

EDITOR: Alvin Clavin, Hughes Aircraft Company, Canoga Park, California • Number 50 • April 1968



EDITORS NOTES

In the January Issue of the Newsletter, Dr. Irving Kaufman of Arizona State wrote a letter advocating one day symposia. That Irv's message came across can be seen from page 13 of this issue where Dr. Wes Matthews, Chairman of the San Francisco Chapter, is planning such a one-day symposium. The program is designed to bring local and area engineers up to the state of the art as seen by senior engineers in major microwave organizations. Also in this issue of the Newsletter is presented the program for the MTT National Symposium. Questions that would logically arise concerning these symposia are: do they conflict, and does one detract from the other?

No, in my opinion they do not. The speakers for the one day symposium are invited, and will discuss the broader aspects of a problem with recent results of interest. The National Symposium largely consists of contributed papers representing completed work that may be published at a later date in the transactions.

I can see a number of advantages to running a one-day symposium such as:

- providing a forum for up to date results to area engineers.
- promoting chapter activity
- providing the chapter with experience for running a larger symposium, i.e. MTT National
- providing the opportunity for local and area engineers to exchange their idea within the framework of a low cost travel budget.

In the Southern California-Arizona area of which I am familiar I would like to see a Round Robin arrangement organized where the symposia site is changed from year to year such as from San Francisco to Los Angeles (Orange County & Foothill) to San Diego, to Phoenix. I am sure that once started these events would catch on and draw a large and enthusiastic audience.



CHAIRMAN'S VIEWPOINT

BY RUDY HENNING

In the last issue of the newsletter I pointed out that it is G-MTT's responsibility to provide you, its members, with services which will help you in your profession. Further, that two basic means are available to accomplish this: the written word (publications), and the spoken word (meetings). I concluded that for G-MTT to fully accomplish its objective requires not only having publications available that you can study and meetings scheduled that you can attend. . . but also that you - its members - actually use these services.

Today, I would like to continue to explore the subject of how G-MTT can be of greatest value to you. Specifically, I want to inquire into the technical areas G-MTT should cover in its publications and meetings, now and in the future. What does our constitution say about this? What does G-MTT Ad-Com know about your technical information needs and interests?

The first part of this question is the easier one to answer, so I will start there. Our constitution defines our field of interest as . . . "Microwave Theory, Techniques and Applications; Microwave Components, Devices and Circuits; the Generation, Amplification, Transmission and Detection of Microwaves" . . . with the limitation that . . . "the generation and amplification of microwaves does not conflict with the interests of the Group on Electron Devices in matters relating to research, design, manufacture, and testing of electron tubes and semiconductor devices." Our constitution further states that . . . "it is recognized that a desirable overlap exists between the two Groups in relation to the use of such devices." The foregoing broadly defines the technical areas of G-MTT, but the constitution adds one more highly important point when it states that the foregoing is . . . "subject, as the art develops, to additions, subtractions, or other modifications." This point is re-emphasized in the statement that the . . . "Field of Interest . . . may be enlarged, reduced or shifted moderately."

Our constitution thus broadly outlines the area of our technical activities. More important, it recognizes the area as dynamic and it

defines the means by which, as the need arises, changes can be made. It is Ad-Com's responsibility to assure that G-MTT's areas of activity remain within the confines of its constitution and that the relative emphasis placed on various technical specialities is properly balanced for maximum value to G-MTT's membership.

Now, to the second half of my earlier question: What does G-MTT Ad-Com know about your technical information needs and interests? Even more important, what does Ad-Com know about your future needs and interests? This information is a prerequisite for Ad-Com to do the needed planning and take the necessary actions in time to give you . . . in the future . . . the best possible tools to advance your profession and your own career. Here the exact answer becomes somewhat uncertain and unsure. Why?

Because we only know about the interests of our active members; the less active a member is, the less we know about him or his specific interests. Further, we know a lot more about our members' current and past interests than we do about their needs and interests in the future. This leaves two open questions:

1. Do the interests of our active members accurately reflect the interests of all our members . . . is the cross-section of our active membership representative of the cross-section of our total membership?
2. How can we establish more accurately what your future interests and needs will be?

Anything that we on Ad-Com can do towards answering these two questions will help us to make G-MTT of greater value to you.

To help us find the answers to the first question, would I be asking too much if I suggest that you take a few minutes and tell me what you like, what you dislike, what you miss and what you feel we give you too much of in G-MTT publications and meetings. Your giving us a better knowledge of where we stand now can be a great help in defining improvements we should make.

To answer the second question . . . what your future needs and interests will be, is more difficult. However, even though no one has found the magic way of precisely predicting the future, good planning and systematic studies can significantly improve the accuracy of projections. Ad-Com should therefore attempt to define as well as possible the technical needs of our members in the 1970's. The course to follow appears to be the following: It stands to reason that most of us will be working, let's say five years from now, in areas already discovered -- for the same reason that most of our members are working today in technical areas which were discovered a good number of years ago. Further, both industry and the military devote extensive effort to long range planning and to defining likely product and service needs of the future. These plans, when implemented, become your future assignments. Therefore, a study now of what's new in research and who is planning what products and services, should tell us about the tools you'll need to do your job. Once we can define the technical areas that will grow and become important, we can align our publications and meeting mechanisms to give you the most for your membership fee.

Are you active in research or long range planning now? Do you have specific inputs that can help us? Would you be interested in actively participating in G-MTT's Long Range Planning Group? If so, please contact me -- we need your help and counsel.

In conclusion, let me urge you again to resolve to do a little more in 1968 to advance your professional stature. Attend your meetings, read your publications, and let us know what you think of G-MTT so we can make it still better and more useful to you and your associates in the future.



QUANTUM ELECTRONICS COUNCIL LIAISON

BY K. TOMIYASU

Within the IEEE, the laser activities are sponsored by the IEEE Council on Quantum Electronics representing two IEEE Groups, viz., Group on Electron Devices, and Group on Microwave Theory and Techniques. The Council publishes monthly the IEEE Journal of Quantum Electronics and sponsors conferences. The co-editors of the Journal are Dr. Robert H. Kingston and Professor Glen Wade, and in 1967, 740 pages were published. The Council is involved in two series of Quantum Electronics Conferences, and these will be described after mentioning another aspect of the organization.

Since there is interest in lasers also by the American Institute of Physics (AIP) represented by the American Physical Society and Optical Society of America, a Joint Council on Quantum Electronics (JCQE) was formed in 1964 to act on behalf of both AIP and IEEE. The JCQE comprises 12 members with 6 from each of the two principal societies. The Chairman and Secretary of JCQE are Drs. Benjamin Lax and K. Tomiyasu, respectively. The JCQE sponsored the Fourth International Quantum Electronics Conference in Phoenix, Arizona in April 1966, and is holding the Fifth International Quantum Electronics Conference in Miami, Florida, on May 14-17, 1968.

The IEEE Council on Quantum Electronics is presently organizing the 1969 IEEE Conference on Laser Engineering and Application (CLEA) to be held in Washington, D.C. on May 26-28, 1969. This conference is a sequel to the 1967 CLEA held in June 1967 in Washington with an attendance of about 1000. The CLEA are held on years intermediate to the International Quantum Electronics Conferences. The co-chairmen of the 1969 CLEA are Drs. Frank R. Arams and L.K. Anderson. The Optical Society of America is listed as a participating society.

Among those who receive the IEEE Journal of Quantum Electronics, 1728 and 590 are members of Electron Devices and Microwave Theory and Techniques Groups, respectively.

The IEEE Council on Quantum Electronics was established in August 1967 and its membership is given below:

W. W. Mumford (G-MTT), Chairman	
A. Yariv	(G-ED), Vice - Chairman and Secretary
G-MTT	
G-ED	
E. I. Gordon	F. R. Arams
A. E. Siegman	K. Tomiyasu
K. Tomiyasu serves as liaison to the G-MTT Administrative Committee.	

February 26, 1968



ADCOM (ADMINISTRATIVE COMMITTEE) REPORT

BY LEO YOUNG

The Administrative Committee met during the IEEE Convention on March 20, 1968, at the New York Hilton Hotel. Outside, the weather was spring like, a great improvement over the previous year's snow storm.

Organization Chart

The chairman, R. E. Henning, handed out an up-dated organization chart, which he proposed for Ad Com's day-to-day operational organization. It is reproduced as part of this report.

1967 Symposium (Boston)

It was reported by Ted Saad that last year's Symposium in Boston resulted in a surplus of \$2,700.

1968 Special Microwave Presentations (New York)

Leo Young reported on the first two days of microwave sessions at the Coliseum. Although there had been some initial difficulties with the slide projector on the first morning, they had been corrected. There was an overflow audience for several papers and a larger room will be needed if the microwave sessions are to be given again next year. Ad Com voted unanimously to recommend that the microwave presentations should be repeated during the 1969 Convention. Frank Arams is to look into it and to find an organizer for next year. Leo Young is preparing a final report on the 1968 presentations.

George Haddad and John Bryant brought copies of the advance program (featuring an automobile with microwave headlights and other innovations). Forty-two papers were accepted (of the 117 submitted), and there are four invited papers, plus two informal parallel evening sessions, which promise to be most interesting—one on computer-aided design of microwave networks, organized by Bill Getsinger; and one on solid-state control devices, organized by Dave Adams. Anyone can participate.

Institutional listings in the Symposium digest are an important part of the Symposium income, and John Bryant reported that already more had been received than were projected.

Symposium digests can be purchased by members or by libraries. All MTT members should have a copy in their company library (as well as their own). They may be purchased from IEEE HQ in New York. (The price to IEEE members is \$4.00, non-members \$8.00, libraries \$6.00.)

1969 Symposium (Dallas)

Jim Sadler and Ben Halford reported. It is planned to have parallel

sessions, so that more areas can receive adequate coverage, especially the newer areas (such as possibly millimeter and submillimeter waves, acoustic and magnetoelastic waves, superconducting metals and the Josephson effect, high power, quantum electronics, optical waveguides and resonators, computer aided design, etc.). Jim Sadler or Ben Halford will be glad to hear your suggestions.

Other Meetings

Frank Arams reported on other meetings in which GMTT participates, including WESCON and NEC, as well as the European microwave conference in London in September 1969. The latter has two Ad Com representatives on it, Walter Kahn and Peter Clarricoats. Dave Adams will organize a WESCON session on "Microwave Solid-State Receivers: Designing for Increased Dynamic Range," for August 1968 in Los Angeles.

Membership Services

Peter Rizzi and Ted Saad reported. There are now 5503 full members, 11 affiliates and 611 students, for a grand total of 6125 members.

