

EDITOR: Alvin Clavin, Hughes Aircraft Company, Canoga Park, California • Number 49 • January 1968



EDITORS NOTES

Starting with this issue I have been asked to assume the responsibility of Newsletter Editor.

I start this new venture with some apprehension.

Not just the apprehension one normally feels with the beginning of a new task, but knowing that I will be following the steps of Gustav Shapiro.

Few people may realize that Gus has been editor for over a decade. Through the years he has modified and improved the newsletter making it more entertaining and easy to read. His ideas have taken hold in other IEEE Group Newsletters and have resulted in an overall elevation of quality.

I am sure I speak for all of GMTT when I say "Many Thanks" Gus for a job well done.

In starting a new job one always tries to define what it is the job requires. For example, what does the newsletter try to accomplish? To whom does it address itself? For whom does it speak, and why does it exist? I did not suspect that these were very original questions, so I sought the answers in the AD-Com Committee Reports. As expected, there exists a 1965 Ad-Hoc committee report establishing the aims of the newsletter to be as follows:

1. Provide a means of communication between the Ad-Com and the membership.
2. Provide a means of communications between members.
3. Microwave news.

The report also points out the fact that the Trans-actions are not intended to carry news items.

In considering the above I have formulated the following plan.

1. I intend to ask each active member of Ad Com to write an article describing his committee and discussing his viewpoints. In time all aspects of Ad-Com will be covered. As usual we will continue to publish the minutes of the Ad-Com meetings; this will be edited by Dr. Leo Young, Ad-Com Vice Chairman.
2. Individual members of MTT will be contacted to write newsletter articles. These will concern their viewpoints on MTT activities, relationships, or other microwave personalities.
3. The Chapter Chairmen have been asked to appoint a newsletter correspondent to expedite news.
4. Ted Saad, Chapter Activities Chairman will write a regular column regarding chapter happenings, problems and cures, and relationship to Ad-Com.

Everyone is invited to contribute to the newsletter.

Write your "Letter to the Editor". I will gladly publish them if it is of interest to the MTT.

Address letters to:

A. Clavin, 265/P35
Hughes Aircraft Company
Canoga Park, California 91304

The newsletter is your publication, be active, take part, contribute.



CHAIRMAN'S VIEWPOINT

By

Rudy Henning

Through this column I would like to introduce myself as your 1968 MTT Administrative Committee (Ad Com) Chairman. Some of you may wonder what I am chairman of -- what is Ad Com? -- what really is MTT? MTT Ad Com is the committee which directs the IEEE Microwave Theory and Techniques Group. This Group does more than just help get the MTT Transactions for \$5.00 per year (though this is one of its important functions.) Our constitution spells out the Group's objectives as "scientific, literary, and education," and requires that it strives for the advancement of the theory and practice of electronics, allied branches of engineering, and of the allied arts and sciences, and the maintenance of high professional standards among its members with special attention to such aims within the field of interest The Group shall accomplish this by " promoting close cooperation and exchange of technical information and shall hold meetings for the presentation of papers and their discussion, and through its committees shall study and provide for the needs of its members."

The MTT therefore is charged with the responsibility of providing you with services which will help you make technical advances which will help you achieve a high professional standard -- objectives which, I am sure, must coincide with your personal goals. Why is it then that most members get the MTT Transactions and that's all? Is it that many of you don't know what other activities MTT is carrying out? Or is it because to make use of and personally benefit from them, each member has to devote some of his own time???

Be that as it may, MTT Ad Com has two means available to provide you with tools (which you have to pick up and use) to advance our technology and your own professional competence: the written word and the spoken word -- publications and meetings.

The written word The most important written words issued by MTT are in the Transactions on Microwave Theory and Techniques which, in calendar 1967, will give you 836 pages of latest technical information. In addition to this effort MTT publishes an annual Digest in connection with the G-MTT Symposium, and this Newsletter. Finally, MTT is actively represented on the Board of the Journal of Quantum Electronics. You, as members, are urged to make thorough use of these publications, both to publish your own technical advances, and to read about the discoveries and advances your associates are making.

And the spoken word As great as the wealth of information may be which you can obtain from our publications, it is exceeded manifold by the hundreds of papers presented on Microwave Theory and Techniques each year. The two most important media used here are the local chapters and the annual IEEE G-MTT International Symposium. Subject matter extends from tutorial-type material presented by foremost microwave authorities to the very latest research results and findings. It takes more initiative to go to a meeting than to read one of the MTT publications in your living room. But hearing the latest, asking questions, informally exchanging professional experiences or debating theories and approaches -- all those can be tremendous stimulants and catalysts to your creativeness and professional excellence. Just ask a few of your associates who take advantage of these opportunities. Why not resolve right now to do a little more in 1968 to advance your professional stature. Make definite plans to attend chapter meetings, submit a paper on the original aspects of your work, and get to know your professional associates and their work. Such active participation will definitely be of benefit to you. It may also encourage some of your inactive associates to "do something about becoming more active." You can start the positive chain reaction!

Of course, the annual IEEE G-MTT International Symposium and Chapter meetings aren't the only "spoken

York. The requirement in Section I, Item 3, that the annual meeting should be held "during the International Convention of the IEEE, or within 30 days of that convention" would be replaced by "during the month of September".

New Technical Activities

Donald Dunn, a member of the board of governors of the International Microwave Power Institute, explained that IMPI publishes a quarterly journal, with emphasis on industrial microwave systems, and that there is not too much overlap with MTT. At the March 1966 IMPI Conference, about one third of the registrants were microwave engineers. He is willing to help obtain a speaker to give a survey paper describing circuits and installations, for example at an MTT Symposium. A survey paper is now being prepared by Dr. Okress for the MTT Transactions. Applications of microwave power including drying inks in the color printing industry and drying glues in furniture and paper boxes. The field is "active" but not "explosive". Bill Mumford and Saul Rosenthal offered Don Dunn the use of the MTT mailing list by IMPI. (We furnish the mailing list, they pay for the mailing.) Don Dunn said he would find out if the board wishes this cooperation from MTT. The possibility of a Symposium session on "high power" was suggested by Saul Rosenthal. Leo Young suggested it might be made into a session on "industrial applications." Possible technical committees on microwave high power, industrial applications of microwaves, and on radiation hazards were also suggested.

Pay of Russian Microwave Engineers

As a matter of interest, Saul Rosenthal mentioned that Russian microwave engineers get relatively more pay and work fewer hours, than U.S. microwave engineers, because their official danger level is set lower than ours.

1968 PIB Symposium

In the past MTT has paid for mailing announcements to MTT members. In return, MTT members received 20% discount on the Symposium Proceedings. Dr. R. M. Emberson at IEEE HQ has stated that this is against IEEE policy. It was pointed out that many of the PIB Symposium will be on the subject of turbulence in fluids and plasmas, and would be of little interest to microwave engineers. The Ad Com therefore voted not to pay for mailing announcements this year. We will therefore not get the discount this year.

