IEEE SOCIETY ON MICROWAVE THEORY AND TECHNIQUES

NEWSLETTER

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TRW ESG, One Space Park, Redondo Beach, California 90278

Number 110, Summer 1984

REFLECTIONS ON THE 1984 INTERNATIONAL MICROWAVE SYMPOSIUM

by Stephen F. Adam

EXPANDING MICROWAVE HORIZONS

The 1984 International Microwave Symposium was hosted by the San Francisco/Santa Clara Valley MTT-S Chapter. This was the fourth time that this Chapter had the opportunity to serve our Society in such a way. It has only been a couple of months that the great event passed, and it took 6 years to prepare for it. An organization, such as the Steering Committee is manned by a host of dedicated, hard-working professionals, devoting hours, days and weeks of hard labor. Only with these kinds of people can such a complex job be done with the success we experienced. I feel honored to be the chairman of this group of people.

This year is the Centennial Year of celebration for IEEE. We are proud of our heritage, and added exhibits appropriate to this celebration to our growing Historical Exhibits.

We are experiencing a continued growth in both the Technical sessions and in the Exhibits of the Microwave Symposium for the last several years. It is almost an expected fact that every year new attendance records are set. This year was the first time that the Technical Sessions and Exhibits were not in a hotel or located directly adjacent to one. There were six major hotels, where the participants were housed. It was a major challenge to arrange for their continual move across such a busy city as San Francisco. With almost continous shuttle bus service and the well marked and explained availability of BART and MUNI (local rapid transit systems) we have not received a single complaint from the participants. This was one of the most talked about anticipation from other cities' organizers and ADCOM.

The Microwave and Millimeter-Wave Monolithic Circuits Symposium preceeded our Symposium along with a number of Workshops. At the plenary session, Stephen F. Adam, conference chairman, officially declared the symposium in session. H. George Oltman, Jr., president of MTT-S, added his

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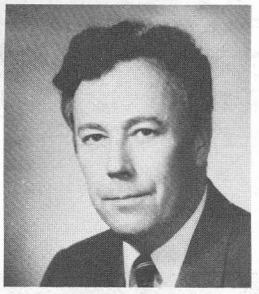
ADCOM HIGHLIGHTS



BY HARLAN HOWE, JR.

The second ADCOM meeting of the year was held at the Hyatt Regency Hotel in San Francisco on Monday, May 28, 1984 from 8:30 AM to 5:00 PM. The first major item of business was the approval of a number of expenditure requests including advances to future Symposium Committees, small purchases by the Transaction Editor and the ADCOM Secretary, and approval of the purchase by the Historical Committee of video recording equipment to be used primarily, but not exclusively, to record the recollections of some of the older members of the MIT RAD Lab.

George Oltman announced the formation of an ADHOC Committee for the Promotion of National Microwave Standards. Douglas Rytting will serve as its Chairman. Those members wishing to communicate with the Committee should contact either him or the Committee Secretary, Mario Maury.

The Awards Committee submitted a proposal for ADCOM to consider a "Goal Oriented Award". During the May 2, 1984 meeting the Awards Planning and Policy Committee, of the IEEE Awards Board, chaired by Kiyo Tomiyasu, the concept of a Goal Oriented Award for consideration within the Institute was introduced by Martin Schnieder, a member of APPC. An example cited was a high power solid state millimeter wave amplifier. It was suggested that such an award be proposed, supported, and administered by the MTT-S. The purpose would be to stimulate and offer an exciting challenge to MTT-S members. It would be a specific type of Application Award. A task force was formed to prepare a draft proposal and specification of a Goal Oriented Award for consideration at the Fall ADCOM meeting.

In the area of publications and standards, ADCOM voted to exempt the centennial issue authors from page charge requirements. This was done primarily because the entire issue is made up of invited papers. ADCOM also approved a special issue fo the Transactions to appear next year on "Numerical Methods For Microwave and Millimeter Wave Problems".

Jim Degenford reported that the Society's net worth has risen to just over $600,000. While this sounds like a great sum of money, it should be noted that the annual operating expenses of the Society are approximately $550,000 and that this surplus is not unreasonable by IEEE or IRS standards.

ADCOM voted to invoke a ban against the use of private video tape recording at the Symposium Technical Sessions. While copyright considerations formed a portion of the decision, the major reason for this ban was the consideration of other members attending the technical sessions, since video recording equipment and its users, tend to be intrusive and can easily distract both author as well as the members of the audience who have come to hear him. As a related action, it was proposed that the MTT itself professionally video tape the technical sessions of the International Symposium starting in 1985. These recordings would be of high quality and available for sale to libraries, companies, and individuals. After some debate, in which it was pointed out that presently available video tapes have not been a success, the proposal was defeated.

The proposal for a Past Presidents Council, which was brought up originally at the last ADCOM meeting, was also defeated although a resolution was passed urging future ADCOM Presidents to permit Past Presidents to make motions from the floor.

In a final action ADCOM approved the establishment of a committee to periodically review the scope and purpose, objectives, composition, operations, and effectiveness of all MTT Society Committees. This is in consonance with the Institute's By-Laws which provide for periodic review of committees to assure that their scopes and compositions continue to serve the best interests of the Institute and its membership. The Review Committee will be composed of three or more past MTT Presidents.

The meeting was adjourned promptly at 5:00 PM. The next ADCOM meeting will be held on September 17-18, 1984 in New York City.

EXPANDING MICROWAVE HORIZONS

PRESIDENT'S REMARKS

IEEE CELEBRATES ITS CENTENNIAL IN A GRAND WAY

by George Oltman

I recently had the pleasure of attending my most inspiring professional activity ever. I attended the Boston Centennial Celebration. I have to say that the IEEE celebrated its centennial in a grand way. I don't mean grand in the sense of "lavish," but in the sense of meaningful, respectful and inspiring. As MTT-S President and representative to the Technical Activities Board (TAB), I was privileged to attend these events and represent our Society. The centennial events included:

The luncheon hosting three invited Chinese Society delegations Sunday, May 13 (unscheduled)
IEEE Annual Awards Presentation and Reception Sunday evening, May 13
IEEE Learned Societies and Associations Luncheon and Presentation Monday, May 14
IEEE Centennial Convocation Monday evening, May 14

TAB/Industry Round Table Discussions (Centennial Division breakfast) Tuesday, May 15 The objectives of all of these activities were to promote the electrical and electronic engineering technology and honor those individuals who had been outstanding in that endeavor throughout the years. The latter was especially meaningful; it was humbling yet heartwarming to listen to the lists of accomplishments of the IEEE award winners. And to listen to each awardee's statement thanking their peers, their co-workers, their enlightened company,their supportive spouse and family.

IEEE Hosts Luncheon for Three Chinese Societies. Eighty-three international societies sent representatives to Boston to honor the IEEE during it's centennial celebration. Among those traveling the farthest were twenty-two members of three Chinese (Mainland) societies. On Sunday, the IEEE hosted these attendees in an unscheduled luncheon. I had to take the "red-eye" flight from L.A. to get there in time. The attendees included two microwave engineers. So, I was asked to come early and participate in the luncheon. It was a pleasant exchange with the offering of gifts and numerous toasts honoring the participating societies. Three Chinese societies were the Chinese Institute of Electronics, Chinese Society of Electrical Engineering and the Chinese Electrotechnical Society. The microwave delegates were Chen Han Kuei and Lin Jin Ting. Professor Chen studied engineering at the University of Illinois. Dr. Lin was a host to the MTTS delegation that visited China Last October (1983).

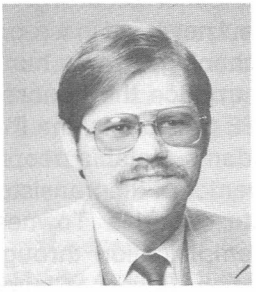
IEEE Receives Gifts and Honors from Eighty-three World-Wide Societies. The most unusual event of the three-day celebration was the ceremony in which the gifts and plaques were received. The delegate from each of the eighty-three societies presented to Dr. Richard Gowan, IEEE President, their society's gift. Then they said a few words in honor of the occasion. The gifts were those which gave society's character. The gifts varied widely and included plaques, scrolls, paintings, other works of art, medals, and an innovative holographically projected plaque. This was an impressive event which illustrated the esteem in which the IEEE is held throughout the world. Besides China there were delegates from Yugoslavia, Poland, England, France, and Germany, Italy, Israel and others. There was a total of twenty-eight non-U.S. societies. These gifts will be on permanent display at IEEE headquarters in New York City and Piscataway.

The Humbling IEEE Centennial Convocation. The highlight event of the year's centennial celebration was the convocation banquet. Most of the great names of our society were there. I never sat in a room with so many greats of our technology. It was humbling. It took 45 minutes to introduce the honored guests. These included the IEEE presidents, the IRE presidents, and the AIEE presidents. Notable people included John Bardeen, co-inventor of the transistor and two time Nobel laureate; Charles Townes, originator of the concept of amplification through stimulated emission of radiation (laser); Claude Shannon, father of Information Theory; and many others. The featured speaker of the evening was David Packard, Board Chairman of Hewlett-Packard. The evening was concluded with a theatrical presentation in which actors were dressed to represent some of the great contributors to our technology.

They carried on dialogues about their contributions, their problems and their successes. We listened to Franklin, Edison, Marconi, Bell, Steinmetz, Von Neumann and Farady. The play was interesting, provocative and the players were well chosen. Steinmetz, who in real life was diminutive and hunchback was played by an actor with the same deformity. He also displayed the strong character of Steinmetz.

TI Chief, Mark Shepard, Says Older Engineers Resist Continuing Education. Mark Shepard, speaking to a breakfast meeting of the TAB leaders on the third day, stated that the biggest barrier to keeping the U.S. engineering work force up-to-date is the reluctance of older engineers to go back to school. He stated, that "when a guy reaches forty or forty-five, it's very hard to convince him that he needs more education." TI replenishes its work force for the most part by recruiting recent college graduates. TI then continues their education in-house. Mr. Shepard also stated that the United States should take steps to increase their supply of engineers. He noted that Japan, despite a population less than half that of the U.S., produces ten thousand more engineers a year from its schools. Japanese companies also pay their engineers about one-half what equivalent engineers in the U.S. receive, thereby giving Japanese industry more money to spend on product research and development. Finally, and this is a point I subscribe to, Mr. Shepard stated "we need to get more academics into the shop and more engineers into the universities."

CHAIRMAN'S REMARKS: 1984 IEEE MICROWAVE AND MILLIMETER WAVE MONOLITHIC CIRCUITS SYMPOSIUM



James G. Oakes
General Chairman 1984

This year's Monolithic Circuits Symposium was our strongest yet. The technical program represented strong, individual contributions to the state-of-the-art along with a new emphasis on chip size, producibility and cost. The meeting ran smoothly despite being held at the Hyatt Regency Hotel on Tuesday and at the Civic Auditorium on Wednesday. San Francisco gave us some nice weather to enjoy.

The symposium attendance of over 600 shows the continuing strong interest in monolithic GaAs integrated circuits. Our registration number are about half the size of the International Microwave Symposium attendees. This is certainly an accomplishment for a three year old meeting. Of course, our attendance is bouyed by running sequentially with the International Microwave Symposium, but I believe we are now attracting people to our symposium who then stay for the main symposium.

One weak area in our technical coverage is the signal processing IC. This can be as simple as a divide-by-2 circuit or a shift register, or as complex as a high speed A/D converter. These components will increasingly impact the design of microwave front ends and other units. So send us your astracts for next year's conference! We'd like to address this area.

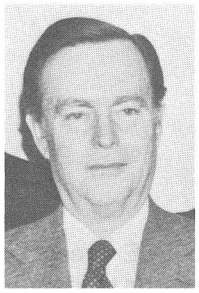
A successful conference takes more than good papers. The Steering Committee and Technical Program Committee are responsible for the smooth operation and informative papers. Special thanks go to our Technical Program Chairman and head of next year's conference, Bill Wisseman. Our West Coast representatives did an outstanding job on local arrangements and coordination with the main symposium; Reynold Kagiwada, Derry Hornbuckle, Charlie Huang. Our finances have been ably handled by Roger Sudbury. The publicity and publications organizers, Barry Spielman and John Kuno, gave us exposure plus a well organized digest of technical papers. Paul Greiling, our secretary, kept the committee informed. As in years past, Walter Gelnovatch is handling the papers submitted to the MTT Transactions for special issue publication.

Finally, we appreciate the support of the MTT AdCom and the cooperation of the International Microwave Symposium organizing committee. We couldn't succeed without their help.

I hope those of you who attended the Monolithic Circuits Symposium enjoyed it as much as I did. If you missed it this year, make a point to get to it next year.

1884 1984
A CENTURY OF ELECTRICAL PROGRESS

REFLECTIONS ON THE 1984 TECHNICAL PROGRAM



by Ferdo Ivanek
TPC Chairman

Now that it's all over for this year and we have to concentrate on the next symposium, it is useful to capture the predominant impressions while they are fresh. As usual, there are some useful lessons to learn from experience.

The most striking one is that a technical program of high quality is of greatest help in overcoming any organizational imperfections. While we had our share of unexpected problems and gathered additional evidence to support the validity of Murphy's Law, it was most gratifying to see how everybody — attendees, speakers and session chairmen alike — either helped to overcome any encountered problem or simply ignored it and concentrated on the papers.

Trying to evaluate the changes we introduced in the technical program framework, we found that the expected benefits of reducing the session length to 90 minutes had indeed materialized. The sessions became more homogeneous in content and their attendance more stable; there was noticeably less commuting between parallel sessions. In addition, having thereby created a greater number of session slots without extending the length of the symposium or adding more parallel sessions, we gained flexibility in structuring the program to better accommodate the increasing variety of reported work.

The other most important new feature of the technical program was the introduction of short papers. While new to us, short papers had been well established with several IEEE and other technical conferences. It was certainly encouraging that the paper authors and the Technical Program Committee opted to place one out of every three papers in the short paper category, but we were still apprehensive about the acceptance of this change at the symposium. As it turned out, the material made available in this alternative way of presentation attracted the same level of attention as the full-length presentations, and made the sessions more informative.

The introductions by the session chairmen were given more emphasis by allocating 10 minutes for their verbal presentation, and by including a written version in the Digest. The results were encouraging, but uneven. Some session introductions were most informative about the development trends in the session's subject area, but at the other extreme some were too limited in scope and thereby did not take full advantage of the opportunity to substantially contribute to the session's content. We certainly recommend that this feature which was first emphasized at the 1983 symposium in Boston be further strengthened.

Our second Open Forum was again very successful. It obviously generated lively, widespread interest, enjoyed excellent attendance and stimulated mutually rewarding discussions. These were apparently so absorbing that only near the end were we reminded that we did not deliver on our promise to provide refreshments. We made up at the next session of the Open Forum, but observed that this inducement did not increase the attendance. The program itself was fully successful in this respect; most significant are the suggestions voiced by some attendees that a third Open Forum Session should be added at the next symposium.

Thanks again to everybody for all their individual contributions and group efforts which made this year's technical program such a success!

BITS OF HUMOR

If you think computer jargon is confusing, take a look at the following sentences. Buried beneath the high-faluting language are some common cliches you've all heard. See how many you can recognize.

(1) The prudent avis which matutinally deserts the coziness of its abode will ensnare a vermiculate creature. (Hint: If you get to work before 7:00 a.m., you can get terrific response time on the terminal and fast turnaround for your jobs.

(2) A large round earthenware vessel subject to the observation of a plethora of persons on no occasion reaches a temperature of 100 degrees centigrade. (Hint: Checking on the status of your job every five minutes won't make it run any faster.

(3) It is futile undertaking to lament the evacuation from a container of bovine nutrient matter. (Hint: If your program does not run correctly the first time, don't be upset; just try, try again.

Were you aware of the fact that there are the names of 26 states shown on the back side of a five dollar bill?

REFLECTIONS (continued from page 1)

welcoming remarks. After Ferdo Ivanek, Technical Program Chairman explained the Technical Program, John A. Young, president and Chief Executive Officer of Hewlett-Packard Company delivered a very timely keynote address dealing with Industrial Competiveness. Young was named chairman of the President's Commission on Industrial Competiveness. A cross-section of his talk is printed elsewhere in this issue of the Newsletter.

Our Technical Program Committee selected, and put together an outstanding Technical Program, which is reported on another page of this Newsletter. A good selection of Social Programs were available for the Symposium going engineers and their accompanying relations. My dear wife, Edie and Phyllis Hensperger (our Treasurer's wife) had arranged for the tours of the Social programs. Some of the highlights were: Visit to Alcatraz Island; shopping tour to Jackson Square; a tour to the Filoli Mansion in Menlo Park; visit to other Victorian Mansions of San Francisco; a Bay cruise with a dinner in Tiburon; an all day Saturday tour of the wine country.

The highlight for all social activities of the Symposium is the Annual Awards Presentation Banquet. It was held Thursday evening in the Grand Ballroom of the Hyatt Regency, San Francisco Hotel. After a very delicious dinner, which was preceeded by a cocktail party, hosted by the Exhibitors, short introductions followed. H. George Oltman, Jr. President of the MTT-S addressed the attendance and presented this year's Microwave Carrier Award to John R. Pierce. The Microwave Prize this year was awarded to Reinmut K. Hoffman and Johann Siegl. The Microwave Applications Award was received by Paul J. Meier. This year, it was the second time that MTT-S has given a Distinguished Service Award. It was presented to Alvin Clavin for his service to the society. Al's acceptance remarks moved everyone in the audience. Stephen F. Adam received the Distinguished Microwave Lecturers Plaque; Charles Rucker was given the past president's pin.

Twenty Centennial Medals were available to be presented at that time by President Oltman. One was sent to the widow of Donald D. King as a result of his untimely death. The names of the remaining nineteen recipients are:

Stephen F. Adam
Alfred C. Beck
Alvin Clavin
Seymour Cohn
Marion E. Hines
William W. Mumford
Arthur A. Oliner
Don Parker
George P. Rodrigue
Fred J. Rosenbaum
Charles T. Rucker
Theodore S. Saad
Phillip H. Smith
Harold Sobol
Richard A. Sparks
Kiyo Tomiyasu
Lawrence R. Whicker
John R. Whinnery
Leo Young

Dr. Bruno O. Weinschel, 1986 IEEE presidential candidate, presented the Fellow Awards to those who requested that their awards be presented to them at the Annual Symposium. The award recipients were:

Gunther U. Sorger
Julin W. Dees
Glenn F. Engen
Anthony R. Kerr
William R. Wisseman
Eikichi Yamashita

Following the award presentations, a three act show was introduced by Larry Stark (arrangements co-chairman). Donald Pippin Pocket Opera Company entertained the audience with a broad selection of the favorite melodies. Ray Jason kept everyone breathless with his outstanding juggling act. The final act crowned the entertainment of the evening with the Oakland Ballet's performance. This year we have set records again in attendance: The preliminary count of the attendance records are given below.

Grand total attendance (after elimination for duplicate registration)	5,695
Total Technical Program registration MTT-S	1556
Monolithic Symposium	693
Workshops:	
Testing and Trimming MMICs	134
Numerical Techniques	63
Coaxial Connectors—40 GHz	64
Suspended Stripline Filter Technology	113
Clinical Hypothermia	18
Industrial Applications of Microwaves	28
ARFTG	110

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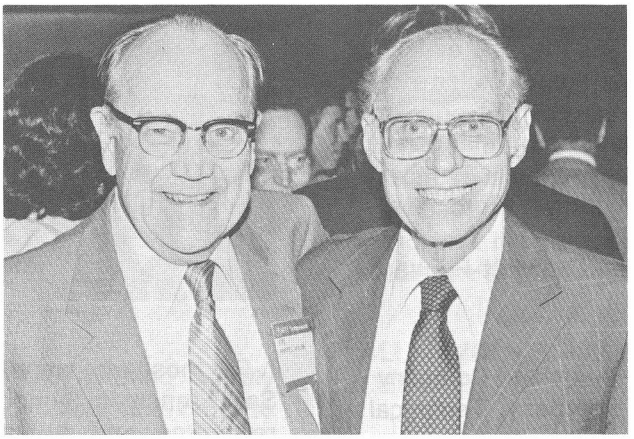
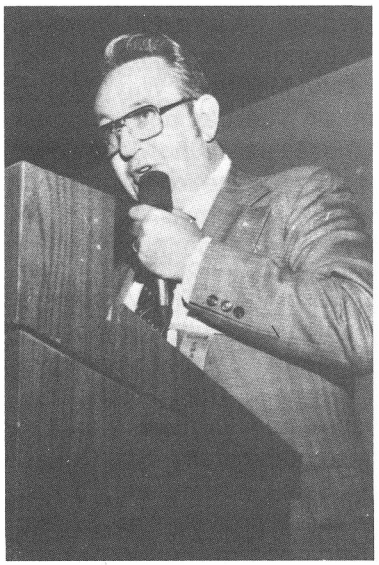
1984 MTT-S INTERNATIONAL MICROWAVE SYMPOSIUM

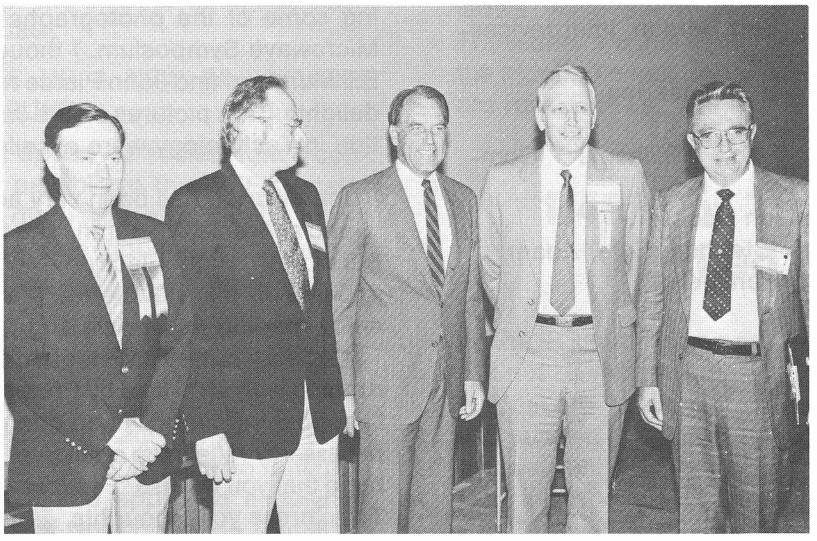


W. W. Mumford/J. R. Pierce: Reunion



S. F. Adam

A. Clavin/H. G. Oltman



F. Ivanek, J. White, J. Young, H. G. Oltman, and S. F. Adam

REFLECTIONS (continued from page 6)

I would like to take this opportunity to give you a list of this year's Steering Committee members, and express my appreciation for their hard work, dedication and service to their Society.

Chairman: Stephen F. Adam, Adam Microwave Consulting Inc.
Vice-Chairman: E. Wes Matthews, Ford Aerospace & Communications
Secretary: Roger Wong, Hewlett-Packard Company

Members at large:
Edward (Bud) Cristal, Hewlett-Packard Company
Robert Bathiany, Wiltron Company, Technical Program
Chairman: Ferdo Ivanek, Farinon Div, Harris Corporation
Vice-Chairman: James Crescenzi, Watkins-Johnson Company
Spec. Sessions: Joseph Barrera, Harris Microwave Semiconductor
Reynold Kagiwada, TRW-ESG
Secretary: Philip Chen, Farinon Div., Harris Corporation
Arrangements: Lawrence Stark, Hewlett-Packard Company
Jay Stone, Jay Stone Associates
Jack LePoff, Hewlett-Packard Company
Mrs. Sallie LePoff
Dick Schneider, Hewlett-Packard Company
Finance: Edward Hensperger, RYT Industries
Publications: Ronald E. Pratt, Hewlett-Packard Company
Publicity: Nicholas Kuhn, Hewlett-Packard Company
Registration: Donald R. Chambers, Hewlett-Packard Company
Centennial Activities: Bert Berson, Interdevices
Robert Hamilton, Avantek
Jim Lindauer, Compact Engineering
Ted Saad, Sage Laboratories
Exhibits: Pang-Ting Ho, Gillaspie Communications, Inc.
Howard Ellowitz, Horizon House
Ladies Program: Mrs. Stephen (Edie) Adam
Mrs. Edward (Phyllis) Hensperger

1884 1984
A CENTURY OF ELECTRICAL PROGRESS

Editor's Notes

by R. S. Kagiwada

For those who were fortunate enough to attend the San Francisco Symposium found it to be a very rewarding and exciting event. Starting with the workshops on Monday and Tuesdays followed by the International Microwave Symposium on Wednesday, Thursday and Friday, there was never a dull moment. For those who desired a stronger dose of monolithic, there was the Microwave and Millimeter Wave Monolithic Circuit Symposium on Tuesday and Wednesday. I take my hat off to those hardee individuals that attended the AFRTG conference the following Monday and Tuesday.

The International Microwave Symposium had over 5,695 attendees, as well as exhibitors. The Microwave and Millimeter Wave Monolithic Circuits Symposium had more than 693 people attend again illustrating the growing interest in this field. The AFRTG Conference was equally successful with more than 110 attendees. Steve Adam's committee, Jim Oakes' committee and Wendell Seal's committee worked extremely hard to make these conferences a great success. I am sure that everyone that attends the conferences would like to thank these people for a job well done. I would also like to thank Nick Kuhn for taking some of the photographs for the International Microwave Symposium. I thought the picture of the Bill Mumford and John Pierce reunion was especially delightful. His pictures on the Japan-U.S.A. Competition in Technology were excellent.

John Horton has been very active soliciting for his "Special Articles" column. The first article is by John Berenz on High Electron Mobility Transistor that appears in this newsletter. I am sure that you will enjoy reading this article and those to follow.

Kurtis L. Kurisu's "Feedback Column" is off and running with an article by Professor J. Robert Ashley. "Feedback Column" is an open forum and does not necessarily reflect the opinion of the Newsletter Staff. I hope that you will use "Feedback Column" as a vehicle To express your thoughts.

TAB REPORT

by George Oltman

The Technical Activities Board meeting usually held in July was moved forward to May 15 in order to coincide with the IEEE Centennial Convocation. (See the President's Report for a description of the celebration.) Below are selected items from that TAB meeting that are of interest to MTT-S members.

NO CHARGE FOR EXCISING PAPERS FROM IEEE CONFERENCE DIGESTS

For the last two MTT Symposia, it has been necessary to physically cut and remove a paper from the printed Symposium Digest. The author's DoD contract monitor at the last minute revised his paper's classification to Confidential or higher. Earlier this year, the Conference Board formulated an IEEE Policy statement that if approved, would require payment of removal and possible reprinting expenses by the author's company or the DoD for excising his paper.

The TAB did not approve it; the TAB voted down the proposed policy. I made a strong pitch in favor of its passage but the opponent's concerns prevailed. The prominent concern was that the threat of liability to authors would inhibit submission of papers. Also, no author, his company or the DoD, to date, has been unwilling to pay the costs.

THE INSTITUTE SETS UP A NEW INVESTMENT FUND FOR SOCIETY FUNDS

The new investment option for society funds contains a 2 percent fee payable to the IEEE General Fund. There was some discussion as to the size of this service fee at the TAB. A Blue Ribbon Committee has been formed to examine the propriety of the fee size.

COMAR APPROVES THE 6TH REVISION OF POSITION PAPER

The Committee on Man and Radiation, a TAB committee charged with creating consensus on radiation hazards, again modified and approved a position paper on the "Absence of Non-Ionization Radiation from CRT Terminals." The paper had been sent back for revision five times. This action illustrates the diverse opinion within the IEEE and illustrates the effort that these committees go through in order to achieve a true consensus. The Society presidents were asked to comment on it prior to the TAB OpCom meeting July 18 where it will be considered again. On behalf of the MTT, I will have indicated my approval. It's an acceptable, meaningful position for us to take. The paper doesn't say that there is no radiation of any kind, but it does say that there is no non-ionizing radiation of consequence from CRT terminals.

ALL INVOLVED IEEE BOARDS APPROVE PROCEDURES FOR APPROVING POSITION PAPERS

TAB and other IEEE Boards approved procedures and approval requirements for IEEE position papers. This was a sticky problem involving inter-board authorities. I ended up making the motion that was the consensus of the TAB. But this involved behind-the-scenes negotiations before it was put into an acceptable form for the IEEE Boards. In essence, the procedure requires all Boards to approve a position paper even if not in their sphere of influence.

A NEW COMPUTER SCIENCES COLLEGE ACCREDITATION BOARD

TAB approved the Computer Societies plan to establish a "Computer Sciences Accreditation Board." I have lot of respect for the Computer Society's management. Here, they perceived a need and moved to resolve it.

HAS ANY PUZZLE WIZZARD FIGURED OUT THE IEEE LABEL DATE CODE?

For those who are interested, the date code on IEEE labels uses 3 letters followed by the day of the month. The letters are the first 3 characters of the number of the month. To fool us, however, the first 2 characters are reversed. i.e., April 12 is OFU12.

1.49% of Tax Returns Audited by IRS

The IRS audit game goes on. If you are lucky, you will not be invited to play.

What are your chances? Here is an overview: The IRS audited 1,427,660 individual income-tax returns in fiscal 1983 out of the 95.4 million filed for 1982. That is an average of 1.49 percent, compared to 1.55 percent for the year before. Whether your return will be

subjected to an agent's scrutiny depends on many factors, including how well you get along with Lady Luck.

One thing is certain: the higher your income, the better your chances. The IRS has released the breakdown on individual non-business tax returns subject to examination. The following schedule reveals how many 1982 returns were examined in 1983 out of each 10,000 filed by various categories.

A huge computer system helps the IRS nail you if you forget to pick up an item of income. The IRS received about 678 million information documents in 1983 and intends to match about 82 percent of them against the corresponding returns.

What are the chances of your business being audited? The schedule below shows the chances for auditing of a business return in 1983. For example, if your corporation had between $1 million and $10 million in assets, you were just about a one-in-10 shot for hosting an examining agent during 1983.

And to each of you who is forced to play the audit game: Good luck.

Individuals - Nonbusiness
(Based on total positive income without considering

Category	How many Returns Examined out of each 10,000
$10,000 to $25,000 (with itemized deductions)	215
$10,000 to $25,000 (without itemized deductions)	64
$25,000 to $50,000	261
$50,000 and over	493

Non-Corporate Businesses (Based on Income)	Percent of Returns Examined
Under $25,000	1.63
$25,000 under $100,000	3.28
$100,000 and over	6.12
Corporation (Based on Assets)	
Under $100,000	1.96
$100,000 under $1 Million (M)	3.45
$1 M under $10 M	9.90
$10 M under $100 M	22.47
$100 M and over	57.83

Published earlier: Monday, June 1, 1984
Electronics Engineering Times

MTT-S Cosponsored AFRICON '83

by Ferdo Ivanek, MTT-16 Technical Committee

AFRICON '83, held in Nairobi, Kenya, December 7-9, 1983, was the first IEEE conference organized to address the technological needs of Africa in the areas of electrical power and communications. The organizers, IEEE Region 8, approached our society for possible cosponsorship and assistance with the technical program. The MTT-S ADCOM agreed to cosponsor the conference and MTT-16, the Microwave Systems Technical Committee, offered to help with the technical program.

MTT-16 had developed extensive contacts with MTT members in several countries and was well aware of the development of the Pan African Telecommunication Network (PANAFTEL) using terrestrial and satellite microwave radio systems. The International Telecommunication Union played and continues to play a crucial role in this international project of unprecedented size and complexity. We therefore invited Mr. Gabriel Tedros, Coordinator of the ITU PANAFTEL Implementation Project to present an overview paper for AFRICON '83. He kindly agreed to do so, provided the ITU approves and provides funding. We submitted a proposal which was approved by Mr. R. E. Butler, Secretary-General of the ITU. Mr. Tedros' paper "The Development of the Pan African Telecommunication (PANAFTEL) Network" was selected by the AFRICON '83 Technical Program Committee as one of the four Keynote Lectures in the Opening Session which also included the lecture "World Energy Sources" by James B. Owens, President, IEEE. The MTT-16 was indeed pleased with this distinction, especially because we wanted to assure presentations by authors from Africa.

In this sense, we were also instrumental in the inclusion into the AFRICON '83 program of a specialized paper on satellite communications. It was authored by Dr. Olushola Taylor of the Nigerian External Telecommunications Ltd. under the title "Design Proposals for a Digital domestic Satellite System for Africa (AFROSAT)."

EXPANDING MICROWAVE HORIZONS

Keynote Address for the 1984 IEEE MTT-S
International Microwave Symposium
San Francisco, California

by John A. Young
President & CEO
Hewlett-Packard
Company

A recent IEEE symposium was entitled "Expanding Microwave Horizons." The conference title was a most appropriate one. Today's working engineers need to stretch their thinking, but in some non-technical directions. Because the factors most crucial to their success—and their industry's future—are not solely or even primarily technical in nature.

Engineers today are players in a high-stakes game called international competition in high technology. It's a contest waged in a vast arena—a world marketplace that is growing in size and interdependence. The players are thousands of individual firms in the private sector. But to make things complicated, hundreds of national public policies influence what those private sector firms can do. So this is a game where government helps formulate the rules.

To develop a strategy for winning in this competition, the President's Commission on Industrial Competitiveness was formed in the fall of 1983. Its 30 commissioners plus staff are grappling with the question of what makes an industry—and a nation—able to compete successfully in world markets. And while many of the details studied are purely American, the questions asked and factors examined are really quite universal.

Due to report in December of 1984, the Commission members have come to one, definitive conclusion: The only people who think that the competitive question has a simple answer are politicians running for office.

A nation's ability to compete is a complex subject. It's determined by many elements—all inter-related.

Since complexity doesn't scare engineers, they should find some value in going through the following factor analysis of competitiveness. Such an exercise will help them better understand what trends and forces affect nations and their ability to compete in high technology markets. Better yet, perhaps it will spur them to consider some issues to which they haven't yet given much time to.

