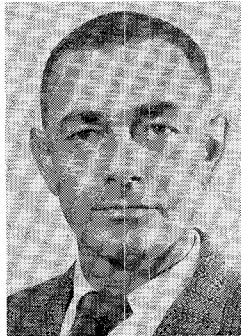


G-MTT Symposium

Jack Tar Harrison Hotel, Clearwater, Fla.
May 5-7, 1965



R. E. Henning,
Steering Committee Chairman



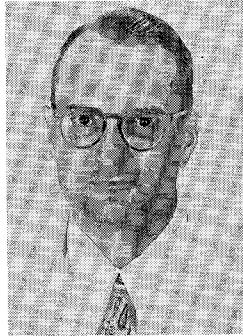
H. M. Altschuler,
*Chairman Administrative
Committee*



S. B. Cohn,
Microwave Prize



T. L. Martin, Jr.,
Banquet Speaker



D. D. King,
Keynote Speaker



(Above) Steering Committee (Left to right)—J. Newitt, E. V. Dashiell, M. R. Donaldson, E. W. Matthews, R. E. Henning (Chairman), J. E. Tracy, R. C. Aucremann, J. C. Wright.

(Below) Technical Program Committee (Left to right)—B. C. DeLoach, Jr., R. W. Beatty, L. Young, W. G. Matthaei, L. Swern, M. W. Long, J. C. Wiltse, J. E. Pippin (Chairman), (P. A. Rizzi not in picture)



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GENERAL INFORMATION

Microwave engineers and physicists will convene May 5, 6, 7, for the 1965 G-MTT Symposium of The Institute of Electrical and Electronics Engineers Microwave Theory and Techniques Group. All technical and social activities will be held at the Jack Tar Harrison Hotel in downtown Clearwater, Fla. The symposium will consist of invited and contributed papers of current interest.

REGISTRATION

Advance registration may be made by completing the registration form attached in the center of the Advance Program Booklet (or see page 266), and returning it with appropriate payment to:

1965 G-MTT Symposium
Mr. Jack E. Andrews
c/o Sperry Microwave Electronics Co.
P.O. Box 1828
Clearwater, Fla. 33517

Checks should be made payable to the 1965 G-MTT Symposium. Registration forms must be postmarked no later than April 24 to qualify for the advance registration rates.

The advance registration rates, before April 24 are:

IEEE Members	\$6.00
Nonmembers	\$8.00
Student Members	\$2.00
Ladies Events	\$7.50

Registration rates after April 24 are:

IEEE Members	\$ 8.00
Nonmembers	\$10.00
Student Members	\$ 2.00
Ladies Events	\$ 8.00

The registration desk will be open on Tuesday, May 4, 1965, from 6 P.M. to 10 P.M. on the Mezzanine of the Jack Tar Harrison Hotel, and during the Symposium, as follows:

Wednesday, May 5—8:00 A.M. to 4:00 P.M.

Thursday, May 6—8:00 A.M. to 4:00 P.M.

Friday, May 7—8:00 A.M. to 2:00 P.M.

SYMPORIUM 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 Jack Tar Harrison Hotel should be made on the registration form (see page 266). 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 Clearwater arriving by air at the Tampa International Airport may use the Clearwater-Tampa International Airport Suncoast Limousine Service direct to the Jack Tar Harrison Hotel. It is a 20 mile ride across Tampa Bay. The rates are \$2.50 each for one to two passengers; \$6.00 for three to five passengers and \$8.00 for six to eight passengers.

Visitors arriving by car may find the map on the last page of the Advance Program helpful. Free parking will be available for all hotel registrants in the hotel garage. Courtesy stickers will be available at the registration desk for free city parking for all symposium registrants.

Car rental facilities are available at the Airport and Symposium Hotel.

TECHNICAL SESSIONS

All sessions of the 1965 G-MTT Symposium will be held in the Fort Harrison Room of the Jack Tar Harrison Hotel. There are no simultaneous sessions.

COCKTAIL PARTY AND BANQUET

Cocktail Party

Advance Registration	After April 24
\$2.00	\$2.30

Banquet

Advance Registration	After April 24
\$7.00	\$7.50

A cocktail party will be held prior to the symposium banquet on Thursday, May 6, 1965 at 6:00 P.M. in the Japanese Garden of the Jack Tar Harrison Hotel. The symposium banquet will be held in the Fort Harrison Room at 7:00 P.M. The Master of Ceremonies for the banquet will be Dr. John E. Pippin. Entertainment of an unusual and exotic nature will be presented.

