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1977 INTERNATIONAL MICROWAVE SYMPOSIUM SAN DIEGO, CALIFORNIA

THE PLACE: SHERATON-HARBOR ISLAND HOTEL



THE THEME

"ACCENT ON APPLICATIONS"

The San Diego Symposium Steering Committee extends to you a warm welcome to join us for the 1977 MTT Symposium, the second to be held in our city (the first in 1960). The meeting will be held at the Sheraton Harbor Island Hotel, very close to San Diego's Lindbergh Field. We suggest that you consider taking your family along to enjoy a vacation at "America's Finest City".

The record number of papers submitted this year has required the use of four simultaneous sessions. The Technical Program Committee has attempted to structure the sessions so that areas of obvious overlapping interests will be minimized. Over 150 papers from 11 countries will be presented.

For the first time in MTT history, the exhibits

will be managed professionally (that is, by a paid manager). Microwave Journal has assembled a large number of exhibitors for our meeting. Coffee breaks will be in the exhibit area.

There will be four "Workshops" to be held just before and after the Symposium. The organizers require that attendees actively participate in the discussions. Details are given below.

Again, as in 1975, there will be a special session held in cooperation with the Japanese MTT Chapter. Organized by Professor Shigebumi Saito of the University of Tokyo and TPC Advisor Stephan Adam of H. P., this session will feature "Microwave and Millimeter Wave Solid State Circuits Development in Japan".

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PRESIDENT'S MESSAGE

by Larry Whicker

PRESIDENT'S MESSAGE

As Pete Rodrigue indicated in the last Newsletter, 1976 was a good year within the MTT-Society. Outstanding technical meetings were held in Cherry Hill, New Jersey and we sponsored another outstanding topical meeting on Sub-Millimeter Waves in San Juan, Puerto Rico. Our Transactions continued on a high technical plane while conveying much valuable design information. We are, however, faced with increased responsibilities.

One of the key challenges to the MTTs Administrative Committee is to provide expanding and constantly changing services to our membership. In one area, we are attempting to do this by providing professionally managed exhibits at this year's symposium. A professionally managed exhibit portion of our annual meeting should provide several advantages including:

- Increased attendance at our meetings resulting in increased revenue
- Provide a forum for display of new microwave instrumentation
- Serve a broader cross-section of our microwave community including managers, marketers, and younger engineers

Professional management of exhibits does force us to hold our meetings in larger hotels. In San Diego, the site was selected far before an exhibit's contract was signed. Thus we may be a bit crowded in our meeting rooms to provide adequate space for the exhibits. The site in San Diego is so ideal that I don't think we will notice a little crowding. In the next few years following San Diego we have selected larger hotel-convention complexes which will allow outstanding meeting and exhibit space. Please provide us with your impressions of the meeting and exhibit.

Another area of concern to the MTTs Adcom is how best to serve our members in the areas of emerging technologies. Here we have a mixed record. We have done very well in the sub-millimeter wave area where Ken Button and Jim Gallagher have organized well run topic meetings. We have done poorly in areas such as fiber and integrated optics where the Quantum Electronics Council (QEC) is in the process of petitioning to become a new Group to serve this area. Another point of concern is the microwave biological effects area. This area needs a technical home. We are taking several steps here. These include:



EDITOR'S NOTES

by Nat Pelner

EDITOR'S NOTES

Over the past three years, I have worked out a system of column or department sheets to facilitate the preparation of the NEWSLETTER. One sheet has hardly even been used — the Letters To The Editor sheet. Over these three years, I have received only TWO letters. This sort of situation sends shivers up and down the backs of editors; an ailment called "low reader-author ratio" syndrome. Assuming that we do not suffer from this ailment, one might conclude that all is well with ADCOM and IEEE responsive to our needs, or that we are so apathetic that there is no point to write, or that we are just too busy. No one in his right mind would be so smug as to think that "All Is Well". We microwavers are too intelligent and worldly to be apathetic. This leaves the conclusion that we are too busy and that criticizing MTT and/or IEEE has too low a priority. If this is the case, we are missing the boat.

The NEWSLETTERS are read by our IEEE officials. They use the NEWSLETTERS to feel the pulse of the membership.

In the early 1970s when our profession was on the brink we were concerned with our jobs. We wrote! We complained! We pushed! The IEEE flexed a bit. Has it flexed enough? Has it flexed in the direction we want? With no feedback, other than a few individuals taking destructive pot-shots, the decision makers can assume they are on the right road, that is to say, "Silence Implies Consent".

It is our organization. It must satisfy our needs. Your ADCOMs need your help. So write!!!!



1. A Special Issue of the MTT Transactions with Bill Guy as Guest Editor.
2. John Osepchuk is National Lecturer in this area for 1977-1978.
3. We are planning a topical meeting in this area in conjunction with the 1978 Symposium in Ottawa.

Please let me, other Adcom members or the Editor of the Newsletter know of areas where the MTT Adcom might better serve the membership.

UPDATE YOUR DIRECTORY

John Horton
TRW Systems, M5/1426
ONE Space Park
Redondo Beach, Ca. 90278



ADCOM HIGHLIGHTS

by Hal Sobol

The February 21 ADCOM meeting, the first conducted by our new President Larry Whicker, was held at the Sheraton Harbor Island Hotel, site of the 1977 Symposium. The meeting was held in conjunction with the Symposium Technical Program Committee's paper selection session and ran from 9-6 p.m.

President Whicker reported on the TAB meeting held February 17 in Philadelphia. He described the new TAB organization with Frank Blecker as chairman and the following Vice Chairmen: Frank Pittman, Operations; W. F. Spencer, Technology; Development, J. Zaborsky, W. Guy, D. Webb, and K. Button are MTT representatives on the COMAR, Materials, and Meetings Groups in the Technology area. Considerable discussion at the TAB meeting was devoted to the proposed formation of an Electro-Optics Society that would replace the present Quantum Electronics Council and would be the primary IEEE group involved in the Fiber Optics field. The ED Society which previously had opposed the formation of the new Society now supports it. MTT voted not to support the formation of this Society at the December ADCOM meeting and reaffirmed its negative position by a 12 to 6 vote at the February meeting. MTT's primary concern in voting negatively was the loss of a field that involved many microwave workers and used microwave techniques. A committee headed by H. Sobol and consisting of D. Anderson, J. Gallagher, D. Chang, K. Button, F. Rosenbaum and L. Allen was appointed to formulate a position paper for our short and long term approach to this field. A report will be prepared by May 1, to be presented at the next TAB meeting.

PUBLICATIONS (Don Parker)

From June 74 to February 77, 686 papers, excluding Special Issues were submitted to the Transactions editor. Of these, 385 were accepted, 180 rejected and the remainder are still in review. During this period 445 papers, including Special Issues were published. The current average time between submission of a paper and publication in the Transactions is nine months, of which six months are required by IEEE for printing and distribution.

Starting March 77, the policy to give first printing priority to papers covered by page charges will become effective. Our goal is to maintain a minimum level of 55% of page charges.

Don presented the details of the Technical Note section of the Transactions that was approved by ADCOM at the December meeting. These details will be published in the Newsletter. The Technical Notes will replace the Short Papers and will be restricted to one page papers that are typed by the author on standard mats and are reviewed.

Publication will occur in two to three months after submission rather than the nine months for a standard paper. The first Notes will appear in the September or October 1977 issue.

1977 SYMPOSIUM (Dave Rubin)

Dave reported that 241 papers, a 20% increase over last year were submitted. 152 papers were accepted and will be presented in 24 sessions. Four parallel sessions will run throughout the Symposium.

A four year contract with a fifth year option was signed with Horizon House, Publishers of the Microwave Journal, to run the exhibits at MTT Symposiums. MTT will receive a share of the profits of the exhibits. The San Diego Symposium will be the first for this cooperative venture. Howard Ellowitz of the MW Journal reports that 46 of a possible 60 booths have been sold at this writing and we fully expect a sell out. Howard is advertising heavily for the Symposium in newspapers and magazines, as well as to IEEE mailing list. Because of the excellent program, the great San Diego location and Howard's campaign we expect a very large turn out in 1977.

NON-PERIODIC PUBLICATIONS (Lamar Allen)

Lamar has been working towards obtaining NSF funds to publish a Microwave Encyclopedia as an MTT non-periodic publication. Unfortunately NSF has discontinued the practice of supporting publication of archival type manuscripts. Lamar is looking for other sources of funds.

FINANCE (George Oltman)

George reported that we ended the year within \$600 of our budget. Several items were above and below but the net was on target. Three cheers for George!

Certain symposiums' funds were not included in our 1976 income but will be recorded as credits in 1977.

OPERATIONS (Warren Cooper)

The revision of our by-laws is now complete and will be published shortly. The ADCOM nominating committee is being formed and will include several shapter chairmen.

TECHNOLOGY FORECASTING (Al Clavin)

Al resigned as chairman of this committee and received the thanks of ADCOM for his excellent work. Al had arranged several Technology Forecasting sessions that were extremely well attended at our symposiums over the past few years. Technology forecasting will be carried on under the Long Range Planning Committee. [

TECHNICAL COMMITTEES (John Horton)

John Horton, who now is chairman of Technical Committees, is reviewing the current organization and will present any changes that he feels necessary at the June ADCOM meeting.

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CHAPTER ACTIVITIES

by Dick Sparks

As final arrangements are being made by the San Diego Symposium Steering Committee to host the microwave community to its annual technical conference and exhibition, the Membership Services Committee is laying plans for a novel Chapter Chairmen's meeting at the Symposium site. This year the MTT-S ADCOM has authorized a Chapter Chairmen's dinner to precede the meeting in order to encourage as much chapter representation as possible. Every chapter will be contacted to designate an attendee as early as possible so that plans for the event can be finalized.

The present schedule calls for dinner to be served at 6:30 p.m., Monday evening June 20, with the formal Chapter Chairmen's meeting to begin at 8:00 p.m. and end by 10:00 p.m. This will be the only evening of the Symposium that any formal business will be scheduled and it is important that every chapter be represented. Chapter Chairmen will receive an agenda of the topics to be discussed and actual participation of all attendees is encouraged. As has been characteristic of previous meetings the Membership Services Committee is particularly interested in discussing any problems that chapters have experienced in obtaining speakers or meeting locations and any financial difficulties that have arisen. The solutions to these problems most often comes from other chapters who have experienced these same situations. Each Chapter Chairman or his representative should plan to attend the Monday morning ADCOM meeting scheduled to begin at 8:30 a.m. The detailed agenda and meeting notices of ADCOM are generally sent out one month prior to the meeting. The Symposium ADCOM meeting can be very beneficial to chapter officers in that nearly all ADCOM members are present and specific time is allotted to hear reports from the Chapter Chairmen that are present.