Tore Anderson, reporting for the Connecticut chapter, said it was difficult to get a good turn-out because of the wide scatter of members.

Back issues of the Transactions can be obtained by local chapter chairmen. Please contact Pete Rizzi.

Newsletter

Al Clavin reported on the Newsletter. He is trying to do something about the long delays at IEEE HQ. R. E. Henning suggested, and Ad Com agreed, to give Al Clavin authority to get one newsletter out using a local printer and mailing first class if necessary to speed it up. This experiment will be watched carefully and all MTT members are invited to send in their comments.

National Lecturer

Ted Saad reported that Leo Young has accepted as National Lecturer for 1968. They are currently working out a schedule. Pete Rizzi has taken over from Ted Saad to help work it out. It is hoped to accommodate nearly every chapter that has asked for the National Lecturer, and where Dr. Oliner (last year's National Lecturer) was unable to speak.

Special Transactions on Microwave Integrated Circuits

This will be a joint issue of MTT with ED and the Solid State Circuits Journal. Bill Edwards is guest editor. The issue will come out sometime after July.

Special Transactions on Noise

Bill Mumford reported that he has had 48 reviewers. He expects to get 25 good papers for publication.

Ad Com Annual Meeting: Revision of Bylaws

Gene Torgow reported. Ad Com approved moving the annual meeting, including election of officers and members of Ad Com, to the September meeting. (See previous Newsletter, p. 4.)

Awards

Ted Saad takes over from Seymour Cohn.

Councils

Bill Mumford reported for the Quantum Electronics Council, and Frank Arams reported on preparations for the CLEA meeting in Washington. Warren Cooper and Bob Garver reported on the Solid State Circuits Council.

R. E. Henning stated that CADAR, the organization for Computer-Aided Design, Analysis and Realizability (see previous Newsletter p. 7), will after all not become a council, but will be a standing committee of TAB (Technical Activities Board), reporting to and financially supported by TAB (and not by interested Groups).

Standards

Bob Beatty has taken over from Marvin Cohn. Bob Beatty has been in touch with Patricia Loth, who did such an excellent job on the (now defunct) Antennas and Waveguides Committee. She will head the Waveguide Standards Committee. Gus Shapiro, who is secretary of IEC (International Electro-technical Commission) SC 46B on Waveguides and Their Accessories, would like to see GMTT take an active part in and work with IEC on waveguide standards. For example, Hungary has prepared a document on electrical leakage, and Norway has prepared one on square waveguide. GMTT should prepare a report which could be routed through the U.S. National Committee of the IEC and could be given the status of a U.S. position paper.

Long-Range Planning

The Chairman, R. E. Henning, asked what future technical areas will be of interest to GMTT members in 5, 10 and even 15 years from now. His feelings are well expressed on another page in this Newsletter, under "The Chairman's Viewpoint." He would like to hear from all members what they think, and what they can contribute. Leo Young suggested a simple form to facilitate the flow of inputs, and such a form follows in Box 1. It should not limit your expression of interest--it is intended to get you started.

CALL FOR NOMINATIONS TO ADCOM

The Administrative Committee of G-MTT is principally manned by 18 elected members, one-third of whom are elected each year for a three year term. Elections this year will be held at the September meeting of Ad Com. The Ad Com is constantly searching for candidates who are interested in furthering the objectives of the group and are willing to devote their time to this important work. During April, the chairman of the Nominating Committee

Continued on page 5.

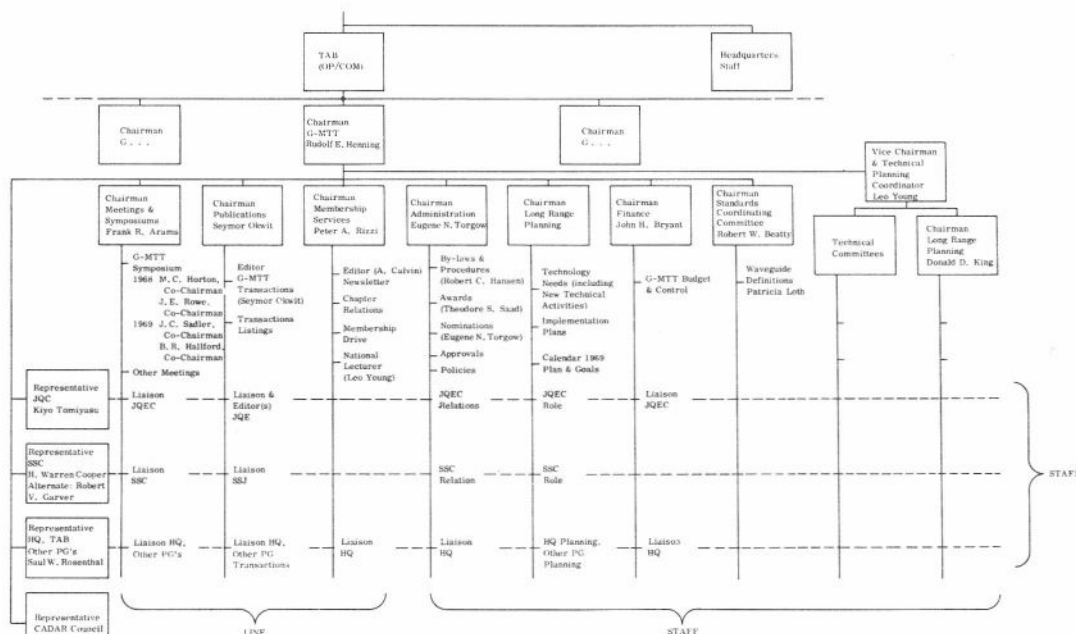
BOX 1

WHAT ABOUT GMTT'S FUTURE?

1. I would like to see MTT feature the following new technical areas (in order of priority)
 - (1)
 - (2)
 - (3)
 - (4)
 - (5)
 - (6)
 - (7)
 - (8)
 - (9)
 - (10)
2. They should be featured in
 - (1) MTT Transactions
 - (2) MTT Symposia
 - (3) Other forums (which? existing ones? new ones?)
3. Ten years ago I worked on . . .
4. Five years ago I worked on . . .
5. Today I work on . . .
6. Today my main interests are . . .
7. In five years' time, I hope to be working on . . .
8. In ten years' time (if I live that long), I ought to be working on . . .
9. To help me plan my future, GMTT ought to . . .
10. I am willing to help plan my future as well as GMTT's by . . .

Please send this form with any additional comments to:

Dr. Rudolph E. Henning
Sperry Microwave Electronics Co.
P.O. Box 1828
Clearwater, Florida 33517



Proposed ADCOM Day-to-Day Operational Organization

will be soliciting members of the committee for nominations directly to the nominating committee chairman,

Eugene N. Torgow
Rantec Division -
Emerson Electric Company
24003 Ventura Boulevard
Calabasas, California

or to their local MTT Chapter Chairman, who are ex-officio members of the nominating committee.

Please ascertain, before submitting a candidate's name, that he is willing to serve, if elected. Also enclose a brief biography of your candidate, highlighting his professional experience, education, grade of IEEE membership, and record of IEEE service. Nominations must be received by June 15, 1968.



ADCOM REPORT ON CHAPTER ACTIVITIES

BY TED SAAD

This is my second and last report to the Newsletter on Chapter Activities. Starting with the next issue, Dr. Peter Rizzi will take over the Chairmanship and will be reporting in this space.

The major activity of the committee for the past period has been to first, select a National Lecturer, and then arrange for a schedule of his activities.

After a balloting of the members of the National Administrative Committee, Dr. Leo Young of Stanford Research Institute was named 1968 National Lecturer. The choice was a logical one, and I am pleased to say that Dr. Young has agreed to serve in this capacity.

He supplied me with a schedule of dates that he would not be available to speak, and with that information, I circulated a notice to all the Chapter Chairmen relative to his appointment and availability. The deadline for hearing from Chapter Chairmen was set for March 15, so that I could work with Leo during the IEEE Show in an effort to finalize his schedule. Since I am writing prior to that date, the schedule has not been finalized. Of the 35 Chapters, 16 have indicated interest in having him speak. As soon as the schedule is set, all of the Chapter Chairmen will be notified.

The National Lectureship appears to be a success. Dr. Oliner, who was the National Lecturer for 1967, presented an outstanding talk. He was well received and greatly appreciated in all the Chapters that he had an opportunity to visit. He has set a rather high standard, for future

Lecturers, but I feel that Dr. Young will be able to sustain the same high level of quality.

Incidentally, I still have several thousand back copies of the MTT Transactions, which I am storing for Peter Rizzi. If anyone is looking for those back copies for any reason, please let either me or Dr. Rizzi know.

I have continued my telephone campaign. I managed to talk to a number of the local Chapter Chairmen late in the year. Again I came across the fact that the Chairmen are sometimes reluctant to invite people of stature to speak at their local meetings. In many cases, they feel that they should have a much greater attendance than they can guarantee, before they invite such a speaker. This is not the case. Most of our good speakers make themselves available to all groups, regardless of size.

Up in Syracuse John Stratakos said the best way to maintain good attendance at their meetings is through personal contact. They have the same problem as the group in Buffalo experienced last year. They must be careful to have at least one Administrative Committee member from outside General Electric and at the same time the two men from General Electric are usually chosen from different departments.

John Gallagher from Atlanta tells me they have a very ambitious program. They have thirteen meetings scheduled for the year. One of the points made was that they had already selected their program for this year, when they received the list of speakers. Bob Tenenholz is planning to have his speakers list ready at the end of May. This will give local Chapters the summer to examine the list and make their selection.

J. Langston in Dallas said their main effort is planning and organizing the International Symposium in 1969. They have been using our speakers list and they have been trying to have a dinner meeting each month as part of their program. Their main effort is to interest young Engineers in the Chapter, and he feels me they have been succeeding. It sounds like a young active group.

I spoke to a few of the other Chapters, and in general, things are moving along quite well. The Washington Chapter, for example, has scheduled a series of five evening lectures, to be held every other week on the subject of Solid State Microwaves. They were looking for attendance of 400. One of the interesting techniques they use, is to have 40 key men in the area to help stimulate membership and meeting attendance.

I finally located the Chapter Chairman of the Montreal Chapter, Mr. E. F. Morriss, Canadian Marconi Company, Avionics Department, Commercial Products Division, 2442 Trenton Avenue, Montreal, Canada. They have had their difficulties over the years. Three years ago, they had three meetings and attendance was very poor, about eight people at each meeting. Two years ago, no meetings, and last year they made a very strong effort to have one meeting with a great deal of publicity. Our good friend Bill Mumford spoke. They attracted fifty people. This year they plan to do a similar thing. That is, one meeting, famous speaker, highly publicized. I suggested they think in terms of two speakers and two meetings.

