

# 1992 Microwave Career Award

## Theodore S. Saad



The Microwave Career Award is the highest honor bestowed by MTT-S. It recognizes an individual for a lifetime career of meritorious service and technical excellence in our field.

The 1992 award was made to Theodore S. Saad, Chairman and CEO of Sage Laboratories Inc.

Ted Saad had a distinguished technical career. He was a member of the famous M.I.T. Radiation Laboratory, during World War II, and his technical creativeness is best characterized by the 17 patents he received. His concern for broad dissemination of practical information to microwave engineers led to him being the cofounder of Microwave Journal and Artech House Publishing.

Mr Saad, who has been a dedicated MTT member and at this time is the distinguished "patriarch" of MTT-S ADCOM, has been honored by MTT-S in the past and it is certainly appropriate to bestow on him MTT-S's highest award. His Career Award Citation reads:

**"FOR A CAREER OF MERITORIOUS ACHIEVEMENT AND OUTSTANDING CONTRIBUTIONS TO THE FIELD OF MICROWAVE THEORY AND TECHNIQUES"**

The award consists of a plaque, certificate and US\$2000.

**Theodore S. Saad** (S'41, A'45, SM'54, F'65, LF'86) received the Bachelor's Degree in Electrical Engineering from M.I.T. in 1941. During his senior year, he took his first microwave course under W.W. Hansen. For his senior thesis, under the supervision of Professor W.W. Barrow, he did a study of waveguide bends at 10cm wavelength, a project for which he designed his first slotted line.

After 7 months at Sylvania, working on the manufacture and test of fluorescent lamps, he joined the M.I.T. Radiation laboratory as a Research Associate in January 1942. He remained there until November 1945. At the Laboratory, he worked on a variety of projects, first in the R.F. Components Group and later, in the Beacon Group.

In November 1945, he joined the Submarine Signal Company as a Senior Development Engineer and assistant head of the microwave group in charge of design. The group was responsible for producing the first KU Band radar set, under contract to the U.S. Navy.

In March 1949, Mr. Saad helped to form Microwave Development Laboratories Inc., where he was Vice President and Chief Engineer. While at MDL, he was responsible for the design of a number of passive microwave components, including rotary joints, directional couplers, wavemeters, mixers, waveguide switches, etc . . .

In October 1953, he joined Sylvania as a Microwave Engineering Specialist. While there, he helped to standardize the measurement of microwave diodes. In addition, he designed new microwave diodes.

In January 1955, he co-founded and became President and Chairman of the Board of Sage Laboratories, Inc. He is presently Chairman and CEO. During his years at Sage, he has designed a variety of passive microwave components, including mixers, diode holders, directional couplers, rotary joints, phase shifters, Wireline, etc . . .

As a practicing engineer, he has been awarded 17 patents.

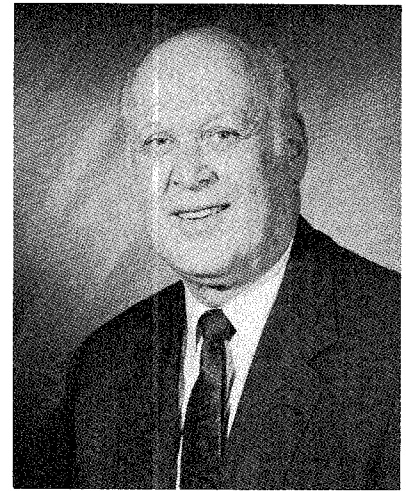
Mr. Saad is a co-founder of Horizon House Microwave Inc., which publishes the Microwave Journal and Telecommunications. He is also a co-founder of Artech House, which publishes technical books. He was the creator and editor of the Microwave Engineer's Handbook.

Mr. Saad was a member of the second Administrative Committee of the Microwave Society in 1953, and has been an active participant ever since. Some of his Adcom duties have included: Chairman, Editor of the Transactions, and National Lecturer. He was responsible for the creation of the MTT Historical Collection and is the Historian of the Society. He was elected an Honorary Life Member in 1974. He received the Centennial Medal of the IEEE in 1984, and was the first recipient of the MTT Distinguished Service Award in 1983. For several years, he has also been active on several IEEE Committees, including TAB, RAB and PUB. He was Chairman of the IEEE Public Information Committee, the TAB Finance Committee, and Electro. In 1987, he was elected a Fellow of the American Association for the Advancement of Science.

