

IEEE GROUP ON
MICROWAVE THEORY
AND TECHNIQUES

NEWSLETTER



EDITOR: J. B. Horton
Electronic Resources, 4561 Colorado Blvd., Los Angeles, California 90039

Number 65, January 1972



The Arlington Towers, Chicago, Illinois

1972 IEEE INTERNATIONAL MICROWAVE SYMPOSIUM INAUGURATES EXHIBITS

The 1972 IEEE Microwave Symposium, to be held in the Chicago suburb of Arlington Heights, May 22-24, will establish an important new communication link between the engineer-manufacturer and the engineer-consumer. This communication will take place as the result of exhibit booths which will be conveniently located on the level immediately below the Symposium meeting rooms in the Arlington Park Towers Hotel. Symposium attendees will be able to discuss latest product availabilities and future product developments with technically qualified personnel who are representing the engineering and production capability of their company.

Applications for exhibit space will be received through April. Anyone wishing additional information may contact:

Mr. Clarence Arnow
Micro-Now Instrument Co.
6104 N. Pulaski
Chicago, Illinois 60646
312/478-1151

While the deadline for papers has now passed, that for late-news items has not. Important late-news items suitable for a short talk will be considered if a 100-word abstract and 300-500 word summary are received by April 26, 1972. Submit these to:

Dr. Peter P. Toullos, Co-Chairman
Technical Program Committee
IIT Research Institute
10 W. 35th St.
Chicago, Illinois 60616

Advanced programs for the 1972 Symposium will be mailed to MTT members in March. Members are encouraged to make early plans to attend the Symposium and to take advantage of cost savings through advanced registration. Copies of the advanced program or other Symposium information may be requested from Mr. Jim Huber chairman of publicity, or Mr. Robert Knox, Steering Committee Co-Chairman, both affiliated with IIT Research Institute.

SPECIAL NOTE

Effective February 1, 1972 G.P. Rodrigue will assume the Editorship of the G-MTT NEWSLETTER. After this date, all correspondence concerning the NEWSLETTER should be sent to:

Dr. G.P. Rodrigue
Georgia Institute of Technology
School of Electrical Engineering
Atlanta, Ga. 30332
(Tel. 404-894-2944)

INSERT-1972 COMMITTEE DIRECTORY

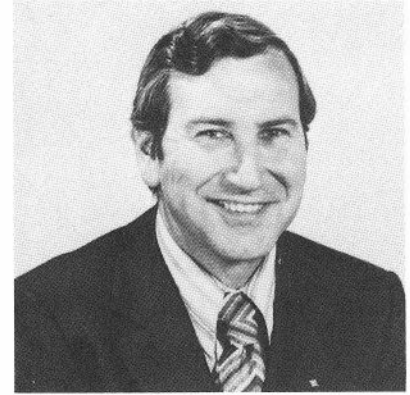


EDITORS NOTES

by J. B. HORTON

PRESIDENTS MESSAGE

by AL CLAVIN



The Economic Well-Being of the Engineer and the IEEE

This issue of the NEWSLETTER highlights two of the current topics of concern to most G-MTT members. The Galindo proposal which resulted in a vote on an IEEE Constitutional amendment, has caused a major change in the overall IEEE policy towards economic well-being of the engineer. This is covered in detail by Al Clavin in his President's Message and by Leo Young in his year-end report on Division IV activities. A second topic is the upcoming IEEE International Convention and Exposition on March 20-23 in New York. Art Solomon and Harold Sobol have put together three sessions each for the Show. Information about these sessions has been included in this issue.

Our own symposium, scheduled for May 22-24 at the Arlington Towers in Chicago, is in the final phases of organization. Details of the Symposium, including information on exhibits, are given on page 1.

One of the topics of concern to IEEE recently reported by P.H. Smith, Chairman of the Standards Coordinating Committee, is waveguide designations. Comments on the role that IEEE and G-MTT can play in solving this problem are included in this issue in excerpts from letters written by J.J. Taub and R.W. Beatty.

The 1972 G-MTT Committee Directory is included as an attachment to this issue of the NEWSLETTER. The Directory contains the names and addresses for ADCOM officers, committee members, the National Lecturer, and other general information. Our special thanks to H.G. Oltman for his work in compiling and editing the Directory.

Since this is the last issue which I will be Editor of the NEWSLETTER, I would like to take this opportunity to express my appreciation to everyone for their help in supplying information for the NEWSLETTER. I look forward to continuing to be a part of the G-MTT as the 1972 ADCOM Vice President, and to working with G-MTT members on other projects in the future.

In my opinion, all members of the IEEE owe a debt of gratitude to Dr. Victor Galindo. This is true even for those who voted against his amendment to the Constitution of the IEEE. As most of you know, he proposed and solicited the proper number of signatures to place an amendment on the ballot changing the Constitution of the IEEE to read that the primary objective of the Institute is the economic well-being of the engineer; the secondary objective being technical and educational. The vote on this amendment was nearly split 50-50 (the amendment did not pass since it required a 2/3 majority).