Factor One: The Givens

The first factor can be labeled as "givens." They're things that already exist, like natural resources, infrastructure—roads and communications networks—and the size of the national market. When these are present in abundance, they become advantages that have a good news - bad news character. Their existence is a positive. But the competitive ease afforded can make a country somewhat wasteful and slow to respond to change.

Today, both America and Europe face strong challenges from nations that have no resources—Japan and all the "new Japans" in the Pacific Rim. All their energy has to be imported. And just a few decades ago, these same nations had little in the way of roads or communications systems either. Now they're giving us a run for the money in technology.

Factor Two: The Cost and Quality of our People

Human resources—people—represent a second national factor affecting competitiveness. Here there are two issues to consider—first, the cost of those human resources and secondly, their quality. The data cited here will have a purely U. S. perspective, but they have implications no matter where you may live.

For human resources, America's cost is a real competitive disadvantage. We get paid more than people elsewhere, no matter what job classification we may have. Hopefully, we're worth that much more. But no matter where we live, we must remember that our high standard of living has to be earned; the marketplace doesn't bestow it upon us as a right.

Earning it may not be as easy as it sounds, when you compare wage rates around the world. For every dollar in wages and benefits paid to a U.S. production worker, a French worker gets 68 cents, a Japanese gets 49 cents, a Mexican gets 23 cents, and a Korean gets 11 cents.

That's quite a comparison. Consider products that require equal labor. When you have wage costs that are so much higher in some countries than in others, you build in a productivity improvement challenge of overwhelming proportions.

Please note that the wage rate comparison cited was for production workers, not professionals or managers. The same probably holds true for other job classifications, and costs vary widely from country to country. Wherever we are, we need to be aware of

those cost differentials and make productivity—whether in R&D, or manufacturing, or sales and administration—a goal for every activity we pursue.

The second element of the human resource factor is the quality or skill level of the workforce. Too often, there's a mismatch between skills needed and skills available. Microwave technology is a case in point. Demand worldwide for communications equipment is booming, but in the United States the number of people trained in this highly technical field is not keeping pace. Engineering availability will be a critical factor in the future strength of any nation's ability to compete in technological markets.

The scope and seriousness of America's engineering shortage are open to debate. But no one will argue with the statement that many engineering schools are constrained by outdated equipment and too many vacancies in key faculty engineering disciplines. And few will question the proposition that technology and world markets are changing so rapidly that we must create more vehicles where people can get trained—or retrained—at various times throughout their lives.

The shortage of technically trained people and our lack of mechanisms for helping them acquire new professional information are not the only challenges we face. Often, management needs to rethink its assumptions and methods.

First, it needs more of an international perspective—a better view of world markets and international data needs. Here it must be admitted that the Japanese and Europeans have kept a broader view than Americans.

Secondly, management's view needs to be not only broader, but more long-term. Too often, business leaders focus on short-term gains rather than the long haul, too much on the manipulation of paper assets than on the creation of real value.

The final area of human resource skills is one for which there is no curriculum. It's one that everyone in business needs. It's so simple that it isn't taught. But it's so *difficult* that it isn't often accomplished. It's called getting along together—creating a consensus among everyone in an organization about where it's going and why. There are many ways of creating that sense of shared purpose—profit-sharing, stock purchase plans, or participative management. We should pursue them all, because the ability to compete depends on how well we function as a team.

Factor Three: Capital

The third competitive factor is an area that engineers don't tend to think about very much—capital. Investment is what fuels economic growth. Countries that invest more have better manufacturing productivity growth. The statistical correlation is strong.

Take the top six industrialized countries and rank them according to investment rates for the past ten years. From top to bottom, that ranking will exactly mirror how they stack up in regards to productivity growth. By the way, you'll find Japan at the top of that list with about 20 percent of GNP invested, and the U. S. at the bottom with under 7 percent. The difference between the two countries in productivity growth was also about 3 to 1.

The President's Commission on Industrial Competitiveness decided that those were disturbing rankings. It asked a wide range of economists why it was happening. A lot of testimony was heard and, marvel of all marvels, a wide spectrum of economists actually agreed!

There's a logical reason American industry hasn't invested as much as its foreign competitors. Capital costs more here than it does abroad. Using Japan as the yardstick, the experts pin U.S. capital costs as between one-and-a-half to four times higher—a real competitive disadvantage for American firms. As a result of higher capital costs, U.S. firms have to price their products higher to make a comparable profit.

There are many reasons capital costs vary so much from country to country—the inflation rate, the source of the capital (whether it's debt or equity), or the way the capital is used. Let me just discuss two key causes that vary widely around the world—the neutrality or non-neutrality of a nation's tax code and the question of supply and demand for capital.

National tax codes can have a significant impact on the competitiveness of an industry. Some countries have tax codes that favor one industry over another. Some do it quite explicitly, with definite competitive goals in mind. Others are more ad hoc, and its appropriate to place the U.S. in that latter category. Here, different tax allowances and depreciation rates combine to create a situation where the effective tax rate on industry ranges from a plus 48 percent to a negative 14. The U.S. electronics industry falls toward the high end of that range.

The cost of capital is even more troubling for industries like electronics because of its high growth rate, short equipment life, and high levels of investment in R&D. Many scholars have attributed the Japanese success in the American semiconductor market to their ability to borrow more easily and at a lower cost.

The U. S. now has real cause for concern. We're now contemplating government deficits that will

absorb more than half of the total private sector savings. And what capital remains will be even more expensive than it is now.

Here's an example of where a non-technological issue—capital demand, supply and cost—has very direct effects on our industry, its ability to compete, and on our jobs.

Factor Four: Technology

A fourth national factor affecting competitiveness is technology, and it represents the most powerful and dynamic of any strength a nation can bring to bear. Technology can be thought of in two different ways. First, it can be product technology whose very uniqueness calls for a premium price. This is how we usually think of technology.

Maintenance of this innovative strength requires investment in a nation's universities, strong government support for basic research, the ability to couple that research with the needs of the market, and mechanisms to transfer advances in basic knowledge to the commercial sector. That last point—the commercialization of research—is something this country has been slow in doing.

There's a second aspect of technology that deserves greater attention because its something engineers can directly affect. Product technology is only half the coin. The other side is process technology. Applied to the manufacturing functions, it can make products that are more attractive in terms of cost and quality.

Please think about those last two words—cost and quality—because those are the two elements that ultimately determine *any* industry's success in world markets. Even in the world of microwave technology, where so much of the procurement is done by government, buying decisions are most often made on the basis of how much quality performance a piece of equipment can deliver at a given price.

Anyone who has studied the Japanese success story knows that a large part of their success derives from the attention they've given to the process of manufacturing. One of their greatest strengths has been in applying technology—much of it imported—to the production of products that are superior in both cost and quality.

So engineers must do more than develop advanced technology for use in products. It does little good to develop an innovative product if, within a short time, someone can replicate and offer it for half the price. Engineers must recognize that the systematic *application* of technology to the manufacture of our products is a most important but neglected part of the profession.

Besides contributing directly to better quality and lower cost, process technology is easier to protect. We export the product, not the process used to make it. Who knows the recipe for Colonel Sanders Chicken?

There's one final thought worth pursuing while on the subject of how process technology can improve the cost and quality of our products. Its been said before in some circles, but it's important enough to repeat: Cost and quality are *not* mutually exclusive goals. In fact, improving quality is the best way of reducing costs. HP has seen these results in case after case.

When quality and cost become design criteria, some new relationships develop among members of the team. Our designers and process people now work closely together from day one. R&D engineers think about manufacturability. The result has been elegant equipment that's easier to build. And production engineers now realize that the solutions they develop can contribute the competitive edge we need.

Factor Five: Institutional Conditions

The fifth and last factor influencing our ability to compete can be termed institutional conditions. This means how we organize and govern ourselves.

Starting with the global perspective, let's look for a moment at the rules of international trade. The high-stakes game of international competition in high technology should be played on a level playing field. There must be open and equal access to all national markets. That way, when anyone wins, he knows he's done so fair and square.

Protected and subsidized industries are not, by definition, competitive. Any nation has the right to decide what industries it would like to encourage, but it must do so within the boundaries of international trade laws.

On a national level, increased competition in high technology calls for a re-examination of a whole range of public policies. We need to ask ourselves some hard questions.

Have we asked the competitive consequences of our actions?

Or do we just take competitiveness for granted, ignoring the trends or actions that may weaken our position?

Do our policies just concentrate on distributing wealth, rather than creating it?

Are the goals of government and business, labor and management really so divergent?

Do we have mechanisms for creating consensus on goals?

Or do our laws (like anti-trust) and our historical attitudes (the division between management and labor) prevent us from working together?

Lastly, if we were to formulate a strategy to meet international competition, what would it be?

Any nation can formulate such a strategy, one that's consistent with its own social, economic and political heritage. Here's a brief sketch of the directions it might take.

First, after the factor analysis, decide whether your country has a competitive advantage or disadvantage in each area.

Next, build on your strengths. For the U.S., its competitive advantages are skilled human resources, technology, and a vast domestic market. All of those strengths could be better developed and deployed.

Then look at your competitive disadvantages. Decide whether you want to improve them or accept them as givens. If you're from a country with a high standard of living, you'll probably have to live with a high cost for human resources. Other disadvantages may be at least neutralized. The U. S. will never have low capital costs, but they can be improved.

The next step is to decide in whose court the ball lies. Some weaknesses must be addressed in the private sector, such as the management of human resources and technology. Other factors get you into the realm of public policy—things like capital costs, exchange rates, tax policy or the administration of international trade law.

So there's a wealth of targets and arenas to choose from. Hopefully, engineers will select at least one. There are plenty of reasons for them to get out of the lab and add to the public dialogue, to expand your microwave horizons, so to speak.

So thank you for entitling your conference "Expanding Microwave Horizons". It provided an opportunity to remind us all that engineers have a very broad stake in the outcome of international competitiion. And that we can and should play a very broad role in formulating our nation's response—no matter where we live. Engineers have a lot to offer here. We're used to complexities. We're pragmatic. We're problem-solvers.

That call to action—for engineers to get involved in solving the broad societal issues that surround them—is an appropriate note to leave you with. It's also the same theme that has run through IEEE since its inception one hundred years ago. That's because it's a message worth repeating, worth hearing, and worth acting upon.

The following is a biographical sketch of Mr. John A. Young, President and Chief Executive Officer, Hewlett-Packard Company.

John Young is president and chief executive officer of Hewlett-Packard Company, located in Palo Alto, California.

Young has served as HP's chief executive officer since May 1978 and as chairman of the executive committee of HP's board of directors since March 1983. He had served as the company's chief operating officer and president since September 1977.

Young joined Hewlett-Packard's marketing planning staff in 1958 after receiving a master's degree in business administration from Stanford University. He subsequently served as a regional sales manager, a member of the corporate finance staff, and marketing manager of the former Microwave Division. In 1963 he was appointed Microwave Division general manager.

In 1968 Young was named vice president of the company and assumed responsibility for the newly formed Electronic Products Group, which included the instruments, components and measuring systems produced by Hewlett-Packard.

Young was appointed executive vice president and elected to the company's board of directors in September 1974. At the same time, he was named to the executive committee, established to coordinate all phases of the company's operations. As executive vice president, Young was responsible for HP's Instrument, Computer Systems and Components Groups.

Born in Nampa, Idaho, on April 24, 1932, Young was graduated from Oregon State University with a bachelor's degree in electrical engineering. There he was a member of two honorary fraternities, Eta Kappa Nu (electrical engineering) and Sigma Tau (engineering), served as president of Alpha Tau Omega social fraternity, and received the Air Force ROTC communication award.

From 1954 to 1956, Young was an officer in the Air Force Research and Development Command at Holloman Air Development Center in New Mexico.

Young is very active in Stanford University affairs and is currently serving as a member of the Board of Trustees. He also has devoted considerable time over the past several years to the University's fund-raising activities, having served as National Corporation Chairman for the $300 million Campaign for Stanford program. Additionally, he serves on the Business Council for the College of Idaho.

On June 28, 1983, Young was appointed by President Ronald Reagan to be chairman of the President's Commission on Industrial Competitiveness, which is chartered to explore means of improving the competitive posture of U.S. industry at home and abroad. The same year, he was named national chairman of Junior Achievement, Inc.

Young is a director of the Wells Fargo Bank, Wells Fargo & Company, and SRI International. He is co-chairman of the Western Technical Manpower Council, a member of the Business Council, the Business Roundtable, the Executive Committee of Machinery & Allied Products Institute, and is a member of the National Industrial Advisory Council of the Opportunities Industrialization Center (OIC). He also serves on the Board of Governors for the San Francisco Symphony Association, and is a member of the board of directors of the Bay Area Council. His professional affiliations include membership in the American Electronics Association (formerly WEMA).

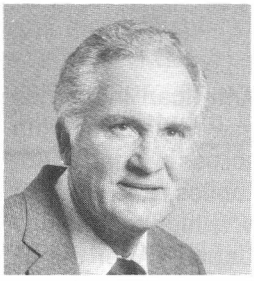
ENGINEERING AWARDS HONORS DR. G. P. RODRIGUE

The South East Region (Region 3) of the Institute of Electrical and Electronics Engineers (IEEE) honored Dr. G.P. Rodrigue of the Georgia Institute of Technology with its Outstanding Engineering Educator Award at the annual banquet held at the Galt House Hotel. IEEE, with nearly a quarter million members, in over 100 countries, is the largest institute of its kind in the world. As the name implies, the award honors the electrical engineer in the South Eastern United States who is regarded by his fellow members as the year's outstanding educator.

Dr. Rodrigue is the Regent's Professor in the School of Electrical Engineering at Georgia Tech, a position he has held for the past five years, after nine years as Professor of Electrical Engineering. Prior to that, and after obtaining his PH.D. from Harvard, he worked for ten years at Sperry Microwave Electronics. During his time at Georgia Tech he has acted as a Consultant to several industrial organizations. He was elected to the Georgia Tech Executive Board in 1979 and was Board Chairman in 1981-1982. He has written many technical papers and holds two patents related to microwaves.

Dr. Rodrigue served on the Board of Directors of IEEE in 1982 and 1983 as Vice President for Publications Activities, an important position since IEEE publishes about one half of the world's total electrical engineering information. He was President of the IEEE Microwave Theory and Techniques Society in 1976, and has served on many committees at the International level of the Institute. He was named a Fellow of IEEE in 1975 for his extensive work in microwave devices.

SPECIAL ARTICLES SOLICITED FOR THE MTT NEWSLETTER



by J.B. Horton

In March of this year, the MTT Newsletter staff began a new feature for the Newsletter, publication of special articles dealing with current topics in the technical and professional areas of interest to MTT members. Our first article, High Electron Mobility Transistors (HEMT), by John J. Berenz, appears in this issue. The HEMT appears to have a future in the microwave field and promises some interesting performance results in the EHF band. Our second article, featuring millimeter wave connectors, in scheduled for the Fall issue. Mario Maury is the contributor.

I would like to emphasize that these special articles will cover topics in a broad, general sense. The idea is to provide the members with a general understanding of the topic and its significance in current and future activities in the microwave field. Specific design techniques and applications will be covered in papers appearing at the MTT symposia and in the Transactions.

If you know of a topic that is current and you are willing to contribute an article to the Newsletter, please contact John Horton (213/375-5032) or Reynold Kagiwada (213/536-2402) at TRW, One Space Park, Redondo Beach, CA. 90278.

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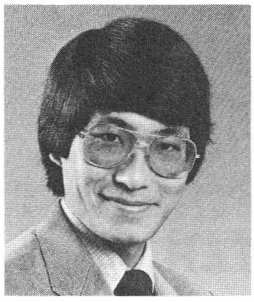
A CENTURY OF ELECTRICAL PROGRESS

JAPAN-USA COMPETITION IN TECHNOLOGY



by Kurtis L. Kurisu

"one can always learn the same thing in an entirely different light."

Dr. Leo Young

Over the past two decades, American industries have witnessed massive Japanese inroads in both domestic and overseas markets across a broad spectrum of products including automobiles, steel, motorcycles, and consumer electronics. Is high technology in danger of also falling behind Japan? After the oil shock in 1973, Japan's Ministry of International Trade and Industry (MITI) placed a major thrust on high technology, particularly in the semiconductor, communication, and information processing industries. How important is MITI to Japan's industrial success? What is the importance of their industrial success? What is the importance of their industrial approach, management style, and quality assurance? What impact will this have for microwave engineers?

The 1984 International Microwave Symposium featured a Panel Session entitled "Japan-USA Competition in Technology" which addressed these and other important questions. The audience was fortunate and privileged to have a highly qualified and experienced panel. Moderated by Dr. Leo Young, this very outstanding group of experts consisted of John Arnold, W. Andrew Osterman, H. William Tanaka, and Keiske Yawata. The session was held on May 31 in the Main Arena of the San Francisco Civic Auditorium. Opening remarks were made by Dr. Young. Each panel member then presented a short opening statement. These statements were followed by an opportunity for each panel member to respond to what had been said. Questions were then received from the floor. Highlights from this outstanding discussion now follow.

Dr. Young began by reminding us that cultural and philosophical differences must be recognized when studying the Japan/USA technical competition topic. These basic differences come into play when considering this issue.

An initial observation is that the Japanese are very well informed regarding U.S. technology whereas the U.S. is somewhat limited regarding Japanese technology. This fact may be confirmed by studying the language capabilities of both parties. The question is: How many U.S. researchers regularly read Japanese journals in that language? Compare this to the number of Japanese who are fluent in the English written and spoken word.

Dr. Young's next point referred to a Japanese movie entitled "Rashomon." The plot of this classic movie centers around a medieval Japanese Warrior. He and his bride are travelling through the woods when they are attacked. He is killed and his bride beaten and raped. There are a number of witnesses and when the bandit is caught, these witnesses all testify. The slain warrior's spirit also returns from the dead to testify. The testimonies turn out to be different, yet they are all consistent with the facts. This shows that the same truth can be learned or perceived in an entirely different way. This same philosophy applies to the Japan/USA competition issue: "one can always learn the same thing in an entirely different light."

This was a brilliant introduction to the panel member statements because it made light of the fact that different perspectives are a critical point when considering international issues. There are cultural and philosophical differences, variations in how well informed the players are regarding the opposition, and a number of perspectives depending upon which team you are on.

". . . Japan/USA competition issue as a love-hate relationship."

H. William Tanaka

Mr. Tanaka began his statement by saying the high technology arena may be portrayed in a bilateral context. This becomes clear as he expands on several topics. First, he views the Japan/USA competition issue as a love-hate relationship. For example, the U.S. loves the imported Japanese final products, yet it experiences a heartfelt fear that Japan may be preempting the U.S. industrial future. This point is well taken in light of the present electronics and automobile markets.

He addressed the concept of industrial policy and raised the question: "does the U.S. have a national policy?" First, let's take a look at the Japanese approach. Mr. Tanaka noted that the Japanese marketing approach does address the problems of declining industries and promoting new products. National R&D funding and relaxed anti-trust/cartel regulations have allowed the Japanese to focus on specific technologies. Japan uses a coordinated effort to promote cost efficiency and to shift from low growth to high growth-high technology. A prime example is in the area of telecommunications. A concerted and planned effort contributes to their growing success in this area.

Mr. Tanaka then examined the U.S. counterpart for national industrial policy. He believes this is found in the form of DoD funding and NASA. It should be noted that most U.S. exports began with government funding for military and space technology. Technology transfer in the U.S. can therefore be traced from high technology development in government programs to commercialization in the industrial sector. One prime example is the jet engines which were developed by the Air Force in the early 1950's. This began as an Air Force development program which has led to the U.S. being a current leader in this commercial technology.

Mr. Tanaka then focused on electronics by stating that in 1958, over 50% of the output for U.S. electronics was due to DoD government and space R&D funding. The conclusion is that very little funding was available for national support of consumer products. Compare this to Japan, where post war goals were directed at televisions, radios, stereos, etc. This Japanese development was actually in the form of improvements to existing product design. Therefore, the restructuring during the last two decades of our domestic industry was to move to the high technology, high reliability sector. Japan simply moved in where the U.S. left off in the early 60's. The Japanese merely improved upon commercial product design. This is reflected in Japan's current success. It is also seen in the recent changes experienced in U.S. technological leadership. For example, the U.S. enjoys high technology leadership due to its developmental programs with lower degrees of success in the commercial markets.

Mr. Tanaka says the common misconception is that Japan is intruding into our consumer market. The truth is that we left it void. Japan had no defense market to depend upon for electronics. This was a term agreed to in the World War II treaty. The U.S. moved into space and defense development instead of addressing commercial and industrial markets. This is bilateral development: Japan developing the commercial aspects of technology while the U.S. worked space and defense objectives.

Mr. Tanaka sees Japan dominating the linear IC portion of semiconductor technology. They also have the major market in TV and audio. He feels the U.S. has the jump in MOS memories and digitals. This is a large growth area for the future.

He concluded by stating that U.S. high technology will not be eliminated. Japanese competition has been healthy. He believes the competitive spirit will continue to strengthen technology.

Mr. H. William Tanaka addressed the issues of national policy and the topic of bilateral development in different technological markets. These points are well taken. We must consider the track records of the players before passing any judgment regarding their plans of action. We must not blame Japan for its success. We chose to advance space and defense technology and they selected the only market available to them - the commercial sector. Mr. Tanaka's statement was an enlightening opening to this session.

"will the U.S. be poised for a similar NTT split. . .?"
W. Andrew Osterman

Mr. Andrew Osterman began his statement by outlining the major changes expected in the next three to five years in the technological arena. They are as follows:

1) No longer can the finance people count beans and the engineering staff build things. They must now coordinate their efforts to the fullest. One can only expect the roller coaster of technological competition to get steeper. He noted that the U.S. and Japanese markets are out of sync. They do not play to the same audience at the same times.

2) Different technological goals must be considered. For example, we must examine the national business approaches. Traditional U.S. targets are for short term rewards. The Japanese look to the future, long range business and projected cash flow. We are therefore two different groups of people from this respect.

3) There is excess capacity in Japan. This is a problem which must be worked in conjunction with item 1.

4) U.S./Japan worked at joint technological ventures in the period 1959 through 1963. The U.S. would cross-license technology in trade for Japanese marketing openings and possibilities. This did not work very well and never provided much for the U.S. U.S. companies "know" they can buy into areas as required. One key area is electronics investments.

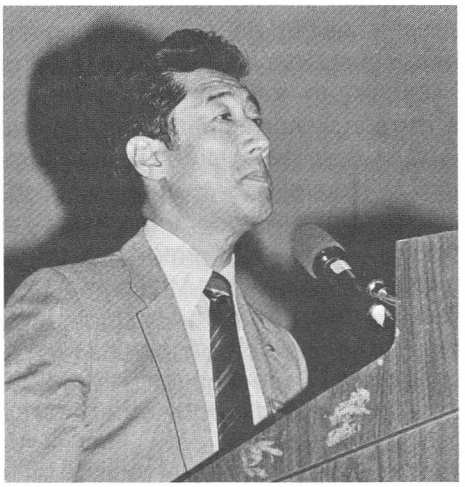
5) NTT - Nippon Telephone and Telegraph. This is similar to ATT except it has no telecommunications manufacturing capability. Japanese industry was very well positioned for the U.S. ATT breakup. The main question is, "will the U.S. be poised for a similar NTT split which is expected in the next few years?" Mr. Osterman's opinion is:
"Probably not!"

6) Defense spending is an issue which must be recognized and addressed. There is very little in Japan. As a matter of fact, it amounts to about 1% of the GNP for Japan in comparison to 6% for the NATO countries. This difference will most certainly impact the U.S. in the future concerning Japan/U.S. commercial markets.

7) Consider the U.S. industry and its ability to enter the Japanese economy. Now look at the inverse. Language is a major barrier for the U.S. entry into the Japanese marketplace. How many of us have ever seen or studied a Japanese product data sheet? Or how many of us have examined and studied a Japanese annual report? Their annual reports have ten times the detail of the U.S. counterpart. How prepared are we to work in the Japanese economy? How well do we understand it? We have a lot of work to do.

Mr. Osterman's statement focused on the difference between the U.S. and Japanese business approach. It is obvious from his examination of the marketplace that the Japanese are an opportunistic people from the technological standpoint. They do their homework and prepare well to enter the international marketplace both on the corporate and national levels. Mr. Osterman did a very good job of making his point: "We have a lot of work to do!"

H. W. Tanaka *W. A. Osterman*



"Remember, that the U. S. leads in technology while Japan leads in the trade/commercial sector."
Keiske Yawata

Mr. Keiske Yawata has been with NEC since 1958. He has experienced the industry through the eyes of engineer to President and CEO. He opened his statement by speaking about technology. He feels that the U.S. and Japan are about equivalent in the telecommunications area, especially since the breakup of ATT. They are equal in the transmitter and telephone switching areas. The U.S. still has the lead in the computer area. However, for consumer electronics, Japan is much ahead of the rest of the world.

Regarding R&D and manufacturing capability, the U.S. has a healthy lead in the former. For this reason, it is the leader in most technology areas. Japan concentrates and leads in the manufacturing areas including semiconductors and communications. Mr. Yawata added to Mr. Tanaka's statement by agreeing that Japan is leading in the linear IC arena. He also believes Japan is leading in dynamic and static RAM technology.

The next point he made was regarding heirarchical structure, going from highest to lowest parts complexity. Starting with a systems perspective, the U.S. leads. This systems category includes peripherals. Next on the ladder is production equipment and circuits. Here the U.S. is still ahead. As far as semiconductor devices and components are concerned, Japan leads although the two countries are roughly equal in the semiconductor materials area. It should be noted that Japan leads near the bottom of this heirarchical list - mainly those areas which are production oriented. Two important areas to be also considered are hardware and software. In most cases, the U.S. is about equivalent to Japan in hardware. However, the U.S. has a healthy lead in the software realm.

Mr. Yawata believes these items lead to healthy, keen competition. One needs to find a median point between R&D and manufacturing. This is the trade/technology war. Remember, that the U.S. leads in technology while Japan leads in the trade/commercial sector. He believes both can cooperate and prosper.

Mr. Yawata next addressed the area of domestic competition saying that it exists in both the U.S. and Japanese markets. In fact, he perceives domestic competition to be quite fierce in Japan. The common misconception is that Japanese companies are all monopolies. This is not true. Domestic competition is sharper in Japan than in the U.S..

Finally, Mr. Yawata believes that cultural aspects must be brought to light. He says the Samurai spirit still exists and is alive and well in Japan. Losing competition is the same as losing face. One must compete until one is convinced of a true, full, definite loss. In the U.S., if no profit is shown for two consecutive quarters, the business is labelled a failure and one sells the line off. In Japan, one continues for quite a while. This spirit was demonstrated in World War II; they stuck with it until the loss was quite certain. The result is that they work very hard to succeed.

Japanese education is also a factor. It is designed to raise the average standard of the Japanese youth. Its goal is to provide competition to give a homogeneous orientation in life. In the U.S., the focus is on creativity and innovation. The U.S. approach produces a heterogeneous orientation. The difference is therefore in individuality.

The conclusion must be made that competition is healthy. The U.S. is more innovative whereas Japan is better at developing ideas. The U.S. presently has technological leadership but Japan is catching up. Both must continue to push to the technological edge. Mr. Yawata feels that if it is not the U.S. and Japan, then it will be Singapore, China, or Korea.

Mr. John Arnold addressed the telecommunications area. This is his area of experience and expertise. Telecommunications is currently a $15 Billion per year market. Imports over the next few years are expected to increase by 15 to 20 percent. This translates to $3-4 Billion. One question is, "Why is our market so vulnerable??" This market competition is not a technological issue. This is in agreement with Mr. Yawata. From a technological standpoint, the U.S. and Japan balance out. Thus it is more of a political item.

"Why is our market so vulnerable?"

John Arnold

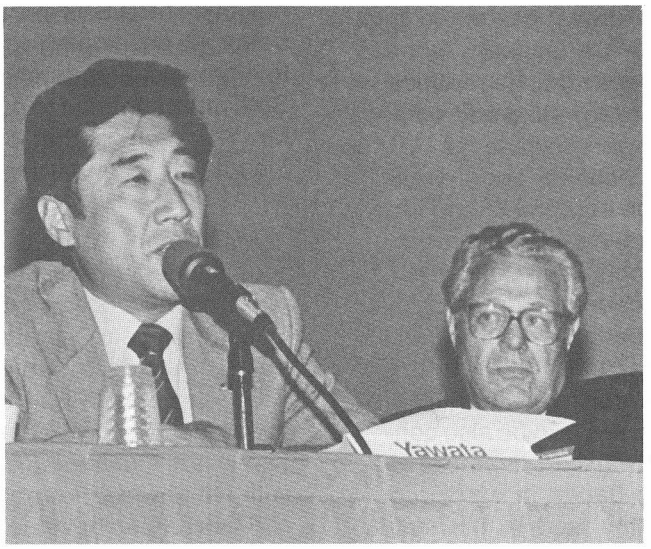
The U.S. presently has 40% of the telecommunication worker population. The U.S. has in the past set the world standards in this technology. The world looked up to the Bell System. Now we have destroyed this through anti-trust litigation with very little consideration for the consequences to U.S. technology and technological leadership. Western Electric had 75% of the world market before the ATT break up. Look at it from this perspective. We could foresee Europe and Japan purchasing small U.S. companies to get into the U.S. market. Looking at the past, we must remember that NTT and NEC had roots with Western Electric and they were welcome to compete with us. It was clear that we dominated this technical arena and that others were hungry to get their feet in the door. Japan has had difficulty in selling telecommunications in the U.S. market. For the U.S. industry, it is far simpler, to sell in ones home market. Therefore, the conclusion is that to survive, one must be equipped to operate outside the home marketplace. The U.S. must enter into Japanese and European, as well as North American markets.

In summary, Mr. Arnold's emphasis pertains to telecommunications. Similar to Mr. Osterman's statement, Japan has been prepared to move into those areas left open by the U.S.. A large entrance has resulted from the ATT situation. Mr. Arnold feels it is important to equip oneself to enter other international markets.

Following these statements, each panel member was given the opportunity to respond to what had been said. The remarks were as follows.

William Tanaka — Mr. Tanaka agreed with Mr. Osterman regarding U.S./Japan marketing approaches, the fact that the markets are out of sync, and that Japan prepares well to enter foreign markets. He says that U.S./Japan discontinuities are anti-petal. In 1978 and 1979, the U.S. shortage of the 16K RAM allowed Japan to pick up their share of this market. In the 1980's, Japan now prepares for the recovery of the U.S. economy.

Mr. Tanaka disagreed with Mr. Yawata's statement that the small industry survives in the home market only. Mr. Tanaka believes a main ingredient can be the exports. For example, look at Honda automobiles. It couldn't survive only in Japan; its success is due to exports. Therefore, his conclusion is that survivors may or may not go abroad. There are no winners or losers, only increasing positive energy in the technology marketplace.



K. Yawata *J. Arnold*

Andrew Osterman — Mr. Osterman's initial response is to say that Intel is keeping up with capital investment in spite of the recession. This refers to the previous remarks saying that U.S. industry does not prepare. In 1984, Japanese capital spending exceeded U.S. funding for the first time. Japan now invests 21% of its total semiconductor dollars into capital. This is up from a previous 17%. For the U.S. the amount has decreased from 19 to 15% capital investment of the semiconductor funding. Therefore, the U.S. is disinvesting?? Mr. Osterman strongly believes the U.S. industry must get to work.

Keiske Yawata — Mr. Yawata responded initially by expanding on what Mr. Tanaka had said about RAMs. The U.S. is currently moving into Japan for high productivity and yield. This drives the experience curve up quickly since the same technogy is used in all manufacturing areas. This manufacturing experience is very costly, therefore the gains are worth the overseas effort. Mr. Yawata believes the semiconductor industry must maintain volume as well as its R&D efforts in order to succeed.

The domestic market is different than the international counterpart. The U.S. must do research and analysis in order to do well in the international arena. For example, Mr. Yawata recalls an incident. A friend from Japan purchased a large U.S. refrigerator to take home with him to Japan (large refrigerators are not readily available in Japan). A Japanese kitchen is small and as a result it was too hot in the room with the refrigerator operating. The friend had to add an air conditioner to keep the kitchen comfortable. This illustrates the fact that one must design a particular product for a specific environment. Markets are different; therefore, services must be different.

Regarding international sales, Mr. Yawata believes that a U.S. salesman could not communicate as well in the Japanese market due to a lack of knowledge regarding the culture and language. Therefore, much training and education are needed. The U.S. must push to the technological edge. This is especially applicable in the areas of engineering, semiconductors, and computers.

Questions were then received from the floor with the panel members responding as follows.

Question: How does this technology competition impact the microwave industry? Specifically, the DBS market?

Mr. Arnold — Microwave represents a good portion of telecommunications, therefore it does come into play in this competition issue. It is important to remember that DBS receiving equipment is very similar to TV sets from a mass production point of view. Thus, the stronger manufacturing capabilities and experience are a distinct advantage for success in this market.

Mr. Yawata — The U.S. is far ahead of Japan in the area of basic microwave technology. With regard to the satellite portion, the two latest launched by Japan failed. Therefore, Japan is still very much behind in this technology. One must consider however, that it does have a good consumer technology. The Japanese expertise would be in the area of individual home sets. DBS is a very large market and all parties could have a part.

Dr. Young — Japan does have a very good microwave technology. The U.S. effort is driven by defense, so we must keep in mind that we're not of the same mind, there is a dichotomy to be dealt with.

Question: How would a government push effect this competition?

Dr. Young — Japan did sign a treaty after World War II in which they agreed not to develop certain technologies. For this reason, it has been difficult to work closely with each other and to share product implementation. Our markets focus heavily on DoD development whereas Japanese industry is directed at the commercial market. This has been said many times: we chose to focus on space and defense related technology development whereas Japan selected that area which was available to them - the commercial sector.

Mr. Tanaka — There are distinct difficulties with macroeconomic policies. The mix of economic policies and their impact can reduce exports to Europe or increase imports as a result of high interest rates.

