# PROGRAM

## CONDENSED PROGRAM

### 1963 PTGMTT NATIONAL SYMPOSIUM

SUNDAY, May 19, 1963

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| 7:00 p.m. to 9:00 p.m. | Registration:<br>The Registration Desk will be open in the Main Lobby of the Miramar Hotel |

MONDAY, May 20, 1963

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| 8:15 a.m. to 2:30 p.m. | Registration:<br>Foyer, Satellite Room, Miramar Hotel |
| 8:50 a.m. to 9:30 a.m. | Introductory remarks and Key-note Speech; Satellite Room, Miramar Hotel |
| 9:34 a.m. | Ladies' Hospitality, Garden Room |
| 9:30 a.m. to 10:35 a.m. | Session I. RADAR<br>Satellite Room, Miramar Hotel |
| 10:55 a.m. to 12:05 p.m. | Session II. PLASMAS<br>Satellite Room, Miramar Hotel |
| 2:20 p.m. to 5:00 p.m. | Session III. MICROWAVE FILTERS AND COUPLERS<br>Satellite Room, Miramar Hotel |
| 6:00 p.m. to 7:00 p.m. | Cocktail Klatsch<br>Under the Moreton Bay Fig tree adjacent to the Satellite Room |

# PROGRAM

TUESDAY, May 21, 1963

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|---|---|
| 8:15 a.m. to 2:30 p.m. | Registration:<br>Foyer, Satellite Room,<br>Miramar Hotel |
| 8:50 a.m. to 11:50 a.m. | Session IV. SEMICONDUCTOR DEVICES - 1<br>Satellite Room, Miramar Hotel |
| 9:45 a.m. | Ladies' Hospitality - Lanai Room |
| 1:30 p.m. to 3:00 p.m. | Session V. SEMICONDUCTOR DEVICES - 2<br>Satellite Room, Miramar Hotel |
| 3:30 p.m. to 4:50 p.m. | Session VI. SPECIAL DEVICES<br>Satellite Room, Miramar Hotel |
| 6:00 p.m. to 7:00 p.m. | Cocktail Party:<br>Under the Moreton Bay Fig tree adjacent to the Satellite Room |
| 7:00 p.m. to 9:30 p.m. | Banquet:<br>Satellite Room, Miramar Hotel |

WEDNESDAY, May 22, 1963

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|---|---|
| 8:15 a.m. to 2:30 p.m. | Registration:<br>Foyer, Satellite Room<br>Miramar Hotel |
| 8:50 a.m. to 10:20 a.m. | Session VII. MAGNETICALLY ACTIVE DEVICES<br>Satellite Room, Miramar Hotel |
| 10:40 a.m. to 11:40 a.m. | Session VIII. PHASE AT MICROWAVE FREQUENCIES<br>Satellite Room, Miramar Hotel |
| 1:15 p.m. to 3:35 p.m. | Session IX. LASERS AND MICROWAVE ACOUSTICS<br>Satellite Room, Miramar Hotel |

# PROGRAM

## MONDAY, MAY 20, 1963

### MONDAY MORNING

8:50 Introductory Remarks -- D. B. Anderson, Chairman, Symposium Steering Committee; and S. B. Cohn, Chairman, PGMTT National Administrative Committee

9:00 Keynote Address -- Professor Robert S. Elliott, Department of Engineering, University of California, Los Angeles, California

### SESSION I: RADAR

Chairman: W. L. Pritchard, Aerospace Corporation

9:30 / I-1 "Modern Radar Systems" -- H. G. Weiss, M.I.T. Lincoln Laboratory (INVITED)

10:15 2 I-2 "TRADEX - The Second Generation of Super Power Transmitters" -- R. Graham, Jr., Radio Corp. of America

Problems in designing a super power UHF transmitter for TRADEX radar, used for exoatmospheric targets, are discussed. Specifically, these are high purity fine line spectrum, low intra-pulse phase shift nonlinearity, unusually high prf, and minimization of "off" time.