The debt of gratitude that we owe Dr. Galindo is for his efforts in allowing the members to speak on this issue. The Directors of the Institute now know that they are in their positions in order to serve the membership in the economic as well as technical field. There were many people I talked to who voted against the amendment but who wished it well. Their conflict was due to the fact that they did not approve of the form of the amendment, but did approve of the spirit. It was their desire that the Institute undertake activities directed towards the economic betterment of its members.

The Board must consider this vote literally as a mandate from the members to initiate activities relating to the Galindo amendment. I have heard it said that one could interpret the vote as meaning that all those members voting for it be considered in one class; all those against it, plus all those who didn't vote in another class — this silent majority being put into the negative camp. The reasons for not voting are many, not least of which is the confusion due to the large amounts of junk mail put out by the Institute; but my information says that this is still a record vote for the IEEE and I can assure the Directors that the vote was due to the interest in the Galindo amendment. The Directors **have** heard and have taken the first step by allowing the regions to initiate their own programs in this area. They will have the power to raise the dues of their regional members to support their programs.

I believe all of us who are concerned should make sure that our regional directors know that we approve of these activities and that we are willing to pay for them and to participate. We have been hit once with massive lay-offs and unemployment. Things may be

getting better but I hope that we are not so foolish as to let them happen again without trying through our institutions to better our economic well-being.

THE YEAR 1972

The above comments are not the usual message one expects from a newly elected president. However, they do set the tone for the work to be carried out in 1972. The financial problems of the IEEE are making it necessary for us to curtail the number of pages printed in the Transactions. We are looking into additional ways of raising revenues and will be putting emphasis on page charges, symposium exhibits, and institutional listings in the Transactions.

We are still coping with the problems of Groups, Societies, and Divisions and where MTT should stand. Should there be merger attempts with the eventual aim of becoming a society or should we stay as we are? I hope to be addressing these new problems as well as continuing with our past programs.

Bob Rivers is doing an excellent job in formulating plans for his Political Action Committee. I think all of us need to participate in this area. I am sure that those of you who are interested can write to Bob and he will be able to set you to a challenging task.

All in all, I am sure it will be the year of change for MTT.



GMTT PROFESSIONAL ACTION COMMITTEE

by R.A. Rivers

Much of the past year has been spent on attempting to organize a committee that is active in an area that has been tabu in the past. While attempts were made to organize activities on a national basis, they were not successful and the resulting active committee was a Boston Area operation.

It was first necessary to determine if IEEE members did in fact have a problem. This was established and it was established that they would probably continue to have problems for several years.

The nature of the problem was studied and it was determined that in addition to the unemployment and the misemployment, practically half of the employed IEEE members have a problem due to the destruction of the Career Environment.

Extensive discussions and study of the operating environment for Research and Development lead to the selection of 22 items that are most important to the professional career needs of engineers and scientists. They are as follows:

1. Vested Pension Benefits
2. Lobbying for R&D Spending
3. Lobbying for Allocation of R&D
4. Public Education of Role of Science and Engineer in Attaining Goals
5. Public Education of Scientific and Engineering Contributions
6. Public Education of Consequences of Suppressed Technology
7. Professional Employment Service
8. Professional Career Counseling Service
9. Professional Education Quality Standards
10. Public Education of Need of Society to Adapt to Technology
11. Supplemental Unemployment Compensation
12. Patent Royalty Rights
13. Monthly Polling of Members in Support of Lobbying
14. Retread Education Funding
15. Retread Education Courses
16. Severance Pay
17. Professional Employment Standards
18. Professional Education Quantity Controls
19. Lobbying for Continuity of Technical Programs
20. Promote Adoption of Code of Ethics
21. Professional Internships for Specialization
22. Promote Personal Responsibility for Environmental Effects

The committee has been promoting action on these items even while studying. There are a number of indications of forward motion. Much of the action can be credited to our President, James Mulligan Jr. Credit is also due the G-MTT ADCOM in sticking its neck out to support a Standing Professional Action Committee, not just an ad hoc committee that could be quietly killed if the going got rough. You can be sure that the G-MTT ADCOM is at the forefront in attempting to satisfy the needs of its membership.

WAVEGUIDE DESIGNATIONS

J.J. Taub, R.W. Beatty

[As a part of the Waveguide Standards Committee activities, J.J. Taub presented a report on waveguide designations. The text of this report is included here. Comments by R.W. Beatty on the metric WR system suggested by J.J. Taub are included, also.]

I have looked into the problem of standardization of waveguide designations as per the minutes of our February meeting [Waveguide Standards Committee]. The situation as I see it is presented together with some recommendations for action by the Waveguide Standards Committee.

There are three approaches to this problem:

1. Letter designations such as the classical L, S, C, and X or a completely new set of letters such as currently being instituted by the U.S. Armed Services.
2. The WR designation of the E.I.A. which indicates the wider inner dimension (in units of hundredths of inches) of rectangular waveguide. For example, WR90 (standard X-band) connotes a rectangular waveguide with an "a" dimension of $90 \times 0.01 = 0.90''$.
3. The IEC standard gives a clue to the nominal center frequency for best dominant mode propagation. For example, R100 (standard X-band) indicates a rectangular waveguide centered at 10 GHz.