Chapters that are interested in sponsoring the International Symposium in a subsequent year should contact Ken Button, the meetings and Symposium Chairman. Proposals will be considered this year for the 1981 Symposium site. It is not too early to be thinking about sites for the 1982 Symposium and beyond.

An additional note of interest to chapters, the election of new members to ADCOM will not occur until the September meeting, but names of potential candidates should be submitted to Warren Cooper who is chairing the Nominations Committee. A notice to this effect appears elsewhere in the Newsletter.

I look forward to seeing each of you at San Diego in June. Please contact me directly at any time on questions concerning your Chapter Activities:

Area Code 617-274-7100, Ext. 4523

CALL FOR NOMINATIONS TO ADMINISTRATIVE COMMITTEE

Notice is hereby given to all members of the IEEE Society on Microwave Theory and Techniques that nominations for the Administrative Committee are now open and will be received on or before the annual meeting to be held in September.

Nominations can be made through any member of the Administrative Committee (see 1977 Committee Directory for names and addresses) or by petition signed by 25 members of the Society. Petitions should be submitted to the Chairman of the Nominations Subcommittee.

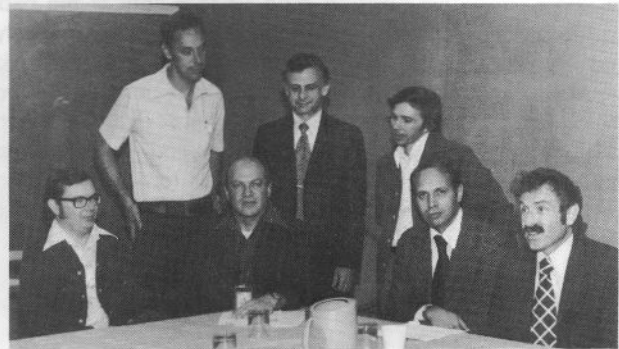
H.W. Cooper, Chairman of the Nominations Subcommittee

Westinghouse Electric Corp.
Advanced Technology Labs.
Box 1521 MS-3717
Baltimore, MD 21203

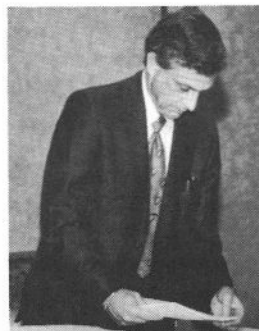
The members of the Nominating Subcommittee are

R. A. Sparks
J. L. Allen
C. J. Rucker

MEET THE SYMPOSIUM STEERING COMMITTEE



Front (Left to Right) – W. Boley (Local Arrangements); D. Proctor (Finance Chairman); H. Faller (Publications); E. Silverstein (Publications Chairman)
Rear (Left to Right) – D. Rubin (Chairman); G. Schaffner (T.P.C. Chairman); T. Kihm (Local Arrangements Chairman)
Missing – M. Devan (Publicity); H. Cabayen (T.P.C.); V Learned (Local Arrangements)



G. Schaffner

"Getting it all together" at the technical program committee meeting

1977 MTTs INTERNATIONAL MICROWAVE SYMPOSIUM

ADVANCE PROGRAM

TUESDAY MORNING, JUNE 21, 1977

Victoria Room (D)

Cuyamaca Room (A)

SOLID STATE SOURCES

- Chairman: Berin Fank
Organizer: Arye Rosen
- 0830 "HIGH POWER W-BAND IMPATT OSCILLATORS"
A1.1 T. Fong, W. Lane, H. Kuno, N. Kramer
 - 0850 "MECHANICALLY TUNEABLE, CAVITY-STABILIZED, MILLIMETER-WAVE OSCILLATORS"
A1.2 B. Owen
 - 0910 "Y-BAND (170-260 GHz) TUNABLE CW IMPATT DIODE OSCILLATORS"
A1.3 C. Chao
 - 0930 "Ka-BAND SOLID STATE AMPLIFIER"
A1.4 F. Bayuk, J. Raue
 - 1020 "COMPUTER AIDED TIME AND FREQUENCY DOMAIN MEASUREMENTS OF TRAPATT DIODE OSCILLATORS"
A1.5 M. Ryken, Jr., K. Kotzebue
 - 1040 "AMPLIFIER APPLICATIONS OF MILLIMETER WAVE InP GUNN DEVICES"
A1.6 R. Hamilton, Jr., S. Long
 - 1100 "A NEW LOOK AT NOISE IN TRANSFERRED ELECTRON OSCILLATORS"
A1.7 H. Gnerlich, J. Ondria

OPTICS AND SUBMILLIMETER WAVES

I. Review of Fibre & Integrated Optics

- Chairman: H. Taylor
Organizer: D. Anderson
- 0830 "LIGHT WAVE COMMUNICATIONS (invited)"
D1.1 M. DiDomenico
 - 0900 "SINGLE STRAND OPTICAL FIBRE SYSTEMS" (invited)
D1.2 M. Barnoski
 - 0930 "A REVIEW OF INTEGRATED OPTICS" (invited) W.S.C. Chang
D1.3

II. Novel Millimeter Wave Sources

- Chairman: J. Gallagher
- 1040 "RELATIVISTIC ELECTRON BEAM INTERACTIONS FOR GENERATION OF HIGH POWER AT MICROWAVE FREQUENCIES (invited) T. Godlove"
D1.4
 - 1110 "CW PERFORMANCE OF OPTICALLY PUMPED LASERS IN THE MILLIMETER WAVE SPECTRAL REGION"
D1.5 F. Foote, D. Hodges
 - 1130 "DEVELOPMENT AND APPLICATIONS OF MILLIMETER WAVELENGTH, HIGH POWER OPTICALLY PUMPED LASERS"
D1.6 N. Luhmann, Jr., A. Semet

TUESDAY AFTERNOON, JUNE 21, 1977

Mission Courts North (B)

SIX PORT NETWORK ANALYSIS

- Chairman & Organizer: S. Adam
- 0830 "DESIGN CONSIDERATIONS FOR AUTOMATIC NETWORK ANALYZERS BASED ON THE SIX-PORT CONCEPT"
B1.1 G. Engen
 - 0850 "A NETWORK ANALYZER USING TWO 6-PORT REFLECTOMERS"
B1.2 C. Hoer
 - 0910 "A SIX-PORT AUTOMATIC NETWORK ANALYZER"
B1.3 H. Cronson, L. Susman
 - 0930 "AN IMPROVED CIRCUIT FOR IMPLEMENTING THE SIX-PORT TECHNIQUE OF MICROWAVE MEASUREMENTS"
B1.4 G. Engen
 - 1020 "AN APPLICATION OF THE SIX-PORT JUNCTION TO PRECISION MEASUREMENT OF ONE-PORT PARAMETERS"
B1.5 E. Komarek
 - 1040 "A SEMI-AUTOMATED SIX-PORT FOR MEASURING MILLIMETER WAVE POWER AND COMPLEX REFLECTION COEFFICIENT"
B1.6 M. Wiedman

Cuyamaca Room (A)

DIODE FREQUENCY CONVERTERS

- Chairman: John Kuno
Organizer: Ayre Rosen
- 1330 "BROADBAND FREQUENCY DIVIDERS USING MICROWAVE VARACTORS"
A2.1 R. Harrison
 - 1350 "PARAMETRIC FREQUENCY MULTIPLICATION AND LEVEL CONTROL IN BROADBAND MICROWAVE SIGNAL SOURCES"
A2.2 Y. Kim, R. Kmetovicz
 - 1410 "LOW COST X-BAND MIC BARITT DOPPLER SENSOR"
A2.3 S. Kwok, K. Weller
 - 1430 "K-BAND BARITT DOPPLER DETECTORS"
A2.4 J. East, P. McCleer, G. Haddad
 - 1530 "FM DISTORTION IN SINGLE CASCADED INJECTION LOCKED DIODE OSCILLATORS"
A2.5 T. Berceci
 - 1550 "A SIMPLE QUASI-OPTICAL MIXER FOR 100-120 GHz"
A2.6 A. Kerr, P. Siegel, R. Mattauch
 - 1610 "QUASI OPTICAL RECEIVER DESIGN"
A2.7 J. Gustincic

Mission Courts North (B)

MICROWAVE MEASUREMENTS

- Chairman & Organizer: E.L. Komarek
- 1330 "MICROWAVE DEVIATION LINEARITY TEST METHOD"
B2.1 J.C. Caci
 - 1350 "A MICROWAVE LINEARITY TEST SET"
B2.2 G.L. Heiter

Mission Courts South (C)

MULTIFUNCTION MICROWAVE MODULES

- Moderator: B. Spielman

1977 MTTs INTERNATIONAL MICROWAVE SYMPOSIUM

- 1410 B2.3 "PHASE NOISE MEASUREMENTS IN THE FREQUENCY DOMAIN"
A. Lance, W. Seal, F. Mendoza, W. Hudson
- 1500 B2.4 "SUPER TSD, COVERING N-PORT MEASUREMENTS WITH MULTIPLE LEAKAGE PATHS"
R. Speciale, N. Franzen
- 1520 B2.5 "PROBE MEASUREMENTS OF GUIDE WAVELENGTH IN RECTANGULAR SILICON DIELECTRIC WAVEGUIDE"
G. Novick, W. Jacobs, R. Walter, C. LoCascio
- 1540 B2.6 "DETERMINATION OF COMPLEX DIELECTRIC AND MAGNETIC PROPERTIES OF MATERIALS USING A LEAST SQUARE FIT METHOD BASED ON VON HIPPEL'S TECHNIQUE"
S. Weisbrod, L. Morgan
- 1600 B2.7 "MEASUREMENT OF DIELECTRIC PROPERTIES WITH SUPERCONDUCTING RESONATORS: THEORY AND PRACTICE"
W. Meyer

Mission Courts South (C)