IEEE Convention -- Special Microwave Presentations (18-21 March '68)

Leo Young reported on the program. (It is given in full elsewhere in this Newsletter.) Twenty four papers were submitted, and one was received after the program was selected. There will be twelve presentations, each to be given twice, so that all the presentations could be taken in by anyone attending the Convention on

two consecutive days. The quality of all the papers submitted was high, and some promising papers could not be placed. The twelve presentations accepted should appeal not only to microwave engineers, but to all engineers interested in microwaves. Since each presentation is allotted 50 minutes (including questions), this should allow time for demonstrations in many cases. Equipment and components will also be displayed to illustrate several of the talks. They will remain on display as long as the Coliseum is open. The titles of the four sessions are:

Session 1, Materials for Microwaves;

Session 2, Components for Microwave Integrated Circuits

Session 3, Microwaves for Space

Session 4, Microwave Frequency Control and Measurements

Leo Young will mail detailed instructions to the authors, and will encourage each author's company to fully support his presentation.

International Solid State Circuits Conference (14-16 February 1968)

Leo Young reported that 5 out of 15 sessions are classified as "microwave" this year. These sessions are titled:

Microwave Control Techniques,

Microwave Integrated Circuits,

Microwave Generation,

Microwave Circuits,

Avalanche Diode Circuits.

Only 30 percent of the papers submitted were accepted.

Rudi Henning pointed out that the solid state circuits area overlaps G-MTT's area of interest to a considerable degree. Bill Mumford pointed out that Warren Cooper and Bob Garver represent MTT on the Solid State Circuits Council, but MTT has no financial responsibility (as we have in the Quantum Electronics Council).

Newsletter

Al Clavin is taking over as editor of the Newsletter. The general topics will be similar, the format a bit different. Chapter reports will be streamlined. It is a problem getting chapter reports and news, and these are always welcomed. Columns will be solicited from microwave personalities. Letters to the editor will be encouraged. Hughes Aircraft is supporting the art work financially. The first issue should be out in January.

Chapter Activities

Ted Saad mailed in a full report. He has been working on the selection of the next National Lecturer to succeed Art Oliner, who has given 10 lectures all over the country in 3 months. Ted has continued with his telephone campaign and discussed their special problems with the local chairmen. He has numerous back copies of the Transactions which local chapters may use in their pro-

motional campaigns and at local meetings. He attached a long list giving details of local meetings at which attendance varied from 10 to 125 (when T. M. Hylltin spoke on "Microwave Integrated Circuits in Phased Array Radars" in Boston).

European Microwave Conference (London, 3-6 September 1969)

The meeting will be in cooperation with G-MTT. Saul Rosenthal has appointed Peter Clarricoats and Walter Kahn to be MTT representatives on the Steering Committee.

IEEE Information Services Committee

Jesse Taub has been nominated to represent G-MTT on this new IEEE committee.

Secretary-Treasurer

Rudi Henning proposed and the Ad Com approved unanimously the appointment of Leonard Swern as Secretary-Treasurer.

Ad-Com Organization

Rudi Henning presented a comprehensive organization chart to improve the efficiency of Ad Com, and to assign responsibilities. These include: Finance, John Bryant; Meetings and Symposia, Frank Arams; Chapter Relations and Membership Services, Pete Rizzi; Administration, Gene Torgow; Bylaws, Bob Hansen; QEC Liaison, Kiyo Tomiyasu; IEEE HQ Liaison, Saul Rosenthal; TAB Op Com, Rudi Henning (as MTT Chairman). Other areas to be covered include Long-Range Planning, Publications, Solid-State Circuits Council, CADAR, Standards.

Washington and Long Island Chapters' Tutorial Lectures

Saul Rosenthal brought an attractive flyer announcing a series of five lectures on "Solid-State Microwave" organized by the Washington, D.C., Chapter, starting on 16 January 1968 at 2-week intervals. Details can be obtained from H. Warren Cooper, MSI29, Westinghouse Aerospace, P.O. Box 746, Baltimore, Maryland 21203.

The Long Island chapter plans a tutorial series on various subjects, including microwaves, for 1968.

CADAR

CADAR--Computer Aided Design, Analysis and Realizability--was managed by an IEEE Committee under NTSAC (New Technical and Scientific Activities Committee); this committee has just been made into a council. (The other two councils are on Quantum Electronics and on Solid State Circuits.)

The new CADAR Constitution states that CADAR shall be managed by a Council which is appointed by the IEEE Technical Activities Board (TAB) from suggestions made by the cooperating IEEE Groups. G-MTT will be one of these cooperating groups. G-MTT will have one voting member representing MTT on the CADAR

Council, and will contribute \$200 per year to CADAR. A motion to this effect was passed by Ad Com.

The rapidly growing importance of computers in the design of microwave components and in the application of microwaves means that all microwave engineers should know of and participate in the activities of CADAR. It is a simple matter to be put on the mailing list as explained in the accompanying Box 1 reproduced from the November 1967 issue of the Proceedings of the IEEE. It is free for IEEE members. To make it especially easy for MTT members, the accompanying Box 2 can be filled out, signed, cut out, and mailed to Dr. Emberson at the address shown.

Schedule of Ad Com Meetings for 1968

The following dates and places were tentatively selected: Wednesday, March 20, in New York; Sunday, May 19, in Detroit; Friday, September 13 in New York; Monday, December 2, in Los Angeles.

There may also be a meeting in Detroit on Tuesday, January 30, if necessary.

BOX 1

What Is CADAR?

CADAR is an acronym for the "Computer-Aided Design, Analysis, and Realization" Organization which is sponsored by the IEEE New Technical and Scientific Activities Committee (NTSAC). The purpose of CADAR is to promote the effective utilization of computers in the design, analysis, and realization of electrical and electronic devices, circuits, and systems. The technical scope of this organization includes computer programs for the design and analysis of devices, circuits, and systems. The applications of computer graphics and numerical control to specific fields of technology are also included in the activities of CADAR.

CADAR interfaces with many of the IEEE Groups; however, it is not a part of any one Group. CADAR representatives have been appointed by ten Groups: Automatic Control; Aerospace and Electronic Systems; Circuit Theory; Computer; Electron Devices; Information Theory; Parts, Materials and Packaging; Power; Reliability; and Systems Science and Cybernetics.

At present, CADAR encourages the scheduling of seminars and sessions pertaining to computer-aided design and analysis as part of the many existing conferences and symposia. Similarly, the publication of papers in this field in existing journals is encouraged. The only publication for which CADAR is responsible is the quarterly *Newsletter* whose format is more varied than the conventional types. The contents include announcements of coming conferences, calls for papers, membership lists, editorial comments, and chairman's messages. The *Newsletter* also presents technical notes which are informative descriptions of computer programs for circuit analysis.

You are encouraged to join this organization—a subscription to the *CADAR Newsletter* is free to IEEE members and affiliates. Just mail your request to R. M. Emberson, 345 East 47 Street, New York, N. Y. 10017. Don't forget to include your zip code number.