# PROGRAM

10:35 - 10:55 COFFEE BREAK

## SESSION II: PLASMAS

Chairman: V. Josephson, Aerospace Corporation

10:55 3 II-1 "Plasmas and Microwaves" -- T. Morita, Stanford Research Institute (INVITED)

11:25 4 II-2 "Propagation of Linearly Polarized Electromagnetic Waves in Dense Magneto-Plasmas" -- J. T. Verdeyen, University of Illinois

Propagation through a plasma bounded by parallel conducting planes, with H-field parallel to the planes and perpendicular to the propagation, is examined. Theory and experiment demonstrate that a surface wave can propagate at frequencies well below the plasma frequency.

11:45 5 II-3 "Microwave Breakdown near a Hot Surface" -- M. Gilden and J. Pergola, Microwave Associates, Inc.

The threshold of microwave breakdown near a hot surface is increased by a rapid flow of gas, which not only cools the surface, but also reduces the thickness of the hot gas film.

12:05 - 2:20 LUNCH

# PROGRAM

## MONDAY AFTERNOON

## SESSION III: MICROWAVE FILTERS AND COUPLERS

Chairman: S. B. Cohn, Rantec Corporation

2:20 6 III-1 "Synthesis of Microwave Filters and Directional Couplers" -- H. J. Riblet, Microwave Development Laboratories, Inc. (INVITED)

2:50 7 III-2 "General Synthesis of Optimum Multi-Element Coupled-Transmission-Line Directional Couplers"-- R. Levy, Mullard Research Laboratories

A new class of multi-element asymmetric couplers is described, for which an exact synthesis has been obtained, leading to optimum Tchebycheff characteristics. Design formulas are derived. Excellent experimental agreement with theory was found.

3:10 8 III-3 "An 'Exact' Design Technique for a Type of Maximally-Flat Quarter-Wave-Coupled Band Pass Filter" - W. W. Mumford, Bell Telephone Laboratories, Inc.

A practical "exact" design technique for a type of broadband maximally flat waveguide band pass filter is presented. Its basis is a configuration of shorted quarter wave stubs shunting a uniform line at quarter wave intervals.

# PROGRAM

3:30 - 4:00 COFFEE BREAK

4:00 9 III-4 "Evaluation of a Coupling Hole Between two Resonant Cavities" -- H. A. Wheeler, Wheeler Laboratories

A basis is presented for evaluating coupling in terms of an effective area or volume of an aperture relative to that of the adjoining bounded regions. Concepts and formulas derived aid in understanding and computing coupling aperture behavior.

4:20 10 III-5 "Exact Design of Band-Stop Microwave Filters" -- B. M. Schiffman and G. L. Matthaei, Stanford Research Institute

An exact band-stop filter design method, using Ozaki-Ishii synthesis techniques, treats configurations of: (1) Open-circuited shunt stubs separated by lengths of line; (2) Resonators parallel to main line, either attached or separated from it.

4:40 // III-6 "Minimum Insertion Loss Microwave Filters" -- J. J. Taub and H. J. Hindin, Airborne Instruments Laboratory

A design procedure for equal-element band pass filters, for small or large resonator dissipation, in waveguide, coaxial, or strip line is outlined and demonstrated. SWR and delay are superior to Butterworth or Tchebycheff filters of comparable skirt responses.

# PROGRAM

## TUESDAY, MAY 21, 1963

### TUESDAY MORNING

### SESSION IV: SEMICONDUCTOR DEVICES 1

Chairman: A. D. Berk, Micromega Corporation

8:50 12 IV-1 "Microwave Diodes and Transistors" -- L. D. Armstrong, Micro State Electronics Corporation. (INVITED)

9:20 13 IV-2 "A New Microwave Measurement Technique to Characterize Diodes and an 800 Gc Cutoff Frequency Varactor at Zero Volts Bias" -- B. C. DeLoach, Bell Telephone Laboratories, Inc.

Mounting of a diode in reduced rectangular waveguide accomplishes characterization by a simple equivalent circuit. Parameters so measured at X-Band are compared with audio frequency results. Measurement of a new 800 Gc cutoff varactor at 50-60 Gc is described.