Mr. Osterman — The U.S. fails to negotiate with Japan on the critical issues such as NTT. The U.S. attitude is not serious about problem solving. There is presently a 20 to 1 trade ratio for the U.S. to Japan and it is getting worse. The U.S. is not taking steps to change. As an example, Japanese procurement documents average 1 1/2 pages. Look at the U.S. equivalent. The last six years have presented problems in the U.S. procurement area.

Question: How about international applications such as a space station or other earth systems? How will Japan integrate and contribute to these projects? How do national pride and international cooperation fit in?

Mr. Osterman — Space station specifications are not yet worked out. There will be system and subsystem requirements which could be produced by North American firms working in Japan.

U.S./Japan Competition in Technology 1984: left to right: H. W. Tanaka, W. A. Osterman, K. Yawata, J. Arnold, and L. Young.

Question: Could anybody comment regarding protection of the industry? Is there a national policy?

Mr. Yawata — There is no Japanese policy that says "buy Japanese." They are a patriotic people but will buy based on cost and quality just like Americans.

Mr. Arnold — Purchases will be based on cost, serviceability, and quality.

Mr. Tanaka — It is the same "buy national" bias as is present here in the U.S.. There are no government policies which explicitly say to buy U.S.

These questions brought to a close a very enlightening and informative panel session. Each panel member contributed greatly to our understanding of the "Japan/USA Technological Competition" topic. Many critical issues were addressed. Dr. Young pointed out the cultural and philosophical differences: the fact that we view the marketplace from differing perspectives. Mr. Tanaka focused upon national policy and bilateral development: we do address different technological areas. Mr. Osterman spoke about the different business marketing approaches and preparation: we must prepare if we are to be a viable entity in the international marketplace. Mr. Yawata looked at various competitive, philosophical, and academic differences. He believes that competition is quite healthy. Mr. Arnold views the competition issue from the telecommunications area: we must be equipped to compete in the home, as well as the international arenas.

Many differences must be considered when addressing the Japan/USA Technological Competition issue. These include: culture, marketing philosophy, national policy, academic goals, technology goals, and perhaps most important: perspective. We must look at the competition; we must recognize our strengths and use them. We must do our homework and be prepared. Competition is healthy.

Each of these experts bring with them outstanding credentials. A brief biography for each follows.

Dr. Leo Young — Director for Research and Laboratory Management, Office of the Under-Secretary of Defense for Research and Engineering. Dr. Young was appointed Director for Research and Laboratory Management in the Office of the Secretary of Defense in 1981. Previously he served as Associate Superintendent of the Electronics Technology Division of the Naval Research Laboratory (NRL), which he joined in 1973. Dr. Young was employed by Westinghouse Electric Corporation and was staff scientist and program manager at Stanford Research Institute. He is a recipient of the Benjamin Garver Lamme Scholarship and holds several honors degrees.

Dr. Young is a Fellow of the IEEE and was the 1968 IEEE National Lecturer. He has received the IEEE Microwave Society's Microwave Prize, IEEE Distinguished Service Award, and the IEEE United States Activities Board Citation of Honor. Dr. Young was elected 1980 President of the IEEE which has over 230,000 members worldwide. He served as Executive Vice President in 1979, and was elected four times to the IEEE Board of Directors. In 1980, he also served as a member of the Board of Governors of the American Association of Engineering Societies (AAES).

Mr. John Arnold — Vice President, Harris Corporation. Mr. Arnold retired as President and Chairman of GTE International after 30 years of service. GTE employed about 35,000 people outside the USA. He previously served in Japan on the Board of Directors of NEC-Sylvania. Most recently, Mr. Arnold was President and Chief Executive Officer of Farinon, prior to its merger with Harris Corporation. Mr. Arnold has lived abroad for over twenty years and has travelled extensively throughout the world working on and dealing with telecommunications projects.

Mr. W. Andrew Osterman — Fab Contracting Department Manager, Intel Corporation. Mr. Osterman is the Finance and Administration Manager of the Fab Contracting Department of Intel. He has also been a member of Intel's Corporate Strategic Staff and a Senior Financial Analyst with the Treasury Department. A former Foreign Service Officer, he was assigned to the White House, Japan-U.S. Economic Relations Group, and served in the U.S. Embassy in Tokyo, the Economic Policy Office, and the Japan Desk of the State Department where he was responsible for bilateral economic issues and Japanese industrial policy in the electronics industry. Prior to joining Intel, Mr. Osterman operated a consulting firm offering strategic planning services to companies in East Asia.

Mr. Hajime William Tanaka — Counselor at Law. Mr. Tanaka is currently in private practice in Washington, D.C.. He has previously served as an Interpreter and Japanese Language instructor for the Department of State and Foreign Service Institute. He also was employed by the Allied Powers Far East Command and the Office of Strategic Services. He has been admitted to practice before the U.S. Supreme Court, U.S. Court of Appeals, U.S. Court of International Trade, and U.S. Court of Federal Appeals. His numerous affiliations include Director, Board of Directors, Pan-Pacific Community Association and Member, Advisory Council, U.S.-Japan Study Center, School of Advanced International Studies, Johns Hopkins University. He is past President of the Japan-American Society of Washington and current Member of the Executive Committee.

Mr. Keiske Yawata - President, NEC Electronics Inc. Mr. Keiske Yawata is President and Chief Executive Officer of NEC Electronics Inc. Prior to this appointment, Mr. Yawata was General Manager of the International Electron Devices Division of NEC Corporation. In this capacity he was responsible for overseas marketing and sales activities of electronic components. He has served in the Semiconductor Group of NEC Corporation as engineer manager, manufacturing manager, process engineer, development engineer, and application engineer. He is the recipient of a Fullbright Scholarship and a David Sarnoff Scholarship.

Summary of Responses to Centennial Questionnaire By Division 4 Members

(Revised 6-13-84)

by E. W. Pugh

This report summarizes 40 interviews from 4 out of 5 societies. MTT-S members furnished 18 of 40 interviews. The percentage of interviewees giving a certain response is only approximate because of the different wording of the individuals.

1. What sevices are you not getting from your IEEE membership that you expected to get when you joined?

Over 75 percent responded that they were getting all that they expected.

The following reponses were each given by 5 percent to 10 percent:

- Members fail to get a large enough discount on IEEE conference fees.
- Not enough practical, hardware-oriented papers in the transactions.
- IEEE should quit acting like a labor union.

2. Which benefits of IEEE membership do you value the most?

Over 75 percent identified technical publications as the most important benefit. Slightly over half of those who specified journals singled out the Transactions as the most valuable publication and just under half specified either Spectrum or the Proceedings.

Technical conferences and/or professional contacts were mentioned by about 70 percent.

Almost 60 percent of the respondents identified life insurance as an important benefit.

3. What new or improved services would be most valuable?

About one third requested professional training or tutorial materials and courses. But a warning is raised by comments that present courses are not good. One person called the short courses a "rip off".

About one third identified better portable pensions as the most desired benefit.

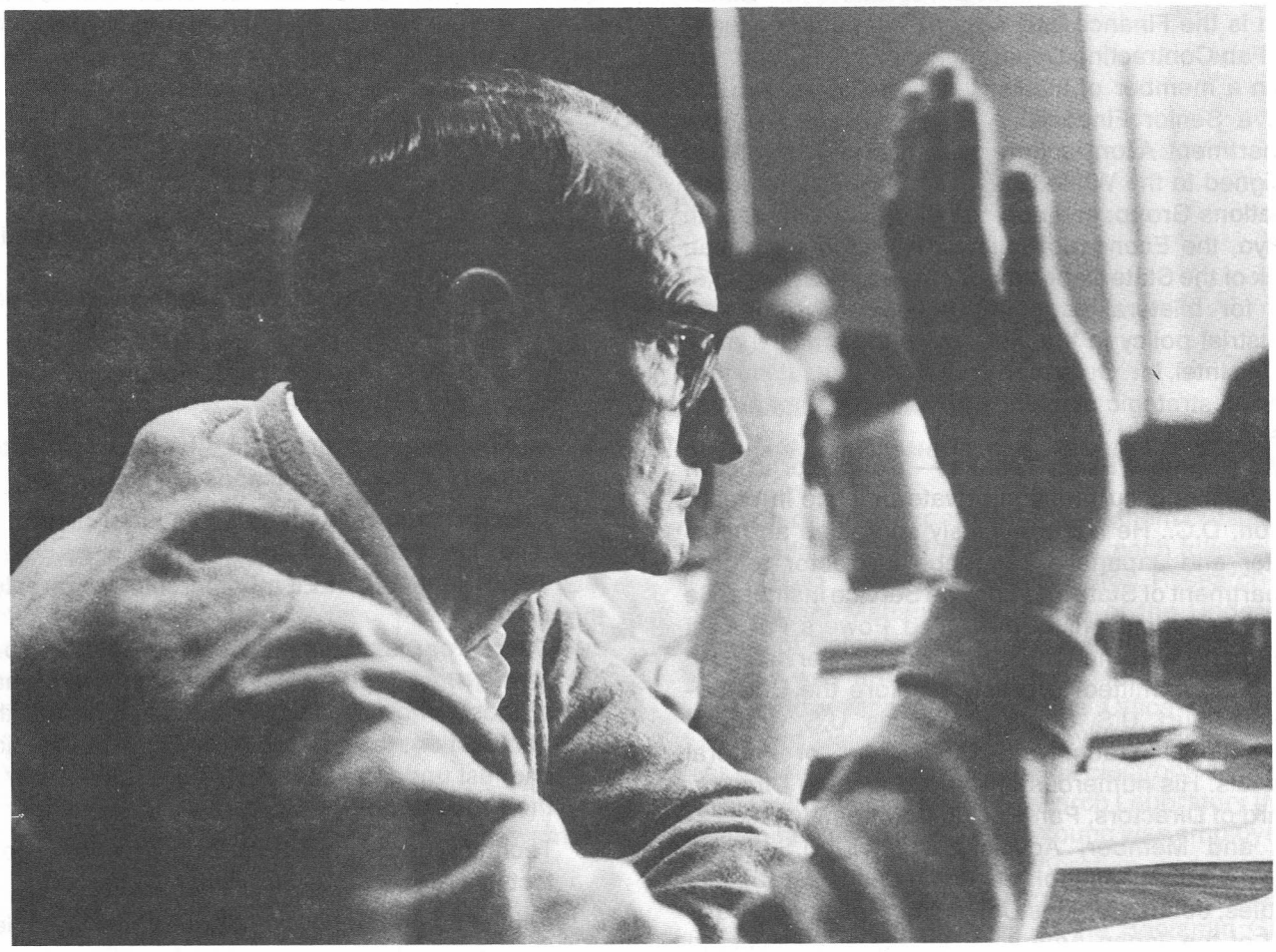
Low-cost auto insurance was suggested by about 10 percent.

Collective bargaining or related activities were suggested by about 7 percent.

More lobbying to raise the public image of engineers was requested by about 7 percent.

Less frequently mentioned requests were for translation of Japanese journals, computer sorting of references, information on investments for retirement, and Spectrum articles with one or two page summary of important advances in various fields.

MTT-S TRIBUTE TO DR. DONALD D. KING 1919-1984



It was a profound shock to the IEEE when Dr. Donald D. King, 1984 President-Elect, died suddenly on March 13, 1984. This was announced in the Spring 1984 issue of the MTT-S NEWSLETTER. Dr. King, President of Philips Laboratories Division of North American Philips Corporation, died on March 13 following a brief illness. He was 64 years old and lived in Chappaqua, New York. Prior to joining Philips Laboratories, he was employed by Aerospace Corporation and earlier by Electronic Communications, Inc. After receiving his Ph.D. degree from Harvard University in 1946, Dr. King held teaching positions at Harvard and Johns Hopkins Universities.

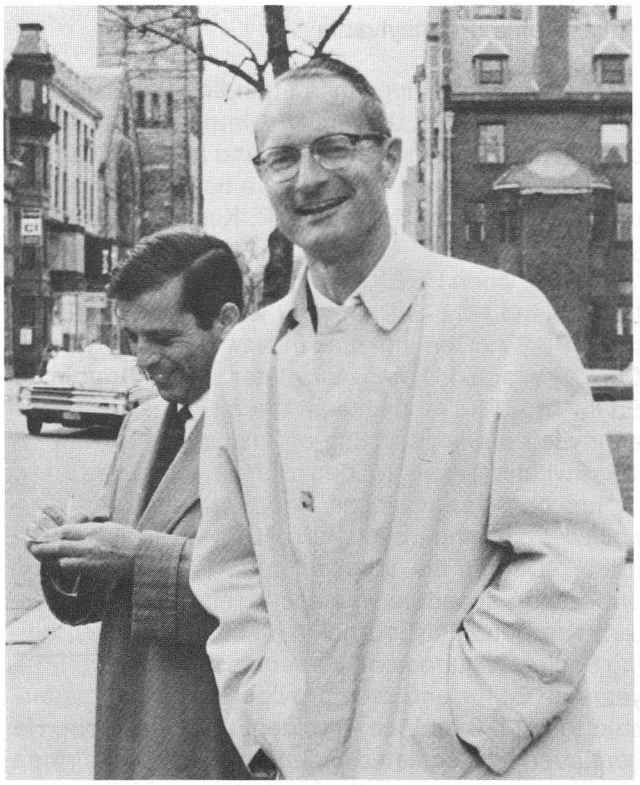
Dr. King was a Fellow of the IEEE and had been a member since 1946. Among his many activities, he served on the Awards, Publications and Technical Activities Boards and on a number of major IEEE Committees. Dr. King contributed widely to the entire Institute, but the MTT Society was especially saddened. Don was a Charter Member of MTT-S when it was organized in 1952, and he served MTT-S in various capacities for many years and made numerous friends. A few close friends have recalled their personal relationships with Don. These recollections by Theodore S. Saad, Kiyo Tomiyasu, Leo Young, Marvin Cohn and William W. Mumford are published here.

Theodore S. Saad
Natick, Massachusetts

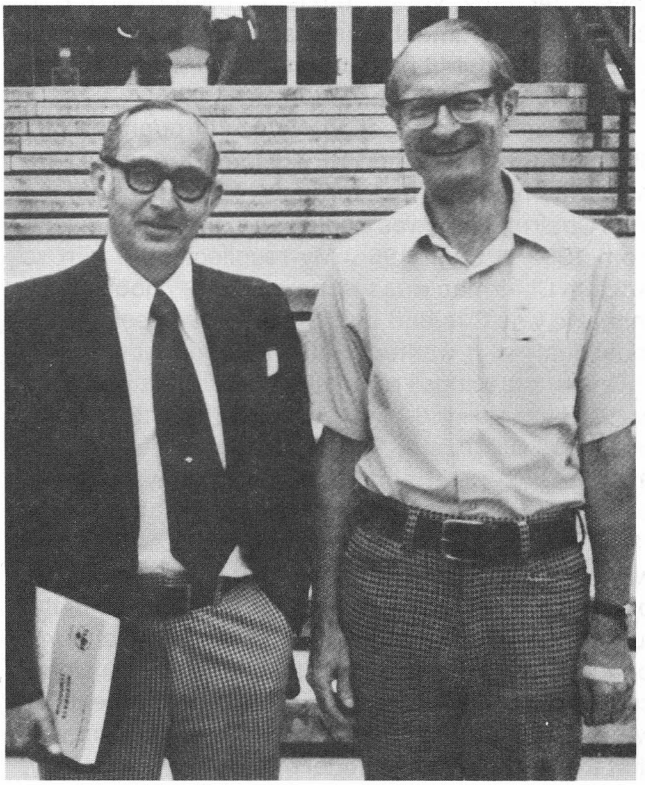
With the untimely death of Dr. Donald D. King, I searched for some historical information about his activities in the MTT Society. According to my records, these are some of the facts about his particpaion in MTT and as a member of the MTT AdCom. He was on the first five AdComs, and at the first AdCom, he submitted the first Constitution and Bylaws. He was a task group of one and he submitted the draft at the first meeting.

At an AdCom meeting in September of 1958, K. Tomiyasu made a motion to make Don the next Editor of the Transactions to be effective January 1, 1959. This was unanimously passed. Don was a very effective Editor. In fact, according to my records, he had the longest span as Editor, from April 1959 through

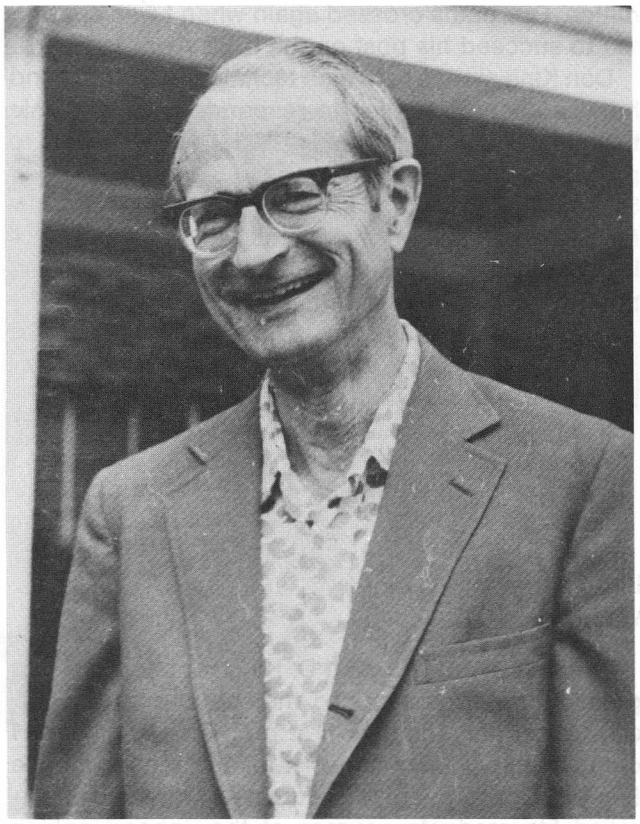
Tribute to Donald D. King



S. B. Cohn *D. D. King*
1967 Microwave Symposium, Boston, MA



R. Henning *D. D. King*
1974 Microwave Symposium, Atlanta, GA



D. D. King
1977 Microwave Symposium, San Diego, CA

D. D. King *K. Tomiyasu*
1977 Microwave Symposium, San Diego, CA

November 1962. When he passed the job on to Bob Beatty, his comment was that it was a lively and interesting job, but he felt that in the interests of the Society it should be passed on.

Don was the Transactions Editor through the 8th, 9th, 10th and part of the 11th AdCom. During the 11th AdCom, which was 1962 through 1963, he was named Vice Chairman. He was Chairman in the 12th AdCom, from 1963 through 1964. My recollection of him as AdCom Chairman was that he was a very good chairman. He was firm and he brooked no nonsense with individuals who wanted to distract the meeting.

One of the things I remember best about Don King was a keynote address he gave at the 1965 Symposium in Clearwater, Florida. I thought it was one of the best I had heard and that opinion stays with me, even after all these years. The title of the talk was "Space for Microwaves" and in it he pointed out three ways to maintain growth in the face of the fact that he proposed there was no space for microwaves in the future, either in aerospace or in commercial components. What he meant was that there was no physical space for microwave circuits and components as we knew them. His three-fold recommendation was first to advance conventional microwave technology, but concentrate primarily on using new materials. Second, he enthusiastically urged people to work on reducing the size of microwave circuits to microcircuits, and third, he recommended a planned attempt to control one micron wavelength with the same finesse that we now display at 1 centimeter.

After Don's term as Chairman of the AdCom, he became ex-officio for 3 years, and then was reelected to the AdCom. He became very active in long-range planning and was Chairman of the Long-Range Planning Committee, starting in 1968 and he held that committee responsibility for several years. He was also Chairman of the Nominating Committee in the term immediately after his term as Chairman of AdCom. He was for several years Chairman of the Technical Committee on Millimeter and Submillimeter Waves. He held this position for several years.

In 1966 he was nominated by MTT to be a Member-at-Large of TAB OPCOM for a two year term. He was also named to an Ad Hoc Committee on the G-MTT AdCom organization during that same year. In 1969, when Leo Young was AdCom Chairman, Don was appointed Chairman of an Ad Hoc Committee and submitted a report on the name and scope of G-MTT. In 1970, he became Chairman of the Awards Committee. His continued active participation was so greatly appreciated that, in 1973 at the Symposium in Boulder, Colorado, he was named an Honorary Life Member of MTT-S.

Kiyo Tomiyasu
Philadelphia, Pennsylvania

I first met Don King while attending the Graduate School at Harvard University. I knew him as being conscientious, friendly, sincere and kind. He earned his doctorate before I did and we both had his older brother, Professor Ronold W. P. King, as our thesis advisor.

In 1953, when I was Chairman of the newly-formed Long Island MTT-S Chapter, I was invited to attend the MTT-S AdCom meeting in New York where I met Don King again. Four years later, I was appointed Editor of MTT Transactions. We published annually an invited paper reporting on microwave advances. This invitation was extended to Don because we knew of his conscientiousness, thoroughness and reliability. Following my tenure, Don was appointed Editor. During his tenure, the MTT Transactions publication schedule was accelerated from a quarterly to a bimonthly journal to meet the rapidly growing Society requirement. He served faithfully for three years as Editor and then provided excellent leadership to MTT-S as Vice President and President. He continued his dedicated service to MTT as Chairman of its Awards Committee. I followed him in this capacity while he advanced to the IEEE Awards Board as Chairman of its Society and Other Awards Committee. Our paths crossed again when I was appointed to succeed his post on the IEEE Awards Board.

Don King always held high technical standards and he was keen and quick to respond to the dynamic technical environment. In May 1982, he was invited to present a luncheon address to the Benjamin Franklin Symposium sponsored by the Philadelphia Joint AP-MTT Chapter. He stressed the importance of continuing education to the IEEE membership and discussed means for wider implementation.

It is difficult to find words to convey the loss of Dr. Donald King. His exemplary standards and characteristics are to be emulated.

Leo Young
Washington, DC

The death of Dr. Donald D. King robbed IEEE of a great future President. To me, he was a teacher, counselor, and friend. I first met Don soon after I came to this country to work for the Westinghouse Electric Corporation in Baltimore, Maryland. I enrolled for graduate courses at the Johns Hopkins University in February 1954, and the first course I took was Don King's course on antennas. Thus began a

Tribute to Donald D. King

IEEE HQ Front Lf to Rt A. Clavin, R. Garver, R. Sparks, and S. Rosenthal. Standing Lf to Rt unknown, J. Horton, unknown, M. Cohen, D. D. King, R. Moore, W. Edwards, and H. Sobol.

1967 Microwave Symposium, Boston MA: Lf to Rt T. S. Saad, R. Hansen, L. Lewin, S. B. Cohen, and D. D. King.

beautiful friendship cemented over the years through common endeavors for the MTT-S, and later on various IEEE Committees and Boards. I followed Don as President of the MTT-S. We served together on the AdCom, and I was impressed by the range of his interests and depth of understanding, whether in microwave engineering, running a microwave symposium and exhibition, or editing the MTT Transactions.

In more recent years we worked together on IEEE's Individual Benefits and Services Committee, where his concern for IEEE members and his business acumen came together. With his background and dedication, Don King would surely have used the IEEE Presidency to further its members' interests. His example remains our inspiration.

Marvin Cohn
Baltimore, Maryland

I have known Don King since 1952 when he was the Director of the Johns Hopkins University Radiation Laboratory and I was a young engineer who worked for him. That relationship continued over part of the next decade at the Research Division of Electronic Communications, Inc. During his career Don made many significant and documented contributions to the microwave technology. His celebrated career included the holding of many important positions in both the MTT-S and the IEEE culminating in being the President-Elect of the IEEE.

My fondest memories of Don, however, go back to the decade when I observed the manner in which he managed a research laboratory. Under his direction, an environment was established in which creativity flourished. Information was exchanged and his researchers grew professionally and achieved recognition. He was always available either for consultation on a difficult problem or to help celebrate a significant milestone. Don will be missed, but he left and important legacy.

William W. Mumford
Morris Plains, New Jersey

During Dr. King's tenure on the Administrative Committee (ADCOM) of the IEEE Microwave Theory and Techniques Society, I had the privilege of observing him work for almost 30 years not only as a member of ADCOM but also as the Editor of the Transactions, as Vice Chairman and Chairman of the Society and later as an Honorary Life Member.

My appraisal of him was that he was a diligent worker, with the interests of the Society always uppermost in his mind and he always used good judgment. He was cool, calm and collected, even under stressful conditions.

His personality was a very pleasant one, indeed, with a smile and a nod for everyone and all the members of ADCOM seemed to like and admire him.

The touching thoughts expressed by William Saroyan in one of his novels seem to be quite appropriate here.

"As long as there are any two of us to remember him together he will never be gone". . ."We do not mourn for him but rather for ourselves, because of the treasure we have lost."

THIRTY PLUS YEARS OF CONTRIBUTIONS TO OTHERS

This article was originally written by H. George Oltman for the Centennial Year Book. This Centennial was to be published by TAB and have articles from all the IEEE Society presidents. The presidents were to write about the industrial contribution of the society over the past century. Unfortunately, too many society presidents missed the deadline so that TAB decided to cancel the publication. I have published this article since I thought the MTT-S members would enjoy reading it.

by H. G. Oltman

The contributions of the microwave industry to the world society are reflected in its contributions to other industries and technologies. Microwave devices and components, in themselves, are generally not an end product. They are used as components by other industries to make useful systems. The systems made possible by these components include many which directly benefit mankind. An obvious example is radar in all of its forms: weather avoidance, commercial airborne, military, satellite, automotive, and on and on. Other examples include terrestrial and satellite communication links, biomedical sensing and treatment of tumors, and commercial microwave heating. The latter has come the closest to being a microwave end product.

Through its contributions of microwave technology, the microwave industry has made possible the vast explosion in communication services for the world society. These advances have been occurring for the past three to four decades. Two major developments have lowered the cost and made possible the recent expansion in communication services. They are point-to-point microwave repeaters and satellite stations. Microwave repeaters have linked national and continental communities. Satellite repeaters have added transoceanic links at even lower user cost. Satellite communications would not be possible without microwave technology and the contributions of the microwave industry. Without these developments, communication costs would have remained high and the productivity and resulting growth in our world-wide standard of living would have been lower. We are now beginning to see the effects of another technology which promises even lower communication costs: fiber optics. It is interesting to note that this developing area borrows heavily from microwave technology.

A significant, but not often realized contribution of the microwave industry to others, is our highly sophisticated, mathematical based, design tools. Other technologies have benefitted by the transfer of these tools and related principles to their own design tasks.

The microwave industry represents that technology lying between electronic circuits and optics, where the size of the microwave circuit is on the order of the wavelength. Here, neither electronic parameters such as inductance and capacitance, nor classical optical parameters can fully describe the effects occurring. Though complex, microwave circuits can be accurately described by mathematical models. Over the last five decades, the most sophisticated, versatile, and useful tools to design microwave components have been conceived and developed by MTT-S members.

These tools have extended the speed, quality, and quantity of microwave components that can be designed. In addition, they have been modified and used by workers in other fields to extend their technology. One example of this technology transfer is associated with fiber optic circuits. I speak of the dielectric waveguide concepts investigated in the fifties by D.D. King and his associates at Johns Hopkins Applied Research Laboratory. This work has been expanded and formalized by a host of others over subsequent years. The work has resulted in a microwave subset of well understood transmission line concepts and associated derivations: couplers, transformers, antennas, and other components. This subset of microwave techniques has been picked up and is now being used by workers in fiber optics. As a specific example, microwave technology had developed techniques to convert desired electrical characteristics such as coupling magnitude and bandwidth into the physical dimensions for a coupler. Fiber optics workers using the same technology can compute similar dimensions for couplers in optical integrated circuits.

Design and analysis tools have found application in even more diverse technology areas. Specific tools are associated with antenna array design and the vast body of microwave filter and line transformer concepts. For example, an illustrious group at Stanford Research Institute was instrumental in microwave theory development in the mid-fifties. Headed by S.B. Cohn, and later by L. Young, this group initiated a coordinated development of microwave applications of modern network theory. The work was supported by the U.S. Army Signal Corp. From this early beginning, the microwave industry has developed the most complete body of design synthesis and analysis tools of any technology I know. This body of knowledge allows the accurate prediction of the dimensions of a large variety of filter or transformance structures with virtually any prescribed response. Over the years, workers in the field have refined the technology so that predictions are now sufficiently accurate to necessitate very little experimentation. Both analytical and numerical approaches are available to synthesize a filter that will yield a specified response or analyze a filter configuration to determine its response.

Anyone who has observed both the amplitude (gain) pattern of a multi-element array antenna plotted against its spatial angle, and the response pattern of a multi-resonator bandpass filter plotted against frequency, cannot help noticing the similarity between the two seemingly unrelated technologies. The fact is, they are mathematically related. Antenna workers who have noticed this similarity and also understand filter theory (or can collaborate with filter theorists), have at their disposal the synthesis portion of the microwave filter/transformer technology. This is a powerful tool that can be used to determine the antenna element currents of an array that will yield a prescribed pattern response.

One associate of mine, R.S. Elliott, is an eminent antenna theorist who has observed this similarity. ollaborating with H.L. Orchard, a well known filter theorist, they have synthesized aperture current dis tributions to yield desired patterns. Examples include a cosecant-squared search radar pattern with specified sidelobes, and a flat-topped, steep-sided array pattern highly suitable for efficiently illuminating a parabolic dish antenna.

There are undoubtedly other technologies that either are or could be benefitting from the highly developed microwave filter tools. Some might say that these are not microwave tools but are mathematical tools. It is true that the transferred element to such technologies is the mathematics and not necessarily the exact microwave tool, i.e. the microwave interpretation of the mathematics. However, the value derived from understanding the microwave tools is the subsequent realization of what could be achieved by borrowing the technology and adapting the related mathematics.

Another technology that could have benefitted from understanding the microwave tools is solid state physics (SSP). Both SSP and microwave filters have coupled resonators as common elements. A filter embodiment of a coupled resonator might be a set of waveguide cavities with coupling irises between them. The SSP equivalent is the valence electrons of atoms in a crystalline lattice. These electrons orbit the nuclei of the lattice in specific periods of time (hence, they are resonant) and are shared (coupled) with their neighbors. The correspondence between the two technologies is strong; each could benefit from the other.

The filter, line transformer, and dielectric guide are only three of many subsets of the microwave technology that have yielded identifiable contributions to other industries and the world society. Microstrip transmission lines and a few related microwave com ponents first described in the literature in the early fifties has grown through many stages into the microwave integrated circuits area. This is now a major family of components and subsystems widely used in today's communication and radar systems.

The very first issue of the MTT Transactions contained a description of the new microstrip line concept. However, it was preceded by a five volume treatis on microstrip authored by Maurice Arditi and privately published by ITT Federal Labs of Nutley, New Jersey. Many other workers recognized the potential of microstrip circuits and by 1955 a Special Transactions Issue on strip circuits was published. This was the MTT Society's first special topics issue. Over the ensuing years, many workers contributed to the expanding knowledge of microstrip lines. It is tempting to list their names and add to the recognition which many of them have already received for their work. However, to list all names would exceed page limits and to select a few outstanding names would be to pass judgment on everyone's work.

Microstrip lines promise to be a major transmission line media for realization of tomorrow's monolithic integrated circuits -microwave circuits integrated into a semiconductor substrate with needed semiconductor devices diffused into the same substrate. The hope is that planar technology, which is highly amenable to automated processing, will substantially lower the cost of microwave subsystems and greatly enhance the benefits of microwave related technology to the world society.

The list of contributions of the microwave industry and members of the MTT Society goes on and on: microwave amplifiers and oscillators: TWTs, BWOs, Gunn, IMPATT, FET, monolithic, parametric, MASERs (the first realization of "Amplification by Stimulated Emission of Radiation" now chiefly embodied in LASERs); ferrites: circulators, isolators, phase shifters; swept oscillators and filters; acoustics: filters, oscillators, signal processors; microwave measurements: spectrum analyzers, automatic network analyzers; materials; satellite remote sensing; radiometry;----------and on----------.

George Oltman graduated from the University of New Mexico in 1950 with a degree in physics. In that year he joined the antenna laboratory of the Sandia Corp. and the IRE. He later earned the Master's degree in Physics at the same institution and has been a member of the MTT-S since 1956.

His physical sciences background and broad interests have resulted in a wide range of scientific and engineering work. This work focuses on wave motion and circuits, including antennas, filters, couplers and other passive components; mm-wave components ; microwave acoustics; and microwave sources including vacuum tubes and Gunn, IMPATT and TRAPATT solid state sources.

Oltman holds four patents in vacuum tubes, microwave acoustics and light deflection; four patents on techniques for summing the powers of solid-state sources; one patent on slotline couplers; and two on printed circuit antennas. He has received the Lawrence A. Hyland Patent Award, Hughes' most prestigious, for his microstrip dipole antenna patents. He has published 35 papers in the above fields.

Oltman is currently a senior scientist in the Missile Systems Division of Hughes Aircraft, prior to which he was with the Physical Research Center at TRW Systems. Other positions include the engineering staff at Rantec and antenna group manager at Electronic Specialty.

Active in the IEEE since 1956, Oltman was chairman of year of the Albuquerque PGAP. Since then he has been Los Angeles Chapter Chairman of both G-MTT and G-AP and vice chairman of the Los Angeles council. He has worked on the MTT Adcom for several years, before being elected to Adcom in 1973. Prior to his election as President of Adcom for 1984, he published the MTT-S Directory, was finance chairman, associate editor of the Transactions and vice president in 1983. Oltman was elected Fellow of the IEEE in 1983. He is a fellow of the British Interplanetary Society and he is a member and past president of the Automatic RF Techniques group. In 1984 he was awarded the Distinguished Service Award by the ARFTG. He was elected to both Sigma Xi and Kappa Mu Epsilon.

His wife is the former Loretta M. Nemes of Princeton, New Jersey. They have five children, Carolyn, Joan, David, Brian and Neil. For the past 25 years he has resided in Woodland Hills, California.

ON FET DEVICES

by Keats A. Pullen Jr.

The range of application of field-effect transistors today is such that these devices are being used in many applications previously considered to be the private domain of bipolar devices. They have become so important that I believe it may be useful to recount some relatively-little-known history of these devices.