(From Proc. IEEE, Vol. 55, No. 11, p. 2006, November 1967.)

Dr. R.M. Emberson
IEEE
345 East 47 Street
New York, N.Y. 10017

Dear Dr. Emberson:

I am a member of IEEE. Please arrange to have my name placed on the mailing list for the CADAR Newsletter. I understand that joining CADAR is free to IEEE members.

My name and mailing address is

Name

Street Address

City State Zip Code

Sincerely yours,



INTROSPECTION CIRCUMSPECTION

By

Mel Marcus

As you read this issue you can't help but notice a preponderance of introspection. Rudy Henning, our new chairman, does it; Al Clavin, our new editor, does it; and perhaps it is in order for all of us to do it - so I will.

There are some strange things happening in our industry. Things that make me wonder what microwaves really are. Last November the Microwave Journal was devoted entirely to millimeter waves and some recent issues of Microwaves magazine were heavily slanted toward lasers. What happened to us slobs who still think that X-band is pretty high? And K-band? --- Oooo-Weee!

Of course these lofty publications always feature the most glamorous work being done in our industry and what could possibly be more glamorous than millimeter waves and lasers? No fair counting Gina Lola-what's-her-name.

Certainly a lot of research is being done in these areas, but is it really microwaves? Are us older fellows

really that far behind? Don't you believe it. The bulk of the money being spent in our industry still goes for components, sub-systems, and systems in the frequency range below 20 GHz. And anyone working below 20 GHz can't be all bad. And if you're not all bad it doesn't hurt to do some introspection. And that's what everybody did --- especially in this issue.



ADCOM REPORT ON CHAPTER ACTIVITIES

By

Ted Saad

This is my first formal Report as Chairman of the Chapter Activities and Membership Committee, and quite a bit has been accomplished in our first year.

Professor Arthur A. Oliner, of the Polytechnic Institute of Brooklyn, was named our National Lecturer and last Summer we managed to arrange visits by him to a number of the local chapters. The chapters and dates are as follows:

Milwaukee	September 25
Chicago	September 26
New Hampshire	September 27
Seattle	October 9
Foothills/California	October 10
Los Angeles (possibly joint with Orange County)	October 11
San Diego	November 14
Tucson	November 15
Phoenix	November 16
North Carolina	December 14

From the reports I have heard the effort is a great success. I am presently working on the choice of a 1968 National Lecturer. Once he has been named, a Program will be worked out with the local chapter chairmen. I managed to sit in on the New Hampshire meeting when Professor Oliner presented his talk and, as always, I was impressed by the message and the clarity with which he delivered it. It will be hard to find a suitable successor. Any suggestions would be greatly appreciated.

There are a number of problems chapter chairmen face which are of great interest. There is not enough space in this column to describe them all, but let me mention three.

Many chapter chairmen are not aware of the fact that they can easily get very good speakers simply by asking. They may not always be aware that most good speakers are willing to go almost anywhere to deliver their talks, and at no expense to the local group. Bob Tenholtz has been appointed to prepare and distribute the Speakers List. The first copy of it has been put together and circulated to all chapter chairmen. If anyone needs additional copies, please write directly to Bob Tenholtz at Sage Laboratories, 3, Huron Drive, Natick, Massachusetts, 01760.

One of the most interesting problems I have run across happened to the Buffalo Chapter last year. It seems that in Buffalo last year a number of people were transferred from the Sylvania operation and two of them happened to be on the Administrative Committee of the local chapter. This left Dick Clark, of Cornell Aeronautical Laboratory, the only person on the Committee. He became Chairman by default. He told me he spent last Summer lining up new Officers. The problem, of course, is the fact that there are only two or three companies in the area that are working in the microwave field. Consequently, it is dangerous to select a Committee whose members all come from one facility. This is a message for local chapter chairmen in similar situations. One of the interesting things was that the engineering representatives were instrumental in supporting the effort by paying for the room and the liquid refreshments, and often furnishing a speaker from one of their principals.

The new Chapter Chairman is Robert E. Nelson, of Cornell Aeronautical Laboratory. Dick Clark deserves a

great deal of credit for the effort he has put in; we need more people like him.

Another interesting situation I ran into is in the Connecticut Chapter. Connecticut, although one of our smallest states, has a problem one would expect to find in California. It seems the microwave industry is spread widely throughout the State and consequently it is difficult to find a central location such that is easy for people to attend chapter meetings. As a result, chapter meetings in the area have been poorly attended, despite the interest by the individual members. There have been times when there have been as few as two or three members at a local chapter meeting. A few weeks ago they made an effort to correct this situation by having a Saturday night combination chapter meeting and social gathering, with wives. At that meeting they managed to have twenty people in attendance, ten of whom were wives.



CHAPTER NEWS

BALTIMORE CHAPTER

Past Meetings

Date:	December 13, 1967
Location:	Winston's Steak Pub, Sutton Place Apartments
Speaker:	Mr. Ernest Stern
Affiliation:	M. I. T. Lincoln Laboratory
Abstract:	"Some Current Problems With Components For Ballistic Missile Defense Array Radars"

This talk will treat some current problems with component design for BMD radars, analytic techniques for evaluating 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.

CONNECTICUT CHAPTER

Past Meetings

Date:	November 4, 1967
Attendance:	Twenty
Location:	Newington, Connecticut

Speaker: Ted Saad
Affiliation: Sage Laboratories
Abstract: "The Past, Present and Future of the
Microwave Industry"

A review of the past, present and future of the Microwave Industry from both the historical and technical viewpoints. The discussion areas included developments in the solid state, the communications and commercial applications of Microwave Energy.

DALLAS CHAPTER

Past Meetings

Date: September 20, 1967
Attendance: Thirty-two
Location: Alamo Room, First Federal Savings & Loan,
5930 Royal Lane, Dallas, Texas
Speaker: Dr. Curtis P. Hartwig
Affiliation: Raytheon Research Division
Abstract: "Properties of rutile Microstrip Lines"

A report of investigation into the properties of ceramic rutile transmission lines. The appearance of an upper frequency limit for TEM transmission was discussed. The possibility of surface wave transmission and its properties were investigated. A lively question and answer period followed the talk as the particular mode of surface wave propagation was in dispute.

Date: October 25, 1967
Attendance: Twenty-three
Location: Alamo Room, First Federal Savings & Loan,
5930 Royal Lane, Dallas, Texas
Speaker: Mr. Roy W. Roberts, Jr.
Affiliation: Melabs Labs, Palo Alto, California
Abstract: "Recent Advances in Ferrite Devices"

A recent state of the art development of a large class of ferrite devices was performed. Items such as size, weight, performance, and cost were reviewed. A brief picture of ferrite devices for use in microwave integrated circuits was presented.

