

# G-MTT Symposium

*Statler Hilton Hotel and New England Life Hall, Boston, Mass.*

May 8-11, 1967



M. Michelson  
*Co-Chairman, Steering Committee*



R. W. Damon  
*Co-Chairman, Steering Committee*



S. W. Rosenthal  
*Chairman, Administrative Committee*



A. A. Oliner  
*Microwave Prize*

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## GENERAL INFORMATION

On May 8-11, the G-MTT 1967 International Microwave Symposium will be held in Boston at the Statler Hilton and New England Life Hall. The four-day program will include 45 contributed papers and 9 invited papers on topics of current interest to the microwave profession.

New to the microwave symposium will be two informal sessions devoted to the topics of microwave integrated circuits and microwave sources. The former will be tutorial and the latter, a typical rump session. These parallel sessions, scheduled for Monday evening, will provide attendees with an opportunity to present and discuss last minute information.

The highlight of the symposium will be the

banquet, to be held on Tuesday night, May 9. The feature speaker will be John C. Slater; Dana Atchley will be toastmaster.

## REGISTRATION

Symposium registration will be at the Statler Hilton on Sunday, May 7, from 5 to 10 P.M. From Monday through Wednesday, May 8-10, you may register at the New England Life Hall. The enclosed form in the Advanced Program Booklet may be used for advanced registration with a total savings of \$4.00 if mailed in with remittance before April 24.

Conference fees for the symposium are shown below:

Item	Postmarked	
	Before April 24	After April 24
Registration		
IEEE Member	\$ 7.00	\$ 9.00
IEEE Non-Member	12.00	14.00
Student	2.00	3.00
Banquet	10.00	12.00
Symposium Digest	3.00	3.00

Remittance should be mailed to:

G-MTT 1967 International  
Microwave Symposium  
Box 91  
Bedford, Mass. 01730

## SYMPOSIUM DIGEST

All papers presented will be published in the *Symposium Digest*, to be presented to you upon formal registration at the symposium. Additional copies can be purchased for \$3.00 per copy. You can insure the availability of extra copies by so indicating on the advanced registration form. For those of you who may not be able to attend the symposium, *Digest* copies can still be purchased by use of the advanced registration form. Please allow several weeks following the symposium for mailing.

## MEETING ROOM

Formal symposium papers will be presented at the New England Life Hall, only a few short blocks from the Statler Hilton Hotel. This facility offers one of the most modern, completely air-conditioned auditoriums in Boston, where acoustics are second to none, visibility is excellent, and comfortable upholstered chairs are provided. For those wishing to take a break, coffee will be available in the lobby.

## TRANSPORTATION

The Statler Hilton Hotel is easily available from Boston's Logan Airport by limousine. Typical travel time is 15 to 20 minutes. If you are driving in from out of town, take the Massachusetts Turnpike to the Copley Square exit. The hotel is just another five minutes away. For those of you who may be planning visits to outlying suburbs, helicopter service is available from Logan Airport. Further information can be obtained at the registration desk.

## ENTERTAINMENT

On the day before the conference, May 7, at 7:00 PM, a Dutch treat get together will be held to help renew old acquaintances at the Statler Hilton.

On May 9, 6:00 PM, a cocktail party will be held preceding the banquet. Dana Atchley and feature speaker, John C. Slater, well-known individuals of the microwave profession promise a most enjoyable evening for all. Also of importance will be the presentation of the IEEE Morris E. Leeds Award to W. M. Mumford. Use the advanced registration form to insure your attendance.

## LADIES' PROGRAM

An extensive ladies' program is planned that will fit nicely with symposium activities. This includes trips that will introduce you to the New Boston and its neighboring Colonial suburbia. These excursions will take in the Freedom Trail, Old North (Christ) Church, the Isabella Stuart Gardner Museum, and Sudbury. Additional sights too numerous to mention are also on the schedule.

