

1987  
Technical  
Program

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*Papers by Sessions*

# **Technical Program Contents**

## **Session A**

### **Ziegfeld Room: Opening Ceremony**

**8:30 a.m. – 10:00 a.m.**

**Tuesday, June 9, 1987**

**Welcome**

Mr. Steve March  
Dr. Dave McQuiddy  
Dr. Rey Kagiwada

**Keynote Address**

Mr. Les Besser

## Session B

### Ziegfeld Room: Joint with Monolithics Symposium – Non-Linear and Power Circuits

**10:30 a.m. to Noon**

**Tuesday, June 9, 1987**

Chairman: D.R. Chen, Microwave Monolithics, Inc.  
Co-Chairman: Z.J. Lemnios, Ford Microelectronics, Inc.

<b>B-1</b>	<b>Nonlinear Modeling for MMICs (Invited)</b>	<b>85</b>
<b>10:30 a.m.</b>	Don Estreich Hewlett-Packard, Microwave Technology Division, Santa Rosa, CA	
<b>B-2</b>	<b>Ka-Band Monolithic GaAs Power FET Amplifiers</b>	<b>89</b>
<b>11:00 a.m.</b>	H.L. Hung, A. Ezzeddine, L. Holdeman, F. Phellips, J. Allison, A. Cornfeld, T. Smith, and H. Huang Comsat Laboratories, Clarksburg, MD.	
<b>B-3</b>	<b>Wideband GaAs MMIC Receiver</b>	<b>93</b>
<b>11:20 a.m.</b>	D.C. Yang, R. Estandiari, T.S. Lin and T. O'Neill TRW Inc., Microwave and Millimeter-Wave Technology Center Redondo Beach, CA	
<b>B-4</b>	<b>1-6 GHz GaAs MMIC Linear Attenuator with Integral Drivers</b>	<b>97</b>
<b>11:40 a.m.</b>	T. Andrade, G. Lazama, R. Benton Pacific Monolithics, Inc. Sunnyvale CA	

## Session C

### Gable 5, 6, 7 Room: Computer-Aided Design Analysis and Synthesis

10:30 a.m. to Noon

Tuesday, June 9, 1987

Chairman: Ulrich L. Rohde, Compact Software

<b>C-1</b>	<b>Simple Analytical Modeling of GaAs MESFET Nonlinear Behavior</b>	<b>103</b>
<b>10:30 a.m.</b>	T. Kawai, and F.J. Rosenbaum Washington University, St. Louis, MO.	
<b>C-2</b>	<b>Large-Signal Modeling of GaAs Power FET Amplifiers</b>	<b>107</b>
<b>10:40 a.m.</b>	M.A. Khatibzadeh, R.J. Trew and I.J. Bahl* Electrical and Computer Engineering Department North Carolina State Univ. Raleigh, NC *ITT-GTC, Roanoke, VA	
<b>C-3</b>	<b>Optimum Design of Non Linear Power FET Amplifiers</b>	<b>111</b>
<b>10:50 a.m.</b>	C. Guo*, M. Camiade**, D. Rousset*, A. Cessey**, J. Obregon*, and A. Bert** *IRCOM Université de Limoges, France **Thomson Composants DHM, Massy, France	
<b>C-4</b>	<b>Generalized Power Series Analysis of Intermodulation Distortion in a MESFET Amplifier: Simulation and Experiment</b>	<b>115</b>
<b>11:10 a.m.</b>	G.W. Rhyne and M.B. Steer Department of Electrical and Computer Engineering North Carolina State University, Raleigh, NC	
<b>C-5</b>	<b>The Spectral Balance: A General Method for Analysis of Nonlinear Microwave Circuits Driven by Non-Harmonically Related Generators</b>	<b>119</b>
<b>11:30 a.m.</b>	M. Gayral, E. Ngoya, R. Quere, J. Rousset, J. Obregon Université de Limoges, France	
<b>C-6</b>	<b>Modeling of Circular Spiral Inductors for MMICs</b>	<b>123</b>
<b>11:50 a.m.</b>	I. Wolff Dept. of Elect. Engr. Duisburg University, FRG. and H. Kapusta, Siemens AG, Munchen, FRG.	

## Session D

### Gable 3, 4 Room: Microwave Filters and Multiplexers

10:30 a.m. to Noon

Tuesday, June 9, 1987

Chairman: R.V. Snyder, R.S. Microwave Company, Inc.

<b>D-1</b>	<b>Quasi-Lowpass, Quasi-Elliptic Symmetric Filter</b>	<b>129</b>
<b>10:30 a.m.</b>	M.C. Horton MCH Associates Thousand Oaks, CA	
<b>D-2</b>	<b>Dielectric High-Power Bandpass Filter Using Quarter-Cut TE<sub>018</sub></b>	
<b>10:50 a.m.</b>	<b>Image Resonators for Cellular Base Stations</b>	<b>133</b>
	T. Nishikawa, K. Wakino, K. Tsunoda, Y. Ishikawa Murata Manufacturing Co., Ltd. Kyoto, Japan	
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<b>11:10 a.m.</b>	Y. Kobayashi, and K. Kubo Department of Electrical Engineering Saitama University Urawa, Saitama, Japan	
<b>D-4</b>	<b>Dual Mode Dielectric Resonator Filters Without Iris</b>	<b>141</b>
<b>11:20 a.m.</b>	K.A. Zaki and C. Chen Electrical Engineering Department University of Maryland College Park, MD A.E. Atia Comsat Corporation, 950 L'Enfant Plaza S.W. Washington, DC	
<b>D-5</b>	<b>Quadruple-Mode Filters</b>	<b>145</b>
<b>11:30 a.m.</b>	R.R. Bonetti and A.E. Williams Comsat Laboratories Clarksburg, MD	
<b>D-6</b>	<b>Matched Four Port Hybrid Filters</b>	<b>149</b>
<b>11:50 a.m.</b>	C.I. Mobbs Filtronic Components, Ltd. Shipley, UK	

## Session E

### Ziegfeld Room: Joint with Monolithics Symposium – Low Noise Techniques

**1:30 p.m to 3:00 p.m.**

**Tuesday, June 9, 1987**

Chairman: V. Nair, Motorola, Inc.  
Co-Chairman: S. Moghe, Pacific Monolithics

<b>E-1</b>	<b>A 2-20 GHz, High-Gain, Monolithic HEMT Distributed Amplifier</b>	<b>155</b>
<b>1:30 p.m.</b>	C. Nishimoto, R. LaRue, S. Bandy, N. Day, J. Eckstein, C. Webb, C. Yuen, and G. Zdasiuk Varian Research Center, Palo Alto, CA	
<b>E-2</b>	<b>State-of-the-Art Low Noise GaAs MESFET and Monolithic Amplifier Using Shallow Ion Implanted Channels</b>	<b>161</b>
<b>1:50 p.m.</b>	K.G. Wang and S.K. Wang Hughes Aircraft Company Torrance, CA	
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<b>2:10 p.m.</b>	C.P. Hutchinson, W. Kennan Avantek, Inc. Santa Clara, CA	
<b>E-4</b>	<b>Wide-Band Monolithic GaAs Phase Detection for Homodyne Reception</b>	<b>169</b>
<b>2:30 p.m.</b>	P. Jean, V. Pauker, and P. Dautriche Laboratoires D'Electronique Et De Physique Appliquée Limeil-Brevannes, France	

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### Gable 5, 6, 7 Room: Microwave Integrated Circuits

1:30 p.m. to 3:00 p.m.