A large segment of the ED membership apparently considered FET devices of little value in the early 1960's, even though a limited amount of experimentation was in progress at such companies as Siliconix, Raytheon, and United Technologies, among others. I was in fact told by a leader of the ED group at that time that "He could do anything I could do with an FET better with bipolar devices."

At least two factors were being overlooked at that time, first that the current is carried by majority carriers, with the resultant increased radiation hardness for these devices (as verified by Siliconix under a small contract placed by the Army), and second, that short-channel devices having extremely high limit frequencies could not be built without their being "short circuits." A possible short-channel design was disclosed in my patent 3 274 462, which issued in 1966.

One of the important steps in this development was disclosed in a letter by Evans and Pullen[1]. This letter demonstrated the existence of a diffusion mode of operation of FETs which was evident in the bias range where the depletion region(s) for the FET virtually cut off current flow in the device. When this is the case, the potential jump across the Debye region represents the source of the controlling field for all charges travelling from source to drain. Over a range in output current as large as 100,000 to one, it is possible to double or halve the current flow through such a device with about 18 millivolts change in gate-to-source voltage, the same as is nominally true across the base-to-emitter junction in the bipolar transistor. The validity of the analysis predicting this was confirmed in a conversation with Dr. Shockley in August 1969.

If the design of the channel is made such that under all normal operating conditions, the effect on channel

flow of the potential jump across the Debye region is maximized, then the short-channel device becomes a practical device, as has since been shown. I calculated the effective field gradient in a channel as a function of the doping distribution in the early 1960's and found, as I had suspected when I applied for the patent, that if the doping in a symmetrical channel followed a catenary distribution, one could in fact minimize the field gradient in the channel, leaving channel current flow controlled largely by the potential jump. Physically, it meant that as the channel was widened by voltage variation, each successive laminar layer of the channel adjacent to the Debye region had higher and higher current-carrying capability, and that meant that most of the current flowed in two laminar sheets on the active channel edge. This makes the short-channel device a realizable device. In a similar way, a one-sided vertical structure having a base of insulator (or a p-layer like the base region [NPN transistor] between source and drain) will have field-generated carriers following an approximate exp(-x)distribution as one moves from the surface into the device. Again, a device having field control due to the potential jump across the Debye region (0.026 volts) results, making possible a short-channel device.

When these devices are operating in the diffusion mode, the drain-to-source voltage may be as small as 0.050 to 0.100 volts, and the device will amplify. The benefits in circuit power economy are obvious.

Conventional FET theory assumes either uniform doping across a channel or doping proportional to $(1-f(x/L)^2)$ with respect to channel center at x=0, with the channel width, 2L. Both of these channel configurations lead to uncontrolled current flow in the center of the channel, confirming conventional theory. This uncontrolled flow of current leads to reduced transconductance per unit of current, to a value less than that for the bipolar transistor, (ql_c/kT), introducing my previously reported transconductance efficiency parameter, kappa, $K^2$2. This kappa is of critical importance, as power-handling ability is an inverse function of it, $(K)^{-1}$, in RF and IF applications. The principle is evident with high-power transmitting tubes, which can have values as small as 10^{-4}.

The approximate value of kappa for any device may be found by dividing the input bias voltage change required for a 2:1 change in output current into 0.018, viz:

$$K=(0.018/\Delta V_i)$$

where ΔV_i is the input voltage change, and 0.018 is the value for an ideal device.

It works out that transconductance and transconductance efficiency are important with bipolar devices as well as FETs and electron tubes. An important consequence of this is that a single unified theory of amplifier design for all of these becomes possible. Voltage amplification, not current amplification, (B), controls both the stability and the magnitude of excess phase in all amplifiers using these devices. The same back-to-back diode equations used for bipolar devices, when transformed into their common-emitter format, can be used to model all three. The advantages to students, both starting and advanced, are easily recognized. When it is recalled that with many of these devices, the mean time between failure (MTBF) is halved by a device temperature rise of less than 30° C, the all-pervasive importance of this begins to become evident.

Several papers have been published in places that have not been readily accessible to ED members. Unfortunately, I have been unable to get the papers accepted in ED Journals. Most of the publications have been listed in my Letter to the Editor.[3]

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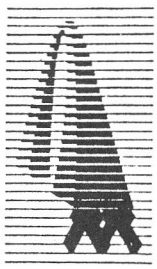
[1] L. Evans and K. Pullen, Jr. "Limitation of Properties of Field Effect Transistors," Proc IEEE(Letters),Vol. 54,pp. 82,83. Jan 1966.
[2] K. A. Pullen, Jr., "Transconductance Efficiency," Proc IEEE (Letters),Vol 64,pp. 1442, 1443, Sept. 1976.
[3] K. A. Pullen, Jr., "Comments of the Bibliography on Field Effect Transistors,"IEEE Trans. ED, p. 1014, November 1970.

Published earlier March 1984 issue IEEE Electronic Devices Newsletter

HELP YOUR BACK STAY HEALTHY!

Bend your knees; squat and lift with your thigh muscles, not your back. Never bend over with your knees straight and lift with your upper torso. Move slowly and avoid sudden movements. Try to avoid lifting loads in front of you above the waist line. Avoid bending over to lift heavy objects from car trunks, as this places a strain on lower back muscles.



St Louis, Missouri

MEMBERSHIP SERVICES

by E. C. Niehenke

In conjunction with the 1984 IEEE MTT-S Microwave Symposium, the Annual Chapter Chairmen's Meeting was held Wednesday evening, May 30, 1984. The meeting was productive and well attended with representatives from 16 of the 43 MTT-S Chapters throughout the world (see the meeting report by T. Nelson which includes the Chapters activities).

The 1983/84 Distinguished Microwave Lecturer, Dr. Stephen Adam, had a busy year visiting 37 locations in addition to the well performed job of chairman of the 1984 International Microwave Symposium. The two 1984/85 Distinguished Microwave Lecturers, Dr. Paul Greiling and Dr. Sander Weinreb are scheduling and preparing their lecturers.

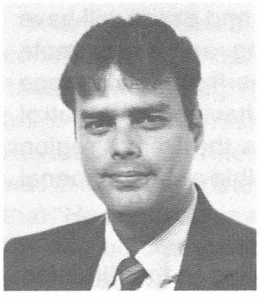
The number of MTT-S Chapters has increased 8 percent over the last year. We now have 43 Chapters throughout the world to serve the MTT-S members. West Germany is the newest Chapter under the chairmanship of Dr. Nigel J. Keen. A few new prospective Chapters are in the process of being formed. A Chapter, either MTT-S or joint with another Society, can be formed by having at least 12 Society members above the Student grade in the area sign the petition and have it approved by the local IEEE Section and respective Society(s). Please contact me if you need assistance. In forming the Chapter, it may be helpful to have the names, addresses, and telephone numbers of Society members in the new Chapters area. This information, as well as the petition or any other pertinent information can be obtained from the IEEE Services Center (201) 981-0060. The address is:

IEEE Services Center
445 Hoes Lane
Piscataway, N.Y. 08854

All active MTT-S Chapters are eligible to receive from our Society up to $300 this year to subsidize Chapter activities. The financial assistance to the Chapters provided by MTT-S is intended to supplement, not replace, funds provided to the Chapters by the local IEEE Section. The funding can be used to enhance the Chapter's program in one-day Symposia, lecture series, technical meeting, tours, and social events. Chapters should prepare a letter requesting a specific amount and should describe how the Chapter plans to use the money. Address letter to:

E. C. Niehenke
Westinghouse Electric Corporation
P.O. Box 746, MS 339
Baltimore, Maryland 21203
(301) 765-4573

MEMBERSHIP MATTERS



by P. A. Green

A steady and stable increase in MTT-S membership has been continuing throughout the year. MTT's rank in IEEE society growth has held a solid seventh position. MTT-S has increased with 437 new members, to 6902 as of May 31, 1984, a 6.8 percent increase as compared to a year ago. This is well above the 4.5 percent increase predicted this year. If the pace continues we should surpass our goal of 7,770 active members by years end.

Congratulations are in order to the Canaveral and Ottawa chapters for their outstanding efforts in promoting MTT-S membership for 1983. Canaveral did exceedingly well in their efforts and had the highest growth rate with 35.7 percent, while Ottawa increased its membership by 18.5 percent. Representatives from these two chapters received Chapter Recognition Awards and two-hundred dollar checks during the Chapter Chairmen's dinner at the recent MTT-S Microwave Symposium held in San Francisco.

Each year, the chapter with the largest growth (percentage-wise), from regions 1-6 and another from 7-10, shall receive this award. Good Luck to all the chapters for their efforts in promoting membership this year.

LON L. SANDERS

IN MEMORIAM

Lon L. Sanders, Fellow of the IEEE, died suddenly during an operation on March 23, 1984.

Lon was a pioneer in, and co-inventor of, the Microwave System, now used for Space Shuttle and destined to become the international standard landing system of the 21st century. He received a commendation from the Chief of Naval Operations and was nominated for a Presidential Legion of Merit.

Lon received the BSEE from Newark College of Engineering and studied at USC. He was a design engineer at Hoffman Radio and Allen Dumont Laboratories before joining ITT Gilfillan in 1953 where he worked until his death. He became an independent consultant for one year, in 1975-76, then returned to Gilfillan. At Gilfillan, he was Systems Manager and Project Engineer on several radars and electronic landing systems and rose to become Senior Member of the Technical Staff. He was System Engineer for a NATO air defense radar, a job that often took him to Belgium. His specialty in recent years was the conceptual design and performance testing of new radars.

He published ten technical papers and held four patents on automatic landing aids. He won two Gilfillan awards for best technical paper.

Lon was active in IEEE affairs. He was Chairman of and a vigorous leader of the Los Angeles Chapter of the Aerospace and Electronic Systems Society. He was an elected Member-at-Large of the Los Angeles Council and served as Awards Chairman and as Head of the Development Committee, revising the financial and operating policies of the Council. He was also a member of the Institute of Navigation and the American Institute of Aeronautics and Astronautics.

Lon built wooden models of a Polynesian ship and a Chumash Indian canoe that are on exhibit at the Ventura Museum, and built other Polynesian ship models for his own pleasure based on his own research. In his studies of Polynesian navigation, he and his wife made many visits to Tahiti, American Samoa, Western Samoa, Fiji and New Zealand. They were planning another trip to the South Pacific when he died.

He leaves his wife, Nancy, their son and two daughters.

Myron Kayton
April 9, 1984

General Chairman Remark 1985 IEEE MTT-S International Microwave Symposium

by Fred J. Rosenbaum

The 1985 IEEE MTT-S International Microwave Symposium and Exhibition will be held in St. Louis, Missouri on 4, 5, 6 June 1985. This is the first time the Symposium is being held in St. Louis. The last meeting to be hosted in the Midwest was in 1972 at Arlington Heights, Illinois, a suburb of Chicago.

The St. Louis Steering Committee has been hard at work planning a meeting that we hope will be up to the high standards set by our predecessors. "Microwave Week" will begin with the 1985 Microwave and Millimeter-Wave Monolithic Circuits Symposium on Monday, June 3. The week will conclude with the ARFTG Symposium on Friday, June 7. Other specialist workshops are also in the planning stages at this time.

The site of the technical sessions and exhibition is the Cervantes Convention Center in downtown St. Louis, near the historic riverfront. The conference hotel, the Sheraton St. Louis Hotel, is located across the street. A large number of hotel rooms have been booked in the downtown area convenient to the Cervantes Center. Continuous bus service is planned for the convenience of the Symposium participants. A highlight of the Symposium will be an expanded historical exhibit with emphasis on early British and European contributions to the field.

We in St. Louis hope you can join us to experience Mid Western hospitality at the Symposium. We will look for you there.

St Louis, Missouri

1985 IEEE Microwave and Millimeter-Wave Monolithic Circuits Symposium

W.R. Wisseman
1985 General Chairman

The 1985 IEEE Microwave and Millimeter-Wave Monolithic Circuits Symposium will be held in St. Louis, Missouri on June 3 and June 4, 1985. The Symposium was organized by the Microwave Theory and Techniques Society in 1982 to be held in conjunction with the IEEE MTT-S International Microwave Symposium. The Monolithic Symposium has grown in attendance each year with 620 people attending in 1984. The Electron Devices Society is a cooperating sponsor of the Symposium.

I have been impressed with the progress that has been made in GaAs monolithic technology since the first Monolithic Symposium was held in Dallas. I came away from the Symposium this year in San Francisco with the feeling that GaAs monolithic technology has reached a new level of maturity. Wafer processing has become sufficiently reproducible that circuit designers are free to investigate a variety of circuit approaches, some that are only possible using monolithic circuits. It seems clear that significant systems applications of GaAs monolithic circuits are close at hand, both at microwave and millimeter-wave frequencies.

We expect the 1985 Symposium in St. Louis to continue highlighting significant advances in monolithic circuit technology. Prospective authors are invited to respond to the Call for Papers printed below. The deadline for submission of papers is December 10, 1984.

FIRST CALL FOR PAPERS

The 1985 IEEE Microwave and Millimeter-Wave Monolithic Circuits Symposium will be held in St. Louis, MO on June 3 and June 4, 1985. This symposium is held annually in conjunction with the IEEE MTT-S International Microwave Symposium.

Papers are solicited describing original work in the field of analog and related digital monolithic integrated circuits with applicability to the 1-300 GHz frequency range. The following subject areas concerned with the design, fabrication and testing of microwave and millimeter-wave monolithic integrated circuits are particularly appropriate but other aspects of this technology will also be considered for this conference:

- Analog & Related Digital ICs
- Signal Control & Modulation
- Oscillators & Amplifiers
- Computer-Aided Design Techniques
- Related Device Technology
- Microwave Digital Interfaces
- Radiation Effects & Reliability
- Packaging & Testing
- Device & Circuit Modeling & Design
- Systems, Subsystems & Components

Authors are required to submit 10 copies of a 500-1000 word summary, with supporting illustrations, that clearly explains their contribution. In addition, an abstract of 30 to 50 words must also be submitted with the complete mailing address of the author(s). The paper summary and abstract must be received on or before 10 December 1984 by:

Roger W. Sudbury, L-324
MIT Lincoln Laboratory
P.O. Box 73
Lexington, Mass. 02173
(617) 863-5500

Authors are responsible for obtaining all required company and government clearances prior to submission of papers. Notice of acceptance or rejection will be mailed to authors by 11 February 1985. Authors of accepted papers will receive material and instructions for preparing photoready copies of papers to be printed in the Symposium Digest, copyright release forms, and presentation guidelines.

The authors are also encouraged to prepare expanded versions of papers presented at the symposium to be considered for publication in a special section of the MTT-S and/or ED-S transactions.

1986 IEEE MTT-S International Microwave Symposium

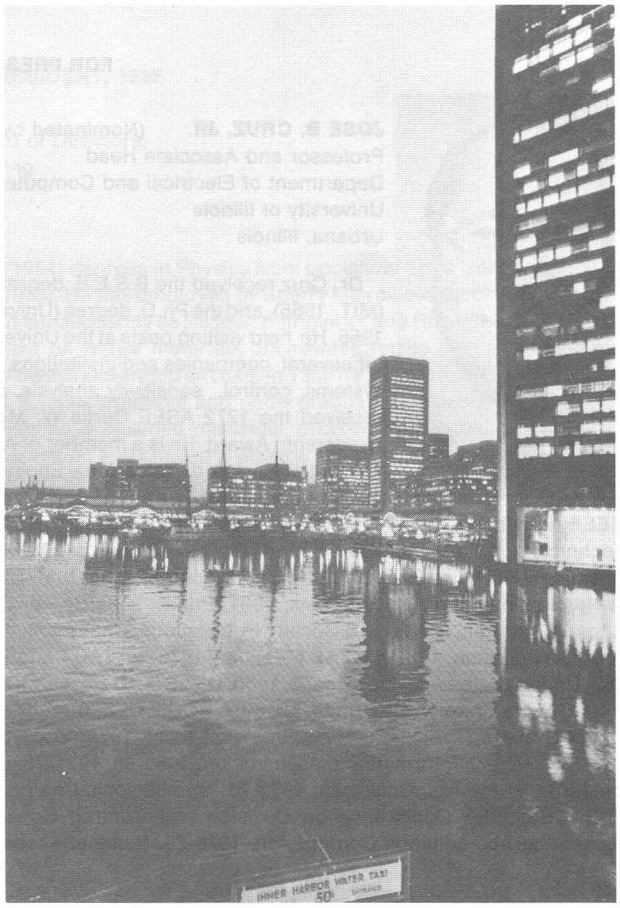
by E. C. Niehenke

The 1986 IEEE MTT-S International Microwave Symposium committee has been hard at work for over two years now laying the foundations for the Microwave Symposium to be held the week of June 2-6 in Baltimore, Maryland. The committee of over 30 is enthusiastic with a deep commitment to make this symposium a well run and enjoyable event to be remembered for years to come. The new Baltimore Inner Harbor has been selected as the city of the Symposium with technical meetings and exhibits to be held at the new spacious Convention Center. Six modern hotels located within a few blocks of the center will provide 1925 sleeping rooms. All hotel contracts have been negotiated and signed with excellent discounts. The projected estimated 1986 room rate is $87 single, $100 double or less. Hotels have honored our request of a flat single or double rate for any room in the hotel.

The theme "Microwaves Linking Nations" has been selected reflecting the international role that microwaves play in our life and is also appropriate for the Baltimore site since this town has numerous strong ethnic groups from all over the world. Each weekend during the summer months, one of the groups has a festival at the Inner Harbor with entertainment, food, dancing and showing of crafts. The symposium banquet will be fashioned after this theme with regards to food, entertainment, and the like.

"The lure of the distant and the difficult is deceptive. The great Opportunity is where you are."

- John Burroughs



Baltimore Inner Harbor — Site of 1986 International Microwave Symposium.

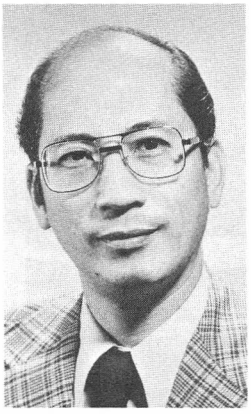
Microwave Measurement Standard Committee

In keeping with its traditional role of leadership in the microwave field, the Microwave Theory and Techniques Society is in the process of activating a committee to establish a comprehensive standard for modern microwave metrology. This standard will fill a void which has existed for some time. This standard is certain to become a reference "bible" for the microwave community. If you are interested in actively participating in this important work as a member of the committee, please contact:

Arthur Blaisdell
M/A-COM Millimeter Products Company
Building #21, 73 Second Avenue
Burlington, MA 01803

1984 ANNUAL ELECTION CANDIDATE BIOGRAPHIES

FOR PRESIDENT-ELECT, 1985



JOSE B. CRUZ, JR. (Nominated by Board of Directors)
Professor and Associate Head
Department of Electrical and Computer Engineering
University of Illinois
Urbana, Illinois

Dr. Cruz received the B.S.E.E. degree (summa cum laude, University of the Philippines, 1953), the S.M. degree (MIT, 1956), and the Ph.D. degree (University of Illinois, 1959) all in electrical engineering. He has been at Illinois since 1956. He held visiting posts at the University of California at Berkeley, MIT, and Harvard. He has served as consultant for several companies and institutions. He is the author or coauthor of five books and over 170 papers in feedback systems, control, sensitivity analysis, and circuits. He is a member of the National Academy of Engineering. He received the 1972 ASEE Curtis W. McGraw Research Award and the 1981 Halliburton Engineering Education Leadership Award. He is a member of ASEE, NSPE, ISPE, PAASE, PESO, Eta Kappa Nu, Phi Kappa Phi, and Sigma Xi. He is a registered Professional Engineer and a member of the Professional Engineering Examination Committee of the State of Illinois.

IEEE Activities — (S'56-M'57-SM'61-F'68)OFFICES: Board of Directors, 1980-84; Vice President - Publication Activities, 1984; Vice President - Technical Activities, 1982-83; Division I Director, 1980-81. COMMITTEES/BOARDS: Education Medal, 1977-79; Simon Ramo Medal, 1982-84; Educational Activities Board, 1973-75; EAB Accreditation Guidelines, Chairman, 1973-75; Executive, 1982-84; Fellow, 1970-72; Finance, 1982-84; Nominations and Appointments, 1981; Publications Board, Chairman, 1984, Vice Chairman, 1981; PUB Panel of Technical Publication Editors, Chairman, 1981; PUB Society Publications, Chairman, 1981; Technical Activities Board, 1979-83, Chairman, 1982-83; TAB OpCom, 1980-83, Chairman, 1982-83; TAB Meetings, 1976-78; TAB Periodicals, Chairman, 1981; TAB/USAB Communications and Information Policy, 1983; United States Activities Board, 1980; USAB/TAB Research and Development, 1981-83, Co-Chairman, 1981. SECTIONS: Central Illinois, Circuit Theory Chapter, Chairman, 1966-67. SOCIETIES: Circuits and Systems: Associate Editor Transactions, 1962-64; Publications, 1962-64. Control Systems: President, 1979; President-Elect, 1978; Vice President, 1975-77; Finance, Chairman, 1975-77; Administrative Committee, 1966-75, 1978-80; Information Dissemination, 1966-68, 1971-73; Linear Systems, Chairman, 1966-68; Editor Transactions on Automatic Control, 1971-73; Awards, Chairman, 1973-75; Nominations, Chairman, 1980; Distinguished Member, 1983. Centennial Medal Recipient. CONFERENCES: IEEE Conference on Decision and Control, General Chairman, 1975. REPRESENTATIVE: ABET, Corps of Inspectors for Engineering Accreditation Commission, 1976-84. National Academy of Engineering, 1982-84.

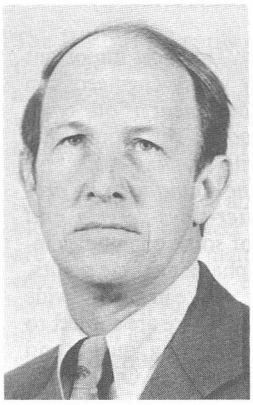
FOR PRESIDENT-ELECT, 1985

BRUNO O. WEINSCHEL (Nominated by Board of Directors)
President and Chief Engineer
Weinschel Engineering Company
Gaithersburg, Maryland

Dr. Weinschel born 1919 in Stuttgart, Germany, received a BA-Physics (equivalent), and a DR-Engineering at Technische Hochschule, Stuttgart and Munich; Honorary DR-Science, Capitol Institute of Technology; Professional Engineer's licenses, D.C., MD. Supervisory Engineer, Electrical Test Planning, Western Electric; Chief Engineer, Industrial Instruments; Research Worker, National Bureau of Standards. Since 1952, Chief Engineer and President of Weinschel Engineering, Gaithersburg, MD. Fellow, IEEE, 1966, "For contributions in the field of precision microwave measurements and advancement of attenuation measurements"; Fellow, British IEE, 1977. Chairman of the Engineering Affairs Council, American Association of Engineering Societies, 1980-81, which includes the Engineering Manpower Commission. Principal Investigator for NSF Study on Engineering Utilization since 1983. Chairman, U.S. URSI Commission I, 1967-70. Chairman, Executive Committee, Conference for Precision Electromagnetic Measurements, 1976-78. Secretary, Committee SC-46D, International Electrotechnical Commission on Coaxial Connectors since 1982. Author, co-author, 40 journal articles; inventor, co-inventor, 20 patents; reviewer for several journals.

IEEE Activities — (A'45-M'47-SM'53-F'66)OFFICES: Board of Directors, 1978-80; Vice President - Professional Activities, 1978-79; Secretary, 1980. COMMITTEES/BOARDS: Executive, 1978-80; Finance, 1978-80; Member Conduct, 1977; Standards, 1971-74, Vice Chairman, 1972; Standards Comm. on Precision Coaxial Connectors, 1964-67; Standards Comm. on Bolometric Power Meters, 1964-72; Standards Comm. on Fixed and Variable Attenuators and Test Methods DC-40GHz, Chairman, 1964-73; Standards Comm. on Network Analyzers, 100KHz to 18GHz, Chairman, 1970-84; Technical Activities Board, 1973, 1975-76; TAB OpCom, 1972-76; TAB Finance, Chairman, 1973; United States Activities Board, Chairman, 1978-79; USAB/Licensure and Registration, 1980-81; USAB/Manpower Activities, 1982-present; USAB/Productivity and Innovation, 1981-present, Chairman. SECTIONS: Washington: Instrumentation and Measurement Chapter, Vice Chairman, 1958-59, Chairman, 1959-60. Microwave Theory and Techniques Chapter, Program Chairman, 1965-66. SOCIETIES: Instrumentation and Measurement: Comm. on High Frequency Instruments and Measurements, Chairman, 1967. Microwave Theory and Techniques: Transactions Review Comm. Chairman, 1972. CONFERENCES: Conference for Precision Electromagnetic Measurements, Executive Committee Chairman, 1976-78. Conference on U.S. Technological Policy, Co-Chairman, 1978, 1979. IEEE International Convention, Technical Session Chairman, 1964. REPRESENTATIVE: AAES, Coordinating Council on Productivity and Innovation, 1980-present.

FOR EXECUTIVE VICE PRESIDENT, 1985



GEORGE P. RODRIGUE (Nominated by Board of Directors)
Regents Professor, School of Electrical Engineering
Georgia Institute of Technology
Atlanta, Georgia

Dr. Rodrigue received the B.S. (1952) and M.S. (1954) degrees in Physics from Louisiana State University and the Ph.D. in Applied Physics from Harvard University (1958). He was employed by Sperry Microwave Electronics Division, Sperry Rand (1958-68), first as Senior Engineer and subsequently as Research Engineer and Research Staff Consultant. His work included research and development on ferrite materials, microwave ferrite devices, parametric amplifiers, microwave acoustic delay lines and microwave integrated circuits. In 1968 he joined the faculty of Georgia Tech, School of Electrical Engineering, where he teaches graduate and undergraduate courses in circuits, electromagnetics, and solid state. His research interests have included materials, microwave devices, and near-field antenna measurements. At Georgia Tech he has served on and chaired a wide range of faculty committees. He was elected Chairman of the Georgia Tech Executive Board for 1981-82. He has been a consultant to a number of industrial and government organizations.

IEEE Activities — (S'56-M'65-SM'69-F'75)OFFICES: Board of Directors, 1982-83; Vice President - Publication Activities, 1982-83. COMMITTEES/BOARDS: Executive, 1982-83; Finance, 1982-83; INSTITUTE Editorial Board, 1984; Long Range Planning, 1981-82; Nominations and Appointments, 1979-81; Publications Board, 1977-78, 1982-84, Chairman, 1982-83, Consultant, 1984; PUB Long Range Planning, 1984; Technical Activities Board, 1976, 1979-80; TAB OpCom, 1979-80; TAB Technology Committees Administration, Chairman, 1979-80. SECTIONS: Atlanta: Awards Comm. Chairman, 1976-77; Antennas and Propagation/Microwave Theory and Techniques Chapter, Chairman, 1970-71. SOCIETIES: Microwave Theory and Techniques: President, 1976, Vice President, 1975; AdCom, 1970-79; Newsletter Editor, 1972-75; Membership Services Chairman, 1973-74; Meetings and Symposium Chairman, 1974-75; Awards Chairman, 1977-78; Long Range Planning Comm., 1975, 1978; Microwave Acoustics Comm. Chairman, 1965-67; Microwave Integrated Circuits Comm. Chairman, 1968-70; Microwave Ferrites Comm., 1968-75. CONFERENCES: Conference on Magnetism and Magnetic Materials: Advisory Board, 1970-73; Steering Comm., 1971-73; Technical Program Committee, 1966. INTERMAG Conference: Technical Program Committee, 1973. IEEE Ultrasonics Symposium: Local Arrangements, Technical Program Committee, 1983. International Microwave Symposium: Chairman, 1974; Technical Program Committee, 1969, 1970, 1973, 1979, 1981, 1982, 1983, 1984.

FOR EXECUTIVE VICE PRESIDENT, 1985

MERLIN G. SMITH (Nominated by Board of Directors)
Technical Assistant to Vice President
of Logic and Memory
IBM/T.J. Watson Research Center
Yorktown Heights, NY

Mr. Smith received the B.S.E.E. degree from the University of Cincinnati in 1950 and the M.S.E.E. degree from Columbia University in 1957. After military service at the Signal Corps Engineering Laboratories he joined the International Business Machines Corporation in 1952, and participated in the development of the Naval Ordnance Research Calculator. From 1963 to 1969 he was Engineering Manager for the early development of large-scale integration. Mr. Smith has managed programs in advanced computer components, design automation, and cryptographic systems, and has been a fre quent author and patentee in the field of electronic components. He is presently engaged in the application of VLSI technologies and is Technical Assistant to the Vice President of Logic and Memory at the IBM T.J. Watson Research Center in Yorktown Heights, New York.

IEEE Activities — (S'46-A'54-M'59-SM'64-F'78)OFFICES: Board of Directors, 1983-84; Division VIII Director, 1983-84. COMMITTEES/BOARDS: Awards Planning and Policy, 1983; Budget Development, 1981; Conference Board, 1983-84; Field Awards, 1981-82; Institute-Wide Publications, 1981-82; Piore Award Subcomm., Chairman, 1981-82; Publications Board, 1981-82; Regional Activities Board (TAB liaison), 1983-84; RAB Transnational Activities, 1984; Society Publications, 1982; Technical Activities Board, 1977-78, 1983-84; TAB OpCom, 1983-84; TAB Transnational Relations, 1983-84. SOCIETIES: Computer: President, 1977-78, Vice President for Technical Activities, 1976, Vice President for Chapters, 1975, Secretary, 1972-73, Governing Board, 1970-79, Awards Comm. Chairman, 1980-82, Constitution and Bylaws Comm. Chairman, 1972-73, Education Comm. Chairman, 1971-72, Long Range Planning Comm. Chairman, 1979, Solid State Circuits Council representative, 1971, Computer Elements--Circuits and Systems, Chairman, 1967-70. CONFERENCES: Fall COMPCON, Chairman, 1974, Fall COMPCON Standing Comm. Chairman, 1974-75. Joint CAS/CS Conferences, Coordinating Committee, 1984. National Computer Conference, Chairman, 1979. VLSI Conference, Standing Committee, Chairman, 1981-82. REPRESENTATIVE: AFIPS, Board of Directors, 1977-79, Executive Committee, 1979. National Computer Conference, Board of Directors, 1973-76, Chairman, 1976.

Statements by Candidates for 1985 President-Elect

The following independently written statements by the two candidates for President-Elect, Dr. Jose B. Cruz, Jr. and Dr. Bruno O. Weinschel, have been especially prepared for readers of IEEE newsletters. It is hoped that these statements will supplement the biographical sketches and other statements made by the candidates which appear elsewhere in the IEEE literature and that they will assist IEEE member voters in the election process.

Statement by Jose B. Cruz, Jr.

Improvement of Technical and Educational Services to Members

Advances in computers, communications, microelectronics, electronic materials, electromagnetics, systems, energy, and other areas within the scope of IEEE concern have been dramatic in recent years. IEEE members must continuously learn a significant amount of new material. The nature of our profession demands that lifelong learning, in its broadest sense, occupy a central place in our individual activities.

The IEEE provides an organizational framework through which each member can participate to more fully utilize collectively developed technical services. Publications, short courses, workshops, Society and Regional conferences, and Section/Chapter meetings will continue to be the principal vehicles through which we achieve lifelong learning objectives. In view of the great diversity of our fields of activity and the speed with which these fields change, I believe that we need to develop new and highly flexible means of service for delivering educational and technical information.

This year the IEEE Publications Board—which I chair—will provide an experimental service called "Finding Your Way." This enables a member, who wishes to learn a new field, to access a computer system through a communication network. Members can obtain listings of tutorial articles, workshops and conferences, home study courses, special satellite broadcasts, short courses, IEEE press books, and other relevant aspects on desired topics. I propose to greatly expand this service so that a member with a personal computer or terminal may obtain a variety of additional information services from IEEE.

Enhancement of Status of Members of the Profession

An important mission of the IEEE is to enhance the status of the members of the profession. This is a constitutional mandate which I strongly support. Although our principal activity in this regard is confined to the United States arena, many professional issues have universal applicability. Thus, we are addressing concerns affecting the status of the profession as a whole. Moreover, we are serving the needs of a large fraction of IEEE members who reside in the United States.

I am very supportive of the USAB positions on career enhancement issues including professional practices for engineers and their employers, portable pensions, patent rights, and age discrimination; salary surveys and other member opinion surveys; and legislative coordination. We need to develop more position papers to address the major problems facing the profession. Furthermore, we should give strong support to the joint USAB/TAB initiatives on: technology policy issues on productivity, technology transfer, energy, the environment, and communications.

As President I will work for the improvement of our technical services to IEEE members through expanded tutorial and educational materials. I will support the creation of a system that provides access to a variety of IEEE information services through a computer network. Overall, I will press for the establishment of a dynamic professional development program to enhance the status of members of the engineering profession.

Statement by Bruno O. Weinschel

1. *Necessity To Improve Competitiveness:* The most important problem confronting the economy today where engineers can play a more important role, is the *re-establishment of our competitiveness in world trade and against imports*. This requires the introduction of many new technologies into "smoke stack" industries and continuing *improvement of the manufacturing processes, quality control, reliability, after-sales-service and customer satisfaction*. The management of some companies including Hewlett-Packard and IBM are emphasizing these points, but many others have not yet grasped that we are in a worldwide competition. About 90% of all products used here are subject to foreign competition. We need better manufacturing, quality and reliability engineering as well as marketing research. Our private sector management must be improved. *Engineers must participate*.

2. *Continuing Education of Engineers*: Industry must budget for the *maintenance of human technical capital*. Especially, electrical engineering changes so rapidly that continuing education is necessary to stay abreast of current technologies. We must *improve* the *utilization* of engineers, so that an engineer can use a greater part of his time utilizing his technical knowledge. This requires sufficient support by subprofessionals including technicians, tech writers, etc., and adequate facilities.