When I was in Palo Alto I managed to visit with Dr. Matthews, Chairman of the San Francisco Chapter. They are planning a one day Seminar on Microwave Integrated Circuits. The program will include a series of four presentations during the afternoon and a panel discussion in the evening. He had invited some fine speakers. This kind of an all day Seminar, I feel, is a very effective thing.

A few years ago, we had an all day Seminar on Phased Arrays. As I recall, it was a co-operative effort of the Boston MTT and AP. It was perhaps one of the most interesting and well received meetings. I would urge other Chapters to consider this possibility.



CHAPTER NEWS

BALTIMORE CHAPTER

Past Meetings

Date: February 21, 1968
 Location: Sutton Place Apartments, Howard St.
 Speaker: Carlyle J. Sletten
 Affiliation: AF Cambridge Research Labs.
 Abstract: "Antenna Technology and Market"

Some ideas and developments in antenna and diffraction theory were discussed in relation to projected needs, both military and commercial. Spherical reflections, millimeter wave antennas, active loaded antennas, and other design and synthesis techniques were presented. Special requirements emerging from commercial communications, space exploration, limited war, and missile defense were treated in the context of antenna systems.

Date: December 13, 1967
 Location: Sutton Place Apartments
 Speaker: Ernest Stern
 Affiliation: M.I.T. Lincoln Laboratory
 Abstract: "Some Current Problems with Components for Ballistic Missile Defense Array Radar's"

This talk treated some current problems with component design for BMD radars, analytic techniques for evaluation the effectiveness of proposed designs, and some examples of Lincoln Laboratory solutions to these component problems - such as the need for new antenna radiators, new phase shifter designs, and new pulse burst mode signal processing components.

Date: January 9, 1968
 Location: Sutton Place Apartments
 Speaker: Dr. C. Herbert Grauling, Jr.
 Affiliation: Westinghouse Aerospace Division
 Abstract: "ILS Flight Inspection Positioning System"

A microwave interferometer utilizing a linear array of radiators excited by coherently related frequencies has been employed for precision angle measurement. The technique has been applied to the determination of aircraft position, and the equipment described is intended as a calibrator for Instrument Landing Systems.

BOSTON CHAPTER

Past Meetings

Date: November 30, 1967
 Attendance: Fifty-three
 Speaker: Dr. William E. Bicknell
 Affiliation: Sylvania Applied Research Lab., Waltham, Mass.
 Abstract: "Practical Electro-optic Modulators for Practical Applications"

BUFFALO CHAPTER

Past Meetings

Date: February 28, 1968
 Attendance: Twenty
 Speaker: Howell Boyd
 Affiliation: Texas Instruments
 Abstract: "State of Art in Microwave Integrated Circuit Techniques"

A description of the devices and circuits used in a 604 element microwave integrated circuit X-band phased array radar. Microwave transistors and step recovery diodes packaged in a high K microstrip configuration were used. Advances in Gunn diodes and research in LSA diodes were also discussed.

Date: October 25, 1967
 Speaker: Arthur W. Murphy
 Affiliation: Sylvania
 Abstract: "Optical Resonators for Millimeter Wave Applications"

Extremely high Q millimeter cavities of the Fabry-Perot interferometer type were discussed.

Date: November 29, 1967
 Attendance: Thirteen
 Speaker: Richard Sanders
 Affiliation: Watkins-Johnson Co.
 Abstract: Mr. Sanders addressed the group on YIG devices, with the emphasis on YIG filters. An equipment demonstration was also presented.

CHICAGO CHAPTER

Past Meetings

Date: December 5, 1967
 Attendance: Twenty-two
 Speaker: R. G. Gould
 Affiliation: COMSAT Corporation, Washington, D.C.
 Abstract: "Characteristics of the Satellite Systems of Intelsat"

DENVER- BOULDER CHAPTER

Past Meetings

Date: December, 1967
 Attendance: Forty-seven
 Speaker: H. H. Meinke
 Affiliation: Institute for Highfrequency Tech., Technische Hochschule, Munich, Germany
 Abstract: "Piston Attenuators and Electromagnetic Fields"

FLORIDA WEST COAST CHAPTER

Past Meetings

Date: January 25, 1968
 Location: Tampa, Florida
 Speaker: W. W. Mumford

Affiliation: Bell Telephone Laboratories
 Abstract: "Noise Performance Factors in Communication Systems"

In any communication system, the output noise is a disturbing influence. In order to evaluate the performance of receivers in an operating environment and to determine their capability of handling weak signals, an operating noise temperature has been defined. It utilizes the concepts of Effective Input Noise Temperature and the Noise Temperature of the generator.

The application of these concepts to single and multiple response receivers was discussed. Methods of measurement were derived and the relationship to several definitions of Noise Figure were pointed out.

Date: February 22, 1968
 Location: Holiday Inn, U.S. 19 South, Clearwater, Florida.
 Speaker: Tore N. Anderson
 Affiliation: Amphenol RF Division, Danbury, Connecticut
 Abstract: "Coaxial Connector Standardization"

This paper described the important new performance based coaxial connector standards and specifications which have arrived on the scene in the last several years.

The USASI Committee, C83.2 on RF Connectors, has been working with the various military departments, industry users, and scientific organizations to establish a performance based military connector specification Mil-C-39012 with its associated specification sheets which cover all of the popular connectors in the form which allows the user the benefits of fully documented performance, the manufacturer the chance to use his ingenuity in meeting these performance requirements and a qualified product system for assuring the military that qualified products to this specification are available.

The laboratory standard connector dimensions for series N, TNC, BNC, SC, and BRM/OSM were described along with the philosophy for establishing precision referenced connectors in each of these series.

The work of the IEEE Precision Connector Subcommittee of the Instrumentation and Measurements Group was discussed showing the philosophy and techniques which have been arrived at in successfully meeting the high performance standards of these precision connectors and the benefits that these connectors have provided, not only to the microwave spectrum, but to the lower frequency instrumentation applications as well.

The new program of the standardization of a miniature precision coaxial connector, useful to 40GHz, was described.

FOOTHILL CHAPTER

Past Meetings

Date: October 10th, 1967
 Attendance: Fifty-five
 Speaker: Arthur A. Oliner
 Affiliation: Polytechnic Institute of Brooklyn
 Abstract: "The Microwave Field in Transition: Challenges for Microwave Theory"

Date: November 14, 1967
 Attendance: Thirty
 Speaker: Arthur H. Solomon
 Affiliation: Sylvania Electric Products Inc., Woburn, Mass.
 Abstract: "Applications of Avalanche Diode Oscillators to Microwave Systems"

HUNTSVILLE CHAPTER

Past Meetings

Date: January 18, 1968
 Attendance: Eleven
 Speaker: Dr. K. R. Carver
 Affiliation: University of Kentucky
 Subject: Helicone Antenna

Date: February 29, 1968
 Attendance: Eight
 Speaker: Dr. Arthur Uhlir
 Affiliation: Microwave Associates
 Subject: "Circuit Consequences of Device Mechanisms in Mixers and Multipliers"

Date: March 21, 1968
 Speaker: Dr. Leo Young
 Subject: "Microwave Filters"

Future Meetings

Date: April 25, 1968
 Speaker: Dr. W. W. Mumford
 Subject: "Microwave Radiation Hazards"

LOS ANGELES CHAPTER

Past Meetings:

Date: October 11, 1967
 Attendance: Thirty-eight
 Location:
 Speaker: Dr. Arthur A. Oliner
 Affiliation: Polytechnic Institute of Brooklyn
 Abstract: "The Microwave Field in Transition: Challenges for Microwave Theory"

Date: December 14, 1967
 Attendance: Twenty-five
 Location: Roger Young Auditorium
 Speaker: Dr. Benjamin Lax
 Affiliation: National Magnet Laboratory, MIT
 Abstract: "Lasers and High Magnetic Field Research"

Involved in such research is marrying of lasers and high magnetic fields. Some of the investigations and applications were presented and new magnet types were described.

Slides were presented showing the Bitter Magnet Laboratory facility. The facility was discussed including two large motor-generator sets which are capable of producing 2.5 million watts of power.

Described were Bitter magnets and details of the magnet disc assemblies. Several slides were presented showing these. It was pointed out that a Bitter magnet with a one-inch diameter disc assembly will produce a field intensity of 175,000 gauss and a two-inch diameter disc will produce 200,000 gauss. The life of these magnets is based on the copper contained in them which will develop shorts after a period of operation. Their life span is on the order of six months.

Continued on page 8.

Date: February 08, 1968
 Attendance: Twenty-four
 Location: Roger Young Auditorium
 Speaker: Roger Rauskolb
 Affiliation: Hewlett-Packard Company
 Abstract: "Automated Measurement of Complex Reflection Coefficient"

MILWAUKEE CHAPTER

Past Meetings

Date: November 21, 1967
 Location: Engineers and Scientists of Milwaukee, 3112 West Highland Boulevard, Milwaukee, Wisconsin
 Speaker: Harold S. Merrill
 Affiliation: University of Wisconsin, Madison
 Abstract: "Tropospheric Radio Propagation"

Date: February 6, 1968
 Attendance:
 Location: Milwaukee School of Engineering, Milwaukee and Kilbourn Streets, Milwaukee, Wisconsin
 Speaker: Professor Albert Van der Ziel
 Affiliation: University of Minnesota
 Abstract: "Noise in Microwave Transistors"

Present transistor noise theory is a low-level injection theory. Although medium-frequency transistors at high current densities show an extra input noise, this effect is not very significant in microwave transistors up to 2000 MH.

Date: March 7, 1968
 Location: A-C Electronics, 7929 South Howell Avenue Oak Creek, Wisconsin
 Speaker: Robert J. Wenzel
 Affiliation: Bendix Research Laboratories Microwave Technology Dept.
 Abstract: New Technique for the design of Microwave Networks.

The application of Richard's transformation to the synthesis of filters, multiplexers, broadband transformers, directional couplers, and both active and passive device matching networks were discussed and illustrated.

NEW HAMPSHIRE CHAPTER

Past Meetings

Date: September 27, 1967
 Location: Olde Coach Inn
 Speaker: Dr. Arthur A. Oliner
 Subject: Microwave Field in Transition

Date: November 29, 1967
 Location: Berkshire Country Inn
 Speaker: Mr. William Ray
 Affiliation: Hewlett-Packard Company
 Subject: The Role of the Computer in Microwave Measurements
 Abstract:

Mr. Ray described the development of computer aided microwave

measurement equipment and some of the techniques which allow this approach to microwave measurement.