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Chairman: C. Buntschuh, Narda Microwave

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<b>F-5</b> <b>2:30 p.m.</b>	<b>Fast Switching X and Ku Band Multi Frequency Dielectric Resonator Oscillator Using a Single GaAs FET</b> A.P.S. Khanna and R. Sooho Avantek Inc. Santa Clara, CA	<b>189</b>
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### Gable 3, 4 Room: Couplers and Power Dividers

1:30 p.m. to 3:00 p.m.

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Chairman: Peter LaTourette, Consultant

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3:30 p.m. to 5:00 p.m.

Tuesday, June 9, 1987

Chairman: James Schellenberg, Hughes Aircraft Co.

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	Council for Scientific and Industrial Research	
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## Session K

### Ziegfeld Room: MMW Technology and Applications

8:30 a.m. to 10:00 a.m.

Wednesday, June 10, 1987

Chairman: J. Horton, TRW

<b>K-1</b>	<b>Application of Grating-Filter Techniques in Microstrip to Obtain Narrowband Millimeter-Wave Bandpass Filters with Low Radiation Losses</b>	<b>425</b>
<b>8:30 a.m.</b>	P.K. Ikalainen and G.L. Matthaei Department of Electrical and Computer Engineering University of California Santa Barbara, CA	
<b>K-2</b>	<b>Recent Advances in the Modelling and Performance of Millimeter Wave InP and GaAs VCO's and Oscillators</b>	<b>429</b>
<b>8:50 a.m.</b>	L.D. Cohen, and E. Sard Eaton Corp, AIL Division Melville, NY	
<b>K-3</b>	<b>A 94 GHz Synchronized Oscillator-Chain for Fast, Continuous 360° Phase Modulation</b>	<b>433</b>
<b>9:10 a.m.</b>	H. Barth AEG Aktiengesellschaft Ulm, W. Germany	
<b>K-4</b>	<b>Millimeter Wave Characteristics of Fresnel Zone Plates</b>	<b>437</b>
<b>9:30 a.m.</b>	D.N. Black and J.C. Wiltse Georgia Tech Research Institute Georgia Institute of Technology Atlanta, GA	
<b>K-5</b>	<b>35 GHz Low Noise HEMT Amplifier</b>	<b>441</b>
<b>9:40 a.m.</b>	J.M. Schellenberg, M.V. Maher, S.K. Wang, K.G. Wang and K.K. Yu Hughes Aircraft Company Microwave Products Division Torrance, CA	

## Session L

### Gable 5, 6, 7 Room: Microwave Measurements

8:30 a.m. to 10:00 a.m.

Wednesday, June 10, 1987

Chairman: H. George Oltman, Jr., Tecom Industries

<b>L-1</b>	<b>A Nondestructive Microwave Beam Lead Diode Measurement</b>	<b>445</b>
<b>8:30 a.m.</b>	J.F. White and S.J. Parisi M/A-COM, Inc. Burlington, MA	
<b>L-2</b>	<b>A Measurement and Calibration Technique for the Accurate Measurement of Amplifier S Parameters</b>	<b>449</b>
<b>8:40 a.m.</b>	M. Roos and V. Sotoudeh EIP Microwave, Inc. San Jose, CA	
<b>L-3</b>	<b>An 18 to 26.5 GHz Waveguide Load-Pull System Using Active-Load Tuning</b>	<b>453</b>
<b>8:50 a.m.</b>	K. Kotzebue, T.S. Tan and D. McQuate Microwave Technology Division Hewlett-Packard Co., Santa Rosa, CA	
<b>L-4</b>	<b>Dielectric Constant Evaluation of Insulating Materials: an Accurate, Practical Measurement System</b>	<b>457</b>
<b>9:10 a.m.</b>	J.A. Weiss Department of Physics Worcester Polytechnic Institute, MA and D.A. Hawks ASIC Package Engineering Digital Equipment Corp., Hudson, MD	
<b>L-5</b>	<b>Method for Determining Dielectric Properties of Solids from Measurements on Pulverized Materials</b>	<b>461</b>
<b>9:30 a.m.</b>	S.O. Nelson U.S. Dept. of Agriculture Athens, Georgia	
<b>L-6</b>	<b>Dielectric and Temperature Measurements During Microwave Curing of Epoxy Resins in a Sweeping Resonant Cavity</b>	<b>465</b>
<b>9:50 a.m.</b>	J. Low, M. Finzel, J. Asmussen* and M.C. Hawley Dept. of Chemical Engineering *Dept. of Electrical Engineering & System Science, Michigan State University, East Lansing, MI	

# Session M

## Gable 3, 4 Room: Communications Systems

8:30 a.m. to 10:00 a.m.

Wednesday, June 10, 1987

Chairman: Peter G. Petrelis, TRW

<b>M-1</b>	<b>Performance of a Ka-Band Satellite System Under Variable Transmitted Signal Power Conditions</b>	<b>471</b>
<b>8:30 a.m.</b>	G. Fujikawa and R. Kerczewski NASA Lewis Research Center Cleveland, OH	
<b>M-2</b>	<b>Phase Transients in Digital Radio Local Oscillators</b>	<b>475</b>
<b>8:50 a.m.</b>	M. Znojewicz and B. Vassilakis Northern Telecom Canada LTD. Montreal, Canada	
<b>M-3</b>	<b>Power Amplifier for Microwave Digital Radios with Inherent Phase Compensation</b>	<b>479</b>
<b>9:10 a.m.</b>	P. Bura, D. Gelerman, P. Ntake Northern Telecom St. Laurent, Canada	
<b>M-4</b>	<b>Advanced 6/4 GHz Receiver for Space Application</b>	<b>483</b>
<b>9:30 a.m.</b>	L. Duque, S. Jarvis, G. Gatti*, and R. Dion Spar Aerospace Ltd. Montreal, Canada *European Space Agency	
<b>M-5</b>	<b>GHz Band Monolithic Modem ICs</b>	<b>487</b>
<b>9:40 a.m.</b>	H. Kikuchi, S. Konaka, and M. Umehira NTT Electrical Communications Laboratories Kanagawa, Japan	

## Session N

Ziegfeld Room: – Focused Session –

**Advances in Millimeter Wave Systems (60-230 GHz)**

**10:30 a.m. to Noon**

**Wednesday, June 10, 1987**

Chairman: James C. Wiltse, Georgia Tech Research Institute

<b>N-1 (Invited)</b>	<b>Recent Advances in Millimeter Wave Instrumentation for Radio Astronomy</b>	<b>493</b>
<b>10:30 a.m.</b>	J.M. Payne National Radio Astronomy Observatory Tucson, AZ	
<b>N-2 (Invited)</b>	<b>A Survey of Advanced Developments in Millimeter Wave Seeker Front Ends</b>	<b>497</b>
<b>10:50 a.m.</b>	T.T. Fong TRW Redondo Beach, CA	
<b>N-3 (Invited)</b>	<b>A High Power Coherent 95 GHz Radar (HIPCOR-95)</b>	<b>499</b>
<b>11:10 a.m.</b>	J.C. Butterworth Georgia Tech Research Institute Atlanta, GA	
<b>N-4 (Invited)</b>	<b>Recent Advances in Gyrotrons and Free Electron Lasers</b>	<b>503</b>
<b>11:30 a.m.</b>	R.J. Temkin Plasma Fusion Center, MIT Cambridge, MA	

# Session O

## Gable 5, 6, 7 Room: Noise Measurements

10:30 a.m. to Noon

Wednesday, June 10, 1987

Chairman: Stephen F. Adam, Adam Microwave Consulting, Inc.