## ADVANCED TECHNICAL PROGRAM

MONDAY, MAY 8, 1967

Introductory Session  
Welcoming Remarks  
9:00-9:30 AM

M. Michelson, Co-Chairman, Steering Committee, G-MTT 1967 International Microwave Symposium, and S. W. Rosenthal, Chairman, G-MTT National Administrative Committee Keynote Speaker.

Session I  
Waveguides  
9:30-12:30 AM

Chairman: Dr. K. Tomiyasu, General Electric Company, Schenectady, N. Y.

- I-1 "Coupling of Waveguides by Resistive Films," *Prof. G. Epprecht, Eidgenössische Technische Hochschule, Zurich, Switzerland (Invited).*
- I-2 "Attenuating Films in Rectangular Waveguides," *A. Wexler, Manitoba University, Winnipeg, Canada.*
- I-3 "A Broadband Absorbing Wall for VHF Range Utilizing Thin Ferrite Tiles," *Prof. K. Suetake, Tokyo Institute of Technology, Japan (Invited).*
- I-4 "A New Class of Low-Loss Reactive Wall Waveguides," *R. P. Larsen, Grumman Aircraft Engineering Corporation, and A. A. Oliner, Polytechnic Institute of Brooklyn.*
- I-5 "Computer Solution of Waveguide Discontinuity Problems," *Prof. P. J. B. Clarricoats, Leeds University, England, and K. R. Slinn, Microwave Associates, Inc.*
- I-6 "Electromagnetic Resonances of Free Dielectric Spheres," *Mlle. M. Gastine, L. Courtois, and J. L. Dormann, Laboratoire de Magnétisme et de Physique du Solide, France.*
- I-7 "Research on Millimeter Wave Communication in Japan," *Ken-ichi Noda, Nippon Telegraph and Telephone Public Corporation, Japan.*

Session II  
Filters and Couplers  
2:00-5:20 PM

Chairman: Dr. L. Young, Stanford Research Institute, Menlo Park, Calif.

- II-1 "The Superconducting Resonator—A New Microwave Component," *H. Zimmer, Philips, Zentrallaboratorium, Hamburg (Invited).*
- II-2 "A Frequency Transformation for Commensurate Transmission-Line Networks," *E. G. Cristal, Stanford Research Institute.*
- II-3 "Band Rejection Filters in Coaxial Waveguides," *D. Varon, Bell Telephone Laboratories, Inc.*

- II-4 "Wideband, High Selectivity Diplexers Utilizing Digital-Elliptic Filters," *R. J. Wenzel, The Bendix Corporation.*
- II-5 "Computer Designed, 720 to 1 Microwave Compression Filter," *H. S. Hewitt, Systems Techniques Laboratory, Stanford, Calif.*
- II-6 "Optimal 3-Port Power Dividers Derived from Hybrid-T Prototypes," *S. David, Wheeler Laboratories, Inc., and W. K. Kahn, Polytechnic Institute of Brooklyn.*
- II-7 "Electrically Short 90° Couplers Utilizing Lumped Capacitors," *C. W. Gerst, Syracuse University Research Corporation.*
- II-8 "A Stripline Directional Coupler Utilizing a Nonhomogeneous Dielectric Medium," *J. E. Dalley, Bell Telephone Laboratories, Inc.*

Monday night, informal rump discussions at the Statler Hilton Hotel:

- a) Microwave integrated circuits.
- b) Microwave sources.

TUESDAY, MAY 9, 1967

Session III  
Ferrite Components  
9:00-12:00 AM

Chairman: P. Romanelli, Rome Air Development Center, Rome, N. Y.