Date: January 1968
 Speaker: Mr. Thomas Carberry
 Affiliation: Raytheon Company
 Subject: Computer Solutions for Large Antenna Aperture Problems
 Abstract:

He indicated ways of evaluating various approaches to this computational problem. Various summaries of algorithm properties were presented with representative problems.

Date: February 28, 1968
 Location: The "88" Restaurant
 Speaker: Mr. William Pastori
 Affiliation: Airborne Instruments Laboratory
 Subject: Noise
 Abstract:

Mr. Pastori presented the basic theory and problems associated with noise figure measurements, as well as some comments on noise standardization.

Date: March 27, 1968
 Speaker: Dr. Carl J. Sletten
 Affiliation: AF Cambridge Research Laboratories
 Subject: Requirements for New Antenna Technology related to recent Antenna Advances.

ORANGE COUNTY CHAPTER

Past Meetings

Date: October 11, 1967
 Location: Orlando's Restaurant, Pomona, California
 Speaker: Dr. Arthur Oliver
 Affiliation: Polytechnic Inst. of Brooklyn
 Abstract:

Dr. Oliver discussed the Microwave Field in transition and resultant challenges for microwave theory. Two of these were: (1) New applications involving new configurations or different frequency ranges; and (2) Interactions with other physical wave types such as those encountered in non-linear optics and microwave acoustics.

It was a very thought provoking and inspiring talk.

Date: November 7, 1967
 Attendance: Twenty-three
 Location: Autonetics' Research Auditorium
 Speaker: Prof. R. A. Deschamps
 Affiliation: Univ. of Illinois, Urbana
 Abstract:

Professor Deschamps presented a simple matrix method of handling geometric optics problems. The matrix method is based on an analogy which uses a network representation for a ray undergoing a number of reflections and refractions at some arbitrary curved surfaces.

Date: December 5, 1967
 Attendance: Twenty-eight
 Location: Autonetics' Research Auditorium
 Speaker: Dr. R. S. Elliott
 Affiliation: Univ. of California - Los Angeles

Abstract:

Dr. Elliott described a T System Waveguide for variable polarization. An analysis was presented which serves to define the physical dimensions controlling the propagation characteristics of two modes in the waveguide. The result is the opportunity to create a line source which can radiate a conical beam of variable polarization. The experimental data obtained supported the theory and also led to some very interesting possible uses.

Date: February 6, 1968

Attendance: Forty-five

Location: Autonetics' Research Auditorium

Speaker: John L. Allen

Affiliation: Lincoln Laboratory

Abstract:

Using a straightforward engineering approach, a thorough analysis of the workings of the eyes of nocturnal moths was performed. In his own inimitable fashion, Mr. Allen used a mixture of the experimental determination of the properties of the optical path with the applicable electromagnetic theory techniques to make a very interesting presentation.

Date: March 5, 1968

Attendance: Thirty-one

Location: Autonetics' Research Auditorium

Speaker: Dr. Samuel Silver

Affiliation: Univ. of California, Berkeley

Abstract:

Dr. Silver summarized the basic principles of molecular radiation in the millimeter and infrared regions. The expected emission and absorption bands of a given atmosphere were related to the pressure-temperature distributions in the atmosphere. He then reviewed his recent work on H_2O , O_2 , and O_3 in the earth's atmosphere and corresponding constituents in the atmospheres of other planets. Several important and interesting problem areas were noted.

Future Meetings

Date: April 2, 1968

Speaker: Raymond G. Forest

Affiliation: Microwave Associates

Subject: Digital Pin Diodes For Ground & Airborne Array Applications

Date: May 7, 1968

Speaker: Merrill I. Skolnic

Subject: The Role of the Antenna in Radar Systems

ORLANDO, FLORIDA CHAPTERPast Meetings

Date: October 11, 1967

Attendance: Twenty-one

Speaker: Dr. Fred Johnson

Affiliation: Electro-optical Systems, Pasadena, California

Abstract: "Nonlinear Optics and Raman Technology"

Date: November 8, 1967

Attendance: Thirty-two

Speaker: Dr. Robert Adler

Affiliation: Zenith Radio Corp., Chicago, Illinois, 60639

Abstract: "Acoustical Modulation Techniques"

Date: November 26, 1967

Attendance:

Thirteen

Speaker:

Dr. Alvin Kiel

Affiliation:

Bell Telephone Labs., Holmdel, N.J.

Abstract:

"Microwave Optical Double Resonance Experiments Using Circularly Polarized Light"

PHILADELPHIA CHAPTERPast Meetings

Date:

December 6, 1967

Attendance:

Twenty-five

Speaker:

T. J. Lyon

Affiliation:

Scientific - Atlanta, Atlanta, Georgia

Abstract:

"Precision on Phase Measurements on Microwave Antenna Systems"

SAN DIEGO CHAPTERPast Meetings

Date:

June 6, 1967

Attendance:

Twenty-one

Location:

U. S. Naval Electronics Lab., Pt. Loma, San Diego, California

Speaker:

Dr. Perry H. Vartanian

Affiliation:

Melabs, Incorporated, Palo Alto, California

Abstract:

"Some Miniaturization for Microwave and VHF Circuits"

Date:

September 12, 1967

Attendance:

Forty-four

Location:

U. S. Navy Electronics Lab., Pt. Loma, San Diego, California

Speaker:

Gregory Young, Ph.D.

Affiliation:

Hughes Aircraft Company, Culver City, Calif.

Abstract:

"Processing Antenna Arrays"

Date:

November 14, 1967

Attendance:

Twenty-eight

Location:

U. S. Navy Electronics Lab., Pt. Loma, San Diego, California

Speaker:

Dr. Arthur A. Oliner

Affiliation :

Polytechnic Institute of Brooklyn¹ Brooklyn, New York

Abstract:

"Microwave Field in Transition: Challenges for Microwave Theory"

Date:

December 12, 1967

Attendance:

Twenty-nine

Location:

U. S. Navy Electronics Lab., Pt. Loma, San Diego, California

Speaker:

Harry F. Cooke

Affiliation:

Texas Instruments, Dallas, Texas

Abstract:

"Microwave Integrated Circuit Technology"

Date:

March 12, 1968

Attendance:

Sixteen

Speaker:

Dr. Meuer Gilden

Affiliation:

Microwave Associates, Inc.

Abstract:

Avalanche Diode Oscillator

SAN FRANCISCO CHAPTERPast Meetings

Date: February 28, 1968
 Attendance: One Hundred and twenty
 Location: Hewlett-Packard Auditorium, San Francisco
 Speaker: Carl Blake
 Affiliation: M.I.T. Lincoln Laboratory, Lexington, Mass.
 Abstract: "Phased Array Radar Systems"

Mr. Blake first reviewed the basic concepts of phased arrays, and then launched into a description of the various components involved in their construction, emphasizing a number of recent innovations in each. These include:

- a. The cold-cathode Dematron transmitter tube, capable of nearly a megawatt peak output power in C-band.
- b. A Phase-stable low-noise tunnel diode amplifier.
- c. Latching ferrite phase shifters, miniature, temperature-stable, capable of analog-type control.

Mr. Blake stressed the need for an honest evaluation of the cost-performance trade-off in planning for new phased arrays, and ended up with a prediction of future trends in this field. He included slides of a number of current phased arrays, including Hi-Hat, Spadar, Spadat, and a low-frequency array in Peru covering many acres.

SCHEENECTADY, NEW YORK CHAPTERPast Meetings

Date: November 28, 1967
 Attendance: Eight
 Location: G.E. Research and Development Center
 Speaker: Prof. John A. Bradshaw
 Affiliation: Rensselaer Polytechnic Institute
 Abstract: "Delivery of Microwave Power to a high-speed Vehicle in a tube"

The subject of new means of rapid, dependable surface transportation is a timely one. Researchers at R.P.I. have been studying vehicles supported by air cushions within a guiding tube. Prof. Bradshaw described his particular interest, which is providing the power to propel the vehicle by means of microwave energy propagating down the tube. He discussed means of launching appropriate low loss waves and means of collecting them on the vehicle.

Future Meetings

Date: May 7, 1968
 Location: Rensselaer Polytechnic Institute, Troy, New York
 Speaker: W. W. Mumford
 Affiliation: Bell Telephone Laboratories
 RSVP to: R.G. Lock, G.E. Co., Bldg. 269, 1 River Rd., Schenectady, New York
 Abstract: In any communication system, the output noise is a disturbing influence. In order to evaluate the performance of receivers in an operating environment and to determine their capability of handling weak signals, an operating noise temperature has been defined. It utilizes the concepts of effective input noise temperature and the noise temperature of the generator.

The application of these concepts to single and multiple

response receivers will be discussed. Methods of measurement will be derived and the relationship to several definitions of noise figure will be pointed out.

SEATTLE CHAPTERPast Meetings

Date: January 27, 1968
 Speaker: Dr. R. W. Carlson
 Affiliation: Boeing Co., Antenna and Propagation Unit
 Abstract: "The Near Field Blockage of Phased Arrays"

SYRACUSE CHAPTERPast Meetings

Date: December 7, 1967
 Attendance: Thirty
 Location: White Hall, Room 104, Syracuse University
 Speaker: George D. Johnson
 Affiliation: Texas Instruments
 Abstract:

The MERA approach to achieving a low-cost, all solid state radar is based on the use of microwave integrated circuit r.f. module for performing the transmit-receive function independently for each element of the array. The r.f. modules consist of transmitter power amplifier and harmonic multiplier, T-R switches, receiver local oscillator mixer, I-F amplifier, digital phase shifter and logic circuitry for adjusting the elemental phase according to a digital program. The MERA system operates at X-band, with the phase-shifting performed at S-band. Other micro-electronic modules are under development for use in L-, S-, and C-band systems.

Date: March 14, 1968
 Attendance: Fifteen
 Location: White Hall, Room 104, Syracuse University
 Speaker: Dr. A. T. Adams
 Affiliation: Syracuse University
 Abstract: Some of the general properties of radiation from periodic structures were given. The helix antenna was described as an example and research at the Syracuse University Research Center on the quadrafilar helix antenna was discussed. The effects of dielectric and metallic loading, which produces a frequency scanned mode of operation, were also described.

SOUTHEASTERN MICHIGAN CHAPTERPast Meetings

Date: January 24, 1968
 Attendance: Seventy
 Location: University of Michigan
 Speaker: Dr. H. Sobol
 Affiliation: RCA
 Abstract: A large number of microwave functions can be realized today in hybrid integrated form. With improved technology and the continued invention of planar devices, there will be an impetus to make more monolithic circuits. A convenient way of introducing MIC's into systems may be through modularization. This approach not only

allows new systems flexibility, but also may be the key to cost effectiveness.