<b>O-1</b>	<b>A New Measurement System for Oscillator Noise</b>	
<b>10:30 a.m.</b>	<b>Characterization</b>	<b>509</b>
	A.N. Riddle	
	Avantek Inc.	
	Milpitas, CA	
	and R.J. Trew	
	North Carolina State University	
	Raleigh, NC	
<b>O-2</b>	<b>Microwave Noise Characterization of GaAs MESFETs by</b>	
<b>10:50 a.m.</b>	<b>On-Wafer Measurement of the Output Noise Current</b>	<b>513</b>
	M.S. Gupta*, O. Pitzalis, Jr., S.E. Rosenbaum and P.T. Greiling	
	Hughes Research Laboratories	
	Malibu, CA	
	*University of Illinois at Chicago	
<b>O-3</b>	<b>A New Automated Noise and Gain Parameter Measurement</b>	
<b>11:10 a.m.</b>	<b>System</b>	<b>517</b>
	V.A. Hirsch and T.H. Miers	
	Ball Aerospace Systems Division	
	Boulder, CO	
<b>O-4</b>	<b>The Evaluation of Phase Noise in Low Noise Oscillators</b>	<b>521</b>
<b>11:20 a.m.</b>	D.M. Harrison, M.J. Howes and R.D. Pollard	
	Dept. of Electrical and Electronic Engineering	
	University of Leeds, UK	
<b>O-5</b>	<b>New Millimeter Wave Noise Sources with High Reliability</b>	<b>525</b>
<b>11:40 a.m.</b>	P. Tong, N. Fernandez, J. Gladstone and E. Cristal	
	Hewlett-Packard	
	Palo Alto, CA	

## Session P

### Gable 3, 4 Room: Radar Systems

10:30 a.m. to Noon

Wednesday, June 10, 1987

Chairman: Kiyo Tomiyasu, General Electric Co.

P-1	<b>Solid State Transmitter/Modulator for the Mode Select</b>	
10:30 a.m.	<b>Airport Beacon System Sensor</b>	531
	T.M. Nelson, M.J. Reinhart, K.J. Yoo, D.A. Poltorak and R.K. Palmer	
	Westinghouse Electric Corp.	
	Baltimore, MD	
P-2	<b>94 GHz Integrated Monopulse Radar Demonstrator</b>	535
10:50 a.m.	C.E. Burnett	
	Marconi Electronic Devices Ltd.	
	Lincoln, England	
P-3	<b>Self Adaptive Bandpass Filters with Applications to</b>	
11:10 a.m.	<b>'Frequency Set-On' Oscillators</b>	539
	J.D. Rhodes	
	Filtronic Components Ltd.	
	Charlestown, UK	
P-4	<b>Noise in Pulsed Microwave Systems</b>	543
11:30 a.m.	C. Wong, E. Caramanis, A. Skantzaris, J. Bender and R. Campbell	
	Raytheon Co.	
	Bedford, MA	

# Session Q

## Garland Ballroom: Open Forum II

1:30 to 3:30 p.m.

Wednesday, June 10, 1987

<b>Q-1</b>	<b>Multioctave Multithrow Active Switches</b>	<b>549</b>
	D.L. Dunn, P.G. Asher, and C.D. Chang	
	Hughes Aircraft Company	
	Torrance, CA	
<b>Q-2</b>	<b>A Comparative Study of TEGFET and MESFET Large Signal Characteristics and Saturation Mechanisms</b>	<b>553</b>
	M. Weiss	
	Thomson Semiconductors, Orsay, France	
	and D. Pavlidis	
	University of Michigan, Ann Arbor, MI	
<b>Q-3</b>	<b>Comparative Study of Phase Noise in HEMT and MESFET Microwave Oscillators</b>	<b>557</b>
	M. Pouysegur	
	LAAS du CNRS, Toulouse, France	
	J. Graffeuil, J.F. Sautereau	
	Université Paul Sabatier, Toulouse, France	
	and J.P. Fortea	
	Centre Nat. D'Études Spatiales, Toulouse, France	
<b>Q-4</b>	<b>A GaAs Monolithic 6 GHz Low-Noise Amplifier for Satellite Receivers</b>	<b>561</b>
	R. Mott	
	COMSAT Laboratories	
	Clarksburg, MD	
<b>Q-5</b>	<b>Miniature Gain Block for Satellite Communication Transceivers</b>	<b>565</b>
	A. Fathy, R. Brown and E. Belohoubek	
	RCA Laboratories	
	Princeton, NJ	
<b>Q-6</b>	<b>A GaAs Microwave MESFET with Extremely Low Distortion</b>	<b>569</b>
	G.G. Zhou, T. Curtis and R. Chen	
	Gould Inc. Microwave Products Division	
	San Jose, CA	
<b>Q-7</b>	<b>The Deformable-Channel Model-A New Approach to High-Frequency MESFET Modeling</b>	<b>573</b>
	F. Crowne, A. Eskandarian, H.B. Sequeira and R. Jahkete	
	Martin Marietta Laboratories/Gamma Monolithics	
	Baltimore, MD	

<b>Q-8</b>	<b>Load-Line Analysis in the Frequency Domain with Distributed Amplifier Design Examples</b>	<b>575</b>
	M.L. Salib, D.E. Dawson, and H.K. Hahn	
	Westinghouse Electric Corp.	
	Baltimore, MD	
<b>Q-9</b>	<b>Fast Settling, Low Noise Ku Band Fundamental Bipolar VCO</b>	<b>579</b>
	A.P.S. Khanna	
	Avantek Inc.	
	Santa Clara, CA	
<b>Q-10</b>	<b>Long Term Stability of DROs Compared to Crystal Oscillators</b>	<b>583</b>
	K.R. Varian	
	Rockwell International	
	Dallas, TX	
<b>Q-11</b>	<b>Low Phase Noise X/KU-Band VCO</b>	<b>587</b>
	D.A. Boyd	
	Eaton Corp., Microwave Products Division	
	Sunnyvale, CA	
<b>Q-12</b>	<b>Microwave Resistance of Gallium Arsenide and Silicon P-I-N Diodes</b>	<b>591</b>
	R. Caverly	
	Southeastern Mass. University	
	N. Dartmouth, MA	
	and G. Hiller	
	M/A-COM Semiconductor Products	
	Burlington, MA	
<b>Q-13</b>	<b>W Band Crossbar Mixers Integrated Entirely on a Single-Sided Substrate Yielding 15 GHz Instantaneous Bandwidth</b>	<b>595</b>
	S. Low	
	COM DEV Ltd.	
	Cambridge, Canada	
<b>Q-14</b>	<b>Diode Phase Shifter and Model in Waveguide</b>	<b>599</b>
	J.A. Lester and C.M. Jackson	
	TRW	
	Redondo Beach, CA	
	and K. Chang	
	Texas A & M University, TX	