COMPUTER ORIENTED MICROWAVE DESIGN AND PRACTICES

Chairman: B.S. Perlman
Organizer: V.G. Gelnovatch

- 1330 C2.1 "CALCULATOR-BASED SYNTHESIS ROUTINE SPEEDS MICROWAVE AMPLIFIER DESIGN"
D. Mellor, G. Pierson
- 1350 C2.2 "COMPUTER-AIDED DESIGN OF COMMENSURATE NETWORKS USING STATE-SPACE TECHNIQUES"
M.I. Sobhy, M.H. Keriakos
- 1410 C2.3 "MICROWAVE CIRCUIT DESIGN BY MEANS OF A SIMPLE SIMULATOR WITH AN ON-LINE MINICOMPUTER"
M. Parisot, J. Magarshack
- 1500 C2.4 "AN AUTOMATED RECEIVER TEST CONCEPT"
D. Cooley, R. Hume
- 1520 C2.5 "COMPUTER-CONTROLLED INFRARED MICROSCOPE FOR THERMAL ANALYSIS OF MICROWAVE TRANSISTORS"
F. Sechi, B. Perlman, J. Cusack
- 1540 C2.6 "COMPUTER-AIDED TUNING OF MICROWAVE CIRCUITS"
J. Marquardt, G. Muller
- 1610 C2.7 "A TIME-DOMAIN TECHNIQUE FOR CHARACTERIZING LEAKY COAXIAL CABLES"
M. Iskander, M. Hamid

Victoria Room (D)

HIGH POWER

Chairman: J. Osepchuk
Organizer: H. Goldie

- 1330 D2.1 "DIELECTRIC WAVEGUIDES FOR UNDERWATER TRANSMISSION OF HIGH MICROWAVE POWER"
D. Pavlidis, H. Hartnagel
- 1350 D2.2 "THE SELECTION OF HIGH-POWER INTEGRATED MICROWAVE COMPONENTS FOR MILITARY SATELLITE COMMUNICATION TERMINALS"
F. Johnson, H. Mohr, D. Robinson
- 1410 D2.3 "FURTHER ADVANCES IN HIGH-POWER ELECTRONICALLY TUNED RESONATORS"
A. Karp
- 1500 D2.4 "A 1.2 KW L-BAND SOLID STATE POWER AMPLIFIER FOR SPACE-BORNE SYNTHETIC APERTURE RADARS"
K. Lee

- 1520 D2.5 "HIGH POWER MICROWAVE P-I-N DIODE INDUCTIVE DRIVING"
C. Georgopoulos
- 1540 D2.6 "GRACEFULL DEGRADATION PROPERTIES OF MATCHED N-PORT POWER AMPLIFIER COMBINERS"
R. Ernst, R. Camisa, A. Presser
- 1610 D2.7 "A PASSIVE METHOD FOR MONORITING NON-IONIZING RADIATION"
G. Fanslow

WEDNESDAY MORNING, JUNE 22, 1977

Cuyamaca Room (A)

MICROWAVE INTEGRATED CIRCUITS

Chairman & Organizer: U. H. Gysel

- 0830 A3.1 "A S-BAND HIGH POWER FEEDBACK AMPLIFIER"
E. Strid, C. Hsieh
- 0850 A3.2 "A LOW NOISE FET AMPLIFIER IN COPLANAR WAVEGUIDE"
J. Vokes, W. Barr, J. Dawsey, B. Hughes, J. Shrubbs
- 0910 A3.3 "AN MIC PUSH-PULL FET AMPLIFIER"
B. Geller, M. Cohn
- 1000 A3.4 "A HIGH POWER PASSIVE DIODE RECEIVER PROTECTOR WITH INTEGRAL STC USING VARIABLE BASEWIDTH TECHNIQUES"
M. Gawronski, H. Goldie
- 1020 A3.5 "A LOW NOISE MIC GaAs FET AMPLIFIER FOR 4 GHz RADIO"
R. Knerr, C. Swam
- 1040 A3.6 "Ku-BAND FRONT-END RECEIVER USING MIC TECHNOLOGY"
C. Krowne, F. Marki, E. Crescenzi

Mission Courts North (B)

DIGITAL MICROWAVE SYSTEMS

Chairman: M. Yoder
Organizer: G. Chao

- 0830 B3.1 "DIGITAL RADIO: SYSTEMS, MARKETS AND TRENDS" (invited)
H. Sobol
- 0900 B3.2 "PSK AND QPSK MODULATORS FOR GIGABIT DATA RATES"
C. L. Cuccia, E. W. Matthews
- 0920 B3.3 "MM-WAVE PIN DIODES FOR ULTRA HIGH DATA RATES"
F. Bosch, O. Petersen
- 0940 B3.4 "APPLICATIONS OF ADVANCED TECHNOLOGIES TO DIGITAL MICROWAVE SYSTEMS"
D. Claxton
- 1040 B3.5 "MILLIMETER WAVE IMPATT SOURCES FOR COMMUNICATION APPLICATION"
Y. Chang, J. Hellum, J. Paul, K. Weller
- 1100 B3.6 "DESIGN OF DIRECT PHASE MODULATORS FOR HIGH SPEED DIGITAL RADIO SYSTEMS USING MIC TECHNIQUES"
J. Robinson, A. Husain
- 1120 B3.7 "PRECISION DELAY MEASUREMENTS OF SUB-NANISECOND LOGIC CIRCUITS"
C. Ryan, M. Leskela

1977 MTTs INTERNATIONAL MICROWAVE SYMPOSIUM

Mission Courts South (C)

MICROWAVE & MM WAVE SOLID STATE CIRCUIT DEVELOPMENT IN JAPAN

Chairman: T. Makimoto
Organizer: S. Saito

- 0830 "4-W IMPATT AMPLIFIERS FOR 6-8 GHz
C3.1 1800 CHANNEL FM RADIO SYSTEMS"
M. Noguchi, T. Hayasaka, K. Sakamoto
- 0850 "HIGH POWER GaAs IMPATT AMPLIFIER"
C3.2 K. Nishitani, H. Sawano, T. Ishii, S. Mitsui
- 0910 "INJECTION LOCKING OF AN IMPATT DIODE
C3.3 OSCILLATOR BY USING A LOW-FREQUENCY
SIGNAL. --PARAMETRIC INJECTION LOCKING--"
H. Okamoto
- 0930 "SCHOTTKY-BARRIER DIODE CONVERTERS
C3.4 IN THE SHORT MILLIMETER WAVELENGTHS
REGION"
M. Akaike
- 1030 "A NEW MICROWAVE AMPLITUDE LIMITER
C3.5 USING GaAs FIELD EFFECT TRANSISTOR"
S. Fukuda, M. Kitamura, Y. Ara, I. Haga
- 1050 "A 7 GHz FM TRANSMITTER UTILIZING GaAs
C3.6 POWER MESFETS"
H. Komizo, Y. Arai, T. Saito
- 1110 "20 GHz BAND GaAs-FET WAVEGUIDE-TYPE
C3.7 AMPLIFIER"
H. Tohyama

Victoria Room (D)

APPLICATIONS TO CANCER TREATMENT I

Chairman: A. Ecker
Organizer: W. Guy

- 0830 "MICROWAVE THERMOGRAPHY AS A DIAG-
D3.1 NOSTIC TOOL FOR THE DETECTION OF
CANCER" (invited)
A. Barrett, P. Myers
- 0900 "HYPERThERThIA DOSE DEFINITION"
D3.2 E. R. Atkinson (invited)
- 0930 "SELECTIVE HEATING OF CUTANEOUS HUMAN
D3.3 TUMORS AT 27.12 MHz"
P. Antich, N. Tolita, J. Kim, E. Hahn
- 1020 "HYPERThERThIA: HEALING AND HAZARD IN
D3.4 TUMOR BEARING RATS"
H. Moroson, S. Stowe, M. Schechter
- 1040 "CHANGES IN TUMOR BLOOD FLOW PRODUCED
D3.5 BY MICROWAVE-INDUCED HYPERThERThIA"
C. Sutton, F. Carroll
- 1100 "INCREASE IN X-RAY SENSITIVITY OF CANCER
D3.6 AFTER EXPOSURE TO 434 MHz ELECTROMAG-
NETIC RADIATION"
J. Holt, P. Keckie, A. Nelson

WEDNESDAY AFTERNOON, JUNE 22, 1977

Cuyamaca Room (A)

FET DEVICES AND CIRCUITS

Chairman: B. Berson
Organizer: A. Rosen

- 1330 "X-BAND GaAs FET YIG TUNED OSCILLATOR"
A4.1 T. Ruttan
- 1350 "WIDE-BAND VARACTOR-TUNED GaAs MESFET
A4.2 OSCILLATORS AT X AND Ku-BANDS"
H. Tserng, H. M. Macksey
- 1410 "DESIGN OF GaAs MESFET OSCILLATOR USING
A4.3 LARGE SIGNAL S-PARAMETERS"
M. Nakatani

- 1430 "A DIELECTRIC RESONATOR OSCILLATOR WITH
A4.4 5 PPM LONG TERM STABILITY AT 4 GHz"
J. Plourde, D. Linn, I. Tatsuguchi, C. Swan
- 1520 "A HALF-MICRON GATE LOW NOISE GaAs MESFET
A4.5 AND AMPLIFIERS"
H. Kodera, Y. Kaneko, H. Sato
- 1540 "HIGH POWER MICROWAVE STATIC INDUCTION
A4.6 TRANSISTOR"
K. Kajiwara, Y. Yukimoto, K. Shirahata
- 1600 "AN EXPERIMENTAL EVALUATION OF X-BAND
A4.7 GaAs FET MIXERS USING SINGLE AND DUAL-
GATE DEVICES"
S. Cripps, O. Nielsen, D. Parker, J. Turner

Mission Courts North (B)

FILTERS I

Chairman: S. B. Cohn
Organizer: R. Levy

- 1330 "MICROWAVE DIELECTRIC RESONATOR FILTERS
B4.1 UTILIZING Ba₂Ti₉O₂₀ CERAMICS"
J. Plourde, D. Linn
- 1350 "NEW APPLICATION OF EVANESCENT MODE
B4.2 WAVEGUIDE TO FILTER DESIGN"
R. Snyder
- 1410 "MULTI-OCTAVE COMBLINE FILTER
B4.3 MULTIPLEXERS"
P. LaTourrette
- 1430 "TEM BANDPASS FILTERS HAVING EIGHTH-
B4.4 WAVELENGTH COUPLED STUBS"
M. Horton
- 1520 "THE DESIGN OF LADDER NETWORKS CONTAIN-
B4.5 ING LUMPED AND DISTRIBUTED ELEMENTS"
M. Sobhy, M. Safi
- 1540 "ON THE DESIGN OF MATCHED EQUALIZERS
B4.6 OF PRESCRIBED GAIN VERSUS FREQUENCY
PROFILES"
D. Mellor
- 1600 "EXACT SYNTHESIS OF INTERSTAGE MATCHING
B4.7 NETWORK FOR BROADBAND MICROWAVE GaAs
FET AMPLIFIERS"
W. Ku

