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AND TECHNIQUES



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NEWSLETTER



The fountain at Lake Eola, one of Orlando's landmarks, is a favorite for visitors and residents. (Photo credit: Mark Englert)



Professor Tatsuo Itoh elected Honorary Life Member of MTT-S AdCom (see story, page 9).

**1995 IEEE MTT-S
International Microwave
Symposium
May 16-18, 1995
Orlando, Florida**

"Microwaves on the Move!"

**Chairmen's Welcome, page 5
Registration/Hotel Forms, page 14
Symposium Events, pages 13 to 17**

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The MTT Newsletter staff is interested in obtaining feature articles dealing with current topics in the technical and professional areas of interest to MTT members. These articles should provide members with a general understanding of the topic and its significance in current and future activities in the microwave field. I would like to emphasize, however, that these special articles should cover topics in a broad, general sense. Specific design techniques and applications will be covered in the papers appearing at the MTT Symposium and in the *Transactions*.

If you know of a topic that is current and/or you are willing to contribute an article to the Newsletter, please contact:

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10! seconds = 6 weeks

1 light-year \cong 6 trillion miles

1 year $\cong \pi \times 10^7$ (within 1/2%)

The universe is composed of matter and radiant energy. Matter (from the Latin materia, meaning wood or other material) may be defined as any kind of mass-energy that moves with velocities less than the velocity of light, and radiant energy as any kind of mass-energy that moves with the velocity of light.

General Chemistry 3rd Ed., by Linus Pauling.

President's Message



Eliot Cohen

Don't forget to mark your calendar and make your reservations for 1995 Microwave Week to be held in Orlando, Florida, from May 14 through May 19, 1995. As always, the week will be packed with activities including the International Microwave Symposium, the Microwave and Millimeter Wave Monolithic Circuits Symposium, the National Telesystems Conference, and the 45th Automatic RF Techniques Conference. In addition, there will be plenty of social activities including the Microwave Journal reception and the International Microwave Symposium banquet.



Retiring President Jim Crescenzi passes the President's Pin to incoming President Eliot Cohen (Dec. '94, Orlando).

has been responsible for the management, design, development, and testing of numerous communications satellite systems for the past 30 years. He is particularly proud of his roles as the "Father" of INTELSAT V and OdysseyTM. OdysseyTM is a new satellite based, Medium Earth Orbit personal communications system. Mr. Rusch's talk will describe recent developments in wireless, microwave communications. An anticipated highlight of the presentation will be a discussion of proposed satellite transmission systems, Earth stations, user terminals, and personal telephones. Information will also be provided about market trends, demand, and investment requirements. I urge you not to miss this exciting presentation. It will be followed by 390 additional technical papers, including 105 poster papers, reflecting advances in virtually every facet of microwave technology. There will be six focused technical sessions, panel sessions and a large number of workshops. There are also over 400 exhibits by microwave industry and universities. In addition, ten new IEEE Fellows have elected to

receive their awards at the International Microwave Symposium. In summary, Microwave Week is your yearly opportunity to hear the latest in microwave technology developments, see the latest microwave products, mingle with friends and colleagues, and enjoy outstanding social activities. Be there!

As a continuing part of its efforts to be a truly international organization, the Microwave Theory and Techniques Society in conjunction with the Electron Devices Society and the Antennas and Propagation Society is moving ahead with its efforts to establish joint chapters in Eastern Europe and the former Soviet Union. During January, a Ukraine MTT/ED/AP Society joint chapter was formed. Bulgaria is also working actively toward chapter formation. Other international activities include continuing support of the SBMO Symposium in Brazil.

During December, I had an opportunity to hear a preview of a presentation by the MTT Society's newest distinguished lecturer, Mr. Rahul Dixit of TRW's Transportation Electronics Division. Mr. Dixit discussed the increasing importance of microwave and millimeter wave components, including MMICs, for the vehicles of the not-too-distant future. His talk was extremely interesting, he is a very dynamic speaker, and it is clear that microwave systems will play a key role in future vehicles and transportation systems. I urge you to make a special effort to hear Mr. Dixit's talk when he visits your area. Also, because of the recognized importance of microwave and millimeter wave products in vehicles and transportation systems, MTT-S is an active participant in the IEEE Technical Activities Board Intelligent Transportation Systems (ITS) committee. This year Dick Sparks, MTT-S administrator, and I will be the MTT-S representatives to this committee.

On a personal note, I will be leaving the U.S. Government after over 33 years of service. During this time I have worked at the Naval Research Laboratory, Space

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Robert Trew, the new editor of the MTT-S Transactions, got a briefing at the December 1994 AdCom meeting from retiring editor Dan Massé.



Tatsuo Itoh, founder and editor of the Microwave and Guided Wave Letters for the last four years, is passing the baton to the new editor, Roberto Sorrentino.

Call for MTT-S AdCom Nominations and Committee-Appointment Suggestions



Barry E. Spielman
Chairman
Nominations and Appointments
Committee

The nomination of candidates for election to the MTT-S Administrative Committee (AdCom) will be conducted by the MTT-S Nominations and Appointments Committee (N&A Committee). The N&A Committee will handle the nominations with the same procedure as in past years specified in the MTT-S Bylaws and Procedures Manual. In addition to the elections, the N&A Committee seeks interested and qualified individuals who will be recommended to the incoming President for his consideration to serve on various MTT-S committees.

At its fall meeting, the MTT-S AdCom elects members to serve on AdCom. The Bylaws state that the Nominations Committee will present a slate of at least two members for each vacancy which will occur the following January 1. The Nominations Committee shall consider in their selection the geographical and organizational distribution, as well as AdCom effectiveness. AdCom members who have served three consecutive terms by the following January 1 are ineligible for nomination by the N&A Committee.

The Bylaws provide three means by which one may be nominated for AdCom consideration. They are as follows:

- Nomination by the Nominations Committee,
- Nomination by petition signed by 25 MTT-S members and submitted to the Nominations Committee prior to July 1, 1995,
- Chapter nomination submitted prior to July 1, 1995.

All nominees will be contacted to ascertain that they will accept the nomination and will commit themselves for active participation in at least two meetings a year, held at various locations in the United States.

The geographical and affiliation distributions of current AdCom members are given below:

Present Elected AdCom (1995): Total = 18			
Eastern U.S.	6	Industry	11
Central U.S.	2	Government	4
Western U.S.	7	University	3
Europe	2		
Asia-Pacific Region	1		

The Nominations Committee needs your help in suggesting potential nominees to serve our membership as AdCom members. Please submit your suggestion to your local Chapter Chairman and/or to B. Spielman, N&A Committee Chairman, Washington University, One Brookings Drive, Box 1127, St. Louis, MO 63130, or fax 314-935-7500 by July 1, 1995.

Letter to the Editor

Dear Editor Wassel,

On 20 December 1994 we celebrated the 5th anniversary of the Yugoslav IEEE MTT-S Chapter. We summarized our five-year activities and issued the Yugoslav *IEEE MTT-S Chapter Informer*, a copy of which we enclose. As you will see, we felt free to include two texts that were also published in *MTT-S Newsletter*.

Upon the AdCom session held on 21 October 1994 we decided to announce the most successful lecture delivered from 1989, when the YU IEEE MTT-S Chapter was established. The winner of the award would receive the Certificate of Recognition and a golden coin. The winners for the past five-year period are:

- Prof. Christos Christopoulos, University of Nottingham, Department of Electrical and Electronic Engineering, for his lecture "Some Recent Developments in the Transmission-Line Modeling (TLM) Method," and
- Prof. Aleksandar Marincic, University of Belgrade, Faculty of Electrical Engineering, for his lecture "Nikola Tesla Contributions to the Development of Radio."

Dr. Martin Schneider was also awarded for his outstanding and dedicated service to this chapter.

As you know, due to U.N. sanctions against Yugoslavia, we have to work in almost complete isolation. However, Prof. Christos Christopoulos attended our celebration, which gave us great encouragement to continue with our efforts not to be left too much behind.

Should you find anything from our *Informer* interesting for publishing in *MTT-S Newsletter*, please do not hesitate to contact me for further information.

In the meantime, we remain with best regards,

Yours truly,

Branka Jokanovic

President

YU MTT-S Chapter

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1995 IEEE MTT-S International Microwave Symposium



Gene Keith
Huddleston

Co-Chairmen, IMS '95 Steering Committee



Rudolph E.
Henning

1995 MTT-S Technical Program



Larry Brockman
IMS Technical
Program
Chairman



Terry Duffield
MMWMC Liaison

Welcome to Orlando!

On behalf of the Steering Committee, it is our pleasure to invite you to join us in Orlando May 14-19 for the 1995 IEEE International Microwave Symposium as the centerpiece of Microwave Week '95. The technical program and exhibits will be hosted in the spacious and beautiful Orange County Convention Center in the heart of the International Drive tourist and convention area. The Clarion Plaza Hotel, as headquarters hotel, and seven other nearby hotels of varying ambiance and price are blocked for you the entire week, including weekends, with convenient transportation to and from all events. We look forward to your arrival and your enjoyable stay in Orlando, The City Beautiful.

"Microwaves on the move!" was chosen as our theme to reflect the dynamic new applications and movement from defense to commercial arenas in space and on Earth, in the United States and internationally. The subjects of 390 technical papers, 19 workshops, six focused sessions, four panel sessions, one rump session, and the five concurrent technical sessions and technical exhibits each day Tuesday through Thursday amply support this theme. To highlight some of the movement in microwaves, Roger J. Rusch of TRW's Odyssey™ Services Organization will discuss dramatic new space-based communications networks in his plenary session presentation, "Moving Cellular Communications into Space." Following the keynote presentation, new Fellows of the IEEE will be recognized.

IMS '95 will kick off with a very special Magic Night for all attendees on Monday evening in conjunction with the *Microwave Journal* reception at Church Street Station in downtown Orlando. The annual MTT-S Awards Banquet will be held on Wednesday evening, May 17, at the Clarion Plaza Hotel, to honor those who have made significant service and technical contributions to our Society and profession. The gala banquet will be pre-

(continued on next page)

This year, the Technical Program Committee (TPC) for the 1995 MTT-S met on December 11, 1994, a month earlier than the usual January date because this year's MTT-S will be held about a month earlier than the normal mid-June time period. The TPC met at the Clarion Plaza Hotel in Orlando, Florida, home of the 1995 MTT-S IMS "Microwave Week." Mark your calendars for Sunday, May 14, through Friday, May 19, 1995, for this year's Microwave Week extravaganza!

163 of the 198 TPC members were present on that rainy Sunday and pored over the 638 submitted papers, including 17 student papers, to pick the best possible technical program in 26 different categories. We were concerned that the earlier due date would limit our program, but the MTT members responded to our call for papers in an outstanding manner with the second largest number of submissions in MTT-S history!

This year, about 60 percent of the papers were submitted by authors outside the USA, up about 5 percent from last year, indicating that the MTT-S is truly an international event. Of the papers submitted, 391 were accepted, including 160 long papers, 131 short papers, and 100 open forum papers. The resultant technical program includes a plenary session and 55 technical sessions, including six focus sessions and two open forum sessions. The plenary and six focus sessions will emphasize the theme of this year's MTT-S, *Microwaves on the Move*, thus featuring the keynote address, one session on defense conversion, two on microwave applications to the information superhighway, and one on microwave packaging. In addition, panel sessions are scheduled at noon each day, with one evening interactive rump session.

Microwave Week begins on Sunday, May 14, 1995, with an all day workshop focusing on wireless communications. On Monday, May 15, nine additional workshops will be offered in parallel with the first day of the Micro-

(continued on next page)

1995 MTT-S Technical Program

(continued from previous page)

wave and Millimeter Wave Monolithic Conference (MMWMC) which will be held jointly with the MTT-S as in previous years. The core MTT-S technical sessions begin on Tuesday, May 16. Joint sessions will be held with the MMWMC on Tuesday. The plenary session will be held at 10:30 a.m. on Tuesday, and will feature J. Rusch of TRW's Odyssey™ Services Organization. Five parallel tracks of sessions will be held over the Tuesday through Thursday time period, with an additional room dedicated to open forum sessions in the afternoon on both Wednesday and Thursday, lunchtime panel sessions (one on Monday, two on Tuesday, one on Wednesday, and one on Thursday), and an evening rump session on Tuesday dealing with microwave curriculum. The National Telesystems Conference (NTC) will be held concurrently with the MTT-S again this year, and begins on Wednesday, May 17. NTC sessions will span Wednesday and Thursday, including sessions held jointly with the IMS. On Friday, May 19, nine additional workshops will be offered, along with a short course on application of digital signal processing to digital receivers, and the ARFTG technical sessions.

