 1005 LOW NOISE MICROWAVE AND MILLIMETER WAVE INTEGRATED CIRCUIT MIXERS
A.J. Kelly and H.C. Okean, LNR Communications, Inc., Farmingdale, N.Y.

8–6 1025 A NEW PHASE TYPE IMAGE ENHANCED MIXER
L.E. Kickens & D.W. Maki, Westinghouse Defense & E.S.C., Baltimore, MD.

8–7 1045 AN ADVANCED INTEGRATED TRANSMITTER UTILIZING A HIGH EFFICIENCY VARACTOR QUADRUPLER
R. Allison & J.E. Champan, Texas Instruments, Dallas, Texas; C.W. Sirles, Collins Radio, Dallas, Texas

8–8 1105 CHARACTERISTICS AND APPLICATIONS OF COUPLED MICROSTRIP LINE
R. Daumas, D. Pompei, E. Rivier, A. Ros, Laboratoire'd Electronique Faculte Des Sciences PCNI, Nice Cedex, France

1200 LUNCH

SESSION 9. TECHNOLOGY FORCASTING

0830–1200 Room A

Chairman: H.W. Cooper, Westinghouse Electric Co., Baltimore, Md.; A. Clavin, Hughes Aircraft Co., Canoga Park, CA.

1200 LUNCH

SESSION 10. MICROWAVE DIODE CONTROL DEVICES

0830–1200 Room C

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

10–1 0830 INTEGRATED DIODE PHASE SHIFTERS AND PERFORMANCE IN 520 ELEMENT X-BAND ARRAY, INVITED
Mark E. Davis, General Electric, Utica, New York

10–2 0900 RECENT ADVANCES IN BINARY PROGRAMMED ELECTRONICALLY TUNABLE BANDPASS FILTERS OF THE "FLAUTO" TYPE
A. Karp and W. Weir, Stanford Research Institute, Menlo Park, CA.

10–3 0920 4 GHz 8 x 8 SWITCH MATRIX FOR SDMA SYSTEM
M. Yamaguchi, Y. Ito, M. Kyogoku, T. Kudo and M. Akao, R & D Labs Kokusai Denshin Denwa Co., Ltd., Tokyo, Japan

0950 COFFEE BREAK

10–4 1000 DIODE STRUCTURES FOR A MILIMETER WAVE PHASE SHIFTER
Ralph M. Mindock, Gerald Vanier, Martin-Marietta Aerospace, Orlando, Florida

10–5 1020 A TRANSFERRED ELECTRON FREQUENCY MEMORIZER
W. Curtice, RCA Labs, Princeton, New Jersey

10–6 1040 OCTAVE BANDWIDTH HIGH SPEED LIMITER WITH UNIFORM SUPPRESSION CHARACTERISTICS
B. Geller, J.E. Degenford and M. Cohn, Westinghouse Electric Corporation, Baltimore, Md.

10–7 1100 RF BURNOUT OF MIXER DIODES AS INDUCED UNDER CONTROLLED LAB CONDITIONS AND CORRELATION TO SIMULATED SYSTEM PERFORMANCE
G. Morris, V. Higgins, G. Hall, U.S. Army Elect. & Tech. Lab., Fort Monmouth, New Jersey; Y. Anand, Microwave Assc., Burlington, Mass.; C. Cook, Electronic Materials and Nuclear Hardening Research Area

1200 LUNCH

SESSION 11. COMPUTER AIDED MICROWAVE PRACTICES

1330–1700 Room B

Chairman: Robert Hall, RRC International, Inc., Los Altos, CA.

11–1 1330 ANALYSIS OF MICROWAVE NETWORK PROBLEMS BY TIME AND FREQUENCY DOMAIN COMPAIRSONS, INVITED
Harold Stinehelfer, Microwave Associates, Burlington, Mass.

11–2 1405 SYNTHESIS OF MATCHING NETWORKS FOR MICROWAVE AMPLIFIERS
Douglas J. Mellor, Hewlett-Packard Co., Palo Alto, CA.; John G. Linville, Stanford University, Stanford, CA.

11–3 1430 MODELING AND SIMULATION OF MICROWAVE TO DC ENERGY CONVERSION ELEMENT
Joseph J. Nahas, University of Notre Dame, Notre Dame, Indiana

1500 COFFEE BREAK

11–4 1515 NETWORK MODELING OF INTERACTING CAPACITIVE IRISES AND STEPS IN WAVEGUIDE
T.E. Rozzi, Phillips Research Labs, Eindhoven, Holland

11–5 1540 THREE DIMENSIONAL NUMERICAL ANALYSIS OF MICROWAVE CAVITIES USING THE TLM METHOD
P.B. Johns and S. Akhtarzad, University of Nottingham, Nottingham, England

11–6 1600 SOLUTION OF LARGE, SPARSE SYSTEMS IN DESIGN AND ANALYSIS
A. Wexler, University of Manitoba, Winnepeg, Canada

11–7 1640 INTEGRATED APPROACH TO MICROWAVE DESIGN
J.W. Bandler, P.C. Liv and H. Iromp, McMaster University, Hamilton, Ontario, Canada

SESSION 12. MILLIMETER WAVE COMMUNICATIONS IN JAPAN INVITED SESSION

1330–1700 Room A

Chairman: S. Saito, Univ. of Tokyo, Japan; S. Okamura,

12–1 W-40G GUIDED MILLIMETER WAVE TRANSMISSION SYSTEMS
K. Miyauchi, Tokosuka Electrical Communication Laboratory, Nippon Telegraph and Telephone Public Corporation, Yokosuka, Japan