Date: November 25, 1967
Attendance: Forty-two
Location: Alamo Room, First Federal Savings & Loan
5930 Royal Lane, Dallas, Texas

Speaker: Mr. Robert D. Hall
Affiliation: Hewlett-Packard Associates
Abstract: "Noise and Instabilities of Frequency
Multipliers"

The talk covered the results of theoretical and experimental study concerning the instabilities of step recovery diode frequency multipliers. A frequency dependent negative resistance has been derived analogous to the techniques of parametric amplifier circuit theory. The results of this instability were related to the noise, efficiency and phase performance of two frequency multipliers. Several miniaturized multipliers were exhibited.

Future Meetings

Date: January 17, 1968
Location: North Park Inn, Dallas, Texas
Speaker: Dr. Kiyo Tomiyasu
Affiliation: General Electric
RSVP To: Miss Jan Cox, 235-9511, Ext: 323
Cost: \$5.00
Abstract: "Laser Technology"

This meeting will be our annual dinner meeting with the wives invited. This is the opportunity to acquaint them with the field in which their husbands work as well as take them out of the kitchen for one night.

Activities

Dallas is privileged to host the 1969 G-MTT International Microwave Symposium. Congratulations are extended to the Proposal Committee for their fine efforts in securing this symposium. Committee members are: Jim Sadler (chairman), Ben Hal Iford, John Horton, and Frank Emery.

Dates for the symposium are May 5 - 8, 1969; the site is the Dallas Marriott Motor Hotel.

Program plans are similar to those of previous G-MTT symposia. In addition to the daily technical sessions, evening panel discussions are planned. Social activities call for a luncheon either on Monday or Wednesday and a banquet on Wednesday evening. A ladies program will be offered for the attending wives.

After the success last year, a special microwave session has again been planned for this year's SWIEECO. The conference will be held in Houston. Britt Vincent, Texas Instruments, Incorporated, Dallas, is the session chairman. Those who are interested in presenting a paper should get in touch with Britt for details.

Personals

Tom M. Hyltin of TI had his wife searching the town for an extra large tux to rent so that he could attend the award dinner of Industrial Research, Incorporated. He received an award for the X-band transmit/receive module developed for the MERA integrated circuit solid state radar under contract from the Avionics Laboratory at WPAFB.

FLORIDA WEST COAST CHAPTER

Past Meetings

Date: November 29, 1967
 Attendance: Nineteen
 Location: Holiday Inn & Restaurant, Clearwater, Florida
 Speaker: Dr. S. C. Block
 Dr. Richard W. Vogel
 Affiliation: Associate Professor Physics Dept. U.S.F.
 Research Associate, U.S.F.
 Abstract: "Microwave Non-Linear Interactions in Plasmas, including Diagnostics, Harmonic Generation, OSC. Bulk Effect, etc."

Future Meetings

Date: January 25, 1968
 Location: Sweden House, Tampa, Florida
 Speaker: W. W. Mumford
 Affiliation: Bell Telephone Laboratories, Inc. Murray Hill, New Jersey
 RSVP To: George Horner, Sperry Microwave
 Cost: \$3.00
 Subject: "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 will be discussed. Methods of measurement will be derived and the relationship to several definitions of Noise Figure will be pointed out.

LONG ISLAND CHAPTER

Past Meetings

Date: November 28, 1967
 Attendance: Thirty-five
 Location: Polytechnic Institute of Brooklyn Graduate Center, Long Island, N.Y.
 Speaker: Dr. John Copeland
 Affiliation: Bell Telephone Labs, Murray Hill, New Jersey
 Abstract:

The talk dealt with recent research on bulk negative resistance semiconductor devices and their applications to power generation, logic, and amplification. Power generation using these devices is not limited by geometry as in transistors.

 Date: December 19, 1967
 Attendance: Thirty-five
 Location: Polytechnic Institute of Brooklyn, Graduate Center, Long Island, N.Y.
 Speaker: Jack D'Agostino
 Affiliation: Sperry Gyroscope
 Abstract:

The selection of Electronic Scanning Radar as opposed to mechanically scanned radar is indicated for tactical environments. Types of ESR antenna techniques are discussed along with applications of these techniques at the present time.

This meeting was JOINT with the Antennas and Propagation LI Section.

Future Meetings

Date: January 23, 1968
 Location: Polytechnic Institute of Brooklyn Graduate Center, Long Island, N.Y.
 Speaker: Walter A. Crofut
 Affiliation: Anderson Laboratories
 Subject: "Recent Advances in Microwave Acoustic Delay Lines"
 Abstract:

Recent advances in microwave acoustic delay lines

and their technology will be discussed. Applications to non-dispersive delay lines, acousti-optical modulators, and diffraction grating delay lines will be treated along with laboratory results.

Personals

Since our last meeting, our former Chapter President and Publicity Chairman have left Wheeler Laboratories and joined Sedco Systems in Farmingdale. (Vince Maxzola and Walt Mehuchy) Harvey Hindin left AIL for LEL.

LOS ANGELES CHAPTER

Future Meetings

Date: February 8, 1968
Location: Rodger Young Auditorium
Speaker: R. Rauskolb
Affiliation: Hewlett-Packard
Subject: "Automated Measurement of Complex Reflection Coefficient"
RSVP To: C. Swift TR3-4778
Cost: \$4.50
Abstract:

An automated system incorporates a small instrumentation computer measures and displays or prints out complex reflection coefficients over a frequency range of .1 to 12.4 GHz with extremely high accuracy. The system calibration program and performance capability will be described.

MONTREAL CHAPTER

Past Meetings

Date: March 29, 1967
Attendance: Fifty
Speaker: W. W. Mumford
Affiliation: Bell Telephone Laboratories
Whippany, N.J.
Abstract: "Noise Performance Factors in Communication Systems"

NORTH CAROLINA CHAPTER

Past Meetings

Date: November 8-9, 1967
Location: Greensboro, North Carolina
Abstract:

The annual IEEE Symposium of the Affiliation of North Carolina Sections was held at the Greensboro Coliseum November 8-9. This was the 17th such sympos-

ium and, as always, was highly successful with over 500 members and visitors in attendance.

Date: December 14, 1967
Location: Holiday Inn, Burlington, N.C.
Speaker: Professor A. A. Oliner
Affiliation: Department of Electrophysics,
Polytechnic Institute of Brooklyn

Abstract:

This was a meeting of the North Carolina Central Section promoted by the North Carolina Joint G-MTT/AP Chapter. Professor Oliner discussed the changes the microwave field as a whole is currently experiencing. He discussed new applications involving new configurations or different frequency ranges and interactions with other physical wave types.

PHILADELPHIA CHAPTER

Past Meetings

Date: October 18, 1967
Attendance: Sixty-two
Speaker: Ray Forrest
Affiliation: Microwave Associates, Inc.
Burlington, Mass.
Abstract: "PIN Diode Phase Shifter"

PHOENIX CHAPTER

Future Meetings

Date: January 16, 1968
Location: Room P.S. 100, Physical Science Center,
ASU, 8:30 p.m.
Subject: "Philosophical Perspectives of Modern Physics"

Abstract:

Professor Henry Margenau will give a talk entitled "Philosophical Perspectives of Modern Physics," the talk will deal with the philosophical relevance of modern physical theories, touching upon topics like statistical causality, epistemological feedback, and reliance upon mathematical models (while mechanistic explanation is being rejected).

