



EDITOR: Nat Pelner

Hughes Aircraft Co., Missile Engineering Labs, Canoga Park, California 91304

Number 79, Summer 1975

## '75 AWARDS BANQUET

The Annual Awards Banquet was held on May 13 at the Adobe Creek Lodge in Los Altos Hills. This banquet had several departures from past banquets. First, the banquet dinner was a steak barbeque. Second, informal atmosphere; many of us came in sports attire. Third, our guest speaker was electronic — the Moog Music Synthesizer — under control of Roy Pritts, Professor of Music, University of Colorado.

Highlighting the evening were the awards presentations. The Microwave Prize was presented to Charles A. Liechti and Robert L. Tilman. B. C. DeLoach received the David Sarnoff Award, Dean F. Peterson III received the Microwave Application Award, Harold A. Wheeler received the Microwave Career Award and Phillip H. Smith received the first Special Recognition Microwave Application Award.

Fellow Awards were presented to G. P. Rodrigue and Gordon Harrison. Outgoing ADCOM President, R. A. Rivers received the Past President pin from Warren Cooper.

E. W. Matthews, Symposium Steering Committee Chairman, served as MC.



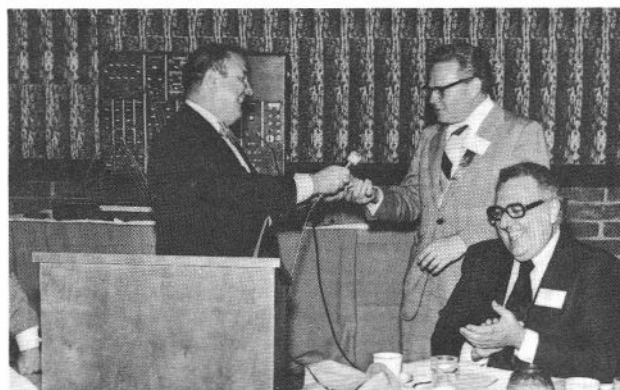
C. Liechti and R. L. Tillman receive the Microwave Prize from Warren Cooper.

## OTTAWA SELECTED TO HOST THE 1978 SYMPOSIUM

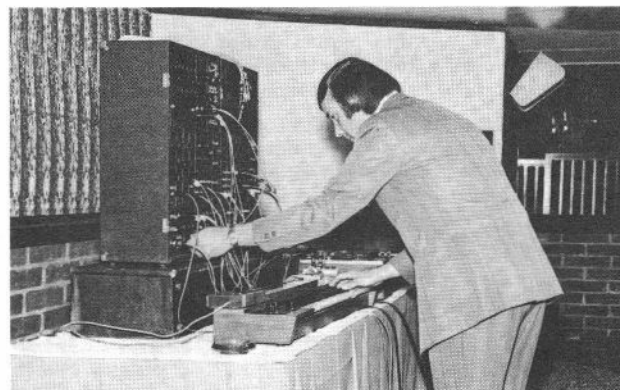
At its May meeting, MTT-ADCOM selected the University of Ottawa as the site for the 1978 MTT-S International Symposium. The proposal was submitted by Willem J. Steenaert of the University of Ottawa. The Montreal AP-MTT Chapter will cooperate fully.

The Steering Committee Chairman is A. L. Van Koughnett. The Technical Program Committee is co-chaired by P. Silvester and W. Steenaert.

The selected dates are May 16-18, 1978.



Bob Rivers receives the Past President Pin from Warren Cooper, John Guerrera applauds loudly.



Our banquet guest, the MOOG Music Synthesizer under the control of Roy Pritts.



**ADCOM  
HIGHLIGHTS**

by Pete Rodrigue

The second ADCOM meeting of 1975 was held on the day before the opening of the Symposium. This year that meeting fell on Sunday, May 11, — Mother's Day — to the consternation of several members. President Warren Cooper called the meeting to order at 10:00 a.m. The meeting quickly got to a consideration of the MTT Society's financial standing. According to IEEE figures the MTT-S reserve has drifted down to approximately \$20K. George Oltman, MTT-S Representative to IEEE on Finance, described the sources and sinks for Society funds with the following (approximate) table.

	Income			Expenditures	
	Total	(Cost/Member)		Total	(Cost/Member)
Dues	\$37K	(\$7.00)	Transactions		
Subscriptions			Printing	\$108K	(\$20.40)
Nonmembers	42K	(\$7.93)	Hdq. Expense	49K	(\$9.25)
Full	26K	(\$4.91)	Miscellaneous	13K	(\$2.46)
Page Charges	44K	(\$8.31)		170K	
Meetings	15K	(\$2.83)	Newsletter	\$ 10K	(\$1.90)
Prorated IEEE Support	14K	(\$2.64)	Admin. Chg.	13K	(\$2.46)
Miscellaneous	19K	(\$3.50)	Miscellaneous	12K	(\$2.27)
	<u>\$194K</u>			<u>\$205K</u>	

It was observed that ≈85% of the total expenditures goes into the Transactions, and two motions were passed to prod a reconsideration of page charge policies by the IEEE Board. The first motion asked that MTT adopt a policy establishing a maximum allowable percentage of unhonored (free) pages/per issue of the Transactions. The second asked that IEEE approve an increase in the page charge rate to more nearly cover publications costs. (The present charge per page covers about 50% of the cost per page.) Both motions have no immediate effect, but are aimed at prompting a re-thinking of publications policy by TAB and the IEEE Board of Directors. Any implementation would also require considerable modification of existing IEEE billing activities, and ADCOM was sympathetic to having it's own business editor assume those duties if IEEE could not work out procedures.

Steve Adam moved that MTT-S dues for next year be maintained at \$7.00, and this motion carried. Kiyo Tomiyasu was appointed to chair a committee to investigate the possibility of including advertising in the Transactions and the Newsletter.

