

# Technical Program Contents

## Opening Ceremonies Jacob Javits Convention Center Meeting Room 1

**8:30–10:00 A.M.**  
**Wednesday, May 25, 1988**

- 8:30 a.m.* Welcome from the Chairman—Chuck Buntschuh
- 8:40 a.m.* Welcome from the Technical Program Committee—J. Taub, J. Whelehan
- 8:50 a.m.* Greetings from the City of New York—Alair Townsend, Deputy Mayor for Financial and Economic Development
- 9:00 a.m.* Address by the IEEE President—Dr. Russell Drew
- 9:10 a.m.* Address by the MTT Society President—Dr. Barry Spielman, Washington University
- 9:20 a.m.* Keynote Address, “Tomorrow’s Microwave Technology”—Dr. Frank Brand, Vice President & Chief Technical Officer, M/A-Com., Inc.
- 10:00 a.m.* Adjourn

# Session A

## Producibility and Applications

Jacob Javits Convention Center, Hall 1E—Room 1

10:30 a.m. to 12:00 Noon

Wednesday, May 25, 1988

Chairman: Steve Temple—Raytheon Company  
Co-Chairman: Sanjay Moghe—Pacific Monolithic

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|---------------------------------|---|------------|
| <b>A-1</b><br><b>10:30 a.m.</b> | <b>Commercial Applications of GaAs ICs (Invited)</b><br>J. Gladstone<br>Hewlett-Packard Company, Microwave Technology Division<br>Santa Rosa, CA 95403  | <b>93</b>  |
| <b>A-2</b><br><b>11:10 a.m.</b> | <b>GaAs Monolithic Circuit for FMCW Radars</b><br>R. Leblanc, V. Pauker, P. Talbot, A. Collet and J. Bellaiche<br>LEP: Laboratoires d'Electronique et de Physique Appliquée<br>3 avenue Descartes<br>94451 Limeil-Brevannes Cedex, France<br><br>M-I. Rudelle<br>TRT: Télécommunications Radioélectriques et Téléphoniques<br>5 avenue Réaumur<br>92350 Le Plessis Robinson, France | <b>99</b>  |
| <b>A-3</b><br><b>11:30 a.m.</b> | <b>Laser Chip Separation Method for GaAs MMIC Wafers</b><br>E. H. Wong, R. B. Wylie and D. R. Johnson<br>Hewlett-Packard, Microwave Technology Division<br>1412 Fountaingrove Parkway<br>Santa Rosa, CA 95403   | <b>103</b> |
| <b>A-4</b><br><b>11:50 a.m.</b> | <b>Broad Band Monolithic Microwave Active Inductor and Application to a Miniaturized Wide Band Amplifier</b><br>S. Hara, T. Tokumitsu, T. Tanaka and M. Aikawa<br>ATR: Optical and Radio Communications Research Laboratories<br>Radio Systems Department<br>Twin 21 Bldg. MID Tower<br>2-1-61 Shiromi, Higashi-ku<br>Osaka 540, Japan  | <b>107</b> |

# Session B

## Acoustics and Ferrites

Jacob Javits Convention Center, Hall 1E—Room 2

10:30 a.m. to 12:00 Noon

Wednesday, May 25, 1988

Chairman: Bruce McAvoy—Westinghouse R&D Center

- B-1**                    **A 2 GHz Surface Transverse Wave Oscillator with Low Phase Noise**                    **113**  
**10:30 a.m.**        L. Eichinger, P. Russer and R. Weigel  
Lehrstuhl für Hochfrequenztechnik, Technische Universität München  
Arcisstr. 21, D-8000 München 2, FRG  
  
B. Fleischmann  
Siemens Research Laboratories München  
Hellabrunner Str. 1  
D-8000 München 90, FRG
- B-2**                    **Clock Recovery in the Gigabit Region Using Dielectric Resonators as an**  
**10:40 a.m.**        **Alternative to Surface Acoustic Wave Filters**                    **117**  
P. Baum  
GTE Laboratories Incorporated  
40 Sylvan Road  
Waltham, MA 02254
- B-3**                    **Millimeter Wave Ferromagnetic Resonance in Cubic and Hexagonal Ferrites**                    **121**  
**11:00 a.m.**        M. N. Afsar  
Department of Electrical Engineering, Tufts University  
Medford, MA 02155  
  
Kenneth J. Button  
P.O. Box 72, M.I.T. Branch  
Cambridge, MA 02139
- B-4**                    **Low-Cost Method of the Measurement of Microwave Ferrite Parameters**                    **125**  
**11:20 a.m.**        J. Modelski  
Warsaw University of Technology  
ul. Nowowiejska 15/19  
00-665 Warszawa, Poland  
  
K. Derzakowski  
Institute of Radioelectronics  
00-665 Warszawa, Poland  
  
A. Abramowicz  
Institute of Electronics Fundamentals  
00-665 Warszawa, Poland
- B-5**                    **Quasi-Optical Ferrite Rotator for Millimeter Waves**                    **127**  
**11:30 a.m.**        G. F. Dionne, J. A. Weiss\*, G. A. Allen† and W. D. Fitzgerald  
Lincoln Laboratory, Massachusetts Institute of Technology  
Lexington, MA 02173  
  
\*affiliated with the Department of Physics  
Worcester Polytechnic Institute  
Worcester, MA  
  
†affiliated with the Department of Physics  
Massachusetts Institute of Technology  
Cambridge, MA

# Session C

**Special Session In Honor of Prof. A. A. Oliner  
Jacob Javits Convention Center, Hall 1E—Room 3**

**10:30 a.m. to 12:00 Noon**

**Wednesday, May 25, 1988**

Chairman: Prof. S. T. Peng—New York Institute of Technology

- 10:30 a.m. Introduction by J. Taub**
- C-1 Perspectives on Guided Wave Phenomena (Invited) 133**  
**10:35 a.m.** T. Itoh  
The University of Texas at Austin  
Dept. of Electrical and Computer Engineering  
Austin, TX 78712
- C-2 Radiation from Open Waveguides and Leaky Wave Phenomena (Invited) 137**  
**11:00 a.m.** F. K. Schwing  
US Army CECOM  
Fort Monmouth, NJ 07703
- C-3 Integrated Circuit Discontinuities and Radiation (Invited) 141**  
**11:25 a.m.** N. G. Alexopoulos  
Electrical Engineering Department  
University of California  
Los Angeles, CA 90024-159410
- 11:50 a.m. Comments by S. T. Peng**

# Session D

## Biological Effects and Medical Applications

Jacob Javits Convention Center, Hall 1E—Room 4

10:30 a.m. to 12:00 Noon

Wednesday, May 25, 1988

Chairman: Arye Rosen—David Sarnoff Research Center

- D-1**  
**10:30 a.m.**      **Experimental Determination of Absorbed Power Distribution in a Phantom Irradiated with a Microwave Applicator**      **147**  
D. Van Den Berge, S. Denayer, R. Van Loon and G. Storme  
Department Radiotherapy University Hospital  
V.U.B. Laarbeeklaan 101  
B-1090 Brussels, Belgium  
A. Barel  
Department Elec V.U.B., Pleinlaan 2  
B-1050 Brussels, Belgium
- D-2**  
**10:50 a.m.**      **Design Optimization of Interstitial Antennas for Microwave Hyperthermia**      **151**  
M. F. Iskander and A. M. Tumeh  
Electrical Engineering Department  
University of Utah  
Salt Lake City, UT 84112
- D-3**  
**11:00 a.m.**      **Microwave Correlation Thermography for the Imaging of Hot Spots in Lossy Materials**      **155**  
G. Schaller  
Institut für Hochfrequenztechnik, Universität Erlangen-Nürnberg  
D-8520 Erlangen, Cauerstr. 9
- D-4**  
**11:10 a.m.**      **Microwave Imaging at 3 GHz for the Exploration of Tumors of the Breast**      **157**  
Giaux\*, J. Delannoy<sup>†</sup>, D. Delvallee<sup>#</sup>, Y. Leroy<sup>‡</sup>, A. Mamouni<sup>‡</sup>,  
J. C. Van de Velde<sup>‡</sup>  
\*Centre Anti-Cancer, Centre Bourgogne  
<sup>†</sup>Centre Anti-Cancer  
N.I.H.-Bethesda-MD, USA  
<sup>#</sup>Centre Anti-Cancer  
<sup>‡</sup>UA 287 CNRS Université  
Sciences: Lille, France
- D-5**  
**11:30 a.m.**      **Modelisation of Microstrip-Microslot Applicator by Extension of Transmission Line Model**      **161**  
R. Ledee, P. Pribetich, P. Kennis and M. Chive  
Centre Hyperfrequences et Semiconducteurs  
UA CNRS n°287, Bât.P4  
Université des Sciences et Techniques de Lille-Flandres-Artois  
59655 Villeneuve D'ASCQ Cedex, France
- D-6**  
**11:40 a.m.**      ***In Vivo* Experiment for the Analysis of Multi-Frequency Microwave Radiometric Data**      **165**  
F. Bardati, M. Mongiardo and D. Solimini  
Dipartimento di Ingegneria Elettronica, Tor Vergata University  
Via O. Raimondo, 00173 Roma, Italy  
B. Paolone  
E.S.P., S.p.A., Via della Meccanica  
04011 Aprilia, Italy

# Session E

## Power Amplifiers

Jacob Javits Convention Center, Hall 1E—Room 1

2:00 p.m. to 3:30 p.m.

Wednesday, May 25, 1988

Chairman: J. G. Tenedorio—Harris Microwave

Co-Chairman: D. E. Dawson—Westinghouse

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|--------------------------------|---|------------|
| <b>E-1</b><br><b>2:00 p.m.</b> | <b>A 3-Watt X-Band Monolithic Variable Gain Amplifier</b><br>R. B. Culbertson and D. C. Zimmermann<br>Texas Instruments Incorporated<br>P.O. Box 655474, MS 255<br>Dallas, TX 75265   | <b>171</b> |
| <b>E-2</b><br><b>2:20 p.m.</b> | <b>Stability and Improved Circuit Modeling Considerations for High Power MMIC Amplifiers</b><br>R. G. Freitag, S. H. Lee, D. M. Krafcsik, D. E. Dawson and J. E. Degenford<br>Westinghouse Electric Corp., Advanced Technology Division<br>P.O. Box 1521 MS 3FT2<br>Baltimore, MD 21203 | <b>175</b> |
| <b>E-3</b><br><b>2:40 p.m.</b> | <b>Ka-Band Monolithic GaAs FET Power Amplifier Modules</b><br>N. Camilleri, B. Kim, H. Q. Tserng and H. D. Shih<br>Texas Instruments Incorporated<br>Central Research Laboratories<br>P.O. Box 655936 M/S 134<br>Dallas, TX 75265   | <b>179</b> |
| <b>E-4</b><br><b>3:00 p.m.</b> | <b>Wideband Variable Gain Amplifiers in GaAs MMIC</b><br>K. H. Snow, J. J. Komiak and D. A. Bates<br>General Electric Company<br>Electronics Laboratory<br>Syracuse, NY 13221   | <b>183</b> |

# Session F

## Heinrich Hertz Centennial Special Session I Jacob Javits Convention Center, Hall 1E—Room 2

2:00 p.m. to 3:30 p.m.

Wednesday, May 25, 1988

Chairman: John H. Bryant—University of Michigan

<b>2:00 p.m.</b>	<b>Chairman's Introduction</b>	
<b>F-1 2:10 p.m.</b>	<b>The History of Electromagnetics as Hertz Would Have Known It (Invited)</b> R. S. Elliott University of California Los Angeles, CA 90024	<b>191</b>
<b>F-2 2:55 p.m.</b>	<b>Heinrich Hertz: A Short Life (Invited)</b> C. Süsskind College of Engineering University of California Berkeley, CA 94720	<b>193</b>

# Session G

## Guided Wave Effects

Jacob Javits Convention Center, Hall 1E—Room 3

2:00 p.m. to 3:30 p.m.

