

TECHNICAL PROGRAM

MONDAY MORNING, JUNE 14

Introductory Session 0845-0955 Presidential Suite		INTRODUCTION: B. DeMarinis, Chairman, Symposium Steering Committee KEYNOTE ADDRESS: G. P. Rodrigue, President MTT-S Administrative Committee	
SESSION 1. OPTICS 0910-0955, Presidential Suite INVITED: Review of the Status of Optical Fiber Transmission and Integrated Optics S. E. Miller, Bell Telephone Laboratories, Inc., Holmdel, NJ		Page	
SESSION 2. INTEGRATED OPTICS AND FIBER OPTICS 1015-1200, Independence Room Chairman: A. A. Oliner, Polytechnic Institute of New York, Brooklyn, NY		SESSION 3. SOLID-STATE MICROWAVE SOURCES 1015-1200, Jefferson Room Chairman: H. C. Bowers, Hughes Aircraft Co., Torrance, CA Organizer: H. J. Kuno, Hughes Aircraft Co., Torrance, CA	
SESSION 4. PASSIVE MICROWAVE COMPONENTS 1015-1200, Lincoln Room Chairman: E. J. Denlinger, RCA Laboratories, Princeton, NJ		Page	
2-1 1015 A Broad Band GaAs Microstrip Modulator at 16 GHz for CO₂ Laser Radiation M. Gliden and P. Cheo, United Technology Corp., East Hartford, CT	18	3-1 1015 A High-Power 50 GHz Double-Drift IMPATT Oscillator With Low Side-Band Noise Y. Hirachi, Y. Toyama, Y. Fukukawa and Y. Tokumitsu, Fujitsu Laboratories, Ltd., Kawasaki, Japan	36
2-2 1035 Signal Processing Using Guided-Wave Acoustic-Optic Bragg-Diffraction in LiNbO₃ Waveguides I. W. Yao and C. S. Tsai, Carnegie-Mellon University, Pittsburgh, PA	21	3-2 1035 Time Varying IMPATT Impedance Measurements Robert L. Eisenhart, Hughes Aircraft Company, Culver City, CA	40
2-3 1050 Theory for Electrooptical Grating Modulators R. S. Chu, GTE Sylvania, Inc., Needham, MA, and J. A. Kong and D. Lee, MIT, Cambridge, MA	24	3-3 1055 BARIIT Devices for Self-Mixed Doppler Radar Applications J. E. East, N. Nguyen-Ba and G. I. Haddad, University of Michigan, Ann Arbor, MI	43
2-4 1105 Network Methods for Dielectric-Grating Applications T. Tamir and S. T. Peng, Polytechnic Institute of New York, Brooklyn, NY	27	3-4 1115 Series Interconnection of Six TRAPATT Devices on a Diamond Substrate N. W. Cox, G. N. Hill, J. W. Amoss and C. T. Rucker, Georgia Institute of Technology, Atlanta, GA	45
2-5 1125 An Ideal Refractive-Index-Distribution and Mode Filter for Band Broadening of Multimode Optical Fibers K. Furuya, Y. Suematsu, T. Tanaka and S. Ishikawa, Tokyo Institute of Technology, Tokyo, Japan	30	3-5 1135 YIG-Tuned GaAs FET Oscillators Timothy L. Heyboer and Frank E. Emery, Watkins-Johnson Co., Palo Alto, CA	48
2-6 1143 Propagation in Inhomogeneous Slab Waveguides S. Choudhary and L. B. Felsen, Polytechnic Institute of New York, Farmingdale, NY	33		
		4-1 1015 A 4, 6, 20 and 30 GHz Band Branching Network Using A Multilayer Dielectric Filter for A Satellite Communication Earth Station Isao Ohtomo, Suichi Shindo, and Masaki Koyama, Nippon Telegraph & Telephone Public Corp., Yokosuka-shi, Japan	52
		4-2 1035 New High Performance 3.5 MM, Low Cost, Utility Coaxial Connector With Mode-Free Operation Through 34 GHz S. F. Adam and G. R. Kirkpatrick, Hewlett-Packard Co., Palo Alto, CA	55
		4-3 1055 On Some Integral Relationships for Commensurate Transmission-Line Networks Edward G. Cristal, Hewlett-Packard Co., Palo Alto, CA	57
		4-4 1115 Comments on a 2-Gap Waveguide Mount Robert L. Eisenhart, Hughes Aircraft Co., Culver City, CA	60
		4-5 1135 Symmetrical 2N-Port Directional Couplers M. E. Hines, Microwave Associates, Inc., Burlington, MA	63