The letter designation in theory has the virtue of conciseness which is probably why most manufacturers prefer this approach. It has unfortunately been corrupted by many rival sets of letter designations in common use. The attached table (Fig. 1) painfully indicates this dilemma. More recently, the U.S. Armed Services has been using completely new designations.¹ It is my own view that it will not be the answer because it is prone to future corruption together with the fact that many engineers prefer the reduced ambiguity of WR or IEC designations.

The WR designations seems to have caught on strongly in the U.S. I have interviewed several microwave engineers, mechanical designers, and surveyed some recent U.S. microwave literature. This has indicated solid preference to a system that uniquely identifies the waveguide and enables them to determine the cutoff frequency and an idea of waveguide size (assuming a 2:1 aspect ratio). One disadvantage of this system is that it is based on inches. This would be a deterrent to international acceptance.

The IEC system also eliminates the letter ambiguity but its indication of frequency or size is less precise than the WR system. Its main virtue is that frequency is in the same units for both the inch and the metric systems. It appears to have strong non U.S. acceptance.

After considering the pros and cons I lean towards a WR type of designation with millimeters as a base. For example, the "a" dimension of X band guide is $0.9'' = 22.86$ mm. A number designation of 23 would be close enough to uniquely distinguish this guide. I believe that it would be an improvement on the IEC system.

¹T.F. Curry, "Frequency Band Designations," G-MTT NEWSLETTER, July 1971, page 13.

J.J. Taub

Comments by R.W. Beatty

The subject of Waveguide Type Designations is controversial but I think that Jesse Taub has done a fine job of summing up the possibilities as well as the pros and cons. As far as the U.S. needs are concerned, I agree that conversion of the WR-system to metric is a good idea.

One of the main advantages of the WR-system over the IEC system is that the WR-numbers pretty accurately give the inside width of the waveguide, from which one could compute the cutoff wavelength. So I have enclosed a table (Fig. 2) showing the errors one makes in doing this for the existing WR-system as well as for several proposed metric versions of the WR-system.

If one were to insist on no error, then the metric WR-system numbers would be the waveguide widths in millimeters. In some cases, these would be whole numbers such as WR-5842 (top of table), and in some cases they would involve decimals, such as WR-8.64 (bottom of table).

The present WR-system has no error for 22 out of 34 waveguides. However, the error does get up to almost 12 percent for small waveguide cross-sections.

I personally favor the no-error approach, and do not object to WR numbers such as WR-8.64. However, one can devise WR-systems having small errors, but with simpler numbers. Four such systems are shown in the table with the corresponding errors. In each case, a compromise has been made. The simpler the numbering system, the greater the errors when one considers the whole range of standard rectangular waveguides.

In addition to the metric WR-system, (if adopted) I believe we also need a letter system. And if an IEEE letter designation system is put forth, it should do a lot to reduce the present disagreement on which letter to use for which waveguide. As a starting point, there is fairly general agreement on X, K, and L. If the IEEE assigned other letters to other sizes, and the manufacturers were involved in the IEEE committee which did this, I believe that the present chaotic condition would improve.

R.W. Beatty

Figure 1. WAVEGUIDE BAND DESIGNATION OF MANUFACTURERS

Frequency GHz	NARDA	HP	TRG	FXR	D/B	DOUGLAS	LIELO	MDL	AIL	NOISE GENERATOR (AIL)
1.12 - 1.7	L	-	-	L	P	L	-	L	L	-
1.7 - 2.6	LS	-	-	R	-	M	-	W	LS	-
2.6 - 3.85	S	S	-	S	L	S	E	S	S	07048
3.95 - 5.85	C	G	-	H	K	C	F	C	G	07049
5.85 - 8.2	XN	J	-	C	J	A	G	XB	J	07050
7.05 - 10.0	XB	H	-	W	H	B	H	XL	H	07051
8.2 - 12.4	X	X	-	X	G	X	J	X	X	07052
10.0 - 15.0	-	M	-	-	-	-	-	75	M	-
12.4 - 18.0	KU	P	-	Y	F	G	K	KU	P	07091
18.0 - 26.5	K	K	-	K	E	K	L	K	K	07053
26.5 - 40.0	V	R	A	U	D	T	M	KA	R	07096
33.0 - 50.0	Q	-	B	Q	C	V	N	Q	Q	-
50.0 - 75.0	M	-	V	M	B	W	P	V	B	-
60.0 - 90.0	E	-	E	E	A	Z	Q	-	E	-
75.0 - 110.0	-	-	W	-	-	-	-	-	-	-
90.0 - 140.0	-	-	F	F	-	-	-	-	F	-
140.0 - 220.0	-	-	G	G	-	-	-	-	-	-