Dean Anderson submitted a letter addressing general policies of page charges and paper review processes. After some discussion Don Parker was appointed to chair an ad hoc committee to consider these recommendations.

The Ottawa Chapter, through W. J. Steenart their Chairman, presented a proposal to host the 1978 Microwave Symposium—possible in conjunction with meetins on Precision EM Measurements and IMPI. ADCOM unanimously approved this proposal and commended the Ottawa group on their planning. The Symposium is scheduled for mid-May 1978.

After lunch break ADCOM heard reports of planning from the 1975-76- and 77 Symposiums. Steve Adam and Wes Matthews stated that everything was in order for the 75 Symposium (as evidenced elsewhere in this Newsletter). In reporting on the 76

Symposium at Cherry Hill, Marty Caulton said that there would be an attempt to reduce the number of parallel sessions, and in addition, some greater emphasis on tutorial sessions is planned. For the San Diego Chapter that the 1977 Symposium site has been set at the Sheraton-Harbor Island for the 3rd week of June. The attractiveness of this location for family vacations was stressed. Ken Button reported that a call for papers for the 1976 Submillimeter Wave Symposium to be held in San Juan, Puerto Rico, Dec. 6-10, 1976, was being circulated. This meeting is sponsored by MTT-S was the very successful '74 Submillimeter Wave Symposium in Atlanta.

Hal Sobol announced a new line-up of Technical committees and chairman as follows:

**MTT-1 Computer Oriented Microwave Practices**

B. Perlman

**MTT-2 Microwave Acoustics**

R. Williamson

**MTT-3 Optical Techniques**

D. B. Anderson

**MTT-4 Submillimeter Waves Techniques**

K. Button

**MTT-5 Microwave High Power**

J. M. Osepchuck

**MTT-6 Microwave and Millimeter Wave Integrated Circuits**

Ray Waugh and Rhinehard Knerr

**MTT-7 Microwave and Millimeter Solid State Devices**

Burt Berson

**MTT-8 Inactive**

**MTT-9 Inactive**

**MTT-10 Microwave Biological Effects**

A. Guy

**MTT-11 Microwave Measurements**

E. Komarek

**MTT-12 Inactive**

**MTT-13 Microwave Ferrites**

F. Rosenbaum

**MTT-14 Microwave Low Noise**

J. Whalen

**MTT-15 Microwave Field Theory**

D. C. Chang

**MTT-16 Microwave Systems**

J. B. Horton

(This represents considerable revision of the MTT Directors you received with your last Newsletter.)

(Continued on page 6)



## EDITORS NOTES

by Nat Pelner

The copyright revision controversy is "quietly" raging in and out of Congress, but one hardly hears a word about its impact on the scientific community.

In a nut shell, the new copyright law revisions (Senate Bill No. 1359) will stop our libraries from supplying us with photocopies of articles we need to do our job. In addition, if your library does not have a journal from which you need a paper, the revision will not allow it to obtain a photocopy of the article from another library. If the revision passes, as it is structured, it will significantly effect our ability to do our job (See MTT NEWSLETTER, Spring 1975, Letters to the Editor, letter from J. Tallman).

The introduction of the photocopy machine has made it convenient to extract articles from journals and it is now done extensively. To this the publishers are crying "rip-off." There have been many abuses of the copyright law such as copying whole texts or journals, and mass dissemination of journal article copies (Williams and Wilkins Vs. HEW). It is apparent to me however, that in the main, single copies of articles are reproduced for individual scientific use.

The irony of this situation is that much of the scientific writing is either directly or indirectly supported by public funds (DoD contracts, Government grants, etc.). In addition, many publications have some form of page charges, where the author's employer is asked to support its publication.

The U.S. Copyright law is essentially unchanged since 1909. Some revision is necessary. But the revision should be fair and equitable not only to the publishers but also to us the journal user.

Your librarians are fighting this battle now. It is about time WE, who will be most effected, take an active part so WE will not be short changed.



Harold A. Wheeler accepting the Microwave Career Award from Warren Cooper.

## REPORT OF DIVISIONAL DIRECTOR



by Bob Rivers

In the brief span of office since the first of this year, I have been attempting to understand the relationship between the Board of Directors and its various constituencies including the members. I have reached the conclusion that when the board perceives a majority member desire, it does in fact respond. The difficulty is in communicating the real member needs and desires through the multiple layers of filtering and distortion inherent in a bureaucratic system. Some of the Directors have achieved the bypassing of the filtering and have a significant level of rapport with the members. It is in your interest to select for support those elected officers that have a real and aware interest in serving the needs of the members of the Institute. After you have elected them, it is also your responsibility to keep them aware of your concern and interest. I recommend that each of you take the opportunity on every occasion to corner your officers and directors and let them know privately of your interests.

In the area of Technical Affairs, I have been supporting a policy directed toward the ethical control of IEEE sponsored research programs. I have supported a policy of bringing out all of the IEEE support to the G/S onto the table in the financial reporting so that we can see what we are getting. This will probably result in an apparent doubling of IEEE support of the Groups and Societies but will not increase the services. We can then proceed to see if we are getting our money's worth. I am proposing the option of 100% coverage of costs with page charges, and the G/S option of limiting the number of unpaid page charge pages to be published. The above are some of the minor fixes to a tremendously successful activity of the Institute, its Technical Publications. In none of my contacts have I ever promoted or heard recommended any attack on our technical eminence. It is the very core of our existence without which there is no purpose to any other activities. The effective serving of our Technical interest is the absolutely necessary but not sufficient condition for serving the total Professional interests.

The following represents an IEEE Member's Bill of Rights:

### IEEE MEMBER'S PROFESSIONAL NEEDS

In recognition of the importance of engineering for maintaining and improving the quality of life for the people of the world, and in recognition of the great investment of time, effort and finances of individuals in developing and maintaining their engineering competence, and in recognition of the dedicated and responsible effort to apply that competence to the problems of the people of the world, the IEEE shall actively and demonstrably pursue a course of action to meet the following professional needs.

