

1988 MTT Symposium Digest

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Wednesday, May 25, 1988

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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 Drow
9:10 a.m. Address by the MTT Society President—Dr. Barry Spielman, Washington University
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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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J. Gladstone
Hewlett-Packard Company, Microwave Technology Division
Santa Rosa, CA 95403
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R. Leblanc, V. Pauker, P. Talbot, A. Collet and J. Bellaiche
LEP: Laboratoires d'Electronique et de Physique Appliquée
3 avenue Descartes
94451 Limeil-Brevannes Cedex, France
- M-L Rudelle
TRT: Télécommunications Radioélectriques et Téléphoniques
5 avenue Réaumur
92350 Le Plessis Robinson, France
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E. H. Wong, R. B. Wylie and D. R. Johnson
Hewlett-Packard, Microwave Technology Division
1412 Fountaingrove Parkway
Santa Rosa, CA 95403
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S. Hara, T. Tokumitsu, T. Tanaka and M. Aikawa
ATR: Optical and Radio Communications Research Laboratories
Radio Systems Department
Twin 21 Bldg. MID Tower
2-1-61 Shiomi, Higashi-ku
Osaka 540, Japan

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Acoustics and Ferrites

Jacob Javits Convention Center, Hall 1E—Room 2

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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
Hilfabrunner Str. 1
D-8000 München 90, FRG
- B-2 10:40 a.m. Clock Recovery in the Gigabit Region Using Dielectric Resonators as an Alternative to Surface Acoustic Wave Filters 117
P. Baum
GTE Laboratories Incorporated
40 Sylvan Road
Waltham, MA 02254
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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

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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

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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

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T. Itoh
The University of Texas at Austin
Dept. of Electrical and Computer Engineering
Austin, TX 78712
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F. K. Schwing
US Army CECOM
Fort Monmouth, NJ 07703
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N. G. Alexopoulos
Electrical Engineering Department
University of California
Los Angeles, CA 90024-159410
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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
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M. F. Iskander and A. M. Tuneh
Electrical Engineering Department
University of Utah
Salt Lake City, UT 84112
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G. Schaller
Institut für Hochfrequenztechnik, Universität Erlangen-Nürnberg
D-8520 Erlangen, Cauerstr. 9
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Giaux*, J. Delannoy†, D. Delvalet*, Y. Leroy‡, A. Mamouni*, J. C. Van de Velde*
- *Centre Anti-Cancer, Centre Bourgogne
†Centre Anti-Cancer
N.I.H.—Bethesda-MD, USA
‡UA 287 CNRS Université
Sciences, Lille, France
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R. Ledee, P. Pribetich, P. Kennis and M. Chive
Centre Hyperfréquences et Semiconducteurs
UA CNRS n°287, Bât. P4
Université des Sciences et Techniques de Lille-Flandres-Artois
59655 Villeneuve D'ASCQ Cedex, France

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F. Bardati, M. Mongiardo and D. Solimmi
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

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Chairman: J. G. Tenedorio—Harris Microwave
Co-Chairman: D. L. Dawson—Westinghouse

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R. B. Culbertson and D. C. Zimmermann
Texas Instruments Incorporated
P.O. Box 655474, MS 255
Dallas, TX 75265
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R. G. Freitag, S. H. Lee, D. M. Kratsch, D. L. Dawson and J. E. Degenford
Westinghouse Electric Corp., Advanced Technology Division
P.O. Box 1521 MS 3FT2
Baltimore, MD 21203
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N. Camilleri, B. Kim, H. Q. Tserng and H. D. Shih
Texas Instruments Incorporated
Central Research Laboratories
P.O. Box 655936 M/S 134
Dallas, TX 75265
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K. H. Snow, J. J. Komiak and D. A. Bates
General Electric Company
Electronics Laboratory
Syracuse, NY 13221

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Heinrich Hertz Centennial Special Session I

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R. S. Elliott
University of California
Los Angeles, CA 90024
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C. Suskind
College of Engineering
University of California
Berkeley, CA 94720

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A. C. Cangellaris
Electromagnetics Laboratory
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Tucson, AZ 85721
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A. A. Oliner
Polytechnic University
Brooklyn, NY 11201
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R. W. Jackson
Department of Electrical and Computer Engineering
University of Massachusetts
Amherst, MA 01003
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Electrical Engineering Department
University of Maryland
College Park, MD 20742
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C. M. Krowne
Electronics Science and Technology Division, Naval Research Laboratory
Washington, D.C. 20375-5000
A. A. Mostafa and K. A. Zak
University of Maryland, Department of Electrical Engineering
College Park, MD 20742
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Electromagnetics Communication Laboratory
University of Illinois
Urbana, IL 61801