Mission Courts South (C)

MICROWAVE ACOUSTICS

Chairman: R. C. Williamson
Organizer: T. W. Bristol

- 1330 "SURFACE ACOUSTIC WAVE SLANTED CORRELA-
C4.1 TORS FOR LINEAR FM PULSE-COMPRESSORS"
B. Potter
- 1350 "A SAW PULSE COMPRESSION FILTER USING THE
C4.2 REFLECTIVE DOT ARRAY"
H. van de Vaart, L. Solie
- 1410 "REAL TIME WIDEBAND SPECTRUM ANALYSIS
C4.3 BASED ON SAW DEVICES"
J. Jack, P. Grant, J. Collins
- 1500 "SYNTHESIS OF ACOUSTIC-SURFACE-WAVE-
C4.4 RESONATOR FILTERS USING ANY OF VARIOUS
COUPLING MECHANISMS"
G. Matthaai, E. Savage, F. Barman
- 1520 "MICROWAVE DEVICES BASED ON MAGNE-
C4.5 TOSTATIC WAVE REFLECTING ARRAYS"
J. Collins, J. Owens, C. Smith, Jr., J. Adam, Z. Bordai
- 1540 "ACTIVELY CONTROLLED SAW MULTISTRIP
C4.6 COUPLER"
J. Crowley, J. Weller, T. Giallorenzi
- 1600 "X BAND BULK WAVE DELAY LINE STABILIZED
C4.7 OSCILLATOR"
Y. Amblard, A. Peyrat

1977 MTTs INTERNATIONAL MICROWAVE SYMPOSIUM

Victoria Room (D)

APPLICATIONS TO CANCER TREATMENT II

Chairman: R. Atkinson
Organizer: W. Guy

- 1330 D4.1 "PRELIMINARY IN-VIVO PROBE MEASUREMENTS OF THE ELECTRICAL PROPERTIES OF TUMORS IN MICE"
E. Burdette, J. Seals, J. Toler, F. Cain
- 1350 D4.2 "NON-PERTURBING MICROPROBES FOR MEASUREMENT IN ELECTROMAGNETIC FIELDS"
A. Priou, A. Deficis
- 1410 D4.3 "NEAR ZONE MICROWAVE EXPOSURE OF A BIOLOGICAL SPHERE"
K. Al-Badwaih, S. Hafiz
- 1430 D4.4 "EFFECT OF SURFACE COOLING AND BLOOD FLOW ON THE ELECTROMAGNETIC HEATING OF TISSUE"
H. Kritikos, K. Foster, H. Schwan
- 1520 D4.5 "BOLUSING TECHNIQUE FOR BATCH MICROWAVE IRRADIATION OF TUMORS IN THE FAR FIELD"
A. Cheung, D. McCulloch, J. Robinson, G. Samaras
- 1540 D4.6 "A SYSTEM FOR DEVELOPING MICROWAVE INDUCED HYPERTHERMIA IN SMALL ANIMALS"
R. Baker, V. Smith, L. Kobe, T. Phillips
- 1600 D4.7 "THE DESIGN AND PERFORMANCE OF A CIRCULARLY POLARIZED DIRECT CONTACT APPLICATOR FOR MICROWAVE DIATHERMY"
G. Kantor, D. Witters, J. Greiser

THURSDAY MORNING, JUNE 23, 1977

Cuyamaca Room (A)

MICROWAVE AND MILLIMETER WAVE INTEGRATED CIRCUITS

Chairman: R. H. Knerr

- 0830 A5.1 "INTERDIGITATED COUPLERS ON FUSED SILICA"
W. Childs, P. Carlton
- 0850 A5.2 "WIDE-BAND FREQUENCY DISCRIMINATOR WITH HIGH LINEARITY"
U. Gysel
- 0910 A5.3 "COMPONENTS FOR MICROWAVE INTEGRATED CIRCUITS WITH EVANESCENT MODE RESONATORS"
K. Schunemann
- 1000 A5.4 "CALCULATION OF QUASI-PLANAR LINES FOR MM-WAVE APPLICATION"
H. Hofmann
- 1020 A5.5 "PLANAR MULTI-PORT MILLIMETER INTEGRATED CIRCUITS"
P. Meier
- 1040 A5.6 "SUBHARMONICALLY PUMPED MILLIMETER WAVE MIXERS BUILT WITH NOTCH-FRONT AND BEAM-LEAD DIODES"
T. Mc Master, E. Carlson, M. Schneider

Mission Courts North (B)

FILTERS II

Chairman: A. E. Williams
Organizer: S. B. Cohn

- 0830 B5.1 "LOW LOSS LINEAR PHASE FILTERS"
S. Kallianteris
- 0850 B5.2 "DUAL MODE CANONICAL WAVEGUIDE FILTERS"
A. Atia, A. Williams

- 0910 B5.3 "AN EXACT SOLUTION FOR A SIX-CAVITY DUAL-MODE ELLIPTIC BANDPASS FILTER"
G. Pfitzenmaier
- 0930 B5.4 "ALL GFEC DUAL-MODE QUASI-ELLIPTIC MULTIPLEXERS FOR SATELLITE TRANSPONDERS"
C. Mok, N. Epstein
- 1020 B5.5 "TUNING PROCEDURE FOR SYMMETRIC COUPLED-RESONATOR FILTERS"
H. Bell, Jr.
- 1040 B5.6 "SHORT CIRCUIT TUNING METHOD FOR SINGLY TERMINATED FILTERS"
H. Chen
- 1110 B5.7 "MEASUREMENT SYSTEMS TO DISPLAY $Re(Z_{s,t})$ OF SINGLY TERMINATED FILTERS"
W. Erlinger
- 1130 B5.8 "LOSS MECHANISMS IN COUPLED CAVITY FILTERS"
H. Thal, Jr.

Mission Courts South (C)

SATELLITE COMMUNICATIONS SYSTEMS

Chairman & Organizer: J. Horton

- 0830 C5.1 "A TV SATELLITE BROADCAST SYSTEM FOR THE PUBLIC BROADCASTING SERVICE" (invited)
J. Moore
- 0900 C5.2 "PUBLIC SERVICE SATELLITE COMMUNICATION SYSTEM OPPORTUNITIES" (invited)
E. Wolff
- 0930 C5.3 "THE CENTIMETER WAVE BEACON OF THE COMSTAR DOMESTIC COMMUNICATION SATELLITE"
W. Getsinger
- 1020 C5.4 "A 12 GHz LOW COST EARTH TERMINAL FOR DIRECT TV RECEPTION FROM BROADCAST SATELLITES"
R. Douville
- 1040 C5.5 "A COST-EFFECTIVE MODULAR DOWN-CONVERTER FOR S-BAND WEFAX RECEPTION"
H. P. Shuch

Victoria Room (D)

WAVEGUIDES AND TRANSMISSION LINES

Chairmen & Organizers: T. Itoh, D. M. Bolle

- 0830 "Q FACTORS OF FREE AND SHIELDED CYLINDRICAL DIELECTRIC RESONATORS"
P. Guillon, Y. Garault
- 0850 "RADIATION FROM TRIANGULAR AND CIRCULAR RESONATORS IN MICROSTRIP"
M. Cuhaci, D. James
- 0910 D5.3 "THEORETICAL ANALYSIS OF A RIDGED-WAVEGUIDE MOUNTING STRUCTURE"
S. Mizushina, N. Kuwabara, H. Londoh
- 0930 D5.4 "ANALYSIS OF WAVEGUIDE JUNCTIONS BY RANK REDUCTION"
D. Zuckerman, P. Diamant
- 0950 D5.5 "FIELDS IN NONUNIFORM TRANSMISSION LINES"
P. McGovern

1977 MTTS INTERNATIONAL MICROWAVE SYMPOSIUM

- 1040 D5.6 "PROPAGATING MODES ALONG A THIN WIRE LOCATED NEAR A GROUNDED DIELECTRIC SLAB"
E. Kuester, D. Chang
- 1100 D5.7 "THE ELECTROMAGNETIC FIELDS AND THE PHASE CONSTANTS OF DIELECTRIC IMAGE LINES"
I. Wolff, K. Solbach
- 1120 D5.8 "ANALYSIS OF DISPERSION IN ARBITRARILY CONFIGURED DIELECTRIC-LOADED TRANSMISSION STRUCTURES"
A. Ganguly, B. Spielman
- 1140 D5.9 "INFRARED DETECTION OF SURFACE CURRENTS"
R. Burton, J. Selim

THURSDAY AFTERNOON, JUNE 23, 1977

Cuyamaca Room (A)

LOW NOISE COMPONENTS AND TECHNIQUES

Chairman: J. Whelehan
Organizers: J. Honda, H. Chait

- 1330 A6.1 "LOW NOISE AND LINEAR FET AMPLIFIERS FOR SATELLITE COMMUNICATIONS"
P. Mercer, D. Cowan
- 1350 A6.2 "AN ENVIRONMENTALIZED LOW-NOISE PARAMETRIC AMPLIFIER"
E. Niehenke
- 1410 A6.3 "BROADBANDING AN ELECTRONICALLY SWITCHED TWO-CHANNEL Ka-BAND PARAMETRIC AMPLIFIER"
S. Nussbaum, E. Sard
- 1500 A6.4 "LOW NOISE OCTAVE BANDWIDTH WAVEGUIDE MIXER"
L. Yuan
- 1520 A6.5 "ANALYSIS OF NOISE IN ROOM-TEMPERATURE MILLIMETER-WAVE MIXERS"
D. Held
- 1540 A6.6 "TIME DOMAIN ANALYSIS OF SIMPLE DIODE MIXERS"
M. Hines

Mission Courts North (B)

PASSIVE COMPONENTS

Chairman: M. C. Horton
Organizer: S. B. Cohn

- 1330 B6.1 "EXPERIMENTAL ATTENUATION OF RECTANGULAR WAVEGUIDES AT MILLIMETER-WAVELENGTH"
F. Tischer
- 1350 B6.2 "HIGH DIRECTIVITY CTL-COUPLEDERS AND A NEW TECHNIQUE FOR THE MEASUREMENT OF CTL-COUPLEDER PARAMETERS"
S. Rehnmark
- 1410 B6.3 "A BROADBAND PLANAR N-WAY COMBINER/DIVIDER"
Z. Galani, S. Temple
- 1430 "NEW N-WAY HYBRID POWER DIVIDERS"
N. Nagai, E. Maekawa, K. Ono
- 1450 B6.5 "A NEW ODD NUMBER N-WAY POWER COMBINER/DIVIDER"
C. Chao