<b>Q-15</b>	<b>Wide-Band True Time Delay Phase Shifter Device</b> P.R. Herczfeld, A. Daryoush Drexel University, Philadelphia, PA M. Kieli Thomas & Betts, Raritan, NJ S. Siegel RCA, David Sarnoff Lab, Princeton, NJ and R. Soref RACD/ESO Hanscom AFB, MA	<b>603</b>
<b>Q-16</b>	<b>A Novel Whiskerless Schottky Diode for Millimeter and Submillimeter Wave Application</b> W.L. Bishop, K. McKinney, R.J. Mattauch, T.W. Crowe, and G. Green Department of Electrical Engineering University of Virginia, Charlottesville, VA	<b>607</b>
<b>Q-17</b>	<b>Filled Image Guide for Millimeter-Wave Circuits</b> M.Q. Shi and D.H. Jiang Peking University Beijing, People's Republic of China	<b>611</b>
<b>Q-18</b>	<b>A Tunable Grating Impedance Transformer</b> J.D. Xu Northwestern Polytechnical University Xian Shaanxi, China	*
<b>Q-19</b>	<b>A Novel Technique for Evaluation and Integration of Connectorless (Drop-In) Microwave Components</b> D. Herstein General Microwave Corporation Amityville, NY	<b>613</b>
<b>Q-20</b>	<b>Coupling Between Hybrid Mode Dielectric Resonators</b> K.A. Zaki and C.M. Chen Electrical Engineering Department University of Maryland College Park, MD	<b>617</b>
<b>Q-21</b>	<b>Exact Calculation of Scattering Parameters of the Coplanar – Slot Transition in a Unilateral Finline Technology</b> O. Picon, J.P. Lefevre, V.F. Hanna CNET, Issy-Les-Moulineaux, France and J. Citerne Laboratoires Structures Rayonnantes, Rennes Cedex, France	<b>621</b>

\*Manuscript not available at the time of printing

<b>Q-22</b>	<b>Analysis of VLSI Interconnect Structures</b> L. Carin, Q. Xu, and K. J. Webb University of Maryland College Park, MD and J.A. McClintock Martin Marietta Labs Baltimore, MD	<b>625</b>
<b>Q-23</b>	<b>Towards a Unified Efficient Algorithm for Characterizing The Planar Periodic Waveguides</b> K. Wu and P. Saguet Laboratoire D'Électromagnétisme Et Optique Guidée E.N.S.R.G. Grenoble, France	<b>629</b>
<b>Q-24</b>	<b>Centering and Tolerancing the Components of Microwave Amplifiers</b> A. MacFarland, J. Purviance Department of Electrical Engineering University of Idaho Moscow, Idaho and D. Loescher, K. Diegert, and T. Ferguson Sandia National Laboratories Albuquerque, NM	<b>633</b>
<b>Q-25</b>	<b>Analysis of Discontinuities in Optical Waveguides</b> J.B. Davies and B.M.A. Rahman University College London, UK	<b>637</b>
<b>Q-26</b>	<b>Optical Crosstalk Due to Electrical Coupling in High Speed LiNbO<sub>3</sub></b> P. Perlmutter, J.E. Baran and Y Silberberg Bell Communications Research Red Bank, NJ	<b>641</b>
<b>Q-27</b>	<b>Optoelectronic Generation and Sensing of Millimeter Waves</b> A.P. DeFonzo and C. Lutz University of Massachusetts Amherst, MA	<b>645</b>
<b>Q-28</b>	<b>Generation of Kilowatt/Kilovolt Broadband Microwave Bursts with a Single Picosecond Photoconductive Switch</b> H.A. Sayadian, M.G. Li and C.H. Lee University of Maryland College Park, MD	<b>649</b>

<b>Q-29</b>	<b>Large Signal Modulation of Semiconductor Lasers with Optical Feedback for Millimeter Wave Applications</b>	<b>653</b>
	V.M. Contarino	
	Naval Air Development Center	
	Warminster, PA	
	and A.S. Dayoush and P.R. Herczfeld	
	Drexel University	
	Philadelphia, PA	
<b>Q-30</b>	<b>Optically Controlled Millimeter Wave Phase Shifter in a Metallic Waveguide</b>	<b>657</b>
	G. Hadjicostas and J. Butler	
	Southern Methodist University	
	Dallas, TX	
	and M. Scott	
	LTV Aerospace & Def. Co.	
	Dallas, TX	
<b>Q-31</b>	<b>A New Generalised Approach to the Design of Microwave Oscillators</b>	<b>661</b>
	Y. Xuan and C.M. Snowden	
	Department of Electrical & Electronic Engineering	
	University of Leeds	
	Leeds, UK	
<b>Q-32</b>	<b>A Refractory Self-Aligned Gate Process for Monolithically Combined Microwave and Digital GaAs ICs</b>	<b>665</b>
	A. Geissberger, R. Sadler, E. Griffin, H. Singh,	
	I. Bahl and M. Drinkwine	
	ITT Gallium Arsenide Technology Center	
	Roanoke, VA	
<b>Q-33</b>	<b>Analysis of Multiple-Step Radial-Resonator Waveguide Diode Mounts with Application to IMPATT Oscillator Circuits</b>	<b>669</b>
	B.D. Bates	
	Department of Electrical and Electronic Engineering	
	University of Melbourne	
	Australia	
<b>Q-34</b>	<b>Absorbed Power Distribution in Heart Lung System Due to Microwave Irradiation at 750 MHz</b>	<b>673</b>
	J. Behari	
	School of Environmental Sciences	
	Jawaharlal Nehru University	
	New Delhi, India	