Various aspects of MIC's were examined and design procedures and criteria discussed. Examples of functional circuits and systems using MIC's were shown. Some possible forms of MIC's of the future were mentioned.

TUCSON CHAPTER

Past Meetings

Date: November 15, 1967
 Attendance: Twenty-six
 Location: Paulos' Steak House, Tucson, Arizona
 Speaker: Dr. A. A. Oliner
 Affiliation: Polytechnic Institute of Brooklyn, Long Island, New York
 Abstract: "Microwave Field in Transition: Challenges to Microwave Theory"

The Tucson Joint AP/MIT Chapter is fortunate in having had Dr. A. A. Oliner, MIT National Lecturer, as a speaker in November of 1967. His visit warranted the first joint meeting of the Chapter and the Tucson Section.

In the brief period of his talk, Dr. Oliner effectively defined microwave theory and described the past accomplishments of the theory, interesting areas of research to which the theory is presently being applied, and the distinctive character which, if present, allows a ready solution of various physical problems through present microwave theory.

Dr. Oliner's talk was appreciated by members present with widely varying backgrounds, and his visit must be considered from several aspects to be an enhancement of the microwave engineer and his work.

The members of the Tucson Section appreciate the efforts required of Dr. Oliner as MIT National Lecturer and thank him again for his visit. The members of the Tucson Chapter would like to commend the members of the Administrative Committee for their initiation of the lecture program and their choice of Dr. A. A. Oliner as first lecturer.



PERSONALITIES

Microwave theses completed at Marquette University Department of Engineering for the Master of Science Degree:

January 1968

Gary A. Sawyer, "Acceleration Detection with Electromagnetic Wave at Microwave Frequencies."

February 1968

Edward F. Nitka II, "Interaction of Microwave Signals with Ferrite Media in the Presence of Changing Gravitational Fields".

Theses on file at the Memorial Library, Marquette University, Milwaukee Wisconsin.

Philip J. Caruso Jr. has been named president of the newly formed Micro-wave Sensor Systems Inc., Downey. The new company will major on the application of microwave radiometry and radar for government and commercial uses.

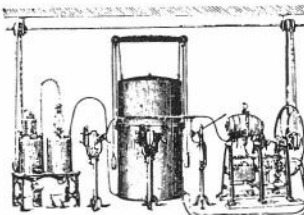
Other officers are Gerard La Rocca, executive vice president; Jay H. Overholser, secretary, and George Humiston, treasurer.

Dr. George Tyras has joined the University of Houston as Professor of Electrical Engineering to pursue his current interests in electromagnetic optics.

C. K. Fulton, formerly manager of radar programs at the General Electric, Heavy Military Electronics Department has joined the Anaren Microwave Corporation.

Dr. Vern Johnson has joined the University of Arizona as Associate Professor of Electrical Engineering, and Dr. John Reagan has joined the Department as an Assistant Professor.

Hugh Hair and Carl Gerst, formerly of the Syracuse University Research Corporation, have formed a new company for the production of Microwave Signal-Processing Components and Subsystems. The company, Anaren Microwave, Inc., will have 8000 sq. ft. of office and manufacturing space located at 478 E. Brighton Avenue, Syracuse, New York.



TECHNICAL NOTES

The Proceedings of the Cornell Conference on High Frequency Generation and Amplification held August 29, 30, 31, 1967, are now available. The Conference was held with the cooperation of MTT. They may be purchased at a special price of \$5 a copy for IEEE members and government employees, and \$6 for non-members. Please make checks payable to Cornell University and address orders to:

Professor Joseph L. Rosson
 School of Electrical Engineering
 224 Phillips Hall
 Cornell University
 Ithaca, N.Y. 14850

CALIBRATION SERVICE ANNOUNCED FOR NONREFLECTING WAVEGUIDE PORTS

The Radio Standards Laboratory (Boulder, Colorado) of the NBS Institute for Basic Standards (U.S. Department of Commerce), announces a calibration service for the evaluation of nonreflecting waveguide ports, including "matched loads." The frequency coverage of the service is continuous from 2.6 GHz to 18.0 GHz and includes six waveguide sizes: WR284, WR187, WR137, WR112, WR90, and WR62.



BOOK REVIEWS

Theoretical Physics: Application of Vectors, Matrices, Sensors and Quaternions, A. Kyrala - W. B. Saunders Co., West Washington Square, Philadelphia, Pa., 1967, 359 pages, \$9.00.

Rather than a theoretical physics text, this is an exposition on the mathematical methods of theoretical physics. The author's presentation is refreshingly concise rather than wordy; he deals with his subject and concludes with an illustrative example.

The emphasis is centered on vector and function space ideas and applications most useful in quantum and relativistic physics, in addition to the uses of variational calculus, Fourier analysis and Green's functions in classical physics. The author does not, in general, offer rigorous proofs, since he has tailored the text for the physicist and engineer rather than the mathematician. Toward this end, a heuristic style rather than an axiomatic one is used.

The book is broken down into ten chapters, eight of which are tutorial and the remaining two are primarily applications. The author covers vector algebra; formal strictures of vector space, such as groups, rings, fields, Hilbert spaces; Linear transformation of vectors, dyadic and tensor operation; integral equations; vectorial differentiation and integration; tensor analysis and curvilinear coordinates, metric, Riemann-Christoffel Ricci, and Einstein Tensors; four dimensional vector analysis, space-time and Minkowskian metric, Lorentz transformation, the paradoxes; quaternions, quaternion Maxwell equations and quaternion form of wave-particle dualism; applications of these techniques to quantum mechanics, use of Green's function; and a 50 page summary of classical mechanics, electro-magnetics and diffusion.

The author has attempted to include too much in just 359 pages. The book would have profited by a more extensive coverage of tensor analysis and quaternions. Notwithstanding these, Dr. Kyrala has done well with his subject matter. This book is highly recommended as a reference and review text.

N. Perner
Hughes Aircraft Co.
Canoga Park, Calif.



LETTERS TO THE EDITOR

--- The difficulty of reporting the activities of the Huntsville Chapter arises from the fact that some members of the group, including the Program Chairman, are in Nashville, Tennessee, which is over 100 miles away. The effort they expend in driving to the meetings, which are held in the evenings, is commendable.

We had the following two group meetings so far this season.

1. January 18, 1968. The speaker was Dr. K. R. Carver, Assistant Professor at the University of Kentucky. He talked about the Helicone Antenna. Eleven people attended the lecture.
2. February 29, 1968. Dr. Arthur Uhlir of Microwave Associates addressed eight members of the group when he talked about the Circuit Consequences of Device Mechanisms in Mixers and Multipliers.

You may think that the above attendance of 11 or 8 is a poor response of the Huntsville Chapter. On the contrary, it is more than 20% of the total membership.

We are looking forward to hearing Dr. Leo Young when he will talk about Microwave Filters on March 21, 1968 and also Dr. Mumford on April 25, 1968 talking about Microwave Radiation Hazards.

N. F. Audeh, Chairman
Huntsville Chapter

(Please note a similar "distance" problem experienced by the Connecticut Chapter, as reported by Ted Saad in the January 1968 Newsletter -- Editor.)

--- The Microwave Section of the Electronic Research Laboratories at Louvain University is presently missing several out-of-print issues of the Transactions on Microwave Theory and Techniques. I am therefore wondering whether it would be possible to insert the following request in the next PGMTT Newsletter:

WANTED : Old MTT Transactions

Vol 8, No.2	March 1960
Vol 8, No.4	July 1960
Vol 9, No.1	January 1961
Vol 9, No.2	March 1961
Vol 11, No.5	September 1963
Vol 12, No.1	January 1964
Vol 12, No.2	February 1964

Would any member who is willing to sell one or more of the above listed issues, communicate with Professor A. S. Vander Vorst, Electronic Research Laboratories, Louvain University, 94 Kardinaal Mercierlaan, Heverlee, Belgium, stating his price.

If you know of any other way for completing our collection, I would appreciate to have your suggestions.

Thank you for your assistance.

Prof. A. S. Vander Vorst



ANNOUNCEMENTS

MICROWAVE INTEGRATED CIRCUITS SEMINAR

WEDNESDAY, APRIL 10, 1968

SPONSORED BY
SAN FRANCISCO CHAPTER
IEEE
MICROWAVE THEORY &
TECHNIQUES
E. W. Matthews, Chmn.
(966-2410)
E. G. Cristal, Vice-Chmn.
(326-6200)

LOCATION
STANFORD LINEAR
ACCELERATOR AUDITORIUM
SAND HILL ROAD
PALO ALTO, CALIFORNIA
1:30 P.M. and 7:30 P.M.

The San Francisco G-MTT Chapter is sponsoring a one-day seminar on Microwave Integrated Circuits, to be held at the Stanford Linear Accelerator Auditorium on April 10, 1968. The program will feature four invited speakers for a full afternoon on this important new area in microwave technology, followed by an evening panel discussion session with the same four speakers, to provide adequate opportunity for audience feedback. Invitations have been extended to other MTT chapters in the west to participate in this seminar, to promote interchange of ideas and information on a more regular basis.

The various speakers and their topics will be as follows:

1. Roger Webster, Texas Instruments, Dallas, Texas:

Mr. Webster will discuss means for implementing microwave integrated circuits, as well as certain design implications and some specific realizations, such as encountered on the MERA program.

2. Kenneth F. Sodomsy, Bell Telephone Labs, Reading, Penna.:

Dr. Sodomsy will briefly review the technology employed at BTL in the fabrication of MIC's, and cover the present status of device technology. He will then describe circuit configurations used at BTL for mixers, amplifiers, control circuits, etc., and summarize current development work on MIC's.

3. Bernard Hershenov, RCA Labs, Princeton, N.J.:

Dr. Hershenov will review work at RCA on an integrated low-noise X-band receiver, and on integrated lumped-element thin-film 2-GHz amplifiers. Receiver components include circulators, TD amplifiers, balanced mixers, and frequency multipliers, while the 2-GHz amplifier incorporates small planar lumped L's and C's in both single and cascaded stages.

4. Gordon Harrison, Sperry Microwave, Clearwater, Florida:

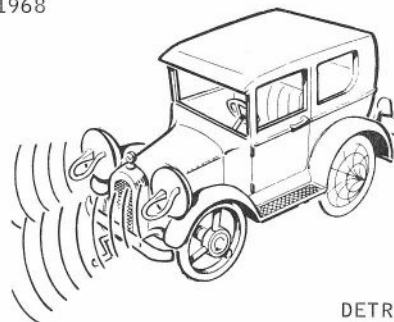
Dr. Harrison will describe the design and performance of hybrid MIC's utilizing both active and passive devices on dielectric and ferrite substrates. Circuits will include junction circulators, ferrimagnetic phasers, YIG filters, and mixers, all on ferrite substrates, as well as avalanche oscillators and passive devices in MIC form.