Mr. Saad was a member of the National Academy of Sciences Panel 272,000, advisory to the Radio Standards Engineering Division of the Institute for Basic Standards, National Bureau of Standards from 1967 through 1971. He was Chairman in 1969 and 1970.

# 1992 Microwave Application Award

## Bernard Hershenov



The Microwave Application Award is presented aperiodically to an individual for an outstanding application of microwave theory and techniques. The eligibility requirements are creation of a new device, component, or technique, novel use of components or both.

The 1992 recipient of the award is Dr. Bernard Hershenov, Director, East Asia Business Development of the David Sarnoff Research Center, a subsidiary of SRI International.

The award citation reads: "For the Introduction of the Microstrip Ferrite Circulator"

A key component in any microwave system is the non-reciprocal element known as the circulator. It is essential to the design of high performance, stable microwave systems.

In retrospect, the microwave circulator was an obvious solution to the problem of designing microstrip systems. But at the time of its invention it was far from obvious that a small, magnetized ferromagnetic puck could resonate with unconfined fringe fields in such a way that the sum of the clockwise and counterclockwise modes, excited at one port, would add at the second port and subtract at the third port over a relatively wide bandwidth. This circulator was used in the first low noise X-band receiver fabricated at RCA Laboratories.

The microwave circulator was first published in the IEEE Proceedings in December 1966 by B. Hershenov, entitled: "X-Band Microstrip Circulator". He received Patent #345 6213 on 7/15/69 for "Single Ground Plane Junction Circulator Having Dielectric Substrate."

**Bernard Hershenov** received his BS degree in Physics in 1950, his MS degree in Mathematics in 1952 and his PhD in Electrical Engineering in 1959, all from the University of Michigan, Ann Arbor, Michigan. From 1951 to 1952 he worked for the University of Michigan Dental Materials Laboratory, studying the physical properties of dentin. From 1952 to 1959 he was employed as a research assistant, research associate, and finally, associate research engineer with the University of Michigan Research Institute. During this period he worked on domain wall resonance in ferrites, high-power traveling-wave tubes, and crossed-field devices. From 1959 to 1960 he worked on high-power unimoded magnetrons for General Electric Company.

In 1960 Dr. Hershenov joined the Microwave Research Laboratory of RCA Laboratories (also known as the David Sarnoff Research Center), Princeton, New Jersey, and, in 1968, became Head of the Microwave Integrated Circuits group. In 1972 he was appointed Director, RCA Research Laboratories, Tokyo, where he redirected the work into areas including penetration phosphors, solar cells using aqueous deposition of II-VI compounds, photocatalytic semiconductors, electrochromic displays, latex displays, and microsonics. He returned to RCA Laboratories, Princeton, in 1975 as a Staff Advisor, and in 1977 headed the Energy Systems Analysis Group. In 1979 he was appointed Director, Solid State Devices Laboratory and in 1983 he assumed responsibility as Director, Optical Systems and Display Materials Research Laboratory. In 1984 he was appointed Director, Optoelectronics Research Laboratory. Following the purchase of RCA by GE in 1986, and the subsequent transfer of the David Sarnoff Research Laboratories to SRI International as a subsidiary in April 1987, Dr. Hershenov was appointed Director, East Asia Business Development.

At RCA Labs, he worked on space-charge waves in electron beams, crossed-field amplifiers, ferrite devices, magnetic semiconductors, microwave circuits, and microwave integrated circuits. He directed work on millimeter wave devices and circuits, microwave FETs, TRAPATTs, surface-state chemistry and physics related to boundary lubricant properties for VideoDisc, energy conversion, displays, microsonics, phosphors, discrete silicon power devices, electro-optic devices, optical recording and communications. In 1964 and 1967, he was the recipient of RCA Outstanding Achievement Awards.

Dr. Hershenov served as Secretary-Treasurer of the IEEE Magnetics Society and was a member of the Magnetic Materials Conference Advisory Committee, the Technical Committee on Microwave Integrated Circuits of the PGMITT, and the Editorial Board of Transactions on MTT. He was the first chairman of the Microwave Magnetics Technical Committee of the Magnetics Society (1965-1969). From 1964 to 1966 he was co-adjutant in the Mathematics Department of University College, Rutgers University, at New Brunswick, New Jersey. He is currently a member of the Physics Advisory Council of the University of Michigan.