<b>Q-35</b>	<b>Dielectric-Resonator-Stabilized Second Harmonic Ka-Band Microstrip Gunn Oscillator</b>	<b>677</b>
	S. Zhong-Liang and C. Ning	
	Department of Radio Engineering	
	Nanjing Institute of Technology	
	Nanjing, China	
<b>Q-36</b>	<b>Edge Corrections for Microstrip Planar Analysis Models</b>	<b>681</b>
	H.A. Burger	
	Goodyear Aerospace Corporation	
	Litchfield Park, AZ	
<b>Q-37</b>	<b>Characterization Method and Simple Design Formulas of MCS Lines Proposed for MMICs</b>	<b>685</b>
	E. Yamashita, K.R. Li, E. Kaneko, and Y. Suzuki	
	University of Electro-Communications	
	Tokyo, Japan	
<b>Q-38</b>	<b>Global Stability Analysis of Microwave Circuits by a Frequency-Domain Approach</b>	<b>689</b>
	V. Rizzoli	
	Department Di Electronica	
	University of Bologna	
	Bologna, Italy	
	A. Neri	
	Fondazione Ugo Bordoni	
	Bologna, Italy	
<b>Q-39</b>	<b>Analysis Equations for Shielded Suspended Substrate Microstrip Line and Broadside-Coupled Stripline</b>	<b>693</b>
	Y. Shu, X. Qi, Y. Wang	
	Department of Radio Engineering	
	Nanjing Institute of Technology	
	Nanjing, China	
<b>Q-40</b>	<b>The Effectiveness of Four Direct Search Optimization Algorithms</b>	<b>697</b>
	R.W. Rhea	
	Scientific Atlanta, Inc.	
	Atlanta, GA	
<b>Q-41</b>	<b>Computer Aided Design Models for Unilateral Finlines with Finite Metallization Thickness and Arbitrarily Located Slot Widths</b>	<b>703</b>
	P. Pramanick, R.R. Mansour	
	COM DEV Ltd.	
	Cambridge, Canada	
	and R.H. MacPhie	
	University of Waterloo	
	Ontario, Canada	

<b>Q-42</b>	<b>Puff, an Interactive Microwave Computer Aided Design Program for Personal Computers</b>	<b>707</b>
	R.C. Compton, W.L. Williams, and D.B. Rutledge	
	Division of Engineering and Applied Science	
	California Institute of Technology	
	Pasadena, CA	
<b>Q-43</b>	<b>An Automatic Decomposition Technique for Device Modeling and Large Circuit Design</b>	<b>709</b>
	J.W. Bandler and Q.J. Zhang	
	Electrical Engineering Department	
	McMaster University	
	Hamilton, Canada	
<b>Q-44</b>	<b>Modeling the Dispersion in a Suspended Microstripline</b>	<b>713</b>
	R.S. Tomar	
	Bolriet Technologies, Inc.	
	Carleton Place, Ontario, Canada	
	and P. Bhartia	
	Department of National Defense	
	Ottawa, Ontario, Canada	
<b>Q-45</b>	<b>An Almost-Periodic Fourier Transform for Use with Harmonic Balance</b>	<b>717</b>
	K.S. Kundert, G. Sorkin and A. Sangiovanni-Vincentelli	
	University of California	
	Berkeley, CA	
<b>Q-46</b>	<b>Generalized Analysis of E-Plane Septa Discontinuities</b>	<b>721</b>
	A. Rong, S. Li	
	Nanjing Institute of Technology	
	Nanjing, China	

## Session R

### Gable 5, 6, 7 Room: Guided Waves

1:30 p.m. to 3:00 p.m.

Wednesday, June 10, 1987

Chairman: Prof. Jeffrey B. Knorr, Naval Postgraduate School

<b>R-1</b>	<b>Simple Analytic Formulas for Dielectric Waveguides</b>	<b>727</b>
<b>1:30 p.m.</b>	S.T. Peng New York Institute of Technology Old Westbury, NY S.L. Wang University of New Haven West Haven, CT F.K. Schwering U.S. Army CECOM Ft. Monmouth, NJ	
<b>R-2</b>	<b>Guidance and Leakage Properties of Offset Groove Guide</b>	<b>731</b>
<b>1:50 p.m.</b>	H. Shigesawa, M. Tsuji Doshisha University Koyoto, Japan A.A. Oliner Polytechnic University Brooklyn, NY P. Lampariello, F. Frezza University of Rome "La Sapienza" Rome, Italy	
<b>R-3</b>	<b>Analysis and Design of Microslab™ Waveguide</b>	<b>735</b>
<b>2:10 p.m.</b>	B. Young and T. Itoh University of Texas Austin, TX	
<b>R-4</b>	<b>Microstrip Circuit Elements on Cylindrical Substrates</b>	<b>739</b>
<b>2:30 p.m.</b>	A. Nakatani Phraxos Research and Development Inc. Santa Monica, CA and N.G. Alexopoulos University of California Los Angeles, CA	
<b>R-5</b>	<b>Analysis of Double-Layered Finlines Containing a Magnetized Ferrite</b>	<b>743</b>
<b>2:50 p.m.</b>	M. Geshiro On Leave From Ehime University, Ehime, Japan and T. Itoh University of Texas Austin, TX	

# Session S

## Ziegfeld Room: – Focused Session –

### Advances in Millimeter Wave Technology (60-230 GHz)

1:30 p.m. to 3:00 p.m.

Wednesday, June 10, 1987

Chairman: James C. Wiltse, Georgia Tech Research Institute

<b>S-1 (Invited)</b>	<b>Millimeter Wave Material Properties and Measurements</b>	<b>747</b>
<b>1:30 p.m.</b>	G.J. Simonis U.S. Army Harry Diamond Laboratories Adelphi, MD	
<b>S-2 (Invited)</b>	<b>Advances in HEMT Technology and Applications</b>	<b>749</b>
<b>1:50 p.m.</b>	P.M. Smith, P.C. Chao, K.H.G. Duh, L.F. Lester B.R. Lee and J.M. Ballingall General Electric Co. Syracuse, NY	
<b>S-3 (Invited)</b>	<b>Imaging Antenna Arrays</b>	*
<b>2:10 p.m.</b>	D. Rutledge California Institute of Technology Pasadena, CA	
<b>S-4 (Invited)</b>	<b>GaAs Schottky Barrier Diodes for High Sensitivity Millimeter and Submillimeter Wavelength Receivers</b>	<b>753</b>
<b>2:30 p.m.</b>	T.W. Crowe and R.J. Mattauch University of Virginia Charlottesville, VA	

\*Manuscript not available at the time of printing

## Session T

### Ziefeld Room: Invited European Session

3:30 p.m. to 5:00 p.m.

Wednesday, June 10, 1987

Chairman: R. Sparks, Raytheon

<b>T-1 (Invited)</b>	<b>Detection of Millimeter and Submillimeter Waves</b>	<b>759</b>
<b>3:30 p.m.</b>	E. Kollberg Chalmers University of Technology Gothenburg, Sweden	
<b>T-2 (Invited)</b>	<b>State-of-the-Art of MMIC Technology and Design in West Germany</b>	<b>763</b>
<b>4:00 p.m.</b>	E. Pettenpaul Siemens AG Munich, West Germany	
<b>T-3 (Invited)</b>	<b>Modeling of New Microwave Devices</b>	<b>767</b>
<b>4:30 p.m.</b>	G. Salmer Université de Lille France	

## Session U

### Gable 5, 6, 7 Room: Waveguide Discontinuity Structures

3:30 p.m. to 5:00 p.m.