- III-1 "A Nonreciprocal Ferrite Hybrid," *M. Omori, Bell Telephone Laboratories, Inc.*
- III-2 "High Power UHF Y-Junction Circulator," *Y. Konishi, Technical Research Laboratories, Nippon Hoso Kyokai, Tokyo, Japan.*
- III-3 "S-Band Latching Circulator with 10 Nanosecond Switching Speed," *P. C. Goodman and C. P. Tresselt, The Bendix Corporation.*
- III-4 "A New Type of Latching, Switchable, Ferrite-Junction Circulator," *W. W. Sienkanowicz and W. A. Schilling, Radio Corporation of America.*
- III-5 "Broadband Latching Waveguide Circulator," *J. W. Simon, W. K. Alverson, and J. E. Pippin, Scientific-Atlanta, Inc.*
- III-6 "A High Power, Y-Junction, E-Plane Circulator," *J. W. McGowan and W. H. Wright, Jr., U. S. Army Electronics Command.*
- III-7 "Latching Ferrite Phase Shifter for Scanning Dielectric Lens," *P. J. Meier and B. J. Musso, Airborne Instruments Laboratory, Division of Cutler-Hammer, Inc.*
- III-8 "Polarization Insensitive Phase Shifter for Use in Phased Array Antennas," *M. C. Mohr and S. R. Monaghan, Raytheon Company.*

**Session IV**  
**Propagation in Ferrite Media**  
**2:00-5:10 PM**

*Chairman:* Dr. P. A. Rizzi, Alpha Industries, Newton Upper Falls, Mass.

- IV-1 "A General Theory for Spin-Wave Suppression in Ferrites," *C. D. Hannaford and M. J. Howes, Leeds University, England (Invited).*
- IV-2 "Dependence of Peak Power Threshold upon  $\omega_M/\omega$ ," *J. J. Green, J. A. Hillier, and J. H. Saunders, Raytheon Research Division.*
- IV-3 "Nonlinear Threshold in Remanent Ferrite," *E. Stern, Massachusetts Institute of Technology.*
- IV-4 "Operating Dynamics and Performance Limitations of Ferrite Digital Phase Shifters," *G. P. Rodriguez, J. L. Allen, L. J. Lavedan, and D. R. Taft, Sperry Microwave Electronics Company.*
- IV-5 "Computer-Aided Analysis as a Quantitative Design Tool for Ferrite Phase Shifters and Resonance Isolators," *J. L. Allen, Sperry Microwave Electronics Company.*
- IV-6 "Nonreciprocal Remanence Phase Shifters in H-Guide," *E. Stern, Massachusetts Institute of Technology.*
- IV-7 "Ferrite Microstrip Propagation," *D. C. Buck, Westinghouse Electric Corporation.*
- IV-8 "On-Wave Propagation in Periodic Media Containing Ferrite," *J. E. Goell, Bell Telephone Laboratories, Inc.*

**WEDNESDAY, MAY 10, 1967**

**Session V**  
**Integrated Circuits**  
**9:00-12:10 AM**

*Chairman:* F. Brand, U. S. Army Electronics R&D Laboratory, Fort Monmouth, N. J.

- V-1 "Engineering Approaches to Integrated Microwave Circuit Design," *A. Uhlir, Microwave Associates, Inc. (Invited).*
- V-2 "High Dielectric Substrates for Microwave Hybrid Integrated Circuitry," *G. D. Vendelin, Texas Instruments, Incorporated.*
- V-3 "Microstrip Transmission Lines on High Dielectric Constant Substrates for Hybrid Microwave Integrated Circuits," *K. C. Wolters and P. L. Clar, Motorola, Inc.*
- V-4 "Microstrip Circuitry for Integrated Transistor Amplifiers," *R. F. Mayo, S. P. Knight, and R. Ekholdt, RCA Laboratories.*

- V-5 "Lumped Elements in Microwave Integrated Circuits," *D. A. Daly, S. P. Knight, M. Caulton, and R. Ekholdt, RCA Laboratories.*
- V-6 "All Garnet Microstrip Circulators for Integrated Circuits," *B. Hershenov, RCA Laboratories.*
- V-7 "A Thin Film X-Band Varactor Quadrupler," *J. B. Horton, Texas Instruments Incorporated.*
- V-8 "Computer Analysis of Microwave Integrated Switches," *H. E. Stinehelfer, Sr., Microwave Associates, Inc.*

**Session VI**  
**Solid-State Sources**  
**2:00-5:00 PM**

*Chairman:* M. Hines, Microwave Associates, Burlington, Mass.