3. *Improvement of Engineering Education*: Many engineers feel unprepared for their jobs. Some schools still teach engineering on a narrow, disciplinary basis while in real life, the required knowledge is inter-disciplinary. For example, in semi-conductors, the demarcation between electrical engineering, chemistry, solid-state physics and advanced fabrication processes has practically disappeared. This needs to be reflected in the *structure and programs* of engineering schools. Since engineers work with other departments as well as the public, they must be able to *communicate effectively*. This is essential if more engineers are to become leaders in the shaping of policy in industry and government.

4. *Long-Term Civilian R&D by Industry*: About 70% of U.S. R&D is supported by defense. While important to national security, the Japanese and West Germans, as a percentage of GNP, spend more on non-defense research. Wealth, jobs and the trade balance are closely related to the amount and quality of non-defense research. Our industries must perform more long-term R&D in civilian products, services and process technology in order to improve the quality of life both here and in the rest of the world. Technology has improved and must continue to improve health, communications, environment, transportation, cost of energy and utilization of materials.

5. *Support for Engineering by the National Science Foundation*: The NSF by law must support both *science* and *engineering*. Historically, it concentrated on basic science. Its budget is about $1.5 billion. Grudgingly, within the last six years engineering increased to 10%. Its engineering research is not supportive of industry's new technologies. The needs of highly technical *industries* have outrun their support by the NSF. Our technological *competitiveness* is closely coupled to the *quality of our engineering research and talent*. Excellence in science is necessary but not sufficient. The NSF must improve the support of engineering research and education, resulting in new and better products and services.

Statements by Candidates for 1985 Executive Vice President

The following independently written statements by the two candidates for Executive Vice President, Dr. George P. Rodrigue and Mr. Merlin G. Smith, have been especially prepared for readers of IEEE newsletters. It is hoped that these statements will supplement the biographicl sketches and other statements made by the candidates which appear elsewhere in the IEEE literature and that they will assist IEEE member voters in the election process.

Statement by George P. Rodrigue

The IEEE is primarily a technical organization and has limited financial assets. Unlike a major corporation or government agency, the IEEE cannot hire full-time professionals to carry out most of its programs. However, the IEEE has enormous resources in its volunteer members, and its professional staff is best utilized to facilitate the voluntary actions of members. Our meetings and conferences are successful because interested and capable engineers volunteer both time and talents. Our publications are pre-eminent in many fields because reviewers, authors, and editors volunteer their efforts. In the professional area members write position papers, testify before government agencies, and lobby with local school boards, and the aggregate of individual member reputations has political power.

The IEEE has a good track record, but much remains to be done in making the engineering profession a rewarding life-long career. I believe that the IEEE Board of Directors should promote programs that foster collective and mutually supportive actions on the part of IEEE members. The program "Finding Your Way" that I successfully urged the Board to approve last year is one such example. This program builds its data base on the recommendations of technically qualified members, and will provide to IEEE members guidance on the best tutorial material available in a broad range of specific technical areas.

Programs in the professional area are also most successful when a heavy infusion of volunteer effort exists. I believe that part of the problem with the AAES is that it has no significant base of volunteer support. A true pooling of the knowledge and talents of engineers from various societies with common professional goals must be achieved. Top-down organizations rarely work on a voluntary basis.

Statement by Merlin G. Smith

It is an honor to be considered for the position of Executive Vice President. Participation in the Executive Committee and Board of Directors affords the opportunity to consider all the interests of the Institute. We are particularly interested in promoting efforts which foster interorganizational or interdisciplinal synergisms. These and other priorities are:

- Joint industry, government and university programs
- Cooperative activities between Society and Regional entities
- Collaboration amongst regional, technical and educational groups in the generation of affordable educational programs
- Conference services to an increasing number of members
- Publications to serve a broader member base
- Intersociety conferences and publications
- Individual-recognition programs
- Recognition of Engineering and Computer Science professions
- Responsible participation in societal and governmental forums
- An environment encouraging greater volunteer participation.

One of the specific functions of the Executive Vice President is to chair the Conference Board. As a founder and a current member of this Board, we can be effective in the brief one-year term of office. We also bring the experience as a past chairman of a major conference board, the National Computer Conference Board, chairmanship of the NCC, founder of the Compcon Fall series, and initiator of a number of workshops and meetings.

We have the support and encouragement of our employer, and we are prepared to give it a good effort.

IEEE JOURNAL OF ROBOTICS AND AUTOMATION

The IEEE Robotics and Automation Council announces the forthcoming publication of the IEEE Journal of Robotics and Automation.

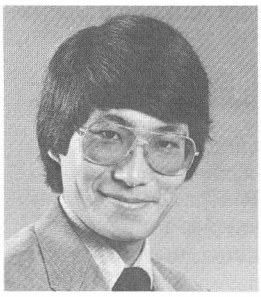
The IEEE Journal of Robotics and Automation is intended to become the authoritative journal in the field. Publication is tentatively scheduled to begin in early 1985. It will cover both Theory and Applications in all the areas of interest of the sponsoring IEEE Societies, including:

- robot arm kinematics, dynamics, control, and manipulation;
- computer simulation of robot motion and manufacturing systems;
- man-machine communication and interface, and robot control languages;
- coordination, management and control of multi-robot systems;
- robotic vision and other imaging systems;
- contact sensors development and sensory information processing;
- manipulator design, redundant robots, and locomotion;
- hardware and software implementation of robotic systems;
- graphics, geometric modeling and other computer-aided engineering techniques as applied to robotics;
- manufacturing science as applied to robotics;
- design, implementation, and applications of robotic systems;
- motion planning, task planning, expert systems for robotics; and
- smart sensors and sytems integration.

IEEE members interested in submitting manuscripts for review and possible publication should contact the Editor:

Professor George A. Bekey
USC Robotics Institute
University of Southern California
Los Angeles, CA 90089-0781
(213) 743-2995

FEEDBACK



by Kurtis L. Kurisu

The 1984 International Microwave Symposium was held May 29 - June 1 in San Francisco. Our feedback letter for this issue deals with a lesson in architectural acoustics. The author of this exposition is J. Robert Ashley. The following excerpts summarize what I believe is the intent of Mr. Ashley's letter.

"To accomodate the large number of exhibitors, this year's Symposium was held in the auditoriums of the San Francisco Civic Auditorium. The plenary session and the panel discussions were held in the large central auditorium.

After the Plenary Session, several of our colleagues who know that I have taught graduate level engineering courses in acoustics and electro-acoustics commented to me on the PA system. At the time, I did not fully understand the causes for the difficulties. Later, I did learn the scientific cause and believe it is interesting enough to explain in this NEWSLETTER. As a long time personal friend and colleague of Dr. Stephen Adam and many of his co-workers on the steering committee, I do not intend this as a criticism of their very hard work towards a successful and useful Microwave Symposium.

The first words Steve Adam spoke into the microphone were greeted with a cry from the audience "louder!" Now, if there had not been other difficulties, the amplified sound would have been loud enough; however, it did not have the amplified loudness we have come to expect in this large an auditorium. Steve moved closer to the microphone to get louder sound, the audience quieted, and the meeting was under way. Four people talked over the PA system and I quickly realized there were some intelligibility problems in the Civic Auditorium.

First, the conventional wisdom is that cardiod microphones control acoustical feedback; thus, a cardiod microphone was used. That is why the four speakers got such variable results using the PA system. It was during the excellent Keynote Address by John A. Young that I realized there was more wrong than the choice of microphone.

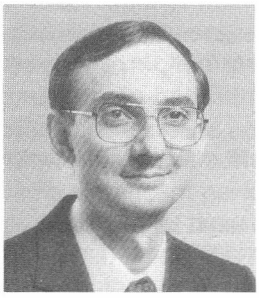
As I sat through Mr. Young's talk, my ears told me there were too many speakers, but my eyes refused to confirm the diagnosis. The two arrays located above and to the right and left sides of the stage were obviously being used. None of the speakers had defective drivers. The amplifiers had plenty of reserve power. Yet, the sound had that vague, non-directional quality I have heard in most of the gymnasiums and large churches I have studied. I knew something was escaping me.

I deduced the cause for the troubles while munching cheese and enjoying wine with the Open Forum session. I noticed the sound techniciam start the set-up for Japan/USA Competition in Technology Panel. As he uttered the magic word "testing," my two transducer passive sonar found those other speakers. There was a row of ceiling mounted speakers under the entire balcony. These were on along with the two front horn arrays. Why? I speculate that in the past, they have had complaints about hearing under the balcony and the conventional wisdom is to put up speakers near the point of complaint. Using those speakers was wrong as a seven dollar bill for the majority of the people in the auditorium. Since the main speakers were not correctly positioned and aimed, we heard much of their sound from reflected paths. Then, the sounds from the speakers behind and to the sides under the balcony were within 10 dB of the main speaker sounds. Our ears had over a dozen copies of each and every syllable to try to sort out.

I have grown accustomed to people politely not believing my explanations of poor speech intelligibility in churches and hotel meeting rooms. If you want to learn what a difference correctly engineered sound reinforcement can make, I invite you to attend IMTC-85 and ICASSP-85. The I&M-s meeting will be March 21-22. The ASSP-S meeting will be March 26-29. Both will be in the Tampa, Florida, Hyatt Regency Hotel. With help from University of South Florida engineering students, the ASSP sound equipment will be used instead of the built-in PA systems. You can hear for yourself the improved intelligibility. Also, you will undoubtedly learn enough about microwave measurements to justify a trip to beautiful Florida in the springtime."

The MTT-S Newsletter editorial staff solicits responsible opinions and feedback from MTT-S members regarding topics of interest and importance to our members. If you have an opinion you would like to express in this column, please contact the feedback editor: Kurt Kurisu, TRW, One Space Park, Redondo Beach, CA 90278.

HIGH ELECTRON MOBILITY TRANSISTORS (HEMT)*



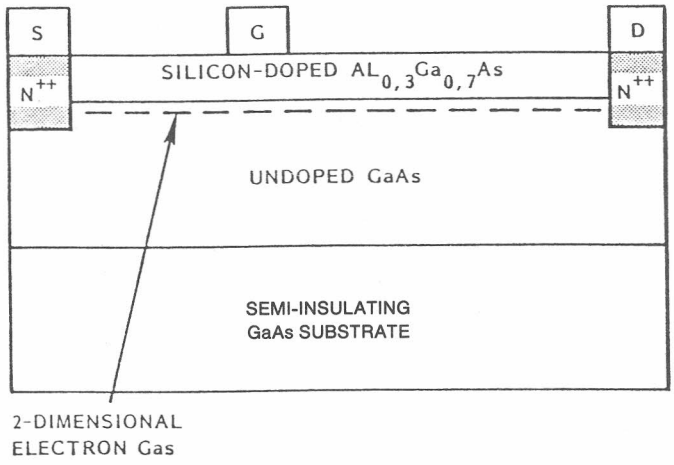
John J. Berenz
TRW Electronic Systems Group
One Space Park
Redondo Beach, CA 90278

Introduction

Since the advent of the modulation-doped superlattice structure in 1978, [1] very rapid progress has been made in improving the quality of the epitaxial material, and in applying the unique electrical properties of this structure to devices. Fujitsu was the first to demonstrate a field effect transistor, which they named the High Electron Mobility Transistor (HEMT) in 1980. They fabricated an otherwise conventional MESFET on a single quantum well, selectively- doped GaAs/n-A1$_x$Ga$_{1-x}$As heterojunction superlattice structure as shown in Figure 1.[2] Since that time great strides have been made at several laboratories throughout the world in optimizing the physical structure for a number of different device applications. However, the device application which has received the most attention has been ultra high speed digital integrated circuits. This is because of the great interest in building more powerful computers.

Several reasons for pursuing HEMT digital ICs are illustrated in Figure 2, which compares the speed-power performance of the various competitive, state-of-the-art digital IC technologies. HEMT ring oscillators have been fabricated which exhibit 12 psec switching delays at room temperature.[4] Only Josephson-Junction devices exhibit a lower power dissipation per gate than HEMT, but JJs must be operated at 4°K (in comparison to 77°K for HEMT) to achieve comparable propagation delays. More complex, functional logic circuits have been fabricated using HEMT with equally impressive performance. Table 1 summarizes the major milestones in HEMT digital IC development. Divide-by-two circuits have been fab-

*Footnote. Also commonly referred to as modulation-doped FET (MODFET), two-dimensional electron gas FET (TEGFET), or selectively-doped heterojunction transistor (SDHT).



WHAT IS IT?

The HEMT is an otherwise conventional MESFET fabricated on an aluminum gallium arsenide/gallium arsenide heterostructure which is grown by molecular beam epitaxy (MBE).

HOW DOES IT WORK?

The device functions as a MOSFET in which the Schottky-barrier gate controls the number of electrons in the 2-dimensional electron gas formed on the GaAs-side of the heterojunction.

WHY USE IT?

Carrier transport in the electron gas is similar to undoped GaAs. As a result, the electrons travel at twice the saturated velocity of a conventional GaAs MESFET. The electron mobility is also many times greater, because there is little or no impurity scattering.

Figure 1. High Electron Mobility Transistor (HEMT)

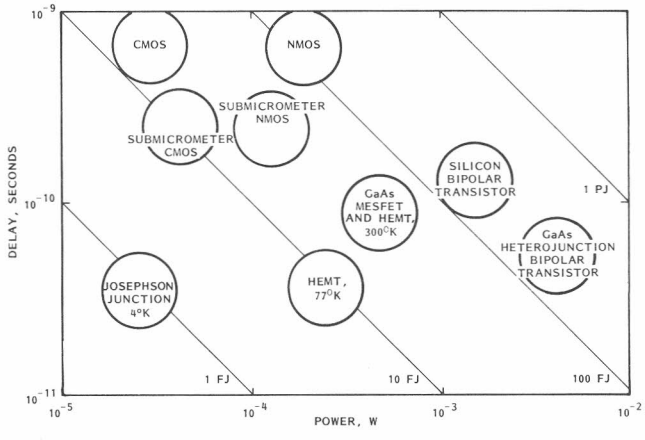


Figure 2. Comparison of Speed-Power Products of Different Technologies

ricated with greater than 5 GHz clock frequencies at room temperature.[5] Since the fabrication technology for HEMT is very similar to GaAs ICs, but the circuit performance is nearly a factor of two better, it is understandable why there is such great interest in this new technology for digital IC applications.

Less well-recognized, and not as fully developed, are the analog signal processing applications of HEMT. The history of low noise HEMT amplifier development is summarized in Table 2. Thomson-CSF was first to report the noise figure of devices which it made in 1981.[8,9] Fujitsu, however, was the first to capitalize on the low noise properties of the device when it reported having built a 4-stage 20 GHz HEMT amplifier for satellite communications in 1983.[10] Subsequent work of Fujitsu reduced the noise figure of the device to 1.4 dB at 12 GHz with 11 dB associated gain.[11] This result was obtained for a 0.5 micron gate length. Most impressive was the reduction in noise figure to 0.35 dB at 100°K with 12 dB associated gain. Subsequently, Chao and co-workers at General Electric Co. fabricated 0.25-micron gate length HEMT devices having a maximum stable gain of 10 dB at 18 GHz and a cutoff frequency of 45 GHz.[12]

Perhaps the primary reason why HEMT hasn't been pursued more vigorously for low noise amplifier applications is because these early results were not

Table 1. Major Milestones in HEMT Digital IC Development

1978	Dingle[1] reported high electron mobilities in modulation-doped semiconductor heterojunction superlattices.
1980	Mimura[2] reported first high electron mobility transistor utilizing selectively doped GaAs/n-$Al_xGa_{1-x}As$ hetero-structure.
1981	1.7 um-gate HEMT ring oscillators demonstrated 17.1 psec switching delay at 77°K with 0.96 mW power dissipation/gate.[3]
1983	1) Lee[4] reported 1 um-gate HEMT ring oscillators with 12.2 psec switching delay at 300°K and 1.1 mW power dissipation/gate. 2) Nishiuchi[5] reported first HEMT master-slave flip-flop divide-by-two circuits with 0.5 um gate operating at clock frequencies up to 5.5 GHz at 300°K (8.9 GHz at 77°K) with 2.9 mW power dissipation per gate (2.8 mW/gate at 77°K). 3) Kiehl[6] reported HEMT type D flip-flop divide-by-two circuits with toggle frequency of 3.7 GHz at 300°K (5.9 GHz at 77°K) with 2.5 mW power dissipation per gate (5.1 mW/gate at 77°K).
1984	First 1K-bit static RAM[7]

Table 2. Summary of HEMT Low Noise Amplifier Performance (300°K)

YEAR	LABORATORY	NOISE FIGURE (dB)	ASSOCIATED GAIN (dB)	FREQUENCY (GHz)	L_G (MICRONS)	G_M (MS/MM)
	TH CSF					
1981	— DEVICE	2.3	10.3	10.0	0.8	117
	FUJITSU					
1982	— DEVICE	1.7	11.2	11.3	0.5	175
1983	— AMPLIFIER	3.9	30.0	20.0		
	— DEVICE	1.4	11.0	12.0	0.5	235
	TH CSF					
1983	— DEVICE	1.3	11.0	10.0	0.6	N/A
		1.7	10.3	12.0	0.6	N/A
		2.3	6.6	17.5	0.6	N/A
	GE					
1983	— DEVICE	N/A	10.0	18.0	0.25	207
	TRW					
1983	— DEVICE	1.3	9.0	15.0	0.35	N/A
		1.5	10.5	18.0	0.35	240
		2.7	5.9	34.0	0.35	N/A
1984	— DEVICE	3.4	5.6	44.0	0.25	N/A
	— AMPLIFIER	4.5	5.0	42-46	0.25	N/A

significantly better then the best results achieved with GaAs FETs. Only more recently have low noise HEMT devices been made which rival the best performance reported for GaAs FETs.[13] These devices, which were made at TRW, exhibited less than 3.4 dB noise figure and greater than 5.6 dB associated gain at 44 GHz for a quarter micron gate length. Single stage low noise preamplifiers, also made at TRW using these devices, exhibited lower amplifier noise figure and greater gain-bandwidth product than similar GaAs FET amplifiers.

At TRW we are convinced that HEMT devices provide a significant performance advantage over GaAs for both digital and analog signal processing applications. This is the reason why we are pursuing the development of these devices for future monolithic integrated circuits. Having established the performance advantage of the devices, the focus of our current development activity is on further improving device performance by reducing parasitic elements, on extending the device performance to higher frequencies and higher power levels, and on establishing the reliability and survivability ccharacteristics of the devices. Of course, there is also interest in manufacturing discrete devices and monolithic integrated circuits which perform universal generic functions.

In spite of the relatively short period of time which this new technology has had to mature, it is already clear that HEMT will become the basis of another generation of new electronics. In fact, HEMT may become the first III-V compound semiconductor technology to provide sufficient performance advantage to justify replacement of the "old steel" silicon in many applications. Only time will tell if this speculation comes to pass. However, several major companies throughout the world have already recognized the possibility and are investing heavily in the future with HEMT. Also, the number of companies initiating HEMT development is growing yearly. Because of the great importance of this new technology, this special feature article is dedicated to its description.

Theory of Operation

The high electron mobility transistor (HEMT) is very different in behavior from traditional MESFET devices. This is expected because totally different physical mechanisms are involved in the basic carrier transport.

Although the HEMT device is relatively new, we have done extensive device modeling and have a good qualitative understanding of device operation. The HEMT structure shown in Figure 3 is an otherwise conventional MESFET fabricated on an aluminum gallium arsenide (AlGaAs)/gallium arsenide (GaAs) heterostructure which is grown by molecular beam epitaxy (MBE). As shown in the device cross-section and energy band diagram, when a silicon-doped AlGaAs layer is grown on top of an undoped GaAs layer, a two-dimensional electron gas is formed on the GaAs side of the heterojunction due to the greater electron affinity of the GaAs. The AlGaAs layer is fully depleted of mobile charge near the interface and acts

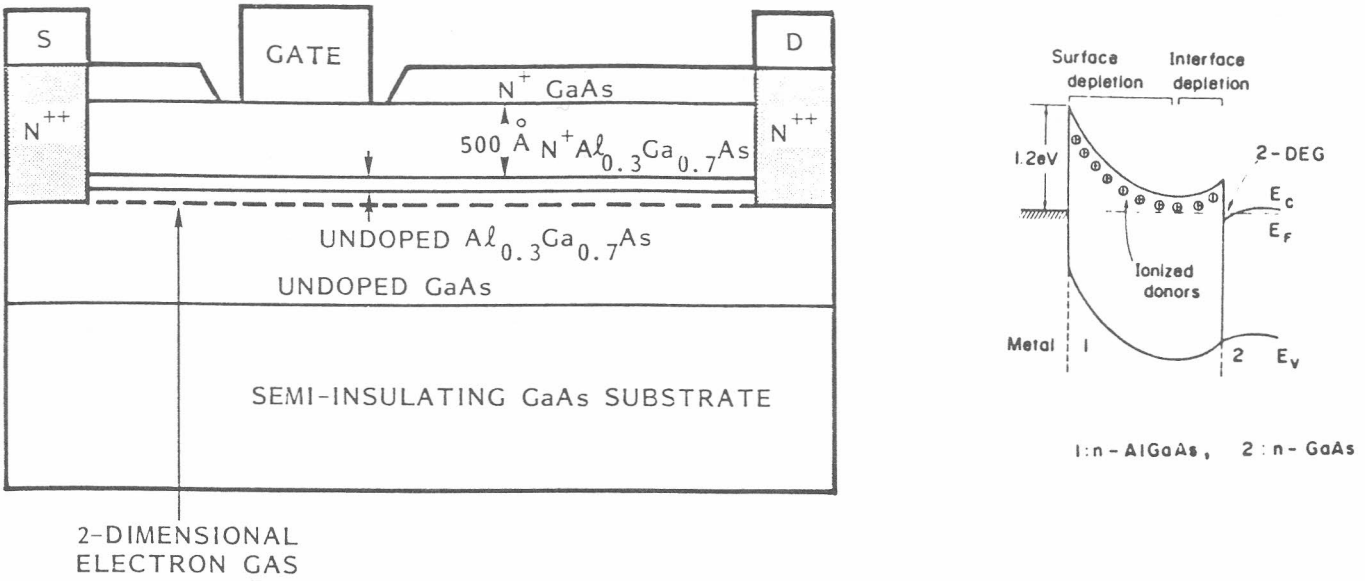


Figure 3. High Electron Mobility Transistor (HEMT) Depletion Mode Device

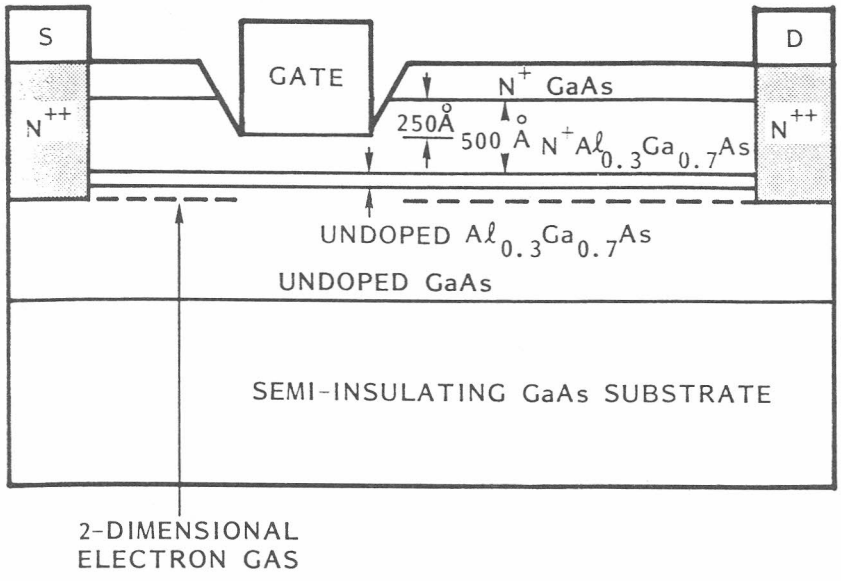
like the gate oxide of a MOSFET. When a Schottky barrier gate is deposited on the AlGaAs layer, a depletion region is formed beneath the gate. If The AlGaAs layer is sufficiently thick, the gate and interface depletion regions will not overlap and the device is normally on. In this depletion mode device, application of negative bias to the gate will extend the gate depletion region to the interface raising the barrier to electron flow and thereby pinching off the drain-source current.

Enhancement mode operation is also possible. In this case, the doping charge of the AlGaAs layer beneath the gate is not sufficient to prevent the gate space charge region from extending into the undoped GaAs layer at zero bias. One method of achieving enhancement mode operation is to etch a deeper gate recess as shown in Figure 4. This device is normally off. Referring to the energy band diagram for this case, when a positive bias voltage greater than the threshold voltage V_{th} is applied to the gate, electrons accumulate at the heterojunction interface and form a two-dimensional electron gas, thus turning on the device. Unlike a conventional GaAs MESFET, the HEMT functions like a MOSFET in which the Schottky barrier gate controls the number of electrons in the two-dimensional electron gas by raising and lowering the interface barrier.

The primary advantage of this device structure is that carrier transport in the two-dimensional electron gas is similar to undoped GaAs. Unlike the highly doped channel of a conventional GaAs MESFET, there is little or no impurity scattering in the undoped GaAs in which the two-dimensional electron gas resides. As a result, the electrons travel at twice the saturated velocity (2×10^7 cm/sec) at room temperature and exhibit an electron mobility of nearly 8,000 cm^2/V-sec (as compared to 4,000 cm^2/V-sec for a GaAs FET channel). As the device temperature is lowered, the electron velocity increases to $\sim 3 \times 10^7$ cm/sec at 77°K and the mobility increases to a value of ~80,000 cm^2/V-sec, depending on the details of the epitaxial layer structure. These superior material characteristics are reflected in the performance of devices made from this material.

Analytic Device Model

Approximate device models based on closed form solutions of the equations describing charge control and carrier transport in a two-dimensional electron gas FET are useful for first order device design, sensitivity analysis, and for analyzing the characteristics of experimental devices. A charge control model was derived by Delagebeaudeuf and Linh,[14] which is the



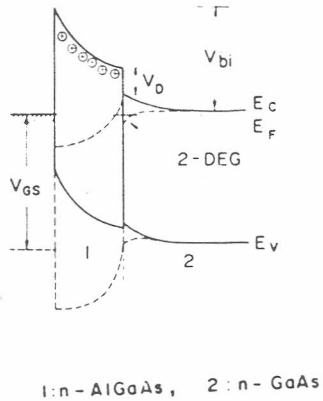


Figure 4. High Electron Mobility Transistor (HEMT) Enhancement Mode Device

same as that used for first order MOSFET modeling. Drummond, et al,[15] improved on this model by including the dependence of the Fermi level on the gate voltage and the finite width of the two-dimensional gas. We have used a version of this model to study HEMT device properties as a function of material and device parameters.

Device Characteristics

For illustrative purposes we will analyze the epitaxial layer cross-section given in Figure 5. We have fabricated sub-half-micron gate length enhancement mode devices using material of this type. These E-mode devices are of interest for both digital and analog circuit applications. Therefore, this example will serve to illustrate the operating characteristics of practical HEMT devices.

The transistor layout is illustrated in Figure 6. These devices have recessed gates which are defined by electron beam lithography. The gate length is nominally 0.35-micron and the gate width is nominally 75 microns. The recessed gate is situated closer to the source contact in a 1.8 micron channel between source and drain contacts.

Figure 7 compares the measured and calculated IV characteristics of these transistors. The dc transconductance is 240 mS/mm of gate width (see footnote), which is an excellent value for devices with this gate length and geometry. These dc I-V characteristics illustrate an important advantage of HEMT, which is that high values of transconductance (i.e., gain) can be realized at much lower drain-source saturation current levels than comparable GaAs MESFETs. As a result, lower noise figures can be achieved with comparable gain but lower power dissipation than GaAs MESFETs.

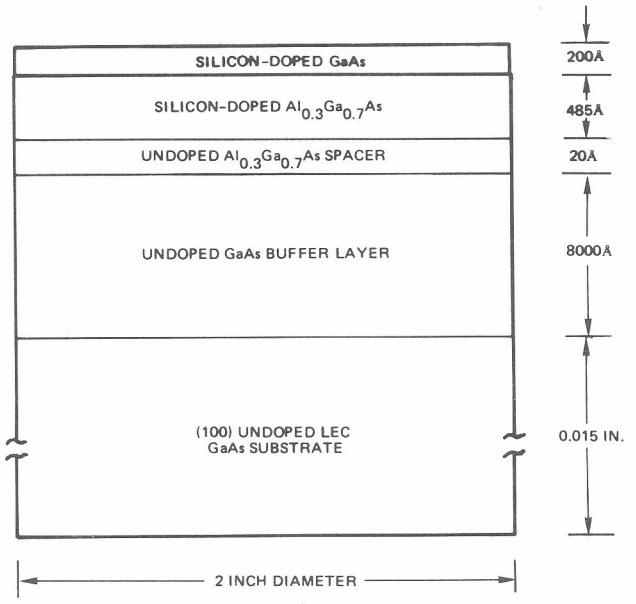


Figure 5. HEMT Epitaxial Layer Cross-Section

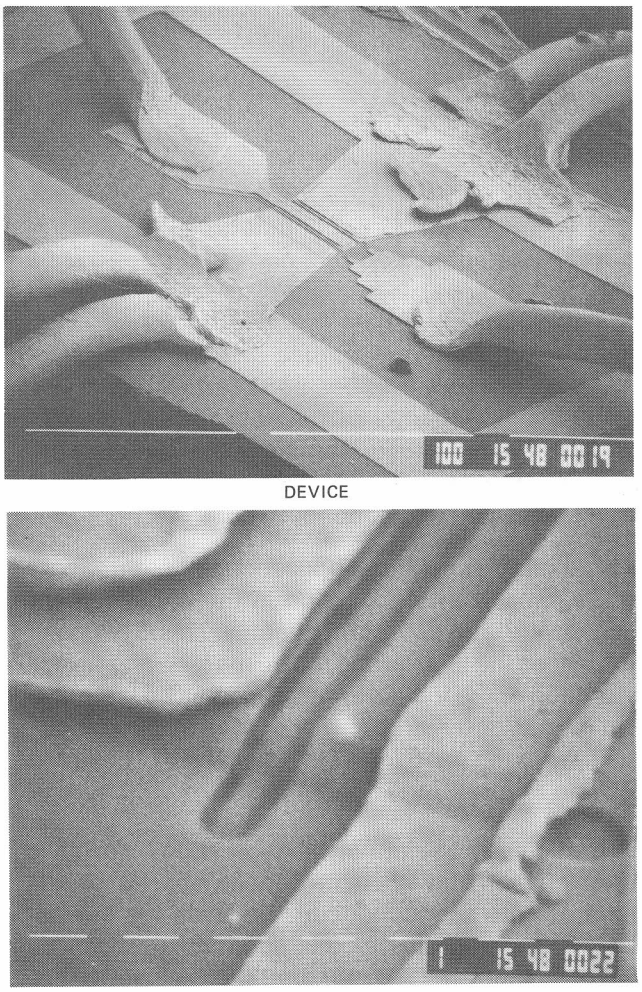


Figure 6. Photographs of TRW HEMT Device

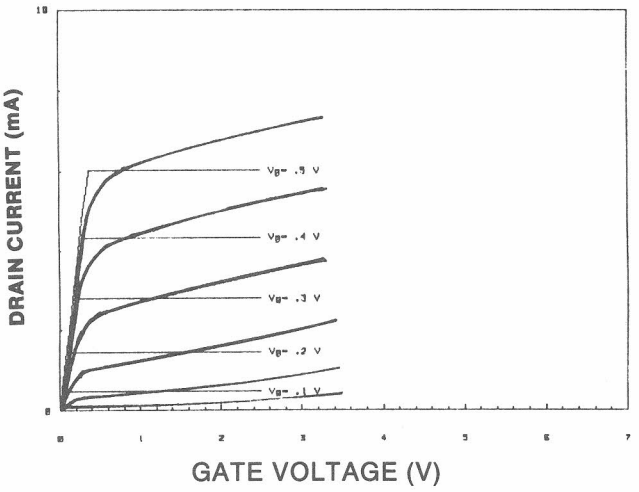


Figure 7. Experimental Enhancement Mode HEMT IV Characteristic (L_G = 0.4 um)

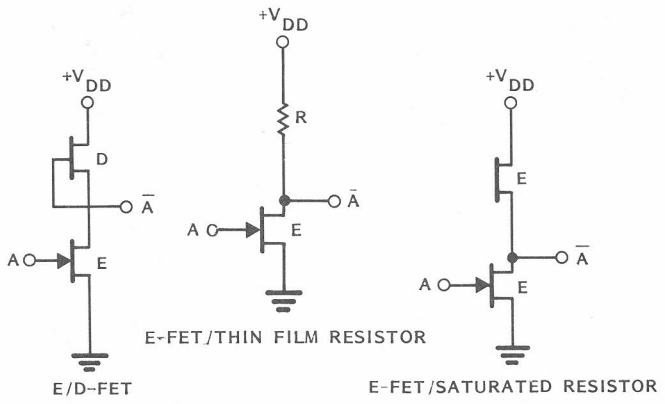


Figure 8. HEMT Inverter Circuits

For digital switching applications the threshold voltage for current conduction in the enhancement mode device is an important quantity. This is because it influences the logic swing, noise margin, and power dissipation of the logic elements. The basic logic element is an inverter circuit. Three types of inverter circuits have been used for HEMT digital ICs. These are shown in Figure 8.

A particularly useful normally-off HEMT device is one which is off only when the Schottky-barrier gate is applied to the semiconductor. Because the corresponding ungated structure is conductive, it can be used as a saturated resistor load for the inverter circuit. This is a particularly attractive logic element combination for HEMT. Fujitsu's record-setting 8.9 GHz divide-by-two toggle frequency was achieved using this type of logic gate.

The alternative configuration requires two types of devices to be fabricated on the same wafer. It is an enhancement/depletion mode logic in which the depletion mode device is wired to act as a current source. In spite of greater processing complexity, excellent circuit performance has also been achieved with this type of logic gate.