Wednesday, June 10, 1987

Chairman: James W. Mink, U.S. Army Research Office

<b>U-1</b> 3:30 p.m.	<b>A Dynamic Model for Microstrip – Slotline Transition and Related Structures</b> H.-Y. Yang and N.G. Alexopoulos Electrical Engineering Department University of California Los Angeles, CA	773
<b>U-2</b> 3:50 p.m.	<b>Characterization of Stripline Crossing by Transverse Resonance Analysis</b> T. Uwano Matsushita Electric Co. Osaka, Japan R. Sorrentino University of Rome Tor Vergata Roma, Italy and T. Itoh University of Texas Austin, TX	777
<b>U-3</b> 4:10 p.m.	<b>An Improved Multimode Small Aperture/Obstacle Theory</b> M. Guglielmi and A.A. Oliner Polytechnic University Brooklyn, NY	781
<b>U-4</b> 4:30 p.m.	<b>An Accurate Analysis of Discontinuities in Dielectric Rectangular Waveguide and its Application to Grating Filters</b> M. Tsuji and H. Shigesawa Department of Electronics Doshisha University Kyoto, Japan	785
<b>U-5</b> 4:50 p.m.	<b>Variational Bound Analysis of a Discontinuity in Nonradiative Dielectric Waveguide</b> J.C. Olivier and J.A.G. Malherbe University of Pretoria South Africa	789

## Session V

### Gable 3, 4 Room: Microwave Acoustics: Developments & Applications

3:30 p.m. to 5:00 p.m.

Wednesday, June 10, 1987

Chairman: Ted Lukaszek, U.S. Army Labcom

<b>V-1</b>	<b>Applications of Custom SAW Devices</b>	*
<b>3:30 p.m.</b>	Ronald C. Rosenfeld Sawtek Inc. Orlando, FL	
<b>V-2</b>	<b>Evolution of SAW Technology from Discrete Devices to Functional RF Building Blocks</b>	<b>793</b>
<b>3:50 p.m.</b>	H.G. Vollers and D. L. Ash RF Monolithics Dallas TX	
<b>V-3</b>	<b>Miniature SAW Antenna Duplexer for Portable Telephone</b>	<b>797</b>
<b>4:10 p.m.</b>	M. Hikita, Y. Ishica, T. Tabuchi and H. Kojima Central Research Laboratory Hitachi, Ltd. Tokyo, Japan and K. Kurosawa Hitachi Toukai Works Katsuta, Japan	
<b>V-4</b>	<b>Design and Evaluation of UHF Monolithic Film Resonator-Stabilized Oscillators and Bandpass Filters</b>	<b>801</b>
<b>4:20 p.m.</b>	M.M. Driscoll, R.A. Moore, J.F. Rosenbaum Westinghouse Defense and Electronics Center Baltimore, MD and S.V. Krishnaswami, and J.R. Szedon Westinghouse Research and Development Center Pittsburgh, PA	
<b>V-5</b>	<b>Performance of Acoustic Charge Transport Chirp Filters</b>	<b>805</b>
<b>4:40 p.m.</b>	F. Fiegel, R. Martin, and F. Guedin Electronic Decisions, Inc. Urbana, IL	

\*Manuscript not available at the time of printing

## Session W

### Gable 3, 4 Room: – Focused Session – Optical Techniques for Microwave Applications I

8:30 a.m. to 10:00 a.m.

Thursday, June 11, 1987

Chairman: Tatsuo Itoh, University of Texas, Austin

<b>W-1 (Invited)</b>	<b>Optical Generation and Control of Microwaves and Millimeter-Waves</b>	
8:30 a.m.	C.H. Lee Department of Electrical Engineering University of Maryland College Park, MD	<b>811</b>
<b>W-2</b>	<b>Microwave Performance of an Optically Controlled AlGaAs/GaAs High Electron Mobility Transistor and GaAs MESFET</b>	
9:00 a.m.	R.N. Simons NRC-NASA Research Associate Cleveland, OH and K.B. Bhasin NASA Lewis Research Center Cleveland, OH	<b>815</b>
<b>W-3</b>	<b>A High-Speed Phase Shifter Based on Optical Injection</b>	
9:20 a.m.	L.R. Brothers and C.H. Cox, III MIT Lincoln Laboratory Lexington, MA	<b>819</b>
<b>W-4</b>	<b>Phase and Frequency Coherency of Multiple Optically Synchronized 20 GHz FET Oscillators For Satellite Communications</b>	
9:40 a.m.	A.S. Daryoush, P.R. Herczfeld, R. Glatz Department of Electrical and Computer Engineering Drexel University, Philadelphia, PA and A.P.S. Khanna Avantek, Santa Clara, CA	<b>823</b>

# Session X

## Ziegfeld Room: FET Amplifiers

8:30 a.m. to 10:00 a.m.

Thursday, June 11, 1987

Chairman: Eliot D. Cohen, Defense Logistics Agency

<b>X-1</b>	<b>Design and Performance of a New Multi Octave High-Gain Amplifier</b>	
<b>8:30 a.m.</b>	K.B. Niclas, R.R. Pereira, A.J. Graven and A.P. Chang Watkins-Johnson Company Palo Alto, CA	<b>829</b>
<b>X-2</b>	<b>A High Performance, Quasi-Monolithic 2-18GHz Distributed GaAs FET Amplifier</b>	
<b>8:50 a.m.</b>	A. Cappello, T. Alexander, J. Calviello, D. Ward, P. Bié and R. Pomian Eaton Corporation/AIL Division Melville, NY	<b>833</b>
<b>X-3</b>	<b>Operating Characteristics of 2-8 GHz GaAs MESFET Amplifiers at Elevated Case Temperatures to 200 Degrees Centigrade</b>	
<b>9:00 a.m.</b>	E.J. Crescenzi, Jr., J.A. Thompson, T.R. Kritzer and M.E. Kretschmar Watkins-Johnson Co. Palo Alto, CA	<b>837</b>
<b>X-4</b>	<b>A 6-18 GHz MMIC Power Amplifier Module Designed for Automated Assembly Fabrication*</b>	
<b>9:20 a.m.</b>	C.A. Sapashe, D.L. Green, C.D. Palmer, and J.S. Pavio Texas Instruments Dallas, TX	<b>841</b>
<b>X-5</b>	<b>A 6 Watt Power GaAs FET for 14.0-14.5 GHz Band</b>	
<b>9:30 a.m.</b>	Y. Kadokawa, S. Igi, M. Wataze, T. Sonoda, K. Hayashi, M. Yamanouchi, S. Takamiya and S. Mitsui Mitsubishi Electric Corporation Hoyogo, Japan	<b>845</b>
<b>X-6</b>	<b>K- and Ka-Band High Efficiency Amplifier Modules Using GaAs Power FETs</b>	
<b>9:40 a.m.</b>	D. Bechtel, J. Klatskin, G. Taylor, M. Eron, S.G. Liu, R. Camisa and H. Dudley David Sarnoff Research Center Princeton, NJ	<b>849</b>

\*Public dissemination disapproved by sponsor

# Session Y

## Gable 5, 6, 7 Room: Solid State Devices/Circuits I

8:30 a.m. to 10:00 a.m.

