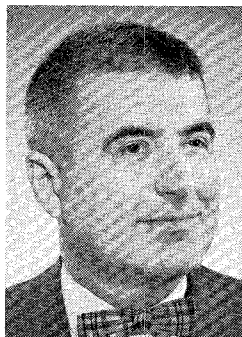


G-MTT Symposium

Cabana Motor Inn, Palo Alto, Calif.
May 16-19, 1966



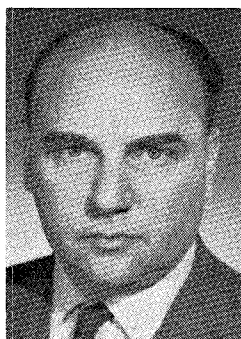
P. D. Lacy
Chairman, Steering Committee



E. N. Torgow
Chairman, Administrative Committee



H. Bosma
Microwave Prize



C. Susskind
Master of Ceremonies



H. Heffner
Keynote Speaker

TECHNICAL PROGRAM

L. Young, *Chairman*

D. Adams	I. Kaufman
D. Anderson	P. Lacy
D. J. Angelakos	G. Matthaei
R. Beatty	F. Olson
W. Culshaw	W. Price
C. L. Cuccia	E. Torgow
R. Hall	M. Weiss
E. M. T. Jones	

LOCAL ARRANGEMENTS

J. Stone, *Chairman*

J. Minck
Mrs. L. Ladouceur, *Ladies' Events*
M. Waldman, *Registration*
C. Walter

GENERAL INFORMATION

Microwave people from many countries will meet May 16-19, for the Eleventh International Symposium of the IEEE Microwave Theory and Techniques Group. All technical and social activities will be held at the Cabana Motor Inn in Palo Alto, Calif. The Symposium will consist of invited and contributed papers of current interest. Eleven speakers from abroad will present papers, including H. Bosma, this year's recipient of the Microwave Prize. Countries represented include England (4), Japan (3), the Netherlands (2), Norway (1), and Scotland (1). Some of the speakers from abroad will be able to travel to the Symposium through the cooperation and financial support of the U. S. Army Research Office and the Office of Naval Research.

COMMITTEES

ADMINISTRATIVE

E. N. Torgow, <i>Chairman</i>	
S. W. Rosenthal, <i>Vice-Chairman</i>	
P. A. Rizzi, <i>Secretary-Treasurer</i>	
H. M. Altschuler	D. D. King
H. E. M. Barlow	T. Moreno
R. W. Beatty	W. W. Mumford
A. C. Beck	S. Okwit
J. H. Bryant	J. Pippin
A. G. Clavier	R. A. Rivers
M. Cohn	T. S. Saad
S. B. Cohn	G. Shapiro
R. C. Hansen	G. C. Southworth
R. E. Henning	K. Tomiyasu
W. Kahn	F. G. R. Warren
I. Kaufman	J. C. Wiltse
L. Young	

STEERING

P. Lacy, <i>Chairman</i>	
D. J. Angelakos	V. Price,
H. M. Barlow	<i>Special Events</i>
S. Cohn	R. Prickett
C. L. Cuccia,	J. Stone
<i>Digest</i>	<i>Local Arrangements</i>
P. Ely, Jr.,	P. Vartanian, Jr.,
<i>Hospitality</i>	<i>Finance</i>
H. Heffner	J. Warnock
M. T. Jones	D. Weller,
D. King	<i>Secretary</i>
E. W. Matthews,	G. Wheeler,
<i>Digest</i>	<i>Publicity</i>
T. Moreno	L. Young, <i>Technical Program</i>

REGISTRATION

Advance registration may be made by completing the registration form attached in the center of the Advance Program Booklet and returning it with appropriate payment to:

1966 International G-MTT Symposium
Marvin Waldman
Waldman Associates
1094 West Evelyn Ave.
Sunnyvale, Calif. 94080

Checks should be made payable to the 1966 G-MTT Symposium. Registration forms must be postmarked no later than May 1, 1966, to qualify for the advance registration rates.