At TRW we have fabricated 15 stage ring oscillators using enhancement mode transistor switches and thin film resistor loads. Propagation delays of 20 picoseconds and a speed-power product of 3.4 femtoJoules have been achieved at room temperature with 1.7 micron gate length transistors. This speed-power product is comparable to the lowest reported for ring oscillators made with the other types of logic gates.

*Footnote. "mS" is the abbreviation for milliSiemens. Siemens is the standard unit of conductance.

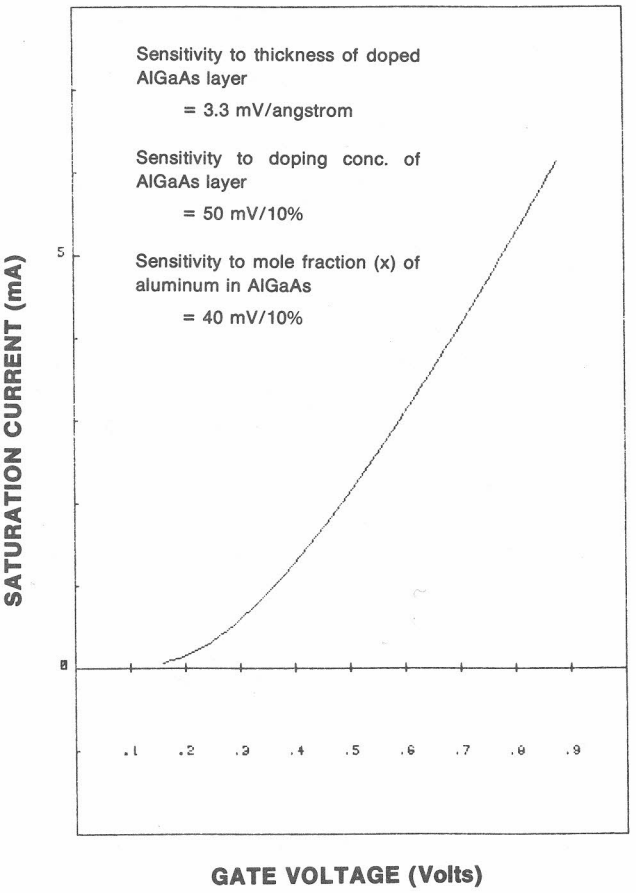


Figure 9. Transfer Characteristic of Enhancement Mode HEMT

To continue with our example, the transfer characteristic of an enhancement mode switching transistor is plotted in Figure 9. For switching applications a threshold voltage of +0.15 volt is considered to be the best choice, based on a tradeoff of competing design requirements. Also shown in this figure is the sensitivity of this parameter to the epitaxial layer parameters. Current "state-of-the-art" material growth and device processing techniques are capable of achieving less than 19 mV standard deviation over 4.5 cm^2 area. This implies better than 3 percent control over doping, thickness, and composition of the AlGaAs layer.

Low Noise HEMT

We have extended the analytic device model to calculate small-signal device noise figure and associated gain as a function of frequency, including additional parasitic elements, such as gate metal resistance. We have obtained excellent agreement

between calculated and measured performance using the Fukui noise figure equation given in Figure 10. The equivalent circuit elements used in the equation are related to the physical regions of the HEMT device structure as shown in Figure 11.

$$NF = 1 + 2\pi C_{GS} K F \sqrt{\frac{R_S + R_G}{G_M}}$$

WHERE

G_M = Transconductance (mS/mm) $\leq \frac{1}{R_c}$

C_{GS} = Gate-source capacitance (pF/mm) $\sim C_c$

R_s = Source resistance (ohm-mm)

R_G = Gate series resistance (ohm/mm)

K = Factor related to material type

K = 2.5 (GaAs)

K = 1.6 (HEMT)

F = Frequency (GHz)

Figure 10. Fukui Noise Figure Equation

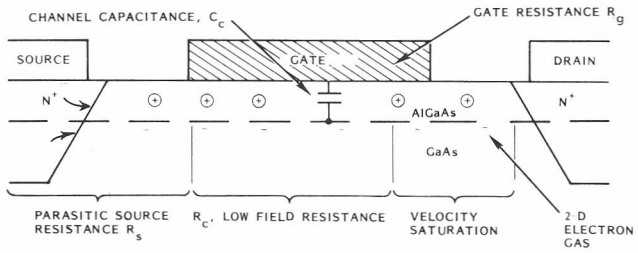


Figure 11. HEMT Device Cross-Section

The gate-source capacitance, C_{GS}, is the principal factor governing noise figure; it is dominated by the channel capacitance, C_c. This capacitance can be minimized by reducing the gate length and optimizing the vertical channel doping profile. The intrinsic transconductance G_m is also primarily determined by the details of the epitaxial structure. Thus, the gate length and epitaxial structure primarily determine the noise figure. Minimizing the ratio of $C_{GS}/\sqrt{G_m}$ minimizes the noise figure. The source resistance, R_S, and the gate metal resistance, R_G, are parasitic elements which also contribute to the noise. Their contribution can be significant, particularly at high frequency, because the noise figure depends on the square root of the sum of these two quantities.

On the other hand, the transistor gain is primarily determined by the cutoff frequency, f_T, which is given by the following expression:

$$f_T = \frac{G_m}{2\pi C_{GS}}$$

The maximum available gain is given by:

$$MAG = \left(\frac{f_T}{f}\right)^2 \frac{1}{4g_{ds}(R_g+R_i+R_S+\pi f_T L_S) + 4\pi f_T C_{dg}(2R_g+R_i+R_s+2\pi f_T L_S)}$$

where $f_T = gm/2\pi C_{gs}$

f = operating frequency

g_{ds} = drain-source conductance

R_g = gate metal resistance

R_i = channel resistance between gate and source

R_s = source series resistance

L_s = source lead inductance

C_{dg} = drain-gate capacitance

C_{gs} = gate-source capacitance

g_m = transconductance

The frequency at which the maximum available gain is 0dB is defined as the maximum frequency of oscillation, f_{max}. From measurement of small-signal S-parameters over 2-18 GHz we have determined an equivalent circuit of our enhancement mode transistor as shown in Figure 12. The cutoff frequency of our 0.35 micron gate length device is 48 GHz and f_{max} >80 GHz.

With 0.25 micron gate length E-mode devices we have achieved very low device noise figures at 44 GHz. Figure 13 illustrates the calculated noise figure versus gate voltage for a 0.25 micron gate length enhancement mode transistor at 44 GHz. The calculated noise figure of 3.3 dB corresponds closely to the value which we measure for our E-mode devices at this frequency. Figure 14 illustrates the corresponding small-signal gain versus gate voltage. The calculated value of 5.6 dB also agrees well with experimental measurements.

Theoretically, depletion mode devices should exhibit lower noise figures than their enhancement mode counterparts, because of higher transconductance and lower gate-source capacitance. This is what we observe experimentally. We have measured less than 3.4 dB device noise figure with greater than 5.6 dB gain at 44 GHz. Perhaps the most impressive aspect of this result is the potential which it indicates for even better performance in the future. Figure 15 illustrates the measured noise figure of our HEMT devices as a function of frequency, and it shows the noise figure which is projected with further refinement of device parasitics. The performance plotted here is for room temperature operation. Projected and measured performance at lower temperatures indicates substantial reduction of noise figure and more than correspondingly greater increase in gain. A twofold improvement over a GaAs MESFET has been achieved.

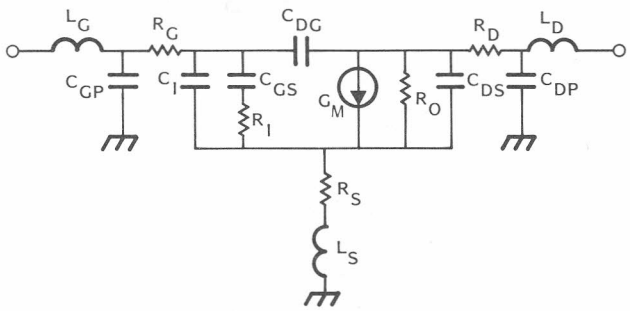


Figure 12. HEMT Equivalent Circuit

Equivalent Circuit Element Values

Parameter	HEMT 2078
TYPE	E-mode
Geometry	Pi-gate
Gate Length	0.35
Gate Width	65
NF (dB)	1.5
Gass (dB)	10.5
Freq (GHz)	18
Id (ma)	3.7
Vd (V)	3.0
Vg (V)	0.5
ELEMENTS	
Lg (nH)	.18
Cgp (pF)	.012
Rg (ohms)	2.4
Cin (pF)	.011
Cgs (pF)	.051
Rin (ohms)	17.1
Rs (ohms)	5.9
Ls (nH)	.076
Cds (pF)	.0108
Ro (ohms)	673
Gm (mS)	15
Cdg (pF)	.0148
Rd (ohms)	6.0
Cdp (pF)	.0088
Ld (nH)	.26

A TRW 0.35-micron gate length enhancement mode device has been characterized in a cryogenically-cooled amplifier assembled by the National Radio Astronomy Observatory. 0.5 dB minimum noise figure (T_N = 35°K) has been measured at an ambient temperature T_A = 15°K with 6 dB associated gain at 24.7 GHz.[16] For comparison, the best GaAs FET result is T_N = 60°K with 8 dB associated gain.

The Future

Future applications of HEMT are anticipated in monolithic integrated receiver circuits and possibly power amplifiers. Their nearly ideal "square-law" transfer characteristic should render them useful in mixing and frequency conversion applications. Their inherently lower 1/f noise than GaAs FETs could make acceptable local oscillator performance achievable without elaborate stabilization schemes. Fully integrated receiver low noise rf front-ends are definitely in the future of HEMT technology.

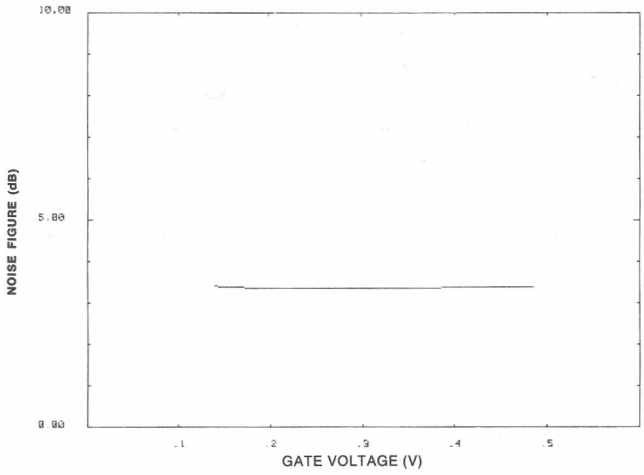


Figure 13. Experimental Enhancement Mode HEMT Noise Figure vs. Gate Voltage (L_G = 0.25 um; F = 44 GHz)

Less clear is the application of these devices to power amplification. Several technical issues need to be addressed before this question can be resolved. One is an assessment of the reliability of the devices under elevated temperature and rf stress. Another is the design of an epitaxial layer cross-section and device geometry which is capable of supporting the current required of a power device. At TRW we have grown triple heterojunction layers which support 450 mA/mm of saturated drain-source current, but more work is needed to increase the breakdown voltage of these structures.

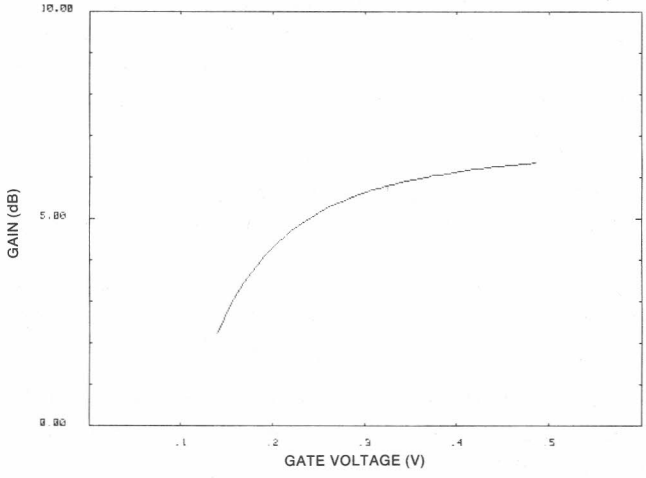


Figure 14. Experimental Enhancement Mode HEMT Gain vs. Gate Voltage (L_G = 0.25 um; F = 44 GHz)

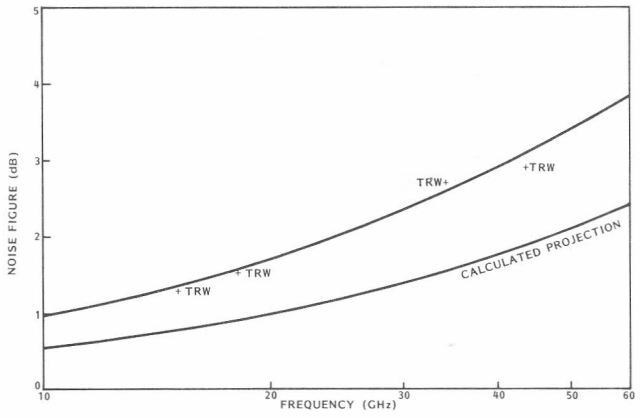


Figure 15. GaAs HEMT Noise Figure vs. Frequency

The benefits of HEMT for high speed digital ICs are more apparent. At TRW we are developing a novel "NMOS-like" analog-to-digital converter circuit which combines the attributes of HEMT with NMOS circuit technology.[17] A/D converters will greatly benefit from HEMT technology. We project that these circuits will operate at greater than 1 gigasamples per second and have up to 5-bit accuracy. Bell Laboratories has recently fabricated a p-type GaAs HEMT which could be used to make logic circuits which are analogous to silicon CMOS.[18]

There is also growing interest in using quantum-well structures for "quantum-coupled" logic. These devices are based on the real space transfer effect first postulated by Hess and co-workers at the University of Illinois.[19] The theory predicts negative differential resistance to occur in a GaAs-AlGaAs superlattice due to scattering of electrons from the two-dimensional electron gas (where they travel at high velocity) into the adjacent AlGaAs layer (where they travel at a greatly reduced velocity). Several types of devices have been fabricated which exhibit the predicted behavior.[20,21] The exploitation of this effect to make logic circuits and other high-frequency devices is "just around the corner."

Two-dimensional electron mobility enhancement also has been demonstrated for a selectively-doped $n^+InP/n^-GaInAs$ heterostructure. Fujitsu has already fabricated a GaInAs HEMT which exhibits slightly higher low field mobility for a given sheet electron concentration than its GaAs counterpart.[22] Because of the superior electron transport properties of GaInAs material, it has long been pursued for the development of millimeter-wave FETs. However, because of the difficulty in fabricating a high-quality Schottky-barrier gate on the narrow bandgap semiconductor, this quest has not been entirely successful. With the advent of a practical GaInAs HEMT structure the full benefits of electron transport in GaInAs material may be realized in the near future.

In conclusion, the future of HEMT technology looks very bright. There are numerous other applications, in opto-electronics for example, which would also benefit from this technology. And, there is more research of two-dimensional systems which needs to be done. Therefore, it is likely that this will continue to be an area of intense research, development, and application for years to come.

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CAREER OPPORTUNITY

ARIZONA STATE UNIVERSITY, EPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING invites applications for tenure track positions at the ranks of professor, associate, and assistant professor. Applications are being accepted for all areas of the Department, with special needs in the fields of MICROWAVES, ELECTROMAGNETICS, ANTENNAS, RADAR, AND ELECTROOPTICS. Qualifications include a doctorate in electrical or computer engineering or closely related disciplines. Applicants would be expected to teach and to initiate, conduct and supervise research.

Arizona State University is in Metropolitan Phoenix, a high-technology area with many consulting opportunities. Since the State, the University, and Phoenix area industries are presently embarked on developing the School of Engineering into a Center of Excellence in Engineering, this is an outstanding opportunity for qualified individuals interested in working in an academic environment.

Interested individuals should send resumes to Professor Richard Saeks, Chairman, Electrical and Computer Engineering, Arizona State University, Tempe, Arizona 85287. First deadline for receipt of applications is 30 September I984. Subsequent deadlines are 3I October I984, 30 November I984, or until filled.

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AWARDS

OUTSTANDING YOUNG ENGINEER AWARD

by Don Parker

We are pleased to announce Steven J. Temple was selected as the MTT Society's candidate for the IEEE Outstanding Young Engineer. Mr. Temple was selected from several candidates based on his technical contributions to the profession, involvement in MTT-S acivities, completion of special assignments and participation on various committees within his company, and active participation in community activities. Mr. Temple's areas of technology include solid-state, monolithic microwave circuits, and computer-aided design. Our Society can be proud of him as our representative.

Mr. Temple will be recognized at a banquet on December 1, 1984 at the Mariott Hotel in Santa Clara, California along with 32 other candidates, one each from the IEEE Societies. At that time, he will be honored by the IEEE and be presented with a "Key to the Technological Future." This banquet will be the concluding event of the IEEE Centennial Year. It is very appropriate that Steven along with the others be recognized for their past contributions and potential to build a better future through technology.

Steven James Temple was born on 23 March, 1952 in Kingston, New York. He graduated from Ulster County Community College where he received an Associate Degree in Applied Science with Distinction in 1971. Mr. Temple was awarded a John McMullen Scholarship to complete his studies in electrical engineering at Cornell University and received the BSEE degree in 1973, and a Master of Engineering (Electrical) degree in 1974.

In June 1974, Mr. Temple joined the Bedford Laboratories of Raytheon Company's Missile Systems Division and was involved in the development of solid-state microwave sources and subsystems for advanced missile systems. In 1977 he assumed responsibility for the development of microwave power-FET amplifiers and transmitters. Between 1977 and 1979 Mr. Temple directed several advanced development programs which evolved pulsed-FET amplifier technology within the division through pilot production and missile flight tests. During this period Mr. Temple collaborated in the invention of a broadband planar (fork) power combiner divider.

In late 1979 Mr. Temple and associates initiated experiments that showed that the output power of microwave GaAs power FETs can be significantly increased by operating the devices in a gate pulsed mode at elevated drain voltages. This technique made possible the development of efficient high-power pulsed FET transmitters for missile seekers.

In July 1981, Mr. Temple was appointed Manager of Monolithic Microwave Circuit Development and Computer-Aided-Design. In this position, Mr. Temple assumed responsibility for directing all monolithic circuit and microwave CAD programs within the Missile Systems Division. Under his direction, a series of GaAs monolithic microwave integrated circuits were developed and integrated into the first demonstration of a 1 watt hybrid/monolithic X-Band phased array transceiver module. He initiated a company-wide, multi-divisional advisory group for monolithic circuits in 1982 and is currently coordinating pilot production and advanced circuit development for MMIC's. Mr. Temple has also been involved extensively in monolithic technology marketing for MSD.

Mr. Temple has been responsible for development of microwave CAD/CAM amd CAT capability in MSD, and has served as a focal point for Raytheon-wide microwave CAD development activities. Under his direction, a software program was developed to automate the generation of microwave microstrip and stripline circuit masks via a network of graphics terminals linked to a central Raytheon computer system. The program allows the user to access a central library of circuit building blocks to quickly construct a mask pattern which is produced subsequently on a Gerber photo plotter. The system has resulted in substantial cost savings and the Raytheon user community now includes 120 engineers in the U.S., Canada and England. Mr. Temple also directed the integration of a microwave computer-aided-test facility within MSD and was appointed to serve on a four man task force to study Raytheon's approach to microwave hardware production for the microwave "factory of the future."

Mr. Temple has authored numerous papers on the subjects of GaAs FET amplifiers, power combining techniques, monolithic circuits and CAD. In November 1982, Mr. Temple was one of the youngest

engineers to receive the Missile System Divisions' Outstanding Authors Award since it was established.

Mr. Temple has been active in the Microwave Theory and Techniques Society since 1976. From 1976 to 1980 he served on the Membership Services Committee as chapter record's chairman. He compiled records of MTT chapter meetings from around the U.S. and the world, presented reports periodically to the MTT AdCom, and assisted National Lecturers in scheduling visits to chapters as required.

Mr. Temple served as Publicity Chairman for the 1982 Microwave Symposium in Boston. He was a member of the 1983 and 1984 symposia technical program committees and served as session chairman for the FET-amplifier session at the 1984 symposium. Mr. Temple is currently Vice-Chairman of the MTT-S Boston Chapter.

Mr. Temple has been actively involved with various Ratheon programs dealing with engineering education. As 1982-84 Vice-Chairman of the Raytheon-Cornell College Cultivation Committee, he helped coordinate efforts which established a scholarship for Master of Engineering students at Cornell, donated equipment to Cornell's microwave teaching lab, and supplied seminar speakers to Cornell. He also worked as the MSD coordinator for Cornell Engineering Co-op Students. This included annual interviewing and selection of new students to enter the program as well as serving as an on-sight mentor.

Mr. Temple has worked with other Raytheon engineers, corporate officers and University of Massachusetts (Amherst) faculty as part of a Microwave Masters Program sponsored by Raytheon. This program has provided lab equipment to the university and has supported students in obtaining a masters degree in microwave engineering. He has served as a student project advisor.

Finally, Mr. Temple has served outside of the engineering community in various leadership positions in his local congregation of The Church of Jesus Christ of Latter Day Saints. Past positions have included: President of the Young Mens program and councillor to the president of the Quorum of Elders. Currently he serves as one of two councillors to the Bishop of his congregation. In this position he works with auxiliary presidents to oversee numberous church programs in his community. He helps to direct the Young Men and Youn Women programs, the childrens Sunday School, public communications and missionary activities, among others.

In April 1981, Mr. Temple was one of three electrical engineers in the United States, recognized in the Outstanding Young Electrical Engineer Awards program of ETA KAPPA NU. He received the honorable mention award, by virtue of "contributions to the field of Microwave Amplifiers and for involvement in church and professional activities."

Goal Oriented Awards

The IEEE Awards Board's Awards Planning and Policy Committee is planning a new type of award for technical achievement. This award is a goal oriented award. A prize would be awarded to the individual that first achieved the goal.

It has been suggested by Kio Tomiyasu that MTT-S institute a similar award. The idea was discussed briefly by AdCom on May 28 in San Francisco and is presently being pursued to further define the award and criteria to be used.

A goal-oriented award would be a specific type of application award. The achievement of such a goal, or to exceed it, should significantly advance the technology and prove to be very beneficial to the MTT profession. An example cited by Martin Schneider who introduced the concept to the IEEE, is that of a high-power solid-state millimeter wave amplifier. A possible goal would be the development of an amplifier with a power-frequency product equal to 1012 Watt-Hz over a 5 percent bandwidth and a gain of 10 dB. A time limit to achieve this goal would be set such as by the end of the decade.

Barry Spielman, Chairman of MTT-S Technical Committees, has reviewed this suggestion with the chairman of each committee and asked the committees to formulate appropriate goals for their respective committee. It is conceivable that MTT-S will sponsor several goal-oriented awards.

We seek your ideas and opinions on this concept of goal-oriented awards.

List of MTT Centennial Medal Winners

G. Abraham, Washington, DC
S. F. Adam, Los Altos, CA
D. B. Anderson, Whittier, CA
R. K. Arora, New Delhi, India
J. R. Ashley, Tampa, FL
J. C. Aukland, Fullerton, CA
W. J. Barclay, Raleigh, NC
F. S. Barnes, Boulder, CO
R. Bartnikas, Varennes, Quebec, Canada

(continued)

LIST (continued from page 54)

J. H. Battocletti, Milwaukee, WI
H. L. Beazell, Keswick, VA
A. C. Beck, Boca Raton, FL
V. Belevitch, Bruxelles, Belgium
A. B. Bereskin, Cincinnati, OH
P. Bernardi, Rome, Italy
R. Bernstein, Oxford, MD
G. F. Bland, Raleigh, NC
E. F. Bolinder, Gothenburg, Sweden
D. M. Bolle, Bethlehem, PA
K. R. Carver, Las Cruces, NM
J. S. Chatterjee, Calcutta, India
R. F. Clark, Ottawa, Ontario, Canada
A. Clavin, Del Mar, CA
S. B. Cohn, Los Angeles, CA
P. D. Coleman, Champaign, IL
A. A. Collins, Dallas, TX
M. C. Creusere, Ridgecrest, CA
T. F. Curry, Vienna, VA
C. C. Cutler, Stanford, CA
R. W. Damon, Waltham, MA
J. B. Damonte, Belmont, CA
J. B. Davies, Berkhamsted, Herts England
M. A. De Barros, Porto, Portugal
G. A. Deschamps, Champaign, IL
S. H. M. Dodington, Mtn. Lakes, NJ
A. A. Dougal, Austin, TX
R. S. Duggan Jr., Atlanta, GA
R. C. Eden, Thousand Oaks, CA
W. A. Edson, Menlo Park, CA
R. M. Emberson, Eugene, OR
E. E. Erickson, Orlando, FL
R. G. Fellers, Columbia, SC
A. G. Fox, Rumson, NJ
K. B. Gabriunas, Bogota, Colombia
R. A. Gaspari, Los Angeles, CA
T. K. Gaylord, Atlanta, GA
H. W. Gerlach, York, PA
A. B. Giordano, Brooklyn, NY
F. E. Goodwin, Washington, DC
H. D. Gorakhpurwalla, Kingsville, TX
H. E. Green, Duntroon, Act Australia
R. F. Harrington, Syracuse, NY
L. J. Hathaway, Eagle River, AK
R. E. Henning, Clearwater, FL
K. H. Hering, Torrance, CA
E. Herz, New York, NY
J. S. Hill, Springfield, VA
M. E. Hines, Burlington, MA
T. K. Ishii, Milwaukee, WA
A. Ishimaru, Seattle, WA
G. Kantor, Garrett Park, MD
A. Katz, Robbinsville, NJ
R. E. Kellerman, Clarence, NY
D. D. King, Briarcliff Manor, NY
R. W. P. King, Winchester, MA
W. Kleen, Munich, West Germany
V. P. Kodali, New Delhi, India
R. V. Lowman, Deer Park, NY
R. Mattauch, Charlottesville, VA
G. L. Matthaei, Santa Barbara, CA
R. E. McIntosh, Amherst, MA
F. Minozuma, Tokyo, Japan
R. Mittra, Urbana, IL
P. Morgan Bro, Memphis, TN
K. Morita, Kanagawa-Pref, Japan
J. H. Mulligan Jr., Santa Ana, CA
W. W. Mumford, Morris Plains, NJ
H. C. Nathanson, Pittsburgh, PA
L. S. Nergaard, Princeton, NJ
J. R. Neubauer, Collingswood, NJ
E. Niehenke, Baltimore, MD
T. Nomura, Tokyo, Japan
J. B. Oakes, Woodbine, MD
A. A. Oliner, Brooklyn, NY
D. T. Paris, Atlanta, GA
D. Parker, Calabasas,CA
P. M. Paterno, Oceanside, NY
P. Penfield Jr., Weston, MA
J. P. Perry, Oklahoma City, OK
A. Reiner, Silver Spring, MD
G. P. Rodrigue, Atlanta, GA
M. Rodriguez-Vidal, Madrid, Spain
L. Rohde, Munich, West Germany
F. J. Rosenbaum, St. Louis, MO
W. Rotman, Boston, MA
C. T. Rucker, Atlanta, GA
C. A. Rypinski, San Rafael, CA
T. S. Saad, Natick, MA
R. Saal, Munich, West Germany
H. A. Sabbagh, Bloomington, IN
A. C. Schell, Hanscom AFB, MA
M. V. Schneider, Holmdel, NJ
H. Schutz, Baltimore, MD
G. Shapiro, Silver Spring, MD
J. E. Shepherd, Concord, MA
D. B. Sinclair, Boston, MA
P. H. Smith, Murray Hill, NJ
A. K. Smolinski, Warsaw, Poland
H. Sobol, Dallas, TX
P. I. Somlo, Lindfield, Australia
R. A. Sparks, Bedford, MA
S. J. Spurk, Haverhill, MA

LIST (continued from page 55)

F. Sterzer, Princeton, NJ
C. T. Swift, Amherst, MA
C. Tai, Ann Arbor, MI
D. L. Talhelm, Hellertown, PA
J. J. Taub, Hicksville, NY
D. T. Thomas, Santa Barbara, CA
M. E. Tiuri, Tapiola, Finland
K. Tomiyasu, Philadelphia, PA
C. H. Townes, Berkeley, CA
F. T. Ulaby, Lawrence, KS
R. Valle-Sanchez, Barcelona, Spain
H. van de Vaart, Orlando, FL
J. P. Wait, Tucson, AZ
E. Weber, Tryon, NC
B. O. Weinschel, Gaithersburg, MD
M. T. Weiss, Los Angeles, CA
H. A. Wheeler, Greenlawn, NY
L. R. Whicker, Arnold, MD
J. R. Whinnery, Berkeley, CA
E. Lee White, Saint Petersburg, FL
R. C. Williamson, Lexington, MA
E. A. Wolff, Silver Spring, MD
L. Young, Bethesda, MD

1983/84 Distinguished Microwave Lecture

by Stephen F. Adam

The Administrative Committee of the Microwave Theory and Techniques Society each year selects a recognized expert in a specific technical area to serve as a Distinguished Lecturer, formerly known as the National Lecturer. This appointment is a great honor, and I would like to express my deepest appreciation to the ADCOM to entrust me with this responsibility. To change the title of this appointment was made to recognize the International nature of the Institute and it is encouraged to accept foreign speaking engagements. It is also understood, that such trips should be economically organized to allow the Lecturer to plan his/her travel to optimize its cost by covering as many engagements as possible for the lowest cost. It is also expected that the foreign Chapters or other entities inviting the Lecturer will cover most of the costs relating to their segment of the trip.

I have given 32 lectures in the United States, 3 in Canada, 4 in Japan to date to 1514 attendees. I also have received invitations from other foreign entities and could not yet fulfill their requests. They are:

Israel Chapter
Singapore Section
Karachi Section
Panama Section
Madras Section
Venezuela Section
Benelux Chapter
University of Porto
Switzerland Chapter
Swedish Chapter
Mid and Southern Italy Chapter

I am still planning to arrange for a European tour fulfilling some of the requests.

A detailed report of the visits is shown on the next page.

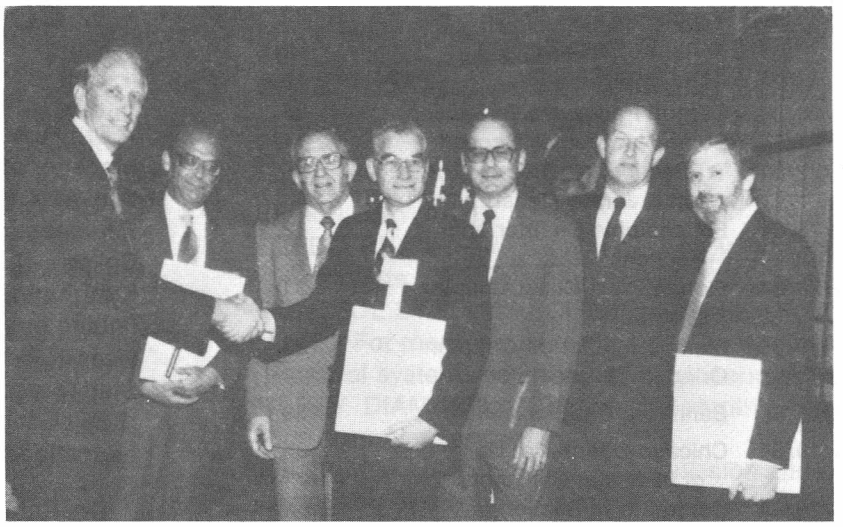
I would also like to express my thanks to my former employer, Hewlett-Packard Company allowing me and partially financing this appointment.

1983/84 Distinguished Microwave Lecturers Interim Report

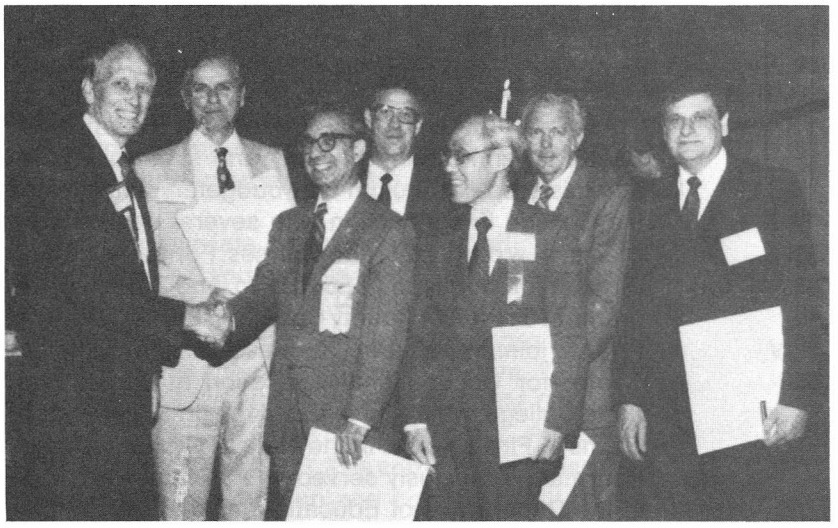
DATE	CHAPTER/SECTION	ATTENDEES
10/27/83	San Francisco/Santa Clara Valley Chapter	63
11/1/83	Schenectady Chapter at RPI (Troy, NY)	26
11/2/83	Syracuse Chapter	21
11/3/83	Trident Group of SE Michigan Section (Ann Arbor)	70
11/15/83	St. Louis Chapter (Washington University)	21
11/17/83	Salt Lake City Chapter (Univ. of Utah)	51
11/28/83	Tokyo Section at Yokogawa-Hewlett-Packard Ltd.	76
11/29/83	Tokyo Chapter at Tokyo University	32
11/30/83	Tokyo Chapter at UNIDEN Laboratories	87
12/2/83	Tokyo Chapter at Kyoto University	42
12/12/83	Dallas-Ft. Worth Chapter	43
12/13/83	Phoenix Chapter	28
12/14/83	Alamagordo/Holloman Section	26

(continued on page 58)

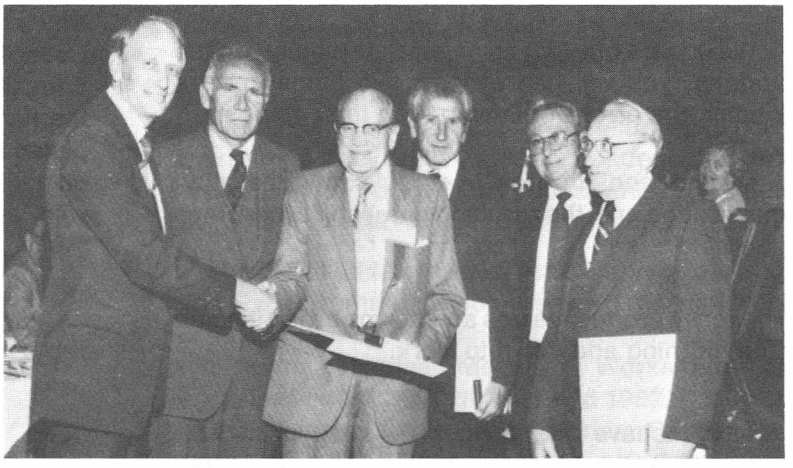
1984 MTT-S INTERNATIONAL MICROWAVE SYMPOSIUM
MTT-S AWARDS BANQUET



Left to right: H. G. Oltman, H. Sobol, T. S. Saad, A. A. Oliner, C. T. Rucker, G. P. Rodrigue, F. J. Rosenbaum.