Wednesday, May 25, 1988

Chairman: T. Itoh—University of Texas at Austin

- G-1**            **The Importance of Skin-Effect in Microstrip Lines at High Frequencies**            **197**  
**2:00 p.m.**    A. C. Cangellaris  
Electromagnetics Laboratory  
Department of Electrical and Computer Engineering  
University of Arizona  
Tucson, AZ 85721
- G-2**            **Conductor-Backed Slot Line and Coplanar Waveguide:**            **199**  
**2:10 p.m.**    **Dangers and Full-Wave Analyses**  
H. Shigesawa and M. Tsuji  
Doshisha University  
Kyoto, Japan  
A. A. Oliner  
Polytechnic University  
Brooklyn, NY 11201
- G-3**            **Mode Conversion Due to Discontinuities in Modified Grounded**            **203**  
**2:30 p.m.**    **Coplanar Waveguide**  
R. W. Jackson  
Department of Electrical and Computer Engineering  
University of Massachusetts  
Amherst, MA 01003
- G-4**            **Role of Complex Modes in Modeling Discontinuities of Dielectric**            **207**  
**2:40 p.m.**    **Loaded Wave Guides**  
S-W. Chen, C. Chen and K. A. Zaki  
Electrical Engineering Department  
University of Maryland  
College Park, MD 20742
- G-5**            **Nonreciprocal Millimeter Wave Propagation in Slot Guiding Structures**            **211**  
**3:00 p.m.**    **Using Magnetoplasmons**  
C. M. Krowne  
Electronics Science and Technology Division, Naval Research Laboratory  
Washington, D.C. 20375-5000  
A. A. Mostafa and K. A. Zaki  
University of Maryland, Department of Electrical Engineering  
College Park, MD 20742
- G-6**            **Investigation of Tapered Multiple Microstrip Lines for VSLI Circuits**            **215**  
**3:20 p.m.**    M. A. Mehalic, C. H. Chan and R. Mittra  
Electromagnetics Communication Laboratory  
University of Illinois  
Urbana, IL 61801



# Session H

## Measurements I

Jacob Javits Convention Center, Hall 1E—Room 4

2:00 p.m. to 3:30 p.m.

Wednesday, May 25, 1988

Chairman: R. D. Pollard—University of Leeds, UK

- H-1**  
**2:00 p.m.**      **Constant Intermodulation Loci Measure for Power Devices**  
Using H.P. 8510 Network Analyzer **221**  
L. Ricco, G. P. Locatelli and F. Calzavara  
Telettra S.p.A.  
Vimercate (Mi) Italy
- H-2**  
**2:10 p.m.**      **A Method for Measuring Magnitude and Phase of Harmonics Generated in**  
**Nonlinear Microwave Two-Ports** **225**  
U. Lott  
Institut für Feldtheorie und Höchstfrequenztechnik  
ETH Zürich  
CH-8092 Zürich, Switzerland
- H-3**  
**2:20 p.m.**      **Nonlinear GaAs MESFET Modeling Using Pulsed Gate Measurements** **229**  
M. Paggi<sup>†</sup>, P. H. Williams<sup>‡</sup> and J. M. Borrego  
Center for Integrated Electronics and  
Electrical, Computer, and Systems Engineering Department  
Rensselaer Polytechnic Institute  
Troy, New York 12180-3590  
<sup>†</sup>Present Address: IBM, Essex Junction, VT  
<sup>‡</sup>Present Address: MIT Lincoln Laboratory, MA
- H-4**  
**Microwave Magneto Transconductance (MMGT) Mobility Measurements of**  
**GaAs MESFETs**  
S. K. Ayyar, A. G. Andreou, C. R. Westgate  
Dept. Electrical and Computer Engineering  
Johns Hopkins University  
Baltimore, MA  
(Paper not available at time of printing)
- H-5**  
**2:40 p.m.**      **Two-Port S-Parameter Characterization of High Electron Mobility Transistors**  
**at Millimeter Wave and Microwave Frequencies** **233**  
J. H. Schaffner, F. K. Oshita and H. R. Fetterman  
University of California  
Los Angeles, CA 90024  
  
J. J. Berenz, K. Nakano and H. C. Yen  
Electronics Systems Group, TRW  
Los Angeles, CA 90278

<b>H-6</b> <b>3:00 p.m.</b>	<b>On-Wafer Characterization of Monolithic Millimeter-Wave Integrated Circuits by a Picosecond Optical Electronic Technique</b> P. Polak-Dingels The Laboratory for Physical Sciences College Park, MD 20740  H-L. A. Hung, T. Smith and H. C. Huang COMSAT Laboratories Clarksburg, MD 20871  K. J. Webb and C. H. Lee Department of Electrical Engineering University of Maryland College Park, MD 20742	<b>237</b>
<b>H-7</b> <b>3:10 p.m.</b>	<b>A Technique for Improving the Accuracy of Wafer Probe Measurements</b> M. A. Magerko and E. W. Strid* North Carolina State University Raleigh, NC 27695 *Cascade Microtech, Inc.	<b>241</b>

# Session I

## MMIC Low-Noise Amplifiers

Jacob Javits Convention Center, Hall 1E—Room 1

4:00 p.m. to 5:00 p.m.

Wednesday May 25, 1988

Chairman: H. C. Huang—COMSAT Laboratories  
Co-Chairman: Z. Lemnios—Ford Microelectronics, Inc.

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| <b>I-1</b><br><b>4:00 p.m.</b> | <b>A Monolithic Ka-Band HEMT Low-Noise Amplifier</b><br>C. Yuen, C. Nishimoto, M. Glenn, Y. C. Pao, S. Bandy and G. Zdasiuk<br>Varian Research Center, Device Laboratory<br>Palo Alto, CA 94303  | <b>247</b> |
| <b>I-2</b><br><b>4:20 p.m.</b> | <b>A High Electron Mobility Transistor with a Mushroom Gate Fabricated by Focused Ion Beam Lithography</b><br>Y. Sasaki, K. Nagahama, K. Hosono, T. Katoh and M. Komaru<br>LSI R&D Laboratory, Mitsubishi Electric Corporation<br>4-1 Mizuhara, Itami 664, Japan | <b>251</b> |
| <b>I-3</b><br><b>4:40 p.m.</b> | <b>X-Band and Ka-Band Monolithic GaAs PIN Diode Variable Attenuation Limiters</b><br>D. J. Seymour, D. D. Heston and R. E. Lehmann<br>Texas Instruments Incorporated<br>P.O. Box 660246 MS 134<br>Dallas, TX 75266   | <b>255</b> |
| <b>I-4</b><br><b>5:00 p.m.</b> | <b>A 35 GHz Monolithic MESFET LNA</b><br>S. Bandla, G. Dawe, C. Bedard, R. Tayrani, D. Shaw, L. Raffaelli and R. Goldwasser<br>Gamma Monolithics<br>20 Sylvan Road<br>Woburn, MA 01801   | <b>259</b> |

# Session J

## Heinrich Hertz Centennial Special Session II Jacob Javits Convention Center, Hall 1E—Room 2

4:00 p.m. to 5:30 p.m.

Wednesday May 25, 1988

Chairman: John H. Bryant—University of Michigan

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|-------------------------|---|------------|
| <b>J-1</b><br>4:00 p.m. | <b>Heinrich Hertz at Work in Karlsruhe (Invited)</b><br>H. V. Friedburg<br>University of Karlsruhe<br>Institut für Hochfrequenztechnik und Elektronik<br>Karlsruhe, Germany   | <b>267</b> |
| <b>J-2</b><br>4:30 p.m. | <b>Heinrich Hertz—Theorist and Experimenter (Invited)</b><br>J. D. Kraus<br>Ohio State University<br>Columbus, OH 43015   | <b>271</b> |
| <b>J-3</b>              | <b>The Legacy of Hertz: Some Highlights in Microwave History from 1889 to 1945 (Invited)</b><br>J. Brittain<br>Social Sciences, Georgia Institute of Technology<br>Atlanta, GA<br>(Paper not available at the time of printing) |            |

# Session K

## High Power Microwaves (Focused Session)

Jacob Javits Convention Center, Hall 1E—Room 3

4:00 p.m. to 5:30 p.m.

Wednesday May 25, 1988

Chairman: J. Goel—TRW

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|-------------------------|--|------------|
| <b>K-1</b><br>4:00 p.m. | <b>Pin Diode Limiter Spike Leakage, Recovery Time, and Damage</b><br>R. J. Tan, A. L. Ward, R. V. Garver and H. Brisker<br>Harry Diamond Labs<br>Adelphi, MD 20783   | <b>275</b> |
| <b>K-2</b><br>4:10 p.m. | <b>A Comprehensive Design Technique for the Radial Wave Power Combiner</b><br>G. W. Swift and D. I. Stones<br>TRW Electronic Systems Group<br>Redondo Beach, CA 90278  | <b>279</b> |
| <b>K-3</b>              | <b>Paper was withdrawn</b>   |            |
| <b>K-4</b><br>4:40 p.m. | <b>A Microwave Powered High Altitude Platform (Invited)</b><br>J. J. Schlesak, A. Alden and T. Ohno<br>Communications Research Centre<br>Communications Canada<br>701 Carling Avenue<br>Ottawa Canada K2H 8S2  | <b>283</b> |
| <b>K-5</b><br>5:00 p.m. | <b>Microwave Sintering of Ceramics</b><br>M. E. Brodwin and D. L. Johnson<br>Northwestern University<br>Departments of Electrical Engineering and Computer Science<br>and Materials Science and Engineering<br>Evanston, IL 60208                                  | <b>287</b> |
| <b>K-6</b><br>5:20 p.m. | <b>Single-Pulse RF Damage of GaAs FET Amplifiers</b><br>J. H. McAdoo, W. M. Bollen<br>Mission Research Corp.<br>8560 Cinderbed Rd. Suite 700<br>Newington, VA 22122<br><br>R. V. Garver<br>Harry Diamond Laboratories<br>2800 Powder Mill Rd.<br>Adelphi, MD 20783 | <b>289</b> |

# Session L

## Measurements II

Jacob Javits Convention Center, Hall 1E—Room 4

4:00 p.m. to 5:30 p.m.

Wednesday May 25, 1988

Chairman: R. E. Ham—Clemson University

- L-1**                    **A Second Generation Dual Six-Port Network Analyser**                    **295**  
**4:00 p.m.**            S. K. Judah and A. S. Wright  
Microwave Lab., Dept. of Electronic Engineering  
Hull University  
Hull, United Kingdom
- L-2**                    **De-Embedding Coplanar Probes with Planar Distributed Standards**  
D. F. Williams and T. H. Miers  
Ball Aerospace Systems Division  
Boulder, CO 80306  
(Paper not available at the time of printing)
- L-3**                    **Modeling of Some Coplanar Waveguide Discontinuities**                    **297**  
**4:40 p.m.**            R. N. Simons and G. E. Ponchak  
National Aeronautics and Space Administration  
Lewis Research Center  
Cleveland, OH 44135
- L-4**                    **Electrooptic Sampling Measurement of Dispersion Characteristics of Slot Line**  
**5:00 p.m.**            **and Coplanar Waveguide (Coupled Slot Line) Even and Odd Modes**                    **301**  
R. Majidi-Ahy, D. M. Bloom and B. A. Auld  
Edward L Ginzton Laboratory  
Stanford University  
Stanford, CA 94305  
  
K. J. Weingarten  
Lightwave Electronics  
Mountain View, CA 94043  
  
M. Riaziat  
Varian Associates  
Palo Alto, CA 94303

# OPEN FORUM-1

Jacob Javits Convention Center, Hall 1E

4:00 p.m. to 6:00 p.m.

Wednesday May 25, 1988

Chairman: J. Levy—Eaton, Corp.