12–2 20G-40M DIGITAL RADIO RELAY SYSTEM
K. Kohiyama, H. Yamamoto and Y. Nakamura, Tokosuka Electrical Communication Laboratory, Nippon Telegraph and Telephone Public Corporation, Yokosuka, Japan

12–3 RECEIVING PART OF SATELLITE BORNE MILLIMETER WAVE TRANSPONDER
K. Tsukamoto and R. Hayashi, 2-1, Nukui-Kitamachi 4-chome, Koganei-shi, Tokyo 184, Japan

12–4a 150 GHZ BAND IMPATT OSCILLATORS, FREQUENCY CONVERTERS AND DOUBLERS
M. Ohmori, M. Hirayama and T. Ishibashi, Musashino Electrical Communication Laboratory, Nippon Telegraph and Telephone Public Corporation, Tokyo, Japan

12–4b WIDEBAND TUNABLE AND HIGHLY STABILIZED MILLIMETER-WAVE IMPATT DIODE OSCILLATORS
T. Miyakawa, N. Tokoyo, T. Nakagami, and H. Hayashi, Fijitsu Labs, Ltd., Nakahara, Kawasaki, 211, Japan

12–5a WAVEGUIDE COMPONENTS FOR MILLIMETER WAVE COMMUNICATIONS AT 40 – 90 GHz
S. Kitazume and H. Ishihara, Millimeter Wave and Video Communications Lab, Nippon Electric Co., Ltd., No. 4035, Ikebe-cho, Midori-ku, Yokohama-shi, 226, Japan

12–5b LOW-LOSS BANDPASS FILTERS AT 80 GHz USING CYLINDRICAL TE_{011}-MODE CAVITIES
T. Nakagami, and S. Takenaka, Fijitsu Labs, Ltd., Nakahara, Kawasaki, 211, Japan

12–5c ADVANCED LOSS REDUCTION TECHNIQUES IN MILLIMETER WAVEGUIDE INSTRUMENTS
S. Ishii and K. Ohi, Hitachi Electronics, Ltd. No. 32, Miyaki-cho, Tokyo, 187, Japan

12–6 CIRCULAR ARC POLYGONAL TYPE TEon MODE FILTER
K. Inada, T. Akimoto and T. Hayakawa, Telecommunications Engineering and Development Dept., The Fijikura Cable Works, Ltd., 5-1, Kiba 1-chome, Koto-ku, Tokyo, 135, Japan

SESSION 13. MICROWAVE FERRITE CONTROL DEVICES

1330–1700 Room C

Chairman: L.R. Whicker, Naval Research Labs, Washington, D.C.

13–1 1330 DESIGN OF FERRITE DIFFERENTIAL PHASE SHIFT SECTIONS
C.R. Boyd, Jr., Microwave Applications Group, Chatsworth, CA.

13–2 1350 PREMATURE DECLINE LIMITING IN X-BAND YIG FILTERS
R.A. Sparks, and R. Diabiase, Raytheon Co., Bedford, MA.

13–3 1410 MICROWAVE YIG TUNED ELEMENTS FOR MONITORING OF EHVAC AND HVDC TRANS. SYSTEMS
S.S. Stuchly, J.A. Dobrowolski, M.Z. Tarnawecky and M. Yunik, University of Manitoba, Winnepeg, Canada

1430 COFFEE BREAK

13–4 1445 CIRCULATOR ANALYSIS
Z. Chan Song-Lint, A. Priou, Laboritoire du D.E.R.M.O. (O.N.E.R.A. – C.E.R.T.) B.P. 4025, 31035 Toulouse Cedex, France

13–5 1505 EDGE GUIDED MODE CIRCUITS
K. Araki, T. Koyama, Y. Naito, Tokyo Institute of Technology, Tokyo, Japan

13-6 1525 POSSIBILITY OF DOUBLE CIRCULATION FREQUENCY OF STRIPLINE Y-JUNCTION CIRCULATOR
T. Sukasa Nagao, Department of Electrical Engineering, Defense Agency Hashiramizu, Yokosuka, Japan

1975 IEEE/S-MTT INTERNATIONAL MICROWAVE SYMPOSIUM

WEDNESDAY, MAY 14

SESSION 14. MILLIMETER WAVE SYSTEMS

0830–1200 Room B

Chairman: J.C. Wiltse, Martin Matietta Corporation, Orlando, Florida

14–1 0830 A SOLID-STATE 90 GHz DOPPLER RADAR
F.J. Bernues and H.J. Kuno, Hughes Aircraft, Torrance, CA.; J. McIntosh, U.S. Coast Guard Research and Development Center, Groton, CA.

14–2 0855 ADVANCED SOLID-STATE COMPONENTS FOR MILLIMETER WAVE RADARS
P.M. Schwartz, R.F. Lohr, R.L. Zimmerman, Hughes Aircraft, Malibu, CA.; K.B. Weller, Hughes Aircraft, Torrance, CA.

14–3 0930 WIDEBAND ELECTRONICALLY TUNED MILLIMETER-WAVE IMPATT OSCILLATORS
C. Chao, Y. Chang, and H.J. Kuno, Hughes Aircraft Co., Torrance, CA.

14–4 0940 MICROSTRIP VARACTOR-TUNED MILLIMETER WAVE IMPATT DIODE OSCILLATORS
E.J. Denlinger, J. Rosen, E. Mykietyn and E.C. McDermott, RCA David Sarnoff Labs, Princeton, New Jersey

1005 COFFEE BREAK

14–5 1020 MILLIMETER WAVE POWER AMPLIFIER AND COMBINER
H.J. Kuno and D.L. English, Hughes Aircraft Co., Torrance, CA.

14–6 1040 A LOW NOISE BROADBAND KA-BAND WAVEGUIDE MIXER
L.T. Yuan, TRW Systems Group, Redondo Beach, CA.