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Vimercate (Mi) Italy
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U. Lott
Institut für Feldtheorie und Hochfrequenztechnik
ETH Zurich
CH-8092 Zurich, Switzerland
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M. Paggi, P. H. Williams and J. M. Borrego
Center for Integrated Electronics and
Electrical, Computer, and Systems Engineering Department
Rensselaer Polytechnic Institute
Troy, New York 12180-3590
*Present Address: IBM, Essex Junction, VT
†Present Address: MIT Lincoln Laboratory, MA
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S. K. Ayyar, A. G. Anderou, C. R. Westgate
Dept. Electrical and Computer Engineering
Johns Hopkins University
Baltimore, MA
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University of California
Los Angeles, CA 90024
J. J. Berenz, K. Nakano and H. C. Yen
Electronics Systems Group, TRW
Los Angeles, CA 90278
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The Laboratory for Physical Sciences
College Park, MD 20740
H. L. A. Hune, I. Smith and H. C. Huang
COMSAT Laboratories
Clarkburg, MD 20781
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M. A. Magerko and E. W. Strid*
North Carolina State University
Raleigh, NC 27695
*Cascade Microtech, Inc.

Session I

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Jacob Javits Convention Center, Hall 1E—Room 1

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Varian Research Center, Device Laboratory
Palo Alto, CA 94303
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4-1 Mizuhara, Itami 664, Japan
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Texas Instruments Incorporated
P.O. Box 660246 MS 134
Dallas, TX 75266
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S. Bandia, G. Dawe, C. Bedard, R. Tayanani, D. Shaw, L. Ruffaeli and R. Golowasser
Gamma Monolithics
20 Sylvan Road
Woburn, MA 01801

Session J

Heinrich Hertz Centennial Special Session II

Jacob Javits Convention Center, Hall 1E—Room 2

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H. V. Friedburg
University of Karlsruhe
Institut für Hochfrequenztechnik und Elektronik
Karlsruhe, Germany
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J. D. Kraus
Ohio State University
Columbus, OH 43015

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J. Brittain
Social Sciences, Georgia Institute of Technology
Atlanta, GA
(Paper not available at the time of printing)

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Harry Diamond Labs
Arlington, MD 20783
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TRW Electronic Systems Group
Redondo Beach, CA 90278
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Communications Research Centre
Communications Canada
701 Carling Avenue
Ottawa, Canada K2H 8S2
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Northwestern University
Departments of Electrical Engineering and Computer Science
and Materials Science and Engineering
Evanston, IL 60208
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Mission Research Corp
3560 Cinderbed Rd., Suite 700
Newington, VA 22122
R. V. Garver
Harry Diamond Laboratories
2800 Powder Mill Rd.
Arlington, MD 20783

Session L

Measurements II

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D. F. Williams and T. H. Miers
Ball Aerospace Systems Division
Boulder, CO 80306
(Paper not available at the time of printing)
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National Aeronautics and Space Administration
Lewis Research Center
Cleveland, OH 44135
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Edward L. Grinton Laboratory
Stanford University
Stanford, CA 94305
K. J. Weingarten
Lightwave Electronics
Mountain View, CA 94043
M. Razzat
Varian Associates
Palo Alto, CA 94303

OPEN FORUM-1

Jacob Javits Convention Center, Hall 1E

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Technion-Israel Institute of Technology
Haifa 32000, Israel
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P.O. Box 92457
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P.O. Box 4953
Beaverton, OR 97076
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Simulation Optimization Systems Research Laboratory and
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S. H. Chen
Optimization Systems Associates Inc
163 Watson's Lane
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D. J. Meller
Radom Incorporated
1035 Justin Place
Meridian, ID 83642
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W. Heinrich
Institut für Hochfrequenztechnik
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23 Rue des Martyrs
Grenoble, France
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Raytheon Corp., Missile Systems Division
Bedford, MA 02173
J. A. Detra and J. B. Bever
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North Carolina State University
Raleigh, NC 27695-7911
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Aero and Defense Systems Division
Tokyo Keiki Co., Ltd.
2-16 Minamukamata, Ohta-ku
Tokyo 144, Japan
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General Electric Company
Electronics Laboratory
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P.O. Box 660246, M/S 255
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Session M

Monolithic Amplifiers

Jacob Javits Convention Center, Hall 1E—Room 1

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Session N

Filters and Multiplexers I

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N-2 8:50 a.m.	High Performance Parallel Coupled Microstrip Filters A. Riddle Avantek 481 Cottonwood Drive Milpitas, CA 95035	427
N-3 9:00 a.m.	Rigorous Design of Septate E-Plane Multiplexers with Printed Circuit Elements J. Dittloff and F. Arndt Microwave Department University of Bremen Kulturstr. NW1 D-2800 Bremen, West Germany	431

N-4 9:20 a.m.	Computer-Aided Design of Parallel-Connected Millimeter-Wave Duplexers/Multiplexers R. Vahdick and B. Varailhon de la Folie University of Victoria Department of Electrical and Computer Engineering Victoria, B.C. V8W 2Y2, Canada	435
N-5 9:30 a.m.	Electronically Tunable Band-Stop Filter D. Auffray and J. L. Lacombe Thomson-CSF Branche Equipements Aeronautiques 178, Bd Gabriel Péri 92240 Malakoff, France	439

Session O
High Frequency Superconductivity
Jacob Javits Convention Center, Hall 1E—Room 3
Thursday May 26, 1988