Figure 2. ERRORS IN DETERMINING INSIDE WIDTHS OF STANDARD RECTANGULAR WAVEGUIDES FROM EXISTING AND PROPOSED WR NUMBERS

Inside Width of Waveguide		Existing WR System based upon inches		Proposed Metric WR Systems							
				Two Non-zero Digits		Up to Three Non-zero digits		Three Significant Figures		Up to Four Non-zero Digits	
Inches	mm*	No.	% Error	No.	% Error	No.	% Error	No.	% Error	No.	% Error
23.00	5842	2300	-	5800	0.7	5840	0.03	5840	0.03	5842	-
21.00	5334	2100	-	5300	0.6	5330	0.08	5330	0.08	5334	-
18.00	4572	1800	-	4600	0.6	4570	0.04	4570	0.04	4572	-
15.00	3810	1500	-	3800	0.3	3810	-	3810	-	3810	-
11.50	2921	1150	-	2900	0.7	2920	0.03	2920	0.03	2921	-
9.75	2476.5	975	-	2500	1.0	2480	0.14	2480	0.14	2476	0.02
7.70	1955.8	770	-	2000	2.3	1960	0.22	1960	0.22	1956	0.01
6.50	1651.0	650	-	1700	3.0	1650	0.06	1650	0.06	1651	-
5.10	1295.4	510	-	1300	0.3	1300	0.36	1300	0.36	1295	0.05
4.30	1092.2	430	-	1100	0.7	1090	0.20	1090	0.20	1092	0.02
3.40	863.6	340	-	860	0.4	864	0.05	864	0.05	864	0.05
2.84	721.4	284	-	720	0.2	721	0.06	721	0.06	721	0.06
2.290	581.7	229	-	580	0.3	582	0.05	582	0.05	582	0.05
1.872	475.5	187	0.11	480	0.9	476	0.10	476	0.10	476	0.10
1.590	403.9	159	-	400	1.0	404	0.02	404	0.02	404	0.02
1.372	348.5	137	0.15	350	0.4	348	0.11	348	0.11	348	0.11
1.122	284.99	112	0.18	280	1.8	285	0.004	285	0.004	285	0.004
0.900	228.60	90	-	230	0.6	229	0.18	229	0.18	229	0.18
0.750	190.50	75	-	190	0.3	190	0.26	190	0.26	190	0.26
0.622	157.99	62	0.32	160	1.3	158	0.006	158	0.006	158	0.006
0.510	129.54	51	-	130	0.4	130	0.36	130	0.36	130	0.36
0.420	106.68	42	-	110	0.3	107	0.02	107	0.02	107	0.02
0.340	86.36	34	-	86	0.4	86	0.42	86.4	0.05	86	0.42
0.280	71.12	28	-	71	0.2	71	0.17	71.1	0.03	71	0.17
0.224	56.9	22	1.8	57	0.2	57	0.18	56.9	-	57	0.18
0.188	47.75	19	1.1	48	0.5	48	0.52	47.8	0.10	48	0.52
0.148	37.59	15	1.4	38	1.1	38	1.1	37.6	0.03	38	1.1
0.122	30.99	12	1.6	31	0.03	31	0.03	31	0.03	31	0.03
0.100	25.40	10	-	25	1.6	25	1.6	25.4	-	25	1.6
0.080	20.32	8	-	20	1.6	20	1.6	20.3	0.01	20	1.6
0.065	16.51	7	7.7	16	3.1	16	3.1	16.5	0.06	16	3.1
0.051	12.95	5	2.0	13	0.39	13	0.39	13	0.39	13	0.39
0.043	10.92	4	7.0	11	0.73	11	0.73	10.9	0.18	11	0.73
0.034	8.64	3	11.8	9	4.2	9	4.2	8.6	0.46	9	4.2

* from IEC Publication 153-2, (1964)



PROGRESS REPORT 1971

Electrosiences Division IV

by Leo Young
Director

1971 has been an exciting year for IEEE in general, and the groups in our division in particular. We usually tend to become so wrapped up in our own problems, that we forget that other people and Groups face similar situations, and that we can often help one another by sharing each other's hopes as well as hang-ups. The end of 1971 and the beginning of 1972 brings in many new people to our ADCOMs and Committees, and so this seems a good time to share my thoughts with you.

Financially it's been a trying year, especially for the smaller Groups. There were times when one or another of our Groups looked like ending up the year in the red. Nevertheless by discipline and hard work, every one of our six Groups and one Council have ended the year in the black, and in every case better than anticipated. G-ED, G-AP, QEC, and G-PHP have always been financially healthy for which they deserve our heartiest congratulations and thanks, while G-MTT, G-MAG and G-SU managed to avoid going in the red, G-MTT even ending up with a substantial surplus in spite of earlier less sanguine predictions.

As Divisional Director I have represented each of our six Groups and one Council* before TAB OPCOM and the Board of Directors, and have worked closely with each Group on a number of matters, only a few of which can be mentioned here. It has been my purpose, generously supported by the ADCOM presidents, to draw together our Groups in common endeavors, while maintaining their identity, enthusiasm, and financial integrity.

One of the more interesting proposals for a "new activity," that might also be undertaken jointly by the Groups in our Division, was made by Prof. Frank S. Barnes, 1972 Vice President of G-ED. It was originally documented by him in a memo dated 5 October 1971 to members of G-ED ADCOM. In brief, it proposes to develop a curriculum for students, both undergraduate and graduate, under the three main headings of: MATHEMATICS, PHYSICS, AND ELECTRICAL ENGINEERING. Although originally conceived for work on Electron Devices, it was subsequently decided that it would be better to extend its scope. To encompass all subject areas of IEEE seemed too ambitious a project, at least for the moment. It seemed more practical to compromise by extending it immediately only to the "electrosiences" subjects in our Division. The study might later serve as a model for other or wider studies. The purpose of the study would be to help provide a modern up-to-date curriculum in light of likely future needs and developments.