**MONDAY AFTERNOON, JUNE 14
1330-1700**

SESSION 5. MICROWAVES IN COMMUNICATION SYSTEMS 1330-1700, Independence Room Chairman: J. B. Horton, GE Valley Forge Space Center, Philadelphia, PA		SESSION 6A. LOW-NOISE RECEIVERS 1330-1700, Jefferson Room Chairman: R. L. Camisa, RCA Laboratories, Princeton, NJ Organizer: S. Okwit, LNR Communications, Inc., Hauppauge, NY		SESSION 7. FILTERS 1330-1700, Lincoln Room Chairman: Richard V. Snyder, Frequency Engineering Laboratories, Farmingdale, NJ	
5-1 1330	INVITED: Dual Polarization Antenna System Design and Performance J. Kiegler, RCA, Astro-Electronics Div., Princeton, NJ	6-1 1330	Ultra-Low-Noise, Ku-Band Parametric Amplifier Assembly H. C. Okean, J. A. DeGruyl and E. Ng, LNR Communications, Inc., Hauppauge, NY	7-1 1330	Design Formulas for Bandpass Channel Diplexers J. D. Rhodes, University of Leeds, Yorkshire, England
5-2 1355	INVITED: Problems & Challenges in Satellite Communications Frequency Reuse—Antennas and Components D. O. Reudnick, Bell Telephone Laboratories, Inc., Holmdel, NJ	6-2 1350	An Experimental Study of Image Termination Methods for Low-Noise Mixers Ben R. Hallford, Collins Radio Group, Rockwell Intl., Dallas, TX	7-2 1350	Narrowband Contiguous Multiplexing Filters with Arbitrary Amplitude and Delay Response R. J. Wenzel and W. G. Erlinger, Wenzel/Erlinger Assoc., Woodland Hills, CA
5-3 1420	INVITED: Digital Telecommunication Systems P. R. Hartmann and J. A. Crossett, Collins Radio Group, Rockwell Intl., Dallas, TX	6-3 1410	FET Mixers for Communications Satellite Transponders P. Bura and R. Dikshit, RCA Limited, Montreal, Quebec, Canada	7-3 1410	Practical Realization of Broadband Microwave Diplexers A. J. Anselmo and A. F. Hinte, AIL/Cutler-Hammer, Melville, NY
5-4 1445	INVITED: Implementation of a Military Digital Microwave System G. Lippencott, H. van Gelder and P. Villaseñor, US Army Communications Command, Ft. Huachuca, AZ	6-4 1430	A Cryogenically-Cooled GaAs FET Amplifier With a 1.1-dB Noise Figure at 5.0 GHz John Pterro, AIL, Div. Cutler-Hammer, Melville, NY	7-4 1425	An Improved Low-Pass Harmonic Absorber R. V. Snyder, Frequency Engineering Laboratories, Farmingdale, NJ
5-5 1525	INVITED: NASA Microwave Propagation and Interference Studies E. A. Wolff, NASA Goddard Space Flight Center, Greenbelt, MD	SESSION 6B. SOLID-STATE POWER AMPLIFIERS Chairman: Bert Berson, Hewlett-Packard Assoc., Palo Alto, CA		7-5 1445	Exact Design of Wideband Equal-Ripple Bandpass Filters with Non-Adjacent Resonator Couplings R. J. Wenzel, Wenzel/Erlinger Assoc., Woodland Hills, CA
5-6 1550	INVITED: Communication Technology Satellite Systems, Space and Ground Segments J. N. Sivo and D. L. Wright, NASA, Lewis Research Center, Cleveland, OH	6-5 1510	A Quasi-Linear Approach to the Design of Microwave Transistor Power Amplifiers K. L. Kotzebue, University of Calif., Santa Barbara, CA	7-6 1525	INVITED: Synthesis of Optimum Waveguide Impedance Transformers Henry Riblet, Microwave Development Labs, Natick, MA
1615	Panel Discussion	6-6 1530	X-Band MIC GaAs FET Power Amplifier H. Q. Tserng, V. Sokolov, H. M. Macksey, W. R. Wiseman, Texas Instruments, Dallas, TX		
		6-7 1600	Processing and Modeling of Low-Noise Silicon Bipolar Transistors with Submicron Emitter Widths Craig P. Snapp, Tzo-Hwa Hsui, and Roger W. Wong, Hewlett-Packard Company, Palo Alto, CA		
		6-8 1620	A 12-18 GHz High Gain Amplifier Design Using Submicron Gate GaAs Field Effect Transistors Martin G. Walker and E. James Crescenzi, Jr., Watkins-Johnson, Palo Alto, CA		