All of the main technical sessions for the MTT-S, NTC, MMWMC, and ARFTG will be held in the Orlando Convention Center on International Drive in Orlando, close to the hotels. Likewise, the Sunday, Monday and Friday workshops and the lunchtime panel sessions will be held in the Convention Center. The short course and evening rump session will be held in the Clarion Plaza Hotel, the Conference Headquarters Hotel.

Every attempt has been made to cover all technical topics of current interest to the microwave community and to schedule the program so that participants can enjoy their selected specialty in sequence. This year we have made a special effort to provide all main technical sessions in one compact area on the first floor of the Convention Center to facilitate movement by the participants from the exhibit area to the sessions.

The Orlando Steering Committee deserves a special word of mention for those who have additional questions. Drs. Jim Wiltse and Parveen Wahid are coordinating the special sessions, panel sessions and workshops; Ed Rizzo is coordinating the open forum; Marty Tanenhaus will be coordinating the Quality Presentation Awards which were initiated last year;



Dan Massé (L) and Glenn Thoren performing the Roll Call for the 1995 IMS Technical Program Committee.

Terry Duffield, my co-chairman, is coordinating interface with the MMWMC; Madjid Belkerdid is the NTC chairman; Larry Dunleavy is our ARFTG liaison; and Mike Thursby will conduct the Student Paper Competition.

I hope to meet many of you personally during the week and look forward to hearing what you liked (and even what you didn't like) about the program. I am confident you will all enjoy your time in sunny Orlando!

President's Message

(continued from page 3)

and Naval Warfare Systems Command (formerly Naval Electronic Systems Command), the Defense Technology Analysis Office and, most recently, the Advanced Research Projects Agency. A high point of my career has been the responsibility, during the past six years, of serving as the manager of the Microwave and Millimeter Wave Monolithic Circuits (MIMIC) program. On March 7, I will be beginning my new career at Palisades Institute for Research Services in Arlington, VA. I plan, of course, to remain very active both in the microwave profession and as your President of the Microwave Theory and Techniques Society. I look forward to serving MTT-S for many years to come. My new address, telephone and fax numbers appear on page 2 in this issue.

1995 IEEE MTT-S International Microwave Symposium

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ceded by the traditionally well-attended, industry-hosted cocktail reception.

A full guest program has been specially arranged for spouses and guests to see and experience some of our favorite places on the nearby Space Coast in Winter Park and at Sea World. Tickets will also be available for individual visits to Disney World, Universal Studios, Splendid China, and the many other attractions in the Orlando area.

It is our pleasure to provide for the other conferences held during Microwave Week in conjunction with IMS '95. The MMWMC Conference will begin on Monday and will continue on Tuesday in joint sessions with IMS. The National Telesystems Conference will begin on Wednesday and enjoy joint sessions with IMS in the microwave systems area, concluding on Friday with a short course. ARFTG will hold its meeting on Friday. Panel sessions and numerous business meetings will be interspersed throughout the week as at past symposia.

Orlando has grown and grown up much since Rudy and his committee hosted the IMS in 1979. Our current Steering Committee, made up of Orlando, Tampa, Melbourne (and Atlanta!) members, has worked hard to organize and plan for your enjoyment and a successful symposium. Come and enjoy the beautiful and attractive Central Florida area as you attend this premier microwave event.

1995 IMS Guest Program



Jane Brockman
Guest Program Coordinator

Can you imagine yourself in nothing but the warmth of sunshine during the day and at night, a cascade of stars filling the night sky? We have that in Orlando almost year round. Orlando also is known for its beautiful lakes and is situated almost equal distance from the Gulf of Mexico and the Atlantic Ocean.

Within the guest program we hope to bring you a taste of our beautiful area.

The Hospitality Suite will be located at the Clarion Hotel, International Drive, Salons 13 and 14. A continental breakfast will be served in the morning hours starting on Monday, May 15, and will be served through Friday, May 19. There will be small sandwiches and drinks served late afternoon after the tour of the day. Come and meet old friends and make new acquaintances. The Hospitality Suite will be staffed by local people ready to assist you in any way they can. On Monday morning, May 15, Premier Convention Services will staff the information booth at the Orange County Convention Center from 7:30 a.m. to 5:00 p.m. They will be on hand to help you arrange to get to places you would like to go in the Orlando area. Tuesday through Thursday they will be in the Hospitality Suite of the Clarion Hotel from 7:30 a.m. to 11:30 a.m. Guests are invited to use the Greyline shuttle bus service to and from the Orlando Convention Center and hotels starting Sunday, May 14, at 8 a.m., running through Friday, May 19, until 6 p.m.

Organized tours are planned for Tuesday, Wednesday, and Thursday of the week of the International Microwave Symposium. Friday of that week, there will be a sea kayaking trip that can be arranged through ESCAPE TOURS OUTFITTERS. I want to make this an adventurous week that few will forget. Please sign up for the following tours at the registration desk.

On Tuesday, May 16, a tour of historic Winter Park will include a relaxing cruise on the Winter Park chain of lakes, a personalized tour of the largest Tiffany glass collection in the world at the Morse Art Gallery, lunch at the Plaza Gardens Restaurant, and shopping in beautiful downtown Winter Park.

On Wednesday, May 17, travel to Kennedy Space Center and tour the entire facility including the space shuttle launch pads. View the dramatic IMAX movie and see the new Astronauts Memorial. Lunch will be served at the Orbit Cafe.

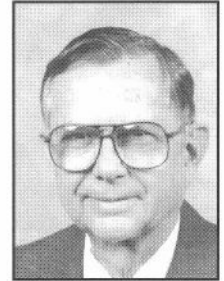
On Thursday, May 18, see "Shamu—Close Up," "Manatees, The Last Generation?," and the Pacific Point Re-

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Special Sessions at the 1995 International Microwave Symposium



Parveen Wahid



James Wiltse

Co-Chairpersons

Special Sessions and Workshops Committee

Abroad array of 30 special sessions and workshops is included in the program for the 1995 International Microwave Symposium. These activities start on Sunday and occur every day through Friday. We hope you will be able to take advantage of the diverse array of topics. The following is a brief summary of this portion of the program.

- Workshops—A total of 19 are being offered on Sunday (1), Monday (9), and Friday (9).
- Panel Sessions—Four lunchtime panel sessions are offered, one on Monday in connection with MMWMC, two on Tuesday, and one on Wednesday.
- Rump Session—One rump session is being offered for Tuesday evening.
- Focused Sessions—Six focused sessions dealing with high-interest topics will be held on Tuesday (3), Wednesday (2), and Thursday (1).

All of the above activities are sponsored by one or more of the MTT-S Technical Committees. A detailed listing is given below, and each item is preceded by a letter code used in the Registration Form, Advanced Program, and Program for ready identification. The codes tell the day of the week on which they are being held, as well as other information discussed below.

Workshops

All workshop codes begin with a "W" and the second letter from the left indicates the day of the week. The third letter from the left is either an "F" for a full-day workshop or an "H" for half-day. The last letter is the number of the workshop. The Sunday workshop, WSFA, will be held at the Clarion Plaza hotel, while all of the Monday and Friday workshops will be held at the Convention Center. Breakfast and lunch will be included for full-day workshops, but half-day workshops include only breakfast for morning workshops or lunch for afternoon workshops. The workshop notes will, in general, be available at registration.

Sunday, May 14, 1995

- WSFA—IC's for wireless communication—F. Ali, B. Geller, M. Golio

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1995 IMS Local Arrangements



Laurie Dunn



Daniel S. Dunn

Orlando Area Information

The MAGIC of Orlando makes it a prime destination for travelers of all ages and from all over the world. Once a small town known for sunshine and acres of surrounding citrus groves, Orlando today has world-class facilities to accommodate all sizes of meetings and conventions while providing an outstanding variety of recreational activities. From exciting theme parks to exploring natural Florida and world-renowned beaches, to the site from where space flight commences, this area truly offers memorable experiences for everyone. Orlando has nearly 100 excellent golf courses, lakes and rivers for fishing or canoeing, and is home to the NBA Orlando Magic.

In mid-May, Orlando is usually sunny and warm with lows in the mid 60s to highs in the mid to upper 80s.

Symposium Hotels

Rooms have been blocked for symposium attendees in eight Orlando hotels along International Drive for the entire week. The headquarters hotel, the Clarion Plaza Hotel, is located adjacent to the Orange County Convention Center, the site of the 1995 IEEE International Microwave Symposium. Transportation will be provided during the symposium to and from all events.

Hotel Registration

All hotel reservations will be handled by the Housing Bureau (Orlando/Orange County Convention and Visitors Bureau.) The Conference Housing Form must be used to make hotel reservations. Respond early to ensure availability of one of your first choices.

Dining and Areas of Interest

All conference attendees will receive an Orlando Official Visitors Guide in their registration packets provided by the Orlando/Orange County Convention and Visitors Bureau. Designed to make your visit more enjoyable, this guide contains several maps and information on attractions, activities, dining, shopping, tours, and other visitor services. Home to some of the world's finest chefs, area restaurants offer a diverse range of dining experiences. Several dinner attractions combine food, fun, and entertainment.

Orlando area attractions include: Walt Disney World Magic Kingdom, EPCOT Center and Disney-MGM Studios, Sea World, Busch Gardens, Universal Studios, Kennedy Space Center, Church Street Station, Cypress Gardens, Gatorland with over 5000 alligators and crocodiles, and Splendid China where 60 Chinese landmarks have been replicated by hand in authentic detail. Other places of interest are the Orlando Museum of Art, the Orlando Opera Company, the Orlando Science Center, the Salvador Dali Museum, and Harry P. Leu Botanical Gardens.

Transportation

Travel Agency

All Travel Services has been selected as the local travel agency for Microwave Week '95. Reservation agents have been specially briefed to assist Microwave Week travelers with travel arrangements with Delta Airlines, Alamo car rentals, and with the Orlando/Orange County Convention and Visitors' Bureau for hotel reservations.

Contact **All Travel Services** at **1-800-633-1456** or at **(407) 851-1751** between the hours of 8 a.m. and 6 p.m., Monday through Friday. Please indicate that you will be attending Microwave Week.

Airline

Delta Air Lines, Inc., is the official carrier for the 1995 IEEE MTT-S International Microwave Symposium and other meetings held in conjunction with it during Microwave Week, including MMWMC, ARFTG, and NTC '95. Delta is offering special discounted meeting fares for round-trip travel to Orlando between May 11-23, 1995, from anywhere within the U.S., Canada, Bermuda, Nassau, San Juan, St. Croix, and St. Thomas.

Reservations on Delta for the International Microwave Symposium can be made either through All Travel Services at the numbers given above, or call **DELTA** from 8 a.m.-11 p.m. Eastern time daily at:

1-800-241-6760

Delta Airlines Reference File #: I3351.

Car Rental

Alamo Rent-A-Car is the official car rental provider for Microwave Week in Orlando from May 15-19, 1995. Special discounted rates have been extended to all attendees. These special rates are available one week before and after Microwave Week and include **UNLIMITED FREE MILEAGE**.

Call Alamo at:

1-800-732-3232

request **Group ID #409237**

and **Rate Code GR**

Also, please have the reservation agent check Rate Code 1G for additional convention discounts that may apply.

Transportation Services

Convenient shuttle bus service will be provided free for attendees during the conference between the Orange

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MTT-6 Sponsored Activities for 1995 Microwave Symposium



*Fazal Ali
Chairman
MTT-6 Technical Committee*

The technical committee on Microwave and Millimeter-Wave Integrated Circuits (MTT-6) of the MTT Society has organized and sponsored a number of activities such as workshops, panel sessions and focus session for the 1995 International Microwave Symposium to be held in Orlando, Florida, during May 15-19. Once again, the level of involvement shows the dedication and commitment of MTT-6 committee members in promoting various circuit applications to the microwave community. A list of activities undertaken and co-sponsored by MTT-6 is provided below:

Workshops:

1. *ICs For Wireless Communication: Design, Packaging and Test Issues*
Organizers: F. Ali—Westinghouse; B. Geller—David Sarnoff; M. Golio—Motorola
2. *Microwave Applications of Ferroelectric Ceramics*
Organizers: C. Buntschuh—Microwave Engineering Services; C. Jackson—TRW
3. *Silicon IU: Technologies*
Organizers: S. Taub—NASA Lewis; A. Gopinath—U. of Minnesota; A. Rosen—David Sarnoff
4. *GaAs HBTs: Devices, Circuits and Reliability*
Organizers: F. Ali—Westinghouse; B. Bayraktaroglu—Westinghouse; A. Gupta—Westinghouse; R. Jansen—Jansen Microwave

Panel Sessions:

1. *PHEMTs and HTBs for Power Amplifiers*
Organizers: E. Niehenke—Westinghouse; F. Sullivan—Raytheon
2. *Cost-Effective MMICs for WLANs: Fact or Fantasy?*
Organizers: F. Ali—Westinghouse; M. Golio—Motorola; D. Maki—Raytheon
3. *Microwave Flip-Chip Technology*
Organizers: R. Sturdivant—TRW; T. Kemmerley—Wright Lab

Focus Session:

1. *Dual-Use and Defense Conversion: Technologies and Applications*
Organizers: F. Ali—Westinghouse; E. Cohen—ARPA

T. Itoh Elected Honorary Life Member

Arthur A. Oliner

Professor Tatsuo Itoh (born in Tokyo, Japan, in 1940) who is a widely known and highly respected member of the international microwave community, has just been elected an Honorary Life Member of the Microwave Theory and Techniques Society by its Administrative Committee. He becomes the seventh living member of this distinguished group, and the 11th member to be elected over the 42-year existence of the MTT Society. The last person in this group was elected in 1982, a dozen years ago.