The presentation of the 1964 Microwave Prize Award will be made to Dr. Seymour B. Cohn, Rantec Corp, Calabasas, California, by Dr. H. M. Altschuler, Chairman, G-MTT Administrative Committee.

The banquet speaker will be Thomas L. Martin, Jr., Dean, College of Engineering and Director, Engineering and Industrial Experiment Station of the University of Florida. The topic of Dean Martin's address will be announced at the Banquet.

LADIES ACTIVITIES

Come to Clearwater! Three days of diversified activities have been planned with you in mind. A single charge includes all transportation; luncheons to be paid for individually. Clearwater is a wonderful place for a family vacation. Please plan to come. A must on Wednesday—a free welcoming coffee and pool-side resort fashion show at the hotel from 9:00 to 11:00 A.M. Clearwater wives will be most anxious to meet you. At 1:30 P.M. on Wednesday, a tour of "Sparkling Clearwater" is planned. This will include several beautiful model houses, inspired by our lovely climate. We know you will enjoy seeing Florida living at its best.

Trip to Colorful Tarpon Springs

Thursday morning at 9:30 A.M. an adventure trip to Tarpon Springs is scheduled. Fun will be had by all seeing the interesting Greek sponge fleet and browsing in the local straw shops. After lunch at the famous Louis Pappas restaurant, the ladies will return early in time to prepare for the evening banquet.

On Friday morning a trip to the very interesting Busch Gardens will provide a chance to see a world famous bird show and acres of lovely Florida plantings. Lunch of your choice at an internationally famous Spanish restaurant in Tampa and a tour through Spanish Ybor City will conclude a day of enjoyment.

Pre-school children with health certificates may attend a local nursery school, if desired. Baby sitting arrangements can be made upon request. May in Clearwater is beautiful! Plan to bring your cottons, a sweater, a cocktail dress, and, most important—your swim suit. Hope to see you in Clearwater. For additional information, please contact Mrs. John C. Hoover, 1455 Bugle Lane, Clearwater, Fla.

TECHNICAL PROGRAM

Wednesday, May 5, 1965

9:00-9:30 A.M.

Welcoming Remarks: R. E. Henning, *Chairman, Steering Committee, 1965 G-MTT Symposium:* H. M. Altschuler, *Chairman, G-MTT Administrative Committee.*

Keynote Address: Donald D. King will present the Keynote Address at the introductory session. Dr. King is Director of the Electronics Research Lab., Aero-Space Corp., Los Angeles, Calif. His topic will be "Space for Microwaves."

SESSION I

OPTICAL WAVEGUIDES AND RESONATORS

Chairman: James C. Wiltse, Martin Co., Orlando, Fla.

9:30-9:50 A.M.—"Theory of a Thermal Gas Lens," *D. Marcuse, Bell Telephone Labs., Inc., Holmdel, N. J.*

9:50-10:00 A.M.—"Measurements on a Thermal Gradient Gas Lens," *William H. Steier, Bell Telephone Labs., Inc., Holmdel, N. J.*

10:10-10:40 A.M.—Coffee Break

10:40-11:00 A.M.—"Light Beam Propagation in Curved Schlieren Guides," *H. G. Unger, Technische Hochschule Braunschweig, Germany; visiting at University of Wisconsin, Madison, Wis.*

11:00-11:20 A.M.—"Modes in Radial Wavebeam Resonators," *G. Goubau and F. Schwering, United States Army Electronics Lab., Fort Monmouth, N. J.*

11:20-11:40 A.M.—"Ray Theory of Resonators and Beam Waveguides with an Inhomogeneous Medium," *W. K. Kahn, Polytechnic Institute of Brooklyn, Brooklyn, N. Y.*

11:40 A.M.-12:00 NOON—"Rayleigh Distance as a Normalizing Range for Beam

Power Transmission," *John F. Ramsay, Airborne Instruments Lab., Deer Park, N. Y.*

SESSION II

FILTER TECHNIQUES

Chairman: Nathan Lipetz, United States Army Electronics Labs., Fort Monmouth, N. J.