EVENING

SESSION 8. PANEL DISCUSSION: Millimeter Integrated Circuit Technology 2000-2200, Jefferson Room Organizer: R. H. Knerr, Bell Telephone Laboratories, Inc., Allentown, PA Moderator: L. F. Moose, Bell Telephone Laboratories, Inc., Allentown, PA		SESSION 9. SOLID-STATE MICROWAVE DEVICES 2000-2200, Lincoln Room Chairman: Lester F. Eastman, Cornell University, Ithaca, NY	
	Panelists: Y. W. Chang, Hughes Aircraft Company, Torrance, CA Paul Meier, AIL, Div. of Cutler-Hammer, Melville, NY R. M. Knox, Epsilon Lambda Electronics Corp., Batavia, IL M. V. Schneider, Bell Telephone Laboratories, Inc., Holmdel, NJ T. Okoshi, University of Tokyo, Tokyo, Japan T. Oxlley, General Electric Company Ltd., Wembley, Middlesex, England		2000 Rump Session on Solid-State Microwave Devices and Amplifiers

SESSION 10. MICROWAVE HIGH-POWER TECHNIQUES 0845-1200, Independence Room Chairman: K. Tomiyasu, GE Valley Forge Space Center, Philadelphia, PA Organizer: H. Goldie, Westinghouse Defense & Electronic Systems, Baltimore, MD		SESSION 11. GIGABIT LOGIC 0845-1200, Lincoln Room Chairman: M. N. Yoder, Office of Naval Research, Wash., D.C. Organizer: S. Y. Narayan, RCA Laboratories, Princeton, NJ	
	Page		Page
10-1 A 400 KW Long Pulse X-Band Planetary Radar 0845 Rob Hartop and Dan Bathker, Jet Propulsion Laboratory, Pasadena, CA	136	0845 Introductory Remarks M. N. Yoder, ONR, Washington, D.C.	
10-2 Performance of a High-Power, 2.388 GHz Receiving Array in Wireless Power Transmission Over 1.54 Km 0915 R. M. Dickinson, Jet Propulsion Laboratory, Pasadena, CA	139	11-1 Gbit/s Pulse Regeneration and Amplification with GaAs MESFETs 0855 Heinz Beneking and Wilhelm Filensky, Technical University Aachen, Templergraben, Federal Republic of Germany	158
10-3 Optimization of the Efficiency and Other Properties of the Rectenna Element 0935 William C. Brown, Raytheon Co., Waltham, MA	142	11-2 Recent Development of Transferred Electron Logic Devices in Japan 0915 H. Yanai and T. Ikoma, University of Tokyo, Tokyo, Japan	161
10-4 High Power Monopulse Tracking Feed for Lincoln Laboratory High Resolution Radar 0955 A. F. Sciambi, Jr., Aeronautic Ford Corp., Palo Alto, CA	145	11-3 Transferred Electron Logic Devices (TELDs) for Gigabit Rate Signal Processing 0930 L. C. Upadhyayula, R. E. Smith, J. F. Wilhelm, S. T. Jolly and J. P. Paczkowski, RCA Laboratories, Princeton, NJ	164
10-5 A 2-Kilowatt Average Power X-Band Receiver Protector for the SOSI Radar 1035 H. Goldie, Westinghouse Defense & Electronic Systems Center, Baltimore, MD	148	11-4 Multiplexing and Demultiplexing Techniques with Gunn Devices in the Gbit/s Range 0950 Klaus Mause, Forschungsinstitut der Deutschen Bundespost Darmstadt, West Germany	166
10-6 Characteristics and Effects of High Power Breakdown in Waveguides 1055 Robert E. May, Hughes Aircraft Co., Culver City, CA	151	11-5 A Silicon Monolithic Technology for 1-2 GHz Analog Signal Processing 1030 D. Breuer, D. Claxton and A. Cosand, TRW Systems, Redondo Beach, CA	169
10-7 Fast, High Power, Octave Bandwidth Waveguide Microwave Switch 1115 Paul E. Bakeman, Jr. and Albert L. Armstrong, RRC International, Inc., Latham, NY	154	11-6 Clocked Diode Pulse Amplifiers for Microwave Bit Rates 1050 B. G. Bosch, U. Barabas, U. Wellens, and U. Langmann, Institut für Elektronik, Ruhr-Universität Bochum, Federal Republic of Germany	172