The eligibility requirements for election to the position of Honorary Life Member are listed in the Society's Bylaws and Procedures Manual. These eligibility requirements are presented at the end of this article, together with a list of the other Honorary Life Members and the year in which they were elected. In satisfaction of the eligibility requirements, Prof. Itoh was found by the Administrative Committee to be truly exceptional in all of the categories listed.

Within the first category, Prof. Itoh's contributions have made important and unusual impacts; they are not only technical in nature, but arise also from his activities as an educator and as an ambassador of good will between the Asian countries and the United States.

Regarding his technical contributions, Prof. Itoh is one of the most active and prolific researchers in our field. He has published about 200 journal papers and about 350 refereed conference publications. In addition, he is the author of 15 book chapters, and editor of two books, a 1987 reprint volume, "Planar Transmission Line Structures," for the IEEE Press, and an edited volume of contributions, "Numerical Methods for Microwave and Millimeter-Wave Passive Structures," for Wiley Interscience, in 1989. This exceptional productivity is the result of an unusually fertile technical imagination and a mind that is constantly bubbling with new ideas.

His research contributions fall into two broad categories: the numerical analysis of passive structures and its application to a variety of novel passive components, and electromagnetic-wave approaches to solid-state devices, which he calls device-wave interaction.

Within the first of these two categories, everyone would agree that the spectral-domain method is the most successful and widely used numerical analysis method for printed-circuit transmission lines for microwave and millimeter-wave integrated circuits. Professor Itoh is generally acknowledged as the major contributor and pioneer in the development of this method; he later generalized the procedure and provided it with greater physical understanding. That alone was a highly important technical contribution, but it formed only the first step in a prolific career. Besides exploring and improving many other types of numerical techniques, Prof. Itoh

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Progress and Change in Microwave Radio Communications



Ferdo Ivanek
Distinguished Microwave
Lecturer
1992-1994

In 1994 I delivered 13 lectures. The following list includes the names of the Chapter Chairs and others to whom I am indebted for their invitations, organizational efforts and financial arrangements that made this lecture series possible:

- Baltimore MTT/AP Chapter—Jon Moellers, March 9;
- International Telecommunication Union, Geneva, Switzerland—Richard Kirby and M. R. Giroux, March 18;
- Virginia Mountain IEEE Section, Roanoke, VA—Jim Griffiths, May 9;
- Virginia Tech, Blacksburg, VA—Ted Rappaport, May 10;
- Kitchener-Waterloo IEEE Section, Cambridge, Ontario, Canada—Chandra Kudsia, May 13;
- MTT/AP/EC Chapter, Toronto, Ontario, Canada—Chandra Kudsia, May 13;
- MTT/AP Chapter, Ottawa, Ontario—Hugh Reekie, May 17;
- MTT/AP/LEO Chapter, Montreal, Quebec—Gar Lam Yip, May 19;
- MTT/AP Chapter, Buffalo, NY—Marlin Gillette and Herb Morrison, May 20;
- United Kingdom/Ireland MTT/ED/AP Chapter—Terry Oxley, Edinburgh, Scotland; Peter Grant, Gordon Povey and John Forrest, September 20; Dublin, Ireland—Tom Brazil, September 22; London, England—Ali Rezazadeh, September 26;
- MTT/CS/AP Chapter, Herzlia, Israel—Asher Madjar, October 20.

This makes a total of 41 lectures during the 1992-1994 period: 15 in the U.S., 13 in Europe, 5 in Australia, 4 in Canada, 3 in Japan, and 1 in Israel. The total attendance was in the 1500-2000 range.

I had additional invitations from the U.S., Europe, and Latin America which I was unable to accommodate so far. Some of these invitations have been extended to 1995, and we are still trying to work out the necessary arrangements.

The experience of meeting a large segment of the MTT-S membership was highly rewarding. The high turnout at most of the lectures showed that the MTT-S AdCom made a timely choice of a subject of great interest to the membership. While I used "microwave" as the key word in the lecture title, the content was actually "wireless."

The dynamic developments in this field made it necessary to frequently update the lecture, mostly with information from conference papers, news items from the daily press, and with viewgraphs collected from R&D sources and equipment manufacturers. Technical journal articles were less useful for my purpose because the information was usually out of date by the time of publication.

Distinguished Lecturers are expected to write a paper for the *Transactions* on the subject of their lecture. In my case it would be a review paper. The fast pace of "wireless" technological developments discourages committing to such a task, but I am inclined to do so within a year or so. Based on my current consulting work, I shall probably focus on fixed wireless local access systems. The projected high growth rates in this new area of microwave communications would greatly help to offset the loss of market share to lightwave systems, which occurred over the past decade.

Summing up my experience with this lecture series and the one I gave in 1982-83 ("Microwave Communications Technology"—over 40 lectures in the U.S., Canada, Europe, Japan and China) I would like to offer an observation and a corresponding suggestion.

The MTT-S Distinguished Lecture is most effective as a means of intensifying chapter activities and attracting new members. For this reason I encouraged the hosts to go beyond the conventional lecture meeting format in one or both of the following two ways:

- Joint meeting with other local chapter(s) interested in the lecture subject (in the case of my lecture, primarily the communications society);
- Organize a seminar or workshop with the participation of local speakers.

Indeed, meetings with much broader frameworks turned out to be among the most successful ones. I would like to point out that a few chapters did it on their own initiative. I suggest following their good examples and systematically encouraging other chapters to leverage distinguished lectures in such and similar ways. Furthermore, when there are more invitations than the Distinguished Lecturer can accept, preference should be given to chapters that are prepared to make best use of the opportunity.

Last, but not least, I would like to express my gratitude to the two Distinguished Lecture Coordinators who supported me in every possible way: Louis Medgyesi-Mitschang and Kris Agarwal.

The MTT-S/ED-S STAR Program



Julia Brown



April Brown

The STAR (Student-Teacher and Research Engineer/Scientist) is a new program sponsored by IEEE MTT-S and ED-S to address the growing concern that girls develop biases against careers in mathematics, science, and engineering at a young age. This educational outreach program promotes involvement of society members with local junior high and high schools to inspire a positive image of engineering careers. Through a one-on-one interaction of society volunteers with a Teacher-Student Team, the goal of STAR is to create a technical support network for teachers and a mentor program for the students.

Children are bombarded every day by the media, with movies and television shows which portray engineers as social outcasts (i.e., nerds). A Barbie doll who says "Math is hard" was recently marketed and fortunately recalled. The mission of STAR is to help to change this negative image. There are numerous successful programs already in place at universities and companies which support such interaction between scientists and the community to help portray a more positive image of career scientists. We hope that STAR will provide an additional network of support to further a positive change to education. As the program matures, opportunities to provide input to the media may evolve. But more importantly, a network to support local teachers by giving input to low-cost experiments which could be incorporated into their curriculum, for example, will be supported.

The first step for interested society members is to contact a local school and identify an enthusiastic teacher. The choice of an eager teacher is critical since the greatest impact on the students may be through exposing the teachers to leading-edge technology which can be taught in their classrooms. After the teacher is identified, the next step is for the teacher to choose one or two girls to participate in the program. The planned activities over the course of a year may be lunches or dinners, a field trip to a local engineering company or university, or informal discussions at the school. The students can learn about real engineers and career options, and the teachers can learn about national or local programs aimed

(continued on page 18)

MTT-S Is on the Web!



Roger Pollard
Vice Chairman
Electronic Communications

Joining the IEEE's debut on the Information Superhighway on January 1, the MTT-S offers a "home page" on the World-Wide Web. Anyone with Internet access and browser software (e.g., Mosaic or Lynx) can explore the Web. The MTT-S Home Page can be found by entering its URL which is "<http://www.ieee.org/mtt/mtt.html>" or by a link from the IEEE home page at "<http://www.ieee.org>". We hope that this is just the beginning of a major new avenue for bringing information and other services to our members.

Please let us have your comments, suggestions and contributions. Input is welcomed via e-mail to r.pollard@ieee.org.

PS—A brief Glossary for the Uninitiated

- **WWW (W3)**—World-Wide Web. An information retrieval system based on the use of *hypermedia* over a worldwide computer network (usually *Internet*).
- **Internet**—A word used to describe the hardware connection of a worldwide network of computers comprised of thousands of smaller regional networks connecting 20 million users in over 50 countries.
- **Hypertext**—A means of using text to interact with the reader. A hypertext document includes highlighted words, phrases or pictures which, when selected, connect to other documents. These, in turn, include links to further material. The reader can thus explore a multiply-connected network of information. *Hypermedia* provides links to "documents" other than text. The Web offers sound, graphics, images and movies, if your computer is appropriately equipped.
- **URL**—Uniform Resource Locator. The way to specify a file or service (the WWW "address"). The first part of the URL specifies the method of access (e.g., file, ftp, http, gopher), the second part the address of the computer where the information is located.
- **HTTP**—HyperText Transfer Protocol. The language used by Web servers and clients to communicate.
- **HTML**—HyperText Markup Language—The standard language used for creation and recognition of *hypermedia* documents on the Web. Provides for control of such characteristics as fonts, character size, spacing, etc., independently of original information.
- **Mosaic**—The best-known and most comprehensive WWW browser. Supports text, sound, movies, graphics, etc. Available for PC-Windows, Mac, X-Windows. You can get a copy by FTP from <ftp.ncsa.uiuc.edu> (start in the Mosaic directory).

See recent issues of "The Institute" for more information, or just start browsing on the Web!

Education Committee Expands Scholarship and Fellowship Programs



Denis Webb
Chairman
Education Committee

The MTT-S has a long tradition of promoting and supporting interest and excellence in education through its transactions, symposium activities (e.g., student paper awards), seminars, continuing education, etc. In addition, over the past few years under the leadership of Glen Thoren, the committee has made several initiatives in providing scholarships and fellowships to encourage and reward excellence in the microwave area. The Microwave Graduate Fellowship Program is entering its third year. Proposals are currently being evaluated for award in 1995. Aditya Gupta, who is administrating the program for MTT, reports that the quality of the submittals is excellent and the number received (15) is more than double last year's number. Results will be announced in the next Newsletter.

The committee intends to expand this activity for 1996 by involving more universities in the competition. AdCom members will be contacting schools in their local area to help accomplish this. Deadline for filing will be in the fall; details are provided in the accompanying flyer.

A new microwave engineering graduate scholarship fund was announced by Barry Perlman in the Fall *Newsletter*. The goal of this fund is to help support the education and accreditation of worthy future microwave engineers. Donations are encouraged from MTT-S members, families and friends of members, trusts of deceased members, as well as companies and institutions. The scholarship grant will range from \$2000 to \$5000, and will be forwarded to the appropriate graduate school and credited to the account of the selected student. Donations from US sources will be exempt from federal income tax.

Finally, a new program to encourage women in engineering was recently presented to the AdCom by Mike Golio and received approval for initiation in 1995. The goal of the program is to promote interactions between society members and girls in high school and junior high school to encourage girls to pursue careers in engineering, sciences and math. The program will be administered by Julia Brown of Hughes Research Lab, who has been active in initiating local programs on this topic. Details of the program are evolving, but field trips to local engineering facilities, dinners and talks are envisioned as potential activities. The program will be executed through local chapters.

Individuals with an interest in any of the above programs should contact me at (202) 767-3312; fax: (202) 767-0455; or e-mail: d.webb@ieee.org.

IEEE Phoenix Waves and Devices Workshop: "Enabling Technologies for Portable Communication and Computing"

For the past several years the IEEE Phoenix Waves and Devices Chapter has organized a one-day biennial workshop. The workshop for 1994-95 was held on November 14, 1994, at Arizona State University (ASU), with support from the Motorola Phoenix Corporate Research Laboratories and ASU. It covered subjects falling under the title "Enabling Technologies for Portable Communication and Computing." The workshop committee, composed of Jim Aberle, Badawy El-Sharawy, Craig Gaw, Bob Grondin, Irv Kaufman (Chair), Majid Hashemi, and Said Tehrani, assembled a program of experts in the following topics: general considerations related to the development of portable communication and computing, circuits, semiconductors, interconnects, packaging, and displays. The speakers were John Escher (Motorola), Ghavam Shahidi (IBM), Peter Zdebel (Motorola), George Norris (Motorola), Dave Hartman (Motorola), Wayne Wei-Ming Dai (Univ. of California Santa Cruz), Jack MacMahon (Intel), Larry Tannas (Tannas Electronics), and Carlo Infante (CBI Technology). In addition to the oral presentations, each of the ninety participants in the workshop received a 200-page volume of material prepared by the speakers.