Thursday, June 11, 1987

Chairman: Michael Dydyk, Motorola

<b>Y-1</b>	<b>Silicon Bipolar MMIC for Frequency-Conversion Application</b>	
<b>8:30 a.m.</b>	<b>up to 20 GHz</b>	<b>855</b>
	L. Kipnas	
	Avantek, Inc.	
	Santa Clara, CA	
<b>Y-2</b>	<b>Frequency Stability of L-Band Two-Port Dielectric Resonator</b>	
<b>8:50 a.m.</b>	<b>Oscillators</b>	<b>859</b>
	M. Loboda, T.E. Parker, and G.K. Montress	
	Raytheon Research Division	
	Lexington, MA	
<b>Y-3</b>	<b>Solid State MM-Wave Oscillators with Large Tuning Range</b>	<b>863</b>
<b>9:10 a.m.</b>	K. Jacobs, and B. Vowinkel	
	University of Cologne	
	West Germany	
<b>Y-4</b>	<b>Varactor-Tuned Microstrip Ring Resonators</b>	<b>867</b>
<b>9:20 a.m.</b>	K. Chang, S. Martin, and F. Wang	
	Department of Electrical Engineering	
	Texas A & M University	
	College Station, TX	
<b>Y-5</b>	<b>A Multi-Diode Cavity Power Combiner Using State-of-the-Art</b>	
<b>9:40 a.m.</b>	<b>Pulsed Gunn Diodes</b>	<b>871</b>
	B.E. Sigmon	
	Motorola Government Electronics Group	
	Tempe, AZ	
	and M. Ayyagari	
	MA/COM Semiconductor	
	Burlington, MA	

## Session Z

### Gable 3, 4 Room: – Focused Session – Optical Techniques for Microwave Applications II

10:30 a.m. to Noon

Thursday, June 11, 1987

Chairman: N.R. Dietrich, AT&T Labs

<b>Z-1 (Invited)</b>	<b>Microwave Measurements of GaAs Integrated Circuits Using Electrooptic Sampling</b>	<b>877</b>
<b>10:30 a.m.</b>	K.J. Weingarten, R. Majidy-Aky, M.J.W. Rodwell, D.M. Bloom and B.A. Auld Stanford University Stanford, CA	
<b>Z-2</b>	<b>Picosecond Reflectometry Technique for On-Chip Characterization of Millimeter-Wave Semiconductor Devices</b>	<b>881</b>
<b>11:00 a.m.</b>	C. Rauscher Naval Research Laboratory Washington, DC	
<b>Z-3</b>	<b>Direct Fiber Optic Transmission of a Wideband Multi-Carrier Microwave Signal Spectrum to and from Satellite Earth Station Antennas</b>	<b>885</b>
<b>11:20 a.m.</b>	J.W. Carlin, J.E. Bowers, A.C. Chipaloski and S. Boodaghians AT&T-Bell Laboratories Holmdel, NJ	
<b>Z-4</b>	<b>Optical Feedback on Linearity Performance of <math>1.3 \mu m</math> DFB and Multimode Lasers Under Deep Microwave Modulation</b>	<b>889</b>
<b>11:40 a.m.</b>	W.I. Way and M.M. Choy Bell Communications Research Red Bank, NJ	

## Session AA

### Ziegfeld Room: Non-Linear FET Applications

10:30 a.m. to Noon

Thursday, June 11, 1987

Chairman: E.C. Niehenke, Westinghouse Electric Corp.

<b>AA-1</b>	<b>A GaAs MESFET Balanced Mixer with Very Low Intermodulation</b>	<b>895</b>
<b>10:30 a.m.</b>	Stephen A. Maas The Aerospace Corp. Los Angeles, CA	
<b>AA-2</b>	<b>A Monolithic Double Balanced Single Sideband Modulator</b>	<b>899</b>
<b>10:50 a.m.</b>	S.D. Thompson and A.M. Pavio Texas Instruments, Inc. Dallas, TX	
<b>AA-3</b>	<b>Passive GaAs FET Switch Models and their Application in Phase Shifters</b>	<b>903</b>
<b>11:10 a.m.</b>	L.C. Upadhyayula, R.L. Camisa, G. Taylor, S.N. Subbarao and S.G. Liu RCA Laboratories Princeton, NJ	
<b>AA-4</b>	<b>A Non-Linear Design and Optimization Procedure for GaAs MESFET Oscillators</b>	<b>907</b>
<b>11:20 a.m.</b>	T.J. Brazil and J.O. Scanlan Department of Electrical Engineering University College Dublin, Ireland	
<b>AA-5</b>	<b>High Performance GaAs C-Band and Ku-Band MMIC Oscillators</b>	<b>911</b>
<b>11:40 a.m.</b>	S. Moghe and T. Holden Pacific Monolithics, Inc. Sunnyvale, CA	

## Session BB

### Gable 5, 6, 7 Room: Solid State Devices/Circuits II

10:30 a.m. to Noon

Thursday, June 11, 1987

Chairman: Clifford Krowne, Naval Research Lab

<b>BB-1</b>	<b>Multi-Watt Power Generation at Millimeter-Wave Frequencies</b>	
<b>10:30 a.m.</b>	<b>Using Epitaxially-Stacked Varactor Diodes</b>	<b>917</b>
	P.W. Staeker, M.E. Hines, F. Occhiuti and J.F. Cushman	
	M/A Com Inc.	
	Burlington, MA	
<b>BB-2</b>	<b>A New Reversible Varactor Frequency Halver/Double Device</b>	<b>921</b>
<b>10:50 a.m.</b>	Z. Nativ	
	Rafael State of Israel Armament Development Authority	
	Haifa, Israel	
<b>BB-3</b>	<b>Measurements and Modeling of Kinetic Inductance Microstrip</b>	
<b>11:10 a.m.</b>	<b>Delay Lines</b>	<b>925</b>
	J.M. Pond, J.H. Claasen and W.L. Carter	
	Naval Research Laboratory	
	Washington, DC	
<b>BB-4</b>	<b>A 100 GHz SIS Quasiparticle Mixer with 10 DB Coupled Gain</b>	<b>929</b>
<b>11:30 a.m.</b>	A.V. Raisanen, D.C. Crete, P.L. Richards and F.L. Lloyd*	
	Department of Physics	
	University of California	
	Berkeley, CA	
	*National Bureau of Standards	
	Boulder, CO	

## Session CC

### Gable 3, 4 Room: Phased and Active Array Techniques

1:30 p.m. to 3:00 p.m.

Thursday, June 11, 1987

Chairman: Eugene H. Gregory, Hughes Aircraft Co.