9:40 14 IV-3 "Low Noise 11 Gc Parametric Amplifier using Refrigerated Silver Bonded Germanium Diode -- S. Kita, K. Tahara, and T. Masuda, Nippon Telegraph and Telephone Public Corporation

Fabrication and test of a silver-bonded germanium diode are described. An 11 Gc parametric amplifier (degenerate), pumped at 23.2 Gc yielded a 3.7 db noise figure at room temperature; 1.5 db when the diode was refrigerated to 140°K.

# PROGRAM

10:00 - 10:30 COFFEE BREAK

10:30 15 IV-4 "A High Power Protector using PIN Diodes" -- M. R. Barber, Bell Telephone Laboratories, Inc.

A switch using two quarter-wave spaced PIN diodes in ridged waveguide is described. Ratings are: 70 db isolation; below 0.16 db low level loss; 10% BW at 1350 Mc; 1000 wats rf continuous, 100 kw peak; 100 nanoseconds switching with control currents less than 0.5 amperes.

10:50 16 IV-5 "Optimum Design of Fast-Acting Broadband Multithrow Diode Switches" -- P. L. Clar, Motorola, Inc.

A 1:16 multithrow switch was designed by use of wideband matching theory. Ratings, dc to 750 Mc: Less than 1 db loss, 1.3 VSWR; higher than 27 db isolation; 40 nanoseconds switching times.

11:10 17 IV-6 "A versatile C-Band Cryogenic Parametric Amplifier" -- C. T. Rucker, B. R. Savage, and E. S. Grimes, Jr., Sperry Microwave Electronics Co.

A liquid nitrogen cooled parametric amplifier, of S. S. noise figure 1.5 db, 25 Mc BW at 16 db gain, capable of tuning from 5.4 to 5.9 Gc, with a unique mechanical design that includes a vacuum insulated diode mounting cartridge, is described.

11:30 18 IV-7 "Integrated Electronics at UHF" -- G. Schaffner, F. Gleason, and P. L. Clar, Motorola, Inc.(INVITED)

11:50 - 1:130 LUNCH

# PROGRAM

## TUESDAY AFTERNOON

## SESSION V: SEMICONDUCTOR DEVICES 2

Chairman: J. C. Cacheris, Motorola, Inc.

1:30 19 V-1 "Harmonic Generation, Mixing, and Detection of Millimeter and Submillimeter Waves using Parametric or Tunnel Diodes" -- K. K. N. Chang, RCA Laboratories (INVITED)

2:00 20 V-2 "Pumped Tunnel Diode Frequency Converters with Idlers" -- P. L. Fleming, International Business Machines Corp.

Tunnel diode converters can perform functions similar to varactors, with simpler circuitry and less pump power. Such a converter was operated at 2000 Mc with gains above 30 db and a pump of only 100 microwatts.

2:20 21 V-3 "Octave Bandwidth Tunnel Diode Amplifier" -- G. J. Wheeler and J. H. Lepoff, Sylvania Electronic Defense Laboratories

A tunnel diode amplifier covering 2-3 Gc was combined with one covering 3-4 Gc (bandwidth in each case limited by circulator) in a diplexing circuit, to make a single two-port amplifier with gain above 12 db from 2-4 Gc.

2:40 22 V-4 "Practical Design Techniques for Solid State Microwave Generators" -- D. O. Fairley, Lenkurt Electric Company

Techniques are presented for the development of diode harmonic multipliers. This includes a discussion of the methods of design; problem areas; spurious enhancement; and cascading techniques.

3:00 - 3:30 COFFEE BREAK

# PROGRAM

## SESSION VI: SPECIAL DEVICES

Chairman: C. L. Cuccia, Radio Corporation of America

3:30 VI-1 "Analysis of a Microwave Radiometer for Precise Standardization of Noise Sources" -- G. Ward and J. M. Richardson, National Bureau of Standards

A detailed analysis of the radiometer employing the cascading matrix method displays potential sources of error, such as those due to departure from ideal impedance match. Influence of fluctuations on the sensitivity is also considered.

3:50 VI-2 "A High-Power Rotary Waveguide Joint" -- P. H. Smith and G. H. Mongold, Bell Telephone Laboratories, Inc.