A problem faced by all the Groups that requires special attention in these days of rapid changes is that of our future — as individuals, as engineers, and as IEEE members. The Groups can and should take a look at their own future. Why are some Group members leaving? Which new Groups do they join? Who are the new Group members? What is the future of the subject(s) our Groups are interested in? Should "my" Group merge with "your" Group? Several Groups have begun discussing merger arrangements with other Groups. I feel strongly that mergers should not be forced for administrative convenience, but should be based on a commonality of interests. I think that the moving closer together of our Groups, through common problems and projects, changing conditions, and the opportunity to form a stronger Society by merging Groups, will lead to some important combinations in the near future. I will be glad to continue to assist in any merger negotiations between Groups.

The vote on the petition prepared by Dr. Victor Galindo is now history. World-wide, about as many IEEE members voted FOR as AGAINST (within a few tenths of one percent).** In the U.S. taken alone there was a small majority (about 54 percent) in favor of the petition. Whatever your opinion, there might never have been a petition but for the pioneering work of G-AP's former committee on professional and economic well-being of the electrical engineer under Prof. Raj Mittra, which did much to arouse interest in the economic plight of engineers. A similar committee on professional action was formed in G-MTT under R.A. (Bob) Rivers, and this committee has now been elevated to become a Division committee. The support of C.T. Tai and John Damonte of G-AP, and of Sy Okwit and Al Clavin of G-MTT were much appreciated. Bob Rivers or I would be happy to make his committee more representative of all the Groups in our Division.

I have stated my belief many times that if the petition had passed, it would have been detrimental to IEEE. But I have felt much sympathy for the petitioners' motives if not always with their methods. Some of us have worked through the Board of Directors, which at its November 1971 meeting was responsive enough to pass several pregnant motions. No one can yet foresee the character of the emerging organization, but the promise of action is clearly there. It is now up to all of us, particularly the Division's committee on professional action, which inherits the mantle of G-AP's original committee, to see that these promises are followed up promptly. Let me enumerate for you (in my own words) the three relevant motions passed unanimously at the last IEEE Board meeting on November 19 in Hollywood, Florida.

1. An IEEE office in Washington, D.C., will be opened. It has been funded for the first year (for \$50,000).
2. Any region may assess its regional members dues, and they would then be billed through IEEE HQ.
3. The region directors of the six U.S. regions were asked to get together and come up with recommendations on professional action. (The chairman of this committee was subsequently appointed, and is Dr. James E. Storer.)

It seems to me that if properly developed these initial actions can lead to several permanent advantages, such as:

- a. The transnational character of the IEEE remains intact. Our non-U.S. members need not worry that we in the U.S. will lose interest in them.
- b. Decentralization means that each Region is better able to cope with its own problems in its own way.
- c. The six U.S. Regions can work together to protect the interests of U.S. engineers through action geared to U.S. conditions, for example they can continue to fund the Washington Office, now funded by IEEE for only one year.
- d. Other regions can solve problems peculiar to them, for example Canadian IEEE members (Region 7) can maintain a Canadian IEEE office (initial funding for which was also voted by the Board on November 19).
- e. IEEE (transnational) dues hopefully might not need to be raised in 1973 in spite of the large budgeted deficit for 1972 (and an almost certainly continuing annual deficit if there were to be no regional dues). The regions should be able to take over support of many regional activities now paid for from transnational dues, and would thus gain more local control.

There is a natural tendency in most organizations, especially successful ones like IEEE, to maintain the status quo. The Board action in November was most heartening to me, showing that the Board is indeed responsive to members' **expressed** wishes. (I fear wishes that are not expressed will not be heeded.) The petition on the ballot was an easy but ambiguous expression of opinion. I hope that you, the members of IEEE, will find better ways to influence the development of this first small step toward a new and better IEEE organization, that is more responsive to the needs of the **individual** member. I would be glad to hear from you, and I am sure so would Bob Rivers (Aircom, Route 16B, Nashua, N.H. 03887); a phone call or short letter to your regional director would surely not be amiss. I intend to continue to work with your help toward a better IEEE to meet our members' needs.

I wish each and every one of you a very successful New Year working for a still better IEEE.

*Division IV consists of G-AP, G-ED, G-MTT, G-SU, S-MAG and QEC.

**It would have required a two-thirds majority to pass.



INTERCON

MICROWAVE SESSIONS AT THE 1972 IEEE SHOW

The annual IEEE International Convention and Exposition will be held on March 20-23 at the New York Hilton and Coliseum. G-MTT will sponsor three Applications sessions at the Coliseum. In addition, three microwave sessions are scheduled with the regular technical program to be held at the Hilton Hotel.

The following microwave applications program was organized by A.H. Solomon for presentation at the Coliseum on Tues. March 21:

A. Session (7CJ)

Applications of Microwave Technology to Today's Communication Systems

Session Chairman: R.E. Sherman, BTL, North Andover, Ma.