SESSION 13A. COMPUTER-AIDED DESIGN AND MEASUREMENT 1330-1700, Washington Room Chairman: V. G. Gelnovatch, USAECOM, Ft. Monmouth, NJ Organizer: B. S. Perlman, RCA Laboratories, Princeton, NJ		SESSION 14. MILLIMETER AND SUBMILLIMETER WAVE TECHNIQUES 1330-1700, Jefferson Room Chairman: William P. Ernst, Princeton University, Princeton, NJ Organizer: Jesse Taub, AIL/Div. Cutler Hammer, Inc., Melville, NY	
	Page		Page
13-1 INVITED: An Introduction to Simulation and Optimization 1330 J. W. Bandler, McMaster University, Hamilton, Ontario, Canada	204	14-1 INVITED: Present and Future Capability of Millimeter Wave Receivers 1330 J. Whelehan, AIL/Div. Cutler Hammer, Inc., Melville, NY	234
13-2 Automated Third-Order Distortion Measurements 1410 S. M. Perlow, RCA Laboratories, Princeton, NJ	207	14-2 Control of Manufacturing Distortions in the WT4 Millimeter Waveguide Medium 1400 V. J. Tarassov, Western Electric Co., Princeton, NJ D. J. Thomson and L. W. Hinderks, Bell Telephone Laboratories, Inc., Murray Hill, NJ	235
13-3 Large-Signal Device Characterization for Broadband Ka-Band Avalanche Diode Amplifier Design 1430 F. J. Bayuk and J. E. Raue, TRW Systems, Inc., Redondo Beach, CA	210	14-3 Surface Characteristics of Metals and Waveguide Attenuation at Millimeter-Wave Frequencies Between 25 and 180 GHz 1420 Frederick J. Tischer, Raleigh, NC	238
13-4 Third Generation Automatic Microwave Measurements 1450 W. R. Boley, General Dynamics, San Diego, CA	213	14-4 Low-Noise Traveling-Wave Maser Receiver for Three Millimeter Wavelength 1440 A. G. Cardasmenos, J. F. Shanley and K. S. Yngvesson, University of Massachusetts, Amherst, MA	241
SESSION 13B. MICROWAVE MEASUREMENT AND TECHNIQUES Chairman: Stephen F. Adam, Hewlett-Packard Co., Palo Alto, CA		14-5 Influence of Longitudinal Magnetic Field on the CW Submillimeter Wave Output from HCN Gas Laser 1500 M. Kawamura, M. Makiuchi, J. Yamada, and H. Hagisawa, Tokyo Institute of Technology, Tokyo, Japan	244
13-5 A New Load-Pull Characterization Method for Microwave Power Transistors 1530 Yoichiro Takayama, Nippon Electric Co., Ltd., Kawasaki, Japan	218		
13-6 A V-Band Network Analyzer/Reflection Test Unit 1550 L. T. Yuan, G. M. Yamaguchi and J. E. Raue, TRW Systems Group, Redondo Beach, CA	221		
13-7 An Improved Solid-State Noise Source 1610 Motohisa Kanda, National Bureau of Standards, Boulder, CO	224		
13-8 Automated Spectral Analysis of Microwave Oscillator Noise 1630 J. Robert Ashley, University of Colorado, Colorado Springs, CO, and Thomas A. Barley, Gustaf J. Rast, Jr., US Army Missile Command, Redstone Arsenal, AL	227		
13-9 Testing of a Multichannel Satellite Transponder Using Automatic Testing Equipment 1650 N. Epstein, R. Dikshit, RCA Limited, Quebec, Canada	236		