Personals

Two prominent FELLOW members of the IEEE associated with the Waves and Devices Group in Phoenix have recently joined the faculty at Arizona State University. Dr. Thomas E. Tice, former Chief Engineer for the Antenna and Microwave

Group at Motorola, Scottsdale, has become Electrical Engineering Department Chairman. Dr. H. W. Welch, former Asistant to the Chief Technical Officer at Motorola, is now Professor of Electrical Engineering.

SAN FRANCISCO CHAPTER

Past Meetings

Date: December 13, 1967
Location: Hewlett-Packard Auditorium,
Palo Alto, California
Speaker: Dr. Arthur O. McCoubrey
Affiliation: Varian Associates
Abstract: "Atomic Time and Frequency Standards"

Modern atomic standards are capable of reproducibly generating the unit of time or frequency within a few parts in 10^{12} and the synchronization of widely separated time keepers within microsecond limits has been established. Depending upon specific needs for such high levels of reproducibility, long term stability, and, with the possibility of trade-offs, short term stability of compactness, the atomic standards are based upon quantum resonances in cesium, hydrogen or rubidium. In each of these cases the resonances occur at microwave frequencies and the talk will describe the origin of the phenomena in terms of a classical picture of motion within the atom and the corresponding coupling to microwave circuits. The sharpness of resonance was also described in qualitative terms familiar to the electrical engineer.

Examples of state-of-the-art atomic frequency standards were on hand and a short tour through a Hewlett-Packard atomic frequency standard laboratory was conducted following the meeting.

Second Speaker: Dr. Joseph Murray
Affiliation: Stanford Linear Accelerator

This is the story of a scientific effort that was only partially successful. A special type of microwave-gated photomultiplier, a so-called DCFEM, was built to fulfill a limited objective, which it did. Measurements were made of the temporal distribution of particles in secondary beams at SLAC. More sophisticated applications envisioned beforehand, however, turned out to be impractical because of basic limitations of the gating process which in this device requires absorption of very low energy electrons on a photoelectric surface.

SOUTHEASTERN MICHIGAN CHAPTER

On 24 January, Harold Sobal of RCA will talk on Microwave

Integrated Circuits (tentative) at the University of Michigan. On 28 February, S. Rablnowitz of Philco-Ford will speak at Bendix in Southfield, Michigan; subject is Radar Systems.

SYRACUSE CHAPTER

Past Meetings

Date: December 7, 1967
Location: Syracuse University
Speaker: Mr. Tom M. Hyltin
Affiliation: Texas Instruments
Abstract: "Microwave Integrated Circuits for Phased Array Radars"

The conventional approaches to radar have all had severely limited reliability due principally to vacuum devices, rotary joints and other electromechanical devices. The use of phased arrays with electronic scanning offers the elimination of electromechanical components but incurs other problems. The number of microwave components increases by three or four orders of magnitude and the space available per component decreases by two orders. Microwave integrated circuits have large potential application in phased arrays and their availability will permit these techniques to be applied to many equipments previously excluded due to size, weight and frequency of operation limitation.

Integrated circuits are being developed for X-band radar applications that will permit a completely solid-state radar having no moving parts. The status of these circuits and their utilization in an airborne type demonstration radar will be discussed.

WASHINGTON D.C. CHAPTER

Past Meetings

Date: September 12, 1967
Attendance: Sixteen
Location: Harry Diamond Laboratories, Education Building Washington D.C.
Speaker: Mr. Leonard Dubrowsky
Affiliation: Aerospace Division, Westinghouse Defense & Space Center, Baltimore, Maryland
Abstract: "The Digilator"

The Digilator is a new type of frequency translator which employs a multi-bit latch ferrite phase shifter with a suitable switching driver to obtain a multi-step approximation to the thermodynamic phase function. Theory and design of a 16-step X-Band device was described.

Date: October 10, 1967
Attendance: Twelve
Location: Harry Diamond Laboratories, Education Building Washington, D.C.
Speaker: Mr. Richard C. VanWagoner
Affiliation: Radiation Systems, Inc. McLean, Virginia
Abstract: "A Modal Analysis of Hybrid Matrix Errors"

A modal analysis technique is presented wherein the effect of systematic matrix component errors can be evaluated in terms of the total matrix operating performance. Particular emphasis is placed on the application of this analysis technique to the evaluation of two-channel monopulse tracking systems. Specifically, a four filament, planar, cavity-backed, multi-mode antenna is evaluated.

Date: November 21, 1967 - This meeting was sponsored jointly by the local GAP and MTT Groups.
Attendance: Thirty
Location: Harry Diamond Laboratories, Education Building Washington, D.C.
Speaker: Dr. Goubau
Affiliation: U.S. Army Electronics Command Laboratories Ft. Monmouth, New Jersey
Abstract: "Optical Waveguides"

A review of optical waveguides which have been discussed in the literature will be presented. The only guides which today appear suitable for long-distance communication in the optical range are beam waveguides which are based on periodic iteration of a wave beam. Particularly promising are lens-type beam waveguides which employ solid lenses for the beam iteration, because they combine low transmission loss (<0.5 dB/km) with relatively low construction cost. Results obtained at the U.S. Army Electronics Command Laboratories, Fort Monmouth, N.J. with an experimental guide of this kind will be discussed in more detail. Also possible applications of such guides for purposes other than long-distance communication will be proposed.

Date: December 12, 1967
Attendance: Twenty
Location: Harry Diamond Laboratories, Education Building Washington, D.C.
Speaker: Mr. C. Herbert Grauling, Jr.

Affiliation: Aerospace Division - Westinghouse Defense & Space Center Baltimore, Maryland
Abstract: "ILS Flight Inspection Positioning System"
Microwave Interferometer utilizing a linear array of radiators excited by coherently related frequencies has been employed for precision angle measurement. The technique, as applied to the determination of aircraft angular position with respect to a ground reference utilizes an array of three fixed radiators for each coordinate and an airborne receiver for real time readout. The desired information is encoded on the transmitted X-Band signal as an audio reference modulation whose phase is a function of position.

Future Meetings

1968 TUESDAY EVENING LECTURE SERIES

Location: Green Auditorium, Administration Building, National Bureau of Standards, Gaithersburg, Maryland
R.S.V.P To: Robert O. Stone, Div. 146, Section 3 National Bureau of Standards Washington, D.C.
Cost: IEEE member, \$7.00; non-member, \$9.00

Date: January 16, 1968
Speaker: Mr. Carl Blake
Affiliation: M.I.T. Lincoln Laboratory
Abstract: "Solid State Microwave Systems"

Solid state microwave integrated circuits which lend themselves to high-volume, low-cost production offer potential applications in phased-array systems. These circuits are now feasible for all low level receiver applications such as low-noise amplification, mixing, switching, and phase shifting; and some transmitter applications. The state-of-the-art will be reviewed and the strengths and weaknesses of the solid state approach will be outlined as it applies to a spectrum of system problems.