Dr. Hershenov is a Fellow of the IEEE and a member of Phi Kappa Phi. He is listed in Who's Who in America, American Men of Science, Who's Who in Technology Today, Who's Who in Engineering, Who's Who in Engineering International, and American Men and Women of Science.

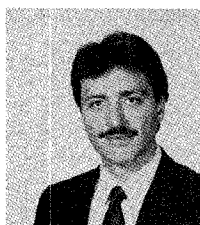
# 1992 Microwave Prize

**R. Majidi-Ahy, C.K. Nishimoto, M. Riaziat, M. Glenn,  
S. Silverman, S. Weng, Y. Pao, G.A. Zdasiuk, S.G. Bandy  
and Z.C.H. Tan**

The Microwave Prize is awarded annually to the author or authors of a paper, published in the IEEE Transactions on Microwave Theory and Techniques, proceedings of the IEEE, or another official IEEE publication, which is judged to be the most significant contribution in the field of interest of the Society in the calendar year preceding that in which the selection is made. The award consists of a certificate and a check for US\$1000.

The 1992 Microwave Prize was awarded to:

R. Majidi-Ahy, C.K. Nishimoto, M. Riaziat, M. Glenn, S. Silverman, S. Weng, Y. Pao, G.A. Zdasiuk, S.G. Bandy and Z.C.H. Tan for their paper, "5-100GHz InP Coplanar Waveguide MMIC Distributed Amplifier", which appeared in the IEEE Transactions on Microwave Theory and Techniques, Vol. MTT-38, pp 1986-1993, December 1990.

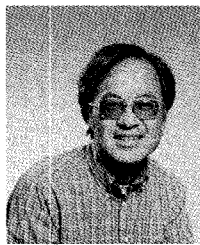


**Reza Majidi-Ahy** received his PhD in Electrical Engineering from Stanford University, B.S.E.E. and M.S.E.E. from University of California at San Diego. His thesis at Stanford University dealt with 100 GHz GaAs MMIC's, Electrooptic and Electronic Wafer Probes. He was a recipient of a fellowship from Rockwell International Science Center, and Stanford Center for Integrated Systems.

He is currently a senior member of technical staff at Varian Research Center, Palo Alto, California, where he has been conducting research on millimeter-wave electronic and high speed optoelectronic InP and GaAs devices, MMIC's and OE-IC's. His current research is in high-speed digital and analog signal processing. Prior to his PhD work at Stanford University, Reza was a senior R & D engineer at Microwave Technology Inc. of Fremont, California and with Harris Microwave Semiconductor Inc. of Milpitas, California.

Reza has been an adjunct professor in the electrical engineering department of Santa Clara university since 1984, where he teaches graduate courses on microwave linear and nonlinear circuits, optoelectronics, and high-speed pulse and digital techniques. He has also taught courses at University of California, Berkeley (Extension) and at Northeastern University.

He has published more than 25 articles on microwave and millimeter-wave amplifiers, frequency multipliers, mixers, coplanar transmission lines, heterostructure devices, and high-speed optical and electronic wafer probing. He also holds several patents in the area of microwave and millimeter-wave circuits and devices.



**Clifford K. Nishimoto** received the B.S. degree in electronic engineering from California Polytechnic State University at San Luis Obispo in 1973.

Currently, he is a process engineer at Varian Associates Research Center, Palo Alto, CA. He was involved with the fabrication and testing of GaAs MESFET's, AlGaAs/GaAs MODFET's and HEMT MMIC's for microwave applications. His

work also included electron-beam lithography. Presently, he is working on vacuum microelectronic devices.



**M.L. Riaziat** is a senior member of technical staff at Varian Research Center's Electron Physics group in Palo Alto, California, working primarily on high speed optoelectronics for medical applications.

Previously, he held the position of the manager of the electro-optics group at the same laboratory where the major emphasis was the development of microwave fiber-optic networks.

From 1984 to 1989 he was working with the MMIC group at Varian where he was responsible for the development of coplanar waveguide integrated circuits as well as InP based HEMTs, and MMICs.

He received the B.S. degree in engineering physics from the University of Oklahoma in 1978 and the M.S. and the Ph.D. degrees in applied physics from Stanford University in 1980 and 1983 respectively.