(Continued on page 9)



**CHAPTER ACTIVITIES**

*by Larry Whicker*

'75 Symposium — The San Francisco MTT Chapter is to be congratulated on the fine job they did in organizing and manning the 1975 International Microwave Symposium. In addition to fine technical sessions, the exhibits were done in good taste and complimented the technical program.

Chapter Chairmen's ADCOM Meeting — As has become the custom in past years, a Chapter Chairman — ADCOM meeting was scheduled in Palo Alto on May 11, just before the MTT Symposium. These meetings have generally proved quite worthwhile with a good interaction between ADCOM members and Chapter Officers. Two of the main topics to be considered at this meeting were:

1. How can ADCOM better serve the membership and the chapters?
2. How can chapter officers become involved with ADCOM?

Only Four Chapter Officers or representatives from their chapters attended. The represented chapters include Ottawa, Tokyo, Boston, and Florida West Coast. I must apologize to the ADCOM members, National Lecturer, and the four chapter officers who did attend the meeting.

As a result of the lack of interest demonstrated by our present chapter members and the chapter officers, I think ADCOM should reassess the value of the services it presently supplies to its chapters. Some of these include:

1. Keeping running records of chapter activities.
2. Providing financial support to chapters for post-card mailings (Los Angeles, Washington).
3. Providing a National Lecturer and paying his expenses.
4. Maintaining a speakers list.
5. Assisting chapters in organizing and running one-day meetings or lecture series.
6. Providing a film library of National Lectures.

National Lecturer — Since most chapters function on a September to June basis, it appears that having National Lecturers on a calendar year basis is not desirable. A more desirable term would be from June to June. At the May 11 ADCOM meeting, it was decided that the June—June term will be adopted. Dr. R. W. Beatty, our National Lecturer for 1975, has agreed to remain in this position until June 1976, allowing for the change to take place. Those chapters desiring to schedule Dr. Beatty's lecture on "The Development of Modern Automatic Systems for the Measurement of Network Parameters" for this fall or next spring should contact him.

Dr. R. W. Beatty  
2110 — 4th Street  
Boulder, Colorado 80302  
Tel: (303)443-6618



*B. C. DeLoach receives the David Sarnoff Award from John Guerrero.*

**MTT/S BYLAWS CHANGE**

**SECTION II ADMINISTRATIVE COMMITTEE MEMBERSHIP**

**D. PAST PRESIDENT**

*PRESENT*

A Past President shall be an Ex-Officio Member of the Administrative Committee for three years following his term of office as President of the Administrative Committee, provided that he remains a member in good standing of the Society. Any remaining years of a Past President's elective term on the Administrative Committee will be vacated, and he will be ineligible for re-election to the Administrative Committee for the duration of this Ex-Officio status. His vacated Elected Member seat will be filled in accordance with Article VII, Section 3, of the Constitution. Election of a member to fill this forthcoming vacancy shall take place during that meeting of the Administrative Committee at which the annual election of members for the coming year is held.

*PROPOSED*

A Past President shall be an Ex-Officio Holdover Member and have the full rights and voting privileges of an Elected Member of the Administrative Committee for three years following his term of office as President of the Administrative Committee, provided that he remains a member in good standing of the Society. Any remaining years of a Past President's elective term on the Administrative Committee will be vacated, and he will be ineligible for re-election to the Administrative Committee for this three year period. His vacated Elected Member seat will be filled in accordance with Article VII, Section 3, of the Constitution. Election of a member to fill this forthcoming vacancy shall take place during that meeting of the Administrative Committee at which the annual election of members for the coming year is held.

**TECHNOLOGY FORECASTING AND ASSESSMENT**  
**Panel Discussion Held at 1975 MTT/S International Symposium**

*By Al Clavin*



The IEEE has been very interested in technology forecasting and assessment as part of its professional activities. The major objective is to use this information for manpower planning. Last year MTT president Bob Rivers asked me to be chairman of a group responsible for MTT technology forecasting and assessment. This year president Warren Cooper has asked me to continue. I found it difficult to plan a useful MTT activity and therefore decided the best method was to use our National Symposium as a vehicle to present technology forecasting ideas. This was done for the first time last year in Atlanta and because of the enthusiastic response, it was repeated again this year in Palo Alto, and we tentatively have planned a similar session next year in Cherry Hill. A summary of this year's symposium presentations and comments follow.

**Technology Forecasting of Receivers in Systems Applications**

H. Okean, LNR Communications, Inc.  
 Hauppauge, N.Y.

**Digest Abstract**

Modern day problems such as the energy crisis, pollution, etc. will play an increasing role as an important system parameter for the design engineer. A typical example of the involvement of low noise receivers in system tradeoff studies for energy conservation is readily seen in large ground based radars. For a given radar range requirement there is a tradeoff between transmitter power and receiver sensitivity  $\text{Range} \propto \left( \frac{\text{transmitter power}}{\text{system noise temperature}} \right)^{\frac{1}{4}}$ . It is clear that if one can improve the system sensitivity by 3 dB the transmitter power requirements correspondingly decrease by 3 dB. The impact this has on prime power requirements is substantial. When one determines the large number of radars being employed in this country and the amount of power used to support these radars, the dynamics of receiver improvement as a conservation tool becomes evident.

The above is only one example of how environmental, social, and economic conditions of the future will dramatically affect how systems are configured.

**COMMENTS**

The questions generally centered around the cost tradeoffs of different mixer-paramp combinations. The use of cryogenically cooled Schottky mixers was also addressed.

- Q. Please discuss the use of cryogenically cooled mixers at 94 GHz.
- A. An attractive cost effective approach is a cryogenically cooled Schottky mixer with a low noise cryogenically cooled IF paramp in the microwave region. The noise contribution of the overall IF is in the order of 20°K.