Date: January 30, 1968
Speaker: Mr. Seymour Okwit
Affiliation: Airborne Instruments Lab
Abstract: "Ultra Low Noise Receiving Techniques"

A general discussion will be presented on the fundamentals of low noise reception. A state-of-the-art review of the relative performances of the well known low noise receivers, such as masers (Image terminated) will be given. In addition, the advantages and disadvantages of using the different receivers in varied applications will be covered.

The remainder of the presentation will be concentrated on some of the important details that govern low noise performance in cooled and uncooled parametric amplifiers and Image-terminated mixers.

Date: February 13, 1968
Speaker: Dr. L. R. Whicker
Affiliation: Aerospace Division
Abstract: "Related Microwave Technologies"

Technologies other than the semi-conductor processing usually associated with solid state microwave provide useful circuit control functions in microwave solid state or microwave integrated circuits. Techniques such as the use of thin ferrite films or slabs for non-reciprocal devices are considered as is the use of integrated microwave ultrasonic propagation for signal processing. Other transmission types are considered as is bulk propagation in solid state plasmas. Special devices and sub-systems of novel properties which can be obtained using the interfaced technologies will be discussed.

Date: February 27, 1968
Speaker: Prof. L. F. Eastman
Affiliation: Cornell University
Abstract: "Semi-Conductor Microwave Power Generation"

The new bulk and transit-time devices, such as avalanche, Gunn domain mode and LSA mode diodes, as well as comparisons of these devices with transistors and varactor multipliers, will be discussed. The most effective properties of each device, the power levels obtained to date and those to be expected in the near future, and the active areas of research will be presented. Emphasis will be placed on the remarkable new results, in both pulsed and C. W. operation, that are being achieved.

Date: March 12, 1968
Speaker: Roger R. Webster
Affiliation: Texas Instruments
Abstract: "Microwave Integrated Circuit Technology"

The combination of integrated circuit technology with high performance solid state microwave devices is a powerful technique. A substantial research and development effort has been in process for the past two years to apply the techniques to develop microwave integrated circuits. Although the field is relatively in its infancy, it has generated much interest, and a wide variety of circuit functions have been or are being developed. These include amplifiers, oscillators, mixers, filters, harmonic multipliers, switching circuits, phase shift networks, isolators and circulators.

The January, February and March meetings will be replaced by the above Tuesday evening series on Solid State Microwave lecture series. Mr. Warren Cooper, the Program Chairman, has worked very hard putting this lecture series together and we feel very proud to be able to get such high quality speakers as Mr. Blake, Mr. Okwit, Dr. Whicker, Prof. Eastman, and Mr. Webster. We have asked six additional groups, as stated on the announcement, to participate and we feel confident that we will have an attendance well over 200.

As you may know, the Washington group can look back on two successful programs of this type which have always been received with great enthusiasm by the microwave oriented crowd in the Washington and Baltimore areas. Last, but not least, each of the foregoing lecture series has always been a financial success; that is, at the end we could always turn money over to the Washington Section of the IEEE.

The April and May meetings have not been completely firmed up yet. Firmed up however, is the spring social to be held in June 1968. This is the social highlight of the season. The number of attendees has grown from year to year. Last year we had approximately 200 people and we even enjoyed a professional M.C. which resulted in a very enjoyable evening. What we are going to do this year is not known. Maybe we should live it up with some belly-dancers. I am sure that we would increase the number of attendees.

Personals

Dr. Bruno O. Weinschel, a fellow of the IEEE and active on many microwave oriented committees has finally taken some time out for personal affairs. Dr. Weinschel was remarried in October and is presently circling the globe on an extended honeymoon.

The present officers who were sworn in during the 1967 Spring Social are:

Dr. Gunther U. Sorger, Chairman
Weinschel Engineering Co., Inc.
Gaithersburg, Maryland

Mr. George Chadwick, Vice Chairman
Radiation Systems, Inc.
McLean, Virginia

Dr. William F. Gabriel, Secretary
Scanwell Laboratories, Inc.
Springfield, Virginia

Mr. Richard VanWagoner,
Program Chairman
Radiation Systems, Inc.
McLean, Virginia



ANNOUNCEMENTS

NEW IEEE FELLOWS

Following is a partial listing of new IEEE Fellows, spotlighting those whose citations are in fields related to MTT:

Eric A. Ash	Marion E. Hines
Walter R. Beam	Richard C. Honey
Charles I. Beard	James D. Horgan
Ervin M. Bradburd	Harold Jacobs
Donald A. Chisholm	Gerhard K. Megla
Peter J. B. Clarricoats	James D. Meindl
Alvin Clavin	Wilbur L. Pritchard
Helmer H. Dahl	Frank Reggia
Richard W. Damon	Myron C. Selby
Eugene J. Gordon	William T. Sumerlin
Leif F. Guadernack	Eugene N. Torgow
John B. Gunn	Jean P. F. Voge
Henri Gutton	Roger P. Webster
Peter W. Hannan	Leo Young

The G-MTT adds its heartiest CONGRATULATIONS to this select group. It is indeed a privilege to be associated with them.

1968 IEEE INTERNATIONAL CONVENTION AND EXHIBITION

Program of
SPECIAL MICROWAVE PRESENTATIONS
Place: New York Coliseum, V.I.P. Room

Session I MATERIALS FOR MICROWAVES

Dates:	Monday and Wednesday mornings, March 18 and 20, 1968
Session Chairman:	Nathan Lipetz U. S. Army Electronics Command Fort Monmouth, New Jersey 07703
Session Co-ordinator:	David K. Adams Stanford Research Institute Menlo Park, California 94025
10:30 a.m.-	"Semiconductor Materials for Microwave Devices,"
11:20 a.m.	by Forrest V. Williams, Monsanto Company, 880 N. Lindbergh Boulevard, St. Louis, Mo. 63166.
11:20 a.m.-	"Ferrimagnetic Materials for Microwave Devices,"
12:10 p.m.	by R.G. West and A.C. Blankenship, Trans-Tech, 12 Meem Avenue, Gaithersburg, Md. 20760.
12:10 p.m.-	"Tutorial Period on Stripline," by Harlan Howe,
1:00 p.m.	Microwave Associates, Burlington, Mass. 01803.