14–7 1100 VARACTOR FREQUENCY DOUBLERS AND TRIPLERS FOR THE 200 TO 300 GHz RANGE
L.D. Cohen, S. Nussbauer, E. Kroemer, J. Calviello, J. Taub, Melville, N.J.

14–8 1125 NEW WAVEGUIDE STRUCTURES FOR MILLIMETER WAVE INTEGRATED CIRCUITS
T. Itoh and R. Mittra, University of Illinois, Urbana, Illinois

1200 LUNCH

SESSION 15. MICROWAVES IN MEDICINE

0830–1200 Room A

Chairman: P. Polson, Stanford Research Institute, Menlo Park, CA.

15–1 0830 RESONANT ELECTROMAGNETIC POWER DEPOSITION IN MAN AND ANIMALS
O.P. Gandhi, Electrical Engineering Department, University of Utah, Salt Lake City, Utah 84112

15–2 0855 NONINVASIVE MICROWAVE MEASUREMENT OF RESPIRATION
James C. Lin, Electrical Engineering Department, Wayne University, Detroit, Michigan, 48202

15–3 0920 COMPLEX PERMITTIVITY AND PENETRATION DEPTH OF CERTAIN BIOLOGICAL TISSUE BETWEEN 40 AND 90 GHz
J. Edrich and P.C. Hardee, University of Denver, Denver, Colorado, 80210

15–4 0945 DIELECTRIC MEASUREMENTS FOR THE DESIGN OF A PHANTOM EYE
Mark R. Foster and William B. Westphal, Massachusetts Institute of Technology, Cambridge, Mass., 02139

1010 COFFEE BREAK

15–5 1030 EFFECT OF MICROWAVE FIELDS ON RABBIT VAGUS NERVES AND SUPERIOR CERVICAL GANGLIA
Chung-Kwang Chou and Arthur W. Guy, University of Washington, Seattle, Washington, 09195

15–6 1055 MICROWAVE IRRADIATION DESIGN USING DIELECTRIC LENSES
Henry S. Ho, Gary J. Hagan, Mark R. Foster, U.S. Dept. of Health, Education and Welfare, Rockville, Maryland 20852

15–7 1120 A NONPERTURBING LIQUID CRYSTAL FIBEROPTIC MICROWAVE POWER PROBE
O.P. Gandhi, University of Utah, Utah, 84112; and T. C. Rozzell, Office of Naval Research, Arlington, Virginia 22217

15–8 1140 FIBEROPTIC MICROPROBES FOR MICROWAVE ELECTROMAGNETIC FIELDS MEASUREMENT
A. Deficis, Lab. du D.E.R.M.O., O.N.E.R.A.–C.E.R.T., B.P. 4025, 31055 Toulouse Cedex, France

1200 LUNCH

SESSION 16. NOISE IN MICROWAVE TRANSMISSION APPLICATIONS OF GUNN AND IMPATT DIODES

0830–1200 Room C, PANEL SESSION

Chairman: John Elliott, Bell Northern Research, Ottawa, Ontario, Canada

0830 INTRODUCTION BY CHAIRMAN

16–1 0840 THE SYSTEM/CIRCUIT INTERFACE IN IMPATT DIODE APPLICATIONS
James W. Gewartowski, Bell Laboratories, Allentown, PA

16–2 0850 THE SYSTEM/CIRCUIT INTERFACE IN GUNN DIODE APPLICATIONS
Ferdo Ivanek, Farinon Microwave, Mountain View, CA

16–3 0900 THE CIRCUIT/DEVICE INTERFACE IN IMPATT DIODE APPLICATIONS
Marinus T. Vlaardingerbroek, Phillips Research Laboratories, Eindhoven, Holand

16–4 0910 THE CIRCUIT/DEVICE INTERFACE IN GUNN DIODE APPLICATIONS
Allen A. Sweet, Microwave Associates, Burlington, MA

16–5 0920 IMPATT AND GUNN DIODE NOISE DIAGNOSTICS
J. Robert Ashley, University of Colorado, Colorado Springs, CO.

16–6 0930 THEORETICAL ASPECTS OF GUNN AND IMPATT DIODE NOISE
Herman A. Haus, Bell Laboratories, Holmdel, New Jersey

0940 COFFEE BREAK

1000 DISCUSSION

SESSION 17. REDUCTION AND MEASUREMENT OF NOISE

1330–1700 Room B

Chairman: J. Kuno, Hughes Aircraft Company, Torrance, CA

17–1 1330 FRONTIERS OF MICROWAVE NOISE MEASUREMENT, INVITED
C.K.S. Miller, National Bureau of Standards, Boulder, CO.

17–2 1410 A MEASURE FOR THE STABILITY OF SOLID STATE NOISE SOURCES
Moto Kanda, National Bureau of Standards, Boulder, CO.

17–3 1435 ANOMALOUS NOISE IN SCHOTTKY DIODE MIXERS AT MILLIMETER WAVELENGTHS
A.R. Kerr, Goddard Institute for Space Studies, New York, New York

1500 COFFEE BREAK

17–4 1515 MIC TUNABLE SINGLE SIDEBAND FREQUENCY CONVERTER
Don Neuf, RHG Electronics Lab, Deer Park, Long Island, New York

17–5 1540 FEEDBACK EFFECTS ON THE NOISE PERFORMANCE OF GaAs MESFET'S
George D. Vendelin, Varian Associates, Palo Alto, CA.

17–6 1600 STABILITY CONSIDERATIONS OF LOW NOISE TRANSISTOR AMPLIFIERS
Les Besser, Farinon Electric, San Carlos, CA.