- OF-1-1**      **Optimal Excitation of Multiapplicator Systems for Deep Regional Hyperthermia**      **307**  
A. Boag and Y. Leviatan  
Department of Electrical Engineering  
Technion-Israel Institute of Technology  
Haifa 32000, Israel
- OF-1-2**      **A General-Purpose Computer Program for the Volterra-Series Analysis of Nonlinear Microwave Circuits**      **311**  
S. A. Maas  
The Aerospace Corp.  
P.O. Box 92957  
Los Angeles, CA 90009
- OF-1-3**      **FET Model Statistics and Their Effects on Design Centering and Yield Prediction for Microwave Amplifiers**      **315**  
J. Purviance and D. Monteith  
University of Idaho  
Dept. of Electrical Engineering  
Moscow, ID 83843  
  
D. Criss  
Triquint Semiconductor  
P.O. Box 4953  
Beaverton, OR 97076
- OF-1-4**      **Robust Model Parameter Extraction Using Large-Scale Optimization Concepts**      **319**  
J. W. Bandler, S. Ye and Q. J. Zhang  
Simulation Optimization Systems Research Laboratory and  
Department of Electrical and Computer Engineering  
McMaster University  
Hamilton, Canada L8S 4L7  
  
S. H. Chen  
Optimization Systems Associates Inc.  
163 Watson's Lane  
Dundas, Ontario, Canada L9H 6L1
- OF-1-5**      **CAD Synthesis of Interstage Networks for Multi-Stage Amplifiers with a Wide Range of Topologies**      **323**  
D. J. Mellor  
Radom Incorporated  
1035 Justin Place  
Meridian, ID 83642
- OF-1-6**      **Distributed Analysis of Submicron-MESFET Noise-Properties**      **327**  
W. Heinrich  
Institut für Hochfrequenztechnik  
Technische Hochschule Darmstadt  
Merckstr.25, D-6100 Darmstadt, FRG

<b>OF-1-7</b>	<b>Synthesis Equations for Shielded Suspended Substrate Microstrip Line and Broadside-Coupled Stripline</b> W. Yunyi, G. Kaijun and S. Yonghui Radio Engineering Department Nanjing Institute of Technology Nanjing, P.R. China	<b>331</b>
<b>OF-1-8</b>	<b>CAD of E-Plane Circuits with Field-Theory Based Lookup Tables and Discontinuity Models</b> P. So and W. J. R. Hoefer Laboratory for Electromagnetics and Microwaves Department of Electrical Engineering University of Ottawa, Canada  P. Saguet Institut National Polytechnique E.N.S.E.R.G. 23, Rue des Martyrs Grenoble, France	<b>335</b>
<b>OF-1-9</b>	<b>Optimizing the Power-Added Efficiency of a Class B GaAs FET Amplifier</b> S. R. LeSage Raytheon Corp., Missile Systems Division Bedford, MA 02173  J. A. Detra and J. B. Beyer Department of Electrical and Computer Engineering University of Wisconsin-Madison 1415 Johnson Drive Madison, WI 53706-1691	<b>339</b>
<b>OF-1-10</b>	<b>GaAs Power MESFET Performance Sensitivity to Profile and Process Parameter Variations</b> J. B. Yan, R. J. Trew and D. E. Stoneking ECE Department, Box 7911 North Carolina State University Raleigh, NC 27695-7911	<b>343</b>
<b>OF-1-11</b>	<b>GaAs HEMT Lossy Match Amplifiers</b> Y. Ito and A. Takeda Aero and Defense Systems Division Tokyo Keiki Co., Ltd. 2-16 Minamikamata, Ohta-ku Tokyo 144, Japan	<b>347</b>
<b>OF-1-12</b>	<b>Lumped and Distributed Scaling of MESFETs</b> J. P. Mondal General Electric Company Electronics Laboratory Syracuse, NY 13221	<b>351</b>
<b>OF-1-13</b>	<b>Frequency-Dependent Characteristics of GAP Discontinuities in Suspended Striplines for Millimeter Wave Applications</b> A. Rong and S. Li Department of Radio Engineering Nanjing Institute of Technology Nanjing, P.R. China	<b>355</b>



<b>OF-1-14</b>	<b>Scattering From 3-Dimensional Discontinuities in Microwave Transmission Lines</b> R. Sachs and F. J. Rosenbaum Dept. of Electrical Engineering Washington University St. Louis, MO 63130	<b>359</b>
<b>OF-1-15</b>	<b>Time-Domain Finite Difference Approach for the Calculation of Microstrip Open-Circuit End Effect</b> X. Zhang and K. K. Mei Department of Electrical Engineering and Computer Sciences University of California Berkeley, CA 94720	<b>363</b>
<b>OF-1-16</b>	<b>Application of the Theory of Linear Operators to the Waveguide Discontinuity Problems</b> S. M. Mahmoud Ain Shams University Cairo, Egypt  M. M. Ibrahim King Abdulaziz Univ. Jeddah, Saudi Arabia  A. S. Omar Inst. of Hochfrequenztechnik Techn. Univ. of Hamburg, W. Germany	<b>367</b>
<b>OF-1-17</b>	<b>A Monolithic Reduced-Size Ku-Band SPDT FET Switch</b> D. T. Bryant Texas Instruments P.O. Box 660246 M/S 255 Dallas, Texas 75266	<b>371</b>
<b>OF-1-18</b>	<b>Matching Structures for High Yield Amplifier Design</b> J. Purviance, W. Brakensiek and D. Monteith University of Idaho Dept. of Electrical Engineering Moscow, ID 83843  T. Ferguson Sandia National Laboratories Albuquerque, NM 87185	<b>375</b>
<b>OF-1-19</b>	<b>Optimization of Distributed Monolithic GaAs Amplifiers Using an Analytical/Graphical Technique</b> M. Ross Northern Telecom Ltd. St-Laurent, Quebec, Canada H4S 1K5  R. G. Harrison Department of Electronics, Carleton University Ottawa, Ontario, Canada K1S 5B6	<b>379</b>

<b>OF-1-20</b>	<b>Experimental Confirmation of Slow-Waves in a Crosstie Overlay Coplanar Waveguide and its Application to Band-Reject Gratings</b> T. H. Wang, T. M. Wang and T. Itoh Department of Electrical and Computer Engineering University of Texas Austin, TX 78712	<b>383</b>
<b>OF-1-21</b>	<b>New Dispersion Models for Open Suspended Substrate Microstrips</b> R. S. Tomar Bolriet Technologies, Inc. Carleton Place, Ont., Canada  P. Bhartia Department of National Defence Ottawa, Ontario, Canada	<b>387</b>
<b>OF-1-22</b>	<b>Finite Element Analysis of Dispersion in Waveguides with Sharp Metal Edges</b> J. P. Webb Computational Analysis and Design Laboratory Department of Electrical Engineering, McGill University 3480 University St. Montreal, H3A 2A7, Canada	<b>391</b>
<b>OF-1-23</b>	<b>Equivalent Coaxial Transmission Lines</b> S-G. Pan Department of Radio Electronics Shanghai University of Science and Technology Shanghai 201800, China	<b>395</b>
<b>OF-1-24</b>	<b>A Method for Obtaining Dispersion Characteristics of Shielded Microstrip Lines</b> Q. Lanfen and G. Changqing Department of Electronics and Information Engineering Huazhong University of Science and Technology Wuhan, China	<b>399</b>

# Session M

## Monolithic Amplifiers

Jacob Javits Convention Center, Hall 1E—Room 1

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

Thursday May 26, 1988

Chairman: B. E. Spielman—Washington University

- |                                |  |            |
|--------------------------------|--|------------|
| <b>M-1</b><br><b>8:30 a.m.</b> | <b>Millimeter-Wave Monolithic Integrated Circuits</b><br>B. E. Spielman<br>Washington University<br>Electrical Engineering Department<br>St. Louis, MS 63130   | <b>405</b> |
| <b>M-2</b><br><b>9:00 a.m.</b> | <b>V-Band Monolithic Power MESFET Amplifiers</b><br>G. Hegazi, H-L. Hung, F. PHELLEPS, L. Holdeman, A. Cornfeld, T. Smith,<br>J. Allison and H. Huang<br>COMSAT Laboratories<br>22300 Comsat Drive<br>Clarksburg, MD 20871-9475                              | <b>409</b> |
| <b>M-3</b><br><b>9:20 a.m.</b> | <b>Ka-Band 1 Watt Power GaAs MMICs</b><br>Y. Oda, S. Arai, T. Yoshida, H. Nakamura, S. Yanagawa, S. Hori and K. Kamei<br>Microwave Solid-State Department<br>Komukai Works, Toshiba Corporation<br>Kawasaki, 210, Japan                                      | <b>413</b> |
| <b>M-4</b><br><b>9:40 a.m.</b> | <b>A 16 W Pulsed X-Band Solid-State Transmitter</b><br>C. Peignet, Y. Mancuso and G. Le Meur<br>Thomson-CSF/RCM<br>178 Bd Gabriel Péri<br>Malakoff, France<br><br>A. Bert, J. F. Jouen and P. Savary<br>Thomson-CSF/THM<br>29 Avenue Carnot<br>Massy, France | <b>417</b> |

# Session N

## Filters and Multiplexers I

Jacob Javits Convention Center, Hall 1E—Room 2

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

Thursday May 26, 1988

Chairman: Jerry Fiedziuszko—Ford Aerospace

<b>N-1</b> <b>8:30 a.m.</b>	<b>Commensurate-Line, Microstrip, Band-Pass Filters</b> M. Gat Avantek Inc. 481 Cottonwood Drive Milpitas, CA 95035	<b>423</b>
<b>N-2</b> <b>8:50 a.m.</b>	<b>High Performance Parallel Coupled Microstrip Filters</b> A. Riddle Avantek 481 Cottonwood Drive Milpitas, CA 95035	<b>427</b>
<b>N-3</b> <b>9:00 a.m.</b>	<b>Rigorous Design of Septate E-Plane Multiplexers with Printed Circuit Elements</b> J. Dittloff and F. Arndt Microwave Department University of Bremen Kufsteiner Str., NW1, D-2800 Bremen, West Germany	<b>431</b>
<b>N-4</b> <b>9:20 a.m.</b>	<b>Computer-Aided Design of Parallel-Connected Millimeter-Wave Diplexers/Multiplexers</b> R. Vahldieck and B. Varailhon de la Filolie University of Victoria Department of Electrical and Computer Engineering Victoria, B.C. V8W 2Y2, Canada	<b>435</b>
<b>N-5</b> <b>9:30 a.m.</b>	<b>Electronically Tunable Band-Stop Filter</b> D. Auffray and J. L. Lacombe Thomson-CSF Branche Equipements Aéronautiques 178, Bd Gabriel Péri 92240 Malakoff, France	<b>439</b>

# Session O

## High Frequency Superconductivity

Jacob Javits Convention Center, Hall 1E—Room 3

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

Thursday May 26, 1988

Chairman: R. L. Camisa—David Sarnoff Research Center

- O-1**            **Microwave Superconductors (Invited)**  
M. Nissenoff  
Naval Research Laboratory  
Washington, DC  
(Paper not available at the time of printing)
- O-2**            **Microwave Characteristics of Bulk High-T<sub>c</sub> Superconductors**            **445**  
**9:00 a.m.**    E. Belohoubek, A. Fathy and D. Kolokitis  
David Sarnoff Research Center  
Princeton, NJ 08543-5300
- O-3**            **Slow-Wave Properties of Superconducting Microstrip Transmission Lines**            **449**  
**9:20 a.m.**    J. M. Pond and C. M. Krowne  
Electronics Science and Technology Division  
Naval Research Laboratory  
Washington D.C. 20375-5000
- O-4**            **Loss Reduction in Superconducting Microstrip-Like Transmission Lines**            **453**  
**9:40 a.m.**    B. Young  
Texas A&M University  
Dept. of Electrical Engineering  
College Station, TX 77843  
  
T. Itoh  
Dept. of Electrical and Computer Engineering  
University of Texas  
Austin, TX 78712
- O-5**            **A Superconducting-Dielectric Resonator at W-Band**            **457**  
**9:50 a.m.**    C-S. Pao, Y. Li and S-P Chou  
Millimeter and Submillimeter Waves Laboratory  
Shanghai University of Science & Technology  
Shanghai, P.R. China

# Session P

## Millimeter Wave Integrated Circuits and Technology

Jacob Javits Convention Center, Hall 1E—Room 4

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

Thursday May 26, 1988

Chairman: J. Wiltse—Georgia Tech.