Session II

COMPONENTS FOR MICROWAVE INTEGRATED CIRCUITS

Dates:	Monday and Wednesday afternoons, March 18 and 20, 1968
Session Chairman:	Donald H. Teeme Lincoln Laboratory Lexington, Massachusetts 02173
Session Co-ordinator:	Carol Veronda Electronics Research Center National Aeronautics and Space Administration 565 Technology Square Cambridge, Massachusetts 02139

2:30 p.m.-	"Microwave Solid-State Sources--Trends and
3:20 p.m.	Applications," by Robert R. Lorentzen, RCA, Solid State Applications Engineering, 1000 South Street, Harrison, New Jersey 07029
3:20 p.m.-	"Application of Integrated Circuit Techniques
4:10 p.m.	at UHF and Microwave Frequencies," by A.T. Botka, M. Gilden, R. Blight and C. Buffler, Microwave Associates, Burlington, Mass. 01803.
4:10 p.m.-	"Integrated Circuit Technology Applicable to
5:00 p.m.	Functional Microwave Modules," by Gordon R. Harrison and J. Lamar Allen, Sperry Microwave Electronics Division, Sperry Rand Corp., P.O. Box 4648, Clearwater, Florida 33518.

Session III

MICROWAVES FOR SPACE

Dates:	Tuesday and Thursday mornings, March 19 and 21, 1968
Session Chairman:	D.D. King North American Philips Laboratories Briar Cliff Manor New York, N.Y.
Session Co-ordinator:	Joseph A. Mosko U.S. Naval Ordnance Test Station China Lake, California 93557
10:30 a.m.-	"Exploration and Exploitation of the 3 cm-to-3 mm
11:20 a.m.	Wavelength Region," by Harold Ewen, Ewen-Knight Corp., East Natick, Mass. 01760
11:20 a.m.-	"A Millimeter Wave Propagation Experiment from the
12:10 p.m.	ATS-E Spacecraft," by J.W. Dees, J.L. King and J.D. Wiltse, Martin Marietta Corporation, Orlando, Florida 32805.
12:10 p.m.-	"Low-Noise Receivers for the Reception of Signals
1:00 p.m.	from Space," by C. Louis Cuccia, Philco-Ford, WDL, Palo Alto, Calif. 94303.

Session IV

MICROWAVE FREQUENCY CONTROL AND MEASUREMENTS

Dates:	Tuesday and Thursday afternoons, March 19 and 21, 1968
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Session Chairman: Joseph C. Palais
c/o Sylvania Electronic Systems
P.O. Box 205
Mountain View, California 94042

Session Co-ordinator: Lloyd A. Robinson
Stanford Research Institute
Menlo Park, California 94025

- 2:30 p.m. - "A Comparison of the Various Techniques for the
3:20 p.m. Accurate Measurement of Microwave Frequencies," by
Richard E. Voyles, Systron-Donner Corp., 888
Galindo Street, Concord, Calif. 94520.
- 3:20 p.m. - "Electronically Tuned Oscillators," by Frederick
4:10 p.m. R. Voorhaar, Omni Spectra, 24600 Hallwood Ct.,
Farmington, Michigan 40824.
- 4:10 p.m. - "Computer-Controlled Network Analyzer for Microwave
5:00 p.m. Measurements," by John Cardoza and Dick Hackborn,
Hewlett-Packard, 1501 Page Mill Rd., Palo Alto,
Calif. 94304.

1968 MICROWAVE POWER SYMPOSIUM

The 1968 Symposium on Microwave Power, sponsored by the International Microwave Power Institute, will be held at the Statler Hilton Hotel in Boston, Massachusetts on March 21, 22 and 23, 1968.

The Symposium will be concerned with the application of microwave power to processes within the food, agricultural, forest product, textile, chemical, and other industries and to advanced concepts in scientific apparatus and power transmission systems.

For more information contact:

James Sterling
Raytheon Company
Lexington, Mass
617 862-6600, ext. 416

FINAL CALL FOR PAPERS

1968 IEEE G-MTT INTERNATIONAL MICROWAVE SYMPOSIUM
TO BE HELD MAY 20-22, 1968---DETROIT, MICHIGAN

Papers are solicited in the areas of active and passive microwave circuits, components and techniques for millimeter through optical wavelengths, microwave solid-state devices and integrated circuits, microwave applications of bulk and avalanche phenomena in semiconductors, ferrite devices, microwave acoustics, computer-aided design of microwave circuits and other topics in the field of microwave theory and techniques. Authors should submit five copies each of a summary and abstract. The summary should consist of 500-1000 words and a maximum of six figures; the abstract, about 200 words and no figures.

SUMMARIES AND ABSTRACTS SHOULD BE MAILED TO --

Dr. George I. Haddad
Chairman, Technical Program Committee
Electrical Engineering Department
University of Michigan
Ann Arbor, Michigan 48104

DEADLINE: January 8, 1968

Authors will be notified of acceptance or rejection by February 12, 1968.

CALL FOR PAPERS

1968 IEEE (2nd) ANNUAL SYMPOSIUM ON VEHICULAR
COMMUNICATIONS SYSTEMS TO BE HELD MAY 23, 1968---
INTERNATIONAL HOTEL, LOS ANGELES, CALIF.

Each year's Symposium stresses some special theme. This year the subject is "Vehicular Communication Command and Control." It is hoped that you will offer papers which constitute a plethora of good, fresh, modern, cheap, implementable ideas for improving what most systems users and planners call the crux of the problem: "Effective Command and Control of Mobile Forces." Forces means personnel engaged in everything from garbage collection to war, but the interest here stresses always the technological base of modern communication and computer systems. From the myriad of subjects this suggests, a few examples follow:

System Technology

1. New approaches to overall system command and control technology
2. System design to support personal communications
3. Portable or mobile control centers
4. Command and control requirements in special environments (e.g. riots)

Functional Technology

1. Automatic location techniques
2. Real time frequency control
3. Using computers to support the communications function

Hardware/Software Technology

1. Digital communications with mobile units
2. Radio or radar aids to control
3. Directional vehicular antennas
4. Computer software for map storage and display
5. Transponders

Papers not wanted:

1. Generalized philosophy
2. Conventional solutions to any problem
3. Brute force or "money-is-no-object" approaches

The audience is composed mostly of systems engineers working with Federal, State, County and City governments, utilities, manufacturers and military services. These are experienced men who really want to learn what their future will offer.

MTT ADCOM

March 20, 1968
New York

Cybernetics Conference (W. German. Sect.; DGK, NTG)

April 23-26, 1968
Munich, F.R. Germany
H.H. Burghoff, 6 Frankfurt/Main 70, F.R. Germany,
Stresemann Allee 21, VDE-Haus

Mid-America Electronics Conference -- MAECON (Kansas City Sect.)

April 29-30, 1968
Glen Manor Motor Convention Center, Overland Park, Kansas.

Sprint Joint Computer Conference (G-C; AFIPS)

April 30 - May 2, 1968
Convention Hall, Atlantic City, N.J.
AFIPS Headquarters, 345 E. 47 St., New York, N.Y. 10017

Symposium on Human Factors in Electronics (G-HFE)

May 6-7, 1968
Marriott Twin Bridges Motor Hotel, Washington, D.C.

National Aerospace Electronics Conference --

NAECON (G-AES, Dayton Sect.)

May 6-8, 1968
Dayton, Ohio
(Abstracts due Nov. 15, papers due Feb. 15)
IEEE Dayton Office, 124 E. Monument Ave.,
Dayton, Ohio 45402.