17–7 1620 IMPATT PUMP SIDEBAND NOISE AND ITS EFFECT ON PARAMETRIC AMPLIFIER NOISE TEMPERATURE
C.A. Tearle and K.R. Heath, Services Electronic Research Lab, Ministry of Defense, Baldock Herts, United Kingdom

SESSION 18. MICROWAVES IN TRANSPORTATION AND NAVIGATION

1330–1700 Room A

Chairman: Herman N. Chait, Aerospace Corporation, El Segundo, CA.

18–1 1330 NAVSTAR – GLOBAL POSITIONING SYSTEM, INVITED
Colonel B. Parkinson, Dept. Dir. of Navigation, Samso, Los Angeles Air Force Station, Los Angeles, CA.; E. Lassiter, Group Dir. for Navigation, Aerospace Corporation, Los Angeles, CA.

18–2 1410 DUAL MODE AUTO COLLISION AVOIDANCE RADAR, INVITED
F. Sterzer, G.S. Kaplan, RCA, Princeton, New Jersey

18–3 1450 INTERMEDIATE FREQUENCY INTERFEROMETRY
H.I. Ewen, G.G. Haroulse, Ewen-Knight, Inc., Weston, Ma.

1520 COFFEE BREAK

18–4 1535 THE ACCURATE MEASUREMENT OF RANGE BY THE USE OF MICROWAVE DELAY LINE TECHNIQUES
G. Ross, Sperry Research Center, Sudbury, Mass.

18–5 1605 MICROWAVE TECHNOLOGY IN THE MICROWAVE LANDING SYSTEM
R. M. Kalafus, DOT-Transportation System Center, Cambridge, Mass.

18–6 1635 INSTRUMENT LANDING SYSTEM PERFORMANCE PREDICTION
G. Chin, L. Jordan, D. Kahn, L. Morton, DOT-Transportation System Center

SESSION 19. MICROWAVE ACOUSTICS AND DELAY LINES

1330–1700 Room C

Chairman: R. Williamson, Massachusetts Institute of Technology, Cambridge, Mass.

19–1 1330 CURRENTLY AVAILABLE MICROWAVE ACOUSTIC DEVICES AND TECHNIQUES, INVITED
Louis Claiborne, Texas Instruments, Dallas, Texas

19–2 1400 DESIGN, FABRICATION AND TESTING OF SAW BUTTERWORTH FILTERS
A. Slobodnik, W. Kearns, J. Noonan, Air Force Cambridge Research Labs, Bedford, Mass.

19–3 1415 PROBLEMS IN THE REALIZATION OF FLAT DELAY, NARROW-BAND SURFACE WAVE FILTERS AT UHF AND MICROWAVE FREQUENCIES
Halvor Skeie, The Norwegian Institute of Technology, Trondheim, Norway

19–4 1535 ELECTRICAL MATCHING OF UNIDIRECTIONAL SURFACE WAVE DEVICES
Roy R. Brown, Texas Instruments Incorporated, Dallas, Texas

1550 COFFEE BREAK

19–5 1600 INFLUENCE OF SOLID ELASTIC PROPERTIES ON THE SCATTERING OF A RAYLEIGH WAVE BY DISCONTINUITIES
E. Cambiaggio, F. Cuozzo, J. Damiano, E. Rivier, Faculte des Sciences, Nice, France

19–6 1615 REAL TIME DISCRETE FOURIER TRANSFORMS USING A PROGRAMMABLE DIODE-CONVOLUOR MODULE
T. Reeder, United Aircraft Research Labs, East Hartford, CT 06108; M. Speiser, H. Whitehouse, Naval Undersea Center, San Diego, CA.

19–7 1630 RADIATION RESISTANCE OF MICROSTRIP EXCITED MAGNETO STATIC SURFACE WAVES
Ganguly and Webb, Naval Research Laboratory, Washington, D.C.

19–8 1645 MAGNETOSTATIC DELAY LINE OSCILLATOR
J. Haworth, Electronics Research Division, Rockwell International, Anaheim, CA.

1975 IEEE/S-MTT INTERNATIONAL MICROWAVE SYMPOSIUM

FERRITE COMPONENT WORKSHOP

The MTT Ferrite Technical Committee is sponsoring a One-Day Workshop on Ferrite Components on May 15 at Ricky's Hyatt House, immediately following the 1975 MTT Symposium. The Workship will be organized as follows:

8:00	– 8:30	Registration
8:30	– 10:15	Circulators
10:15	– 10:30	Coffee
10:30	– 12:00	Edgeguided Mode Components
12:00	– 1:00	Lunch
1:00	– 3:00	Phase Shifters
3:00	– 3:15	Coffee
3:15	– 4:30	Materials

The registration fee for the Workshop is $5.00. If you are interested in attending the Workshop and would like to receive additional information, please complete the form below. Questions concerning the Workshop should be directed to Fred Rosenbaum, Tel: (314) 863-0100, Ext. 4028 or Larry Whicker (202) 767-3312.

Name: _____

Company: _____

Company Address: _____

Please check appropriate box:

I plan to attend Workshop

I would like to present material on

_____

Please forward this form to: Larry Whicker, Code 5250,
Naval Research Laboratory,
Washington, D.C. 20375

LETTERS TO THE EDITOR

APPLICATIONS PAPERS

Editor,

I don't particularly like to disagree with my friends, many of whom seem to be listed as the perpetrators of the new policy enunciated in George Oltman's letter, but I must say I disagree with practically everything reported therein. I note that in the final sentence we are invited to stick pins in the likenesses of the proponents of the new plans, but I do think it would have been less painful to all concerned to invite their opinions rather than their pinpricks!