- P-1** **A 43 GHz-Band Balanced Low-Noise Amplifier** **461**  
**8:30 a.m.** M. Ishizaki, T. Hamabe, Y. Oohashi and S. Asai  
Fujitsu Laboratories Ltd.  
1015 Kamikodanaka  
Nakahara-ku, Kawasaki  
Kanagawa 211 Japan  
  
T. Kasuga and K. Miyazawa  
Nobeyama Radio Observatory  
Tokyo Astronomical Observatory  
University of Tokyo  
Minamimaki-mura, Minamisaku-gun  
Nagano 384-13 Japan
- P-2** **An SIS Mixer for 85-116 GHz Using Inductively Shunted Edge-Junctions** **465**  
**8:50 a.m.** S.-K. Pan and A. R. Kerr  
National Radio Astronomy Observatory  
Charlottesville, VA 22903  
  
M. J. Feldman  
University of Virginia  
Charlottesville, VA 22901  
  
A. W. Kleinsasser, J. Stasiak, R. L. Sandstrom and W. J. Gallagher  
IBM Thomas J. Watson Research Center  
Yorktown Heights, NY 10598
- P-3** **A Broadband Low Noise SIS Receiver for Submillimeter Astronomy** **469**  
**9:10 a.m.** T. H. Buttgenbach, M. J. Wengler\*, D. M. Watson and T. G. Phillips  
Department of Physics  
California Institute of Technology  
Pasadena, CA 91125  
  
R. E. Miller  
AT&T Bell Laboratories  
Murray Hill, NJ 07974  
  
\*Department of Electrical Engineering  
University of Rochester  
Rochester, NY 14627

<b>P-4</b> <b>9:20 a.m.</b>	<b>Waveguide-To-Microstrip Transitions for Millimeter-Wave Applications</b> Y-C Shih Hughes Aircraft Company Microwave Products Division Torrance, CA 90509  T-N Ton TRW One Space Park Redondo Beach, CA 90278  L. Q. Bui Technical Consultant 809 Hickory Ave. Torrance, CA 90509	<b>473</b>
<b>P-5</b> <b>9:30 a.m.</b>	<b>Experimental Modeling for Millimeter-Wave Monolithic Integrated Circuit Components</b> W. Lam, A. K. Sharma, K. Nakano, K. Ip, C. Yang, L. Liu and H. C. Yen TRW Millimeter-Wave and Microwave Technology Center One Space Park Redondo Beach, CA 90278	<b>477</b>
<b>P-6</b> <b>9:40 a.m.</b>	<b>A 94 GHz Low Noise GaAs FET Oscillator Using Whispering-Gallery Dielectric Resonator Modes and a New Push-Push Configuration Reducing 1/f Converted Noise</b> L. A. Bermudez Universidade de Brasília ENE, Caixa Postal 153041 70910 Brasilia, DF, Brasil  P. Guillon and J. Obregon Universit de Limoges IRCOM, 123, Av. Albert Thomas 87100 Limoges, France  A. Bert Thomson-CSF/THM R.D. 128, B.P. 48 91401 Orsay, France	<b>481</b>

# Session Q

## Monolithics-Components

Jacob Javits Convention Center, Hall 1E—Room 1

10:30 a.m. to 12:00 p.m.

Thursday May 26, 1988

Chairman: L. D. Cohen—Eaton, Corp.

- |                                 |  |            |
|---------------------------------|--|------------|
| <b>Q-1</b><br><b>10:30 a.m.</b> | <b>Optimized X &amp; Ku Band GaAs MMIC Varactor Tuned FET Oscillators</b><br>E. Reese, Jr. and J. M. Beall<br>Texas Instruments Incorporated<br>P.O. Box 655474, MS 255<br>Dallas TX 75265                     | <b>487</b> |
| <b>Q-2</b><br><b>10:50 a.m.</b> | <b>2.5–6.0 GHz Broadband GaAs MMIC VCO</b><br>J. E. Andrews, T. J. Holden, K.W. Lee and A. F. Podell<br>Pacific Monolithics, Inc.<br>245 Santa Ana Court<br>Sunnyvale, CA 94568                                | <b>491</b> |
| <b>Q-3</b><br><b>11:10 a.m.</b> | <b>A Miniature Integrated Monolithic VCO Module</b><br>K. J. Anderson and D. L. Allen<br>Texas Instruments Incorporated<br>P.O. Box 655474, MS 255<br>Dallas, TX 75265   | <b>495</b> |
| <b>Q-4</b><br><b>11:20 a.m.</b> | <b>DC-50GHz MMIC Variable Attenuator with a 30dB Dynamic Range</b><br>H. Kondoh<br>Hewlett-Packard Co.<br>Microwave Technology Division<br>Santa Rosa, CA 95401  | <b>499</b> |
| <b>Q-5</b><br><b>11:40 a.m.</b> | <b>A Distributed Broadband Monolithic Frequency Multiplier</b><br>A. M. Pavio, S. D. Bingham, R. H. Halladay and C. A. Sapshe<br>Texas Instruments Incorporated<br>P.O. Box 655474, MS 245<br>Dallas, TX 72265 | <b>503</b> |



# Session R

## Filters and Multiplexers II

Jacob Javits Convention Center, Hall 1E—Room 2

10:30 a.m. to 12:00 p.m.

Thursday May 26, 1988

Chairman: C. Kudsia—COMDEV, Ltd, Canada

- R-1**            **A Bandpass Filter Using Electrically Coupled  $TM_{01\delta}$  Dielectric Rod Resonators**            **507**  
**10:30 a.m.**    Y. Kobayashi and M. Minegishi  
Department of Electrical Engineering  
Saitama University  
Urawa, Saitama 338, Japan
- R-2**            **A TE Triple-Mode Filter**            **511**  
**10:40 a.m.**    R. R. Bonetti and A. E. Williams  
COMSAT Laboratories  
Clarksburg, MD 20871-9475
- R-3**            **Modeling of Coupling by Probes in Dual Mode Cavities**            **515**  
**11:00 a.m.**    K. A. Zaki and C. Chen  
University of Maryland  
College Park, MD 20742  
  
A. E. Atia  
COMSAT Corporation  
22300 COMSAT Drive  
Clarksburg, MD 20871
- R-4**            **The Design and Realization of an Aeronautical L Band Diplexer**  
C. J. Radcliffe  
Phase Devices Ltd.  
Luton, England  
(Paper not available at the time of printing)
- R-5**            **800MHz High-Power Bandpass Filter using  $TM_{110}$  Mode Dielectric Resonators**            **519**  
**11:30 a.m.**    **for Cellular Base Stations**  
T. Nishikawa, K. Wakino, T. Hiratsuka and Y. Ishikawa  
Murata Manufacturing Company Limited  
Kyoto, Japan

# Session S

## Solid State Devices

Jacob Javits Convention Center, Hall 1E—Room 3

10:30 a.m. to 12:00 p.m.

Thursday May 26, 1988

Chairman: Peter Stecker—M/A-COM, Inc.

- S-1**                    **22 GHz Performance of the Permeable Base Transistor**                    **525**  
**10:30 a.m.**        L. J. Kushner, M. A. Hollis, Richard H. Mathews, K. B. Nichols, and  
C. O. Bozler  
Lincoln Laboratory  
Massachusetts Institute of Technology  
Lexington, MA 02173
- S-2**                    **Microwave Performance of npn and pnp AlGaAs/GaAs Heterojunction**                    **529**  
**10:50 a.m.**        **Bipolar Transistors**  
B. Bayraktaroglu and N. Camilleri  
Texas Instruments Incorporated  
POB 655936, MS 134  
Dallas, TX 75265
- S-3**                    **Watt-Level Millimeter-Wave Monolithic Diode-Grid Frequency Multipliers**                    **533**  
**11:10 a.m.**        R. J. Hwu and N. C. Luhmann, Jr.  
Department of Electrical Engineering  
University of California  
Los Angeles, CA 90024  
  
C. F. Jou  
Hughes Aircraft Company  
Torrance, CA 90509  
  
W. W. Lam and D. C. Streit  
TRW  
Redondo Beach, CA 90278  
  
J. Maserjian  
JPL  
Pasadena, CA 91100  
  
D. B. Rutledge  
Division of Engineering and Applied Science  
Cal. Tech.  
Pasadena, CA 91100
- S-4**                    **Silicon Permeable Base Transistors for Low-Phase-Noise Oscillator**                    **537**  
**11:30 a.m.**        **Applications up to 20 GHz**  
D. D. Rathman  
Lincoln Laboratory, Massachusetts Institute of Technology  
Lexington, MA 02173  
  
W. K. Niblack  
Loral Frequency Sources  
Chelmsford, MA 01824



# Session U

## Monolithics-Systems

Jacob Javits Convention Center, Hall 1E—Room 1

2:00 p.m. to 3:30 p.m.

Thursday May 26, 1988

Chairman: Joseph F. White—J. F. White Consulting

- U-1**  
**2:00 p.m.**      **A 32 Tap Digitally Controlled Programmable Transversal Filter Using LSI GaAs ICs** **561**  
J. W. Culver, D. E. Zimmerman and C. M. Panasik  
Texas Instruments Incorporated  
P.O. Box 655936, MS 134  
Dallas, TX 75265
- U-2**  
**2:20 p.m.**      **A 30 GHz-Band Full-MMIC Receiver for Satellite Transponders** **565**  
H. Kato, T. Ohira and N. Imai  
NTT Radio Communication Systems Laboratories  
1-2356, Take, Yokosuka-shi  
Kanagawa-ken, 238-03 Japan  
  
F. Ishitsuka  
NTT Applied Electronics Laboratories  
3-9-11, Midori-cho, Musashino-shi  
Tokyo 180 Japan
- U-3**  
**2:40 p.m.**      **A Monolithic L-Band Limiting Amplifier and Dual-Modulus Prescaler GaAs Integrated Circuit** **569**  
A. E. Geissberger, R. A. Sadler, H. P. Singh, G. K. Lewis, I. J. Bahl and M. L. Balzan  
ITT Gallium Arsenide Technology Center  
Roanoke, VA 24019
- U-4**  
**3:00 p.m.**      **A Monolithic Channelized Preselector for EW Receiver Applications** **573**  
R. H. Halladay, A. M. Pavio, S. D. Bingham and A. Kikel  
Texas Instruments Incorporated  
P.O. Box 655474, MS 255  
Dallas, TX 75265

# Session V

## Passive Networks I

Jacob Javits Convention Center, Hall 1E—Room 2

2:00 p.m. to 3:30 p.m.

Thursday May 26, 1988

Chairman: H. C. Bell—Wavecom, Inc.