The advance registration rates before May 1 are:

IEEE Members	\$ 6.00
Nonmembers	9.00
Student Members	2.00
Ladies' Events	10.00

Registration rates after May 1 are:

IEEE Members	\$ 8.00
Nonmembers	10.00
Student Members	2.00
Ladies' Event	10.00

The registration desk will be open in the Atrium Room of the Cabana Motor Inn during the Symposium as follows:

Monday, May 16—8:00 A.M. to 4:00 P.M.
Tuesday, May 17—8:00 A.M. to 4:00 P.M.
Wednesday, May 18—8:00 A.M. to 4:00 P.M.
Thursday, May 19—8:00 A.M. to 2:00 P.M.

SYMPOSIUM DIGEST

A copy of the Symposium Digest will be distributed to each registrant. Additional copies may be purchased at the registration desk, or may be ordered by use of the registration form, if unable to attend, at \$3.00 per copy.

HOTEL ACCOMMODATIONS

Requests for reservations at the Cabana Motor Inn should be made on the registration form. These will be handled on a "first come, first served" basis. Confirmation of your reservations will be sent to you by the hotel. Attendees who desire other accommodations must make their own reservations with the hotel of their choice.

TRANSPORTATION

Visitors to Palo Alto arriving by air at San Francisco International Airport may use the direct helicopter connection to Palo Alto Airport. A Barrett Bus also travels between San Francisco Airport and the Cabana. (Fare: \$1.85.) Free parking will be available for all hotel registrants.

Car rental facilities are available at the airport and the Symposium hotel.

TECHNICAL SESSIONS

All sessions of the 1966 International G-MTT Symposium will be held in the Circus Maximus Room of the Cabana Motor Inn. There are no simultaneous sessions.

COCKTAIL PARTY AND BANQUET

Cocktail Party

Advance Registration	After May 1
\$1.50	\$1.75

Banquet

Advance Registration	After May 1
\$8.00	\$8.50

A cocktail party will be held prior to the Symposium banquet on Wednesday, May 18, 1966, starting at 6:00 P.M. at the outdoor swimming pool of the Cabana Motor Inn. The Symposium banquet will be held in the Circus Maximus Room at 7:00 P.M. The

banquet speaker will be Prof. John Brown of University College, London, England. The Master of Ceremonies for the banquet will be Dr. Charles Susskind.

The presentation of the 1965 Microwave Prize Award will be made to Hendrik Bosma of the Philips Research Laboratories, Eindhoven, The Netherlands, by E. N. Torgow, Chairman, G-MTT Administrative Committee.

TECHNICAL PROGRAM

Monday, May 16, 1966

9:00 *Welcoming Remarks:* P. D. Lacy, Chairman, Steering Committee, 1966 Symposium, and E. N. Torgow, Chairman, G-MTT Administration Committee.

SESSION I

SOLID-STATE DESIGN

Chairman: L. Lewin, Standard Telecommunication Labs., Ltd., Harlow, Essex, England.

9:20 "GaAs Post-Threshold Microwave Amplifier, Mixer, and Oscillator," by *Basil W. Hakki, Bell Telephone Labs., Inc., Murray Hill, N. J.*

9:40 "Quantitative Comparison of Solid-State Microwave Detectors," *A. M. Cowley and H. O. Sorensen, hp Associates, Palo Alto, Calif.*

10:00 "Ultimate Noise Figure and Conversion Loss of the Surface Barrier Mixer Diode," *M. R. Barber, Bell Telephone Labs., Inc., Murray Hill, N. J.*

10:20 Break.

10:50 "Some Selected Topics in British Solid-State Research," *L. Lewin, Standard Telecommunication Labs., Ltd., Harlow, Essex, England (Invited).*

11:20 "Improved Intermodulation Rejection in Mixers," *J. H. Lepoff and A. M. Cowley, hp Associates, Palo Alto, Calif.*

11:40 "Performance Characteristics of CW Silicon and Gallium Arsenide Avalanche Diode Oscillators," *F. A. Brand, V. J. Higgins, and J. J. Baranowski, Electronic Components Labs., U. S. Army Electronics Command, Fort Monmouth, N. J.*

NOON Luncheon, followed by Keynote Address by Dr. Hubert Heffner, Stanford University, Stanford, Calif. (Topic to be announced). 12:15 P.M. to 1:45 P.M.