In the first place I don't particularly care how many young engineers find the Transactions "too deep" for them. The very fact that they are categorized as "young" is enough to disqualify the validity of their views as far as I am concerned. The young are welcome to air their views but they have no right to dictate them, whether it be their opinions on University Courses or on papers for the Transactions. Eventually perhaps some of them will gain sufficient experience and wisdom to appreciate our relatively high standards.

Secondly, the 1970 membership survey can in no way be considered a mandate for changing the character of the Transactions. Members were asked if they would like to see more applications papers, and 66.6% said more. However they were also asked if they would like to see more or less theoretical papers, and only 26.2% said less! Most people, including this writer, would like to see more applications papers as defined in George's letter, but not at the expense of the lowering of standards, which is surely implied (if, perhaps, not intended) by the entire tone of the letter.

Another aspect which worries me is the statement that "non-applications papers . . . will be grouped in issues dedicated to non-applications papers." Actually I would find it rather difficult to select even one paper from recent issues of the Transactions which has "no application." I am quite certain that no author could be found who would admit to having published a "no-application" paper. The implication is absurd, ridiculous, and to be blunt and honest, downright insulting. It is the job of the editor and the reviewers to reject papers having no application!

In this case, what can be the purpose of the so-called policy change? As a reviewer I will not lower my standards, and I have enough faith in our Transactions to assume that 99% of the other present reviewers won't lower theirs. We must maintain the Transactions as the International standard of excellence having an enviable world-wide reputation. Younger authors, or authors of papers having little original content, have excellent vehicles for their work in the various microwave trade journals. Indeed these journals often publish papers of high quality which could have been accepted by the Transactions. Many authors who publish in the MTT also publish in the trade journals.

Ralph Levy
Microwave Development
Laboratories

Reply to Ralph Levy:

I was pleased to learn of Dr. Ralph Levy's letter to our editor regarding the new Transaction's policy of 'Accent on Applications' although I would have been more pleased had it been a letter expressing agreement. I was pleased because I believe that it is this sort of interaction that places the issues on the table and, if it does not promote agreement, it at least promotes understanding in all who take the time to read the discussion. It is one of the means through which IEEE makes progress. His letter gives me an opportunity to point out some positive ways we may be able to accent applications and thereby answer criticism by MTT members of all ages.

Ralph raised several points of disagreement of which two, at least, fall into the category of misunderstanding. He indicates that an author may feel insulted by the implications that his paper had "no application," should his paper not be published in an Applications issue of the Transactions. I agree that the term "application" allows that interpretation. There must be a more positive interpretation, however.

By its title the Society on Microwave Theory and Techniques is divided into two groups. The title could just as well have been Microwave Theory and Applications. My point is, we are roughly divided into two categories, theory and applications. The dividing line is hazy and, furthermore, there are other minor categories that are not clear either. Survey papers for example. Authors who write survey papers or papers the main substance of which are theoretical are not applications papers nor are they no applications papers — they are, however, non-applications papers.

A second point of misunderstanding is contained in Ralph's remark that "as a reviewer I will not lower my standards."

Standards will not be lowered. We will not ask MTT reviewers to let more applications papers through by lowering our standards. On the contrary we hope to raise our standards. But how? What are the positive ways that we can accent applications papers? Our critics want papers that are useful to them; papers that teach them something. I submit that every paper teaches something. However, many papers are written so that only those readers highly experienced in the subject can understand. Furthermore every paper should have a clearly expressed objective of the subject matter presented, a discussion of background and relationship to prior work, a discussion of how the objective was achieved, a presentation of the subject matter written so those inexperienced can understand, and finally a conclusion and summation which clearly identifies the achievement of the paper.

A major objective of the Accent on Applications will be to stress qualities such as those listed above. A list of such guidelines is being compiled now and will be offered to our reviewers to be used as a check list. Another technique that is being considered is to have one the reviewers be a person technically astute but inexperienced in the field addressed by the paper. The objective here is to identify unclear parts of the paper. Admittedly, this tactic may make a

LETTERS TO THE EDITOR (Cont.)

paper longer when we are finding it difficult to afford the number Transaction pages we presently publish. However, we may be spending our money more wisely.

A third part of the Accent on Applications is to solicit reviewers who are applications oriented. The objective here is to identify and publish papers on subjects that more theoretically inclined reviewers might not consider suitable for the Transactions. Kiyo Tomiyasu is helping out here and has already furnished a list of applications reviewer candidates.

A fourth part of the plan is to solicit review papers from qualified experts on subjects in which advances have been made and a summation of the work is warranted.

Returning to the criticism expressed by Ralph on our accepting the criticism of young engineers and changing our publication policy to satisfy them, I submit that not only the young engineers are critical of the Transactions content. Eg., see Bruno Weinschel's letter in this issue. It is the majority of the older members on Ad Com that recognize the validity of the criticism and have instituted the change.

I hope this response to Ralph's letter will allay any fears that the Transactions will be degraded by our new policy of Accent on Applications. I believe that Ralph's hopes for his letter is fulfilled. We are looking for positive ways to accent applications. It will be difficult and we are open to suggestions for accomplishing our objective. If you have an idea let us hear from you.

George Oltman
Hughes Aircraft Co.

Editor,

Several years ago, when I reviewed the MTT Transactions for TAB, I recommended a greater emphasis on application and tutorial papers. Jesse Taub was a member of our 3 man group. I am happy to see that this was finally implemented.

B. O. Weinchel
Weinchel Engineering

COPYRIGHT LAW AMMENDMENT

Editor's Comments:

Revisions to the copyright law now before Congress, if enacted, can severely inhibit the disemination of information among the scientific community. This playlet describes what may happen.

HOW THE FLOW OF INFORMATION COULD TURN INTO A DRIBBLE, AND SOME SOLUTIONS TO THE PROBLEM

Dateline: Sometime in the near future.