The IEEE Phoenix Waves and Devices Chapter expresses its appreciation and thanks to the Motorola Phoenix Corporate Research Laboratories, to ASU, to the speakers, to the organizing committee, and to the participants for making this workshop a success.

1995 IMS Local Arrangements

(continued from page 8)

County Convention Center and the eight hotels affiliated with the symposium. This service will begin the afternoon of Sunday, May 14, continuing each day through Microwave Week, until 6:00 p.m. Friday, May 19. Additionally, transportation will be provided Monday evening for the *Microwave Journal* reception and the special Magic Night at Church Street Station.

Transportation from Orlando International Airport

International Drive and the Orange County Convention Center are approximately 20 minutes' drive west of Orlando International Airport. Taxis to the affiliated hotels are \$22-\$25. Another option is a Town & Country shuttle which picks up at the airport baggage claim area and takes you directly to the Clarion Plaza Hotel for \$11 per person. Contact Town & Country at (407) 828-3036.

Workshops

	Number	Time	Title	
Sunday	WSFA	8 AM-5 PM	ICs for Wireless Communications	
	WMFB	8 AM-5 PM	Systems Applications of High Temperature Superconductors and Cryogenic Electronics	
Monday Convention Center	WMFC	8 AM-5 PM	Advances in Traveling Wave Tube Technology	
	WMFD	8 AM-5 PM	Modeling of Microwave Filters and Passive Components	
	WMFE	8 AM-5 PM	Automated Circuit Design using Electromagnetic Simulators	
	WMFF	8 AM-5 PM	Photonic Guided Wave Structures	
	WMFG	8 AM-5 PM	Field Theoretical Problems for Wireless Technology	
	WMHH	8 AM-12 PM	Recent Advances in Microwave and mm-Wave Oscillator Design	
	WMHA	1 PM-5 PM	Chaos in Microwave Systems	
	WMHI	1 PM-5 PM	Packaging Technology	
	Friday Convention Center	WFFA	8 AM-5 PM	Silicon RF Technologies
		WFFB	8 AM-5 PM	GaAs HBTs: Devices, Circuits and Reliability
WFFC		8 AM-5 PM	Microwave Vehicular Technology	
WFFD		8 AM-5 PM	Advances in Microwave and mm-Wave Synthesizer Technology	
WFFE		8 AM-5 PM	CAD Design Methodology for Commercial Applications	
WFFF		8 AM-5 PM	Design Approaches for IC Antenna Modules	
WFFG		8 AM-5 PM	Power Devices and MMICs for Wireless and Military Applications	
WFFH		8 AM-5 PM	MIMIC Hardware Description Language and Standards	
WFHI		8 AM-12 PM	Microwave Applications of Ferroelectric Ceramics	

Panel Sessions

12:00 Noon to 1:30 PM

PMOA	Monday	Cost Effective MMICs for WLANs: Fact or Fantasy
PTUB	Tuesday	PHEMTs vs HBTs for Power Amplifiers
PTUC	Tuesday	Spectrum Management for Commercial Applications
PWED	Wednesday	Microwave Flip Chip Technology

Rump Session

7:00 PM to 9:00 PM

RTUA	Tuesday	Microwave Curriculum: What Should We Teach About Microwave Design
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Short Course

8:30 AM to 5:00 PM

SSFA	Friday	Applications of Digital Signal Processing to Digital Receivers
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Guest Programs

9:30 AM to 3:30 PM

GA	Tuesday	Historic Winter Park—Explore Winter Park, the “Worth Avenue” of Orlando, including an hour tour over beautiful lakes and the Morse Gallery. Lunch and shop in Winter Park.
GB	Wednesday	The Kennedy Space Center—A two-hour tour of the Space Center, a visit to Astronauts Memorial and an IMAX movie. Lunch at the Space Center.
GC	Thursday	Sea World of Florida—See “Shamu—Close Up,” “Manatees, The Last Generation?” and The Pacific Point Reserve. Enjoy a light lunch while viewing the Water Ski Show

Advance Conference Registration

1995 IEEE MTT-S INTERNATIONAL MICROWAVE SYMPOSIUM

May 14-19, 1995 • Orlando, Florida • MTT-S • MMWMC • ARFTG • NTC

Each Conference Attendee must submit a separate registration form. A copy of this form may be used.
To ensure advanced registration, this form and payment must be received by April 14, 1995.
On-Site fees will be approximately 30% higher.

NAME _____
Last First

AFFILIATION _____
Company, Etc. Mail Stop

ADDRESS _____
Street

_____ City _____ State _____ Zip Code

TEL. NO. _____

IEEE MEMBER Yes No IEEE Membership No.* _____
*Must be given to qualify for member discount

MTT-S MEMBER Yes No

JOB CATEGORY

- A. Gen. Mgmt.
- B. Res./Engr. Mgmt.
- C. Res./Engr.
- D. Des./Proj. Engr.
- E. Manufacturing
- F. Mkt./Sales/Purch.
- G. Teaching
- H. Student
- I. Government
- J. Consulting
- K. Guest
- L. Other

Check each function for which you wish to register. Check for the appropriate fees and enter the fees in the Remittance column.
For complete titles, schedules and locations see reverse side.

- | | | | |
|---|--------------------------------|--------------------------------|-------------------|
| • MTT-S Symposium
Tue., Wed. & Thur. | IEEE Member | Non Member | Remittance |
| <input type="checkbox"/> All MTT-S Sessions
(Includes MTT-S Digest) | <input type="checkbox"/> \$215 | <input type="checkbox"/> \$300 | \$ _____ |
| <input type="checkbox"/> Single-Day Registration
(No Digest) | <input type="checkbox"/> \$100 | <input type="checkbox"/> \$140 | \$ _____ |
| <input type="checkbox"/> Student, Retiree, Life Member
(No Digest) | <input type="checkbox"/> \$25 | <input type="checkbox"/> \$50 | \$ _____ |
| • MMWMC Symposium
Sunday Evening, Mon. & Tue., (Includes MMWMC Reception and Digest) | <input type="checkbox"/> \$85 | <input type="checkbox"/> \$110 | \$ _____ |
| • ARFTG—Automatic RF Techniques Conference
Fri., (Includes breakfast, lunch and ARFTG Digest) | | | |
| <input type="checkbox"/> ARFTG Member | <input type="checkbox"/> \$125 | <input type="checkbox"/> \$125 | \$ _____ |
| <input type="checkbox"/> ARFTG Non-member | <input type="checkbox"/> \$150 | <input type="checkbox"/> \$150 | \$ _____ |
| <input type="checkbox"/> ARFTG Student | <input type="checkbox"/> \$75 | <input type="checkbox"/> \$75 | \$ _____ |
| • NTC—Microwave Systems Conference
Wed. & Thurs.
(includes proceedings) | <input type="checkbox"/> \$190 | <input type="checkbox"/> \$220 | \$ _____ |
| <input type="checkbox"/> Student, Retiree, Life Member
(no proceedings) | <input type="checkbox"/> \$75 | <input type="checkbox"/> \$75 | \$ _____ |
| • Additional Digests | | | |
| MTT-S Qty. _____ @ | <input type="checkbox"/> \$70 | <input type="checkbox"/> \$85 | \$ _____ |
| MMWMC Qty. _____ @ | <input type="checkbox"/> \$35 | <input type="checkbox"/> \$50 | \$ _____ |
| ARFTG
(member) Qty. _____ @ | <input type="checkbox"/> \$20 | <input type="checkbox"/> \$20 | \$ _____ |
| (non-member) Qty. _____ @ | <input type="checkbox"/> \$45 | <input type="checkbox"/> \$45 | \$ _____ |
| NTC Digest Qty. _____ @ | <input type="checkbox"/> \$60 | <input type="checkbox"/> \$75 | \$ _____ |

- Panel Sessions**
(MTT-S registration required to attend. Includes box lunch)
- PMOA: Cost Effective MMICs for WLANs \$20 \$ _____
- PTUB: PHEMTs vs HBTs for Power Amplifiers \$20 \$ _____
- PTUC: Commercial Spectrum Management \$20 \$ _____
- PWED: MW Flip Chip Technology \$20 \$ _____

- Rump Session** (MTT-S registration required to attend.
Price includes beverage and hors d'oeuvres)
- RTUA—Microwave Curriculum \$20 \$ _____
- Awards Banquet**
Wed. evening, Clarion Plaza Qty. ___ @ \$40 \$ _____
- Workshops**
- | | | |
|---|-------------------------------|---|
| | Attendee | Student/Retiree/
Life Member |
| Full Day
(Includes continental breakfast and lunch) | <input type="checkbox"/> \$75 | <input type="checkbox"/> \$35 |
| Half Day
(AM includes continental breakfast & PM includes lunch) | <input type="checkbox"/> \$45 | <input type="checkbox"/> \$20 |
- Sunday**
- WSFA (Full Day) \$ _____
- Monday**
- WMHA (Half Day) \$ _____
- WMFB (Full Day) \$ _____
- WMFC (Full Day) \$ _____
- WMFD (Full Day) \$ _____
- WMFE (Full Day) \$ _____
- WMFF (Full Day) \$ _____
- WMFG (Full Day) \$ _____
- WMHH (Half Day) \$ _____
- WMHI (Half Day) \$ _____
- Friday**
- WFFA (Full Day) \$ _____
- WFFB (Full Day) \$ _____
- WFFC (Full Day) \$ _____
- WFFD (Full Day) \$ _____
- WFFE (Full Day) \$ _____
- WFFF (Full Day) \$ _____
- WFFG (Full Day) \$ _____
- WFFH (Full Day)* \$ _____
- WFHI (Half Day) \$ _____
- Total for all Workshops** \$ _____
- *Half Day fee for this workshop
- Short Course** (Full day—includes refreshments)—Friday, Clarion Plaza
- \$225 (members) \$255 (non-members)
- SFFA—Applications of Digital Signal Processing to Digital Receivers
Fred Harris and Don Steinbrecher \$ _____
- Guest Programs** (Lunch and transportation are included)
See reverse side for complete information
- GA: Historic Winter Park (Tues.) Qty. _____ @ \$43 \$ _____
- GB: Kennedy Space Center (Wed.) Qty. _____ @ \$38 \$ _____
- GC: Sea World (Thurs.) Qty. _____ @ \$45 \$ _____

The only acceptable forms of payment are cash, check, money order, MasterCard or VISA.
• Make your check or money order (US \$ ONLY on a US Bank or Travelers Check) payable to:

TOTAL REMITTANCE \$ _____
PAYMENT MUST ACCOMPANY FORM

“1995 IEEE MTT-S Symposium” • Or charge your MasterCard or VISA: MasterCard VISA

Card # _____ Exp. Date _____

Signature _____

• Written requests for refund will be honored if received by April 14, 1995.
A \$25 cancellation fee will be charged for processing.

MAIL COMPLETED FORM AND PAYMENT TO:
1995 IEEE SYMPOSIUM, c/o HORIZON HOUSE PUBLICATIONS INC., 685 Canton Street, Norwood, MA 02062, USA
FAX: (617) 762-9230. If this form is sent by FAX do NOT also mail; a Credit Card Number must be included.