The evening panel discussion will include the speakers of the afternoon, as well as Dr. George Bodway of Hewlett-Packard, who is in charge of H-P's MIC work. Audience participation in this discussion is encouraged, and projection facilities will be available to allow presentation of a reasonable number of slides from the audience, hopefully representing latest accomplishments in the MIC field at laboratories other than those represented on the panel.

'68 G-MTT

INTERNATIONAL MICROWAVE SYMPOSIUM

MAY 20-22, 1968



DETROIT, MICHIGAN

CONDENSED PROGRAM

SUNDAY, MAY 19

7:00-10:00 REGISTRATION: Mezzanine
7:00-10:00 DUTCH TREAT GET-TOGETHER: Boulevard Rooms

MONDAY, MAY 20

7:30-4:00 REGISTRATION: Mezzanine
8:45-9:00 WELCOMING REMARKS
9:00-11:50 SESSION I: Microwave Networks
12:15-1:45 LUNCHEON: New Center Ballroom
2:00-5:10 SESSION II: Solid-State Microwave Power Generation
8:00-10:00 INFORMAL EVENING SESSIONS: New Center Ballroom and Boulevard Rooms

TUESDAY, MAY 21

8:00-4:00 REGISTRATION: Mezzanine
9:00-12:00 SESSION III: Microwave Integrated Circuits
2:00-5:10 SESSION IV: Solid-State Devices
6:00-7:00 COCKTAIL PARTY: Boulevard Rooms
7:00-10:00 BANQUET: Ballroom

WEDNESDAY, MAY 22

8:00-12:00 REGISTRATION: Mezzanine
8:40-12:10 SESSION V: Ferrite Components
1:30-4:30 SESSION VI: Microwave Acoustics and Millimeter- and Optical-Wave Components

Item	Postmarked Before May 6	After May 6
Registration, IEEE Member	\$10.00	\$12.00
Registration, IEEE Non-member	\$15.00	\$17.00
Registration, Student	\$ 3.00	\$ 4.00
Luncheon	\$ 4.00	\$ 4.50
Cocktail Party	\$ 2.50	\$ 3.00
Banquet	\$ 9.00	\$10.00
Symposium Digest	\$ 4.00	\$ 4.00

Technical Program

Introductory Session: 8:45 - 9:00, Monday, May 20

Welcoming Remarks

J. E. Rowe, Co-Chairman, Steering Committee,

1968 G-MTT International Microwave Symposium

R. E. Henning, Chairman, G-MTT Administrative Committee

SESSION 1: 9:00 - 11:50, Monday, May 20MICROWAVE NETWORKS

Chairman: R. J. Wenzel

Bendix Research Laboratories

Southfield, Michigan

1-1 NON-MINIMUM PHASE MICROWAVE FILTERS,

T. Fjällbrant, Telefonaktiebolaget LM

Ericsson, Sweden.

1-2 MULTI-OCTAVE BANDWIDTH MICROWAVE MIXER
CIRCUITS,

R. C. Van Wagoner, Radiation Systems, Inc.,

McLean, Virginia

1-3 A WIDEBAND STRIPLINE MATCHED POWER DIVIDER

P. C. Goodman, Bendix Research Laboratories,

Southfield, Michigan.

1-4 THE CALCULATION OF TEM-, TE-, AND TM-WAVES IN
SHIELDED STRIP TRANSMISSION LINES,

W. Baier, Institute for High Frequency

Techniques, Technical University, Munich, Germany.

1-5 ANALYSIS AND SYNTHESIS OF WAVEGUIDE MULTI-
APERTURE DIRECTIONAL COUPLERS,

R. Levy, Microwave Development Laboratories,

Needham Heights, Massachusetts.

1-6 AN INVESTIGATION OF SHARP DISCONTINUITIES IN
RECTANGULAR WAVEGUIDES BY RAY THEORY.

M. A. K. Hamid, Department of Electrical Engineering,

University of Manitoba, Winnipeg, Canada.

1-7 A NEW FINITE-DIFFERENCE TECHNIQUE FOR HIGHER-
ORDER MODES IN ARBITRARILY SHAPED WAVEGUIDES,

M. J. Beaubien and A. Wexler, University of Manitoba,

Winnipeg, Canada.

LUNCHEON: 12:15 - 1:45, Monday, May 20 - New Center Ballroom

Master of Ceremonies: R. C. Hansen, K M S Industries

Speaker: J. E. Rowe, The University of Michigan

Topic: "A Technical and Educational Tour of the Soviet Union"

SESSION 2: 2:00 - 5:10, Monday, May 20SOLID-STATE MICROWAVE POWER GENERATION

Chairman: B. C. DeLoach, Jr.

Bell Telephone Laboratories

Murray Hill, New Jersey

2-1 MULTIPLE AVALANCHE, GUNN AND LSA DIODES FOR
HIGH-POWER GENERATION,

M. E. Hines, Microwave Associates,

Burlington, Massachusetts. (Invited.)

2-2 POWER AND EFFICIENCY IN AVALANCHE-DIODE
OSCILLATORS,W. J. Evans and G. I. Haddad, The University of
Michigan, Ann Arbor, Michigan.2-3 CIRCUIT TECHNIQUES FOR THE NOISE REDUCTION
AND FREQUENCY STABILIZATION OF AVALANCHE
DIODE OSCILLATORS,

E. F. Scherer, Sylvania Electric Products,

Woburn, Massachusetts.

2-4 MICROWAVE INTEGRATED IMPATT DIODE-DIPOLE
RADIATOR,

H. W. Cooper, C. Moskowitz, M. R. Natale,

T. Andrews, Westinghouse Electric Corp., Baltimore,
Maryland.

2-5 GUNN OSCILLATOR AS A FREQUENCY MEMORY DEVICE,

J. Magarshack, La Radiotechnique-Coprim,

R. T. C., Suresnes, France.

2-6 ULTRA-HIGH-SPEED DIODE SWITCH FOR THE 50-GHZ
BAND UTILIZING AVALANCHE BREAKDOWN OF
VARACTOR DIODES,

S. Sugimoto, Central Research Laboratories, Nippon

Electric Company, Kawasaki, Japan.

2-7 FEEDBACK STABILIZATION AND NOISE REDUCTION IN
SOLID-STATE MULTIPLIER CHAINS,

C. L. Cuccia and A. Savarin, Philco-Ford Corp.,

Palo Alto, California.

INFORMAL PARALLEL EVENING SESSIONS: 8:00 - 10:00, Monday,
May 20 - Howard Johnson's New Center Motor Lodge.I COMPUTER-AIDED DESIGN OF MICROWAVE NETWORKS
New Center Ballroom

Organizer: W. J. Getsinger, Lincoln Laboratory,

Massachusetts Institute of Technology, Lexington,

Massachusetts 02173 (617) 862-5500.

II SOLID-STATE CONTROL DEVICES

New Center Boulevard Rooms

Organizer: D. K. Adams, Stanford Research Institute,

Menlo Park, California 94025 (415) 326-6200.

Notice: Individuals interested in participating in these sessions are en-
couraged to contact the respective organizer.SESSION 3: 9:00 - 12:20, Tuesday, May 21MICROWAVE INTEGRATED CIRCUITS

Chairman: F. A. Brand

USAEOM, Fort Monmouth, New Jersey

3-1 RECENT ADVANCES IN MICROWAVE INTEGRATED
CIRCUITS,

R. Webster, Texas Instruments, Dallas, Texas. (Invited.)

3-2 SLOT LINE - AN ALTERNATIVE TRANSMISSION
MEDIUM FOR INTEGRATED CIRCUITS,

S. B. Cohn, Consultant, Tarzana, California

3-3 FREQUENCY-DEPENDENT BEHAVIOR OF MICROSTRIP,

C. P. Hartwig, D. Massé, and R. A. Pucel,

Raytheon Company, Research Division, Waltham,

Massachusetts.

3-4 NORMAL MODE IMPEDANCES OF A COUPLED PAIR
OF MICROSTRIP TRANSMISSION LINES,

R. G. Bryant, Department of Electrical Engineering,

University of Maine, Orono, Maine; J. A. Weiss,

Department of Physics, Worcester Polytechnic Institute,
Worcester, Massachusetts.3-5 ANALYSIS AND EXPERIMENTAL EVALUATION OF DIS-
TRIBUTED OVERLAY STRUCTURES IN MICROWAVE
INTEGRATED CIRCUITS,

K. Wolters and P. Clar, Motorola, Inc., Scottsdale,

Arizona.

3-6 X-BAND INTEGRATED CIRCUIT MIXER WITH RE-
ACTIVELY TERMINATED IMAGE,

K. M. Johnson, Texas Instruments, Inc., Dallas, Texas.

3-7 AN INTEGRATED MICROWAVE FM DISCRIMINATOR,
M. D. Bonfeld, Bell Telephone Laboratories, Allentown,

- Pennsylvania; M. J. Bonomi and E. G. Jaasma, Bell Telephone Laboratories, Holmdel, New Jersey.
- 3-8 X-BAND INTEGRATED DIODE PHASE SHIFTERS, R. G. Stewart and M. N. Giuliano, Westinghouse Electric Corp., Baltimore, Maryland.

SESSION 4: 2:00 - 5:10, Tuesday, May 21

SOLID-STATE DEVICES

Chairman: S. Okwit

- 4-1 Airborne Instruments Laboratory, Deer Park, New York.
- S-BAND INTEGRATED PARAMETRIC AMPLIFIER HAVING BOTH FLAT GAIN AND LINEAR PHASE RESPONSE, H. C. Okean and H. Weingart, Airborne Instruments Laboratory, Deer Park, New York.
- 4-2 A Ka-BAND PARAMP USING PLANAR VARACTORS YIELDS A NOISE FIGURE OF LESS THAN 3 DB, L. E. Dickens, Advanced Technology Corp., Timonium, Maryland.
- 4-3 A TECHNIQUE FOR THE RAPID CALCULATION OF DISTORTION EFFECTS IN VARACTOR PARAMETRIC AMPLIFIERS, D. R. Chambers and D. K. Adams, Stanford Research Institute, Menlo Park, California.
- 4-4 AN EVALUATION OF POINT-CONTACT TUNNEL DIODES AS MICROWAVE CIRCUIT ELEMENTS, R. J. Taylor and C. R. Westgate, Department of Electrical Engineering, The Johns Hopkins University, Baltimore, Maryland.
- 4-5 THE TRANSISTOR, A MICROWAVE FILTER ELEMENT, D. K. Adams and R. Y. Ho, Stanford Research Institute, Menlo Park, California.
- 4-6 A BULK EFFECT SEMICONDUCTOR PHASE SHIFTER, J. F. White, Rensselaer Polytechnic Institute, Troy, New York.
- 4-7 MICROWAVE PHASE MODULATION USING FREQUENCY MULTIPLIERS, A. Marković, B. Schiek, and H. G. Unger, Institute für Hochfrequenztechnik, Braunschweig, Germany.
- 4-8 OPERATIONAL S-BAND TRAVELING-WAVE MASER SYSTEM IN A 15° K CLOSED-CYCLE REFRIGERATOR, J. Wolczok and J. G. Smith, Airborne Instruments Laboratory, Deer Park, New York.