A researcher in a company goes to his library and asks for a copy of an article from a journal, so he can keep it at his desk for perusal and use.

LIBRARIAN: Sorry, but we can't provide you with a photocopy. We can lend you the journal, but you'll have to wait because it is out to someone else and we have a waiting list of two other users ahead of you.

RESEARCHER: Can't you get me a copy from the university?

LIBRARIAN: No, they can't make any more copies for interlibrary loan purposes, and they are not lending their journals to off-campus people.

RESEARCHER: Well, when I can borrow your copy, I'll make a copy on my office copier.

LIBRARIAN: You can't do that either. The Fair Use provision of the new Copyright Act says you have to consider the effect of copying on the potential market of the copyrighted work. By making a copy from our subscription you are denying the publisher additional income.

RESEARCHER: But I thought the whole idea behind copyright was that the welfare of the public will be served and progress of science and useful arts will be promoted. When I have a paper published in a journal, I do it to let other scientists and researchers know of my findings and ideas. I don't get any royalties. In fact, our company pays the publisher page charges to get the article published. Do you mean to tell me that no one else can make any copies of my articles?

LIBRARIAN: That's right, unless he pays some royalty to the publisher, or gets written permission from him before doing this.

RESEARCHER: How did we manage to get into this state of affairs?

LIBRARIAN: The new Copyright Law Revision was passed by Congress because users of publications do not have as strong a lobby with Congress as the publishers. Do you know that publishers have organized the American Book Publishers Political Action Committee which has been going all out to win legislative battles on copyright and which is making campaign contributions to selected candidates for election to Congress?

RESEARCHER: Well, I am not really against authors of books who write for a living getting royalties. But scientists depend on the constant flow of ideas and reports through journals and similar publications to continue to build up our storehouse of scientific knowledge. Why are publishers of these journals trying to pull in extra royalties which they don't pass on to their writers?

LIBRARIAN: Because rapidly rising costs of journals to libraries (some over 100%) have make it impossible for libraries to continue to subscribe to all their journals and have required some cancellations. Some publishers are hurting from these drop-offs in subscriptions, which they blame on excessive photocopying.

RESEARCHER: That does pose a dilemma. How can this issue be resolved to everyone's satisfaction?

LIBRARIAN: Publishers will probably have to eliminate some marginal journals. Perhaps national bodies such as the AAAS could be asked to certify journals which are consistently publishing high quality articles, and these journals would be subsidized not only through page charges and nominal subscription prices, but also through governmental subsidies.

RESEARCHER: Wouldn't that cost the government a lot of money?

LIBRARIAN: Not if the value of maintaining the flow of scientific information is considered as a national resource, especially if the alternative of sparsity of access without photocopying is considered. The government spends thousands of dollars on sponsored research. If the articles resulting from that don't get read by others, the effort will be largely in vain.

RESEARCHER: What if my article did not result from government sponsored research?

LIBRARIAN: As long as it makes a valid contribution to the storehouse of knowledge, as judged by a panel of experts, some means must be found to get it published. There is a possibility of another solution.

RESEARCHER: What's that?

LIBRARIAN: The new Copyright Act provides that owners of coin-operated phono-record players can pay $3 annually for a certificate to be affixed to the machine, plus $8 annually as a royalty fee for that machine. This money goes to the Register of Copyrights who distributes it once a year to persons claiming to be entitled to the royalties. Why couldn't the same thing be done for all photocopying machines on which any copying of copyrighted material is done? That would bring in lots of money and would save libraries the tremendous cost of collecting and ascertaining the distribution of royalties collected for each article reproduced.

RESEARCHER: That sound's like a neat solution. What can I do to bring about such better ways of solving the copyright problem?

(Flashback to January 1975, before the Copyright Law Revision is reintroduced in Congress.)

LIBRARIAN: Find out what the proposed Copyright Law Revision would mean to you if enacted. Then write to your scientific and technical societies, your Senators and Representatives, and anyone else who should know how you feel about it and what you think can be done.

Ms. Johanna E. Tallman
Director of Libraries
California Institute of Technology

ANNOUNCEMENT AND CALL FOR PAPERS

The IEEE Transactions on Microwave theory and Techniques will have a special issue in June 1976 for the publication of original work on

MICROWAVE FIELD-EFFECT TRANSISTORS

Areas of interest include, but are not restricted to: Microwave characteristics of low noise and power MESFETs; device reliability; synthesis, realization and performance of circuits for amplification, power generation, frequency conversion and modulation.

Authors are invited to submit three copies of manuscripts to the guest editor:

C. A. Liechti
Hewlett-Packard Company
Solid-State Laboratory
1401 Page Mill Road
Palo Alto, CA 94304 U.S.A.

before October 1, 1975.

Papers submitted for this special issue are subject to the normal review procedures. They must describe clearly what new and significant results--both theorectical and experimental--have been obtained.

1975 APPLIED MAGNETICS WORKSHOP

Topics:

Papers will be considered which cover application of magnetic theory, materials, or devices. Some typical areas of interest are:

Measurement of magnetic characteristics and properties

Permanent magnet materials and applications

Models and modeling of electromagnetic devices

Solution of electromagnetic problems

Magnetic control application

Magnetic forces

Magnetic materials in power devices

Static inverters, converters, and frequency changers

Deadline:

A 300 to 500 work summary of the paper should be received by January 15, 1975. These should be sent and questions referred to the Program chairman.

Professor T. Bernstein, Program Chairman Electrical and
Computer Engineering Department
University of Wisconsin
Madison, Wisconsin 53706

Phone 608/262-3940

Authors of accepted papers will be notified by February 15, 1975, at the latest. Final copy ready for reproduction will be due March 15, 1975. Instructions for preparing a final copy will be sent to authors of accepted papers.