- V-1**  
**2:00 p.m.**      **New Slot-Coupled Directional Couplers Between Double-Sided Substrate Microstrip Lines, and Their Applications**      **579**  
T. Tanaka, K. Tsunoda and M. Aikawa  
ATR: Optical and Radio Communications Research Laboratories  
Twin 21 Bldg. MID Tower  
2-1-61 Shiromi, Higashi-ku  
Osaka 540, Japan
- V-2**  
**2:20 p.m.**      **Computer Aided Modeling of a Multidielectric Structure and its Application to the Design of Overlay Couplers**      **583**  
J. Gallimore  
Marconi Electronic Devices Ltd.  
Doddington Road  
Lincoln, LN6.3LF, England
- V-3**  
**2:40 p.m.**      **Synthesis and Design of Wideband Symmetrical Nonuniform Directional Couplers for MIC Applications**      **587**  
S. Uysal and A. H. Aghvami  
Department of Electronic and Electrical Engineering  
King's College London (University of London)  
Strand, London WC2R 2LS
- V-4**  
**3:00 p.m.**      **Ideal W.G. to Coax Transitions Using A F.B.M. Monopole**      **591**  
F. C. deRonde  
University of Bath  
School of El. Eng.  
Bath Avon, BA2 7AY, UK
- V-5**  
**3:20 p.m.**      **Ultra-Broadband High-Directivity Directional Coupler Design**      **595**  
J. D. Bickford  
Hewlett-Packard Company  
Santa Rosa, CA 95401  
University of California, Davis  
Davis, CA 92626  
  
G. R. Branner  
University of California, Davis  
Davis, CA 92626  
Avantek Inc.  
Santa Clara, CA 95054

# Session W

## Dielectric Resonator Oscillators

Jacob Javits Convention Center, Hall 1E—Room 3

2:00 p.m. to 3:30 p.m.

Thursday May 26, 1988

Chairman: J. F. White—Consulting

- |                                |   |            |
|--------------------------------|---|------------|
| <b>W-1</b><br><b>2:00 p.m.</b> | <b>A Fast-Locking X-Band Transmission Injection-Locked DRO</b><br>A. P. S. Khanna and E. Gane<br>Oscillator and Filter Products<br>Avantek Inc.<br>3175 Bowers Avenue<br>Santa Clara, CA 95054  | <b>601</b> |
| <b>W-2</b><br><b>2:20 p.m.</b> | <b>Dielectric Split-Ring Resonators and Their Application to Filters and Oscillators</b><br>M. Sagawa, I. Ishigaki, M. Makimoto and T. Naruse<br>Tokyo Research Laboratory<br>Matsushita Electric Industrial Co., Ltd.<br>Higashimita, Tama-ku, Kawasaki 214, Japan | <b>605</b> |
| <b>W-3</b><br><b>2:40 p.m.</b> | <b>A Broadband VCO Using Dielectric Resonators</b><br>P. C. Kandpal and C. Ho<br>Rockwell International<br>Dallas, TX 75207   | <b>609</b> |
| <b>W-4</b><br><b>3:00 p.m.</b> | <b>Oscillator Applications of Double Dielectric Resonator</b><br>S. Jerry Fiedziuszko<br>Ford Aerospace Corporation<br>Space Systems Division<br>3939 Fabian Way<br>Palo Alto, CA 94303   | <b>613</b> |

# Session X

## New Methods for Planar Circuits

Jacob Javits Convention Center, Hall 1E—Room 4

2:00 p.m. to 3:30 p.m.

Thursday May 26, 1988

Chairman: N. G. Alexopoulos—UCLA

- |                         |   |            |
|-------------------------|---|------------|
| <b>X-1</b><br>2:00 p.m. | <b>Numerical Methods for Passive Components (Invited)</b><br>R. Sorrentino<br>Tor Vergata University<br>Department of Electronic Engineering<br>Via O. Raimondo, 00173 Rome, Italy  | <b>619</b> |
| <b>X-2</b><br>2:20 p.m. | <b>The Transfinite Element Method for Modeling MMIC Devices</b><br>Z. J. Cendes and J-F Lee<br>Department of Electrical and Computer Engineering<br>Carnegie Mellon University<br>Pittsburgh, PA 15213  | <b>623</b> |
| <b>X-3</b><br>2:40 p.m. | <b>Time-Domain Method of Lines Applied to a Partially Filled Waveguide</b><br>S. Nam, S. El-Ghazaly, H. Ling and T. Itoh<br>Dept. of Electrical and Computer Engineering<br>University of Texas at Austin<br>Austin, TX 78712                             | <b>627</b> |
| <b>X-4</b><br>3:00 p.m. | <b>Dispersion Characteristics of Transient Signals in Microstrip Step Discontinuity</b><br>K. S. Chen and G. W. Zheng<br>Zhejiang University<br>Hangzhou, Zhijiang, China<br><br>S. T. Peng<br>New York Institute of Technology<br>Old Westbury, NY 11568 | <b>631</b> |
| <b>X-5</b><br>3:10 p.m. | <b>Challenge to 3-D Discontinuous Dielectric Waveguide Circuit Analysis</b><br>M. Tsuji and H. Shigesawa<br>Department of Electronics<br>Doshisha University<br>Kamikyo-ku, Kyoto 602, Japan  | <b>635</b> |

# Session Y

## An Overview of European Activities

Jacob Javits Convention Center, Hall 1E—Room 1

4:00 p.m. to 5:30 p.m.

Thursday May 26, 1988

Chairman: R. Sparks—Raytheon Co.

<b>Y-1</b> <b>4:00 p.m.</b>	<b>GaAs Device Activities in Europe (Invited)</b> W. Baechtold Swiss Federal Institute of Technology Zurich, Switzerland	<b>641</b>
<b>Y-2</b> <b>4:30 p.m.</b>	<b>European MMIC Activities (Invited)</b> J. Magarshack Thomson CSF/THM-Massy 91302, France	<b>645</b>
<b>Y-3</b> <b>5:00 p.m.</b>	<b>Millimeter-Wave Systems and Applications in Europe (Invited)</b> H. H. Meinel AEG Aktiengesellschaft Postfach 1730 D-7900 ULM, West Germany	<b>649</b>



# Session Z

## Passive Networks II

Jacob Javits Convention Center, Hall 1E—Room 2

4:00 p.m. to 5:30 p.m.

Thursday May 26, 1988

Chairman: R. V. Snyder—RS Microwave

<b>Z-1</b> 4:00 p.m.	<b>Broadbanding Techniques for TEM N-Way Power Dividers</b> A. Shor ACRIAN Inc. San Jose, CA 95126	<b>657</b>
<b>Z-2</b> 4:20 p.m.	<b>Use of Circular Sector Shaped Planar Circuits for Multiport Power Divider-Combiner Circuits</b> M. D. Abouzahra and A. Dumanian MIT Lincoln Laboratory Lexington, MA 02173  K. C. Gupta University of Colorado Boulder, CO 80306	<b>661</b>
<b>Z-3</b> 4:40 p.m.	<b>A Compact Seven-Way Power Divider for Satellite Beam Forming Networks</b> S. C. Holme and V. E. Dunn Ford Aerospace Corporation Space Systems Division Palo Alto, CA 94303  V. Jamnejad California Institute of Technology Jet Propulsion Laboratory Pasadena, CA 91100	<b>665</b>
<b>Z-4</b> 5:00 p.m.	<b>Polarization Adaptor</b> C. S. Kim and N. Moldovan Prodelin Corporation P.O. Box 368 Conover, NC 28613	<b>669</b>
<b>Z-5</b> 5:10 p.m.	<b>Broadband Phase Invariant Attenuator</b> D. Adler and P. Maritato General Microwave Corporation Amityville, NY 11701	<b>673</b>

# Session AA

## New Developments in Oscillator and Mixer Technology

Jacob Javits Convention Center, Hall 1E—Room 3

4:00 p.m. to 5:30 p.m.

Thursday May 26, 1988

Chairman: M.Dydyk—Motorola Inc.

- |                                 |  |            |
|---------------------------------|--|------------|
| <b>AA-1</b><br><b>4:00 p.m.</b> | <b>A Low-Noise Ku-Band AlGaAs/GaAs HBT Oscillator</b><br>N.Hayama, M. Madihian and K. Honjo<br>Microelectronics Research Laboratories<br>NEC Corporation<br>4-1-1 Miyazaki, Miyamae-ku<br>Kawasaki, 213 Japan<br><br>S. R. LeSage<br>Missile Systems Division<br>Raytheon Co.<br>Bedford, MA 01730 | <b>679</b> |
| <b>AA-2</b><br><b>4:20 p.m.</b> | <b>Monolithic and Discrete MM-Wave InP Lateral Transferred-Electron Oscillators</b><br>S. C. Binari, R. E. Neidert and K. E. Meissner<br>Electronics Science and Technology Division<br>Naval Research Laboratory<br>Washington, DC 20375-5000   | <b>683</b> |
| <b>AA-3</b><br><b>4:30 p.m.</b> | <b>V-Band Monolithic IMPATT VCO</b><br>B. Bayraktaroglu<br>Texas Instruments Incorporated<br>P.O. Box 655936, MS 134<br>Dallas, TX 75265   | <b>687</b> |
| <b>AA-4</b><br><b>4:50 p.m.</b> | <b>A Uni-Planar Double-Balanced Mixer Using a New Miniature Beam Lead Crossover Quad</b><br>J. Izadian, R. Forse and K. Van Buren<br>Avantek, Inc<br>481 Cottonwood Drive<br>Milpitas, CA 95035<br><br>K. Irwin and R. Curby<br>Avantek, Inc.<br>39201 Cherry Street<br>Newark, CA 94560           | <b>691</b> |
| <b>AA-5</b><br><b>5:10 p.m.</b> | <b>4 to 40 GHz Even Harmonic Schottky Mixer</b><br>J. L. Merenda, D. Neuf, P. Piro<br>RHG Electronics Laboratory, Inc.<br>Deer Park, NY 11729  | <b>695</b> |

# Session BB

## Microstrip and Fin-Line Discontinuities

Jacob Javits Convention Center, Hall 1E—Room 4

4:00 p.m. to 5:30 p.m.

Thursday May 26, 1988

Chairman: Arvind K. Sharma—TRW

- BB-1**            **A New Method for Discontinuity Analysis in Shielded Microstrip**            **701**  
4:00 p.m.        L. P. Dunleavy and P. B. Katchi  
The Radiation Laboratory  
University of Michigan  
Ann Arbor, MI 48109
- BB-2**            **Analysis of Microstrip Open-End and Gap Discontinuities in a**            **705**  
4:20 p.m.        **Substrate-Superstrate Configuration**  
H-Y Yang and N. G. Alexopoulos  
Electrical Engineering Department  
University of California  
Los Angeles, CA 90024  
  
D. R. Jackson  
Electrical Engineering Department  
Houston University  
University Park, TX 77004
- BB-3**            **Special Iterative Techniques for the Full-Wave 3D Analysis of**            **709**  
4:30 p.m.        **(M)MIC Structures**  
W. Wertgen  
University of Duisburg  
FB9, D-4100 Duisburg 1, West Germany  
  
R. H. Jansen  
Plessey Research Caswell Ltd.  
GaAs MMIC Dept.  
Great Britain
- BB-4**            **Simplified Description of the Field Distribution in Finlines and Ridge**            **713**  
4:40 p.m.        **Waveguides and its Application to the Analysis of E-Plane Discontinuities**  
R. R. Mansour and R. S. K. Tong  
COM DEV Ltd.  
Cambridge, Ontario, Canada N1R 7H6  
  
R. H. MacPhie  
Department of Electrical Engineering  
University of Waterloo  
Waterloo, Ontario, Canada N2L 3G1
- BB-5**            **Non-Uniform Finlines on Anisotropic Substrates**            **717**  
4:50 p.m.        A. Beyer and D. Köther  
Dept. of El. Engineering  
University of Duisburg Bismarckstraße 81  
D-4100 Duisburg 1, FRG  
  
W. J. R. Hofer  
Dept. El. Engineering  
University of Ottawa  
Ottawa, Ontario, Canada, K1N 5N5

- BB-6**                    **Analysis and Optimization of E-Plane Directional Couplers**                    **721**  
**5:00 p.m.**                S. Labonté and W. J. R. Hofer  
Laboratory for Electromagnetics and Microwaves  
Department of Electrical Engineering  
University of Ottawa  
Ottawa, Ontario, Canada K1N 6N5
- BB-7**                    **Fullwave Analysis of Coupled-Finline Discontinuities**                    **725**  
**5:10 p.m.**                G. Schiavon, P. Tognolatti and R. Sorrentino  
Tor Vergata University  
Dept. of Electronic Engineering  
Via O. Raimondo, 00173 Rome, Italy

# Open Forum 2

Jacob Javits Convention Center, Hall 1E

4:00 p.m. to 5:30 p.m.