**High Power**

J. E. Grant, Hughes Aircraft Company  
 Torrance, California

**Digest Abstract**

The technology forecast for high power is predicated on new system requirements. Power levels have historically been dictated by system requirements where the necessary funding level could be justified. Little effort has been spent in the past to advance the microwave component art without regard for some system application. This trend is certainly expected to continue.

In general, power increases are expected to be modest. The most notable exception is in the area of communication satellites where power levels are expected to increase substantially by as much as two orders of magnitude. However, the user is becoming increasingly more interested in other characteristics such as wider bandwidth, higher efficiency, better linearity, lighter weight, lower cost and higher reliability even at the expense of reduced power. Taken separately, these characteristics are available in present day amplifiers, but taken simultaneously many compromises have been necessary. Although no dramatic breakthroughs are anticipated the user will expect few compromises in the future particularly in the area of cost and reliability.

Future trends in high power are examined relative to three principle markets — communications, radar and ECM. Trends in other performance characteristics are also considered such as bandwidth, efficiency and linearity.

**COMMENTS**

The crux of the talk was that power level is no problem, efficiency and bandwidth are, to name a few.

- Q. What is generally the efficiency of airborne radar tubes?
- A. Currently -30 to 35%. In development for radars — 40 to 50%.
- Q. Other than efficiency, what is the major problem today?
- A. Bandwidth, primarily for ECM.
- Q. What is the cost factor in millimeter wave tubes?
- A. Frequency — high at high frequencies. This is due to the fact we are pushing the state of the art and limited applications result in small quantity buys. Conversely, if the demand for high frequency devices increases, the cost should go down.

**Microwave Computer Logic and the Future**

B. T. Murphy  
 Bell Telephone Labs  
 Murray Hill, NJ

**Digest Abstract**

Traditionally the microwave engineer has been concerned only with the front-end of systems where relatively few microwave devices are used. This is changing to some extent with the advent of phased array systems where receivers and transmitters may be replicated thousands of times, although the number of systems may be few.

The application of microwave semiconductor logic elements in communications and computers in a field is expanding rapidly. Demands for increased speed for logic operations in the communications and computer field are moving the frequency spectrum up into the gigahertz range so that the application of microwave techniques is mandatory. The talk and discussion will cover the status and problems unique to ultra-high speed logic. Limitations due to fabrication processes and the potential of novel logic elements such as TED's will be covered, as well as the future needs for still higher speed elements.

**COMMENTS**

- Q. How do you get the photolith registration?
- A. With difficulty. We use electron lithography. The problems are shallow structures. Also vibration and thermal ambients during the lithography process. We'll get there.
- Q. What are the prospects for the Josephson Junction?
- A. 1. It's capable of very high speeds.  
 2. Very low impedance levels.  
 3. Cooling the device is a problem. The power dissipation in the device has to be removed. This requires orders of magnitude more pump power to remove the heat.  
 4. May require radical computer architecture change.
- Q. Is there a need for high speed devices?
- A. It's a tradeoff between cost vs. need.

*NOTE: Comments, questions and answers have been paraphrased*

*(Continued on page 6)*

## TECHNOLOGY FORECASTING AND ASSESSMENT

(Continued from page 5)

### Future Prospects for Submillimeter Waves

K. J. Button, M.I.T. National Magnet Lab.  
Cambridge, Mass.

#### Digest Abstract

Many new components are being developed and many applications are emerging apparently at an accelerating rate. We have always thought that submillimeter waves are useless because they will not transmit through the water vapor in the atmosphere and also because we did not have a source of submillimeter radiation. Now we have submillimeter laser sources operating at more than 50 different frequencies. A tunable source of radiation has also been developed. The applications are appearing even in the newest technologies as the measurement of energy and density of deuterium and tritium ions in the plasmas of controlled nuclear fusion prototype machines. Some of the new components and techniques are extensions of microwaves; others are drawn from the optical end of the spectrum. The MTT Society has sponsored the First International Conference on Submillimeter Waves (Atlanta, June, 1974) and also the Second Conference (San Juan, December 6-10, 1976). This is clearly a rapidly growing technology. Some of the growth factors and directions will be discussed.

#### COMMENTS

The submillimeter wave field is now at the same stage of technological development as the microwave field was in the late 1930's. The Klystron was just invented and radar was its prime application. We have our source — the laser, and our application — plasma diagnostics for fusion energy. The components are now being hand made. Until a large scale commercial submillimeter activity or market is generated, such as communications in the microwave field, the large scale development of components will be slow. Conversely, no development — no markets.

- Q. How do you modulate submillimeter wave sources?
- A. We don't know how to do it yet.
- Q. What are the prime component needs?
- A. We need to extend the Schottky barrier detector to the submillimeter region for heterodyning.
- Q. What about submillimeter wave sources as pumps for 94 GHz?
- A. Good sources are available above 500 GHz, but in the region between 200 and 500 GHz, the sources are very low power — in the microwatt range.