SESSION II

AMPLIFIERS, MULTIPLIERS AND CONVERTERS

Chairman: C. Blake, M.I.T. Lincoln Labs., Lexington, Mass.

2:00 "Microwave Solid-State Sources," *B. C. De Loach, Bell Telephone Labs., Inc., Murray Hill, N. J. (Invited).*

2:45 "Instabilities in Varactor Multipliers," *D. B. Leeson, Applied Technology, Inc., Palo Alto, Calif.*

3:05 "Theory and Measurements of Noise in Varactor Harmonic Generator

Sources," *M. E. Hines and J. G. Ondria, Microwave Associates, Inc., Burlington, Mass.*

3:25 Break.

3:55 "Practical Application of a Positive Resistance Up-converter for Ultra-Low-Noise Amplification," *E. Sard, B. Peyton, and S. Okwil, Airborne Instruments Labs., Div. of Cutler-Hammer, Inc., Melville, L. I., N. Y.*

4:15 "A 1200 Megabits/s, Gray Code, Anglog-to-Digital Converter," *R. E. Fisher, Bell Telephone Labs., Inc., Murray Hill, N. J.*

4:35 "Broadband Frequency Translators," *F. S. Coale, H. M. Weil, and P. M. LaTourrette, Melabs, Palo Alto, Calif.*

4:55 "Injection-Locked Oscillators as Amplifiers for Angle-Modulated Signals," *H. L. Stover and R. C. Shaw, Bell Telephone Labs., Inc., Crawford Hill Labs., Holmdel, N. J.*

SESSION III

LINEAR PARTICLE ACCELERATORS

Chairman: W. K. H. Panofsky, Stanford Linear Accelerator Center, Stanford, Calif.

7:30 "The RF Drive System for the Stanford Two-Mile Linear Accelerator," *G. A. Loew, Stanford Linear Accelerator Center, Stanford, Calif. (Invited).*

8:15 "Microwave Applications of Superconductivity," *P. B. Wilson, Hansen Labs., Stanford University, Stanford, Calif. (Invited).*

9:00 "Accurate Phase Length Measurements of Large Microwave Networks," *J. N. Weaver, Hansen Labs., Stanford University, Stanford, Calif., and R. Alvarez, Stanford Linear Accelerator Center, Stanford, Calif. (Invited).*

Tuesday, May 17, 1966

SESSION IV

FILTERS AND COUPLERS

Chairman: S. B. Cohn, Rantec, Calabasas, Calif.

9:00 "Synthesis of Distributed Elliptic-Function Filters from Lumped-Constant Prototypes," *R. Levy and I. Whiteley, Leeds University, Leeds, England (Invited).*

9:45 "The Field Displacement Filter—A New Family of Dissipative Waveguide Filters," *Nikolai Eberhardt, Lehigh University, Bethlehem, Pa.*

10:05 "Theoretical and Practical Applications of Capacitance Matrix Transformations to TEM Network Design," *R. J. Wenzel, The Bendix Corp., Southfield, Mich.*

10:25 Break.

10:55 "Optimal Design of Matching Networks for Microwave Transistor Amplifiers," *F. E. Emery, M. O'Hagen, and S. D. Nolte, Texas Instruments Incorporated, Dallas, Tex.*

11:15 "Filter Requirements for Nanosecond Diode Switching," *R. V. Garver and T. H. Mak, Diamond Ordnance Fuse Labs., Washington, D. C.*

- 11:35 "Coupled-Transmission-Line-Directional Couplers with Coupled Lines of Unequal Characteristic Impedances," *E. G. Cristal, Stanford Research Institute, Menlo Park, Calif.*
- 11:55 "The Design and Construction of Broadband, High Directivity, 90° Couplers Using Non-Uniform Line Techniques," *C. P. Tresselt, The Bendix Corp., Southfield, Mich.*

SESSION V

INTEGRATED CIRCUITS

Chairman: I. H. Solt, Fairchild Semiconductor, Mountain View, Calif.