Electronic Components Technical Conference

(G-PMP; EIA)
May 8-10, 1968
Marriott Twin Bridges Motor Hotel, Washington, D.C.
(Papers due Jan. 30)
F.M. Collins, Spear Research Lab., Packard Rd. &
47 St., Niagara Falls, N.Y. 14302

International Quantum Electronics Conference

(G-ED, G-MTT; JCQE)
May 14-17, 1968
Everglades Hotel, Miami, Fla.
(Abstracts and summaries due Jan. 8)
R.W. Terhune, Physical Electronics Dept., Ford Motor
Co., Box 2053, Dearborn, Mich. 48121

Princeton Conference on Information Sciences and
Systems (G-CT; Princeton University)

March 25-28, 1968
Princeton University, Princeton, N.J.

Prof. Bede Liu, Engineering Quadrangle, Princeton
N.Y. 08540

INTERMAG Conference (G-MAG)

April 3-5, 1968
Sheraton Park Hotel, Washington, D.C.

J.M. Lommel, G.E. Research and Development
Center, Box 8, Schenectady, N.Y. 12301

National Telemetry Conference - NTC (G-AES, G-Com Tech)

April 9-11, 1968
Shamrock Hilton Hotel, Houston, Tex.

Lewis Winner, 152 W. 42 St., New York, N.Y. 10036

Cleveland Electronics Conference (Cleveland Sect.; Cleve-

land Electronics Conference, Inc.)
April 16-18, 1968
Cleveland Eng. and Scientific Center, Cleveland, Ohio

Southwestern IEEE Conference and Exhibition - SWIEEEO

(Region 5)

April 17-19, 1968
Houston Convention and Exhibition Center and Sheraton-
Lincoln Hotel, Houston, Tex. (Papers due Feb. 1)
J.V. Leeds, Jr., Rice University, Box 1892, Houston,
Texas. 77001

Conference on Interference Problems Associated with
Operation of Microwave Communication Systems

(U.K. and Republic of Ireland Sect.; IEE)
April 22-24, 1968
Institution of Electrical Engineers, London,
England.

Region 3 Conference

April 22-24, 1968
Fountainbleau Motor Hotel, New Orleans, La.
(Papers due Jan. 15)
D.H. Vliet, Dept. of Elec. Engg., Tulane Univer-
sity, New Orleans, La. 70118

International Microwave Symposium

(G-MTT) T
May 20-22, 1968
Howard Johnson Motor Lodge, Detroit, Michigan.
G.J. Haddad, University of Michigan, Dept.
of Elec. Engg., Ann Arbor, Mich. 48107

REGION 6 Conference (Region 6, Portland Sect.)

May 20-22, 1968
Sheraton Motor Inn, Portland, Oregon
(Abstracts due Jan. 5; papers due Mar. 11)
George I. Johnston, Univ. of Oregon Medical
School, 3181 S.W. Sam Jackson Park Rd.,
Portland, Oregon.

International Communications Conference

(G-Com Tech, Philadelphia Sect.)
June 12-14, 1968
Sheraton Hotel, University of Pennsylvania,
Philadelphia, Pa.
(Abstracts and papers due Jan. 15)
R.S. Caruthers, IT&T Corp., 320 Park Ave.,
New York, N.Y. 10022

IFAC Symposium on Optimal Systems Planning

(G-SSC; IFAC)
June 20-22, 1968
Case Institute of Technology, Cleveland, Ohio
(Papers due Dec. 1)

Conference on Precision Electromagnetic Measurements

(G-IM; URSI, NBS)
June 25-28, 1968
National Bureau of Standards, Boulder, Colo.
(Abstracts and summaries due Feb. 12)
D.D. King, Bldg. F, Box 95085, Aerospace Corp.,
Los Angeles, Calif.

Symposium on Electromagnetic Compatibility (G-EMC)

July 23-25, 1968
Benjamin Franklin Hotel, Seattle, Washington
J.E. Maynard, 14589 S.E. 51 St., Bellevue,
Washington 98004

Intersociety Energy Conversion Engineering

Conference (G-ED, G-AES; 5 other societies)
August 13-16, 1968
University of Colorado, Boulder, Colo.
A.A. Sorensen, Martin Co., Mail Stop 8600
Denver Colorado

Western Electronic Show and Convention --

WESCON (Region 6, Groups; WEMA) T
August 20-23, 1968
Biltmore Hotel and Sports Arena, Los
Angeles, Calif.
WESCON, 3600 Wilshire Blvd., Los Angeles,
Calif. 90005



MICROWAVE THEORY AND TECHNIQUES GROUP
THE INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, INC.
 345 EAST 47TH STREET, NEW YORK, NEW YORK 10017

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Electronic and Aerospace Systems Conference --

EASCON (G-AES)
 September 9-11, 1968
 Sheraton Park Hotel, Washington, D.C.

MTT ADCOM

September 13, 1968
 New York

International Conference on Microwave and optical

Generation and Amplification (W. German Sect.; VDE, NTG)

September 16-20, 1968
 University of Hamburg, F.R. Germany
 W.A. Krause, 2 Hamburg 11, F.R. Germany,
 Dalmannstr. 1/3, Hafenbau

Industry and General Applications Group Annual Meeting

(G-IGA, Chicago Sect.)
 September 29-October 3, 1968
 LaSalle Hotel, Chicago, Ill.

EHV Transmission Conference (G-P)

September 30-October 2, 1968
 Queen Elizabeth Hotel, Montreal, Que., Canada

International Electron Devices Meeting

(G-ED)T
 October 23-25, 1968
 Sheraton Park Hotel, Washington, D.C.

Northeast Electronics Research and Engineering

Meeting - NEREM (New England Sects.)
 November 6-8, 1968
 Sheraton-Boston Hotel, War Memorial Auditorium,
 Boston, Mass.
 IEEE Boston Office, 31 Channing St., Newton,
 Mass. 02158

Canadian Symposium on Communications (Canadian

Region, Montreal Sec.)
 November 7-8, 1968
 Queen Elizabeth Hotel, Montreal, Que., Canada

Conference on Magnetism and Magnetic Materials

(G-MAG; American Institute of Physics)
 November 17-21, 1968
 New York Hilton Hotel, New York, N.Y.

MTT ADCOM

December 2, 1968
 Los Angeles

Winter Meeting of the National Society of

Professional Engineers
 January 9-13, 1968
 Shoreham Hotel, Washington, D.C.
 NSPE, 2029 K St., N.W. Washington, D.C. 20006

4th National ISA Marine Sciences Instrumentation

Symposium of the Instrument Society of America
 January 22-26, 1968
 Cocoa Beach, Fla.
 Miss Mariruth Reed, Instrument Society of America,
 530 William Penn Pl., Pittsburgh, Pa. 15219

5th International Aerospace Instrumentation Symposium

March 25-28, 1968
 College of Aeronautics, Cranfield, Bedford, England
 Symposium Organized, Dept. of Flight, The College
 of Aeronautics, Cranfield, Bedford, England

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