Chairman: R. L. Camiva—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 9:00 a.m.	Microwave Characteristics of Bulk High-Tc Superconductors E. Belohoubek, A. Fathy and D. Kolotkin David Sarnoff Research Center Princeton, NJ 08543-5300	445
O-3 9:20 a.m.	Slow-Wave Properties of Superconducting Microstrip Transmission Lines J. M. Pond and C. M. Krowne Electronics Science and Technology Division Naval Research Laboratory Washington, D.C. 20375-5000	449
O-4 9:40 a.m.	Loss Reduction in Superconducting Microstrip-Like Transmission Lines 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	453
O-5 9:50 a.m.	A Superconducting-Dielectric Resonator at W-Band C. S. Pao, Y. Li and S.-P. Chou Millimeter and Submillimeter Waves Laboratory Shanghai University of Science & Technology Shanghai, P.R. China	457

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. Wilcox—Georgia Tech

P-1 8:30 a.m.	A 43 GHz-Band Balanced Low-Noise Amplifier M. Ishizaki, T. Hamabe, Y. Ohashi 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, Minamiasaku-gun Nagano 384-13, Japan	461
P-2 8:50 a.m.	An SIS Mixer for 85-116 GHz Using Inductively Shunted Edge-Junctions S.-K. Pan and A. R. Kerr National Radio Astronomy Observatory Charlottesville, VA 22903 M. J. Feidman University of Virginia Charlottesville, VA 22901 A. W. Kleinsasser, J. Stasiak, R. L. Sandstrom and W. I. Gallagher IBM Thomas J. Watson Research Center Yorktown Heights, NY 10598	465
P-3 9:10 a.m.	A Broadband Low Noise SIS Receiver for Submillimeter Astronomy 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	469
P-4 9:20 a.m.	Waveguide-To-Microstrip Transitions for Millimeter-Wave Applications Y.-C. Shih Hughes Aircraft Company Microwave Products Division Torrance, CA 90509 J. N. Fon TRW One Space Park Redondo Beach, CA 90278 I. Q. Bui Technical Consultant 809 Hickory Ave Torrance, CA 90509	473
P-5 9:30 a.m.	Experimental Modeling for Millimeter-Wave Monolithic Integrated Circuit Components 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	477

- P-6
9:40 a.m. **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** 481
L. A. Bermudez
Universidade de Brasilia
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

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

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

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. Kudva—COMDEV Ltd. Canada

- R-1
10:30 a.m. **A Bandpass Filter Using Electrically Coupled TM₀₁₂ Dielectric Rod Resonators** 507
Y. Kobayashi and M. Munegishi
Department of Electrical Engineering
Saitama University
Urawa, Saitama 338 Japan
R-2
10:40 a.m. **A TE Triple-Mode Filter** 511
R. R. Bonetti and A. E. Williams
COMSAT Laboratories
Clarksburg, MD 20871-9475
R-3
11:00 a.m. **Modeling of Coupling by Probes in Dual Mode Cavities** 515
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
11:30 a.m. **800MHz High-Power Bandpass Filter using TM₁₁₀ Mode Dielectric Resonators for Cellular Base Stations** 519
T. Nishikawa, K. Wakano, 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
10:30 a.m. **22 GHz Performance of the Permeable Base Transistor** 525
L. J. Kushner, M. A. Hollis, Richard H. Mathews, K. B. Nichols, and C. O. Boyler
Lincoln Laboratory
Massachusetts Institute of Technology
Lexington, MA 02173
S-2
10:50 a.m. **Microwave Performance of npn and pnp AlGaAs/GaAs Heterojunction Bipolar Transistors** 529
B. Bayraktaroglu and N. Camilleri
Texas Instruments Incorporated
POB 655936 MS 134
Dallas, TX 75265

- S-3
11:10 a.m. **Watt-Level Millimeter-Wave Monolithic Diode-Grid Frequency Multipliers** 533
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
11:30 a.m. **Silicon Permeable Base Transistors for Low-Phase-Noise Oscillator Applications up to 20 GHz** 537
D. D. Rathman
Lincoln Laboratory, Massachusetts Institute of Technology
Lexington MA 02173
W. K. Niblack
Loral Frequency Sources
Chelmsford, MA 01824

Session T

Microwave Integrated Circuits

Jacob Javits Convention Center, Hall 1E—Room 4

10:30 a.m. to 12:00 p.m. Thursday May 26, 1988

Chairman Natalino Camilleri—Texas Instruments

- T-1
Paper was withdrawn
T-2
10:50 a.m. **Optimised Synthesis of Microstrip Branch-Line Couplers Taking Dispersion, Attenuation Loss and T-Junction Into Account** 543
A. Angelucci and R. Burrocco
CSELT-Centro Studi e Laboratori Telecomunicazioni S.p.A.
Via G. Reiss Romoli
274-10148 Torino, Italy
T-3
11:10 a.m. **Thin-Film Millimeter Wave Subassemblies** 547
C. Bueh and D. Murrow
Avantek Incorporated
Folsom CA 95630
T-4
11:30 a.m. **Microstrip Disk Cavities Filter Using GAP Capacitances Coupling** 551
L. Zhuang, L. Yu-Quan, and G. Zhong-Min
Nanjing Communication Engineering Institute
Nanjing, China
T-5
11:40 a.m. **Real Frequency Technique Applied to Synthesis of Lumped Broadband Matching Networks with Arbitrary Nonuniform Losses for MMIC's** 555
L. Zhu, B. Wu, and C. Sheng
Radio Engineering Department
Nanjing Institute of Technology
Nanjing Jiangsu P.R. China