Left to right: H. G. Oltman, R. A. Sparks, L. Young, D. Parker, K. Tomiyasu, J. Whinnery, L. R. Whicker.



Left to right: H. G. Oltman, M. E. Hines, W. W. Mumford, A. Clavin, S. F. Adam, A. Beck.

1983/1984 DISTINGUISHED (continued from page 56)

12/15/83	Albuquerque Chapter	17
1/9/84	Vancouver B.C. Section	32
1/10/84	Santa Barbara Section	25
1/11/84	San Diego Chapter	48
2/20/84	Central Pennsylvania Section	55
2/21/84	South New Jersey Section	14
2/22/84	Tri-Section (No. Jersey, Princeton & Jersey Coast)	157
2/23/84	Philadelphia Chapter and Section	12
2/28/84	Florida West Coast Chapter (Tampa)	31
2/29/84	Melbourne Florida Chapter	23
3/1/84	Orlando Chapter	10
3/15/84	Baltimore Chapter	39
3/19/84	Chicago Chapter at Univ. of Illinois at Chicago	35
3/20/84	Central Iowa Section at Iowa State Univ.	snowed out
3/21/84	Cedar Rapids Section	snowed out
3/22/84	Milwaukee Chapter	35
4/3/84	Susquehanna Section	29
4/4/84	Columbus AP/MTT-S Chapter/Section?	30
4/5/84	Ottawa Chapter	42
4/6/84	Toronto Chapter	40
4/18/84	Seattle Chapter	35
5/1/84	Atlanta Chapter	53
5/2/84	Central Virginia Section	18
5/3/84	Boston Chapter	43
5/4/84	Minneapolis-St. Paul Chapter	40
5/22/84	Los Angeles Chapter	65

OBSERVATIONS

* At the source of every error which is blamed on the computer, you will find at least two human errors including the error of blaming it on the computer.

* A system tends to grow in complexity rather than simplification until the resulting unreliability becomes intolerable.

* The really productive ups and downs are getting up in the morning and down to work.

* Always behave like a duck — keep calm and unruffled on the surface, but paddle frantically underneath.

DR. ROBERT G. KAHRMANN, JR. NAMED SATELLITE AND SEMINAR CONTINUING EDUCATION MANAGER AT IEEE

Dr. Robert G. Kahrmann, Jr. has been named Manager of Satellite and Seminar Continuing Education at The Institute of Electrical and Electronics Engineers, Inc. (IEEE). Formerly Dean, University College, Seton Hall University, South Orange, NJ, Dr. Kahrmann, will manage satellite and seminar continuing education activities of IEEE Educational Services in Piscataway, NJ, reporting to John F. Wilhelm, Staff Director, Educational Services, in New York. The IEEE Educational Activities Board oversees the educational programs of the Institute.

Dr. Kahrmann's responsibilities include work on IEEE video conferences. In addition, he works on packaged courses offered in conjunction with local IEEE entities as well as private companies covering various aspects of the electrical, electronics, and computer engineering field.

As Dean of University College at Seton Hall, Dr. Kahrmann directed faculty and staff as well as administered curriculum and budgetary activities of the College in connection with several degree programs, new programs, and courses. Formerly, he was Director of Continuing Education and Career Programs at Somerset County College in Somerville, N.J. Prior to joining Somerset, he was Assistant Director, Center for Occupational Education at Jersey City State College, where he initiated the first degree programs in Fire Science in the state of New Jersey. Dr. Kahrmann previously served as Assistant Professor in the Department of Education, also at Jersey City State College.

From 1979-82, Dr. Kahrmann was Chairman of the National Committee on Private and Independent Colleges of the Association for Continuing Higher Education. In addition to publishing several articles in the field of continuing education, he has just completed a major study with the New Jersey State Police on training women for police work. Dr. Kahrmann, his wife, and two children reside in North Brunswick, N.J.

St Louis, Missouri

NOMINATIONS IN FOR IEEE AWARDS

One of the most important functions of the IEEE is to provide professional recognition for outstanding achievements in the field of Electrical and Electronics Engineering. The principal method of doing this is through the various awards presented each year by the IEEE.

The process is initiated by someone recognizing a colleague's achievement and completing a nomination form which is sent to the IEEE Awards Board. This nomination form contains information about the nominee's career and detailed information about the individual's notable achievement. Also required are endorsements from others familiar with the nominee's work. After the annual deadline for submission, the committee responsible for the particular award determines which, if any, of the nominees should receive the award and which should be reconsidered next year. This procedure obviously depends strongly on the initiative of the nominator and many go unrewarded because this initial step is not taken. Gathering the information, submitting a properly prepared nomination form, and getting the best people to send endorsements is no small task for the nominator.

To help alleviate the problem of finding suitable candidates, a Candidate Search Committee has been formed and the short form, on the following page, devised for people to easily bring possible candidates to the attention of the committee. YOU ARE STRONGLY URGED TO FILL THIS FORM OUT AND SEND IT IN IF YOU KNOW OF ANY POSSIBLE AWARDS CANDIDATES. The committee will carefully examine the submission and contact you if further action is deemed appropriate. You may obtain a copy of the AWARDS GUIDE, which fully explains the various awards and procedures, by contacting IEEE Awards Board, 345 E. 47th St., New York, N.Y. 10017, (212) 705-7882.

A list of the awards with abbreviated descriptions is given below.

MEDAL OF HONOR

IEEE's Highest Award for an Exceptional Contribution

MAJOR ANNUAL MEDALS
- ALEXANDER GRAHAM BELL - Telecommunications
- EDISON - Electrical engineering
- FOUNDERS - Leadership, planning and administration
- LAMME - Development of apparatus or systems
- EDUCATION - Education
- SIMON RAMO - Systems Engineering (new)

IEEE SERVICE AWARD
- HARADEN PRATT - Service to the Institute

IEEE FIELD AWARDS
- CLEDO BRUNETTI - Miniaturization in the electronic arts
- CONTROL SYSTEMS SCIENCE AND ENGINEERING - For meritorious achievement in the field of control systems science and engineering
- HARRY DIAMOND - Technical contributions in government service
- WILLIAM M. HABIRSHAW - Transmission and distribution of electric power
- INTERNATIONAL COMMUNICATION -International Communication
- MORRIS E. LEEDS - Electrical Measurement
- MORRIS N. LIEBMANN - Emerging technologies within recent years
- JACK A. MORTON - Solid-state devices
- FREDERIK PHILIPS - Management of research and development
- EMANUEL R. PIORE - Computer Science
- DAVID SARNOFF - Electronics
- CHARLES PROTEUS STEINMETZ - Standards
- NIKOLA TESLA - Generation and utilization of electric power
- VLADIMIR K. ZWORYKIN - Electronic television

THE EVOLUTION OF THE INTERNATIONAL MICROWAVE SYMPOSIUM IN BRAZIL

The development of theory and techniques in Microwaves, Antennas, Propagation and Optics is growing extremely fast in Brazil. While the initial interests were concentrated in Microwave Communication they have rapidly broadened to other areas such as optical (fiber) communications, satellite communications and industrial applications.

The Brazilian Microwave, Antennas, Propagations and Optics community soon realized the importance of having their informal annual meetings transformed into formal National Meetings. Workshops were organized in the years of 1981 and 1982. During this period an inclusion of a Latin American Section in the 1981 IEEE-MTT-S International Symposium was one of the most important events.

In addition to these efforts, another very important event was the creation of the Brazilian Microwave Society (SBMO) in July 12, 1982. The membership enrollment increased very rapidly and the Society has already more than 200 members and a few affiliated companies. SBMO is a non-profit organization with the objective of promoting publications and exchange of technical and scientific knowledge in the areas of interest to its members. The SBMO Newsletter is a regular publication of the Society covering the important news items for its members. The series of Brazilian Symposia was initiated in July 1984 starting with the First Brazilian Microwave Symposium. This Symposium was held at the University of Sao Paulo, in July 23-25, 1984 with more than 30 papers, most of them reporting research achievements in Brazil.

There has been rapid increase of interaction with members of the Brazilian Microwave Community with people all over the world. Members actively participate in the disclosure of scientific knowledge to the rest of the world. This is done with periodicals and attendance in international Symposia, which induced the International SBMO's Directory. Resulted in the organization of the 1985 International Symposium on Microwave Technology in Industrial Development. The IEEE-San Paulo Section SBMO has received the approval of collaboration from the Microwave Theory and Techniques (MTT-S) and of the Antennas and Propagation (AP-S) Societies of the IEEE. In addition, the Symposium has received interest from many companies and institutions. They have given support to the event, three of them with a formal commitment already made: (a) TELEBRAS that will provide the space and facilities in addition to help with the publication cost of the Symposium proceedings, (b) the State University of Campinas will promote the Symposium through its Events Support Office, and (c) VARIG is the Official Symposium Carrier. They are giving support through publicity of the Symposium world wide. Their agencies are also helping with travel arrangements.

The Symposium will be held at the excellent facilities of the Research and Development Center (CPqD) of TELEBRAS. Space has been reserved for up to three parallel sessions. The CPqD is located in Campinas, a few miles away from downtown and about one mile from the State University of Campinas (UNICAMP). Campinas is today one of the most developed cities of Brazil, with about 800,000 people. It is located only 60 miles from the Capital City, Sao Paulo and 250 miles from one of the most beautiful cities of the world, the "Capital of Samba", Rio de Janeiro. It is a business center with a large port, which has an exhuberant commercial activity and intense cultural events.

The Symposium Committee has already received the confirmation of participation of several invited speakers from various countries of the world. They are specialists in their areas, and will bring new thoughts and ideas to those attending the Symposium. The Symposium Committee is also receiving confirmation of submission of papers from several interested authors from various countries of the world.

A call for papers has already been mailed to more than ten thousand specialists interested in the subjects of the Symposium. It gives detailed information, particularly the form in which the paper has to be prepared for inclusion in the proceedings of the Symposium. The deadline for submission of papers in its final form for direct reproduction in the confection of the proceedings is February 28, 1985.

Additional copies of the call for papers may be requested to

ATTILIO JOSE GIAROLA
SBMO-Symposium Committee
UNICAMP-CCPG (Reitoria)
C.P. 1170
13100-Campinas, S.P.-Brazil
Tel.(0192)-391301 - Ext. 214

The SBMO Symposium Committee requests the collaboration of all those interested persons for the complete success of the Symposium.

Board resolves to tighten controls on those speaking for IEEE

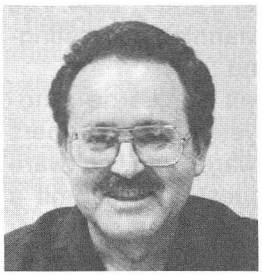
The release of statements supposedly representing the IEEE or one of its entities will be more tightly controlled under a resolution passed unanimously by the IEEE Board of Directors during its meeting in Boston on May 17.

The new policy establishes procedures both for the formation of IEEE or IEEE-entity position statements and for the delivery of testimony to national, state, and local governments.

Previously, most of the procedures were unclear, according to several Board members. For more information on the new resolution and the debate that preceded its passage, see THE INSTITUTE, July, p. 4.

For a copy of the new procedures, which have been incorporated into Section 15 of the IEEE Policy and Procedures Manual, or to order the manual itself, contact Veronica Lewis, Administrator, Corporate Services, IEEE Headquarters, 345 E. 47th St., New York 10017.

ARFTG HIGHLIGHTS



by Mario A. Maury, Jr.

The Automatic RF Techniques Group (ARFTG) is a professional Society that is affiliated with MTT-S. It is primarily concerned with computer-aided microwave measurements and design. The following is a summary of its recent activities.

23rd Conference

The Spring 1984 ARFTG Conference was held in Santa Rosa, California on June 4 and 5, 1984, directly following the MTT-S International Microwave Symposium in San Francisco. The Conference's main topic was "Millimeter ANA's" and was chaired by Wendell Seal of TRW, Redondo Beach, California. The local host was Jim Fitzpatrick who was ably assisted by John Barr and many others from Hewlett Packard, Santa Rosa, California.

Lee Saulsbery of National Bureau of Standards, Boulder, Colorado and President of ARFTG's Executive Committee (EXECOM) opened the meeting and introduced Scott Wright, Marketing Manager for Hewlett Packard's Networks Measurement Division in Santa Rosa who was substituting for Bill Wurst, Division Manager who was attending his son's graduation in Oregon and could not be present. Scott welcomed the more than 155 attendees and described Hewlett Packard's operations at Santa Rosa.

There were a total of fourteen papers presented at the Conference; the following is a partial summary of the papers presented dealing with the main conference topic:

A 0.1 to 50 GHz AUTOMATIC NETWORK ANALYZER, James Benet, Autonetics, Anaheim, CA

VERIFICATION OF SYSTEM SPECIFICATIONS OF A HIGH PERFORMANCE NETWORK ANALYZER, Roger D. Pollard, The Univ. of Leeds, Leeds, U.K.

MAKING THE NEXT STEP IN NETWORK ANALYZER PERFORMANCE PREDICTIONS, Bruce Donecker, HP, Santa Rosa, CA

A 95 GHz DUAL SIX-PORT NETWORK ANALYZER, Manly P. Weidman, NBS, Boulder, CO

A BROADBAND MILLIMETER-WAVE VECTOR MEASUREMENT SYSTEM, Paul A. Gianfortune, HAC, Torrace, CA

A WR22 FREQUENCY EXTENSION ADAPTER FOR THE HP8409B/C VANA, Wendell D. Seal, TRW, Redondo Beach, CA

CONSTRUCTION AND CALIBRATION OF A 18-26.5 GHz W.G. NETWORK ANALYZER USING THE HP 8410 AND A DOWN-CONVERTER, Richard Q. Lane, CEL, Santa Clara, CA

A panel discussion entitled "Millimeter Automatic Network Analyzers - Today and Tomorrow", moderated by Mario A. Maury, Jr., Maury Microwave Corporation, Cucamonga, was held with the following panel members participating:

Bruce Donecker	— Hewlett Packard, NMD, Santa Rosa, CA
Cletus Hoer	— National Bureau of Standards, Boulder, CO
Paul A. Gianfortune	— Hughes Aircraft Company, MMW Dept., Torrance, CA
Eric J. Griffin	— RSRE, Great Malvern, England
Wendell D. Seal	— TRW, Redondo Beach, CA

A wide range of topics were covered including, waveguide flanges, coaxial connectors, component and instrument limitations, trade-offs between Harmonic and Fundamental frequency mixing, repeatability and measurement accuracy considerations, millimeter wave signal sources, test fixtures, HP8510 millimeter wave application, etc. A lively exchange transpired between the audience and various panel members as each topic was discussed.

Formal EXECOM elections were held during the business meeting and the following were elected or re-elected:

John T. Barr, Hewlett Packard, Santa Rosa, CA
Richard Irwin, SAT, Sunnyvale, CA
Peter Lacy, Wiltron Co., Mountain View, CA
Raymond Tucker, RADC, Griffiss A.F.B., NY (re-elected)

One of the main activities during the Conference was a tour of Hewlett Packard, Network Measurement Division facilities in Santa Rosa.

ARFTG AWARDS BANQUET

One of the high points of the Conference was the ARFTG Awards Banquet which was held on the evening of June 4 at the Luther Burbank Center in Santa Rosa.

The following awards were presented during the banquet:

Best Paper, 22nd Meeting	— Harold E. Stinehelfer, Sr., Made-It-Associates, Burlington, MA
Automated Measurements Career Award	— Algie Lance, TRW, Redondo Beach, CA
Automated Measurements Technology Award	— Doug Rytting, Hewlett Packard, Santa Rosa, CA
Distinguished Service	— H. George Oltman, Jr., Hughes Aircraft Co., Canoga Park, CA
Conference Host, 22nd Meeting	— Dennis C. Martin, Sandia National Labs, Albuquerque, NM
Conference Host, 23rd Meeting	— Jim Fitzpatrick, Hewlett Packard, Santa Rosa, CA
Service Award	— Lee Salsbery, National Bureau of Standards, Boulder, CO

The key note speaker was Dick Anderson, RF and Microwave Group Manager, Hewlett Packard, Palo Alto, California. Dick was the project manager then section manager at Hewlett Packard during the development of the original HP8410 and HP8542 VANA which was appropriate for this Conference with the introduction of the HP8510 earlier this year. He gave a very interesting talk entitled, "Growth in the Microwave Industry" which was enjoyed by all.

The evening's festivities were concluded by entertainment provided by a xcomedy musical magic show.

EXECOM ELECTIONS

At the EXECOM meeting, the following members were elected or appointed to the following positions:

Officers:

President	— Lee Saulsbery
Vice President	— Ray Tucker
Secretary	— Bob Nelson
Treasurer	— Barry Perlman
Recording Secretary	— Jim Taylor

Committee Chairman and Co-ordinators:

Standards	— Wendell Seal
Awards	— Frank Mendoza
Nominations	— Peter Lacey
Publications	— John Barr
Publicity	— Rich Irwin
Active Devices	— Barry Perlman
Library	— George Oltman
MTT-S	— Mario Maury

Announcement 24th Conference

The next ARFTG Conference will be held in Baltimore, Maryland on December 6 and 7, 1984. The Conference host will be James Manning of Westinghouse Corp., Baltimore, Maryland.

The main conference topic will be "Large Automated Test Equipment (ATE) Systems" and papers are solicited on recent hardware and software developments. Authors are requested to submit a one page abstract and a 500 to 1,000 word summary with attachments providingsufficienttechnical content toenableproper evaluation by October 1, 1984.

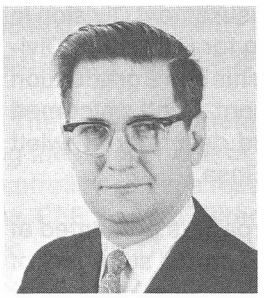
Submit papers to the Technical Program Chairman (TPC):

Jonathan Schepps
RCA Laboratories
P.O. Box 432
Princeton, NJ 08540
(609) 734-2185

For further information, contact the ARFTG Conference Chairman (CC):

Barry Perlman
RCA Laboratories
P.O. Box 432
Princeton, NJ 08540
(609) 734-2661

PACE



R. A. Moore,
PACE Chairman

What does the Pace Chairman do? This is partly answered by the larger question of what does the United States Activities Board (USAB) do. As most of us are aware, IEEE and its predecessors, IRE and AIEE grew primarily as organizations to distribute technical information. In recent years this task has become monumental. This is the main reason that many of us are in the IEEE and MTT-S. Several years ago the IEEE with significant MTT-S leadership explored the possibility of conducting more professional oriented activities. This led to the establishment of the USAB and its associated committees. The USAB is attempting to provide an IEEE interface with

the government for the benefit of the engineering profession.

Though the USAB objective can be applauded by virtually all, its practical efforts in relation to issues, positions and general value may be questioned by many members. Maintaining a successful liaison between membership and the USAB committees has been a very difficult job. Many would say the USAB does not properly represent the interest of the majority of the IEEE membership. Though I would not wish to take issue with that, I must defend the USAB in that they have done a immense amount of work, continuously generated information on issues which are critical to engineers. They have taken positions on these issues. Their first problem is the lack of strong consensus on many issues critical to the profession. Secondly, there is a lack of means to establish consensus positions. Lastly, they lack a means to transmit this information to relevant USAB operating committees. It is the function of the PACE chairman at the society level to provide that liaison.

It is not necessarily clear how this liaison can best be car ried out. Clearly it will include interfacing with the MTT-S Administrative Committee at its meetings, presenting issues, and carrying back positions on behalf of the MTT-S membership. To the extent the MTT-S Administrative Committee represents the MTT-S membership, this is good. For this to be successful we must all be discussing our interests on professional issues with Administration Committee members. I would also invite you to contact me whenever a USAB issue interests you. I will have a column in each newsletter issue. In the last issue your president described the crisis in science/math education. Some of the topics which will by covered include government procurement, pensions, intellectual property (Patent Policy), manpower, age discrimination, employment assistance, ethics, opportunities for women and many others. Clearly any action IEEE might take in many of these areas is quite controversial.

Other means of interacting include presentation and panel discussions at the Microwave Symposium. In this case we could bring together people involved in developing IEEE positions for USAB and provide direct discussions.

In the last newsletter, George Oltman, our president, said professional activities is a matter that U.S. members should not be complacent about. I feel the same way, that in the long run much of our accomplishments are strongly influenced by our professional environment. And that it is our professional responsibility to try to constructively influence it. I should appreciate your thoughts on all the above comments. You can call me at (301) 765-4027 or write me at Westinghouse Defense and Electronics Center, P.O. Box 746, MS. 335, Baltmore, MD 21203.

SHORT COURSES

by Kurtis L. Kurisu

A number of organizations are offering short courses this Fall which will be of interest to some of the members of the Microwave Theory and Techniques Society.

Some short courses will be offered by the UCLA (University of California at Los Angeles) Extension during October, November, and December of 1984. These include:

Analog MOS Integrated Circuits, course number 881.49, October 22-26, $945 per person, Instructors are Gabor C. Temes, Rubik Gregorian, Ken Martin, George Szentirmai, C.R. Viswanathan, and William Black Jr.

Gallium Arsenide (GaAs) Integrated Circuits, course number 881.60, October 29 - November 2, $945 per pupil, Lecturers are Louis Tomasetta, D. Richard Decker, Fred H. Eisen, Allen Firstenberg, Robert E. Lee, and Stephen I. Long.

Synthetic Array and Imaging Radars, course number 867.46, November 5-9, $945 per attendee, Lecturers include S.A. Hovanessian, John C. Kirk, John J. Kovaly, Dean L. Mensa, Frederick V. Stuhr, and Frederick C. Williams.

The Technical Manager in a Dynamic Environment, course number 885.92, November 26-29, $845 per student, Lecturer is Melvin Silverman.

High-Speed Integrated Circuit Technology, course number 881.57, December 3-7, $945 per pupil, Lecturers are Paul T. Greiling, S.G. Knorr, and K.J. O'Connor.

For further information on these short courses, contact Nonie Watanabe at UCLA, Engineering Short Courses, 10995 LeConte Avenue, Room 637, Los Angeles, CA 90024, (213) 825-1047.

The Continuing Education Office of George Washington University is offering a number of courses which may interest MTT-S members. These courses are to be held in Washington, D.C. except when noted. They are:

Radiowave Propagation for Communications Systems Design, course number 249DC, October 22-26, $875 per participant.

Fiber and Integrated Optics, course number 378SW, October 22-26, Seattle, Washington, $875 per student.

Antennas and Arrays, course number 824DC, October 22-26, $875 per attendee.

Radar Systems and Technology, course number 203DC, November 5-9, $875 per person.

Electromagnetic Pulse and Its Effects on Systems, course number 701DC, November 19-21, $695 per person.

Synthetic Aperture Radar With Remote Sensing Applications, course number 664DC, November 26-29.

Introduction to Modern Radar Technology, course number 1038DC, November 28-30.

For additional information contact: Continuing Engineering Education, George Washington University, Washington, D.C. 20052, (202) 676-6106, Toll free: (800) 424-9773.

The Continuing Education Institute offers the following short courses:

Microwave Circuit Design I: Linear Circuits, November 5-9, Palo Alto, California. Lecturers include Steven March, Les Besser, and Bob Wenzel.

Microwave Circuit Design II: Nonlinear Circuits, November 26-December 1 in Palo Alto, California. December 3-8 in Boston, Massachusetts.

For more information contact: Continuing Education Institute, 10889 Wilshire Blvd, Suite 1000, Los Angeles, California 90024, (213) 824-9545.

The University of Southern California (USC) offers a new videotaped short course entitled **Principles of Radar Systems Design**. This short course is available for purchase and/or rental in a variety of video formats. For additional information contact: USC, Instructional Television Program, OHE-214, School of Engineering, Los Angeles, CA 90089-1455, (213) 743-7663.

IMTC/85 CALL FOR PAPERS

The IEEE Instrumentation and Measurement Society has issued the first Call for Papers for the 1985 Instrumentation/Measurement Technology Conference--IMTC/85. As electrical, mechanical, and acoustical measurements grow more complex and dependent on built-in micro-processors and external computer control, the IEEE Instrumentation and Measurement Society needs your help to explain recent advances to the broad spectrum of IEEE members. We solicit papers on new or improved test instruments, measurement methods, and reviews of measurement technology. The technical program is being organized along the following lines:

- **Continuous Wave**
  DC/Low Frequency
  Audio/Video
  RF/Microwave/Millimeter-wave

- **Pulse**
  Pulses/Transients
  Digital Circuits
  Optical Digital

- **Stochastic**
  Acoustical/RF/Microwave Noise
  EMI and EMC

Parameter Estimation Please help the program committee by submitting summaries of papers along these or related themes.

The conference with tutorial sessions and exhibition will be held at the Hyatt Regency Hotel, Tampa, Florida, 1985 March 21 & 22. The theme of the conference is UNDERSTANDING MEASUREMENT METHODS. Papers are solicited on new or improved test instruments, measurement methods, and reviews of measurement technology.

A one page summary is due by 1984 September 07 to:

Dr. Norris S. Nahman
IMTC/85 Technical Program Committee
Electromagnetic Fields Division
National Bureau of Standards 723.03
Boulder, CO 80303

Notification of acceptance and author kits with copyright and publication clearance forms will be sent by 1984 November 09. Camera-ready matts required for Conference Proceedings Printer by 1984 December 12. For a full copy of the call for papers or other information, please write or call:

Mr Stephen Vetter
Baymont Engineering Co. Ltd.
2325 Ulmerton Road
Clearwater, FL 33520 USA
(813) 576-0800

1985 IEEE MTT-S

International Microwave Symposium

St. Louis, Missouri

June 4, 5, and 6, 1985

FIRST CALL FOR PAPERS

The 1985 IEEE MTT-S International Microwave Symposium will be held in St. Louis on June 4-6, 1985. The technical program will consist of both Regular Sessions and an Open Forum. The latter, consisting of poster presentations, gives the author the opportunity not only to present conventional theoretical and experimental information, but also hardware for inspection or display. Prospective authors are asked to designate their papers for either the Regular Session or the Open Forum. All accepted papers in either category will be published in the Symposium Digest, and will receive equal consideration for publication in the special symposium issue of the Transactions.

Papers are solicited describing original work in the microwave field. A list of suggested topics is given below, but papers concerned with other aspects of microwave technology will be considered.

- Biological Effects & Medical Applications
- Computer-Aided Design
- Solid State Devices and Circuits
- Microwave Systems
- Ferrite Devices
- GaAs Monolithic Circuits
- High Power Devices & Systems
- Integrated Optics, Fiber Optics, and Optical Techniques
- Low Noise Techniques
- Microwave and Millimeter Wave Integrated Circuits
- Microwave Acoustics
- Communication Systems
- Field and Network Theory
- Passive Components
- Phased and Active Array Techniques
- Submillimeter Wave Techniques and Devices
- Measurement Theory and Techniques
- Manufacturing Methods

1985 IEEE MTT-S International Symposium

FIRST CALL FOR PAPERS

Prospective authors are required to submit:

1. Ten copies of a 500-1000 word summary, with supporting illustrations, clearly explaining their contribution, its originality, and relative importance.
2. Three copies of a 30-50 word abstract.
3. Three copies of a separate sheet with the complete mailing address of the author, and a statement categorizing the submitted paper for either the Regular Session or the Open Forum.

Submissions should be received on or before December 10, 1984 by

Stephen Honickman
STG Electrosystems
720 Manchester, Suite 215
Ballwin, MO 63011 U.S.A.

Late submissions will be returned unreviewed.

Authors will be notified of the status of their contributions by February 11, 1985. Authors of accepted papers will receive copyright release forms and instructions for publication and presentation. It is the author's responsibility to obtain all required company and government clearances prior to submittal.

The 1985 IEEE Microwave and Millimeter Wave Monolithic Circuits Symposium will be held in St. Louis on June 6-7, 1985 in conjunction with the 1985 IEEE MTT-S International Microwave Symposium. Papers for that symposium will be solicited separately.

COMMON SENSE

On Tuesday, January 17, 1984, *THE WALL STREET JOURNAL* ran an article by Irving Kristol, "Whatever Happened to Common Sense?" The article commented on the "tyranny of ideas." In sum, the article discussed the fact that "It is a tyranny exercised by academic, quasi-academic, and pseudo-academic ideas over the common sense embodied in the practical reason of traditional wisdom." The article went on to say that in area after area of American life, from child rearing to education to crime, educated and well-meaning people are trying to impose their "truths" about human nature upon the real world. "Any recalcitrance exhibited by the real world is interpreted simply as a challenge requiring more vigorous efforts at such imposition." This becomes fanaticism. The reaction against these ideas is "populist conservatism" which is an outraged assertion of the validity of received wisdom as against abstract, academic, innovative theorizing.

In education, we have hundreds of thousands of theorists, people who have the latest knowledge—and have been applying it in "creative ways," as opposed to the old-fashioned teachers of basic literacy, discipline, and manners. So our schools are in a worse mess than ever. The situation with regard to crime is unique too. Ours may well be the first society in all of human history in which the average citizen lives with the constant fear of being victimized by criminal assaults against his person—by fellow citizens. The remarkable increase in American standard of living, an equally notable increase in years of schooling, and a welfare state to assist the poor and needy—have been accompanied by an explosion of criminality. Less developed nations have far fewer criminologists with their theories and also have much lower crime rates. Elaborate theory in our society prevails over common sense. One can expand almost indefinitely the catalog of horrors imported into American life. It's a mess.

Reader Wm. J. Ellenberger, P.E., of Washington, D.C. has written an interesting commentary on the article which was summarized above. He writes:

(continued)

COMMON SENSE (continued from page 66)

Prof. Irving Kristol's appeal for common sense sounds a warning we should heed. In our Transactions we read ever more sophisticated analyses of management problems and proposed solutions suggested to administrators and managers. Our Transactions are a repository for valuable management literature, but as I scan them I wonder to what extent they will be used. Some of the papers look like PhD dissertations to meet the degree requirements rather than significant contributions to a body of knowledge. In 55 years of engineering work I have supervised (managed) up to 200 people in professional, craft, and clerical/administrative work. I learned a lot by "on the job" experience and I read considerable management literature. In the long run, almost everything boiled down to common sense.

In semi-retirement, I have only to manage myself (at times a problem), but in my daily contact with business, I frequently observe that common sense seems to be missing. Business communication, well managed and practical years ago, seems to have declined despite voluminous literature on the subject. Despite our advanced technical management papers we seem to have suffered retrogression in basics. Here are four examples:

(1) I go into a department store to a specific department for a specific item and have difficulty attracting a clerk's attention to answer my inquiry. Years ago, a salesperson saw you coming and was ready to take care of you immediately. Now, when I have gotten their attention, they serve me almost reluctantly and if they don't have what I want, they make no effort to offer a substitute.

(2) I make a telephone inquiry to a public utility on a technical matter and am passed from one person to another restating my question repeatedly. Finally a "customer serice" representative says she will get me the information and call back. From her response, I can tell she knows nothing about the subject and I cannot discuss the incomplete answer with her intelligently. I am not permitted to talk to some engineer who could answer the question in a moment. Meanwhile they have wasted my time and theirs in unsatisfactory "customer service."

(3) I write to an industrial firm for technical information stating my request as specifically as possible. The results are mixed. Sometimes I get a catalog sheet that does not answer my question and there is no letter stating limitations or clarification. Sometimes nothing happens. Sometimes, after a long wait, I write a follow-up letter because I don't know whether my original letter has been received. Years ago, I could count on a complete reply by return mail.

(4) I send a check and order to one of the technical societies for several technical papers. My check clears the bank, therefore I know they received the order, but I do not receive the papers. I have to make a long-distance phone call to trace the order and get action.

Now lest I be accused of a lack of objectivity let's look at the problems from the other side. I see their problems too—management problems. Here are a few of them:

1. Many employees are short-time workers, quick to start, stop, and change jobs. They have no real loyalty to the organization that was common in old-time, long-tenure, devoted employees, some of whom we got to know well. Part of this lack of loyalty can be charged to unionization of clerical employees. Rapidly increasing personnel and overhead costs have been resisted by not hiring additional personnel with the result that a tremendous backlog of unanswered mail accumulates.

2. The postal service is responsible for some mail problems. I can send a letter to England faster that I can get one to a nearby town. They tell us how much mail they are handling. Much of it is "junk mail" that reciepients don't want. There is an easy solution to the "junk mail" problem, but this is not the place to express those views.

3. Some firms try to respond by telephone to written inquiries. In some cases, this works, but not in all.

4. Some government regulations concerning "privacy" make it almost impossible to get the information necessary to respond to a client's engineering problem.