SESSION 12. MILLIMETER AND MICROWAVE INTEGRATED CIRCUITS

0845-1200, Jefferson Room

Chairman R H Knerr, Bell Telephone Laboratories, Inc., Allentown, PA

	Page
12-1 The Elliptical Dielectric Waveguide—A Very Useful Model for Some Microwave and Millimeter Wave Integrated Circuits and Components 0845 J Citerne, S Toutain, P Choteau and L. Raczy, Universite deLille I, Villeneuve d'Ascq, France	176
12-2 Ferrite Planar Circuit in Microwave IC 0905 Tanroku Miyoshi, Kobe University, Kobe, Japan	179
12-3 Passive Millimeter-Wave IC Components Made of Inverted Strip Dielectric Waveguides 0925 T Itoh and R Rudokas, University of Illinois at Urbana-Champaign, Urbana, IL	182
12-4 Millimeter-Wave Downconverter with Subharmonic Pump 0945 T F McMaster, M. V. Schneider, and W. W. Snell, Jr, Bell Telephone Laboratories, Inc., Holmdel, NJ	185
12-5 Microwave Integrated Circuit Receivers at Millimetric Wavelengths 1025 K J. Ming, B. J. Climer and T. H. Oxley, General Electric Co., Ltd., Wembley, England	188
12-6 MIC Transceiver Module for an L-Band Adapter Array Antenna 1045 Mark E Davis, General Electric Co., Utica, NY	191
12-7 Design Techniques for Band-Pass Filters Using Edge-Coupled Microstrip Lines on Fused Silica 1105 William H Childs, Comsat Laboratories, Clarksburg, MD	194
12-8 An Accurate Design of Resonant Frequencies of Dielectric Resonators 1125 P. Guillon, Y. Garault, Universite de Limoges, France	197
12-9 Coupling between a Microstrip Transmission Line and a Dielectric Resonator e.t.c. 1140 P. Guillon, Y. Garault, Universite de Limoges, France	200

SESSION 15. FERRITE COMPONENTS

1330-1700, Lincoln Room

Chairman: F. J. Rosenbaum, Washington University, St Louis, MO

	Page
15-1 INVITED: EGW Five Years Later 1330 Pietro DeSantis, Selenia, Rome, Italy	248
15-2 New Edge-Guided Mode Isolator Using Ferromagnetic Resonance Absorption 1400 Tsutomu Noguchi and Hidehiko Katoh, Nippon Electric Company, Ltd., Kawasaki, Japan	251
15-3 Field Distributions of the New Type of E.G. Mode Isolators 1415 Kiyomichi Araki and Yoshoyuki Naito, Tokyo Institute of Technology, Tokyo, Japan	254
15-4 The Edge-Guided or Peripheral Mode on Ferrite Loaded Striplines 1430 D. M. Bolle, Brown University, Providence, RI	257
15-5 A New Temperature Stabilized Waveguide Circulator 1455 Yasuvuki Tokumitsu, Toshikazu Kashara, and Hidemitsu Komizo, Fujitsu Laboratories, Ltd., Kawasaki, Japan	260
15-6 Low-Loss Broadband EHf Circulator 1525 W. S. Pitotrowski and J. E. Raue, TRW, Systems Group, Redondo Beach, CA	263
15-7 UHF-Band Lumped-Element Circulator for Medium-Power Applications 1545 Sohji Okamura and Takao Okata, Tokyo Shibaura Electric Co., Ltd., Kawasaki, Japan	266
15-8 Microwave Permeability Tensor of Partially Magnetized Ferrites 1605 Mitsuru Igarashi, Oyama Technical College, Oyama, Japan, and Yoshijuki Naito, Tokyo Institute of Technology, Tokyo, Japan	269
15-9 Frequency Selective High Power YIG Limiters 1620 S. N. Stitzer, and H. Goldie, Westinghouse Defense and Electronics Labs, Baltimore, MD P. R. Emtage, Westinghouse Research Labs, Pittsburgh, PA	272
15-10 Design and Performance of an Integrated Three-Channel Tracking YIG Preselector 1635 R. A. Sparks and R. DiBiase, Raytheon Co., Bedford, MA R. A. Craig, Addington Laboratories, Santa Clara, CA	275