U.S. NATIONAL MEETING OF INTERNATIONAL UNION OF RADIO SCIENCE (URSI)

The 1975 Annual Meeting will be held October 20-23, 1975 at the University of Colorado, Boulder, Colorado in cooperation with various Societies of the IEEE and sponsored by the U.S. National Committee of URSI.

Local hosts are the University of Colorado, the National Bureau of Standards, the Office of Telecommunications, and the National Oceanic and Atmospheric Administration.

The following Commissions will hold technical sessions:

Commission 1 - Radio measurement Methods and Standards
Commission 2 - Radio and Non-Ionized Media
Commission 3 - On the Ionosphere
Commission 4 - On the Magnetosphere
Commission 5 - Radio and Radar Astronomy
Commission 6 - Radio Waves and Transmission of Information
Commission 7 - Radio Electronics
Commission 8 - On Radio Noise of Terrestrial Origin

ABSTRACTS

Send original abstract and two copies, prepared in accordance with the instructions below to:

Prof. James R. Wait
Chairman, USNC/URSI Technical Program
Room 242, RB 1, C.I.R.E.S.
University of Colorado
Boulder, CO 90302

DEADLINE FOR RECEIPT OF ALL ABSTRACTS:
JULY 14, 1975

IEEE TO CHART ENGINEERING UNEMPLOYMENT

(New York, N.Y.) - The Institute of Electrical and Electronics Engineers (IEEE), the world's largest professional engineering society, has started a monthly survey of its membership to gain more accurate information regarding unemployment within our profession. Approximately 2,500 members, randomly selected, will receive a questionnaire for each survey. A new group will be selected each time.

From returns already received from the first questionnaire, there are 2.18% who list themselves as involuntarily unemployed. This compares with an unemployment figure of 1.9% published in the Institute's 1972 Salary and Fringe Benefit Survey. Another 4.83% of the surveyed members indicated they were either under employed or working full-time in a position other than the field of their primary technical competence. They have also indicated a desire to return. These figures were tabulated after more than 56% of the questionnaires were returned.

Those listing themselves as involuntarily unemployed were usually forty-years-old or over. This was also true in the 1972 survey. Of those listing their age on the form, over 71% of those unemployed were from this age group. In the under-employed group, 47.5% of the members were forty or over.

The frequency of this manpower survey should enable the Institute to provide current, factual information on the employment trends within the industry. These figures will also enable IEEE to plan effective manpower programs where and when needed to meet the needs of its members.

Unemployment Index Survey

Questionnaires mailed	2,500
Answers received	1,412
Void because they're retired, students, deceased, miscellaneous	128
Total available manpower	1,284
Employed full-time in area of primary technical competence	1,122
Employed full-time not available for employment in area of primary technical competence	72
Employed available for full-time employment in area of primary technical competence	62
Unemployed involuntarily	28

IEEE AUTHORIZES AMICUS CURIAE IN BART CASE

(New York, N. Y., December 6, 1974) - The Board of Directors of the Institute of Electrical and Electronics Engineers (IEEE), the world's largest professional engineering society has authorized its legal counsel to offer the services of the Institute as an amicus curiae in the matter of HJORTSVANG el al vs. the San Francisco Bay Area Rapid Transit District. This case is now in litigation in the Superior Court of the State of California.

The Institute, chartered in 1884, has approximately 170,000 members throughout the world. One of the Institute's aims is to enhance the quality of life for all people through the constructive application of technology. It shall endeavor to promote understanding of the influence of such technology on the public welfare.

In taking this step, the IEEE's Board of Directors reconfirmed its commitment to have the Institute become involved in matters concerning ethical practices of members of the engineering community affecting the public health, safety, and welfare. In addition the Board of Directors indicated that the Institute would not assume positions of advocacy in such matters, but would attempt to provide expert guidance to the court in extablishing understanding of existing codes of ethics within the profession.

Commenting on this precedent setting action, IEEE President John J. Guarrera said, I sincerely hope that through this action taken today (12/6) the public at large will find that their interests will now be better served."

IEEE ANNOUNCES ELECTED OFFICERS FOR 1975-'76

(Hamilton, Bermuda, December 6, 1974) - Regional and Divisional Directors elected during a recent membership ballot were announced at the Institute's Annual Assembly in Hamilton, Bermuda. Each elected officer, who will also be a member of the Institute's Board of Directors, will serve a two-year term starting January 1, 1975.

Those selected as Regional Directors were: William W. Middleton - Region 2 (Eastern); Paul F. Carroll - Region 4 (Central); Carleton A. Bayless - Region 6 (Western); and F. Louis Stumpers - Region 8 (Europe and parts of Asia and Africa). The Divisional Directors will be: Jong E. Barkle - Division II; Robert A. Rivers - Division IV; and Robert W. House - Division VI.

William Middleton (Region 2 Director) is General Buildings Engineer, The Bell Telephone Company of Pennsylvania, Philadelphia. While at Bell, he has pursued a variety of engineering assignments in the fields of transmission, facilities, long range planning, building design and construction as well as assignments in the Plant and Accounting Departments, He gained his education in electrical engineering at Penn State University.

Paul Carroll (Region 4 Director) is President, Semiconductor Specialists, Inc., Chicago, Illinois, and electronic distributor specilizing in high technology products. Since its founding in 1959 by Mr. Carroll, the company has expanded to ten branches in the United States and three wholly owned international subsidiaries in the United Kingdom, Germany, and Canada. Mr Carroll is also Chairman of the Board of Midwest College of Engineering, Lombard, Illinois.