1. High Power CW Gunn Oscillator for Communication Applications, A.L. Reynolds, ITT Defense Communications, Nutly, N.Y.
2. Microwave Technology In Gigabit PSK Modulation and Demodulation For Digital Communication, C.L. Cuccia, Philco-Ford Corp., Palo Alto, Ca.
3. A 19 GHz Transmitter and Receiver for Experimental High-Speed Digital Transmission, W.J. Schwartz, R.W. Kordos, and R.W. Judkins, BTL, North Andover, Ma.
4. Technological Considerations for High-Speed Digital Radio Repeaters, R.D. Silverthorn, Bell-Northern Research, Ottawa, Ontario, Canada

B. Session (6CK)

Microwave Technology In Transportation Systems

Session Organizer and Chairman: G.G. Haroules, DOT, Cambridge, Ma.

1. The Application of Cylindrical Arrays to Microwave Landing Guidance Systems, R. Kalafus, DOT, Cambridge, Ma.

- 2. A New Cylindrical Electronic Scan Antenna For Air Traffic Control, P.W. Hannan, J.H. Gutman, R.J. Giannini, Hazeltine Corp., Greenlawn, N.Y.
- 3. Application of the Doppler Scanning Beam to Microwave Landing Systems, H.W. Redlien, Hazeltine Corp., Greenlawn, N.Y.
- 4. Cost Effective Microwave Systems for Railroad and Automobile Safety Applications, J. Hopkins and R. Holmstrom, DOT, Cambridge, Ma.
- 5. A Millimeter Wave Sensor and Detector for Clear Air Turbulence, G.G. Haroules, W.E. Brown and G.W. Wagner, DOT, Cambridge, Ma.

C. Session (5C1)

Everything You Wanted to Know About Microwave Integrated Circuits*

*And Were Afraid To Ask

Session Organizer and Chairman: V.G. Galnovatch, U.S. Army Electronics Command, Fort Monmouth, N.J.

- 1. Microwave Integrated Circuits, An Overview, F. Sterzer, RCA, Princeton, N.J.
- 2. Why Not Stripline, H. Howe, Microwave Associates, Burlington, Ma.
- 3. A Perspective On Lumped vs Distributed Microwave Integrated Circuits, O. Pitzallis, U.S. Army Electronics Command, Fort Monmouth, N.J.
- 4. Application of Bulk Semiconductor Control Components to Microwave Integrated Circuits, A. Armstrong, P.E. Bakeman and W.C. Taft, RPRI, Troy, N.Y.
- 5. Packaging of Microwave Integrated Circuits for Systems Application, R.J. Bauer, Westinghouse Corp, Baltimore, Md.

Microwave Sessions at the N.Y. Hilton were arranged by H. Sobol for presentation as follows:

A. Session (6B) – Wed., March 22

Advanced Ferrite Components for Reliable Microwave Systems

Session Organizer and Chairman: G.P. Rodrigue, Georgia Tech., Atlanta, Ga.

- 1. Latching Ferrite Technology, J.E. Pippin, Electromagnetic Sciences, Inc., Atlanta, Ga.
- 2. Recent Advances in Ferrite Limiters, R. Kalvaitis and H.S. Maddix, Varian Associates, Beverly, Ma.
- 3. Tailoring Ferrites for Microwave Diodes, R.G. West and A.C. Blankership, Trans Tech, Inc., Gaithersburg, Md.

B. Session (5D) – Wed., March 22

Acoustic Surface Waves Applied to Signal Processing

Session Organizer and Chairman: E. Stern, MIT, Lincoln Labs, Lexington, Ma.

- 1. Surface Acoustic Wave Binary Phase Encoders and Decoders, L.T. Claiborne, Texas Instruments, Dallas, Texas
- 2. Surface Acoustic Wave UHF and VHF Band Pass Filters, R.H. Tancrell, Raytheon Research Labs, Waltham, Ma.
- 3. A Surface Acoustic Wave Digital Recirculating Memory, H. Matthews, Sperry Rand Research, Sudbury, Ma.

C. Session (7B) – Thurs., March 23

Microwave Solid State Amplifiers

Session Organizer: W.G. Matthei
Session Chairman: M. Hines

- 1. Octave Bandwidth TEA's, B.S. Perlman and C.L. Upadhyayula, RCA, Princeton, N.J.
- 2. Transmission Type ADA's, T.A. Midford and H.C. Bowers, Hughes Aircraft Co., Torrance, Ca.
- 3. Tunable Locked ADO's, S.F. Paik and C.W. Lee, Raytheon Company, Waltham, Ma.





CHAPTER NEWS

Dallas Chapter

Date: December 2, 1971 (37)
 Speaker: George Bechter
 Title: A 30 GHz GaAs FET
 Affiliation: Fairchild Camera and Instrument

Milwaukee Chapter

Date: November 30, 1971 (27)
 Speaker: Thomas K. Ishii
 Title: Engineering Analysis of Domestic Size Microwave Clothes Dryers
 Affiliation: Marquette University

Philadelphia Chapter

Date: October 28, 1971 (51)
 Speaker: Octavius Pitzalis
 Title: Modern Large Signal RF Transistor Amplifiers
 Affiliation: United States Army Electronics Command

Date: November 17, 1971 (51)
 Speaker: Gerald DiPiazza
 Title: Measuring The Characteristics of the Multi-Path Mobile Communications Channel
 Affiliation: Bell Telephone Laboratories

Phoenix Chapter

Date: September 27, 1971 (18)
 Speaker: William Harokopus
 Title: Application of Radar to Automobile Control and Sensing
 Affiliation: Bendix Research Labs

Date: October 18, 1971 (13)
 Speaker: R.L. Byer
 Title: Comparison of Laser Methods for the Remote Detection of Atmospheric Pollutants
 Affiliation: Microwave Laboratory, Stanford Univ.