2:00-2:20 P.M.—"Wideband Interdigital Filters with Capacitively Loaded Resonators," *Lloyd A. Robinson, Stanford Research Institute, Menlo Park, Calif.*

2:20-2:40 P.M.—"Equalization of Waveguide Delay Distortion," *Eugene N. Torgow, Rantec Corp., Calabasas, Calif.*

2:40-3:00 P.M.—"Circular TE₀₁₁-Mode, Trapped-Mode Band-Pass Filters," *G. L. Matthaei, University of California, Santa Barbara, Calif., and D. B. Weller, Stanford Research Institute, Menlo Park, Calif.*

3:00-3:20 P.M.—"Microwave Filters Containing High-Q Dielectric Resonators," *Seymour B. Cohn, Rantec Corp., Calabasas, Calif.*

3:20-3:50 P.M.—Coffee Break

3:50-4:10 P.M.—"Optimum Multipole Quarter-Wave TEM Filters," *M. C. Horton and R. J. Wenzel, The Bendix Corp., Southfield, Mich.*

4:10-4:30 P.M.—"Wide-Band Varactor Harmonic Multipliers," *R. J. Wenzel, The Bendix Corp., Southfield, Mich.*

4:30-4:50 P.M.—"Filter-Diode Integration," *F. S. Coale and P. M. LaTourrette, Melabs, Palo Alto, Calif.*

4:50-5:10 P.M.—"Wideband Polarizer in Circular Waveguide Loaded with Dielectric Discs," *Paul J. Meier and Sidney Arnow, Wheeler Labs., Great Neck, N. Y.*

Thursday, May 6, 1965

SESSION III SEMICONDUCTOR DEVICES

Chairman: James J. Gallagher, Martin Co., Orlando, Fla.

9:00-9:30 A.M.—Invited Paper "Progress in Solid State Microwave Power Sources," *F. Sterzer, RCA Labs., Princeton, N. J.*

9:30-9:50 A.M.—"Microwave Transistor Amplifier Design," *B. T. Vincent, Jr., Texas Instruments, Inc., Dallas, Tex.*

9:50-10:10 A.M.—"Frequency Multiplication with the Step Recovery Diode," *Robert D. Hall, Hewlett-Packard Associates, Palo Alto, Calif.*

10:10-10:40 A.M.—Coffee Break

10:40-11:00 A.M.—"Low-Level Limiting Utilizing Impact Ionization in Bulk Germanium at 4.2°K," *W. W. Heinz and S. Okwit, Airborne Instruments Lab., Deer Park, N. Y.*

11:00-11:20 A.M.—"A New Millimeter Using Bulk Semiconductor (and Its Radio Frequency Bolometric Prototype)," *F. Arams, E. Sard, C. Allen, and B. Peyton, Airborne Instruments Lab., Deer Park, N. Y.*

11:20-11:40 A.M.—"A Low Noise Figure 94 Gc Gallium Arsenide Mixer Diode," *Richard J. Bauer, Advanced Technology Corp., Timonium, Md.*

11:40 A.M.-12:00 NOON—"An Electrically-Tuned Parametric Amplifier," *K. L. Kotzebue, University of California, Santa Barbara, Calif., and L. B. Fletcher, Watkins-Johnson Co., Palo Alto, Calif.*

12:00-12:20 P.M.—"Microstrip Transmission on Semiconductor Dielectrics," *Tom M. Hytin, Texas Instruments Inc., Dallas, Tex.*

SESSION IV

COMPONENTS FOR PHASED ARRAYS

Chairman: Samuel J. Rabinowitz, Advanced Research Projects Agency, Washington, D. C.

2:00-2:30 P.M.—Invited Paper "Trends in Array Radars," *John L. Allen, MIT Lincoln Lab., Lexington, Mass.*

2:30-2:50 P.M.—"A Digital Latching Ferrite Strip Transmission Line Phase Shifter," *L. R. Whicker and R. R. Jones, Westinghouse Electric Corp., Baltimore, Md.*

2:50-3:10 P.M.—"Ferrite Digital Phase Shifters," *D. R. Taft, J. W. Simons, and J. D. Sweeney, Sperry Microwave Electronics Co., Clearwater, Fla.*

3:10-3:40 P.M.—Coffee Break

3:40-4:00 P.M.—"A Four-Bit Latching Ferrite Switch," *D. H. Landry and W. C. Passaro, Sperry Microwave Electronics Co., Clearwater, Fla.*

4:00-4:20 P.M.—"A Latching Ferrite Junction Circulator for Phased Array Switching Applications," *P. C. Goodman, The Bendix Corp., Southfield, Mich.*

4:20-4:40 P.M.—"A High Power Phase Shifter for Phased Array Systems," *W. P. Clark, Hughes Aircraft Co., Fullerton, Calif.*

4:40-5:00 P.M.—"Application of the Butler Matrix to High-Power Multichannel Switching," *Richard S. Davis and Helmut E. Schrank, Westinghouse Defense and Space Center, Baltimore, Md.*

Friday, May 7, 1965

SESSION V. COMPONENTS

Chairman: B. J. Duncan, Sperry Microwave Electronics Co., Clearwater, Fla.