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 IC's** 561
J. W. Culver, D. E. Zimmerman, and C. M. Panatik
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. Ishizuka
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. Atikawa
ATR Optical and Radio Communications Research Laboratories
Twin 21 Bldg. MID Tower
2-1-61 Shiomi, 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 J. Galtimore Marconi Electronic Devices Ltd Doddington Road Lincoln LN6 3LF, England	583
V-3 2:40 p.m.	Synthesis and Design of Wideband Symmetrical Nonuniform Directional Couplers for MIC Applications S. Uysal and A. H. Aghvami Department of Electronic and Electrical Engineering King's College London (University of London) Strand, London WC2R 2LS	587
V-4 3:00 p.m.	Ideal W.G. to Coax Transitions Using A F.B.M. Monopole F. C. deRonde University of Bath School of El. Eng. Bath Avon, BA2 7AY, UK	591
V-5 3:20 p.m.	Ultra-Broadband High-Directivity Directional Coupler Design 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	595

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

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

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

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

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

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

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—R.S. Microwave

Z-1 4:00 p.m.	Broadbanding Techniques for TEM N-Way Power Dividers A. Shor ACRIAN Inc San Jose, CA 95126	657
Z-2 4:20 p.m.	Use of Circular Sector Shaped Planar Circuits for Multiport Power Divider-Combiner Circuits M. D. Abouzahra and A. Dumanian MIT Lincoln Laboratory Lexington, MA 02173 K. C. Gupta University of Colorado Boulder CO 80306	661
Z-3 4:40 p.m.	A Compact Seven-Way Power Divider for Satellite Beam Forming Networks 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	665
Z-4 5:00 p.m.	Polarization Adaptor C. S. Kim and N. Moldovan Prodelin Corporation P.O. Box 368 Conover, NC 28613	669
Z-5 5:10 p.m.	Broadband Phase Invariant Attenuator D. Adler and P. Mantato General Microwave Corporation Amityville, NY 11701	673