Date: November 15, 1971 (22)
 Speaker: Carl Blake
 Title: Applications of Solid State Microwave Power Sources
 Affiliation: MIT, Lincoln Labs

Date: December 13, 1971 (15)
 Speaker: W.C. Woody
 Title: Determination of Antenna Errors from Pattern Measurements
 Affiliation: Goodyear Aerospace

S.E. Michigan Chapter

Date: November 17, 1971
 Speaker: Eugene Zaitzeff
 Title: Future Manned Space Program
 Affiliation: Bendix Corp.

Date: January 20, 1972
 Speaker: Carl F. Augustine
 Title: Precise Measurements of Vehicular Speed and Traveled Using Doppler Radar Techniques
 Affiliation: Midwest Microwave, Inc.

Washington Chapter

Date: November 9, 1971 (210)
 Speaker: T.A. Weil
 Title: Radar Transmitters
 Affiliation: Raytheon Company

Date: December 14, 1971 (190)
 Speaker: Theodore C. Cheston
 Title: Antennas
 Affiliation: APL, Johns Hopkins Univ.

Date: January 11, 1972 (185)
 Speaker: W.K. Saunders
 Title: Doppler Radar
 Affiliation: Harry Diamond Laboratories

TECHNICAL NOTES

The following microwave theses completed in 1970-71 in the Department of Electrical Engineering, Marquette University, Milwaukee, Wisconsin 53233.

Gary A. Sawyer, Ph.D. (August, 1970)
 "Stability Analysis of Magnetically Confined Plasmas"

Ken-Wang Hsu, M.S. (August, 1971)
 "Analysis of Reentrant Hybrid Tee"

David C. Offerdahl, Ltjg. USN M.S. (December, 1971)
 "The Influence of Ducts on Radiation Patterns"

These are available at Marquette University Memorial Library, Milwaukee, Wisconsin 53233.



The 1972 Joint Measurement Conference, the first of its kind, will be held June 21-23 at the Boulder, Colorado, Laboratories of the National Bureau of Standards.

The nature of the conference is suggested by the list of its sponsors:

- Institute for Electrical and Electronics Engineers
Group on Instrumentation and Measurement
- Instrument Society of America
Metrology Division
- National Bureau of Standards
- American Society for Quality Control
Electronics Division/Metrology Technical Committee
- National Conference of Standards Laboratories
- Precision Measurements Association

The real value of this conference lies in its unique dual purposes: first, the conference is interdisciplinary in that it intersects several measurement disciplines such as optical, electrical, mechanical, and dimensional; second, the conference material is designed to be of value to personnel in all areas of product evolution — research, design, development, manufacturing, maintenance, and quality control. In other words, JMC is open to persons from varied groups making use of measurement know-how.

For further information contact:

Bureau of Conferences and Institutes
University of Colorado
130 Academy Building
Boulder, Colorado 80302



CONFERENCE ON PRECISION ELECTROMAGNETIC MEASUREMENTS

The 1972 Conference on Precision Electromagnetic Measurements (CPEM) will be held June 26-29, 1972, at the National Bureau

of Standards, U.S. Department of Commerce, Boulder, Colo. The CPEM is held every other year and the goal for the 1972 CPEM is the advancement of electromagnetic measurements science and measurement techniques which are critical to technology and beneficial to society.

The conference is international in scope and will include a special session on international comparison of new electromagnetic techniques in length metrology. Each session of the three day conference will begin with an invited review paper to give perspective of the state-of-the-art for a particular area of measurement.

Sessions planned for 1972 include radiation safety (RF, microwave, and laser); automated measurements; measurement applications in biomedicine, air pollution, process control, network analysis, etc.; time and frequency measurement; direct current and low frequency measurement; microwave measurement; and measurement of pulse quantities.

The Conference on Precision Electromagnetic Measurements is sponsored by the National Bureau of Standards, Institute for Basic Standards; the Institute of Electrical and Electronics Engineers, Group on Instrumentation and Measurement; and the International Scientific Radio Union, U.S. National Committee. A cooperating sponsor is the Union Radio-Scientifique Internationale. The CPEM will follow the June 21-23, 1972, Joint Measurement Conference also being held at NBS in Boulder, Colo.

For further information, contact D.F. Wait, 1-4655, National Bureau of Standards, Boulder, Colo. 80302.



CALL-FOR-PAPERS

1972 Government Microcircuit Applications Conference

The 1972 Government Microcircuits Applications Conference (GOMAC) will be held Tuesday, Wednesday, and Thursday, 10-12 October 1972 at the Town and Country Convention Center, San Diego, California. The Conference will feature significant microelectronic applications work under Government sponsored military and non-military efforts. Confidential and unclassified disclosures, corresponding with the topic categories listed below, will be presented.