- VI-1 "Recent Advances in Bulk Semiconductor Microwave Devices in Japan," *T. Okoshi, Tokyo University, Japan (Invited).*
- VI-2 "Status and Future of IMPATTs," *B. C. DeLoach, Bell Telephone Laboratories, Inc. (Invited).*
- VI-3 "Series Stacked Varactors for High Power, High Frequency Applications," *W. Jann, T. Miles, and J. DiBona, Philco-Ford Corporation.*
- VI-4 "Iterative Synthesis of Varactor-Multiplier Microwave Networks and a Doubler with 0.17 Watt Output at 47 GHz," *D. H. Steinbrecher, Massachusetts Institute of Technology, and M. E. Goff and A. H. Solomon, Sylvania Electric Company.*
- VI-5 "YIG-Tuned and Varactor-Tuned L-Band Transistor Oscillator," *K. Hutton, Sylvania Electric Company.*
- VI-6 "Frequency Modulation of Avalanche Transit Time Oscillators," *J. W. Amoss and K. E. Gsteiger, Sperry Microwave Electronics Company.*
- VI-7 "A High-Speed Binary Pulse Regenerator in Microwave Frequencies," *M. Sugiyama, Y. Matsuo, and A. Saeki, Nippon Electric Company, Japan.*

**THURSDAY, MAY 11, 1967**

**Session VII**  
**Microwave Control Devices**  
**9:00-12:00 AM**

*Chairman:* Dr. K. Mortenson, Rensselaer Polytechnic Institute, Troy, N. Y.

- VII-1 "Microwave Propagation and Faraday Effect in a Solid-State Plasma

Waveguide," *H. J. Kuno and W. D. Hersherberger, RCA Laboratories and University of California.*

- VII-2 "Varactor Linear Microwave Phase Modulator," *R. V. Garver, Harry Diamond Laboratories.*
- VII-3 "A Subnanosecond X-Band Pulse Modulator," *D. K. Adams, B. M. Schiffman, and R. B. Larrick, Stanford Research Institute.*
- VII-4 "High Power, Octave Bandwidth, SPDT Microwave Switches," *J. F. White and K. E. Mortenson, Rensselaer Polytechnic Institute.*
- VII-5 "High Power PIN Diode Limiting," *P. Basken, K. E. Mortenson, and N. Brown, Rensselaer Polytechnic Institute and Microwave Associates, Inc.*
- VII-6 "Ferroelectric Phase Shifters," *D. Ruben, Loral Electronic Systems.*
- VII-7 "Plasma Varactor X-Band Phase Shifters," *J. Y. Wada and R. C. Knechtli, Hughes Research Laboratories, and B. J. Forman and A. Fafarman, Hughes Aircraft Company.*
- VII-8 "A Multikilowatt X-Band Nanosecond Source," *H. Goldie, Westinghouse Electric Corporation.*

**Session VIII**  
**Microwave Delay Lines**  
**2:00-4:40 PM**

*Chairman:* Dr. R. W. Damon, Sperry Rand Research Center, Sudbury, Mass.

- VIII-1 "Realization of Microwave Circuit Functions Using Acoustic Waves," *E. A. Ash, University College, London (Invited).*
- VIII-2 "Frequency Modulation and Translation with Magnetoelastic Waves in YIG," *B. A. Auld, J. H. Collins, and H. R. Zapp, Stanford University.*
- VIII-3 "Current Status of Microwave Delay Lines," *H. J. Shaw, Stanford University (Invited).*
- VIII-4 "Broadband, Fixed Tuned, Acoustic Delay Lines at L- and S-Band Frequencies," *L. R. Whicker, P. F. Carcia, and G. E. Evans, Westinghouse Electric Corporation.*
- VIII-5 "Two-Port UHF Pulse Compression via Magnetostatic Waves in YIG Rods," *G. E. Bennett and F. A. Olson, Teledyne, Inc.*
- VIII-6 "Pulse Compression Using Magnetoelastic Waves in YIG," *H. Van de Vaart and R. W. Damon, Sperry Rand Research Center.*