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

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

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 4:00 p.m.	A New Method for Discontinuity Analysis in Shielded Microstrip L. P. Duncavay and P. B. Katch The Radiation Laboratory University of Michigan Ann Arbor, MI 48109	701
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BB-2 4:20 p.m.	Analysis of Microstrip Open-End and Gap Discontinuities in a 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	705	OF-2-10	Considerations on the Frequency Dependence of Waveguide Modes in Permeagnetized Ferrites Near Resonance D. Kother and A. Beyer Department of Electrical Engineering and SI B 254 Duisburg University, Bismarckstraße 81 D-4100 Duisburg 1, FRG	761
BB-3 4:30 p.m.	Special Iterative Techniques for the Full-Wave 3D Analysis of (M)MIC Structures W. Werthen University of Duisburg FB9, D-4100 Duisburg 1, West Germany R. H. Jansen Plessey Research Caswell Ltd. GaAs MMIC Dept. Great Britain	709	OF-2-11	The Analysis of Magnetostatic Waves in a Waveguide Using the Integral Equation Method 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	765
BB-4 4:40 p.m.	Simplified Description of the Field Distribution in Finlines and Ridge 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	713	OF-2-12	A 20 GHz FET Amplifier in an Integrated Finline/Microstrip Configuration J. Ruxton BTI, Bolnisi 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. Hoeler Lab. for Electromagnetic & Microwaves Dept. of Electrical Engineering University of Ottawa Ottawa, Ontario, Canada K1N 6N5	769
BB-5 4:50 p.m.	Non-Uniform Finline on Anisotropic Substrates A. Beyer and D. Kother Dept. of El. Engineering University of Duisburg Bismarckstraße 81 D-4100 Duisburg 1, FRG W. J. R. Hoeler Dept. of El. Engineering University of Ottawa Ottawa, Ontario, Canada K1N 6N5	717	OF-2-13	Finite Element Analysis of Skin Effect in Copper Interconnects at 77K and 300K U. Ghoshal and L. N. Smith Microelectronics and Computer Technology Corporation Austin, TX 78727	773
BB-6 5:00 p.m.	Analysis and Optimization of E-Plane Directional Couplers S. L. Shontz and W. J. R. Hoeler Laboratory for Electromagnetics and Microwaves Department of Electrical Engineering University of Ottawa Ottawa, Ontario, Canada K1N 6N5	721	OF-2-14	A Single MESFET Down-Converter for TVRO Application 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	777
BB-7 5:10 p.m.	Fullwave Analysis of Coupled-Finline Discontinuities G. Schiavon, P. Tognolatti and R. Sorrentino Tor Vergata University Dept. of Electronic Engineering Via O. Raimondo, 00173 Rome, Italy	725	OI-2-15	Quasioptical Patch Mixers at 35 and 94 GHz C. M. Jackson, T. A. Lester, M. A. Yu and Y. C. Ngan TRW Electronic Systems Group One Apple Park Redondo Beach, CA 90278	781
			OI-2-16	Design of a Rugged Millimeter-Wave Doubler Using a Series Varactor Configuration I. Boch COMDEV Ltd. Cambridge, Ontario, Canada N1R 7H6	785
			OI-2-17	A 32-GHz Reflected-Wave Maser Amplifier with Wide Instantaneous Bandwidth J. Shill and D. Nell Jet Propulsion Laboratory California Institute of Technology Pasadena, CA 91100	789
			OF-2-18	Hybrid HEM ₁₀ Mode Dielectric Resonators for Filter Applications at Short Millimeter Wavelengths W. Holpp ALG Aktiengesellschaft Radio and Radar Systems Group Ulm-Donaue, F.R. Germany	793
			OF-2-19	New Compact Broadband High-Efficiency Mode Converters for High Power Microwave Tubes with TE _{0n} or TM _{0n} Mode Outputs M. J. Buckley, C. H. Luo and R. J. Vernon Department of Electrical and Computer Engineering University of Wisconsin Madison, WI 53706-1691	797
			OF-2-20	Computer Aided Design of Microstrip Antenna Arrays P. Pouze ETSIT, Barcelona, Spain S. Toutain ENST Br. Brest, France F. Penard CNET Lannion, France J. P. Daniel Université des Sciences Rennes, France (Paper not available at the time of printing)	
OF-2-1	Finite Difference Analysis of Integrated Optical Channel Waveguides with Arbitrarily Graded Index Profile N. Schulz, K.-H. Bierwirth and F. Arndt Microwave Department, University of Bremen Kuststeiner Str. NW1 D-2800 Bremen 33, West Germany	731	OF-2-21	Impedance of GaAs P-I-N Diodes A. Gopinath University of Minnesota Department of Electrical Engineering Minneapolis, MN 55455	801
OF-2-2	A High Frequency GaAs Travelling Wave Electro-Optic Modulator at 0.82 μm C. M. Chiriac 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	735	OF-2-22	Electrically Tunable and Switchable Filters Using Microstrip Ring Resonator Circuits T. S. Martin, F. Wang and K. Chang Department of Electrical Engineering Dept. Texas A&M University College Station, TX 77843-3128	803
OF-2-3	A Simple Coupled-Mode Analysis Method for Multiple-Core Optical Fiber and Coupled Dielectric Waveguide Structures N. Kishi and E. Yamashita University of Electro-Communications Chofu-shi, Tokyo, Japan 182	739	OF-2-23	U-Band Shield Suspended-Stripline (SSL) Gunn DRO and VCO H. Zhen-qi Nanjing Solid-State Devices Research Institute P.O. Box 1601 Nanjing, China	807
OF-2-4	An Alternative Broadband Method for Automatic Measurement of the Complex Permeability and Permittivity of Materials at Microwave Frequencies 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	743	OF-2-24	Microwave-Induced Arcing in Filters S. L. Kaplan, A. A. Cucco and R. V. Garver Harry Diamond Laboratories Arlington, MD 20783	811
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. Tsang and K. P. Chang National Chiao Tung University Hsinchu, Taiwan, Republic of China (Paper not available at the time of printing)		OF-2-25	An Integrated 18.75/37.5 GHz FET Frequency Doubler S. Meszaro, C. J. Vercor, R. J. P. Douville Communications Research Centre, Ottawa Ontario, Canada	815
OF-2-6	A Millimeter-Wave Vector Network Analyzer J. V. Bellantoni, G. C. Dalman and R. C. Compton School of Electrical Engineering Cornell University Ithaca, NY 14853	747			
OF-2-7	A New Method for Measuring the Properties of Dielectric Substrate G. Kent Dielectric Laboratories, Inc. Cazenovia, NY 13035	751			
OI-2-8	Q-Band Computerized Slotted Line System A. Tongyi, M. Juhang, M. Queshane, Y. Hua and F. Junlin Microwave Institute East China Normal University Shanghai, China	755			
OF-2-9	Lumped-Element Circulator Optimization I. Schlichiem Raytheon Company Research Division Lexington, MA 02173	757			

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.