A conceptually new type of high power rotary waveguide joint, comprising two tightly coupled ring arrays of keystone shaped waveguide elements, is described. A multimegawatt design is discussed. Experimental results on a C-Band model are presented.

4:10 VI-3 "The Focused Fabry-Perot Resonator and its Application to Plasma Diagnostics" -- R. I. Primich and R. A. Hayami, General Motors Corporation.

Focused Fabry-Perot resonators have given Q's of 80,000 - 100,000 at 70 Gc and spot sizes half as large as those without a resonator. The resonance property provides a great increase in sensitivity for plasma diagnostics.

4:30 VI-4 "Electro-Optic Interference Filter Light Modulator" -- X. De Angelis, Sylvania Electronic Systems

The power required for modulation of a laser beam by utilization of the Pockels effect in KDP or similar materials has been reduced considerably over existing devices by construction of a Fabry-Perot interference filter filled with the electro-optic material.

# PROGRAM

## WEDNESDAY, MAY 22, 1963

### WEDNESDAY MORNING

### SESSION VII: MAGNETICALLY ACTIVE DEVICES

Chairman: R. F. Soohoo, California Institute of Technology

8:50 27 VII-1 "A Review of Microwave Ferrite Devices" -- N. J. Button, National Magnet Laboratory, M.I.T. (INVITED)

9:20 28 VII-2 "4-Port Crossed-Junction Waveguide Circulators" -- L. E. Davis and M. D. Coleman, Mullard Research Laboratories, and J. J. Cotter, Mullard Equipment, Ltd.

Results of experimental investigations of 4-port H-plane waveguide junction circulators between 2.6 Gc and 36 Gc are reported. Typical results are: Isolation greater than 20 db; insertion loss below 0.5 db; VSWR below 1.1; bandwidth 3%.

9:40 29 VII-3 "Superconducting Solenoid - Traveling Wave Maser System" -- S. Okwit, K. Siegel, and J. G. Smith, Airborne Instruments Laboratory

A superconducting air core solenoid, 5 inches in length and weighing less than 3 pounds was packaged into a high gain 2200-2300 Mc maser system: Stable gain above 30 db; 20 Mc BW; $10^{0}$ noise temperature

10:00 30 VII-4 "The Investigation of an Electron Resonance Spectrometer Utilizing a Generalized Feedback Microwave Oscillator" -- J. B. Payne, Lynchburg, Va.

This new oscillator-spectrometer has a microwave amplifier with a generalized sample-carrying network element in the positive feedback loop, causing oscillations to occur at the network-s central resonant frequency, with essentially instantaneous frequency stability.

10:20 - 10:40 COFFEE BREAK

# PROGRAM

## SESSION VIII: PHASE AT MICROWAVE FREQUENCIES

Chairman: P. Lacy, Wiltron Company

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| 31 | 10:40 | VIII-1 | "The Importance of Phase in Systems Design" -- Jean A. Develet, Aerospace Corporation (INVITED) |
| 32 | 11:10 | VIII-2 | "Microwave Phase Measurement Techniques" -- G. E. Schafer, National Bureau of Standards (INVITED) |
| | 11:40 - 1:15 | | LUNCH |

## WEDNESDAY AFTERNOON

## SESSION IX: LASERS AND MICROWAVE ACOUSTICS

Chairman: T. H. Maiman, Korad, Inc.

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| 33 | 1:15 | IX-1 | "Lasers" -- R. H. Kingston, M.I.T. Lincoln Laboratory (INVITED) |
| 34 | 1:45 | IX-2 | "Optical Modulation and Detection" -- D. A. Chisholm, Bell Telephone Laboratories, Inc. (INVITED) |
| | 2:15 - 2:35 | | COFFEE BREAK |
| 35 | 2:35 | IX-3 | "Microwave Ultrasonics" -- R. T. Denton, Bell Telephone Laboratories, Inc. (INVITED) |
| 36 | 3:05 | IX-4 | "Amplification of Ultrasonic Waves in Piezoelectric Semiconductors" -- D. L. White, Bell Telephone Laboratories, Inc. (INVITED) |

# NOTES

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# NOTES