COCKTAIL HOUR: 6:00 - 7:00, Tuesday, May 21

Howard Johnson's New Center Motor Lodge, Boulevard Rooms

SYMPOSIUM BANQUET: 7:00 - 10:00, Howard Johnson's New Center Motor Lodge Ballroom

Master of Ceremonies: Bill Bazy, Horizon House, Inc.

1967 IEEE G-MTT Microwave Prize

Robert J. Wenzel, Bendix Research Laboratories

BANQUET SPEAKER

Dr. W. A. Geoffrey Voss, University of Alberta and Chairman of the Board and Executive Vice President, International Microwave Power Institute (IMPI).

SESSION 5: 8:40 - 12:10, Wednesday, May 22

FERRITE COMPONENTS

Chairman: J. E. Pippin

Scientific Atlanta, Atlanta, Georgia.

- 5-1 PROPAGATION IN LONGITUDINALLY-MAGNETIZED FERRITE LOADED WAVEGUIDE, D. C. Buck, Westinghouse Electric Corp., Baltimore, Maryland.

- 5-2 AN IMPROVED E-PLANE WAVEGUIDE CIRCULATOR, M. Omori, Bell Telephone Laboratories, Allentown, Pennsylvania.
- 5-3 THE USE OF COMPOSITE JUNCTIONS IN THE DESIGN OF HIGH-POWER STRIPLINE CIRCULATORS, C. R. Buffler and J. Hellszajn, Microwave Associates, Burlington, Massachusetts.
- 5-4 RECENT ADVANCES IN MICROSTRIP CIRCULATORS, V. E. Dunn and A. J. Domenico, Melabs, Palo Alto, California.
- 5-5 A DESIGN THEORY FOR REGGIA-SPENCER RECIPROCAL FERRITE PHASE SHIFTERS, W. E. Hord, Emerson Electric Company, F. J. Rosenbaum, Electrical Engineering Dept., Washington University, St. Louis, Missouri; C. R. Boyd, Department of Electrical Engineering, University of California, Los Angeles, California.
- 5-6 A KU-BAND LATCHING, RECIPROCAL FERRITE PHASE SHIFTER, C. R. Boyd, Department of Electrical Engineering, University of California, Los Angeles, California.
- 5-7 A 500-KW X-BAND AIR-COOLED FERRITE LATCHING SWITCH, J. P. Agrios and R. A. Stern, Electronic Components Laboratory, USAECOM, Fort Monmouth, New Jersey.
- 5-8 A WAVEGUIDE RECIPROCAL LATCHING FERRITE PHASE SHIFTER, I. Bardash and J. J. Maune, Sedco Systems, Farmingdale, New York.
- 5-9 MAGNETICALLY-TUNABLE MICROSTRIP FILTER STRUCTURES, R. R. Jones and J. Cunningham, Western Microwave Laboratories, Santa Clara, California.

SESSION 6: 1:30 - 4:30, Wednesday, May 22

MICROWAVE ACOUSTICS AND MILLIMETER- AND OPTICAL-WAVE COMPONENTS

Chairman: L. Young

Stanford Research Institute, Menlo Park, California

- 6-1 ULTRASONIC WAVEGUIDE SYSTEMS FOR SURFACE WAVES, D. L. White, Bell Telephone Laboratories, Murray Hill, New Jersey. (Invited.)
- 6-2 STATE OF THE ART IN MICROWAVE ACOUSTIC DELAY DEVICES, W. A. Crofut, Anderson Laboratories, Bloomfield, Connecticut. (Invited.)
- 6-3 PERFORMANCE OF ULTRA-BANDWIDTH YIG PULSE COMPRESSION NETWORKS, W. L. Bongiovanni and J. Burnsweig, Hughes Aircraft Company, Culver City, California; J. H. Polson, TRW, Redondo Beach, California.
- 6-4 BIREFRINGENT FILTER FOR MILLIMETER WAVES, B. M. Schiffman and L. Young, Stanford Research Institute, Menlo Park, California.
- 6-5 LOW-PASS, QUASI-OPTICAL FILTERS FOR OVER-SIZED OR FOCUSED-BEAM WAVEGUIDE APPLICATIONS, G. L. Matthaei and D. A. Leedom, Department of Electrical Engineering, University of California, Santa Barbara, California.

- 6-6 PLANE WAVEGUIDE MODE EFFECTS IN THE VISIBLE SPECTRUM,
R. Shubert and J. H. Harris, Department of Electrical Engineering, University of Washington, Seattle, Washington.
- 6-7 DIELECTRIC WAVEGUIDES FOR INFRARED WAVE LENGTHS,
D. B. Anderson and C. B. Shaw, Autonetics, Anaheim, California.

GENERAL INFORMATION

SYMPOSIUM DIGEST

The summaries of all papers presented will be published in the symposium digest. This will be presented to you upon formal registration at the symposium. Additional copies can be purchased for \$4.00 per copy. You can insure the availability of extra copies by so indicating on the enclosed advance registration form. For those who may not be able to attend the symposium, digest copies can still be purchased by use of the advance registration form. Please allow several weeks for mailing.

REGISTRATION

You may register on the mezzanine at the Howard Johnson's New Center Motor Lodge on Sunday, May 19, from 7-10 p.m. and during the day on Monday through Wednesday. Advance registration can be made with a total saving of \$4.00 if remittance is included and postmarked before May 6.

HOTEL ARRANGEMENTS

Howard Johnson's New Center Motor Lodge, site of the symposium, is reserving 225 rooms for registrants. Howard Johnson's will also confirm 75 rooms at the Harlan House Motel one-half block away, and 150 rooms at Howard Johnson's Downtown Motor Lodge 2-1/2 miles distant (free bus transportation will be provided morning and night between the downtown and the New Center sites.) Hotel reservations will be assigned on a first come-first serve basis in the order listed above. Please acknowledge if you are a government or university affiliate.

Other hotels and motels in the New Center area, for which reservations can be made on an individual basis, are listed below in the order of proximity to the symposium hotel:

	(Area Code 313)
St. Regis Hotel, 3071 W. Grand Blvd.	873-3000
Town Motel, 2127 W. Grand Blvd.	898-6353
Pallister Motel, 7641 Woodward Ave.	873-6300
Diplomat Motel, 5801 Woodward Ave	873-8500
Park Shelton Motel, 15 E. Kirby	875-9500

Early registration and "doubling-up" on rooms is encouraged to insure accommodations for all attendees in close proximity to the symposium site.

MEETING ROOM

Symposium papers will be presented at the Studio New Center Motor Lodge. This comfortable air-conditioned facility offers modern auditorium seating with excellent visual and acoustical conditions. Coffee will be available in the New Center Ballroom where technical acquaintances may be renewed.

MEALS

Several of the finest Detroit restaurants are within easy walking distance in the New Center area. In addition to Howard Johnson's restaurant and cocktail facilities, these include Topinkas, Act IV Supper Club, and the Mauna Loa. Many more good restaurants may be found nearby in downtown Detroit.

ENTERTAINMENT

The New Center Boulevard section of Detroit is an elite "city within a city." Here are found "Fifth Avenue" shops such as Julies,

Milgrims, and Saks. Also located within a block is the famed Fisher Theater, known by all theater-goers for its pre-Broadway productions and as the most modern and well-appointed theater in the country. For those who prefer the gayer night life, there is downtown Detroit with its many theaters, fashionable restaurants, and supper clubs. There is Ford Auditorium, home of the Detroit Symphony, and Cobo Hall, the largest modern metropolitan convention center. For the sports-minded, the Detroit Tigers will be starting another first division season. Across the Detroit River from downtown is the City of Windsor, Ontario. A five-minute ride through the tunnel or over the bridge and you're in another country where you may dine and be entertained by top stars at the famous Elmwood Casino night club.

TRANSPORTATION

Detroit Metropolitan airport is located 20 miles west of downtown Detroit on I-94. Taxi and car rental service are available at the airport. Bus service to the Downtown Howard Johnson's Motor Lodge is available at all hours and direct limousine service to Howard Johnson's New Center Motor Lodge is available until 8:00 PM. Shuttle service will be provided from the Downtown Howard Johnson's Motor Lodge to the New Center area each day.

If you're driving to Detroit, you'll find easy access to the New Center area via I-94 or I-696.

LADIES PROGRAM

An interesting and varied program has been planned for wives of the symposium attendees. Visits to well-known landmarks in Detroit and two luncheons are included in the plans.

On Sunday evening, you are welcome at the Dutch Treat get-together at the Howard Johnson's New Center Motor Lodge. At 10:00 Monday morning, you can meet at the Motor Lodge for a Welcoming Coffee and register for the various activities described below.

A chartered bus leaves the Lodge at 12:15 Monday to take you to the world's largest manufacturing complex, the River Rouge Plant of the Ford Motor Company. A fascinating tour of the final assembly line and the steel operations of this dynamic industrial giant will give you an appreciation of the role the automotive industry plays in the social and economic well-being of our nation. You'll be back at the Lodge by 4:00 PM.

On Tuesday morning your bus leaves the Lodge at 9:15 to take you to the famed Greenfield Village. The Village, established by the late Henry Ford about 40 years ago, preserves nearly 100 historic American buildings, including birthplaces of such people as Noah Webster, Henry Ford, and Robert Frost, old shops where craftsmen still practice such trades as glassblowing, rug weaving, and candle-making, and notable public buildings such as the Logan County Courthouse where the lawyer, Abraham Lincoln practiced. The buildings contain furniture and other artifacts associated with the former occupants. You will have lunch in the Village at the Clinton Inn, which in mid-19th Century was the first stop on the stagecoach route between Detroit and Chicago. You'll be back at the Lodge by 3:15, in plenty of time to join your husband for the Cocktail Party and Banquet in the evening.

Wednesday's activities include a morning tour of the Detroit Institute of Arts and a Dutch Treat luncheon at the Engineering Society of Detroit.