PLEASE FAX OR MAIL; DO NOT FORWARD HARD COPY IF FAXED

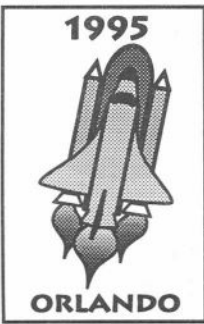


DIRECTIONS FROM ORLANDO INTERNATIONAL AIRPORT TO THE ORANGE COUNTY CONVENTION CENTER

- From the airport, follow signs to exit North towards Orlando and attractions
- Take the Beeline Expressway (SR 528) West towards Tampa
- Pay two tolls (\$1.25)
- Exit at International Drive (exit marked Sea World, Civic Center) and proceed North
- The Convention Center will be on the left at 9800 International Drive (Tel: (407) 345-9800)

1995 IMS Hotels

Map Ref.	Hotel	Single	Double
5	Clarion Plaza Hotel	\$ 92	\$ 92
7	Embassy Suites	\$122	\$122
3	Heritage Inn	\$ 77	\$ 77
8	Orlando Marriott	\$ 85	\$ 85
6	Quality Inn Plaza	\$ 39	\$ 39
2	Sheraton World Resort	\$ 87	\$ 87
4	The Peabody Orlando	\$148/168	\$188
1	Wynfield Inn	\$ 56	\$ 61



CONFERENCE HOUSING

1995 IEEE MTT-S INTERNATIONAL MICROWAVE SYMPOSIUM



May 14-19, 1995 • Orlando, FL

MTT-S • MMWMC • ARFTG • NTC

SEND COMPLETED FORMS TO:
IEEE MTT-S 95 Housing Bureau
7208 Sand Lake Road, Suite 300
Orlando, FL 32819

OR FAX TO:
(407) 363-5817
or
(407) 363-5899

**COMPLETED FORMS MUST BE
RECEIVED AT THE HOUSING BUREAU
BEFORE APRIL 14, 1995**

SEND NO CHECKS OR MONEY TO THE HOUSING BUREAU

Hotel locations and rates are shown on the reverse side of this form

INSTRUCTIONS AND HOUSING BUREAU POLICY

1. Please print or type all data requested.
2. All room reservations must be made by mail or Fax. No telephone calls will be accepted.
3. All reservations will be processed on a first come, first-served basis.
4. Hotels will confirm reservations directly.
5. Contact MTT-S Housing at the above address in writing or by Fax to arrange cancellations and changes.
6. Cancellations must be received by confirming hotel at least 72 hours prior to arrival to qualify for refunds.
7. Copies of this form may be used to reserve more than the three rooms for which it provides.
8. **Send no checks or money to the housing bureau!**

HOTEL PREFERENCE

(Please write full name of hotel and show at least three choices.)

First choice _____ Third choice _____
Second choice _____ Fourth choice _____

Confirmations for all rooms reserved will be sent to:

NAME _____ Last _____ First _____
COMPANY _____
ADDRESS _____
CITY _____ STATE _____ ZIP _____
COUNTRY _____ PHONE () _____

To guarantee, provide the following credit card information: (Do not send any money to the Housing Bureau)

CARD NAME: American Express MasterCard Visa Other _____
CARD HOLDER NAME _____
CARD NO. _____ EXP. DATE _____

ROOM OCCUPANTS

1. Print or type names of persons occupying each room. If more than 3 rooms are required, attach a list providing the information requested below for each additional room.
2. Select room type desired, indicate arrival and departure dates and arrival time.

Occupants (last name first)

ROOM NO. 1	1.	Check one: <input type="checkbox"/> Single <input type="checkbox"/> Double <input type="checkbox"/> Twin Arr. Date _____ Dep. Date _____
	2.	<input type="checkbox"/> Smoking <input type="checkbox"/> Non-smoking <input type="checkbox"/> Handicap <input type="checkbox"/> King
ROOM NO. 2	1.	Check one: <input type="checkbox"/> Single <input type="checkbox"/> Double <input type="checkbox"/> Twin Arr. Date _____ Dep. Date _____
	2.	<input type="checkbox"/> Smoking <input type="checkbox"/> Non-smoking <input type="checkbox"/> Handicap <input type="checkbox"/> King
ROOM NO. 3	1.	Check one: <input type="checkbox"/> Single <input type="checkbox"/> Double <input type="checkbox"/> Twin Arr. Date _____ Dep. Date _____
	2.	<input type="checkbox"/> Smoking <input type="checkbox"/> Non-smoking <input type="checkbox"/> Handicap <input type="checkbox"/> King

1995 IEEE MTT-S International Microwave Symposium – Schedule of Events

SUN. – MAY 14					
	Registration	5:00 PM to 9:00 PM		Convention Center (CC)	
	MMWMC Reception	7:00 PM to 10:00 PM		Clarion Plaza	
8:00 AM– 5:00 PM	WSFA	ICs for Wireless Communications		CC, Hall A1	
MON. – MAY 15					
	Registration	7:00 AM to 5:00 PM		CC	
8:00 AM– 5:00 PM	WMFB	HTS & Cryogenic Electronics	CC, Rm. 20B	WMFE	Automatic Circuit Design
	WMFC	Traveling Wave Tube Technology	CC, Rm. 20C	WMFF	Photonic Guided Wave Structures
	WMFD	MW Filters & Passive Components	CC, Rm. 20E	WMFG	Field Theoretical Problems for Wireless
8:00 AM–12:00 PM	WMHH	Advances in MW and mm-Wave Oscillator Design			CC, Rm. 23A
1:00 PM– 5:00 PM	WMHA	Chaos in Microwave Systems	CC, Rm. 20A	WMHI	Packaging Technology
12:00 PM– 1:30 PM	PMOA	Cost Effective MMICs for WLANs: Fact or Fantasy			CC, Rm. 12A/B
	MMWMC Symposium	8:30 AM to 5:00 PM		Convention Center	
	Microwave Journal/MTT-S Magic Night	6:00 PM to 8:00 PM		Church Street Station	
TUES. – MAY 16					
	Registration	7:00 AM to 5:00 PM		Convention Center	
	MMWMC Symposium	8:30 AM to 5:00 PM		Convention Center	
	Exhibition	9:00 AM to 5:00 PM		Convention Center	
		RM A1	RM A2	RM 12A, B, C	RM A3
8:30 AM–10:00 AM		TU1A: Systems Applications	TU1B: Progress in Time Domain Techniques	TU1C: Photonic Devices	TU1D: Sources and Control Components
10:30 AM–12:00 PM	TU2G	Plenary Session			CC, Hall A5
12:00 PM– 1:30 PM	PTUB	PHEMTs vs HBTs for Power Amplifiers			CC, Rm. 20D
1:30 PM– 3:00 PM	PTUC	Spectrum Management Issues for Commercial Applications			CC, Rm. 20E/F/G
3:30 PM–5:00 PM	TU3A: Mixers & Related Components	TU3B: Leaky Waves	TU3C: mm-wave Frequency Optical Detectors	TU3D: High Density MW Packaging	TU3E: Superconducting Components & Applications
7:00 PM– 9:00 PM	TU4A: Monolithic Receiver Components	TU4B: Leaky Wave Effects & Discontinuities	TU4C: High Speed Optical Modulators	TU4D: Field Theory I	TU4E: Biological Effects & Medical Applications
	RTUA	Microwave Curriculum: What Should We Teach About MW Design			Clarion Plaza Hotel, Ballroom C
WED. – MAY 17					
	Registration	8:00 AM to 5:00 PM		Convention Center	
	NTC	8:30 AM to 5:00 PM		Convention Center	
	Exhibition	9:00 AM to 5:00 PM		Convention Center	
8:30 AM–10:00 AM	WE1A: MW Power Devices & Amplifiers	WE1B: Application of Time Domain Methods	WE4C: Miniaturized Filters	WE1D: Wireless Communication Systems	WE1E: mm-Wave Circuits & Systems
10:30 AM–12:00 PM	WE2A: MW Power Devices & Amplifiers II	WE2B: Frequency Domain EM Modeling	WE2C: Coupled-Mode Waveguide Filters	WE2D: Wireless Technologies	WE2E: mm-Wave Sources & Measurements
12:00 PM– 1:30 PM	PWED	Microwave Flip Chip Technology			CC, Rm. 20E/F/G
1:30 PM– 3:00 PM	WE3A: Power Amps for Wireless Applications	WE3B: Quasi-Optical Passive & Active Amp Arrays	WE3C: Active Device Modeling	WE3D: Field Theory II	WE3E: Passive Planar Components
2:30 PM– 5:00 PM	WE3F	Open Forum			CC, Hall A5
3:30 PM– 5:00 PM	WE4A: Acoustic Filters	WE4B: Active & Quasioptic Antennas	WE4C: Noise Modeling	WE4D: Subsystems for Commercial Communications and Auto Applications	WE4E: Passive Waveguide Components
	Industry-Hosted Cocktail Reception	5:45 PM to 7:15 PM		Clarion Plaza Hotel, Ballroom A	
	Awards Banquet	7:30 PM to 10:00 PM		Clarion Plaza Hotel, Ballroom C/D	
THUR. – MAY 18					
	Registration	8:00 AM to 5:00 PM		Convention Center	
	NTC	8:30 AM to 5:00 PM		Convention Center	
	Exhibition	9:00 AM to 3:00 PM		Convention Center	
8:30 AM–10:00 AM		TH1B: Digital Signal Processing	TH1C: On-Wafer Measurements	TH1D: Dual-Use & Defense Conversion	TH1E: Simulation & Design Techniques
10:30 AM–12:00 PM	TH2A: Phased & Active Array Technology	TH2B: Low Noise Receivers	TH2C: MW Measurements	TH2D: Lightwave Systems & Subsystems	TH2E: Field Theory Based CAD
1:30 PM–3:00 PM	TH3A: Phased Array Antennas & Systems	TH3B: Nonlinear Transistor Modeling	TH3C: Full Wave Analysis	TH3D: MW Optical Devices & Circuits	TH3E: Frequency Conversion Circuits
2:30 PM–5:00 PM	TH3F:	Open Forum			CC, Hall A5
3:30 PM–5:00 PM		TH4B: Nonlinear Devices & Circuits	TH4C: MW Packaging & Interconnect	TH4D: Hi Power Sources & Control Components	TH4E: Transmission Lines, Amps & Control Devices
FRI. – MAY 19					
	ARFTG Conference	8:30 AM to 5:00 PM		Convention Center, Rm. 20	
8:00 AM– 5:00 PM	WFFA	Silicon RF Technologies	CC, Rm. 10C	WFFE	CAD for Commercial Applications
	WFFB	GaAs HBTs	CC, Rm. 12A	WFFF	IC Antenna Modules
	WFFC	MW Vehicular Technology	CC, Rm. 11A	WFFG	Power Devices & MMICS
	WFFD	MW & mm-Wave Synthesizer	CC, Rm. 11B	WFFH	MHDL and Standards
8:00 AM–12:00 PM	WFHI	Microwave Applications of Ferroelectric Ceramics			CC, Rm. 10B
8:30 AM– 5:00 PM	SSFA	Applications of Digital Signal Processing to Digital Receivers			Clarion Plaza Hotel

Calling Car 54, Where Are You?



J. K. McKinney
Chapter Activities Coordinator

To those familiar with the popular old American TV series, the previous question will rekindle memories of two police officers who bumbled along but, nevertheless, somehow always found the right answer to the task at hand. A humorous aspect of Car 54 was that the answer was usually self-evident, or provided, which the two main characters somehow either overlooked or did not hear.

Engineering in the 1990's has become very attentive to the concept of design cycle time and a number of design and test tools are available to assist the original thought of the engineer in accomplishing their task. However, the tools are incapable of original thought (at least at present). The engineers are left with their own intuition and knowledge base to overcome technical obstacles.

OK, about now you may be wondering where all of this is leading, Car 54 and engineering tools versus original thought? The answer is quite simple. One should take advantage of all the information available to accomplish goals in the most efficient manner. This leads us to attending MTT-S Chapter Meetings.

When one desires information, we usually seek help from literature or from our colleagues. We usually keep searching for the desired information until it is located. Along the way, additional information is also collected. This information may be viewed with little value when we first come across it, especially if it is outside the information sought. Sometimes, this additional information is committed to memory, or at least the knowledge as to where it can be located in the future.

This is an important function that Chapter Meetings serve. They provide us with the time to interact with colleagues working in different areas and to hear quality lectures from experts in a field of microwave technology or its application. Both of these have the real benefit of increasing our knowledge base and increasing our productivity. It should be noted that regular attendance helps accumulate the maximum benefit.

So next time you realize that you are "stuck" on some issue, pause to think that if you had been attending regular MTT-S Chapter Meetings, you could be further ahead in your task. You may wish to start attending. Hope to see you at the next Chapter Meeting!

Calling Car 54, where are you?

1996 IEEE Microwave Theory and Techniques Society Graduate Fellowships

- Several \$5,000 fellowship awards each year
- For Graduate research studies in microwave engineering on a full-time basis
- Applicants must have attained high academic achievements in engineering or physics
- Award can be granted *in addition* to any other support received by student
- Award cannot be used for equipment purchase, travel, supplies, etc.
- Award made to institution for support of named student
- Faculty supervisor must be MTT-S member

Application Deadline: 30 November, 1995

For applications contact:

Dr. Aditya Gupta
Westinghouse Advanced Technology Laboratory
Winterson and Nursery Roads
Linthicum, MD 21090, USA
Phone: (410) 765-9170
Fax: (410) 765-7370
e-mail: gupta.a.k.%wec@dialcom.tymnet.com

Requests for application materials must be received no later than 30 September, 1995.

The MTT-S/ED-S STAR Program

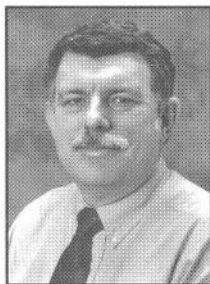
(continued from page 11)

at increasing the participation in the program. This program provides an opportunity for local chapters to increase their community involvement in the promotion of women in science. The program was received with positive response by both MTT-S and ED-S when presented by Mike Golio and April Brown at recent AdCom meetings. Society members interested in participating or desiring further information should contact Julia Brown (MTT-S) and April Brown (ED-S) at:

Julia Brown of Hughes Research Labs:
jbrown@madmax.hrl.hac.com, phone (310) 317-5068, fax 5483.