Papers resulting from R&D programs sponsored or conducted by Government agencies are invited. Technical disclosures presented at the Conference will also be published in the Conference Digests. Typical categories included in the Conference will be:

- o Digital integrated circuits and systems
- o Linear integrated circuits and systems
- o Microwave integrated circuits
- o Hybrid circuits
- o Memories
- o Integrated optoelectronics
- o New solid-state devices
- o Biomedical instrumentation
- o Reliability and quality assurance
- o Radiation hardening

- o Microcircuit design, processing, and packaging
- o Converters, A/D, etc.
- o Electro-Acoustic Praetersonic Devices and Circuits
- o Other microelectronic topics

Papers will be selected on the basis of an **unclassified** summary and abstract. These must be submitted by 1 March 1972 to:

NASA — LANGLEY RESEARCH CENTER
Attn: C. Husson M/S 470
Hampton, Virginia 23365


**1972 IEEE International Conference on
Engineering in the Ocean Environment
(OCEAN 72)**

The IEEE OCEAN 72 steering committee has issued a call for papers to be presented at the Institute's 1972 International Conference on Engineering in the Ocean Environment to be held in Newport, Rhode Island from September 13-15, 1972.

OCEAN 72 will emphasize discussion of advance development and research in electrical and electronics engineering applicable to the marine environment. While presentations on state-of-the-art hardware is not a direct concern of the conference, analysis is desired of marine related systems where electrical and electronics engineers can make major contributions.

Subject areas for which papers are solicited are:

- Navigation, guidance, and control.
- Power generation and transmission.
- Communication, ranging, and imaging systems.
- Data collection and signal processing.
- Oceanographic and pollution monitoring instrumentation.
- Remote sensing.
- Underwater acoustics and electromagnetic phenomena, including optics.
- Materials for electrical and electronic applications in the marine environment.
- Life-support and biological instrumentation systems.

Authors should send **titles and 25-word abstracts** of proposed papers before February 15, 1972, to the Chairman of the Technical Program Committee:

Dr. Charles Polk
Department of Electrical Engineering
University of Rhode Island
Kingston, R. I. 02881

WESCON 1972

Western Electronic Show and Convention (WESCON), Los Angeles Convention Center, Los Angeles, will be held on September 19-22, 1972. For further information contact:

Don Larson
WESCON General Manager
3600 Wilshire Boulevard
Los Angeles, Ca. 90010



PERSONALITIES

Gordon R. Harrison has joined the staff of the Georgia Institute of Technology, Atlanta, Georgia, as a Principal Research Physicist in the Electronics Division of the Engineering Experiment Station. Dr. Harrison was formerly with the Sperry Microwave Electronics Division, Sperry Rand Corporation, Clearwater, Florida, where he was Engineering Manager for Microwave Integrated Circuits and Semiconductor Technology. At Georgia Tech, Dr. Harrison will be leading a research activity in solid-state electronic materials and components with specific initial emphasis on microwave ferrimagnetic and semiconductor materials and their applications in components and integrated circuits. Dr. Harrison's new address is: Electronics Division, Engineering Experiment Station, Georgia Institute of Technology, 225 North Avenue, N.W., Atlanta, Georgia 30332, Phone: (404) 984-3545

Julian W. Dees has joined the staff of the Georgia Institute of Technology, Atlanta, Georgia, as a Principal Research Engineer in the Electronics Division of the Engineering Experiment Station. Mr. Dees is Head of the Special Techniques Branch and will be leading research activity in the areas of millimeter wave technology, optical processing, radomes, dielectric properties of materials, spectroscopy, biological effects of microwave radiation, and laser technology. Mr. Dees was formerly with the Communications and Electronics Division of Martin Marietta Corporation, Orlando, Florida, where he was program manager for several space and ground station hardware projects involving microwave and millimeter wave equipment. Mr. Dees' new address is: Electronics Division, Engineering Experiment Station, Georgia Institute of Technology, 225 North Avenue, N.W., Atlanta, Georgia 30332, Phone: (404) 894-3504

The following G-MTT members were elected to the grade of FELLOW as of January 1, 1972.

Dean B. Anderson, Orange County, Ca.

For contributions to optical waveguides and optical parametric amplification.

R.L. Bell, San Francisco

For contributions to infrared photoemission.

R.E. Collin, Cleveland

For contributions to microwave engineering and to education.

B.C. De Loach, Jr., North Jersey

For contributions to solid-state microwave power sources.

G.I. Haddad, S.E. Michigan

For contributions to solid-state and quantum electronic devices and engineering education.

Masaru Ibuka, Tokyo

For contributions to the development and application of solid-state devices in consumer and computer electronics.

K.C. Kelly, San Fernando Valley

For his contributions to antenna theory and design and to the profession in guiding youth and furthering equal opportunities.

P. Penfield, Jr., Boston

For contributions to varactor theory and to the electrodynamic theory of moving media.

G.F. Ross, Boston

For his contributions in the field of picosecond pulse technology and its applications to microwave-distributed network theory and high-resolution electromagnetic sensors.

Y. Takeda, Tokyo

For his inventive and educational contributions in manufacture, research, and development in the electronics industry.

H.E. Thiemann, Switzerland

For contributions to projection television and leadership in electronic research and development.

CONGRATULATIONS TO OUR NEW FELLOWS!



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