- 2:00 "Survey of Integrated Circuits with Implications for Microwaves," *R. L. Pritchard, Stanford University, Stanford, Calif.* (Invited).
- 2:45 "Ceramic Microstrip for Microwave Hybrid Integrated Circuitry," *Britton T. Vincent, Jr., Texas Instruments Incorporated, Dallas, Tex.*
- 3:00 "Integrated Microwave Tunnel Diode Device," *H. C. Okean, Bell Telephone Labs., Inc., Murray Hill, N. J.*
- 3:15 Break.
- 3:45 "Integrated Microwave Control Devices," *W. J. Moroney and A. Botka, Microwave Associates, Burlington, Mass.*
- 4:00 "A Low Loss 1 Nanosecond 1 Watt X-Band Switch," *R. W. Dawson and B. C. DeLoach, Bell Telephone Labs., Murray Hill, N. J.*
- 4:15 "Integrated Mixers for S and X Band," *C. M. Howell, Microwave Associates, Burlington, Mass.*
- 2:00 Tour of Stanford Linear Accelerator Center (in parallel with Session V).

SESSION VI

MICROWAVES ABROAD

Chairman: W. W. Mumford, Bell Telephone Labs., Whippany, N. J.

- 7:00 "Guided-Wave Research in British Universities," *P. J. B. Clarricoats, Leeds University, Leeds, England* (Invited).
- 7:45 "Microwaves at Japanese Universities," *N. Kumagai, Osaka University, Osaka, Japan* (Invited).
- 8:30 Break.
- 8:45 "Delay Spectra of Single Crystal Ferrimagnetics When Loaded by Polycrystalline Ferrites," *J. H. Collins and B. Yazgan, Glasgow University, Glasgow, Scotland* (Invited).
- 9:15 "A Selective Survey of Microwaves in Scandinavia and Western Europe," *M. M. Brady, Aksjeselskapet NERA, Oslo, Norway* (Invited).

Wednesday, May 18, 1966

SESSION VII

ULTRAMICROWAVE AND OPTICAL TECHNIQUES

Chairman: A. Gardner Fox, Bell Telephone Lab., Inc., Crawford Hill Lab., Holmdel, N. J.

- 9:00 "Optical Transmission Media," *E. A. J. Marcatili, Bell Telephone*

Lab., Crawford Hill Lab., Holmdel, N. J. (Invited).

- 9:45 "Development Towards Practical Applications of TE₀₁-Mode Waveguides, Leaky Waveguides, and Beam Waveguides," *T. Nakahara, Sumitomo Electric Industries, Ltd., Osaka, Japan* (Invited).
- 10:30 Break.
- 11:00 "Confocal Resonator Bandpass Filters," *J. Cohen and J. J. Taub, Airborne Instrument Lab., Div. of Culler-Hammer, Inc., Melville, L. I., N. Y.*
- 11:15 "Submillimeter Broadband Power-Measuring Detector," *M. Wang and F. Arams, Airborne Instruments Lab., Div. of Culler-Hammer, Inc., Melville, L. I., N. Y.*
- 11:30 "Perturbation of Optical Resonator Characteristics by an Inhomogeneous Focusing Medium," *S. A. Harrison and W. K. Kahn, Polytechnic Institute of Brooklyn, Farmingdale, N. Y.*
- 11:45 "A Light Beam Waveguide Using Hyperbolic-Type Gas Lens," *Yasuharu Suematsu, Kenichi Iga, and Shinichi Ito, Tokyo Institute of Technology, Tokyo, Japan.*