Mission Courts South (C)

FERRITES

Chairman & Organizer: F. J. Rosenbaum

- 1330 C6.1 "CONICAL REPRESENTATION AND FIGURE OF MERIT OF CIRCULATOR"
K. Araki, Y. Nito
- 1350 C6.2 "DIPLEXER AND BROADBANDING OPERATIONS OF STRIPLINE Y-JUNCTION CIRCULATORS"
T. Nagao
- 1410 C6.3 "THE MODEL SPECTRUM OF FERRITE-LOADED STRIPLINES"
D. Bolle
- 1430 C6.4 "LONGITUDINALLY MAGNETIZED FERRITE PHASE SHIFTERS USING REDUCED HEIGHT RECTANGULAR WAVEGUIDE"
B. C. Lint, A. Priou
- 1520 C6.5 "BAND STOP FILTER USING LPE-YIG FILMS"
T. Tsai, J. Sethares
- 1540 C6.6 "A HIGH POWER X-BAND FREQUENCY SELECTIVE PASSIVE YIG LIMITER"
S. Stitzer, P. Carter, Jr., H. Goldie
- 1610 C6.7 "MICROWAVE APPLICATIONS OF THIN MAGNETIC RESISTIVE SHEETS"
K. Suetake, K. Ishino, Y. Kotsuka, Y. Shimuzu

Victoria Room (D)

ANTENNAS AND COMPONENTS

Chairman & Organizer: D. C. Chang

- 1330 D6.1 "LEAKY-WAVE ANTENNA AND BAND-REJECT FILTER FOR MILLIMETER-WAVE INTEGRATED CIRCUITS"
T. Itoh
- 1350 D6.2 "MILLIMETRE-WAVE INSULAR-GUIDE FREQUENCY-SCANNED ARRAY"
N. Williams, A. Rudge, S. Gibbs
- 1410 D6.3 "A GHz FEED FOR HORN-REFLECTOR ANTENNA"
C. Ren, H. Wang
- 1430 D6.4 "PROPAGATION AND RADIATION BEHAVIOUR OF DIELECTRIC COATED E-PLANE SECTORAL HORN"
S. Gupta
- 1450 D6.5 "REDUCTION OF RAIN-CROSSPOLARIZATION BY ITS DEPENDENCE ON POLARIZATION DIRECTIONS"
L. Lee

MEET THE GUYS WHO HELPED MAKE
IT HAPPEN

TECHNICAL PROGRAM COMMITTEE



Front Row (Left to Right) – R. Levy; A. Williams;
M. Horton; S. Cohn; H. Stinehelfer; G. Schaffner
Back Row (Left to Right) – G. Mitchell; R. Knerr;
F. Rosenbaum; D. Anderson



Front Row (Left to Right) – B. Fank; E. Komarek;
S. Adam; B. Perlman; J. Kuno
Back Row (Left to Right) – J. Gallagher; S. Berson;
H. Goldie; J. Horton; A. Rosen



Front Row (Left to Right) – G. Matthaei; U. Gysel;
T. Itoh; R. Kihm
Back Row (Left to Right) – R. Williamson; T. Bristol;
D. Bolle; R. Wagecs; G. Chao

History of MTT

by Ted Saad
MTT Historian

ADCOM II July 1, 1953 thru June 30, 1954

Administrative Committee:

A.G. Clavier, Chairman
W.W. Mumford, Vice-Chairman
H.F. Engelmann, Secretary-Treasurer

A.C. Beck	D.D. King	Harold Schutz
C.W. Chandler	Harry B. Marvin	L.D. Smullin
P.D. Coleman	J.G. McCann	G.C. Southworth
Henry Jasik	G.A. Rosselot	Ben Warriner
	Theodore S. Saad	

Herb Engleman was Secretary-Treasurer of the second Adcom. Between them, Bill Mumford and Al Beck acted as the Transactions Editor. Adcom membership was increased to 15. There were seven Adcom meetings that year.

One of the major efforts of the year was to attract new members and to bring the Transactions to a level wherein it would make a significant contribution to the technical literature of the day. At the time, most microwave papers were being published in the IRE Proceedings.

During the early years, there was great concern about the overlapping between MTT, ED and AP, a concern that is still with us today. There was some discussion on the possibility of a joint Transactions, and there was concern for overlapping membership. However, May 19, 1954, the Adcom voted against combining the MTT Transactions with ED and AP, feeling that there should be a strong separate group devoted to Microwave Theory and Techniques.

In the September 3, 1953 meeting, the terms of the officers for the Adcom were established and committees were set up to carry on the functions of the Adcom. There was some discussion about unpaid members. IRE Headquarters stated that it wanted to remove the names of unpaid members after two years.

There was some discussion about holding a Millimeter Wave Symposium and it was brought up at all of the Adcom meetings starting with November. Eventually, the Millimeter Wave Symposium became a section of the URSI spring meeting and two sessions of that meeting were devoted to Millimeter Waves, organized by MTT.

In an Adcom meeting of February 10, 1954, there was a discussion of Awards. It was suggested that consideration be given to establishing an award for the MTT group for the best paper published in the Transactions. In those early days, there was some difficulty in obtaining good papers for the Transactions and the matter was discussed at many of the Adcom meetings. It was the opinion of the Adcom members that a suitable award would help attract better papers to the Transactions.

Continued on page 15

AWARDS TO BE PRESENTED AT THE 1977 MTT SYMPOSIUM

- | | | |
|------------------|---|-----------------------------|
| John R. Whinnery | } | Microwave Career Award |
| R.A. Pucel | | |
| D. Masse' | } | Microwave Prize |
| R. Bera | | |
| M.G. Walker | - | Microwave Application Award |
| F. Sterzer | - | National Lecturer Plaque |
| G.P. Rodrique | - | Past President's Pin |

MICROWAVE CAREER AWARD



J. R. Whinnery

MICROWAVE PRIZE



R. A. Pucel

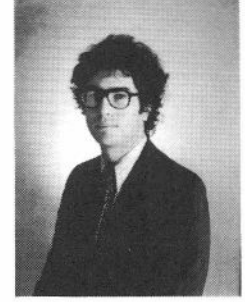


D. Masse'



R. Bera

MICROWAVE APPLICATION AWARD



M. G. Walker

MICROWAVE CAREER AWARD

The Microwave Career Award is presented aperiodically to an individual for an outstanding career in the field of microwave theory and techniques. Dr. John R.-Whinnery is the 1976 recipient of the MTT Microwave Career Award for "a career of meritorious achievement and outstanding technical contribution in the field of microwave theory and techniques". Dr. Whinnery has been a prominent contributor to the microwave field since 1939. He has served on the faculty of the University of California, Berkeley since 1946, and while on leave from the university, has contributed to research activities at Hughes Aircraft Company and Bell Telephone Laboratories, and held a Guggenheim Fellowship at the ETH, Zurich, Switzerland. Dr. Whinnery is author or co-author of many papers and books, but is best known for the textbook which he co-authored with Dr. Simon Ramo, Fields and Waves in Modern Radio. Dr. Whinnery will receive a certificate, a plaque, and a cash sum of \$500.

John Whinnery was born in western Colorado but moved with his family to California when he was ten. He majored in Engineering at the Modesto Junior College and received his B.S. degree in Electrical Engineering from the University of California, Berkeley. His first job was at the General Electric Company, Schenectady, on the Test Program, and later the Advanced Engineering Program. His first microwave assignment was with W.C. Hahn, who at the time (1939) had velocity modulation tubes producing 100 watts of CW power at 10 cm wavelengths. There were lower power tubes operating at 5 cm wavelengths, some electrically tunable. (Many of these are described in the classic paper by Hahn and Metclaf, Proc. IRE Vol. 27, p. 106, 1939). A following assignment was with Simon Ramo, working with microwave magnetrons, and during that assignment Ramo invited him to join in a book he was starting -- one that became the well-known "Fields and Waves in Modern Radio" after many drafts and some trial

uses at G.E. During World War II he worked on microwave disc-seal triodes of the lighthouse class with Ramo, E.D. McArthur, Jim Beggs and others. Using techniques learned from Hahn, he co-authored a series of papers on transmission line and waveguide discontinuities useful in design of discontinuous structures. During this period he taught in Defense Training Classes, and was also a part-time Lecturer at Union College.

Following the War, Whinnery returned to Berkeley to complete a doctorate on microwave antenna problems, teaching first as a Lecturer and then as Associate Professor. He developed the undergraduate course in electromagnetic fields and waves, and graduate courses in Microwave Networks and Microwave Electron Tubes. His consulting work at the time was with the Hughes Aircraft Company on phased-array antennas. In 1952-53, on a leave from the University, he served as Head of Microwave Tube Research in the Electron Tube Laboratory at Hughes with emphasis on traveling-wave tubes for the Hughes systems applications. His research after returning to the University stressed microwave tubes, where associates and graduate students studied backward-wave amplifiers, beam noise, and entrant crossed-field devices. He was also director of the Electronics Research Laboratory and then Chairman of the Electrical Engineering Department during this period. In 1959 he became Dean of the College of Engineering at Berkeley and served in that position until 1963.

Following his assignment as Dean, he again took an industrial leave, this time at the Bell Laboratories, Murry Hill, and had an opportunity to start work in lasers and optical communication problems. His research at Berkeley following that leave reflected these new interests with stress on thermal-lens effects arising from laser beams in lossy materials, transverse mode locking in laser cavities, acousto-optic interactions, and more recently optical guiding by liquid crystals and curved dielectric surfaces.

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BOOK REVIEWS

RADAR SIGNAL SIMULATION

by Richard L. Mitchell
Artech House, 1976

"Radar Signal Simulation" is an elementary text, written in a casual, conversational style. The large, bold typography adds to the impression that this is a primer as the numerous grammatical lapses and typographical errors add to the impression of offhandedness. The mathematical rigor and the care taken in the definitions are consistent with the style established for the English and the typography.

The twelfth and last chapter, contributed by G. E. Pollon and J. F. Walker, is significantly superior in style and content (besides having been better proofed). In addressing its subject of "Real-Time Radar Signal Simulation," this chapter often seems to be apologizing for what has preceded in the text. The author introduces his subject in Chapter 1 with "Other than the real-time requirement, *if there is one,*" (emphasis added) and then devotes eleven chapters to various superficial models of radar subjects as applied to other than real-time simulations. Conversely the guest contributors state "The real-time generation of radar signals for use in actual radar processing represents the final stage in the application of simulation technology to its ultimate objective . . ." and "The application of a well conceived real-time radar signal simulation extend through all phases of the development, test and operational use of the object radar." This chapter is worth reading as a qualitative introduction to the subject and contains many other quotable passages for the author, but it can serve only as an introduction in its 29 pages.