April Brown of Georgia Tech: april.brown@ee.gatech.edu, phone (404) 853-9447, fax 9171.

Membership Services



John T. Barr, IV
Chairman
Membership Services

What Is Membership Services?

The MTT-S Membership Services Committee mission is to stimulate chapter and membership growth, to coordinate and stimulate technical exchanges and meetings of the chapters and members, to maintain society and chapter records pertaining to membership and meetings, to disseminate IEEE and MTT-S information and publicity to chapters and members, and to maintain liaison among the IEEE, chapters and the MTT-S Administrative Committee." (*MTT-S Handbook*).

In simpler terms, Membership Services handles most of the contact and communications with chapters and members in the non-technical areas. We handle the bean-counting on membership and chapter activities; publish this Newsletter, the Chapter Officers' Newsletter, "TransceiverR," and the Chapter Officers' Handbook; provide funding for various chapter activities; coordinate the Microwave Distinguished Lecturer program; and develop programs for attracting new members.

Who Is Membership Services?

Co-Chair	J. T. Barr (w) (707) 577-2350 (f) (707) 577-5644 j.barr@ieee.org
Co-Chair	E. D. Rezek (w) (310) 814-1860 (f) (310) 814-4448 e.rezek@ieee.org
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Chapter Officers Handbook	G. A. Truitt (w) (214) 995-9918 (f) (214) 995-9867 a.truitt@ieee.org
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Feature Article Editor	J. A. Eisenberg (w) (415) 941-7426
Region 8 Editor	R. D. Pollard

Chapter Communications

Chapter Officers meetings were held in 1994 at the San Diego International Microwave Symposium (IMS), at the European Microwave Conference (EuMC—Region 8), and at the Asia Pacific Microwave Conference (APMC—Region 10). These are meetings where the chapter officers (or any member) can meet with the society officers, other chapter officers and members of the Membership Services Committee to develop more effective chapter operations. We will continue these meeting in 1995 at the same conferences (dinner and meeting May 16 at the Orlando IMS) and urge that all chapters be represented at one of the meetings. J. K. McKinney organizes these meetings and is interested in suggestions that would make the meeting more useful. Also, contact Samir El-Ghazaly for information concerning financial travel support.

The *TransceiverR* (the chapter officers' Newsletter) has been published three times a year by Vijay Nair since its inception and has received very positive feedback. Vijay is always interested in articles or suggestions for future issues, such as reports on successful chapter activities. Also, let Vijay know if you are an chapter officer and are not receiving the newsletter.

Another service for chapter officers is the "official"

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MTT Society Ombudsman



Ed Niehenke
Westinghouse Electric Corporation
P.O. Box 746, MS 75
Baltimore, MD 21203
(410) 765 4573
(410) 993-7432 Fax

I have been selected by the Microwave Theory and Techniques Society Administrative Committee (AdCom) to continue serving as your Ombudsman for 1995. It was a pleasure to serve in previous years and I look forward to continuing in 1995. The purpose of the Ombudsman is to receive complaints and assist members in solving problems encountered in obtaining membership services from IEEE and MTT-S.

As your Ombudsman, I have received 24 inquires (16 non-US) from MTT-S members in 1994 and, to my knowledge, all members have been satisfied.

I had inquiries about student dues and also requirements for life member which I would like to share with you.

IEEE student dues for 1995 are \$28. A student may join societies for 50% reduction off the member fees. This entitles him to any periodicals which are included in the society membership fees. Any additional periodicals are 25% off the member fees amount.

The requirements for life member are as follows: Your age plus your years of membership must add up to 100. When you reach this status, the following year, you are a life member. The rules also have a minimum age requirement. To be a life member for 1995, you must be 63. In 1996, you must be 62, in 1997 you must be 61, and in 1998 there is no minimum age requirement to become a life member. Life member benefits include free IEEE dues and free periodicals which come free by being an IEEE member. In a society, if you are and have been a member in that Society for the past 5 years, then your membership in that society is also free and all subscriptions that come free by belonging to that society are also free. If a society offers a periodical for a fee, then you can request the periodical by paying the cost.

Please feel free to contact me by letter or telephone concerning any complaint you may have or any assistance you may need in obtaining membership services from IEEE and MTT-S.

ARFTG Highlights



John T. Barr, IV

The Automatic RF Techniques Group (ARFTG) is an independent professional society that is affiliated with MTT-S as a conference committee. ARFTG's primary interests are in computer-aided microwave analysis, measurement and design. ARFTG holds two conferences each year, one in conjunction with the MTT-S International Microwave Symposium and a second in the later fall.

44th ARFTG Conference— Multichip Systems: Model and Measurements

The 44th ARFTG Conference was held in Boulder, CO, on December 1 & 2, 1994. The theme of this two day technical conference with concurrent manufacture exhibits was *Multichip Systems: Model and Measurements*. In attendance were 67 paid technical attendees plus 10 exhibits that were in the concurrent exhibitors' room. The conference focused on the testing needs of commercial RF wireless applications and on-wafer systems. Below is a list of the presented papers:

- "Simplified Electronic Calibration of a Vector Network Analyzer (VNA)," Vahe Adanian, (ATN Microwave, Inc.)
- "A Convenient Indication of the Effect of Instrumentation Errors on Six-Port Reflection Measurements," Chris Potter (Marconi Instruments)
- "Compensation for the Effect of Substrate Permittivity on CPW Probe-tip Calibrations," D. F. Williams (NIST), R. B. Marks (NIST)
- "Modeling and Measurements of E-M Effects in Multichip Modules," M. Seifert (Rome Laboratory)
- "Accuracy and Repeatability in Time Domain Network Analysis," L. Hayden (NIST), J. B. Rettig (Tektronix, Inc.)
- "Time Domain Network Analysis Using the Multiline TRL Calibration," R. B. Marks (NIST), L. A. Hayden (NIST), J. A. Jargon (NIST), F. Williams (Tektronix)
- "Accurate Determination of the Impedance Profile Using Enhanced Accuracy Time Domain Reflectometry and Transmission," D. A. Smolyansky (Tektronix, Inc.), S. K. Diamond (Oregon State University)
- "Study and Development of On-Wafer Cryogenic Calibration Techniques," M. Nishimoto (EE Dept. University of Hawaii), M. Hamai (EE Dept. University of Hawaii), J. Laskar (EE Dept. University of Hawaii)

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T. Itoh Elected Honorary Life Member

(continued from page 9)

has investigated a large variety of passive components for closed waveguides, dielectric waveguides, and microwave integrated circuits such as filters, diplexers, E-plane techniques and structures, and antennas for microwave integrated circuits. In all cases, however, his focus was on nonconventional and novel types of passive components. Most recently, he has been devising new components based on dominant-mode leakage effects in microwave and millimeter-wave integrated circuits; an example is a leaky-wave directional coupler where the coupling lines are spaced apart from each other to avoid manufacturing difficulties and excessive close-spacing sensitivities at higher frequencies.

His second broad research category combines electromagnetic waves with solid-state circuitry, including active and nonlinear devices. At higher frequencies, these devices can no longer be treated as lumped, but require a distributed-wave treatment. Prof. Itoh is characterizing active microwave integrated circuits numerically by using electromagnetic wave techniques rather than network models. In this context, he is currently applying modified finite-difference time-domain (FDTD) methods for modeling microwave circuits containing active devices under large-signal operating conditions. His activities include theoretical analyses, experimental demonstrations, and development. Much of this effort has been directed toward quasi-optical structures and components, such as mixers, frequency doublers, and spatial power combining. Out of these studies, he created a new research area called "active integrated antennas," which is beginning to have important impact on new wireless technology.

Professor Itoh has also engaged to some extent in consulting activities for industry and government agencies. The industrial concerns include the Hughes Aircraft Company and Superconducting Technology, Inc., and examples of the government agencies are the European Space Agency, the United Nations' International Telecommunication Union, and the U.S. Army Research Office through the Battelle Institute.

From 1983 through 1990, Professor Itoh was the Hayden Head Professor at The University of Texas at Austin, and during that period he also served as Director of the Electrical Engineering Research Laboratory and as Associate Department Chairman for Research and Planning. Since January 1991 he has been with the University of California at Los Angeles (UCLA), where he holds the position of TRW Professor, the endowed chair in microwave and millimeter-wave electronics. During his stay at these two universities, he guided approximately 30 Ph.D. students. He also hosted about 40 visiting scholars and postdoctoral fellows; this incredibly large number includes many from other countries, such as Japan, China, Germany, France, Taiwan and Korea. Those from Japan form the largest group, and, together with Ph.D. students originally from Japan, total 25. To honor Prof. Itoh, these 25 persons have re-

cently formed an "Itoh Laboratory Alumni Association" in Japan, and they held their first meeting in December 1994. This Association is indeed a fine tribute to Prof. Itoh, and demonstrates the appreciation and respect these individuals hold for him and for his services to them as a mentor.

According to his secretary at UCLA, Prof. Itoh is unusually responsible, never missing deadlines and always responding rapidly to messages or requests. He is idolized by his students, and he is considered by them to be very fair. He often plays tennis or racquetball with them to deepen their relations and to allow the students a chance to express their concerns in an informal atmosphere.

Professor Itoh's contributions to the MTT Society have clearly been outstanding. He was elected to the Society's Administrative Committee (AdCom) in 1982, and he served for two successive three-year terms. His principal role during that period involved the Society's publications. He was, in fact, the editor of the *Transactions on MTT* from 1982 to 1985, during which time he computerized the editorial process. He was also the chairman of the Technical Committee on Microwave Field Theory from 1979 to 1988. In 1989 he was elected Vice President, and during 1990 he served as the President of the Society.

During his presidency, he established the Transnational Committee by elevating the status and responsibilities of the International Liaison Committee. In line with his interest in cooperation of an international scale, he also helped to form several new MTT-S Chapters in Asia, including the Taipei, Korea and Singapore Chapters. During that same year (1990) he was the Co-Chairman of the Technical Program Committee for the International Microwave Symposium in Dallas, Texas. He also helped to found the new journal, *Microwave and Guided Wave Letters*, and, after his presidency, served as its first editor for four years, from 1991 through 1994.

Another eligibility requirement for the Honorary Life Member position is "national and international prominence." In the international arena, Prof. Itoh's reputation has been exceptional and the extent of his activities phenomenal. For example, the European Microwave Conference and the Asia-Pacific Microwave Conference are now recognized by the MTT Society as two of the three major conferences in the microwave field. At the European Microwave Conference where the rejection rate for papers has been consistently high, Prof. Itoh has presented papers every year since 1976 and he was twice an invited speaker. At the Asia-Pacific Microwave Conference which is now held annually in a different country in the Asia-Pacific region, he has presented papers at every conference but the first one. In addition, he is and has been on its International Steering Committee where he plays a very respected and influential role.

His excellent national and international reputation is also reflected in the positions he has held in the International Union of Radio Science (URSI) in which 31 different countries participate. URSI stresses the basic re-

search aspects of radio science, and is comprised of ten Commissions, of which Commission D is concerned with "electronics and photonics" but has heavy interest in new microwave solid-state devices. Professor Itoh was elected Vice Chairman of U.S. Commission D in 1987 and then became the Chairman soon afterwards. During 1990, he was elected to the position of International Vice Chairman of Commission D for the three-year period from 1990 to 1993 and, in 1993, he became the International Chairman which he will hold through 1996. He will also be the Vice Chairman of the International Symposium on Signals, Systems, and Electronics (ISSSE) 1995, which is organized by Commissions C and D of URSI and held triennially.

Professor Itoh also participates internationally in many other ways. With respect to other conferences, he was an invited speaker twice at MIKON in Portland, and he presented papers at the MICROCOLL in Hungary, and at the MIOP in Germany at their last three conferences. He has also been an invited speaker at many workshops organized by European MTT Chapters, most notably three workshops in Italy on millimeter-waves. He spent the summer of 1979 at Telefunken in Ulm, Germany. He performed advisory service for the U.S. Army in 1993 for five weeks, assessing technical programs at companies, universities and research institutes in Europe. He has also been since 1993 on the Advisory Board of the Institute for Mobile and Satellite Communication Technology in Germany.

With respect to Asia, he has also served as liaison for the U.S. Army in organizing a workshop on Dual-Use Millimeter-Wave Technology in Kyoto, Japan, in 1993. In addition, he has been since 1994 an Adjunct Research Officer in the Communications Research Laboratory of the Ministry of Post and Telecommunications of Japan. This is a non-salaried advisory position concerned with research directions in millimeter-waves.