Thursday May 26, 1988

Chairman: J. Levy—Eaton Corp.

- OF-2-1**      **Finite Difference Analysis of Integrated Optical Channel Waveguides with Arbitrarily Graded Index Profile**      **731**  
N. Schulz, K-H. Bierwirth and F. Arndt  
Microwave Department, University of Bremen  
Kufsteiner Str., NW1,  
D-2800 Bremen 33, West Germany
- OF-2-2**      **A High Frequency GaAlAs Travelling Wave Electro-Optic Modulator at 0.82 $\mu$ m**      **735**  
C. M. Chorey and A. Ferendici  
Electrical Engineering and Applied Physics  
Case Western Reserve University  
Cleveland, OH 44106  
  
K. Bhasin  
National Aeronautics and Space Administration  
12000 Brookpark Rd.  
Cleveland, OH 44135
- OF-2-3**      **A Simple Coupled-Mode Analysis Method for Multiple-Core Optical Fiber and Coupled Dielectric Waveguide Structures**      **739**  
N. Kishi and E. Yamashita  
University of Electro-Communications  
Chofu-shi, Tokyo, Japan 182
- OF-2-4**      **An Alternative Broadband Method for Automatic Measurement of the Complex Permeability and Permittivity of Materials at Microwave Frequencies**      **743**  
B. B. Szendrenyi, K. Kazi and I. Mojzes  
Research Institute for Technical Physics of the  
Hungarian Academy of Sciences  
H-1325 Budapest, Ujpest 1  
P.O. Box 76, Hungary
- OF-2-5**      **Sensitivity Analysis of Through-Short-Delay Standards and its Extension to Microwave and Millimeter Wave Monolithic Integrated Circuits De-Embedding**  
C. C. Tzuang and K. P. Chang  
National Chiao Tung University  
Hsinchu, Taiwan, Republic of China  
(Paper not available at the time of printing)
- OF-2-6**      **A Millimeter-Wave Vector Network Analyzer**      **747**  
J. V. Bellantoni, G. C. Dalman and R. C. Compton  
School of Electrical Engineering  
Cornell University  
Ithaca, NY 14853
- OF-2-7**      **A New Method for Measuring the Properties of Dielectric Substrate**      **751**  
G. Kent  
Dielectric Laboratories, Inc.  
Cazenovia, NY 13035

<b>OF-2-8</b>	<b>Q-Band Computerized Slotted Line System</b> A. Tongyi, M. Jiaheng, M. Qingxiang, Y. Hua and F. Jinlin Microwave Institute East China Normal University Shanghai, China	<b>755</b>
<b>OF-2-9</b>	<b>Lumped-Element Circulator Optimization</b> E. Schloemann Raytheon Company Research Division Lexington, MA 02173	<b>757</b>
<b>OF-2-10</b>	<b>Considerations on the Frequency Dependence of Waveguide Modes in Premagnetized Ferrites Near Resonance</b> D. Köther and A. Beyer Department of Electrical Engineering and SFB 254 Duisburg University, Bismarckstraße 81 D-4100 Duisburg 1, FRG	<b>761</b>
<b>OF-2-11</b>	<b>The Analysis of Magnetostatic Waves in a Waveguide Using the Integral Equation Method</b> M. Radmanesh Hughes Aircraft Company Microwave Products Division Torrance, CA 90509  C. M. Chu and G. I. Haddad University of Michigan Department of Electrical Engineering and Computer Science Ann Arbor, MI 48106	<b>765</b>
<b>OF-2-12</b>	<b>A 20 GHz FET Amplifier in an Integrated Finline/Microstrip Configuration</b> J. Ruxton BTI, Bolriet 150 Mill St., P.O. Box 53 Carleton Place, Ont. Canada K7C 3P3  R. Vahldieck Dept. of Elect. & Comp. Eng. University of Victoria P.O. Box 1700 Victoria, British Columbia, Canada V8W 2Y2  W. J. R. Hofer Lab. for Electromagnetic & Microwaves Dept. of Electrical Engineering University of Ottawa Ottawa, Ontario, Canada K1N 6N5	<b>769</b>
<b>OF-2-13</b>	<b>Finite Element Analysis of Skin Effect in Copper Interconnects at 77K and 300K</b> U. Ghoshal and L. N. Smith Microelectronics and Computer Technology Corporation Austin, TX 78727	<b>773</b>
<b>OF-2-14</b>	<b>A Single MESFET Down-Converter for TVRO Application</b> J. L. Cáceres and J. Pérez Dpto. Señales, Sistemas y Radiocomunicaciones Univ. Politécnica de Madrid. E.T.S.I. Telecomunicación Ciudad Universitaria s/n. 28040, Madrid	<b>777</b>

<b>OF-2-15</b>	<b>Quasioptical Patch Mixers at 35 and 94 GHz</b> C. M. Jackson, J. A. Lester, M. A. Yu and Y. C. Ngan TRW Electronic Systems Group One Space Park Redondo Beach, CA 90278	<b>781</b>
<b>OF-2-16</b>	<b>Design of a Rugged Millimeter-Wave Doubler Using a Series Varactor Configuration</b> E. Boch COMDEV Ltd. Cambridge, Ontario, Canada, N1R 7H6	<b>785</b>
<b>OF-2-17</b>	<b>A 32-GHz Reflected-Wave Maser Amplifier with Wide Instantaneous Bandwidth</b> J. Shell and D. Neff Jet Propulsion Laboratory California Institute of Technology Pasadena, CA 91100	<b>789</b>
<b>OF-2-18</b>	<b>Hybrid HEM<sub>11p</sub>-Mode Dielectric Resonators for Filter Applications at Short Millimeter Wavelengths</b> W. Holpp AEG Aktiengesellschaft Radio and Radar Systems Group Ulm/Donau, F.R. Germany	<b>793</b>
<b>OF-2-19</b>	<b>New Compact Broadband High-Efficiency Mode Converters for High Power Microwave Tubes with TE<sub>On</sub> or TM<sub>On</sub> Mode Outputs</b> M. J. Buckley, G. H. Luo and R. J. Vernon Department of Electrical and Computer Engineering University of Wisconsin Madison, WI 53706-1691	<b>797</b>
<b>OF-2-20</b>	<b>Computer Aided Design of Microstrip Antenna Arrays</b> P. Pouse ETSIT, Barcelona, Spain S. Toutain ENST Br. Brest, France E. Penard CNET, Lannion, France J. P. Daniel Universite des Sciences Rennes, France (Paper not available at the time of printing)	
<b>OF-2-21</b>	<b>Impedance of GaAs P-I-N Diodes</b> A. Gopinath University of Minnesota Department of Electrical Engineering Minneapolis, MN 55455	<b>801</b>
<b>OF-2-22</b>	<b>Electronically Tunable and Switchable Filters Using Microstrip Ring Resonator Circuits</b> T. S. Martin, F. Wang and K. Chang Department of Electrical Engineering Dept. Texas A&M University College Station, TX 77843-3128	<b>803</b>

- OF-2-23**      **U-Band Shield Suspended-Stripline (SSL) Gunn DRO and VCO**      **807**  
H. Zhen-Qi  
Nanjing Solid-State Devices Research Institute  
P.O. Box 1601  
Nanjing, China
- OF-2-24**      **Microwave-Induced Arcing in Filters**      **811**  
S. L. Kaplan, A. A. Cuneo and R. V. Garver  
Harry Diamond Laboratories  
Adelphi, MD 20783
- OF-2-25**      **An Integrated 18.75/37.5 GHz FET Frequency Doubler**      **815**  
S. Meszaros, C. J. Verver, R. J. P. Douville  
Communications Research Centre, Ottawa  
Ontario, Canada  
  
W. J. R. Hoefer  
Dept. of Electrical Engineering  
Univ. of Ottawa  
Ontario, Canada



# Session CC

## Fiber Optic Links and Transmission Systems I (Focused Session)

Jacob Javits Convention Center, Hall 1E—Room 1

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

Friday May 27, 1988

Chairman: N. R. Dietrich—AT&T Bell Labs.

<b>CC-1</b> <b>8:30 a.m.</b>	<b>Lightwave Applications in Communications—An Overview (Invited)</b> R. H. Knerr AT&T Bell Laboratories Allentown, PA 18103	<b>821</b>
<b>CC-2</b> <b>8:50 a.m.</b>	<b>Fibre Optic Systems in UK and Europe (Invited)</b> T. R. Rowbotham British Telecom Research Laboratories Martlesham Heath, UK	<b>823</b>
<b>CC-3</b> <b>9:10 a.m.</b>	<b>Fiber-Optic Transmission Systems in Japan (Invited)</b> S. Shimada and T. Matsumoto NTT Transmission Systems Laboratories 1-2356 Take, Tokosuka-Shi Kanagawa-Ken, 238-03 Japan	<b>827</b>
<b>CC-4</b> <b>9:30 a.m.</b>	<b>Wide-Band Semiconductor Lasers and Optical Modulators for Communications (Invited)</b> R. S. Tucker AT&T Bell Laboratories Crawford Hill Laboratory Holmdel, NJ 07733	<b>831</b>



# Session EE

## High Speed Digital Transmission

Jacob Javits Convention Center, Hall 1E—Room 3

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

Friday May 27, 1988

Chairman: I. Mack—NRL

<b>EE-1</b> <b>8:30 a.m.</b>	<b>Signal Processing at 4.5 GBIT/S with SI-ICs for Optical Transmission Systems</b> G. Hanke Research Institute of Deutsche Bundespost Darmstadt, FRG	<b>853</b>
<b>EE-2</b> <b>8:50 a.m.</b>	<b>Noise in High Speed Digital Systems (Invited)</b> Madhu S. Gupta Hughes Research Laboratories Palibu, CA 90265	<b>1127</b>
<b>EE-3</b> <b>9:10 a.m.</b>	<b>High-Speed QPSK Modulator and Demodulator with Subharmonic Pumping</b> R. Trambarulo, M. V. Schneider and M. J. Gans AT&T Bell Laboratories Holmdel, NJ 07733	<b>857</b>
<b>EE-4</b> <b>9:30 a.m.</b>	<b>Digital Radio Link Synthesized with A Direct-Division PLL at 22 GHz</b> P. Dorta and J. Pérez ETSIT. Ciudad Universitaria s/n. 28040 Madrid, Spain  I. Rodríguez T. y C., S.A. C/ Albasanz 79. 28037 Madrid, Spain	<b>861</b>

# Session FF

## Microwave and MM Wave Ferrites

Jacob Javits Convention Center, Hall 1E—Room 4

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

Friday May 27, 1988

Chairman: J. M. Owens—Santa Clara University

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| <b>FF-1</b><br>8:30 a.m. | <b>Ferrite Tuned Millimeter Wave Bandpass Filters With High Off Resonance Isolation</b><br>D. Nicholson<br>Hewlett-Packard Microwave Technology Division<br>Santa Rosa, CA 95401   | <b>867</b> |
| <b>FF-2</b><br>8:50 a.m. | <b>Ferrite Tunable Millimeter Wave Printed Circuit Filters</b><br>J. Uher, F. Arndt<br>Microwave Department, University of Bremen<br>Kufsteiner Str. NW1<br>D-2800 Bremen 33, West Germany<br><br>J. Bornemann<br>Dept. of El. and Comp. Eng.<br>University of Victoria<br>Victoria, B.C., Canada V8W2Y2 | <b>871</b> |
| <b>FF-3</b><br>9:10 a.m. | <b>A Microwave Circuit Model for a Magnetostatic Wave Filter</b><br>S. N. Stitzer<br>Westinghouse Electric Corp.<br>Baltimore, MD 21203  | <b>875</b> |
| <b>FF-4</b><br>9:20 a.m. | <b>A 13-Channel Magnetostatic Wave Filterbank</b><br>J. D. Adam, M. R. Daniel and S. H. Talisa<br>Westinghouse R & D Center<br>Pittsburgh, PA 15235  | <b>879</b> |
| <b>FF-5</b><br>9:30 a.m. | <b>Analysis of Microwave Ferrite Devices by The Transfinite Element Method</b><br>J-F Lee and Z. J. Cendes<br>Department of Electrical and Computer Engineering<br>Carnegie Mellon University<br>Pittsburgh, PA 15213  | <b>883</b> |
| <b>FF-6</b><br>9:50 a.m. | <b>A Magnetostatic Forward Volume Wave Directional Coupler with a Guiding Slot Structure</b><br>M. Kaneta, K. Yashiro and S. Ohkawa<br>Department of Electronic Engineering<br>Chiba University Yayoi-cho<br>Chiba 260, Japan  | <b>887</b> |

# Session GG

## Fiber Optic Links and Transmission Systems II (Focused Session)

Jacob Javits Convention Center, Hall 1E—Room 1

10:30 a.m. to 12:00 a.m.