Some key topics in the field of radar signals are:

propagation	saturation
near field	dynamic range
refraction	sensitivity
frequency agility	monopulse
spatial correlation	polarization
fading	multiple targets
eclipsing	glint
radome distortion	scintillation
automatic gain control	

These are not in the index and in view of the limited treatment accorded them in the text, the omissions were warranted. The text includes a light treatment of integral representations of signals and filters, but it often seems to belabor coordinate systems and notation. However, a list of symbols is not provided and some symbols are not explained. It emphasizes table-lookup routines rather than algorithms, digital housekeeping rather than substance. The treatment of random sequence generation is limited to the coordinate transformations of uniform random sequences, but it does not include the generation of the basic uniform random numbers. The introduction to the ambiguity function is nice and to the point, but the categorizing of waveforms is too restrictive, and the classification of target fluctuation models does not include the now standard Swerling models. The treatments of multipath propagation,

parameter estimation, statistical evaluation, non-linear processing, and even the radar range equation are trivial. The material provides no basis for further development by the reader. The material does not include millimeter wave radars, PRF agility, guidance radar, navigation radar or many other interesting topics seemingly not excluded by the preface or introduction.

The opening sentence of the preface is "The primary emphasis in this book is on the simulation of realistic replicas of radar signals that occur at various points in a radar system." More precisely this should have said "the simulation of realistic radar signals" or "the generation of realistic replicas of radar signals," but in any case it seemed to promise realism. Yet, there is no real data in the text and no demonstration of the realism of the methods. Also there is no computer listing or similar mechanism to show how the often over simplified analysis leads to a simulation. In brief, this book is recommended only to those who are considering contributing to the Artech Radar Library.

Reviewed by
Dr. J. A. Glassman
Manager, Phoenix Development Laboratory
Hughes Aircraft Company
Canoga Park, California

SHORT COURSES

TITLE OF COURSE: Antenna Parameter Measurement by Near-Field Techniques.
LOCATION: National Bureau of Standards
Boulder, Colorado
DATES: August 29 through September 2, 1977
CONTACTS: Dr. A. G. Repjar
Section 276.05 - Room 4085
National Bureau of Standards
Boulder, Colorado 80302
Phone: (303 499-1000, Ext. 3927
or 3301

SHORT DESCRIPTION:

This course is designed for engineers and scientists concerned with the accurate measurement of microwave antenna parameters. Major emphasis will be placed on the Scattering Matrix Theory of Antennas and Antenna-Antenna Interactions, its application to near-field scanning on planar, cylindrical, and spherical surfaces, and the computation of desired antenna characteristics from near-field data. Time will be appropriately divided between theory, practical implementation, and data processing techniques. Recent results comparing planar, cylindrical, and spherical scanning methods will be presented and the limitations and advantages of each method discussed. In addition, less detailed treatments will be offered for the extrapolation method of determining absolute gain and polarization and for NBS precision methods of measuring some key parameters of interest in satellite communications using radio stars, i.e., G/T, EIRP, C/kT. Continued on page 15

Continued from page 11

Whinnery has been on numerous government advisory committees, principal of which were the Advisory Group on Electron Devices for DoD, the Science and Technology Advisory Committee advisory to NASA for the Apollo program, the Standing Committee on Controlled Thermo-nuclear Research of the former AEC, and several advisory committees for the National Science Foundation. He recently completed service on the Telecommunications Committee of NAE-NRC and is a member of the Committee on Science and Public Policy (COSPOP) of NAS. He has been on visiting or advisory committees to the engineering schools of MIT, Caltech, Harvard, Yale, and the Worcester Polytechnic Institute. In addition to the leaves in industry, visiting years were spent at Stanford University and the University of California, Santa Cruz. He has been a member of the Board of Directors of Granger Associates, a manufacturer of microwave radios and antennas, since the beginning of the company. He served in all offices of the San Francisco Section of the IRE and was later on its Board of Directors; still later he was on the Board of the IEEE, becoming Secretary in 1970.

Prizes and Awards include the IEEE Education Medal (1967), the Lamme Medal of the American Society on Engineering Education (1957), a Guggenheim Fellowship (1959), and a Research Professorship in the Miller Institute for Basic Research in Science (1973). He is a member of the National Academy of Engineering and the National Academy of Sciences.

Hobbies include nontechnical writing, with many unpublished poems and children's stories circulated among friends. His interest in hiking and backpacking started in the Adirondacks and White Mountains during the period at GE but is now carried on in the High Sierra or along the California Coast. He shares with other members of his Department an interest in California wines and tries to keep up with the latest vintages of the Napa, Sonoma and Alexander valleys in that rapidly changing scene. He is a poor gardener and a worse golfer, but finds both activities fun when there is time for them.

MICROWAVE PRIZE

The Microwave Prize is awarded annually for the best paper on a microwave subject published during the previous year. Robert A. Pucel, Daniel Masse' and Richard Bera are recipients of the 1976 Microwave Prize for their paper, "Performance of GaAs MESFET Mixers at X-Band," published in the MTT Transactions, Vol. MTT-24, June 1976. The authors are with the Raytheon Company, Research Division, Waltham, Mass. Each author will receive a certificate and a cash sum of \$100

BIOGRAPHY OF ROBERT A. PUCEL

Robert A. Pucel (S'48-A'52-M'56-SM'64) received the B.S. and M.S. degrees in 1951, and the D.Sc. degree in 1955, in electrical communications, from Massachusetts Institute of Technology, Cambridge, Mass.

From 1948 to 1951 he was a Test Engineer on the M.I.T. Cooperative Course with General Electric Company. Following his graduation, he joined the Microwave Tube Group at the Research Division of Raytheon Company, Waltham, Mass. A year later, he returned to M.I.T., where, from 1952 to 1955 he was a Staff Member of the M.I.T. Research Laboratory of Electronics doing theoretical studies in network theory, the basis for his doctoral thesis. He studied under the late Professor Guillemin.

He rejoined the Research Division of Raytheon in 1955. In 1965 he organized the first microwave semiconductor devices and integrated circuits program at Raytheon and was its manager until 1970. Following this, he served as a consultant to this program and semiconductor programs in other divisions of Raytheon. In 1974 Dr. Pucel was appointed a Consulting Scientist at the Research Division, the highest professional level at Raytheon.

His work has involved theoretical and experimental studies of new semiconductor device concepts and the design of high-frequency semiconductor devices; for example, the tunnel diode, varactor, avalanche diode, Gunn and LSA structures, metal-semiconductor-metal (MSM) diodes, experimental studies of microstrip propagation on dielectric and magnetic substrates, thin-film components for microwave integrated circuits, and miniature dielectric cavities. His recent studies are concerned with noise and signal properties of microwave field-effect transistors and Read diodes. Dr. Pucel has published extensively on these topics and has patents in this area of research.

Dr. Pucel is a member of the Professional Group on Electron Devices and the Professional Group on Microwave Theory and Techniques. He is also a Registered Professional Engineer of the Commonwealth of Massachusetts.

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BIOGRAPHY OF DANIEL MASSE

Daniel Masse received his diploma in electrical engineering from Ecole Centrale de TSF, Paris, France, in 1951.

From 1951 to 1953 he was engaged in research and development of remote control equipment at the SECRE, Paris, France. In 1953 he joined the Compagnie Generale de TSF, Paris, France, to work on fire-control analog computers.

From 1957 to 1967, Mr. Masse was with the Special Microwave Device Operation of Raytheon Company where he was engaged in the research and development of ferrite components specializing in TEM devices.

In the period from April 1961 to May 1962 he was on leave at the Research Division of Raytheon working on an Air Force contract study of nonlinear microwave ferroelectric devices.

Since 1967, he has been a staff member in the Solid State Physics and Microwave Group of the Research Division.

His current interests and activities are the measurement of ferrite, dielectric, and semiconductor material properties, the design and development of microwave integrated circuits and ferrite devices, the characterization and modeling of low-noise and high-power GaAs FET's and their associated circuits.

BIOGRAPHY OF RICHARD F. BERA

Richard F. Bera attended Massachusetts Institute of Technology from 1961 to 1966. From 1966 to 1968 he was a member of the Department of Environmental Health Engineering of the United States Army Medical Corps.

In 1968 he joined the Research Division of Raytheon Company where he was engaged in semiconductor characterization and measurement of TRAPATT diode oscillators.

Since 1972 he has been a staff member of the Research Division and has participated in the development of GaAs FET oscillators and mixers.

He is currently involved in the design and evaluation of IMPATT diode microstrip circuits.

MICROWAVE APPLICATION AWARD

The Microwave Application Award is presented aperiodically to an individual for an outstanding application of microwave theory and techniques. Martin G. Walker will be presented the 1976 Microwave Application Award "for Application of Microwave Circuit Synthesis in the Development of Practical GaAs Field Effect Transistor Amplifiers Currently Being Produced at C, X and Ku-Band Frequencies.

Mr. Walker is a Member of the Technical Staff of the Watkins-Johnson Company, Palo Alto, California. He will receive a certificate and a cash sum of \$100

Martin G. Walker was born in Berkeley, California, on 20 April 1952. He received his BSEE degree from MIT in 1973 and his SMEE degree from Stanford in 1976. He is currently a member of the Solid State R&D Department, Watkins-Johnson Company, with his principal responsibility being the development of GaAs FET amplifier circuits for operation at 10 GHz and above. His current technical activities include the design and development of 12-18 GHz broadband amplifiers as TWT replacements and 10 GHz narrowband low noise FET amplifiers for radar applications. He previously developed 12-15 GHz and 12-18 GHz amplifier prototypes for the U.S. Army (ECOM), and a 9.6 GHz radar front end for the U.S. Air Force (AFAL). The 12-15 and 12-18 GHz FET amplifiers were the first reported for those frequency bands. The radar front end included full integration of an RF preamp, RF gain control, mixer, FET voltage controlled oscillator, and IF amplifier - all in a highly miniaturized configuration.

Mr. Walker was previously responsible for the successful development of 4.0-8.0 GHz and 8.0-12.4 GHz FET amplifiers at Watkins-Johnson Company. A key contribution to the success of this amplifier effort was Mr. Walker's synthesis of a very complete RF circuit design computer program which included a sophisticated circuit optimization capability. Mr. Walker's computer program has constituted an essential contribution to the success of several GaAs FET RF amplifier programs at Watkins-Johnson Company; he has acted as a computer analysis consultant on numerous projects.