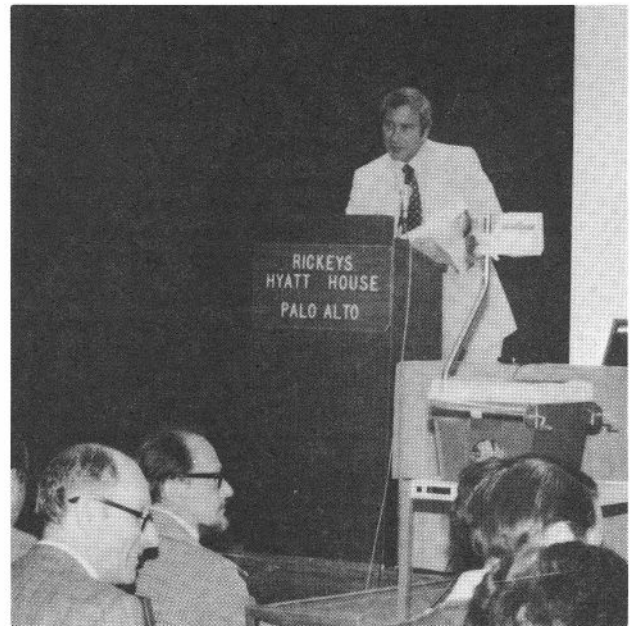
## ADCOM HIGHLIGHTS

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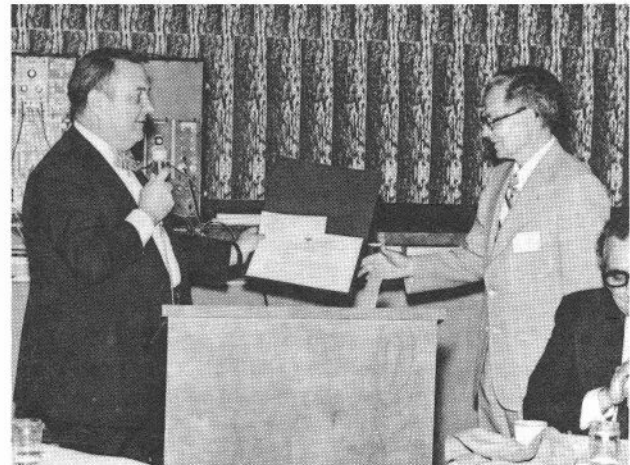
Arthur Guy reported that the COMAR Committee was concerned about the proliferation of small meetings on biological effects. They would prefer to see a single three day meeting on that topic each year. He suggested that MTT-S coordinate with URSI, IMPI, etc. to bring such a single meeting about. He was asked to bring specific recommendations to the next ADCOM meeting.

In the area of Chapter Activities Larry Whicker reported that chapter reports are now coming in somewhat more regularly. It was also suggested that it would be more in synchronism with chapter functions if the National Lecturer's term covered a fiscal year (July 1 - June 30), rather than a calendar year. Possible formats for one day technical symposiums are being developed by Harold Stinehelfer.

Finally, a bylaw change was approved 14 to 1 that has the effect of allowing the three ex-officio Past Presidents to vote in elections of new ADCOM members and officers. The meeting was adjourned at 5:30, and attendees moved on to the "NO HOST" cocktail party that opened the Symposium in Palo Alto.



Al Clavin addressing the attendees at the Technology Forecasting and Assessment session.

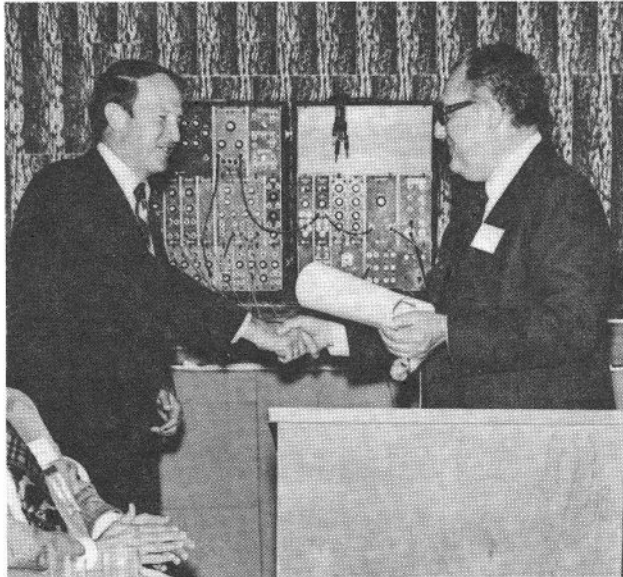


P. H. Smith receives the Special Recognition Microwave Applications Award.

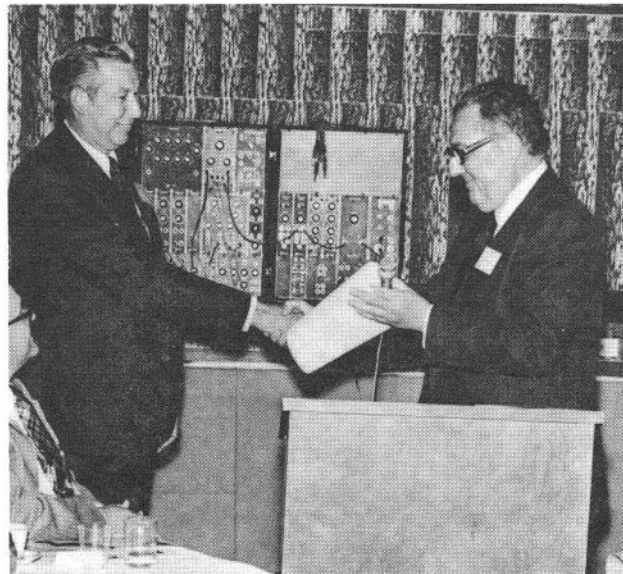


Dean F. Peterson III accepting the Microwave Application Award.

MEET THE TWO NEW IEEE FELLOWS



G. P. Rodrigue



G. Harrison



Wes Matthews — Steering Committee Chairman. Seated — John Guerrero, Warren Cooper and better half.

CALL FOR NOMINATIONS  
TO MTT/S ADCOM

Notice is hereby given to all members of the IEEE Society on Microwave Theory and Techniques that nominations for the Administrative Committee are now open and will be received on or before the annual meeting to held on September 9, 1975 at the Cherry Hill Inn, Cherry Hill, New Jersey. Nominations can be made through any member of the Administrative Committee (see 1975 committee directory for names and addresses) or by petition signed by 25 members of the Society. Petitions should be submitted to the Chairman of the Nominations Subcommittee, A. Clavin, Hughes Aircraft Company, Bldg. 268-MS A55, Canoga Park, Calif. 91304, or presented at the annual meeting.