IEEE REGISTRATION FORM			
1968 G-MTT INTERNATIONAL MICROWAVE SYMPOSIUM MAY 20-22			
NAME _____			
ORGANIZATION _____			
BUSINESS/HOME ADDRESS _____			
CITY AND STATE _____		ZIP _____	
		Postmarked Before May 6	After May 6
Registration, IEEE Member	<input type="checkbox"/>	\$10.00	<input type="checkbox"/> \$12.00
Registration, Non-Member	<input type="checkbox"/>	\$15.00	<input type="checkbox"/> \$17.00
Registration, Student Member	<input type="checkbox"/>	\$ 3.00	<input type="checkbox"/> \$ 4.00
Luncheon, Mon. (Number _____)	<input type="checkbox"/>	\$ 4.00	<input type="checkbox"/> \$ 4.50
Cocktail party, Tues. (Number _____)	<input type="checkbox"/>	\$ 2.50	<input type="checkbox"/> \$ 3.00
Banquet, Tues. (Number _____)	<input type="checkbox"/>	\$ 9.00	<input type="checkbox"/> \$10.00
Extra Copies of Digest (Number _____)	<input type="checkbox"/>	\$ 4.00	<input type="checkbox"/> \$ 4.00
Ladies Coffee and Registration (Mon. AM)	<input type="checkbox"/>	No Charge	
Ladies Tour - Ford Rouge Plant (Mon. PM)	<input type="checkbox"/>	No Charge	
Ladies Tour and Luncheon - Greenfield Village (Tues.)	<input type="checkbox"/>	\$ 5.25	
Ladies Tour - Detroit Institute of Arts (Wed. AM)	<input type="checkbox"/>	No Charge	
Ladies Luncheon - Eng. Soc. of Det. (Wed. Noon)	<input type="checkbox"/>	Dutch Treat	
TOTAL REMITTANCE \$ _____			
Make all checks payable to 1968 G-MTT Int. Symposium and return to: F. W. Chapman, 1367 Villa Road, Birmingham, Michigan 48008. Return room reservations separately.			

MICROWAVE EXPOSITION / 68

The 1968 MICROWAVE EXPOSITION, designed for you and your associates, will be held at the San Francisco Hilton Hotel, O'Farrell and Mason Streets, San Francisco.

The hours of the Show and Conference will be:

Tuesday, June 4 - Noon to 6 PM

Wednesday, June 5 - Noon to 8 PM

Thursday, June 6 - Noon to 6 PM

The editors of MICROWAVES magazine have planned a program of exceptionally fine technical sessions, covering a range of subjects. A copy of the complete program will be mailed to you well in advance of the event.

The 1968 MICROWAVE EXPOSITION will concentrate only on the microwave and upper frequencies, and has a threefold purpose:

1. To offer you, the visitor, a background of broadbased experience on specific problems and how they are being solved around the country.
2. To provide you with an opportunity to discuss your particular specialty with counterparts from companies scattered from coast to coast.
3. To enable you to gather new ideas and information on what is happening in your industry throughout the world.

1968 IEEE International Antennas and Propagation Symposium September 9-11, 1968	United States National Committee 1968 Fall URSI Meeting September 10 - 12, 1968
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Northeastern University
Boston, Massachusetts

CALL FOR PAPERS

The 1968 Fall Meeting sponsored by the U. S. National Committee

of URSI, September 10-12, 1968, will be held in conjunction with the 1968 IEEE International Antennas and Propagation Symposium, September 9-11, 1968, at Northeastern University, Boston, Massachusetts. URSI and IEEE G-AP technical programs will be separately arranged except for appropriate coordination. Papers are solicited in all theoretical, experimental and development fields of interest to the following URSI Commissions:

1. Radio Measurement Methods and Standards
2. Radio Propagation in Non-Ionized Media
3. Ionospheric Radio
4. Magnetospheric Radio
5. Radio and Radar Astronomy
6. Radio Waves and Transmission of information.
7. Radio Electronics

G-AP under the following topics:

1. Antennas
2. Electromagnetic Theory
3. Radio Wave Propagation
4. Scattering and Diffraction
5. Radar Astronomy
6. Radio Astronomy
7. Plasma Physics
8. Radio Physics

Authors are invited to submit, in duplicate, 200 word abstracts of papers for presentation at URSI sessions or 400 to 600 word summaries of papers for presentation at G-AP sessions to: Mr. Leon J. Ricardi, MIT, Lincoln Laboratory, P. O. Box 73, Lexington, Massachusetts 02173. Deadline for receipt of URSI abstracts is June 21, 1968. Deadline for receipt of G-AP summaries is June 1, 1968.

Summaries only of accepted papers will be printed in the symposium digest. An author will therefore retain the right to submit his complete paper to a journal of his choice (such as the IEEE Transactions) for formal publication. The original and two copies of a summary should be submitted in final format, according to the following requirements, to permit direct processing for printing.

The text should be typed with elite type, single spaced on white 8-1/2 x 11" paper. The title should be centered in capital letters one inch from the top of the first page. The authors and complete organization affiliation should be two lines below the title and the text should start four lines below this. Left and right-hand margins should be 1-1/2 inches. A one-inch margin should be left at the top and bottom of all pages.

Additional Instructions for G-AP Authors - A maximum of six illustrations is acceptable. Line illustrations should be prepared with the same margins as the text; photographs should be glossy prints of convenient size. Use a double space between paragraphs. No exceptions, please!

For further information regarding this meeting please contact Mr. P. C. Fritsch, MITRE Corporation, Bedford, Massachusetts 01730.

NBS MICROWAVE CALIBRATION WORKSHOP BOULDER MAY 6-10 1968

Brief Description:

This workshop will cover the quantities measured in the NBS microwave calibration services. These include:

- low-value, CW, power,
- reflection coefficient magnitude
- attenuation
- effective noise temperature
- frequency resonance (of cavity wave-meters)

Oral presentations will include a discussion of the techniques used at NBS and the error analysis upon which the calibrations are based. Extensive measurement theory will not be treated except as a necessary conceptual aid.

Demonstrations will constitute a substantial portion of the program. Various microwave calibration systems from 1.7 GHz (WR 430 waveguide) to 40 GHz (WR 28 waveguide) will be used including coaxial power measurements from 4.0 to 17.0 GHz.

Practical hints for solving some of the common microwave measurement problems will be given.

Notice:

Attendance probably will be limited to approximately 50 people. Applicants will be accepted on a "first come, first served" basis.

For Whom:

The workshop is aimed at the "Practicing meteorologist". This is intended to include the more-experienced operating technical calibration people and first-line supervisory calibration people. Some of the higher-level supervisory engineers in calibration laboratories also may find benefit from the workshop.

Arrangements:

The fee is \$300. A check, billing authority, or purchase order for this amount should accompany the application. Payment in cash is not acceptable. Checks should be made payable to the National Bureau of Standards. We have established a refund deadline of April 26, 1968, and no monies will be deposited until that date.

Information describing hotel and motel accommodations will accompany the letters of acceptance sent to participants.

For further information call or write:

Roy E. Larson, Chief of
Microwave Calibration Services
National Bureau of Standards
Boulder, Colorado 80302
Phone: 303-447-1000, X3821

A 2-1/2 WEEK COURSE IN ELECTROMAGNETIC PROPAGATION UNIVERSITY OF COLORADO, BOULDER, COLORADO JUNE 17-JULY 3, 1968

Course Description:

The objectives of this course are to provide a concentrated study of recent advances in electromagnetic propagation research and in the application of theory to the design and development of communication systems. It is intended primarily for persons presently engaged in some phase of electromagnetic propagation rather than for the full-time student; therefore no academic credit is being offered.

This course is one of a series of short courses offered jointly by the University of Colorado and ESSA. The series, now called the Electromagnetic Science Series, started in 1961 with a three-week course on Radio Propagation. The course was repeated in somewhat modified form in 1962 and again with the title changed to Electromagnetic Propagation in 1965. The series has also included other courses such as the four-week course on Advanced Electromagnetic Theory in the summer of 1967 and a two-week course on Optical Propagation presently being planned for July 8-19, 1968. A course in Electromagnetic Spectrum Utilization is also in the preliminary planning stage.

The following is an outline of the scope of the course:

1. Properties of media of propagation
2. Statistical aspects of propagation and propagation in random media

3. Electromagnetic spectrum utilization
4. Modulation and channel characterization
5. Ground wave propagation
6. Electromagnetic Propagation - 1Hz. to 200 KHz.
7. Electromagnetic Propagation - 200 KHz to 2 MHz.
8. Electromagnetic Propagation - 2MHz. to 100 MHz.
9. Electromagnetic Propagation - 30 MHz. to 40 GHz.
10. Electromagnetic Propagation - 40 GHz. up to and including optical frequencies.
11. Propagation over earth-space communication links
12. Antenna systems, receiving systems, signal detection, and processing theory

The plans are for approximately 56 one-hour lectures to be given by 30 specialists on the various topics. The lecturers will be selected from the staff of the Environmental Science Services Administration (part of which was formerly the Central Radio Propagation Laboratory of the National Bureau of Standards in Boulder, Colorado) and from the University of Colorado, as well as from other research organizations and universities.

Attendees will be supplied before each lecture with a set of notes pertaining to that lecture.

Preparatory Course:

In addition to the 2-1/2 week course in Electromagnetic Propagation described above, a two-week preparatory course will be made available to persons in need of a review of the fundamentals of electromagnetic propagation. This course will be held June 3-14, 1968. It will consist of several series of lectures on electromagnetic theory, random processes, and physics of the atmosphere and the ionosphere by faculty members of the Department of Electrical Engineering of the University of Colorado.

Tuition

Tuition for the two-week preparatory course in Electromagnetic Propagation is \$200. For the 2-1/2 week course in Electromagnetic Propagation, the fee is \$300. Tuition for both courses is \$400.

It is normally expected that the tuition will be paid in full before the course begins, but other arrangements can be made on request.

Registration

Registration will be limited, so early application should be made to ensure consideration. Further details of the course and registration forms can be obtained from:

Professor S. W. Maley
Department of Electrical Engineering
University of Colorado
Boulder, Colorado 80302

PCM TELEMETRY SYSTEMS PURDUE UNIVERSITY MAY 27-JUNE 1, 1968

For engineers, scientists and applied mathematicians who wish to become familiar with both the theoretical and engineering state-of-the-art of telemetry systems for transmitting analog and digital data over noisy digital channels, the faculty of Purdue University School of Electrical Engineering is offering a new intensive short course, "PCM Telemetry Systems" at Lafayette, Indiana, May 27 - June 1, 1968.

Advance registration is required. The fee is \$200 which includes text materials. For information and registration contact Conference Division, 116 Memorial Center, Purdue University, Lafayette, Indiana 47907.

CHAPTER NEWSLETTER REPORTERS

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