While at MIT, Mr. Walker developed fabrication techniques for a low noise microwave device, the BARITT diode. He fabricated and characterized the various devices to optimize performance.

Mr. Walker is a member of Tau Beta Pi, Eta Kappa Nu and the Institute of Electrical and Electronics Engineers.

Continued from page 3

MEMBERSHIP SERVICES (Dick Spacks)

Dick reports that total membership is holding level at about 6100. An IEEE short course catalog has been mailed to chapter chairmen. Members wishing to take advantage of these courses should contact their local chapters.

COUNCILS

QEC (Dean Anderson and Jim Gallagher)

A very lengthy discussion on the formation of the Electro-Optic Society was held as reported under the President's remarks. The culmination of the discussion was to maintain our negative position vis-a-vis this society. Our current and previous council members, Dean and Jim are in favor of the society formation.

COMAR (Fred Rosenbaum)

A very negative two issue report on microwave radiation hazards was presented in the New Yorker magazine in December. A response is being prepared but as yet no decision has been made on where to publish. Twenty papers on Bio-Effects of Microwaves were received for the 1977 Symposium and two sessions will be held. This is a sign of increasing interest by MTT.

OTHER

John Kuno has been named as a U.S. representative to the Popoff Society.

The meeting was adjourned at 6:00 p.m.

Continued from page 10

In May of that year, joint publication of the MTT Transactions with AP and ED was again considered and turned down. There was much discussion on the Transactions and the procurement of papers during the entire year.

In the spring of the year, the Adcom unanimously approved a proposal by Brooklyn Poly to jointly sponsor a full Symposium. The meeting was later called the Modern Advances in Microwave Technology and Al Beck was appointed the MTT representative. The group budget was about \$6,916.00 at the end of the year, and membership on November 4, 1953 was up to 1,446 members, 1,064 of whom were paid. Dues remained at \$2.00.

On November 5th and 6th, MTT held a joint Symposium with the Group on Communication Systems and the Group on Electron Devices at the Western Union auditorium in New York City.

Two issues of the Transactions were published that year, a total of 151 pages, made up of 21 technical articles. In those early days, there were no letters to the editor. Also, the most economical method of printing was used consisting of photographic reproduction of typewritten articles.

During his term, one of Dr. Clavier's prime ambitions was a strong program to increase the membership.

To be continued

Continued from page 12

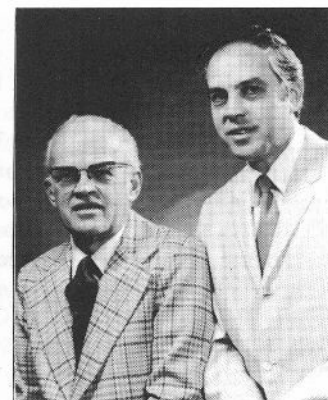
MICROWAVE ANTENNA MEASUREMENTS

Short Course

The ninth annual offering of the Microwave Antenna Measurements Short Course will be held July 11 through the 15, 1977, at the California State University, Northridge. This year's course will feature the results of over two years of tests and evaluation of the production model compact range, the latest near-field measurement technique and the use of automated systems in antenna measurements. For further information, write or phone, Dr. Edmond S. Gillespie, School of Engineering and Computer Science, California State University, Northridge, 18111 Nordhoff Street, Northridge, California 91330, (213) 885-2190, 885-2183.

GOLD MEDAL AWARD

Among the eight National Bureau of Standards employees receiving Department of Commerce gold medals for distinguished service were two members of MTT-S from the Electromagnetics Division of the Institute for Basic Standards. The awards were presented at the Department's 28th Annual Honor Awards Ceremony on Oct. 27, 1976 by Secretary Elliot L. Richardson. The Gold Medal Award is the Department's highest employee award and is presented for "rare and outstanding contributions of major significance to the Department, the Nation, or the World."



Dr. Glenn F. Engen and Mr. Cletus A. Hoer were recognized for their outstanding contributions to microwave theory and measurement techniques which culminated in the invention and reduction to practice of the 6-port principle for making accurate microwave measurements. This principle makes optimum use of modern scattering matrix theory to substitute mathematical manipulation, which can be done with a small computer, for the mechanical perfection of components that has been required by other precise measuring techniques. The principle can be readily adapted to a variety of specialized measurements at minimum cost and with minimum need for reference standards. Since it can tolerate very imperfect components, it provides the best foreseeable way to extend the ability to make accurate measurements into the millimeter wave part of the spectrum. Several manufacturers are working on the development of commercial versions that will reduce the dependence of microwave users and manufacturers on elaborate central standards laboratories.

CONFERENCE NOTICE

SUBMILLIMETRE WAVES '78

FIRST ANNOUNCEMENT

3RD INTERNATIONAL CONFERENCE ON SUBMILLI-METRE WAVES AND THEIR APPLICATIONS

UNIVERSITY OF SURREY 29 MARCH - 1 APRIL 1978

The Third International Conference on Submillimetre Waves and Their Applications will be held at the University of Surrey, Guildford, England from 29 March to 1 April 1978 and is being organized by the Institute of Physics in association with The Institution of Electrical Engineers, The Institution of Electronic and Radio Engineers and The Institution of Electrical and Electronics Engineers. Registration will be from 12 noon on 28 March and there will be a social reception on the evening of the 29th. The submillimetre research groups at the National Physical Laboratory and at Queen Mary College, London will be open for visits on Monday and Tuesday 27 and 28 March and on Saturday 1 April. Guildford is about 25 miles South West of London and is very well served by public transport. It lies on the main A3 Trunk Road and is only 35 minutes by fast train from London Waterloo. Good quality student-type accommodation is available close to the lecture theatres and restaurant. Limited hotel and inn-type accommodation is available in Guildford and the surrounding countryside for those who prefer it.

Papers are invited on: Gas Phase and Solid State Sources, Electron Beam Sources, Detectors, Radiometry, Frequency Determinations, Measurement Techniques and Components and on the applications of submillimetre waves in the study of plasmas, the atmosphere and dielectric media. Papers on applications in other fields will also be considered if emphasis is placed on the exploitation of the submillimetre waves.

There will be formal sessions, informal sessions and discussions groups and also working parties if these seem desirable. Authors may suggest suitable topics for discussion group sessions to the Organizing Committee. Intending Authors may submit a title on the accompanying reply sheet but must in any case send a 35-50 word abstract to G.W. Chantry by 1 October 1977. Authors will be informed if their papers have been accepted and they must

then prepare two page summaries on the Special Camera-ready paper which will be provided. These summaries must be returned by 1 February at the absolute latest if they are to be included in the digest and if the papers are to be optimally placed in the programme. The digest will be distributed to all participants upon registration and extra copies will also be available for sale.

Guildford is near to several places of outstanding interest, including Royal Palaces, Gardens, Antiquities etc and there will be organized a programme for guests accompanying delegates. It would be a great help to the organizers if intending delegates could signify whether they will be bringing guests with them and whether they would be interested in the social programme.

G W Chantry, National Physical Laboratory, Teddington, MIDDLESEX, England TW11 OLW

NOTICE TO CHAPTER CHAIRMAN!

NOTICE TO MEMBERS!

Now is the time to get your Membership Campaign moving!

Make the contacts with your colleagues and neighboring colleges and universities. I can't emphasize more strongly:

THE MICROWAVE THEORY AND TECHNIQUES SOCIETY DEPENDS ON YOU.

Our membership has modulated around 6000 for the past ten years. From a low of 5533 in 1965, to a high of 6933, MTT-S has moved on to a 1976 level of 6155.

Student membership comprises over 17.5% of the MTT-S. Such enthusiasm indicates an optimistic view of the future microwave field. Each MTT-S chapter should make an effort to contact local colleges. Sharing technical expertise and providing a source of guidance to the scientists and engineers of the future is an important opportunity for every MTT-S chapter.

Contact your colleagues. Regular members, in industry, government, and education can share a strong technical base for state-of-the-art advancements.

This year the MTT-S can exceed the 7000 member milestone. A 14% membership increase will surpass this mark. The chapter that shows the largest membership gain will receive special recognition in this column.

So let's

GET THE MEMBERSHIP CAMPAIGN MOVING

Report results to:

Glenn R. Thoren
Membership Subcommittee
Raytheon M.S.D.
C-59 Hartwell Rd
Bedford, MA 01730

CHANGES IN THE NATIONAL BUREAU OF STANDARDS CALIBRATION SERVICES

The development, maintenance and dissemination of measurement standards is a prime NBS function. This entails measurement research and development at the forefront of technology as well as continued surveillance of more familiar techniques. This is the foundation of a coordinated national measurement system which in turn is essential to our national industrial leadership.

However, providing the basis for a national measurement system does not carry with it the additional responsibility that NBS calibrate all accurate measurement devices and instruments. NBS financial and staff resources are too limited to provide this type of service to manufacturers and users. NBS must be continually on the alert to assure that its measurement services are not unnecessarily diluted by services which compete for resources with more essential services.

To be sure there have been instances where NBS became in essence an extension of a manufacturer's production. For example, at one time NBS calibrated and certified all fever thermometers and calibrated all precision reference resistors and capacitors manufactured by certain manufacturers of high accuracy devices. Obviously, the manufacturer or other agency with proper control can transfer the national standard to such devices just as reliably as NBS. Needless to say, this practice, which detracted from other NBS work, was discontinued.

A common metrology practice employs the echelon or chain system of calibration with a degradation in accuracy in each step of the chain. Each succeeding laboratory is less accurate than the one from which it received its calibration. This degradation is not necessary if an operating laboratory maintains adequate control procedures and utilizes measurement assurance units available from NBS. NBS is in the process of reducing many of its services to this procedure.

In view of the above considerations and in the interest of promoting laboratory procedures whereby the using laboratory can provide itself with measuring capability equivalent to that at NBS, the Institute for Basic Standards has reviewed its calibration services. It has found that many of its services could be classed as "courtesy services". That is, these services were not essential to the national standards transfer process. They were services which the user, manufacturer or other organization could provide without undue difficulty and still be referenced to national standards. As a result, the IBS has embarked on a planned reduction in services falling in the above category. Users have been consulted and IBS is attempting to ameliorate difficulties for those users who find it necessary to modify their practices as a result of the discontinuation of some NBS calibration services.