Only a few of the many advisory activities in which Prof. Itoh has been engaged around the world are included here. He is so much in demand in this context because of his awareness of major new developments in the field and his ability to sense new technical directions.

The eligibility requirements express the expectation that the Honorary Life Member will continue to contribute to the Society. There should be no concern with respect to Prof. Itoh. In addition to his aforementioned editorship of the journal, *Microwave and Guided Wave Letters*, after his presidency of the Society, he has also served as Chairman of the Long-Range Planning Committee, during which time he promoted the area of wireless communications and he is currently the Chairman of the Past Presidents Council.

Professor Itoh and his wife, Seiko, have a son, Akihiro, and a daughter, Eiko, 24 and 21 years of age, respectively. In his moments of leisure time, he plays tennis and racquetball, usually early in the morning before going to his office, and he enjoys long-distance driving, which permits him some solitude. He also relaxes by listening to piano music, his pleasure enhanced by the

fact that his daughter plays the piano. He is revisiting classic books that he enjoyed reading as a teenager but didn't have time to finish then, which include German, French and Russian novels; he is currently reading Tolstoy's *War and Peace*. Books on the key factors that have influenced changes in civilizations fascinate him, and he is intrigued by the history of the Silk Road area in Central Asia. He says, "I hate flying," but the frequent-flyer Platinum Card that he recently received from American Airlines states "3 Million Miles!"

Eligibility Requirements for Honorary Life Member

4.1.1.1 ELIGIBILITY—The position of Honorary Life Member may be bestowed upon an outstanding member of the profession who fulfills the following minimum requirements:

4.1.1.1.1 The candidate's contributions, technical or otherwise, shall have made an important impact in the field of interest of the Society.

4.1.1.1.2 The candidate shall have performed outstanding service to the profession and to the Society.

4.1.1.1.3 The candidate shall have shown national and international prominence.

4.1.1.1.4 The candidate shall have been an elected member of the Administrative Committee, a member of the Society for at least 10 years and shall be a Fellow of the IEEE.

4.1.1.1.5 The candidate is expected to continue to contribute to the Society and participate in its activities as an individual contributor, an advisor, and/or by serving on Society *ad hoc* and standing committees.

Honorary Life Members of MTT-S

Name	Award Date
George C. Southworth	1960
Andre G. Clavier	1961
William W. Mumford	1965
Alfred C. Beck	1967
Donald D. King	1973
Theodore S. Saad	1973
Kiyo Tomiyasu	1973
Seymour B. Cohn	1978
Arthur A. Oliner	1978
Leo Young	1982

We were very fortunate to have Dr. Itoh to serve as co-chairman of the Technical Program for the 1990 Symposium in Dallas. Shortly after he was elected MTT-S Vice President in 1988, I asked him if he wanted a release from TP co-chairman because of the many additional activities he had undertaken, such as the Letters Editor and extra committee assignments. He decided to continue and assumed a very heavy load. He was late for only one of our committee meetings because a Texas State Trooper wanted to discuss phase velocity limits used on state highways.

We in Dallas are most proud of this recognition as Life Fellow for our esteemed samunai, Tatsuoh Itoh.

—The Editor

Special Sessions

(continued from page 7)

Monday, May 15, 1995

- WMHA—(1:00-5:00 pm) Chaos in microwave systems—R. Kaul, T. Carroll
- WMFB—Systems applications of high temperature superconductors and cryogenic electronics—S. Talisa, A. Silver
- WMFC—Advances in travelling wave tube technology—A. Katz
- WMFD—Modeling of microwave filters and passive components—M. Guglielmi
- WMFE—Automated circuit design using electromagnetic simulators—J. Bandler
- WMFF—Photonic guided wave structures—A. Gopinath
- WMFG—Field theoretical problems for wireless technology—I. Wolff, T. Itoh
- WMHH—(8:00 am-12:00 noon) Recent advances in microwave and millimeter wave oscillator design—A. Beyer, R. Trew
- WMHI—(1:00-5:00 pm) Packaging technology—J. Pavio, T. Kemerley

Friday, May 19, 1995

- WFFA—Silicon RF technologies—S. Taub, A. Gopinath, A. Rosen
- WFFB—GaAs HBTs: Devices, Circuits and Reliability—F. Ali, B. Bayraktaroglu, A. Gupta, R. Jansen
- WFFC—Microwave vehicular technology—R. Sparks
- WFFD—Advances in microwave and millimeter wave synthesizer technology—F. Sullivan, A. Sharma
- WFFE—CAD design methodology for commercial applications—A. Pavio
- WFFF—Design approaches for integrated circuit antenna modules—K. C. Gupta, P. Hall
- WFFG—Power devices and MMICs for wireless and military applications—M. Gupta
- WFFH—MIMIC hardware description language and standards—D. Rhodes
- WFHI—(8:00 am-12:00 noon) Microwave applications of ferroelectric ceramics—C. Jackson, C. Buntschuh

Panel Sessions

In the code for panel sessions, the first letter is a "P", the next two letters indicate the day of the week, and the fourth letter the number of the session. All panels will take place at the Convention Center during the lunchtime, with a box lunch provided. Unlike the workshops, speakers do not provide copies of their presentation materials.

Lunch 12:00 noon-1:30 p.m.

- PMOA—Cost effective MMICs for WLANs: Fact or fantasy—F. Ali, M. Golio, D. Maki
- PTUB—PHEMTs vs HBTs for power amplifiers—E. Niehenke, F. Sullivan
- PTUC—Spectrum management issues for commercial applications—M. Marcus
- PWED—Microwave flip chip technology—T. Kemerley, R. Sturdivant

Rump Session

One rump session is being offered on Tuesday evening. It will be held in the Clarion Plaza Ballroom, with wine and cheese being served.

- RTUA—Microwave curriculum: What should we teach about microwave design?—M. Gupta

Focused Sessions

These six sessions, which are interspersed in the main technical program, provide coordinated presentations on specific topics of current interest. In the coding, the first two letters in the listing below indicate the day of the week:

- TU3C—Millimeter wave frequency optical detectors—P. Herczfeld, N. Dietrich
- TU4C—High speed optical modulators fabricated on III-V compounds—J. Bowers, A. Rosen
- TU3D—High density microwave packaging—T. Kemerley
- WE1D—Millimeter wireless communication systems—T. H. Oxley, J. B. Horton, E. Yamashita
- WE2D—Technologies for wireless applications—J. B. Horton, J. White
- TH1D—Dual use & defense conversion—F. Ali, E. Cohen

In addition to the authors, there are two other members of the Special Sessions Committee, Drs. Kalpathy Sundaram and Issa Batarseh (both of the University of Central Florida), who will be assisting between now and mid-May as the activity for these sessions reaches its peak. The committee will be dealing with workshops or special sessions during the entire symposium week, from Sunday through Friday. Last year, workshop attendance alone was over 1400 persons.

Membership Services

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MTT-S Chapter Officers' Handbook. This handy reference put together by Austin Truitt is a must-have for all chapters. Updated versions are passed out at the chapter officers meeting or are available from Austin. If you have not received either the "TransceiverR" or the Handbook, it is probably because no one has informed Joe Staudinger of your most current chapter officers.

Chapter Reporting and Funding

It is very important that chapters notify Joe Staudinger of meetings, activities and new officers. It can impact reimbursement to the chapters, such as, if officers are not up to date, information is sent to the wrong person, delaying reimbursement. In addition to the annual Chapter Stipend, there are other kinds of financial support that the MTT-S offers chapters, such as, travel support and local workshop seed support. However, funding must be requested, look in the Chapter Officers' Handbook for forms and information and send requests to Samir El-Ghazaly. We are continually puzzled at how few Chapters actually request any financial support—we are here

(continued on next page)

Membership Services

(continued from previous page)

to help, all you need to do is make the request!! A total of \$19,400 U.S. was provided to 20+ chapters in 1994.

Membership Recruiting

Membership recruiting occurred with Membership Booths at the San Diego IMS, APMC, EuMC, Military Microwaves, and the 1994 MTT-S India Workshop. Thanks for all the local support in these activities, we added over 100 new members overall, most new to both the IEEE and MTT-S. We will continue such activities in 1995 and request support from local chapters at such activities. Contact Jitendra Goel for information, materials and special new member rates for membership booths. Chapters should remember that chapters in Regions 1-6 and Regions 7-10 with the largest percentage membership gain each year can get a \$200 U.S. award. The 1994 winners were the India Council, Korea Council, Virginia Mountain, and Dayton chapters.

We have also started a significant new member recruiting activity with the formulation of a MTT-S Campus Liaison Group which meet together for the first time at the San Diego IMS. The recruiting and retaining of student members is very important to MTT-S. They are the future members and leaders of MTT-S. Roger Pollard has started this effort and will again have a luncheon meeting at the Orlando IMS. All interested should contact Roger.

Former Soviet Union/Eastern European Chapters

Rolf Jansen (newly elected Division IV director) and Mario Maury, Jr. (newly elected MTT-S Vice-President and past Membership Services Chair) have been very actively working on creating new chapters in these formerly closed areas. This has resulted in two new chapters in 1994, one in Russia and the other in Ukraine. A multi-societal effort to provide back issues of *Transactions*, an idea that initially originated with the MTT-S and ED-S, has now been enlarged to include most of the IEEE Societies. With Rolf and Mario's aid, Membership Services will continue to reach out to the potential members in these areas.

Initiated Chapter E-mail Program

The information highway is with us and the MTT-S is on it. Elsewhere in this Newsletter there are description of the IEEE and MTT-S (try mtt.info@ieee.org) activities available by e-mail, Internet or WWW. J. K. McKinney has been working with chapters to set up e-mail links between chapters and the Membership Services Committee. You will be able to file chapter reports and reimbursement requests electronically. This should take less effort and speed up the response time. Make sure J. K. McKinney or Joe Staudinger have your chapter's e-mail address. For those chapters that do not presently have the use of an e-mail service, the MTT-S AdCom has authorized Membership Services to provide financial assistance in obtaining an e-mail connection. Contact J. K. for more information.

Here to Help

The MTT-S exists for the benefit of its membership and the Membership Services Committee exists to aid in providing that benefit. Contact John Barr or Ed Rezek if you have any suggestions on how the MTT-S can better serve its membership. Ideas for improvement in the Newsletter or Transceiver? Need a meeting Speaker? (try the Microwave Distinguished Lecture—contact Kris Agarwal). Starting up a new chapter? Need help in acquiring e-mail access? The Membership Services Committee is here to make the MTT-S function better. Drop us a note or drop by the New Member Booth at Orlando and let us know how we are doing.

1995 IMS Guest Program

(continued from page 7)

serve which replicates the Pacific coastline. Other attractions include Terrors of the Deep, The Whale and Dolphin Discovery, Penguin Encounter, etc. A light lunch is served overlooking the Water Ski Show.

On Friday, May 19, you can learn how to paddle a sea kayak (anyone can do it!) and you will experience one of the most unique wilderness areas in Mosquito Lagoon, just south of New Smyrna Beach. You will see many species of birds and probably dolphins and other wildlife. You will also climb an ancient Indian midden and learn some history of this beautiful area. All equipment, snacks, beverages and a delicious buffet lunch is included (\$75.00 per person, transportation cost not included).

If you plan on staying the weekend, there is also available a two-day, one-night trip in the wilderness area of the Ocala National Forest, meandering down a spring river, camping along the banks, building a campfire at night. Plenty of wildlife among the towering oaks and pine forest and the water is fresh and beautiful! Everything is included. Just bring your clothes (price is \$180.00 per person).

If you would like to do either of these tours, held on Friday and/or the weekend, please contact ESCAPE TOURS OUTFITTERS, KAYAK TOURING ADVENTURES, EUSTIS, FL. 32726. Or call the office at (904) 589-7978 or fax (904) 483-3555.

One more thing I would like to mention is the *Microwave Journal* Reception/Magic Night, Monday evening, May 15, that will be held at one of the most lively places in Orlando. It's called Church Street Station. Here you will be able to experience Florida at its best. The theme at the Presidential Suite is "EVERGLADES ESCAPADE." Anything you thought Florida was will be here that evening. Come and enjoy the evening! It will be held from 6-8:30 p.m. Transportation is provided from the Convention Center and return will be to your hotels. After the M. J. Reception/Magic night, you are free to go and enjoy yourselves throughout the Church Street complex at no extra charge to you.

Come and enjoy Orlando at its finest. We will be looking forward to seeing you again and meeting new faces.

ARFTG Highlights

(continued from page 20)

- "Error Correction in On-Wafer Harmonic Power Measurements," P. Winson (Department of Electrical Engineering, University of South Florida)
- "Noise Parameter Data Comparison While Varying the On-Wafer S-Parameter Calibration Technique," J. R. Fenton (TRW Space and Electronics Group)
- "S-Parameter Test Set for Pulsed Networks," A. H. Regan (Los Alamos Nat'l Lab.), C. D. Ziomek (Los Alamos N. L.), T. R. Brooks (Los Alamos N. L.)
- "Combining RF Functional Testing with In-Circuit Test Systems," G. Talen (Philips Broadband Networks, Inc.)
- "Improved Scalar Transmission Measurements Using Vector Source Match Correction," Chris Potter (Marconi Instruments)
- Panel Discussion on "The Balance Between Practical Microwave Measurements and Metrology."