Carleton Bayless (Region 6 Director) is Systems Design Division Engineer, Pacific Telephone and Telegraph Company, Sacramento, California. While his career includes several positions within the Bell System, his most recent assignments include data transmission and voice frequency network transmission design, microwave radio route transmission design, inductive coordination, and electrical protection design. Mr. Bayless received his Engineering Physics degree from the University of California, Berkeley and has studies Communications Systems Engineering at UCLA, Standford University, and the University of Michigan.

F. Louis Stumpers (Region 8 Director) is Scientific Adviser (retired), Philips Research Laboratories, Eindhoven, The Netherlands. He is currently Professor of Advanced Electronics at the University of Nijmegen. Dr. Stumpers has authored over sixty papers and holds four patents. A graduate of Utrecht and Delft Universities, he is a member of the Netherlands Radio Astronomy Board and the Royal Netherlands Academy of Sciences.

John E. Barkle (Division II Director) - is Project Manager Bechtel Corporation, San Francisco, California. Having joined Bechtel in 1957, he currently manages the engineering design, procurement, and construction of major steam-electric generating stations. As an adjunct to his design experience, Mr. Barkle has worked to develop the use of analog and digital computing techniques for the design and performance analysis of power plants and power systems and for system protection. He is a graduate of Carnegie-Mellon University.

Robert A. Rivers (Division IV Director) is President, Aircom, Inc., Union, New Hampshire. He has designed well over 1,000 microwave related products and his company presently offers over 1,300 catalog components. Mr. Rivers received a BSEE from M.I.T.

Robert W. House (re-elected Division VI Director) is Manager, Social and Systems Sciences Department, Battelle Memorial Institute, Columbus Laboratories, Columbus, Ohio. He directs the following research groups at Battelle's Columbus Laboratories: Environmental and Land Use Planning; Community and Economic Development; Man/Systems Technology; Management Systems; Educational Systems; and Health Care Systems. Dr. House also served as Adjunct Professor at The Ohio State University.

In addition to those elected as Regional and Divisional Directors, President-elect Arthur Stern and Executive Vice President-elect Joseph Dillar (previously announced) as well as nine officers to be appointed at the Annual Assembly will compose the Institute's Board of Directors for 1975.

SHORT COURSES

MODERN TELECOMMUNICATIONS - PRINCIPLES, THEORY AND TECHNIQUES

COURSE NO. 292

April 28 - May 2, 1975

George Washington University

This course is designed for engineers, managers, and others who need a working knowledge of telecommunications, and who have only a limited background in this field. Participants will acquire a broad perspective of both the principles and practices of telecommunications. The basic principles, theory, and techniques will be presented in such a manner to enable the participant to gain a solid understanding of telecommunications without the need for an excessive use of mathematics. The ideas will be illustrated with descriptions of working and proposed systems. Contingent upon participants, several broader issues including policy, regulatory, economic, and legal aspects of telecommunications may be discussed.

FEE: $385

For further information, please write to the Director, Continuing Engineering Education, George Washington University, Washington, DC 20052, or call (202) 676-6106.

PRECISION MEASUREMENT COURSE

ANTENNA PARAMETER MEASUREMENT BY NEAR-FIELD TECHNIQUES

July 7-11, 1975
National Bureau of Standards
Boulder, Colorado

This course is designed for engineers and scientiests working in the field of precision measurement of microwave antenna parameters. The theory of near-field and reduced distance measurements based on the scattering matrix approach will be presented. Two basic methods will be considered: the extrapolation technique which is the most accurate technique available for absolute gain and polarization measurements (0.1 dB for gain and .05 dB/dB for axial ratio), and the near-field planar and non-planar scanning techniques which permit determination of complete far-field patterns as well as gain and polarization. In most cases, these measurements can be made on indoor facilities and generally are more accurate and convenient than conventional far-field measurements. The course will discuss impelementation and data processing, as well as include demonstrations of actual measurement. $495.00

For further information contact:

Dr. C. F. Stubenrauch
National Bureau of Standards 276.70
Boulder, Colorado 80302
(303) 499-1000, Ext. 3927 or 3301

MICROWAVE SEMICONDUCTOR DEVICES, CIRCUITS, AND APPLICATIONS

University of Michigan
Ann Arbor, Mi.

Co-chairmen: George I Haddad, Peter J. Khan

August 18-22, 1974 Fee: $325

This course provides a basic understanding of operating principles and design techniques for mocriwave devices and circuits utilizing solid-state elements including varactors, pin diodes, detectors, mixers, avalanch diodes, Gunn devices and BARITT devices. Recent advances in these various areas will be discussed.

NUMERICAL METHODS IN ENGINEERING

June 2-6, 1975
McMaster University
Ontario, Canada

A short course on "Numerical Methods in Engineering Analysis and Design" will be held June 2-6, 1975 at McMaster University, Hanilton, Ontario, Canada. The speakers, Dr. J. W. Bandler, Dr. E. Della Torre and Dr. W. Kinsner, will cover the following topics: Unconstrained Minimization Methods; Least pth and Minimax Approximation; Nonlinear and Discrete Programming; Optimization in Engineering; Optima Design Centering, Toleranc-ing and Tuning; Efficient Interactive Design; Analytical Principles in Field Problems; Finite Element Method; Finite Difference Method; Direct and Interative Methods in Field Problems; Error Analysis; Carre Algebra in Transportation Problems; Programming Techniques. An intensive computing laboratory will be included in the course. Various program packages will also be distributed.

For further details and application forms contact Dr. W. Kinsner, Department of Electrical Engineering, McMaster University, Hamilton, Ontario, Canada, L8S 4L7, or by telephone (416) 525-9140, Ext. 4305.