Calibration services available from NBS are itemized in the Appendix to NBS Special Publication 250. This appendix is issued in April and October of each year. The latest issue is dated October 1976. Comparing this issue with one dated six months earlier reveals the initial discontinued services in the RF and Microwave area. The April 1977 Appendix will contain additional changes in the Electromagnetics (Boulder) area as well as changes in other parts of IBS calibration services. Specific discontinued services and services to be discontinued are itemized below.

Electromagnetic Calibration Services (Boulder)

To allow for user adjustments, the Electromagnetics Division is modifying its services in stages. The initial stage consisted of dropping services for which there was very little or no demand. These services were deleted from the October 1976 SP 250 Appendix. The discontinued items for this issue are as follows: (It should be noted that this issue announced that the list of Electromagnetic Services had been reduced, but "all deleted items will still be available on an At Cost basis provided advanced arrangements are made.")

Attenuation

- 4.1 B Coaxial fixed attenuators, 1-30 MHz range
- 4.1 E Coaxial variable attenuators, 1-30 MHz range
- 4.1 F Coaxial variable attenuators, 0.10-8.2 GHz range
- 4.1 G Coaxial variable attenuators, 8.2-6.45 GHz range
- 4.1 I Coaxial fixed directional couplers (isolation), 1-30 MHz range
- 4.1 J Coaxial fixed directional couplers, 0.10-18.0 GHz range
- 4.1 K Coaxial variable directional couplers (incremental attn.), 1-100 MHz range
- 4.1 L Coaxial variable directional couplers, 0.10-18.0 GHz range

Fields and Antennas

- 4.2 B Field strength receiver voltmeter
- 4.2 C Field strength receiver attenuator
- 4.2 D Field strength receiver overall linearity
- 4.2 E Loop antennas, 30 Hz to 30 MHz
- 4.2 F Dipole antennas, 30 to 1000 MHz
- 4.2 G Antenna gain, 500 MHz to 65 GHz
- 4.2 H Antenna polarization, 1-65 GHz range

Impedance

- 4.3 B Two terminal capacitance, 100 k Hz - 250 MHz range
- 4.3 E Resistance measurements, 30 k Hz to 250 MHz
- 4.3 I Reflection coefficient of coaxial terminations, 1, 2, 3 or 4 GHz
- 4.3 K Reflection coefficient of nonreflecting rectangular waveguide parts and matched loads, WR 42 thru WR 284, fixed termination.
- 4.3 L Reflection coefficient of nonreflecting rectangular waveguide parts and matched loads, WR 42 thru WR 284, movable termination.

Material Properties (Electromagnetic)

- 4.5 Series (4.5A thru 4.5H) on Electromagnetic material properties.

Continued on page 18

Continued from page 17

Noise Temperature

- 4.6 B Effective noise temperature; coaxial noise generators, 3 MHz
- 4.6 E Effective noise temperature, rectangular waveguide generators. WR15.

Phase Shift

- 4.7 B Fixed coaxial phase shifter; characteristic insertion phase shift, 30 MHz
- 4.7 C Variable coaxial phase shifter; characteristic phase shift difference, 30 MH
- 4.7 D Variable coaxial phase shifter, 0.10 to 8.2 GHz
- 4.7 E Variable coaxial phase shifter, 8.2 to 12.4 GHz
- 4.7 F Coaxial delay lines: CW phase delay time, 0.10 to 18 GHz

Power

- 4.8 K Coaxial RF calorimeters, 10-1000 MHz range
- 4.8 L Coaxial RF calorimeters, 1.3, 2, 2.2, 3, 4 GHz

Voltage

- 4.9 B AT voltmeters, 10-1000 MHz
- 4.9 D RF millivoltmeters and signal sources, 0.05-900 MHz
- 4.9 F Coaxial peak pulse voltmeters
- 4.9 G Coaxial peak pulse generators

It should be noted that the October 1976 SP 250 Appendix retains a very substantial list of Electromagnetic services and that no services vital to demonstrating traceability to NBS basic standards have been eliminated. Furthermore to improve service, reduce cost and turn-around time and facilitate planning the most heavily used service, RF/microwave power 4.8B, was placed on a scheduling basis (see announcement 6 of the Oct 1976 Appendix).

The next stage of streamlining the Electromagnetic Calibration Services is now being planned. Further changes will appear in the April 1977 issue of the SP 250 Appendix. Final details on upcoming changes will not be available until about mid-March. Again the theme of any changes is to reduce the calibration load at NBS without sacrificing traceability of measurements to basic NBS standards. In addition the Electromagnetics Division is negotiating with the principal users of its services on the feasibility of any proposed changes in services.

Continued from page 1

Night sessions are not planned for the Symposium. We would like you to see some of our city during your visit. A specially chartered "San Diego Harbor Cruise" will be held during the first night of the Symposium. Our Social Functions Committee has scheduled tours to Balboa Park and La Jolla. Wives are invited to be our guests at a Continental Breakfast at the hotel on the morning of June 22nd.

The annual Symposium Banquet will be held at the nearby Sheraton Airport Inn, a very short walk from the Sheraton Harbor Island Hotel. After the Awards presentations, we will have a talk by Stanford Research Institute's Dr. Harold Puthoff, a physicist who has been doing ESP research for the last three years. We expect his talk to generate considerable controversy, especially during the question and answer period!

We have tried to make the Symposium as convenient to attendees as possible. The Sheraton Harbor Island Hotel is located about 1/2 mile from the airport and free transportation is available through the direct hotel phones. The Harbor Cruise will dock right at the hotel. Harbor Island is the location of many of San Diego's best restaurants. You will find a large variety of foods served at very reasonable prices. All of these restaurants are within walking distance from the hotel. This, together with the spectacular location, right on San Diego Bay, was the reason for our choice of Symposium site.

We urge you to make your reservations at least one month before the start of the Symposium as space is limited. Also because of the large number of exhibits at the hotel, meeting space will not be overabundant. Therefore, we strongly request that there be

NO SMOKING IN MEETING ROOMS

There will be plenty of smoking space in the adjoining exhibit rooms where the coffee breaks will be held. Please cooperate in this matter.

SOLID STATE MILLIMETER WAVE TECHNOLOGY WORKSHOP

The MTT Technical Committed Microwave Integrated Circuits (MTT-6) is sponsoring a workshop on solid state millimeter wave technology, to be held on June 24, 1977, the day following the MTT Symposium, at the same place, the Sheraton Harbor Island Hotel, San Diego, California. The purpose of the workshop is to bring together practitioners in the field of mm-wave integrated circuits to simulate and exchange ideas on mm-wave circuits, solid-state devices and ferrite devices. The emphasis will be on the developing IC technology rather than on component design.

Each topic will be introduced by an invited speaker and then developed during a question and answer period. The workshop will also break up into number of small groups for informal, in depth discussion of selected topics. Every participant must be prepared to contribute to the discussions and should bring along two or three viewgraphs for this purpose.

Registration will be limited and will be by invitation only. If you are interested in participating, please contact Chuck Bunschuh, Microwave Associates, INC., Burlington, MA by June 1, 1977.

ADCOM ENJOYING THE SAN DIEGO WEATHER.

GREAT!






Front Row (Left to Right) D. Parker; C. Rucker; H. Sobol;
L. Whicker; B. Spielman; F. Rosenbaum; H. Stinehelfer;
N. Perner
Back Row (Left to Right) G. Oltman; P. Rodrique;
A. Calvin; E. Komarek; J. Allen; S. Adam



Front Row (Left to Right) J. Ankland; W. Cooper;
J. Degenford; H. Kuno
Back Row (Left to Right) J. Horton; J. Gallagher;
D. Anderson; D. Sparks

INSTITUTIONAL LISTINGS

The IEEE Microwave Theory and Techniques Society is grateful for the assistance given by the firms listed below, and invites application for institutional Listing from other firms interested in the microwave field.

<p>ADAMS-RUSSELL CO., INC. </p> <p>Antenna & Microwave Division Haverhill Road Amesbury, MA 01913</p> <p>Airborne Antennas, ECM Antennas, RF Coaxial Cable Assemblies, Waveguide Systems & Microwave Components</p>
<p>ATLANTIC MICROWAVE CORPORATION</p> <p>Rt. 117, Bolton, Mass. 01740 Tel. (617) 779-5525 TWX 710-392-1585</p> <p>Development and Production for military and commercial systems manufacturers. Complete front ends from the antenna feed through the IF amplifier including monopulse comparators, passive components and active circuitry</p>
<p>EMERSON & CUMING, INC.</p> <p>Microwave Products Division, Canton, MA 02021</p> <p>Absorber/Shielding Materials/Low-Loss Dielectrics Ecco Reflector & Ecco Luneberg Lens Eccosorb Anechoic & RF-Shielded Chambers</p>
<p> HEWLETT <i>hp</i> PACKARD</p> <p>Sales and service from 172 offices in 65 countries. 1501 Page Mill Road, Palo Alto, California 94304 RF & microwave instrumentation for design production and maintenance.</p>
<p>MAURY MICROWAVE CORPORATION</p> <p>8610 Helms Ave., Cucamonga, Calif. 91730 Tel. 714-987-4715</p> <p>Precision Microwave Components & Instrumentation, Waveguide & Coaxial Devices—DC to 40 GHz & beyond ECM/EW Transmission Lines & Components, mm Coaxial Connectors, Connector Gages, Cryogenic Terminations, ANA Calibration Kits</p>
<p> TRANSCO PRODUCTS, INC.</p> <p>4241 Glencoe Ave., Venice, Calif. 90291 (213) 821-7911</p> <p>Products to direct RF energy . . . Coaxial Waveguide Switches, Antennas, Filters, Hybrids, Couplers, Multiplexers, Power Dividers, RF & Antenna Subsystems</p>
<p>PRD ELECTRONICS</p> <p>Division of Harris Corp. 1200 Prospect Ave., Westbury, N.Y. 11590</p> <p>Microwave Instruments & Components, Electronic Measurement Systems, Automatic Test Equipment</p>
<p>RANDTRON SYSTEMS</p> <p>130 Constitution Dr. Menlo Park, Calif. 94025</p> <p>Design, Development & Production Active and Passive Antenna Systems. Fixed and Gimbaled Microwave Receivers, Multichannel Rotary Joints</p>
<p>WAVECOM</p> <p>An Operating Company of Wavecom Industries 9036 Winnetka Ave., Northridge, Calif. 91324 Tel. 213-882-3010</p> <p>Microwave Filters/Multiplexers, Directional Couplers, Adjustable Gain Equalizers</p>



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