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

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

Session DD

FET Power Amplifiers

Jacob Javits Convention Center, Hall 1E—Room 2

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

Friday May 27, 1988

Chairman: Douglas Maki—Tachonics Corporation

DD-1 8:50 a.m.	High Power and High Efficiency GaAs FET's in C-Band S. Igi, S. Sakamoto, T. Sakayori, M. Watare, I. Sonoda, M. Yamanouchi, S. Takamiya, and S. Minai Kai-Ikumi Works Mitsubishi Electric Corp Itami, Japan (Paper not available at the time of printing)	835
DD-2 8:50 a.m.	Quasi-Monolithic 4-GHz Power Amplifiers with 65-Percent Power-Added Efficiency B. D. Geller and P. E. Goettle COMSAT Laboratories Clarksburg, MD 20871-9475	839
DD-3 9:10 a.m.	High-Efficiency 5-Watt Power Amplifier with Harmonic Tuning B. Koff and D. D. Heslon Texas Instruments Incorporated Dallas, TX 75265	843
DD-4 9:20 a.m.	High Efficiency Small Size 6W Class AB X-Band Power Amplifier Module Using a Novel MBE GaAs FET M. Avasthala, D. S. Day, S. Chan, P. Gregory, and J. R. Basnet Microwave Semiconductor Group Avantek Inc. Santa Clara, CA 95054	847
DD-5 9:40 a.m.	X and Ku Band High Power GaAs FETs Y. Yamada, H. Kuroda, H. Izumi, T. Soezima, H. Wakamatsu, and S. Hori Microwave Solid-State Department Kumukai Works, Toshiba Corporation Kawasaki, 210, Japan	

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—NRI

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

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

FF-1 8:30 a.m.	Ferrite Tuned Millimeter Wave Bandpass Filters With High Off Resonance Isolation D. Nicholson Hewlett-Packard Microwave Technology Division Santa Rosa, CA 95401	867
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FF-2 Ferrite Tunable Millimeter Wave Printed Circuit Filters

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8:50 a.m.
J. Uber, F. Arndt
Microwave Department, University of Bremen
Kufsteiner Str. NW1
D-2800 Bremen 33, West Germany
J. Bornemann
Dept. of El. and Comp. Eng.
University of Victoria
Victoria, B.C. Canada V8W2Y2

FF-3 9:10 a.m.	A Microwave Circuit Model for a Magnetostatic Wave Filter S. N. Stitzer Westinghouse Electric Corp Baltimore, MD 21203	875
FF-4 9:20 a.m.	A 13-Channel Magnetostatic Wave Filterbank J. D. Adam, M. R. Daniel, and S. H. Talisa Westinghouse R. & D. Center Pittsburgh, PA 15235	879
FF-5 9:30 a.m.	Analysis of Microwave Ferrite Devices by The Transfinite Element Method J. F. Lee and Z. J. Cendes Department of Electrical and Computer Engineering Carnegie Mellon University Pittsburgh, PA 15213	883
FF-6 9:50 a.m.	A Magnetostatic Forward Volume Wave Directional Coupler with a Guiding Slot Structure M. Kaneta, K. Yashiro, and S. Ohkawa Department of Electronic Engineering Chiba University Yayoi-cho Chiba 260, Japan	887

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

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

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.

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

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. Petrels—IRW

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

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

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

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

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.

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

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.

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

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 L. Susman—Fort—State Univ. of NY

NN-1 2:00 p.m.	A Unified Framework for Harmonic Balance Simulation and Sensitivity Analysis J. W. Bandler, Q. J. Zhang and R. M. Biernacki Optimization Systems Associates, Inc. 163 Watson's Lane Dundas, Ontario, Canada L9H 6L1	1041
NN-2 2:20 p.m.	Large-Signal MESFET Characterization Using Harmonic Balance B. R. Epstein, S. M. Perlman, 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	1045
NN-3 2:40 p.m.	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 J. M. Nebus, J. P. Villone, 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	1049

NN-4 2:50 p.m.	A GaAs MESFET Large-Signal Circuit Model for Nonlinear Analysis M. Sango, O. Pitzalis, L. Lerner, C. McGuire, P. Wang and W. Childs EEsof, Inc. Westlake Village, CA 91362	1053	PP-2 4:20 p.m.	FET Upconverter Design Using Load Dependent Mixing Transconductance J. L. M. Lord University of British Columbia Vancouver, Canada J. L. Fikart MPR Limited, Burnaby British Columbia, Canada	1089
NN-5	Optimization of Large Signal Spice GaAs FET Model from Measured Scattering Parameters C. K. C. Tzuang and F. Lau Inst. of Communication Engr Nat. Chiao Tung Univ Hsinchu, Taiwan, Republic of China (Paper not available at the time of printing)		PP-3 4:30 p.m.	A Quasi-Optical HEMT Self-Oscillating Mixer V. D. Hwang and T. Itoh Dept. of Electrical and Computer Engineering University of Texas Austin, TX 78712	1093
NN-6 3:20 p.m.	Load Pull Characteristics of GaAs MESFETs Calculated Using an Analytic, Physics Based Large Signal Device Model D. E. Stoneking, R. J. Trew and J. B. Yan ECE Dept., Box 7911 North Carolina State University Raleigh, NC 27695-7911	1057	PP-4 4:50 p.m.	2 to 8 GHz Double Balanced MESFET Mixer with +30 DBM Input 3rd Order Intercept S. Wiener, D. Neuf and S. Spohrer RHG Electronics Laboratory, Inc. A Subsidiary of Adams-Russell Electronics Co., Inc. Deer Park, NY 11729	1097