In addition, ARFTG and National Institute of Standards and Technology (NIST) jointly presented a two-day short course on Microwave Metrology prior to the Boulder meeting. Robert Judish of NIST was the short course organizer. The presenters were:

Roger Marks	NIST	Microwave Circuit Theory
John Juroshek	NIST	Impedance Standards
Manly Weidman	NIST	Power Measurements
Fred Clague	NIST	Power Measurements
Dave Wait	NIST	Noise Measurements
Dylan Williams	NIST	On-Wafer Measurements
Leonard Hayden	Cascade Microtech	Time Domain Measurements
Doug Rytting	HP	VNA Error Correction & Models
Ken Wong	HP	VNA Calibration
Bill Oldfield	Wiltron	VNA Verification
Harmon Banning	Gore & Associates	Precision Connectors

The Conference Chair was Ray Tucker, Rome Laboratory/ERST-A, 525 Brooks Road, Griffiss AFB, NY 13441-4505, (w) (315) 330-3884, (fax) (315) 330-7083 and Conference TPC was Ron Ginley, NIST, 325 Broadway, MS 813.06, Boulder, CO (w) (303) 497-3634, (fax) (303) 497-3970. A post-conference digest is available, contact: Henry Burger, ARFTG, 1008 East Baseline Road, No. 955, Tempe, AZ 85283-1314. Cost is \$20.00 for an ARFTG Member and \$35.00 for a non-member. Notes from the Microwave Metrology short course are also available at a cost of \$100. An additional \$9.00 is requested for airmail outside the USA.

One of the more enjoyable activities of any professional organization is the recognition of outstanding achievement. During the 44th Conference, ARFTG rec-

ognized; John W. Bandler with the Automated Measurements Career Award; Roger B. Marks and Dylan Williams with the Automated Measurements Technology Award; and Distinguished Service Award for William E. Pastori.

45th ARFTG Conference— Testing and CAD of RFICs

The 45th ARFTG Conference will be held in Orlando, FL at the Orlando Visitors and Convention Center on May 19, 1995, as part on 1995 MTT-S International Microwave Symposium. The theme of this one day technical conference with concurrent manufacture exhibits will be *Testing and CAD of RFICs*. Papers are invited which identify problems and/or solutions in this area. In addition, papers concerning all other areas of microwave measurements and design are welcome.

Those interested in participating should contact Conference Chair: Edward Godshalk, Tektronix, PO Box 500, M/S 50-320, Beaverton, OR 97077, (w) 503-627-4772, (fax) 503-627-5177 or Conference TPC: David Walker, NIST, 325 Broadway, MS 813.06, Boulder, CO 80303, (w) 303-497-5490, (fax) 303-497-3970, or e-mail: walker@bldrdoc.gov. Deadline for paper submissions is March 3, 1995. Also, see the IMS-1995 registration materials for more information concerning times and location. Those interested in exhibiting should contact: Bill Pastori, Maury Microwave Corp., 2900 Inland Empire Boulevard, Ontario, CA 91764, (w) (909) 987-4715, (f) (909) 987-1112.

Along with the technical presentations, the attendees will have ample time for informal discussion among themselves during the breaks and during the provided lunch. There will be time for discussion with vendors and viewing of exhibits to see the latest in automation and measurement products. The registration fee includes technical sessions, exhibits, lunch and break refreshments, one year membership in ARFTG and a post-conference digest of the presented papers.

EXCOM Activities

At the Boulder meeting, those elected or reelected to three year EXCOM terms were Harmon Banning, Michael Fennely, Robert Judish and William Pastori. In addition, EXCOM officer elections were held and officers elected were Gary Simpson as President, Kevin Kerwin as Vice-President, William Pastori as Treasurer, and Pat Nolan as Secretary.

Measurement Professional? or Interested in Learning More?

We will be looking forward to discussing the latest in measurement automation and accuracy with you in Orlando. ARFTG brings you the latest in RF, Microwave and Millimeter wave analysis, design and measurement. State-of-the-art papers are presented twice a year. If you are involved in automated measurement techniques, come and join your peers and keep current with our ever-evolving technology. For more information on ARFTG or future conferences, write: John Barr, Hewlett-Packard, NMD, Santa Rosa System Division R&D - 3US-Q, 1400 Fountaingrove Parkway, Santa Rosa, CA 95405-1799.



ANNOUNCEMENT AND CALL FOR PAPERS



First International Workshop on Transmission Line Matrix (TLM) Modeling – Theory and Applications

Co-sponsored by the IEEE Microwave Theory and Techniques Society
and in collaboration with the MTT-15 Technical Committee on Field Theory

August 1 to 3, 1995

University of Victoria, Victoria, British Columbia, Canada

preceded by an

Introductory Short Course on TLM on July 31, 1995

Objective

The principal objective of this International Research Workshop is to bring together experts in computational electromagnetics to assess the state of the art in TLM modeling of electromagnetic fields, to explore its capabilities, applications, limitations and future developments, and to evaluate its strengths and weaknesses with respect to other modeling techniques.

Introductory Short Course (July 31, 1995)

A one-day Short Course on the Theory and Applications of TLM will be offered on July 31, 1995, prior to the workshop. It will provide an introduction to TLM techniques for those workshop participants who have no or little working experience in TLM modelling. A copy of the course transparencies is included in the workshop fee.

Workshop (August 1 to 3, 1995)

This three-day Workshop will feature research presentations by invited international experts in TLM modeling, as well as contributed papers submitted for presentation. All papers will be refereed by the International Steering and Program Committee. The central theme will be Transmission Line Matrix (TLM) modeling of electromagnetic fields and its applications. The Workshop will be held during the week immediately following the "Progress in Electromagnetic Research Symposium 1995" at the University of Washington in Seattle. The first day of the Workshop will be devoted to the theoretical foundations and numerical properties of TLM algorithms. On the second day the focus will be on applications: TLM modeling of guiding and radiating structures, field-theory based design techniques and electromagnetic interference and compatibility issues. The third day will emphasize other aspects of TLM theory and applications, including coupled problems, non-electromagnetic phenomena, computer implementation aspects, and comparison with other methods.

Software Demonstrations

TLM software, electromagnetic simulators and CAD tools will be demonstrated during the Workshop. A limited number of workstations and PC's will be available for demonstrations in the meeting area during breaks and after the official sessions. Participants are welcome to bring their own computers.

Workshop Digest

A digest containing the written contributions by the Invited Keynote Speakers and the contributed papers will be available at the event.

On-line information is available on the World-Wide Web at <http://charge.uvic.ca/>

International Steering and Program Committee

Wolfgang J.R. Hoefler	Workshop Director University of Victoria, Canada
Ruediger Vahldieck	Workshop Co-Director University of Victoria, Canada
Christos Christopoulos	University of Nottingham, U.K.
Michael Krumpholz	Univ. of Michigan, Ann Arbor, U.S.A.
Peter Russer	Ferdinand Braun Institut, Berlin, Germany
Pierre Saguet	University of Grenoble, France

Invited Keynote Speakers

Zhizhang Chen	T.U. of Nova Scotia
Christos Christopoulos	Univ. of Nottingham
Donard De Cogan	Univ. of East Anglia
Fred German	Texas Instruments
David Johns	KCC, Nottingham
Michael Krumpholz	Univ. of Michigan, Ann Arbor
Joe LoVetri	Univ. of Western Ontario
Michel Ney	ENST Bretagne, Brest
John Nielsen	BNR, Ottawa
Dominique Pompei	Univ. of Nice-Sophia Antipolis
Peter Russer	Ferdinand Braun Institut & T.U. Munchen
Pierre Saguet	Univ. of Grenoble
Neil Simons	CRC, Ottawa
Ruediger Vahldieck	Univ. of Victoria

Submission Guidelines

Three copies of a single sheet summary. This sheet should indicate the title, author(s), complete mailing address, FAX number and E-mail address (if available). Text or PostScript submissions can be sent by E-mail or FTP.

Important Dates

Submission of summary by April 30, 1995.
Notification of authors by May 15, 1995.
Deadline for the final manuscript June 15, 1995.

Fee Schedule

Workshop only: \$250, short course only: \$100, workshop and short course: \$300. All funds in Canadian dollars.

----- Copy, detach and return. -----

First International Workshop on Transmission Line Matrix (TLM) Modeling – Theory and Applications

August 1 to 3, 1995, University of Victoria, Canada

I plan to attend (delete as appropriate) workshop only (\$250) / short course only (\$100) / workshop & short course (\$300) (Canadian dollars)

I plan to submit a summary by April 30, 1995: yes/no. Please send a preliminary program: yes/no.

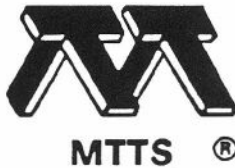
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Mailing Address _____ City _____ State _____

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Please return to:

TLM Workshop c/o S. Cole, Department of Electrical & Computer Engineering, University of Victoria, P.O. Box 3055, M.S. 8610, Victoria, B.C., V8W 3P6, Canada. Tel. +1 (604) 721- 6025, FAX +1 (604) 721-6230 or 6052, E-mail: scole@ece.uvic.ca



AUTOMATIC RF TECHNIQUES GROUP

CALL FOR PAPERS SPRING 1995 CONFERENCE

The Automatic RF Techniques Group will hold its 45th Conference in conjunction with MTT-S in Orlando, FL, May 16, 1995. The conference theme is:

TESTING AND DESIGN OF RFIC'S

Radio frequency integrated circuits continue to expand the performance, complexity, and volume-production envelopes. Competitive pressures are forcing RF design and test engineers to develop circuits and test techniques which combine high performance, ease-of-use, and low cost. Papers are solicited on topics related to RFIC design and testing, including circuit modeling and simulation, design-for-testability and manufacturability, on-wafer RF testing using frequency- and time-domain techniques, efficient in-process monitoring and testing methods which lead to overall RFIC quality improvements, and comparison and compatibility issues with conventional techniques and products.

Papers are also invited in other areas of automated microwave and RF testing, including improved techniques for calibration and verification, MMIC-related measurement issues, CAD, CAT, millimeter wave systems, and other topics of interest to the RF/microwave community.

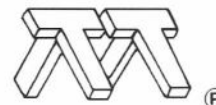
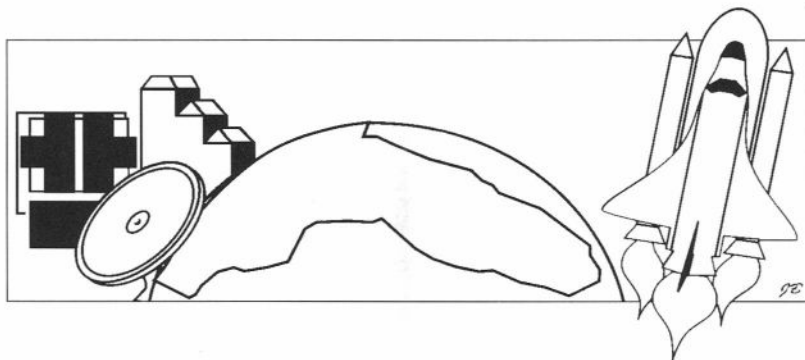
Presentations should be informal 20-minute talks using viewgraphs or 35 mm slides. Authors are requested to submit two copies of a one-page abstract and a 500 to 1000 word summary, including illustrations, to allow evaluation with regard to the interests of the attendees. This submittal should be made to the Technical Program Chair no later than **March 3, 1995**. Early submissions are encouraged and will allow the authors to receive advance publicity. Manufacturers interested in setting up an exhibit should contact the Exhibits Chair for information and application forms. More information can be obtained from the Conference Chair, Mr. Edward M. Godshalk, tel. (503)628-4772, fax (503)627-5177.

Technical Program Chair:

Mr. David K. Walker
National Inst. of Stds. & Tech.
325 Broadway
Mail Stop 813.06
Boulder CO 80303
Tel: (303)497-5490, FAX: -3970
E-mail: walker@bldrdoc.gov

Exhibits Chair:

Mr. W. E. Pastori
Maury Microwave Corp.
2900 Inland Empire Blvd.
Ontario CA 91764
Tel: (909)987-4715
Fax: (909)987-1112



1995 IEEE MTT-S International Microwave Symposium

Microwaves on the Move!

- International Microwave Symposium
- Microwave and Millimeter-Wave Circuits Symposium
- National Telesystems Conference
- 45th Automatic Radio Frequency Techniques Group Conference



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