SESSION 16. SURFACE-ACOUSTIC-WAVE RESONATORS

1330-1700, Independence Room

Chairman E. A. Mariani, USAECOM, Ft Monmouth, NJ

Organizer R. C. Williamson, MIT Lincoln Laboratory, Lexington, MA

	Page
16-1 The Physics and Equivalent Circuit of the Basic SAW Resonator 1330 R. C. M. Li, J. A. Alusow, and R. C. Williamson, MIT Lincoln Laboratory, Lexington, MA	280
16-2 INVITED: Acoustic-Surface-Wave Resonators for Bandpass Filter Applications 1350 G. L. Matthaei, University of California, Santa Barbara, CA	283
16-3 Surface-Acoustic-Wave Resonator Filters 1420 Lawrence H. Ragan, Texas Instruments, Inc., Dallas, TX	286
16-4 Surface-Acoustic-Wave Device for Doppler Filtering of Radar Burst Waveforms 1440 J. Melngailis and R. C. Williamson, MIT Lincoln Laboratory, Lexington, MA	289
16-5 INVITED: SAW Transform Signal Processing 1520 R. M. Hays, Texas Instruments, Inc., Dallas, TX	292
16-6 The Surface Acoustic Wave Reflective Dot Array (RDA) 1610 Leland P. Solie, Sperry Research Center, Sudbury, MA	295
16-7 Weighted Unidirectional Transducer SAW Filter at 328 MHz 1630 B. R. Potter and C. S. Hartmann, Texas Instruments, Inc., Dallas, TX	297
16-8 Periodic Frequency Response SAW Filters for a Tree Approach to Many-Tone Frequency Synthesis 1650 A. J. Slobodnik, Jr., and K. R. Laker, Air Force, Cambridge Research Laboratory (AFSC), Hansom Air Force Base, MA	300

**WEDNESDAY MORNING, JUNE 16
0845-1200**

SESSION 17. GENERAL JOINT INVITED SESSION 0845-0955, Presidential Suite Chairman: S. Okwit, LNR Communications, Inc., Hauppauge, NY 0845 INVITED: Future Microwave Markets in Telecommunication and Aviation Arthur H. Solomon, Arthur D. Little, Inc., Cambridge, MA		Page 304
SESSION 18. ACOUSTIC WAVE DEVICES AND TECHNIQUES 1015-1200, Washington Room Chairman: R. C. Williamson, MIT Lincoln Laboratories, Lexington, MA	SESSION 19. COMMERCIAL APPLICATIONS OF MICROWAVES 1015-1200, Jefferson Room Chairman: J. White, Microwave Associates, Burlington, MA Organizer: H. Howe, Microwave Associates, Burlington, MA	
		Page
18-1 INVITED: Scanning Acoustic Microscope 1015 Calvin F. Quate, Stanford University, Stanford, CA	19-1 INVITED: Practical MLS Design 1015 Dick Cox, Bendix Corp., Baltimore, MD	314
18-2 INVITED: Acoustic Surface Waveguides, With Similarities in Optics 1045 Arthur A. Oliner, Polytechnic Institute of New York, Brooklyn, NY	19-2 A 20-Watt C-Band Solid-State Transmitter for MLS Applications 1045 W. C. Tsai, R. E. Gray and M. I. Grace, Raytheon Co., Waltham, MA	315
18-3 INVITED: Commercial Application of a Surface-Wave Television IF Filter 1115 Robert L. Miller, and Adrian J. DeVries, Zenith Radio Corp., Elk Grove Village, IL	19-3 A Passive L-Band Radiometer for Remote Sensing of Earth Resources 1100 T. Flattau, S. Becker and A. Leber, AIL, Division of Cutler-Hammer, Melville, NY	318
	19-4 Cooperative Signal Processing Beacon Transponder for Airport Traffic Control 1115 Ashok K. Gorwara, Stanford Research Institute, Menlo Park, CA	322
	19-5 INVITED: Microwave Engineering Problems in the Microwave Oven 1130 John M. Osepchuck, Raytheon Research Division, Waltham, MA	325
		328
		331
		334