Friday May 27, 1988

Chairman: H-W. Yen—Hughes Research Lab.

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| <b>GG-1</b><br><b>10:30 a.m.</b> | <b>Military and Aerospace Applications of Lightwave Technology (Invited)</b><br>A. E. Popa<br>Hughes Research Laboratories<br>Malibu, CA 90265  | <b>893</b> |
| <b>GG-2</b><br><b>10:50 a.m.</b> | <b>Devices and Components for Lightwave Transmission Systems (Invited)</b><br>M. Nakamura and N. Chinone<br>Central Research Laboratory<br>Hitachi Ltd.<br>Kokubunji, Tokyo 185, Japan  | <b>897</b> |
| <b>GG-3</b><br><b>11:10 a.m.</b> | <b>Microwave Multiplexing Techniques for Wideband Lightwave Distribution Networks (Invited)</b><br>R. Olshansky, V. Lanzisera and P. Hill<br>GTE Laboratories Incorporated<br>40 Sylvan Road<br>Waltham, MA 02254   | <b>901</b> |
| <b>GG-4</b><br><b>11:30 a.m.</b> | <b>New Developments in Optical Control Techniques for Phased Array Radar (Invited)</b><br>A. J. Seeds, I. D. Blanchflower and N. J. Gomes<br>Department of Electronic and Electrical Engineering<br>University College London, Torrington Place<br>London, WC1E 7JE, England<br><br>G. King and S. J. Flynn<br>Marconi Defence Systems Ltd.<br>The Grove, Warren Lane<br>Stanmore, HA7 4LY, England | <b>905</b> |

# Session HH

## FET Amplifiers

Jacob Javits Convention Center, Hall 1E—Room 2

10:30 a.m. to 12:00 a.m.

Friday May 27, 1988

Chairman: W. Kennan—Microwave Technology, Inc.

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| <b>HH-1</b><br><b>10:30 a.m.</b> | <b>The DUAL-FED Distributed Amplifier</b><br>C. S. Aitchison, N. Bukhari, C. Law, N. Nazoa-Ruiz<br>ERA Technology Ltd., Leatherhead<br>Surrey KT22 7SA, England, UK  | <b>911</b> |
| <b>HH-2</b><br><b>10:40 a.m.</b> | <b>The Stackfet: An Improved Implementation of the Dual Gate FET</b><br>W. W. Hoppin, S. C. Cripps and J. R. Anderson<br>Celeritek, Inc.<br>617 River Oaks Parkway<br>San Jose, CA 95134   | <b>915</b> |
| <b>HH-3</b><br><b>11:00 a.m.</b> | <b>Noise and Small-Signal Distributed Model of Millimeter-Wave FETs</b><br>L. Escotte and J. C. Mollier<br>IRCOM<br>Université de Limoges<br>123 Av. Albert Thomas<br>87060 Limoges Cédex, France<br><br>M. Lecreff<br>Thomson Semi-Conducteurs Division DHM<br>29 Av. Carnot<br>91300 Massy, France | <b>919</b> |
| <b>HH-4</b><br><b>11:20 a.m.</b> | <b>Millimeter-Wave Low-Noise HEMT Amplifiers</b><br>K. H. G. Duh, P. C. Chao, P. M. Smith, L. F. Lester, B. R. Lee, J. M. Ballingall<br>and M. Y. Kao<br>GE Electronics Laboratory<br>Syracuse, NY 13221   | <b>923</b> |
| <b>HH-5</b><br><b>11:40 a.m.</b> | <b>InGaAs Pseudomorphic HEMTs for Millimeter Wave Power Applications</b><br>P. M. Smith, P. C. Chao, L. F. Lester, R. P. Smith, B. R. Lee, D. W. Ferguson,<br>A. A. Jabra, J. M. Ballingall and K. H. G. Duh<br>General Electric Company<br>Electronics Laboratory<br>Syracuse, NY 13221             | <b>927</b> |

# Session II

## Communication Systems

Jacob Javits Convention Center, Hall 1E—Room 3

10:30 a.m. to 12:00 a.m.

Friday May 27, 1988

Chairman: P. G. Petrelis—TRW

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| <b>II-1</b><br><b>10:30 a.m.</b> | <b>Fiber Optic Links for Millimeter Wave Communication Satellites</b><br>A. S. Daryoush<br>Millimeter Wave & Lightwave Engineering Laboratory<br>E.C.E. Dept, Drexel University<br>Philadelphia, PA 19104<br><br>A. P. S. Khanna<br>Avantek<br>Santa Clara, CA 95054<br><br>K. Bhasin and R. Kunath<br>NASA<br>Lewis Research Center<br>Cleveland, OH 44135 | <b>933</b> |
| <b>II-2</b><br><b>10:50 a.m.</b> | <b>A Broadband Down Converter for 4- and 6-GHz Radio Systems</b><br>C. Ho and P. C. Kandpal<br>Rockwell International Corporation<br>Dallas, TX 75207   | <b>937</b> |
| <b>II-3</b><br><b>11:10 a.m.</b> | <b>Balanced FET Up-Converter for 6 GHz, 64-QAM Radio</b><br>P. Bura and D. Geleman<br>Northern Telecom<br>Montreal, Canada  | <b>941</b> |
| <b>II-4</b><br><b>11:30 a.m.</b> | <b>Cryogenic, HEMT, Low-Noise Receivers for 1.3 to 43 GHz Range</b><br>S. Weinreb, M. W. Pospieszalski and R. Norrod<br>National Radio Astronomy Observatory<br>2015 Ivy Road<br>Charlottesville, VA 22903  | <b>945</b> |

# Session JJ

## Phased and Active Array Techniques Jacob Javits Convention Center, Hall 1E—Room 4

10:30 a.m. to 12:00 a.m.

Friday May 27, 1988

Chairman: H. G. Oltman, Jr—Tecom Ind., Inc.

- JJ-1**                    **A C-Band Low-Noise MMIC Phased Array Receive Module**                    **951**  
**10:30 a.m.**            F. Ali, S. Mitchell, S. Moghe, P. Ho and A. Podell  
Pacific Monolithics, Inc.  
245 Santa Ana Court  
Sunnyvale, CA 94086-4512
- JJ-2**                    **Monolithic Millimeter-Wave IMPATT Oscillator and Active Antenna**                    **955**  
**10:50 a.m.**            N. Camilleri and B. Bayraktaroglu  
Texas Instruments Incorporated  
P.O. Box 655936, M/S 134  
Dallas, TX 75265
- JJ-3**                    **Optical Control of A GaAs MMIC Transmit/Receive Module**                    **959**  
**11:10 a.m.**            A. Paoletta\* and P. R. Herczfeld  
Center for Microwave Wave-Lightwave Engineering  
Dept. of E.C.E.  
Drexel University  
Philadelphia, PA 19104  
\*On leave from U.S. Army LABCOM, ETDL  
Ft. Monmouth, NY
- JJ-4**                    **Microstrip Active Antennas and Arrays**                    **963**  
**11:30 a.m.**            K. A. Hummer and K. Chang  
Department of Electrical Engineering  
Texas A&M University  
College Station, TX 77843-3128
- JJ-5**                    **A SPACE-FED Local Oscillator for Spaceborne Phased Arrays**                    **967**  
**11:50 a.m.**            G. M. Shaw and R. B. Dybdal  
Electronics Research Laboratory  
The Aerospace Corporation  
Los Angeles, CA 90009



# Session KK

## High Speed Fiber Optic Links

Jacob Javits Convention Center, Hall 1E—Room 1

2:00 p.m. to 3:30 p.m.

Friday May 27, 1988

Chairman: Paul J. Stabile—David Sarnoff Research Center

<b>KK-1</b> <b>2:00 p.m.</b>	<b>0.83- and 1.3-Micron Microwave (2-18 GHz) Fiber-Optic Links Using Directly Modulated Laser Sources</b> R. D. Esman, L. Goldberg and J. F. Weller Naval Research Laboratory Washington, D.C. 20375-5000	<b>973</b>
<b>KK-2</b> <b>2:20 p.m.</b>	<b>21 GHz Wideband Fiber Optic Link</b> J. J. Pan E-TEK Dynamics, Inc. Melbourne, FL 32904	<b>977</b>
<b>KK-3</b> <b>2:30 p.m.</b>	<b>High Signal to Noise Operation of Fiber Optic Links to 18 GHz</b> H. Blauvelt and K. Lau Ortel Corporation 2015 W. Chestnut St. Alhambra, CA 91803	<b>979</b>
<b>KK-4</b> <b>2:40 p.m.</b>	<b>High Speed Fiber Optic Links for Short-Haul Microwave Applications</b> I. Koffman, P. R. Herczfeld, A. S. Daryoush Center for Microwave/Lightwave Engineering Department of Electrical and Computer Engineering Drexel University Philadelphia, PA 19104	<b>983</b>
<b>KK-5</b> <b>2:50 p.m.</b>	<b>Radar Applications of X-Band Fiber Optic Links</b> I. L. Newberg, C. M. Gee, G. D. Thurmond, and H. W. Yen Hughes Research Laboratories Malibu, CA 90265	<b>987</b>
<b>KK-6</b> <b>3:00 p.m.</b>	<b>Frequency-Dependent and Frequency-Independent Nonlinear Characteristics of a High-Speed Laser Diode</b> W. I. Way Bell Communications Research Red Bank, NJ 07701	<b>991</b>

# Session LL

## Signal Distribution FET Applications

Jacob Javits Convention Center, Hall 1E—Room 2

2:00 p.m. to 3:30 p.m.

Friday May 27, 1988

Chairman: Mahesh Kumar—MSC, Inc.