As I think back half a century when I started in business, if I had responded to a customer in the manner in which I am often treated, I would have been fired on the spot. Professor Kristol pleads for common sense. Shouldn't we of the Engineering Management Society take a new look at our aims and objectives and try to orient some of our management literature toward common sense? In the past, Percy Field's brief bits in this newsletter often met this need. Am I asking too much?

Wm. J. Ellenberger
Life Senior Member
Published Earlier January/February
1984 issue IEEE Engineering
Management Society Newsletter

PLANNING LOCAL CHAPTER TECHNICAL PROGRAMS

by Roger Kaul

Now is the time to plan for the 84-85 Local Chapter Technical programs. Without a plan the results may be only so-so, but the work load to develop the program is nearly the same as a planned activity. Why not consider using some techniques developed over the last few years in the Washington DC MTT-S chapter.

Develop a theme for the program so that the lectures build on each other. The lectures may be held monthly, weekly or all in one day, but a theme seems to make the program more informative. A course text (or notes) is another attractive addition, although don't require the instructors to follow the book too closely since it may be out-of-date. Issue a certificate for those who attend.

Don't expect just MTT members to attend. Instead, encourage other societies to attend and let them co-sponsor the series. Allow walk-ins for those who can't afford the tuition and encourage the local college students to attend.

Roger Kaul, Washington D.C. Chapter, presented a lecture regarding Development of Local Chapter Technical Programs at the Chapter Chairman's Meeting in San Francisco. Chapter Chairmen should receive a copy of the presentation soon. All program organizers are encouraged to call Roger (301) 454-9796 for further discussion.

ANSWERS TO BITS OF HUMOR

(1) The early bird gets the worm.

(2) A watched pot never boils.

(3) No use crying over spilled milk.

As for the 26 names of states on the back side of a five dollar bill. Yes Martha, they are there but you will need a magnifying glass to find them. The names appear on the Lincoln Memorial in two rows. One row is on the frieze above the twelve columns. The second and smaller row appears on the upper indented part of the Memorial. So now, find a $5 bill, the newer the better, get a magnifying glass and behold.

SPECIAL TRANSACTIONS ISSUE ON NUMERICAL METHODS FOR MICROWAVE AND MILLIMETER WAVE CHARACTERIZATIONS AND DESIGNS

As monolithic circuits, millimeter-wave components and other increasingly complex structures are utilized by the microwave industry, elaborate analytical techniques are required for their characterization and design. During the past several years significant advances have been made in numerical and analytical techniques. When the engineer is faced with new structures and applications, the need arises to consider which technique should be employed, what are its limits of validity, and what modifications are needed, etc.

The IEEE Transactions on Microwave Theory and Techniques is planning to publish a Special Issue on Numerical Methods for Microwave and Millimeter Wave Characterizations and Designs in October 1985. Papers are solicited which describe original work concerned with numerical techniques and methods to extend known and new techniques to solve future, and yet undefined, problems in the following (but not limited to) areas:

Planar circuits, waveguide models and methods
Open structures
Structures with anisotropic media
Lossy Systems
Spectral domain method
Transmission line matrix method
Moment method

Authors are requested to submit five copies of the manuscript by February 1, 1985 to Dr. James W. Mink.

Guest Co-editors:

James W. Mink
Editor, Numerical Techniques
U.S. Army Research Office
P.O. Box 12211
Research Triangle Park, NC 27709
(919) 549-0641

Felix Schwering
Editor, Numerical Techniques
U. S. Army Communications and Electronics Command
Fort Monmouth, NJ 07708
(201) 544-5362

THE 1984 MTT-S CHAPTER CHAIRMEN'S MEETING

by Ted Nelson

A very productive MTT-S Chapter Chairmen's Meeting was held on Wednesday evening, May 30, 1984, at the Hyatt Regency Hotel, San Francisco, in conjunction with the 1984 International MTT-S Symposium.

Following cocktails and dinner the meeting was opened by Ed Niehenke, MTT-S membership services chairman. On hand were chapter chairmen and vice-chairmen, or their representatives, from sixteen chapters including a representative from the newly formed chapter of West Germany. Also in attendance were a majority of ADCOM members and their guests.

After a welcoming address by MTT-S President George Oltman, chapter chairmen's service awards were presented by him to each chapter represented at the meeting. Service awards for chairmen not present or represented have been mailed to them.

Leo Young, former IEEE president, former MTT-S president, and now a director in the Office of the Deputy Undersecretary of Defense for Research and Engineering, gave an excellent presentation on present and future government plans for funding in the microwave community.

Ed Niehenke, Pat Green and myself reported on membership services, membership records, and chapter activities respectively. If any chapter officers require information or need help from MTT-S in these regards please contact Ed, Pat or myself. Our addresses and phone numbers are:

Ed Niehenke, Chairman
MTT-S Membership Services
Westinghouse Electric Corporation
PO Box 746, MS 339
Baltimore, MD 21203
(301) 765-4573

Pat Green
MTT-S Membership Records
Westinghouse Electric Corporation
PO Box 746, MS 339
Baltimore, MD 21203
(301) 765-2832

Ted Nelson
MTT-S Chapter Records
Westinghouse Electric Corporation
PO Box 1897, MS 709
Baltimore, MD 21203
(301) 765-6461

Roger Kaul of the MTT-S Membership Services Committee gave an informative talk on coordinating a lecture series. Reynold Kagiwada reported on the newsletter, Richard Sparks on international liaison and Barry Spielman on technical committees. Thanks were given to the 1983-84 distinguished lecturer, Stephen Adam for delivering his excellent presentation, "Modern Microwave Measurements", before the many MTT-S chapters that requested him. The two 1984-85 distinguished lecturers, Paul Greiling and Sander Weinreb, were introduced and they outlined their planned talks. Paul will speak on "High Speed Digital IC Performance Outlook" and Sander on "Radio Astronomy - A Challenge to the Microwave Engineer".

All chapter representatives were introduced and given a chance to discuss their chapter activities with everyone. Good ideas came from this, such as:

- Plan and establish your speakers and meeting dates early.
- Use IEEE services to send post cards to local members announcing your meetings.
- Have a local college or university provide CE (continuing education) units for attending chapter lectures, short courses, workshops, etc.
- Get local vendors or reps involved, they sometimes will provide cocktails or dinner at meetings in return for advertising or displaying their products.
- Plan a microwave career day, with local vendors and reps showing their products. Try to elicit support to provide a free meal with a day long course or mini-symposium.
- Also your chapter can receive $300 in 1984 from MTT-S. Contact Ed Niehenke.

1983-84 was a very successful year. Congratulations go to all the chapter chairmen and all chapter officers. I have also listed all 1983-84 chapter activities that were transmitted to me. If your chapter activities do not appear, please have a chapter officer report them to me. I'll try to get them in the next MTT-S newsletter. And to all 1984-85 officers here's wishing you great success in making the upcoming year even better for MTT-S.

MTT-S CHAPTER MEETINGS (1983-1984)

Date	Attendance	Speaker	Title of Presentation
ATLANTA MTT/AP			
9-26-83	88	Dr. Eli Brookner AP-S Distinguished Lecturer Raytheon Company	"Future Trends in Radars"
11-17-83	51	David K. Barton Raytheon Company	"Radar Clutter Models"
12- 8-83	24	Fred Nathanson Technology Service Corp.	"Does New Technology or the Environment Drive Radar System Design?"
1-17-84	29	Mr. Maurice Raffensperger VOA, US Information Agency	"Voice of America Broadcasting"
2-21-84	55	Dr. Thomas Barnes Univ. of Texas at El Paso	"Origin and Destiny of the Earth's Magnetic Field"
3- 6-84	23	Dr. Barry Turner National Radio Astronomy Laboratory	"A Large Deployable Reflector Antenna"
5- 1-84	53	Dr. Stephen F. Adam MTT-S Distinguished Lecturer Hewlett-Packard Co.	"Modern Microwave Measurements"
5-15-84	20	V. K. Tripp Engineering Experiment Station, Georgia Tech.	"Random Antenna Damage"
BALTIMORE MTT/AP			
3-15-84	36	Dr. Stephen F. Adam MTT-S Distinguished Lecturer Hewlett-Packard Co.	"Modern Microwave Measurements"
4-11-84	29	Prof. Benedikt A. Munk AP-S Distinguished Lecturer Ohio State University	"Scan Independent Phased Array"
5-14-84	162	Edward C. Niehenke Westinghouse Electric Corp.	"China: The People and the Technology"
CANAVERAL MTT/AP			
10-20-83	11	B. C. Tankersly Harris Corporation	"The Future of Spacecraft Antennas"
11- 8-83	19	Warren L. Stutzman Physical Science Laboratory Mexico State University	"Measurement and Prediction of Rain, Induced Attenuation and Depolarization on Milli-meter Wave Satellite Communication Links"
12- 8-83	15	Calvin T. Swift University of Massachusetts	"Passive Microwave Observation of Sea Ice from Aircraft and Spacecraft Platforms"
1-18-84	23	Joseph A. Pape Scientific Atlanta	"A Modular Automatic Antenna Analyzer"
2-29-84	23	Dr. Stephen F. Adam MTT-S Distinguished Lecturer Hewlett-Packard Co.	"Modern Microwave Measurements"
4-17-84	36	Prof. Benedikt A. Munk AP-S Distinguished Lecturer Ohio State University	"Scan Independent Phased Array"

5-14-84	23	Walter D. Burnside Ohio State University	"Modern Electromagnetic Measurement System"

CENTRAL NEW ENGLAND/BOSTON MTT

9-22-83	20	Ralph Levi Microwave Development Labs	"Techniques for Analysis of Scale Microwave Networks"
10-20-83	70	Glenn Thorn Raytheon Company	"Millimeter Waves Solid State Power Sources and Production Systems of the Future"
11-17-83	31	Rod Al Ferness Bell Labs	"Guided Wave Devices For Optic Communications"
12- 8-83	77	Shigeru Sando Nippon Electrical Co.	"GaAs FET Development Technology Trends Looking for MM-Wave Performance"
1-26-84	42	Ted Saad Sage Laboratories	"Microwave Theory and Technique in China"
2-16-84	120	R. A. Phaeuf, C. Gupta & I. Crossley, Alpha Industries	"Three Millimeter Wave Technology Presentations and A Tour of Alpha Industries"
3-22-84	28	Harold E. Stinehelfer Made-It-Associates	"Microwave Analysis Using Reflection and Transmission Time-Domain Techniques"
4-12-84	35	Edward C. Niehenke Westinghouse Electric Corp.	"Advanced Systems Need Super Componets"
4-19-84	33	Alex Chu MIT Lincoln Laboratories	"Millimeter-Wave Componets for Transmitter and Receiver Applications"
5- 3-84	43	Dr. Stephen F. Adam MTT-S Distinguished Lecturer Hewlett-Packard Co.	"Modern Microwave Measurements"

CHICAGO MTT/AP

9-19-83	22	Philip C. Peterson Motorola	"System Design Considerations for 800 MHz Cellular Mobile Telephone Systems"
10-10-83	32	Prof. M. S. Gupta University of Illinois at Chicago	"Characterization and Applications of the Nonlinearity GaAs Microwave FET's"
11-14-83	14	Stephen G. Rudisill Leydig, Voit,...Ltd.	"Recent Developments in Patent and Copyright Laws with Special Reference to Electronics and Communnications"
2-20-84	24	R. Dennis Fraser ALCOA-NEC Communications	"Direct Broadcasting Systems"
3-19-84	38	Dr. Stephen F. Adam MTT-S Distinguished Lecturer	"Modern Microwave Measurements"
4-16-84	15	Dr. Y. Rahmat-Samii AP-S Distinguished Lecturer Jet Propulsion Laboratory	"Large Antenna Systems for Space Applications"
6-11-84	25	Helmut Shrank Westinghouse Electric Corp.	"Low Sidelobe Phased Array Antennas"

COLUMBUS MTT/AP

7- 7-83	33	Frederick Molinet Societe Mothesin, France	"Diffraction by an Imperfectly Conducting Wedged Cylinder"
10-13-83	20	Jiumn S. Yu Sandia National Laboratories	"Dielectric Logging with Downhole Invasion Effects"
11-17-83	50	Prof. Bendikt A. Munk AP-S Distinguished Lecturer Ohio State University	"Scan Independent Phased Arrays"
12-20-83	31	Fred Garber Ohio State University	"Digital Communications Over Selective Fading Channels"

1-12-84	41	George T. Ruck Battelle Columbus Labs	"Electromagnetic Scattering from the Sea"
2-16-84	48	Dr. Edward F. Miller NASA/Lewis Research Center	"NASA's Role in Satellite Communication"
3-27-84	45	Dr. Y. Rahmat-Samil AP-S Distinguished Lecturer Jet Propulsion Laboratory	"Large Antenna Systems for Space Applications"
4- 4-84	29	Dr. Stephen F. Adam MTT-S Distinguished Lecturer Hewlett-Packard Co.	"Modern Microwave Measurements"
5- 8-84	55	Prof. John D. Kraus Ohio State University	"Antennas since Hertz and Marco"
5-22-84	27	Ivan F. LaHale Environmental Research Institute of Michigan	"The Inverse Source Problem for Three-Dimensional Partially Coherent Sources and Fields"

DALLAS MTT

9-29-83	45	Richard V. Snyder RS Microwave Co.	"How are Microwave Filters Like a Fly's Eye?"
10-27-83	47	Paul Gianfortune Hughes Aircraft Co.	"Review of Millimeter Wave Technology"
12-12-83	43	Dr. Stephen F. Adam MTT-S Distinguished Lecturer Hewlett-Packard Co.	"Modern Microwave Measurements"
1-26-84	39	Richard True Litton Industries	"Modern Electron Tubes"
2-23-84	43	Dr. Franco N. Sechi RCA Laboratories	"FET Power Amplifier Design Using Load-Pull Techniques"
3-22-84	53	Dr. Sang Sheem Rockwell International	"Optical Fiber Communications Technology"
5-24-84	35	Dr. Fred Doerbeck Texas Instruments, Inc.	"GaAs Materials Technology from 1952 to 1984"

DENVER/BOULDER MTT/AP

1- 4-83	48	Prof. Akira Ishimaru University of Washington	"Introduction to Statistical Electromagentic Theory and Application
4-14-83	19	Dr. David L. Wright U. S. Geological Survey	"Borehole Radar Experiments in Granite"
5-12-83	25	Robert E. Munson Bell Aerospace Systems	"Spaceborne Imaging Radar"
6- 9-83	20	Prof. Jin Au Kong Massachusetts Institute of Technology	"Theoretical Models for Remote Sensing of the Earth"
10-16-83	21	Dr. Yahya Rahmat-Samil AP-S Distinguished Lecturer Jet Propulsion Laboratory	"Advances on Diffraction Analysis of Satellite Communication Reflector Antennas"
10-20-83	17	William C. Daywitt National Bureau of Standards	"Recent Developments Lead to a New Design for Millimeter-Wave Noise Standard"
12-15-83	28	Dr. Donald E. Barrick Ocean Surface Research	"Evolution toward Ultra-Compact Antennas for HF Radar Oceanography"

FLORIDA WEST COAST MTT

12- 8-83	22	Dr. Robert Ashley Sperry Electronic Systems	"FM Noise Measurement Techniques"

1-15-84	70	Dr. Carl Sutton Medical School University of South Florida	"Biological Effects of Microwaves"
2-28-84	32	Dr. Stephen F. Adam MTT-S Distinguished Lecturer Hewlett-Packard Co.	"Modern Microwave Measurements"
5- 2-84	21	Larry Alter ECI Division of E-Systems	"Adaptive Phased Arrays"

HOUSTON MTT/AP/ED/MAG

1-25-84	36	Jean Van Bladel University of Ghent, Belgium	"Electrodynamics of Moving Media"
3- 8-84	46	Roger F. Harrington Syracuse University	"The Method of Moments in Electromagnetics"
4-30-84	41	Edward D. Wolfe Cornell University	"Miniaturization-A Multidisciplinary Engineering"

MIDDLE AND SOUTH ITALY MTT/AP

1-31-84	50	Giorgio Franceschetti University of Naples	"Sampling Techniques in the Analysis and Synthesis of Antennas"
3- 4-84	25	T. Itoh University of Texas at Austin	"Open Guided Wave Structures" "Transmission Lines on Semiconductor Substrate"
3-16-84	25	T. Itoh University of Texas at Austin	"Quasi-Optical Plane Mixer" "E-Plane and Fin-Line Techniques"

NEW JERSEY COAST MTT/ED/QEA

5-24-83	85	Dr. Lester F. Eastman ED-S Distinguished Lecturer Cornell University	"Advances in High-Speed/High Frequency Compound Semiconductor Devices"*
9-12-83	25	Dr. George Matthaei University of California at Santa Barbara	"Dielectric Waveguide Filter Techniques in Millimeter Waves"*
2-22-84	347	Dr. Stephen F. Adam MTT-S Distinguished Lecturer Hewlett-Packard Co.	"Modern Microwave Measurements"

NORTH JERSEY MTT/AP

4-20-83	50	Dr. Harold Seidel Bell Laboratories	"Microwaves in Slow Motion"
5-11-83	14	Dr. Keith Carver AP-S Distinguished Lecturer New Mexico State University	"Microstrip Antenna Technology"
5-24-83	85	Dr. Lester F. Eastman ED-S Distinguished Lecturer Cornell University	"Advances in High Speed Frequency Compound Semiconductor Devices"*
9-12-83	25	Dr. George Matthaei University of California at Santa Barbara	"Dielectric Waveguide Filter Techniques in Millimeter Waves
10-26-83	22	Prof. Benedikt A. Munk AP-S Distinguished Lecturer Ohio State University	"Scan Independent Phased Arrays"
2-22-84	347	Dr. Stephen F. Adam MTT-S Distinguished Lecturer Hewlett-Packard Co.	"Modern Microwave Measurements"

*Joint Meeting of New Jersey Tri-Section (North Jersey, New Jersey Coast and Princeton).

OTTAWA MTT/AP/EMC

4-14-83	13	Mr. S. Xavier Bell Northern	"EMI Regulation in the Electronics/Telecommunications Market"
10-13-83	12	Dr. P. Constantinou Canadian Dept. of Communications	"FM Interference into Digital Communications Satellite Systems"
11-24-83	36	Dr. M. Suthers & Ms. I. Streibl Bell Northern Research	"An Overview of Surface Acoustic Wave (SAW) Technology and SAW Diffraction Compensation on YZ-LINB03"
3-14-84	71	Mr. S. Stapleton & Dr. B. Ashton Canadian Astronautics	"The Microwave Landing System (MLS) Antenna"
4- 5-84	42	Dr. Stephen F. Adam MTT-S Distinguished Lecturer Hewlett-Packard Co.	"Modern Microwave Measurements"

PHILADELPHIA MTT/AP

10-27-83	22	A. J. Devaney Schlumberger-Doll Research	"Inverse Source and Scattering Problems in Ultrasonics"
11-17-83	16	Dr. Robert S. Elliot University of California at Los Angeles	"The Design of Phased Array Antennas Consisting of Waveguide Slots"
1-26-84	22	Alan J. Simmons Lincoln Labs, Massachusetts Institute of Technology	"Recent EHF Satellite Communication Antenna Developments at MIT Lincoln Labs"
2-23-84	12	Dr. Stephen F. Adam MTT-S Distinguished Lecturer Hewlett-Packard Co.	"Modern Microwave Measurements"

PHOENIX MTT/AP/ED

9-22-83	45	Dr. T. H. Ning IBM Watson Research Center	"Bipolar VLSI Technology"
10-27-83	26	P. T. Greiling Hughes Research Lab	"Digital GaAs IC Performance"
11-15-83	45	Gary Gear/Omniprise Harold Muller/VATIC Systems	"Becoming a High-Tech"
12-13-83	27	Dr. Stephen F. Adam MTT-S Distinguished Lecturer Hewlett-Packard Co.	"Modern Microwave Measurements"
4-13-84	35	Dr. Peter Williams Arizona State University	"Secondary Ion Mass Spectroscopy (SIMS)"

PRINCETON MTT/ED

5-24-84	85	Dr. Lester F. Eastman ED-S Distinguished Lecturer Cornell University	"Advances in High-Speed/High Frequency Compound Semiconductor Devices"*
9-12-83	25	Dr. George Matthaei University of California at Santa Barbara	"Dielectric Waveguide Filter Techniques in Millimeter Waves"*
2-22-84	347	Dr. Stephen F. Adam MTT-S Distinguished Lecturer Hewlett-Packard Co.	"Modern Microwave Measurements"

*Joint Meeting of New Jersey Tri-Section (North Jersey, New Jersey Coast and Princeton).

ST. LOUIS MTT/AP/ED

10- 4-83	N/A	Dr. Reinhard Knerr Bell Laboratories	"Fiber Optic Communications"
10-19-83	N/A	Scott W. Fancher McDonnell Douglas Astronautics Co.	"Laser Communications: A Technology Overview"
11-15-83	N/A	Dr. Stephen F. Adam MTT-S Distinguished Lecturer Hewlett-Packard Co.	"Modern Microwave Measurements"
2-21-84	N/A	James M. Roe Peterson-Roe Corporation	"The 1983 Microwave Study Group to the Peoples Republic of China"
4- 4-84	N/A	Walter M. Scott McDonnell Douglas Microelectronics Center	"Modern Infared Detector Technology"
4-17-84	N/A	Dr. Y. Rahmat-Samii AP-S Distinguished Lecturer Jet Propulsion Laboratory	"Large Antenna Systems for Space Applications"

SAN DIEGO MTT/AP

9-15-83	36	Alfred Hislop Naval Ocean Systems Center	"Suspended Stripline Circuits for Millimeter-Waves"
10- 6-83	26	Dr. Lou Cutrona Sarcutron	"Synthetic Aperture Radal"
11-17-83	28	Dr. Y. Rahmat-Samii AP-S Distinguished Lecturer Jet Propulsion Laboratory	"Large Antenna Systems for Space Applications"
3-16-84	27	Dr. Cheng Donn Randtron Systems	"Some Practical Design Aspects of Corrugated Horns"
4-19-84	35	Dr. John J. Fratimico, Jr. Global Analytics	"Application of Periodic Structures to Reflector Antenna Systems"
5- 4-84	24	John Boyles Hewlett-Packard Co.	"Applications of the HP8510 Network Analyzer"

SANTA CLARA VALLEY/SAN FRANCISCO MTT

9-22-83	N/A	Dieter Scherer Hewlett-Packard Co.	"Generation of Low Phase Noise Microwave Signals"
10-27-83	N/A	Dr. Stephen F. Adam MTT-S Distinguished Lecturer Hewlett-Packard Co.	"Modern Microwave Measurements"
11-17-83	N/A	Tao Chow Farinon Division Harris Corporation	"GaAs FET Frequency Doubler"
1-12-84	N/A	Richard Q. Lane California Eastern Labs	"De-Embedding Techniques for the Measurement of Device Scattering Parameters"
3- 1-83	N/A	Charles L. Grasse Teledyne MEC	"Acousto-Optic Bragg Cells: Tomorrow's Receiver Technology?"
6-14-84	N/A	Stanley Mason Avantek, Inc.	"Design and Use of Internally Matched GaAs FETs C-Band Power Amplifiers"

SCHENECTADY MTT

11- 1-83	26	Dr. Stephen F. Adam MTT-S Distinguished Lecturer Hewlett-Packard Co.	"Modern Microwave Measurements"

TOKYO MTT

4-20-83	38	Prof. Emil Wolf University of Rochester	"Wavefront Correction by Phase Conjugation"
9- 9-83	40	E. Yamashita, S. Hori, T. Yoneyama, J.-P. Hsu, and S. Urabe	"Report from 1983 IEEE MTT-S International Microwave Symposium"
11-14-83	170	Dr. R. W. Wilson Bell Laboratories	"Cosmic Background Radiation and History of Matter"
11-18-83	72	Dr. Stephen F. Adam MTT-S Distinguished Lecturer Hewlett-Packard Co.	"Modern Microwave Measurements"
11-29-83	42	Dr. Stephen F. Adam MTT-S Distinguished Lecturer Hewlett-Packard Co.	"Modern Microwave Measurements"
11-30-83	78	Dr. Stephen F. Adam MTT-S Distinguished Lecturer Hewlett-Packark Co.	"Modern Microwave Measurements"
12- 2-83	32	Dr. Stephen F. Adam MTT-S Distinguished Lecturer Hewlett-Packard Co.	"Modern Microwave Measurements"
4- 5-84	15	Prof. Ernst Bonek Technical University Vienna	"PLL (Phase Locked Loop) Infrared Receivers"
4- 5-84	15	Dr. Nim Cheung Bell Communications Research	"Introduction to Bell Communications Research"

UTAH/SALT LAKE CITY MTT/AP/ED

5- 6-83	33	Dr. Y. Rahmat-Samii AP-S Distinguished Lecturer Jet Propulsion Laboratory	"Advances in Diffraction Analysis of Satellite Communication Reflector Antennas"
5- 9-83	72	Prof. Herbert Kroemer ED-S Distinguished Lecturer University of California at Santa Barbara	"Heterostructures for Everything—The Future of Compound Semiconductor Devices?"
11-17-83	51	Dr. Stephen F. Adam MTT-S Distinguished Lecturer Hewlett-Packard Co.	"Modern Microwave Measurements"
2- 6-84	43	Prof. Donald R. Wilton AP-S Distinguished Lecturer University of Houston	"Numerical Solution Techniques in Electromagnetics"
2-27-84	N/A	Richard K. Chang Yale University	"Laser Scattering frm Passive and Active Microparticles"

BALTIMORE MTT/AP

12-10-83	46	MTT-S Special Meetings, Courses, Symposiums, Workshops & Clinics	"Solid State Microwave Amplifier Design"
2-25-84	29	Short Course C. R. Boyd (Speaker) Microwave Applications Group Douglas Adam (Speaker) Westinghouse R&D Center Russel G. West (Speaker) Trans Tech, Inc.	"Introduction to Microwave Ferrites"
6-17-84	46	Picnic	1984 Membership Drive Picnic

CHICAGO MTT/AP

5-14-84	N/A	Workshop	1984 Technology Update
		Dr. R. Levy (Speaker) Microwave Development Labs	"Broadband Matching — CAD Techniques"
		Dr. L. Rucker (Speaker) University of Texas at Arlington	"FM and AM Characteristics of Field Effect and Bipolar Transistors"
		Dr. C. Hartmann (Speaker) RF Monolithics	"SAW and BAW Resonators and Filters"
		Mr. J. Fiedzuiszko (Speaker) Ford Aerospace & Communi- cations Corporation	"Dielectric Resonator Technology"
		Dr. F. Lee (Speaker) Gigabit Logic	"GaAs Digital IC Technology from 1952 and Applications"

DALLAS MTT

5-24-84	N/A	Workshop	1984 Technology Update
		Dr. R. Levy (Speaker) Microwave Development Labs	"Broadband Matching—CAD Techniques"
		Dr. L. Rucker (Speaker) University of Texas at Arlington	"FM and AM Characteristics of Field Effect and Bipolar Transistors"
		Dr. C. Hartmann (Speaker) RF Monolithics	"SAW and BAW Resonators and Filters"
		Mr. J. Fiedziuszko (Speaker) Ford Aerospace & Communications Corporation	"Dielectric Resonator Technology"
		Dr. F. Lee (Speaker) Gigabit Logic	"GaAs Digital IC Technology from 1952 and Applications"

PHOENIX MTT/AP

2- 8-84	205	Workshop	1984 Phoenix Workshop Technology
3-24-84	50	Outing	

INDIA MTT/ED

12- 2-93	N/A	Workshop	Millimeter-Wave
12- 3-83	N/A	Workshop	Integrated Circuits Techniques and Technology

TOKYO MTT

5-25-84	9	English Speech Clinic Mr. L. M. Colvin (Consultant)	Rehearsal for speakers aqt 1983 IEEE MTT-S International Microwave Symposium
5-24-84	11	English Speech Clinic Mr. K. Dobbyn (Technical Writing/Presentation Specialist)	Rehearsal for speakers at 1983 IEEE MTT-S International Microwave Symposium

Book Review

by R. H. Jansen, University of Duisburg

Microwave Integrated Circuits (in German)
Electrical principles, design rules, technical realization, technology
By R. K. Hoffmann, Springer-Verlag, Berlin, 1983.

The technique of microwave integrated circuits (MICs), which mainly are used in terrestrial as well as satellite radio communication and radar is the subject of this truly commendable book. The author knows on what he is writing, he is familiar with the details and has a good survey of the topic gained by more than 10 years of experience as the leader of a microwave design laboratory. Therefore, his book is worth to be read even by the expert. It contains plenty of details and design hints and should also be of interest to the theoretically oriented microwave engineer. As the subtitle makes clear, however, it is essentially a book on the fundamentals of MIC design. It treats predominantly the foundations, the electromagnetic behaviour and the analysis of the elementary planar thin-film and thick-film structures used in modern microwave circuit design.

Besides this, the presented book has its value as a thorough and intelligent collection of design rules as available at the time of printing. It has good chances to be accepted as a preferred handbook by the MIC research and development engineer and is backed up by an extensive bibliography of more than 1200 references. It is further remarkable that in his treatment the author proves understanding even in judging advanced and mathematically complicated methods of analysis. Nevertheless, he does not miss his aim to always present directly applicable design information and puts this into a variety of precisely and carefully elaborated diagrams.

R. K. Hoffmann's book starts with a detailed introduction into the field outlining the technical, technological and economic aspects of MICs. He shows plenty of applications which demonstrate the characteristic features and advantages of the circuit technique. In a total of 14 additional chapters, he describes on a high yet understandable level and with physical intuition the electrical properties of the technically most important elementary structures of MICs, quantitatively and qualitatively. Particularly, an in-depth treatment of microstrip transmission lines and discontinuities is given. With thoroughness and expertness, he critically inspects and discusses formerly published design rules and formulas before implementing them into his own work. In order to achieve further improvement of the book, therefore, only a few remarks are in order. So, for example, the theoretically difficult item of higher order modes on microstrip is not covered completely satisfactory by chapter 4. Due to its brevity, it would have been better to line up chapter 5 as a section of chapter 3. Finally, chapters 7 and 8 on the measurement of microstrip characteristics and on microstrip using dielectrically anisotropic substrates should have been extended in conformity with the general completeness of the book.

On the whole, the presented book is a contribution to the field of MIC design which to a high degree satisfies the needs of the advanced student and the interested microwave research and development engineer likewise. This judgement remains even valid if comparison is made with available international textbooks. For this reason, R. K. Hoffmann's book should well find its readership if translated into English.

NICE GUYS WIN, EVEN OVER IRS

You might not believe this, but, sometimes, the tax law can be human. In most cases, if you violate a tax rule, you are a loser.

This is one of those rules: If you made payments when you had no legal obligation to do so, the amount paid is not deductible. The rule makes sense because your payments were voluntary, a gift and gifts are not deductible.

Conway Twitty, the well-known country music singer, beat the rule and the IRS.

A number of Twitty's friends invested in Twitty Burger Inc., which was a burger franchise corporation. Ultimately, the franchise operation went belly-up. Twitty's unhappy investor friends were made happy when he fully compensated them for the amounts they lost.

Twitty deducted the payments from his income tax. The IRS denied the deduction, saying there was no business purpose for the payments and that they were made out of a sense of moral obligation.

Twitty claimed the payments were deductible because of his business of being a country-music performer. He paid the investors to protect his personal business reputation. Country-music fans are acutely sensitive to any moral flaw perceived in entertainers. The tax court (Harold L. Jenkins, TC Memo 1983-67) rejected the IRS' arguments and allowed Twitty a full deduction.

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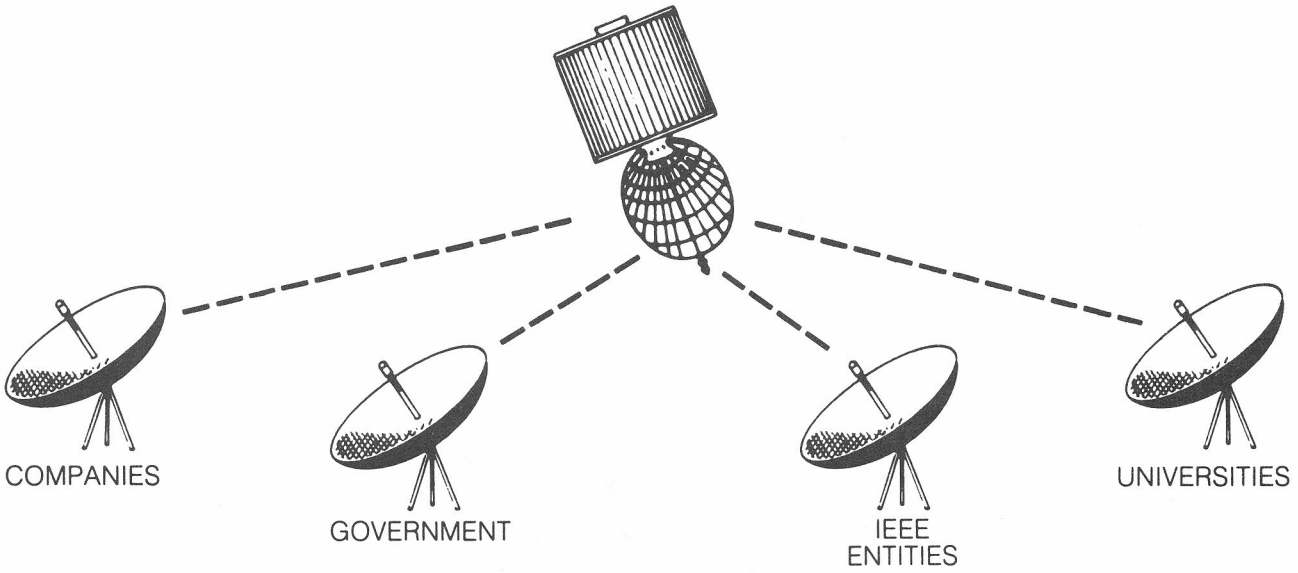

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