M.I.C. WORKSHOP  
HELD IN PALO ALTO MAY 15  
SYNOPSIS

The MTT-6 Subcommittee on M.I.C. (Microwave Integrated Circuit) Techniques conducted an all-day Workshop on mechanical and chemical fabrication techniques on May 15. The all day session, which was held at Rickey's Hyatt House in Palo Alto the day after the International Microwave Symposium, saw 32 attendees turn out to hear three invited speakers, and to exchange ideas. Weldon Jackson kicked off the meeting with a wide-ranging discussion of the methods used by Hewlett-Packard to fabricate circuits, mount them in packages, and protect them from the environment. Gordon Cizek of Abelstik Labs contributed a talk on epoxies in their various forms (liquid, paste, and film). Arnold Pfahnl of Bell Labs detailed his Company's practical photolithographic techniques used in a cost-sensitive production environment. Following these speakers, each attendee was asked to contribute five minutes of discussion on a related topic. Dr. Martin Caulton of RCA Labs acted as moderator for the Workshop.

The Subcommittee's new Chairman, Ray Waugh of Hewlett-Packard, and it's new Co-Chairman, Reinhard Knerr of Bell Labs, were introduced. They are giving serious consideration to sponsoring a similar Workshop after next year's Symposium. Suggestions for topics are now being entertained.



Portion of Head Table — L-R: Mrs. B. C. DeLoach. B. C. DeLoach, Mr. & Mrs. Roy Pritts, Mrs. E. W. Matthews

# '76 International Microwave Symposium



## "THE BICENTENNIAL SYMPOSIUM"

The 1976 IEEE MTT-S International Microwave Symposium will be held at the Cherry Hill Inn, Cherry Hill, New Jersey, near the Bicentennial City, Philadelphia, Pa.

The 1976 MTT-S Symposium will attempt "To Attain a Realistic Perspective in Microwaves." To achieve this role, the conference will use tutorial as well as contributed papers in the appropriate areas.

Papers are solicited describing original work, not published or presented previously, which can be theoretical, technological, or applications oriented. Although any papers concerned with microwave techniques, devices, systems, and applications will be considered, the following subject areas are regarded as particularly appropriate for this conference:

- New Active Microwave Devices and their Applications
- Micron, Sub-micron Devices and Related Technology
- Microwave Acoustics, Delay Lines, and Related Signal Processing
- Computer-Aided Design
- Automating Microwaves
- Integrated Optics, Fiber Optics and Quasi-optical Techniques
- Microwaves in Satellite Communications
- Millimeter and Submillimeter Wave Techniques
- Passive Microwave Components, Devices and Applications
- Microwave Radiation and Biological Effects
- Commercial Applications of Microwaves
- Digital Microwave Radio Systems
- Extending Microwave Techniques to Lower Frequencies

Authors are requested to submit both a 35-word abstract and a 500-1000 word summary (up to 6 illustrations), clearly explaining their contribution, its originality, and its relative importance. Abstracts and summaries must be received on or before January 2, 1976 by

Dr. Martin Caulton, Chairman  
TPC 1976 MTT-S Symposium  
RCA Laboratories  
Princeton, New Jersey 08540

Notices of acceptance or rejection will be mailed to authors by February 5, 1976.

## Symposium Exhibits

The Symposium will also include exhibits, located close to the meeting rooms. For information about these exhibits, please contact

Mr. Bertram Aaron  
55 Northern Boulevard,  
Greenvale, L.I., New York 11548  
516-621-0630



THE INSTITUTE OF  
ELECTRICAL AND  
ELECTRONICS  
ENGINEERS, INC.



**SURFACE ACOUSTIC WAVES  
PROCEEDINGS SPECIAL ISSUE**

Surface acoustic wave devices and applications will be the subject of a special issue of the Proceedings of the IEEE which is being organized for publication in March 1976. The performance and limitation of passive and active surface wave devices will be treated in invited and contributed papers. The major categories to be covered include properties of materials, surface wave filters, adaptive surface wave devices for signal processing, surface wave optical and acoustic scanning devices. In addition, contributions were solicited which describe applications of surface waves to communication systems, oscillators, radars and television.



*Bill Mumford is having a blast.*



*Larry Whicker and friend in a hot technical discussion.*

**REPORT OF DIVISIONAL DIRECTOR**

*(Continued from page 3)*

The needs of engineering professionals are:

1. A lifetime engineering career with adequate financial compensation,
2. Adequate public support for engineering in solving society's problems,
3. Regulation of the quality and quantity of engineers in the profession with due consideration for existing practitioners,
4. A positive incentive system for new contributions,
5. A work environment that can provide a positive professional incentive and an opportunity to maintain technical proficiency,
6. Recognition by his peers for the complete spectrum of professional contributions.

Your support or comments would be appreciated.

**CALL FOR PAPERS**

**MTT TRANSACTIONS SPECIAL ISSUE  
ON MICROWAVE FIELD-EFFECT TRANSISTORS**

The IEEE Transactions on Microwave Theory and Techniques will have a special issue in June 1976 for the publication of original work on

**MICROWAVE FIELD-EFFECT TRANSISTORS**

Areas of interest include, but are not restricted to: Microwave characteristics of low noise and power MESFETs; device reliability; synthesis, realization and performance of circuits for amplification, power generation, frequency conversion and modulation.

Authors are invited to submit three copies of manuscripts to the guest editor:

C. A. Liechi  
Hewlett-Packard Company  
Solid-State Laboratory  
1501 Page Mill Road  
Palo Alto, CA 94304 U.S.A.

before October 1, 1975.

Papers submitted for this special issue are subject to the normal review procedures. They must describe clearly what new and significant results — both theoretical and experimental — have been obtained.