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|---------------------------------|--|-------------|
| <b>LL-1</b><br><b>2:00 p.m.</b> | <b>GaAs Semi-Insulated-Gate FETs (SIGFETs) as High Power MMIC Control Devices</b><br>Y-H. Yun<br>M/A-COM<br>Advanced Semiconductor Operations<br>Lowell, MA 01851<br><br>R. J. Gutmann<br>Rensselaer Polytechnic Institute<br>Troy, NY 12180 | <b>997</b>  |
| <b>LL-2</b><br><b>2:10 p.m.</b> | <b>DC-20 GHz N × M Passive Switches</b><br>M. J. Schindler, M. E. Miller and K. M. Simon<br>Raytheon Co<br>Research Div<br>131 Spring Street<br>Lexington, MA 02173  | <b>1001</b> |
| <b>LL-3</b><br><b>2:20 p.m.</b> | <b>High Efficiency Microwave Harmonic Reaction Amplifier</b><br>T. Nojima and S. Nishiki<br>NTT Radio Communication Systems Laboratories<br>Take, Yokosuka-shi<br>Kanagawa-ken, 238-03, Japan  | <b>1007</b> |
| <b>LL-4</b><br><b>2:40 p.m.</b> | <b>The Design of a 6-Port Active Circulator</b><br>I. J. Bahl<br>ITT/Gallium Arsenide Technology Center<br>7670 Enon Drive<br>Roanoke, VA 24019  | <b>1011</b> |
| <b>LL-5</b><br><b>2:50 p.m.</b> | <b>GaAs Monolithic Implementation of Active Circulators</b><br>M. A. Smith<br>Texas Instruments Incorporated<br>P.O. Box 660246 M/S 255<br>Dallas, TX 75266  | <b>1015</b> |

# Session MM

## System Applications

Jacob Javits Convention Center, Hall 1E—Room 3

2:00 p.m. to 2:30 p.m.

Friday May 27, 1988

Chairmen: K. K. Agarwal—E-Systems, Garland Div.  
D. N. McQuiddy—Texas Instruments, Inc.

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|---------------------------------|---|-------------|
| <b>MM-1</b><br><b>2:00 p.m.</b> | <b>Microwaves in Brazil: Significant Research and Development Activities (Invited)</b><br>A. de Salles<br>CETUC-PUC/RJ-Rua Marquês de São Vicente 225-Gávea<br>22453-Rio de Janeiro, Brazil   | <b>1019</b> |
| <b>MM-2</b><br><b>2:20 p.m.</b> | <b>A 50-GHz Compact Communication System for Video Link Fabricated in MIC</b><br>K. Ogawa, T. Ishizaki, K. Hashimoto, M. Sakakura and T. Uwano<br>Matsushita Electric Industrial Co., Ltd.<br>Information Systems Research Laboratory<br>1006, Kadoma, Osaka, 571 Japan | <b>1023</b> |
| <b>MM-3</b><br><b>2:30 p.m.</b> | <b>A Noncoherent W-Band Transceiver</b><br>R. S. Robertson, R. T. Kihm, E. L. Holzman, J. Poelker and R. L. Bowen<br>Hughes Aircraft Company<br>Missile Systems Group<br>Canoga Park, CA 91304  | <b>1027</b> |
| <b>MM-4</b><br><b>2:50 p.m.</b> | <b>35-GHz-Dopplerradar for Law Enforcement Agencies in Europe</b><br>R. Westphal and A. Kessler<br>Institut für Hochfrequenztechnik<br>TH Darmstadt, West Germany   | <b>1031</b> |
| <b>MM-5</b><br><b>3:10 p.m.</b> | <b>Hidden Electronics Detection</b><br>M. K. Ferrand<br>Microlab/FXR<br>Ten Microlab Rd.<br>Livingston, NJ 07039  | <b>1035</b> |

## Session NN

### Computer Aided Design: Large Signal Analysis Jacob Javits Convention Center, Hall 1E—Room 4

2:00 p.m. to 3:30 p.m.

Friday May 27, 1988

Chairman: Stephen E. Sussman-Fort—State Univ. of NY

- NN-1**      **A Unified Framework for Harmonic Balance Simulation and Sensitivity Analysis**      **1041**  
2:00 p.m.      J. W. Bandler, Q. J. Zhang and R. M. Biernacki  
Optimization Systems Associates Inc.  
163 Watson's Lane  
Dundas, Ontario, Canada L9H 6L1
- NN-2**      **Large-Signal MESFET Characterization Using Harmonic Balance**      **1045**  
2:20 p.m.      B. R. Epstein, S. M. Perlow, D. L. Rhodes and J. L. Schepps  
David Sarnoff Research Center  
Princeton, NJ 08543  
M. M. Ettenberg  
City University  
New York, NY 10017  
R. Barton  
Cornell University  
Ithaca, NY 14853
- NN-3**      **Optimized C.A.D. of Power Amplifiers, for Maximum Added Power or Minimum Third Order Intermodulation, Using an Optimization Software Coupled to a Single Tone Source and Load-Pull Set-up**      **1049**  
2:40 p.m.      J. M. Nebus, J. P. Villotte, J. F. Vidalou, L. Hagerman and H. Jallageas  
I.R.C.O.M., Université de Limoges  
123 Avenue A. Thomas  
87060 Limoges, France  
M. C. Albuquerque  
Giers Schlumberger  
12 Pl. des Etats-Unis  
92124 Montrouge, France
- NN-4**      **A GaAs MESFET Large-Signal Circuit Model for Nonlinear Analysis**      **1053**  
2:50 p.m.      M. Sango, O. Pitzalis, L. Lerner, C. McGuire, P. Wang and W. Childs  
EEsof, Inc  
Westlake Village, CA 91362
- NN-5**      **Optimization of Large Signal Spice GaAs FET Model from Measured Scattering Parameters**  
C. K. C. Tzuang and F. Liu  
Inst. of Communication Engr.  
Nat. Chiao Tung Univ.  
Hsinchu, Taiwan, Republic of China  
(Paper not available at the time of printing)
- NN-6**      **Load Pull Characteristics of GaAs MESFETs Calculated Using an Analytic, Physics Based Large Signal Device Model**      **1057**  
3:20 p.m.      D. E. Stoneking, R. J. Trew and J. B. Yan  
ECE Dept., Box 7911  
North Carolina State University  
Raleigh, NC 27695-7911

# Session OO

## High Speed Optical Techniques and Components Jacob Javits Convention Center, Hall 1E—Room 1

4:00 p.m. to 5:30 p.m.

Friday May 27, 1988

Chairman: P. Wahi—TASC

- OO-1**            **A 100-kHz—22-GHz Instrumentation Photoreceiver**            **1063**  
**4:00 p.m.**      D. J. Derickson, C. M. Miller and R. L. Van Tuyl  
Hewlett-Packard Co.  
Signal Analysis Division  
Rohnert Park, CA 94928
- OO-2**            **Calibration of Optical Receivers and Modulators Using an Optical**  
**4:20 p.m.**      **Heterodyne Technique**            **1067**  
T. S. Tan, R. L. Jungerman and S. S. Elliott  
Hewlett-Packard Co.  
Microwave Technology Division  
1412 Fountaingrove Pkwy.  
Santa Rosa, CA 95401
- OO-3**            **High Power RF Generation with Optically Activated Bulk GaAs Devices**            **1071**  
**4:40 p.m.**      A. Kim, M. Weiner and R. Youmans  
US Army Electronics Technology & Devices Laboratory, LABCOM  
Fort Monmouth, NJ 07703-5000  
  
P. Herczfeld  
Drexel University  
Electrical Engineering Department  
Philadelphia, PA 19104  
  
A. Rosen  
David Sarnoff Research Center  
Subsidiary of SRI International  
Princeton, NJ 08543
- OO-4**            **Pulsed Operation of an Optoelectronic Finline Switch**            **1075**  
**4:50 p.m.**      K. Uhde and J. Müller  
Technische Universität Hamburg-Harburg  
Postfach 90 14 03, D-2100  
Hamburg 90, West Germany
- OO-5**            **Characteristics of Coplanar Waveguides with Metal Coating on Multilayer**  
**5:00 p.m.**      **Substrate: Application to Broadband LiNbO<sub>3</sub>:Ti Traveling Wave Light**  
**Modulators/Switch**            **1079**  
D. Bourreau and P. Guillon  
I.R.C.O.M., U.A. C.N.R.S. 356  
Faculté des Sciences  
123 Av. A. Thomas  
87060 Limoges Cédex, France

# Session PP

## Non-Linear FET Applications

Jacob Javits Convention Center, Hall 1E—Room 2

4:00 p.m. to 5:30 p.m.

Friday May 27, 1988

Chairman: E. C. Niehenke—Westinghouse Electric Co.

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|--------------------------|--|-------------|
| <b>PP-1</b><br>4:00 p.m. | <b>A 13-GHz YIG-Film Tuned Oscillator for VSAT Applications</b><br>Y. Mizunuma, T. Ohgihara, H. Nakano, T. Okamoto and Y. Murakami<br>Sony Corporation Research Center<br>174 Fujitsuka-cho, Hodogaya-ku<br>Yokohama, 240 Japan                  | <b>1085</b> |
| <b>PP-2</b><br>4:20 p.m. | <b>FET Upconverter Design Using Load Dependent Mixing Transconductance</b><br>J. L. M. Lord<br>University of British Columbia<br>Vancouver, Canada<br><br>J. L. Fikart<br>MPR Limited, Burnaby<br>British Columbia, Canada                       | <b>1089</b> |
| <b>PP-3</b><br>4:30 p.m. | <b>A Quasi-Optical HEMT Self-Oscillating Mixer</b><br>V. D. Hwang and T. Itoh<br>Dept. of Electrical and Computer Engineering<br>University of Texas<br>Austin, TX 78712   | <b>1093</b> |
| <b>PP-4</b><br>4:50 p.m. | <b>2 to 8 GHz Double Balanced MESFET Mixer with +30 DBM Input<br/>3rd Order Intercept</b><br>S. Weiner, D. Neuf and S. Spohrer<br>RHG Electronics Laboratory, Inc.<br>A Subsidiary of Adams-Russell Electronics Co., Inc.<br>Deer Park, NY 11729 | <b>1097</b> |

# Session QQ

## Computer Aided Design, Analysis and Modeling Jacob Javits Convention Center, Hall 1E—Room 3

4:00 p.m. to 5:30 p.m.

Friday May 27, 1988

Chairman: Barry S. Perlman—David Sarnoff Research Center

- QQ-1**            **Numerical Analysis of Intermodulation Distortion in Microwave Mixers**            **1103**  
4:00 p.m.        V. Rizzoli and A. Lipparini  
Dipartimento di Elettronica  
Informatica e Sistemistica  
University of Bologna  
  
C. Cecchetti  
Fondazione Ugo Bordoni  
Villa Griffone  
40044 Pontecchio Marconi  
Bologna, Italy
- QQ-2**            **A Mixer Computer-Aided Design Tool Based in the Time Domain**            **1107**  
4:20 p.m.        P. Estabrook and B. B. Lusignan  
Stanford University  
Stanford, CA 94305
- QQ-3**            **Non-Linear Modelling and Design of Microwave Mixers**            **1111**  
4:30 p.m.        M. I. Sobhy and F. Bassirat  
Electronic Engineering Laboratories  
The University of Kent at Canterbury  
Canterbury, Kent CT2 7NT U.K.
- QQ-4**            **Optimal CAD of MESFETS Frequency Multipliers With and**            **1115**  
4:40 p.m.        **Without Feedback**  
C. Guo, E. Ngoya, R. Quere and J. Obregon  
I.R.C.O.M. Université de Limoges  
CNRS 87060 Limoges Cedex, France  
  
M. Camiade  
Thomson Hybrides et Microondes/DHM  
29 Avenue Carnot  
91300 Massy, France
- QQ-5**            **A Novel Approach for the Large Signal Analysis and Optimisation of**            **1119**  
4:50 p.m.        **Microwave Frequency Doublers**  
S. El-Rabaie, J. A. C. Stewart and V. F. Fusco  
Department of Electrical and Electronic Engineering  
The Queen's University of Belfast  
Northern Ireland  
  
J. J. McKeown  
Department of Engineering Mathematics  
The Queen's University of Belfast  
Northern Ireland
- QQ-6**            **The Use of Parametric Modeling in Microwave Circuit Design**            **1123**  
5:00 p.m.        M. Eron and D. L. Rhodes  
David Sarnoff Research Center, CN 5300  
Princeton, NJ 08543-5300