9:00-9:20 A.M.—"Theoretical Analysis of Twin Slab Phase Shifters in Rectangular Waveguide," *Ernst Schlömann, Raytheon Co., Waltham, Mass.*

9:20-9:35 A.M.—"Broadband Strip-Transmission Line UHF Circulators," *J. W. Simons, Sperry Microwave Electronics Co., Clearwater, Fla.*

9:35-9:50 A.M.—"New Design Techniques for Miniature VHF Circulators," *V. E. Dunn and R. W. Roberts, Melabs, Palo Alto, Calif.*

9:50-10:05 A.M.—"Advanced Ferrite Duplexing-Limiting Techniques," *J. E. Andrews, J. L. Brediger, and D. H. Landry, Sperry Microwave Electronics Co., Clearwater, Fla.*

10:05-10:35 A.M.—Coffee Break

10:35-10:50 A.M.—"A High Power X-Band Limiter," *E. Wantuch and M. King,*

Airtron Division, Litton Precision Products, Inc., Morris Plains, N. J.

10:50-11:05 A.M.—"Overside Waveguide Quasioptical Ferrite Devices," *H. J. Hindin and J. J. Taub, Airborne Instruments Lab., Deer Park, N. Y.*

11:05-11:20 A.M.—"A Ferroelectric Microwave Switch," *J. W. Amoss, M. R. Donaldson, L. J. Lavedan, and A. L. Stanford, Sperry Microwave Electronics Co., Clearwater, Fla.*

11:20-11:35 A.M.—"Design Considerations for Microwave Acoustic Delay Devices," *J. R. Yaeger and F. A. Olson, Microwave Electronics Corp., Palo Alto, Calif.*

11:35-11:50 A.M.—"Suppression of Multiple Pass Signals from Microwave Acoustic Delay Lines," *H. A. Willing and G. P. Rodriguez, Sperry Microwave Electronics Co., Clearwater, Fla.*

11:50-12:05 P.M.—"UHF Magnetoacoustic Delay Line," *W. Skudera, R. Sproat, I. Bady, and E. Gikow, United States Army Electronics Labs., Fort Monmouth, N. J.*

SESSION VI

COMPONENTS AND MEASUREMENTS

Chairman: L. Lewin, Standard Telecommunications Labs., Harlow, England

1:30-1:50 P.M.—"Monopulse Comparator Networks for Multi-Octave Operation," *Richard Van Wagoner, Radiation Systems, Inc., Alexandria, Va., and Paul Shelton, Institute for Defense Analyses, Arlington, Va.*

1:50-2:10 P.M.—"Techniques for Providing TWM's with Wide Instantaneous Bandwidths," *J. A. DeGruyl, S. Okwit, and J. G. Smith, Airborne Instruments Lab., Deer Park, N. Y.*

2:10-2:30 P.M.—"Impedance and Attenuation of Transmission Lines Supporting TEM Modes," *M. V. Schneider, Bell Telephone Labs., Inc., Holmdel, N. J.*

2:30-2:50 P.M.—"The Arc Loss of Multi-megawatt Gas Discharge Duplexers," *C. S. Ward, Microwave Associates, Inc., Burlington, Mass.*

2:50-3:10 P.M.—"A Superheterodyne 600 Gc/s Radiometer Receiver," *R. F. Packard, Advanced Technology Corp., Timonium, Md.*

3:10-3:30 P.M.—"Prediction and Measurement of Oscillator Frequency Modulation under Random Vibration," *J. R. Ashley and C. B. Searles, Sperry Electronic Tube Division, Gainesville, Fla.*

3:30-3:50 P.M.—"Interpretation of Interaction of Fabry-Perot Resonator Fields with Plasmas," *D. H. Auston, R. I. Primich and A. Hayami, General Motors Corp., Santa Barbara, Calif.*

3:50-4:10 P.M.—"A Simple Method for Precise Phase Shift Measurement," *C. F. Augustine, Weinschel Engineering Co., Gaithersburg, Md.*

4:10-4:30 P.M.—"The Automatic Phasing System for the Stanford Two-Mile Linear Electron Accelerator," *C. B. Williams, A. R. Wilmunder, J. Dobson, H. A. Hogg, M. G. Lee, and G. A. Loew, Stanford University, Stanford, Calif.*