**U.S. NATIONAL MEETING OF INTERNATIONAL  
UNION OF RADIO SCIENCE (URSI)**

The 1975 Annual Meeting will be held October 20-23, 1975 at the University of Colorado, Boulder, Colorado in cooperation with various Societies of the IEEE and sponsored by the U.S. National Committee of URSI.

Local hosts are the University of Colorado, the National Bureau of Standards, the Office of Telecommunications, and the National Oceanic and Atmospheric Administration.

The following Commissions will hold technical sessions:

- Commission 1 - Radio Measurement Methods and Standards
- Commission 2 - Radio and Non-Ionized Media
- Commission 3 - On the Ionosphere
- Commission 4 - On the Magnetosphere
- Commission 5 - Radio and Radar Astronomy
- Commission 6 - Radio Waves and Transmission of Information
- Commission 7 - Radio Electronics
- Commission 8 - On Radio Noise of Terrestrial Origin

**ABSTRACTS**

Send original abstract and two copies, prepared in accordance with the instructions below to:

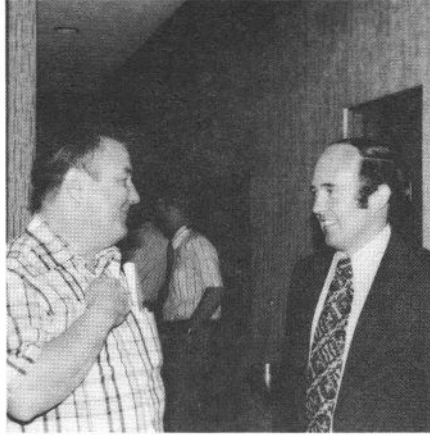
Prof. James R. Wait  
Chairman, USNC/URSI Technical Program  
Room 242, RB 1, C.I.R.E.S.  
University of Colorado  
Boulder, CO 90302

**DEADLINE FOR RECEIPT OF ALL ABSTRACTS:  
JULY 14, 1975**

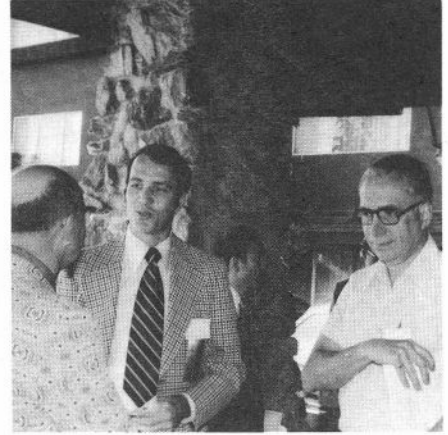
PICTURES FROM THE SYMPOSIUM



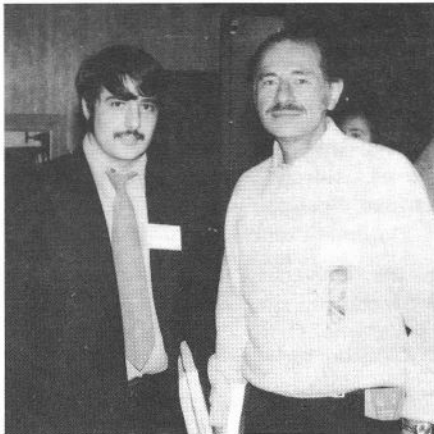
*Steve Adam, Kiyo Tomiyasu, and S. Saito are enjoying themselves.*



*Warren Cooper must have told Jeff Grant a funny story.*



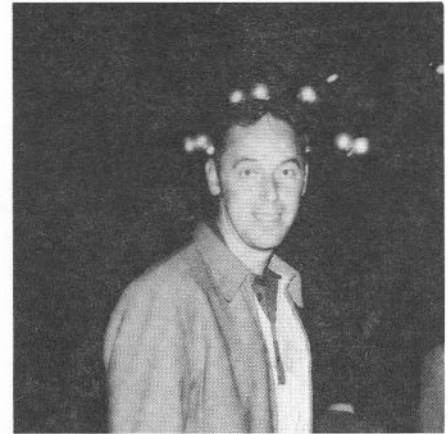
*Lamar Allen and Bill Steenarrt enjoying the good weather.*



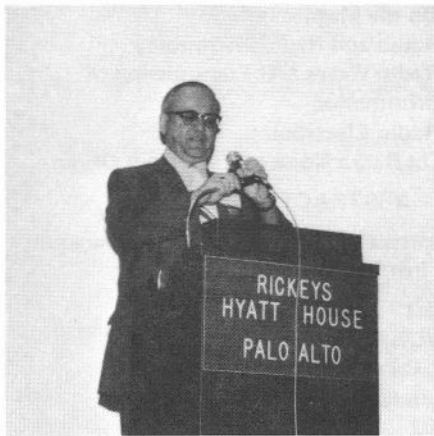
*B. D. DeMarinis and Marty Caulton preparing for the '76 MTT Symposium at Cherry Hill.*



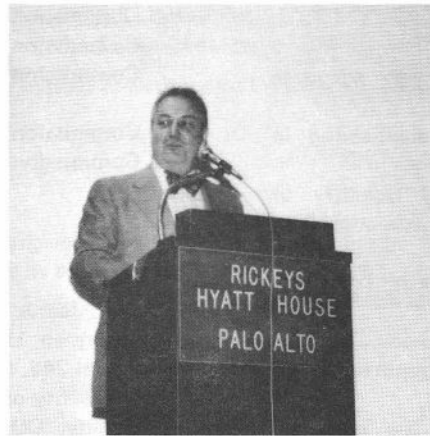
*Dave Rubin getting advice from John Horton for the '77 symposium at San Diego.*