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. Wahl—TASC

OO-1 4:00 p.m.	A 100-kHz—22-GHz Instrumentation Photoreceiver D. J. Derickson, C. M. Miller and R. L. Van Tuyl Hewlett-Packard Co Signal Analysis Division Rohnert Park, CA 94928	1063
OO-2 4:20 p.m.	Calibration of Optical Receivers and Modulators Using an Optical Heterodyne Technique T. S. Tan, R. L. Jungerman and S. S. Elliott Hewlett-Packard Co Microwave Technology Division 1412 Fountaingrove Pkwy Santa Rosa, CA 95401	1067
OO-3 4:40 p.m.	High Power RF Generation with Optically Activated Bulk GaAs Devices A. Kim, M. Weiner and R. Youmans US Army Electronics Technology & Devices Laboratory, LABCOM Fort Monmouth, NJ 07703-5000 P. Herezfeld Drexel University Electrical Engineering Department Philadelphia, PA 19104 A. Rosen David Sarnoff Research Center Subsidiary of SRI International Princeton, NJ 08543	1071
OO-4 4:50 p.m.	Pulsed Operation of an Optoelectronic Fm-line Switch K. Uhde and J. Müller Technische Universität Hamburg-Harburg Postfach 90 14 03, D-2100 Hamburg 90, West Germany	1075
OO-5 5:00 p.m.	Characteristics of Coplanar Waveguides with Metal Coating on Multilayer Substrate: Application to Broadband LiNbO₃:Ti Traveling Wave Light Modulators/Switch 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	1079

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

PP-1 4:00 p.m.	A 13-GHz YIG-Film Tuned Oscillator for VSAT Applications Y. Mizunuma, T. Ohgihara, H. Nakano, T. Okamoto and Y. Murakami Sony Corporation Research Center 174 Fujitsuka-cho, Hodogaya-ku Yokohama, 240 Japan	1085
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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 4:00 p.m.	Numerical Analysis of Intermodulation Distortion in Microwave Mixers V. Rizzoli and A. Lipparini Dipartimento di Elettronica Informatica e Sistemistica University of Bologna C. Cecchetti Fondazione Ugo Bordon Villa Griffone 40034 Pontecchio Marconi Bologna Italy	1103
QQ-2 4:20 p.m.	A Mixer Computer-Aided Design Tool Based in the Time Domain P. Estabrook and B. B. Lusignea Stanford University Stanford CA 94305	1107
QQ-3 4:30 p.m.	Non-Linear Modelling and Design of Microwave Mixers M. I. Sobhy and F. Bassrat Electronic Engineering Laboratories The University of Kent at Canterbury Canterbury, Kent CT2 7NT U.K.	1111
QQ-4 4:40 p.m.	Optimal CAD of MESFETS Frequency Multipliers With and 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. Camade Thomson Hybrides et Microondes/DHM 29 Avenue Carnot 91300 Massy, France	1115
QQ-5 4:50 p.m.	A Novel Approach for the Large Signal Analysis and Optimisation of 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	1119
QQ-6 5:00 p.m.	The Use of Parametric Modeling in Microwave Circuit Design M. Eron and D. L. Rhodes David Sarnoff Research Center, CN 5300 Princeton, NJ 08543-5300	1123

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Co-Chairman: Perry Hornbuckle, Hewlett-Packard

- 8:50 The MMIC Program—Key to Affordable MMICs for DOD Systems (Invited), E. D. Cohen, Office of the Secretary of Defense, DOD Technology Analysis Office, Washington, D.C. 1
- 9:20 A K/Ka-Band Distributed Power Amplifier with Capacitive Drain Coupling, M. J. Schindler, J. P. Wendler, M. P. Zaitlin, M. L. Miller and J. R. Dornall, Raytheon Co., Research Division, Lexington, MA 5
- 9:40 Application Specific MMIC: A Unique and Affordable Approach to MMIC Development, I. Turner, Ford Aero., Palo Alto, CA; Z. Lemnios, Ford Motor, Colorado Springs, CO; S. Moghe, A. Podcil, C. Korgell, and R. Genin, Pac. Mono., Sunnyvale, CA; H.-C. Huang, COMSAT, Clarksburg, MD 9
- 10:00 6 to 18 GHz Single-Ended and Push-Pull MMIC Amplifiers for High-Gain Modules, R. Ramachandran, S. Moghe, J. Girimaji, and A. Podcil, Pacific Monolithics Inc., Sunnyvale, CA 15

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Co-Chairman: Hwa-Quan Tserng, Texas Instruments

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- 11:20 A GaAs MESFET 7 Gb/s Dynamic Decision Circuit I/C, R. J. Bayrums, A. D. M. Chen, J. Gilbert, R. Goyal, and J. Wang, ANADIGICS Inc., Warren, NJ 27
- 11:40 A 9.5 GHz Commercially Available 1/4 GaAs Dynamic Prescaler with Suppressed Noise Performance, M. Takahashi, H. Itoh, K. Ueda, and R. Yamamoto, NEC Corporation, Kawasaki, Japan 31

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Co-Chairman: Peter A. Beck, Rockwell International

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Co-Chairman: Richard T. Webster, RADC

- 1:30 Monolithic Ka-Band VCOs, G. Goldwasser, D. Donoghue, G. Dawe, S. Nash, R. Fingerman, I. Crossley, Alpha Industries, Inc., Woburn, MA; C. Mason, Aerojet ElectroSystems, L. Radaelli, and R. Layman, GAMMA Monolithics 55
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Chairman: David E. Meharry, Sanders Associates/Lockheed
Co-Chairman: Vladimir Sokolov, Honeywell, Inc.