CC-1	<b>A 2 Watt GaAs TX/RX Module with Integral Control Circuitry, For S-Band Phased Array Radars</b>	933
1:30 p.m.	C.R. Green, A.A. Lane, P.N. Tombs, R. Shukla, P.D. Cooper J.R. Suffolk, and J.A. Sparrow Plessey Research Caswell Ltd. Caswell, UK	
CC-2	<b>A 35 GHz Electronically Steered Line Array</b>	937
1:50 p.m.	R.J. Lang and B.J. Edward General Electric Company Syracuse, NY	
CC-3	<b>An Ultraminiature 5-10 GHz, 2 Watt Transmit Module for Active Aperture Application</b>	941
2:10 p.m.	J. Pierro and R. Clouse Eaton Corp./AIL Division Melville, NY	
CC-4	<b>Microstrip FED Planar Frequency Multiplying Space Combiner</b>	945
2:30 p.m.	S. Nam, T. Uwano, and T. Itoh Department of Electrical and Computer Engineering University of Texas Austin, TX	
CC-5	<b>Low Cost Cartop Phased Array Steering</b>	949
2:40 p.m.	G. Schaffner Teledyne Ryan Electronics San Diego, CA	

## Session DD

### Ziegfeld Room: HEMT/MESFET Applications

1:30 p.m. to 3:00 p.m.

Thursday, June 11, 1987

Chairman: B.D. Geller, Comsat Corporation

DD-1	<b>Bias-Dependent Microwave Characteristics of an Atomic Planar-Doped AlGaAs/InGaAs/GaAs Double Heterojunction MODFET</b>	
1:30 p.m.	Y.K. Chen, D.C. Radulescu, G.W. Wang, A.N. Lepore, P.J. Tasker and L.F. Eastman School of Electrical Engineering Cornell University Ithaca, NY	*
DD-2	<b>FETs and HEMTs at Cryogenic Temperatures – Their Properties and Use in Low-Noise Amplifiers</b>	955
1:50 p.m.	M.W. Pospieszalski and S. Weinreb National Radio Astronomy Observatory Charlottesville, VA	
DD-3	<b>Reliability of Low-Noise Microwave HEMT Using by MOCVD</b>	*
2:10 p.m.	K. Tanaka, H. Takakuwa, K. Togashi, Y. Kato and S. Watanabe Sony Corp. Kanagawa, Japan	
DD-4	<b>Predicting Long Term Frequency Drift in FET Oscillators Using Device Modeling</b>	959
2:20 p.m.	K.K. Agarwal and C. Ho Telecommunication Division Rockwell International Corp. Dallas, TX	
DD-5	<b>Harmonic Reaction Amplifier – A Novel High-Efficiency and High-Power Microwave Amplifier</b>	963
2:40 p.m.	S. Nishiki and T. Nojima NTT Electrical Communications Laboratories Take Yokosuka-Shi, Kanagawa-Ken, Japan	

\*Manuscript not available at the time of printing

## Session EE

### Gable 5, 6, 7 Room: Solid State Devices/Circuits III

1:30 p.m. to 3:00 p.m.

Thursday, June 11, 1987

Chairman: Robert L. Eisenhart, Hughes Aircraft Co.

EE-1	<b>A1GaAs/GaAs Heterojunction Bipolar Transistors with 4W/mm Power Density at X Band</b>	969
1:30 p.m.	B. Bayraktaroglu, N. Camilieri, H.D. Shih, and H.G. Tserng Texas Instruments Dallas, TX	
EE-2	<b>Millimeter Wave Heterojunction MITATT Diodes</b>	973
1:50 p.m.	N.S. Dogan, J.R. East Department of Electrical Engineering Washington State University Pullman, WA M.E. Elta and G.I. Haddad The University of Michigan Ann Arbor, MI	
EE-3	<b>Improved Performance of Fundamental and Second Harmonic MMW Oscillators Through Active Device Doping Concentration Contouring</b>	977
2:10 p.m.	J. Ondria Marconi Electronic Devices Ltd Lincoln, England and R.L. Ross U.S. Army Electronic Technology and Devices Laboratory Fort Monmouth, NJ	
EE-4	<b>W-Band Microstrip Oscillator Using InP Gunn Diode</b>	981
2:30 p.m.	D.R. Singh Defense Systems Division Honeywell Inc. Minnetonka, MN	

## Session FF

### Gable 3, 4 Room: Microwave Ferrites

3:30 p.m. to 5:00 p.m.

Thursday, June 11, 1987

Chairman: W.E. Hord, Microwave Applications Group

<b>FF-1</b>	<b>A New Type of Fast Switching Dual-Mode Ferrite Phase Shifter</b>	<b>985</b>
<b>3:30 p.m.</b>	W.E. Hord, C.R. Boyd, Jr. and D. Diaz Microwave Applications Group Santa Maria, CA	
<b>FF-2</b>	<b>Impact of Dielectric Loss Tangent on the Performance of Millimeter Wave Ferrite Circulators</b>	<b>989</b>
<b>3:50 p.m.</b>	G.R. Harrison, S.B. Thompson, J.T. Vaughn Electromagnetic Sciences, Inc. Norcross, GA and G.P. Rodrigue School of Electrical Engineering Georgia Institute of Technology Atlanta, GA	
<b>FF-3</b>	<b>Full Wave Analysis of Slot Line and Coplanar Waveguide on a Magnetic Substrate</b>	<b>993</b>
<b>4:00 p.m.</b>	E. El-Sharawy and R.W. Jackson University of Massachusetts Amherst, MA	
<b>FF-4</b>	<b>Magnetostatic Waves in a Normally Magnetized Waveguide Structure</b>	<b>997</b>
<b>4:10 p.m.</b>	M. Radmanesh GMI Engineering & Management Institute Flint, MI and C.M. Chu and G.I. Haddad University of Michigan Ann Arbor, MI	
<b>FF-5</b>	<b>Energy Storage Effect in MSSW Metal-Finger Reflectors</b>	<b>1001</b>
<b>4:20 p.m.</b>	T.S. Cheng Bell Communications Research Red Bank, NJ and J.P. Parekh and H.S. Tuan Department of Electrical Engineering State University of New York Stony Brook, NY	

## Session GG

### Gable 5, 6, 7 Room: HEMT Amplifiers and Devices

3:30 p.m. to 5:00 p.m.

Thursday, June 11, 1987

Chairman: Bert Berson, Berson & Associates

GG-1	<b>HEMT Low-Noise Amplifier for Ka-Band</b>	1007
3:30 p.m.	M.A.G. Upton, P.M. Smith and P.C. Chao General Electric Co. Syracuse, NY	
GG-2	<b>Broadband HEMT Amplifier for 26.5-40 GHz</b>	1011
3:50 p.m.	K. Shibata, B. Abe, S. Hori and K. Kamei Toshiba Corporation Kawasaki, Japan	
GG-3	<b>A Four Stage V-Band MOCVD HEMT Amplifier</b>	1015
4:10 p.m.	W. Yau, E.T. Watkins, S.K. Wang, K. Wang and B. Klatskin Hughes Aircraft Company Torrance, CA	
GG-4	<b>Super Low-Noise HEMTs with a T-Shaped Gate Structure</b>	1019
4:30 p.m.	S. Asai, K. Joshin, Y. Hirachi and M. Abe Fujitsu Laboratories Ltd. Atsugi, Japan	
GG-5	<b>Reliability of Super Low Noise HEMTs</b>	1023
4:40 p.m.	K. Hayashi, T. Sonoda, T. Yamaguchi, K. Nagahama, S. Takamiya, S. Mitsui, and M. Yamanouchi Mitsubishi Electric Corp. Itami, Japan	