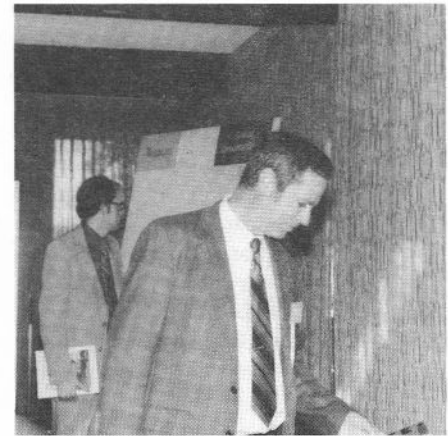
*Dave after getting the advice.*



*Wes Matthews making the Introductory Address.*



*Warren Cooper making the Keynote Address.*



*Dick Sparks intent on the exhibits.*

## SHORT COURSES

### MICROWAVE ANTENNA MEASUREMENTS SHORT COURSE

July 14-18

Fee: \$350

The California State University, Northridge is presenting the Seventh Annual offering of the "Microwave Antenna Measurements" short course. This course is an intensive study of the measurement of microwave antenna radiation characteristics and impedance properties. The principal lecturers will be Searcy Hollis and Gerald Hickman, Scientific-Atlanta, Inc., and Edmond S. Gillespie, CSUN. Guest lecturers include A. M. Archer, Lockheed-California Co., Ronald Bowman and Allen Newell, National Bureau of Standards, Charles Stelzried and Arthur Freiley, JPL, Harry Sefton, Bunker-Ramo, G. P. Tricoles, General Dynamics and Dusan Zrnica, CSUN. For further information write:

Dr. Edmond S. Gillespie  
School of Engineering  
California State University, Northridge  
Northridge, California 91324

This course is given in alternate years at Georgia Tech.

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### OPTICAL COMMUNICATION VIA GLASS FIBER WAVEGUIDES

August 3-8, 1975  
University of Colorado  
Boulder, Colorado

It has now become apparent that the demands of modern telecommunication systems may very well be met through the use of hair-like glass fibers which act as waveguides at optical frequencies. This course is an intensive 4-1/2 day study of the state-of-the-art of this emerging technology. It will cover the transmission medium, optical sources and their modulation, and the detection of the signal. Advantages, disadvantages, and applications (both current and proposed) will be discussed. Engineering trends and problem areas will be reviewed to give the participant a realistic appraisal of the utility of appropriate techniques.

The course will be addressed to communication engineers, planners, and users; it will assume a B.Sc. degree or the equivalent.

The course will cover the following major topics: Analog & Digital Techniques; The Transmission Medium; Optical Sources; Source Modulation; Detection and Noise; Integrated Optics; System Design Considerations.

Registration by July 7, \$395

For further information, contact:

Dr. R. L. Gallawa  
U.S. Dept. of Commerce  
Office of Telecommunications  
Institute for Telecommunication Sciences  
Boulder, CO 80302  
(303)499-1000, ext. 3761 or 4281

### MICROWAVE SEMICONDUCTOR DEVICES, CIRCUITS, AND APPLICATIONS

Co-Chairmen: George I. Haddad, Peter J. Khan, August 18-22, 1975, Fee: \$325

This course provides a basic understanding of operating principles and design techniques for microwave devices and circuits utilizing solid-state elements including varactors, pin diodes, detectors, mixers, avalanche diodes, Gunn devices and BARITT devices. Recent advances in these various areas will be discussed.

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### MEETING NOTICE AUTOMATIC R.F. TEST GROUP SEPTEMBER 17-19, 1975 NATIONAL BUREAU OF STANDARDS BOULDER, COLORADO

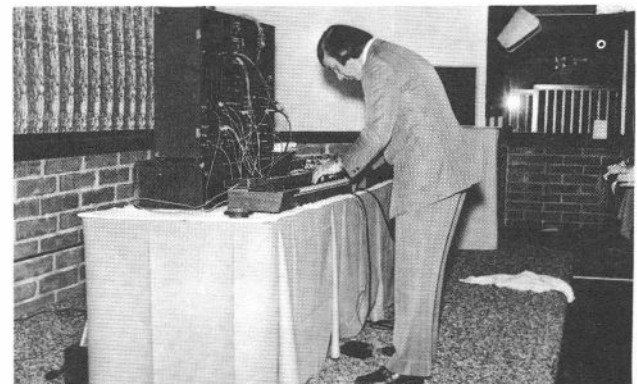
This is an association of approximately 200 users of Automatic Network Analyzers, mainly the large Hewlett-Packard type. Meetings are held twice a year. For further information, contact

A. E. Holley  
600/B 130  
Hughes Aircraft Co.  
P.O. Box 3310  
Fullerton, CA. 92634

### PICTURES FROM THE BANQUET



Left to right, Mr. and Mrs. W. Cooper, Mrs. and Mr. J. Lepoff and J. Guerrero.



Roy Pritts playing the MOOG.

**MORE PICTURES FROM THE BANQUET**

**ACCEPTANCE SPEECHES**



*B. C. DeLoach*



*H. A. Wheeler*



*P. H. Smith*

The IEEE Board of Directors recently reduced the signatures required to place a candidate on the ballot for IEEE president and executive vice-president. Now only one percent of the voting members can put a name on the ballot. This is about 1,500 signatures.

This may be the first time that we have a contested election in the IEEE. This is not necessarily bad because it gives the opposition a chance to voice their views. The democratic process rarely fails.

On the other hand, it can fail if the electorate is either uninformed or apathetic. Usually only about 40,000 members, out of 150,000 eligible, bother to cast a ballot. This means a very small minority of only 20,000 can elect the top officers of the institute who influence the direction that our professional society moves.

Your responsibility as a voting member of IEEE is to be informed about the candidates. Review what they have done for the IEEE. Review their experience that would help them lead IEEE. Evaluate the value of their own careers in providing IEEE with the leadership it needs. Finally, your duty is to cast your ballot for the candidate of your choice.

Third Class



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