SESSION VIII

MICROWAVE TECHNIQUES

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

- 2:00 "Electromagnetic Momentum as a Tool in Microwave Analysis" (provisional title), *John Brown, University College, London, England* (Invited).
- 2:30 "Sampling for Oscilloscopes and Other RF Systems: Dc Through X-Band," *Wayne Grove, hp Associates, Palo Alto, Calif.*
- 2:45 "A Power Reflection Technique for Characterization of High Quality Varactor Diodes," *G. D. Vendelin and S. A. Robinson, Texas Instruments Incorporated, Dallas, Tex.*
- 3:00 "Application of a Microwave Technique to the Measurement of Electron Density and Relaxation Time," *S. Lederman and E. F. Dawson, Polytechnic Institute of Brooklyn, Farmingdale, L. I., N. Y.*
- 3:15 Break.
- 3:45 "Full-Band Matching of Waveguide Discontinuities," *F. C. de Ronde, Philips Research Labs., Eindhoven, The Netherlands* (Invited).
- 4:30 "Microwave Breakdown Technique for Measuring Ionization Rate of High Temperature Gases in a Shock Tube," *J. B. Chown, W. C. Taylor, and T. Morita, Stanford Research Institute, Menlo Park, Calif.*
- 4:45 "Characteristics of a Periodic Type of Microwave Sampling Cavity," *R. E. Post and A. G. Potter, Iowa State University, Ames, Iowa.*

6:00 Cocktail Party.

- 7:00 Banquet. Prof. John Brown, University College, London, England, will speak on a subject of international interest. (Topic to be announced.)

Thursday, May 19, 1966

SESSION IX

FERRITE PHASE SHIFTERS

Chairman: Max Weiss, Aerospace Corp., El Segundo, Calif.

- 9:00 "A Fast Millimeter Ferrite Latching Switch," *R. A. Stern and J. P. Agrios, Electronic Components Lab., U. S. Army Electronics Command, Fort Monmouth, N. J.*
- 9:15 "Circularly Polarized Phase Shifter for Use in Phased Array Antennas," *M. C. Mohr and S. Monaghan, Raytheon Co., Bedford, Mass.*
- 9:30 "A Slow Wave Digital Ferrite Strip Transmission Line Phase Shifter," *R. R. Johes, Westinghouse Electronics Div., Baltimore, Md.*
- 9:45 "A Miniaturized C-Band Digital Latching Phase Shifter," *J. K. Parks, B. R. Savage, L. J. Lavedan, Jr., and J. Brown, Jr., Sperry Microwave Electronics Co., Clearwater, Fla.*
- 10:00 "A Reciprocal TEM Latching Ferrite Shifter," *J. W. Simon, W. K. Alverson, and J. E. Pippin, Scientific-Atlanta, Inc., Atlanta, Ga.*
- 10:15 Break.
- 10:45 "Microwave Ferrites for Phase Shifting Applications," *J. J. Green, Raytheon Research Div., Waltham, Mass.* (Invited).
- 11:30 "A Coupled-Mode Description of the Reggia-Spencer Phase Shifter," *C. R. Boyd, Rantec, Calabasas, Calif.*
- 11:45 "Reciprocal, Latching Ferrite Phase Shifter," *E. Schlömann, M. Harris, and J. J. Green, Raytheon Research Div., Waltham, Mass.*

SESSION X

FERRITE CIRCULATORS AND LIMITERS

Chairman: Perry Vartanian, Melabs, Palo Alto, Calif.

- 2:00 "Theoretical Aspects of 3-Port Junction Circulators," *H. Bosma, Philips Research Labs., Eindhoven, The Netherlands* (Invited).
- 2:45 "Phase-Array Digital Time Delay Phaser Using Latching Ferrite Switches," *P. C. Goodman, The Bendix Corp., Southfield, Mich.*
- 3:00 "A 35 GHz Latching Switch," *W. C. Passaro and J. W. McManus, Sperry Microwave Electronics Co., Clearwater, Fla.*
- 3:15 Break.
- 3:45 "A Switching Circulator: S-Band; Stripline; Remanent; 15 kW; 10 μ s; Temperature-Stable," *F. Betts, D. H. Temme, and J. A. Weiss, M.I.T., Lexington, Mass.*
- 4:00 "Theoretical Design of 3-Port and 4-Port Waveguide Circulators," *L. E. Davis, Rice University, Houston, Tex.*
- 4:15 "The Four-Port Single Junction Circulator in Strip Line," *C. E. Fay and W. A. Dean, Bell Telephone Labs., Inc., Murray Hill, N. J.*
- 4:30 "Analysis of a Gounded Junction Circulator," *M. Omori, Bell Telephone Labs., Inc., Allentown, Pa.*
- 2:00 Tour of Stanford Linear Accelerator Center (in parallel with Session X).