**WEDNESDAY AFTERNOON, JUNE 16
1330-1530**

SESSION 22. MICROWAVE ACTIVITIES IN GOVERNMENT LABORATORIES 1300-1530, Jefferson Room Chairman: L. R. Weisberg, Department of Defense, Washington, DC Organizer: L. Young, Department of Defense, Washington, DC and F. Sterzer, RCA Laboratories, Princeton, NJ	SESSION 23. REVIEW AND STATE-OF-THE-ART, BIOLOGICAL EFFECTS AND HAZARDS OF MICROWAVE RADIATION 1300-1530, Independence Room Chairman: S. W. Rosenthal, Polytechnic Institute of New York, Farmingdale, NY	
		Page
1300 Panel Discussion W. Eppers, Air Force Avionics Lab, Dayton, OH K. Fisher, USA Electronics Command, Ft. Monmouth, NJ H. Gerlach, Harry Diamond Labs, Washington, DC N. Lipetz, USA Electronics Command, Ft. Monmouth, NJ E. Maynard, Naval Electronics Laboratory, San Diego, CA C. J. Sletten, Air Force Cambridge Research Laboratory, Bedford, MA L. Strom, Defense Advanced Research Projects Agency, Arlington, VA L. R. Whicker, Naval Research Lab, Washington, DC	23-1 INVITED: A Biological Effects and Experimental Techniques 1300 A. W. Guy, University of Washington, Seattle, WA	356
	23-2 INVITED: Behavioral and CNS Effects 1320 D. R. Justesen, Veterans Administration Hospital, Kansas City, MO	356
	23-3 INVITED: Measurements and Dosimetry 1340 R. Baird, National Bureau of Standards, Boulder, CO	356
	23-4 INVITED: Medical Surveillance 1400 P. E. Tyler (M.D.), Naval Medical R & D Command, Bethesda, MD	356
	23-5 INVITED: Effects Other Than Biological 1420 J. Thiel, Texas Department of Health Resources, Austin, TX	356
	1440 Panel Discussion	

SESSION 20. PHASED-ARRAY COMPONENTS 1015-1200, Lincoln Room Chairman: L. R. Whicker, Naval Research Laboratory, Washington, D.C.		SESSION 21. TECHNOLOGY FORECASTING 1015-1215, Independence Room Chairman: A. Clavin, Hughes Aircraft Company, Canoga Park, CA	
	Page		Page
20-1 Variable Power Dividers in Satellite Systems 1015 E. W. Matthews, Aeronutronic Ford, Palo Alto, CA	338	21-1 Microwave Solid-State Power 1015 Tom Midford, Hughes Aircraft Co., Torrance, CA	352
20-2 Antenna Array for Limited Scan Applications 1035 R. A. Stern and J. Borowick, U.S. Army Electronics Command, Ft. Monmouth, NJ	341	21-2 Millimeter-Wave-Integrated Circuits 1045 John Kuno, Hughes Aircraft Co., Torrance, CA	352
20-3 Lithium Ferrite C-Band Latching Phase Shifter 1055 S. Gaglione and G. Hanley, Sperry Gyroscope, Great Neck, NY	344	21-3 Microwave Packaging Techniques 1115 Harlan Howe, Microwave Associates, Burlington, MA	352
20-4 Digital Phase Shifter Elements for a Ku-Band Phased Array Radar 1115 A. R. Wolfe and M. E. Davis, General Electric Co., Utica, NY	347	21-4 Microwave Transmission of Energy 1145 William Brown, Raytheon Corp., Waltham, MA	352

SESSION 24. ELECTROMAGNETIC THEORY 1300-1530, Lincoln Room Chairman: Gerald Whitman, New Jersey Institute of Technology, Newark, NJ Organizer: Stephen F. Adam, Hewlett-Packard Co., Palo Alto, CA	
	Page
24-1 INVITED: Evanescent Waves 1300 Leopold B. Felsen, Polytechnic Institute of New York, Brooklyn, NY	358
24-2 INVITED: Propagation in a Rectangular Waveguide Periodically Loaded with Resonant Irises 1330 T. E. Rozzi, Phillips Research Laboratories, Eindhoven, The Netherlands, and M. S. Navarro, University of Illinois at Urbana-Champaign, Urbana, IL	359
24-3 Scattering by Periodic Metal Surfaces with Sinusoidal Height Profile, A New Theoretical Approach 1400 G. Whitman, N.J. Institute of Technology, Newark, NJ, and F. Schwing, USAECOM, Ft. Monmouth, NJ	362
24-4 Theoretical Analysis of Open Ring Line 1420 C. Fray and A. Papiernik, Université de Limoges, Limoges, France	365
24-5 Pulse Broadening in Multimode Optical Fibers, Numerical Results 1440 J. A. Arnaud, Bell Telephone Laboratories, Inc., Holmdel, NJ	368
24-6 Prototype Networks in Broadband Parametric Amplifier Synthesis 1500 Joseph L. Tauritz, Microwave Laboratory, Delft University of Technology, Delft, The Netherlands	371

NOTES