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- 3:30 Uniplanar MMICs and Their Applications, M. Maraguchi, T. Hirota, A. Minakawa, K. Ohwada, and T. Sugeta, Nippon Telegraph and Telephone Corporation, Kanagawa, Japan 75
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- 3:30 A Q-Band Monolithic Three-Stage Amplifier, I. Yonaki, M. Aust, K. Nakano, G. Dow, L. C. T. Liu, E. Hsieh, R. Dia, and H. C. Yen, TRW Redondo Beach, CA 91
- 4:10 A 3 Bit K/Ka Band MMIC Phase Shifter, M. J. Schindler, M. E. Miller, Raytheon Research Division, Lexington, MA 95
- 4:30 A High Performance V-Band Monolithic FET Transmit-Receive Switch, G. L. Lan, D. L. Dunn, J. C. Chen, C. K. Pao, and D. C. Wang, Hughes Aircraft Company, Torrance, CA 99

WEDNESDAY, MAY 25, 1988

Jacob Lavits Convention Center—Hall 1E, Room 1

SESSION VII PRODERABILITY AND APPLICATIONS

Chairman: Steve Temple, Raytheon Company
Co-Chairman: Sanjay Moghe, Pacific Monolithics

- 10:30 Commercial Applications of GaAs ICs (Invited), J. Gladstone, Hewlett-Packard Company, Santa Rosa, CA 103
- 11:10 GaAs Monolithic Circuit for FMCW Radars, R. Leblanc, V. Pauker, P. Talbot, A. Collet, and J. Bellaiche, LEP Cedex France, M.-J. Rudille, TRT Robinson, France 109
- 11:30 Laser Chip Separation Method for GaAs MMIC Wafers, E. H. Wong, R. B. Wylie, D. R. Johnson, Hewlett-Packard, Santa Rosa, CA 113
- 11:50 Broad Band Monolithic Microwave Active Inductor and Application to a Miniaturized Wide Band Amplifier, S. Hara, T. Tokumitsu, T. Tanaka, and M. Aikawa, AIR, Osaka, Japan 117

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SESSION VIII POWERAMPLIFIERS

Chairman: Jaime C. Tensdoro, Harris Microwave
Co-Chairman: Dale L. Dawson, Westinghouse Electric Corp.

- 2:00 A 3-Watt X-Band Monolithic Variable Gain Amplifier, R. B. Culbertson and D. C. Zimmermann, Texas Instruments Incorporated, Dallas, TX 121
- 2:20 Stability and Improved Circuit Modeling Considerations for High Power MMIC Amplifiers, R. G. Freitag, S. H. Lee, D. M. Kratesik, D. J. Dawson, and J. L. Degenford, Westinghouse Electric Corp., Baltimore, MD 125
- 2:40 Ka-Band Monolithic GaAs FLI Power Amplifier Modules, N. Camilleri, B. Kim, H. Q. Tserng, and H. D. Shih, Texas Instruments Incorporated, Dallas, TX 129
- 3:00 Wideband Variable Gain Amplifiers in GaAs MMIC, K. H. Snow, J. J. Komak, and D. A. Bates, General Electric Company, Syracuse, NY 133

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SESSION IX MMIC LOW NOISE AMPLIFIERS

Chairman: Hui C. Huang, Comsat Labs
Co-Chairman: Zachary Lemnios, Ford Microelectronics Inc.

- 4:00 A Monolithic Ka-Band HEMT Low-Noise Amplifier, C. Yuen, C. Nishimoto, M. Glenn, Y. C. Pao, S. Bandy, and G. Zdziasik, Varian Research Center, Palo Alto, CA 139
- 4:20 A High Electron Mobility Transistor with a Mushroom Gate Fabricated by Focused Ion Beam Lithography, Y. Sasaki, K. Nasahama, K. Hoshino, T. Katoh, and M. Komuro, Mitsubishi Electric Corporation, Itami, Japan 143
- 4:40 X-Band and Ka-Band Monolithic GaAs PIN Diode Variable Attenuation Limiters, D. J. Seymour, D. D. Hoston, and R. L. Lehmann, Texas Instruments Incorporated, Dallas, TX 147
- 5:00 A 35 GHz Monolithic MESFET LNA, S. Bandla, G. Dawe, C. Bedard, R. Jayaram, D. Shaw, L. Raffaelli, and R. Goldwasser, GAMMA Monolithics, Woburn, MA 151