**Michael Glenn** (M'81) received the B.S.E.E. in 1980 from the University of Washington, Seattle, and the M.S.E.E. in 1986 from the Santa Clara University, Santa Clara, CA.

He is currently employed at Raynet Corporation developing automated test for fiber optic communication systems. Previously he was involved with automated measurements and characterization of microwave and millimeter wave devices and circuits, first at Avantek, and then at the Varian Research Center. He also worked at Wiltron developing microwave test equipment.

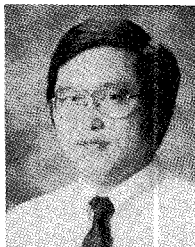
**S. Silverman**, photograph and biography not available at the time of publication.

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**Shang-Lin Weng**, received the Ph.D. degree in surface physics from the University of Pennsylvania in 1978. He was born in Taiwan in 1949 and received the B.S. degree in 1971 from the Physics Department of National Taiwan University.

In 1978 he joined Bell Laboratories (Murray Hill, NJ) as a Postdoctoral Member of Technical Staff to study surface science. In 1979 he went on to Brookhaven National Laboratory to continue his research in surface physics as a Staff Physicist. In 1983 he joined the Varian Research Center as a Senior Engineer to study molecular beam epitaxy (MBE) of III-V compound semiconductors and its application in microwave devices and circuits. In January 1990 he joined Varian MBE Equipment Operations as the Applications Lab Manager and has since been in charge of all research activities related to the advancement of MBE materials, equipment development, and marketing support.

Dr. Weng received the Wayne B. Nottingham Prize in 1977 for his work in surface physics. He has published more than 35 papers in a variety of refereed journals and has received one patent. He is currently a member of the American Physical Society, the American Vacuum Society, and the Materials Research Society.



**Yi-Ching Pao** received his B.S. degree in Electrophysics from National Chiao-Tung University in 1981, the MSEE degree from Pennsylvania State University in 1983, and the Ph.D. degree in electrical engineering from Stanford University in 1990 through the Honors Co-op program.

In 1983, he joined Varian Associates III-V Device Center, Santa Clara, CA., as MBE and device engineer working on epitaxial device design and fabrication of IMPATT, GUNN, MESFETS and HEMTs. In early 1991, Varian III-V Device Center was acquired by Litton Systems, Inc. and became Litton Solid State Division, where he is currently manager of MBE operation and New Device Development. Based on his accomplishments in the epitaxial material and microwave device development, Dr. Pao was named "Process Engineer of the Year" for 1986 by "Semiconductor International". He is also the recipient of 1990 R&D award for the development of millimeter wave monolithic integrated circuit (MMIC) on InAlAs/InGaAs/InP material system.

His research has been involved in developing Molecular Beam Epitaxy (MBE) growth of compound materials for high speed and optoelectronic devices, and investigating the high speed solid state device physics. He has authored or coauthored over 50 technical papers, and holds several patents in the field of MBE and high speed devices. Dr. Pao is also affiliated with Stanford University as consulting assistant professor in the Department of Electrical Engineering, where he supervises graduate research activities. He is a member of IEEE and Sigma Xi.

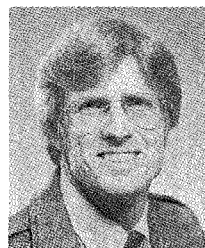


**George Zdasiuk** was born in Toronto, Canada. He received the B.A.Sc. Degree in Engineering Science and the M.Sc. Degree in Physics from the University of Toronto in 1974 and 1975, respectively. He subsequently received the Ph.D. Degree in Applied Physics from Stanford University in 1981. His thesis research was in the area of quantum electronics.

In 1980, Dr. Zdasiuk joined the Varian Associates Solid State Laboratory. He has been involved in the development of submicron GaAs FET devices, microwave device characterization techniques and the design and fabrication of GaAs and InP monolithic microwave and optoelectronic integrated circuits. In 1985 he became Director of the Solid State Device Laboratory at the Varian Research Center.

In 1990 Dr. Zdasiuk became Director of the Electron Physics Laboratory at Varian's Ginzton Research Center. He currently manages R&D programs in microwave accelerators for radiation therapy, medical imaging, vacuum microelectronics, high temperature superconductivity and digital signal processing.

Dr. Zdasiuk is a member of the Institute of Electrical and Electronics Engineers and the American Physical Society.



**Steve G. Bandy** received a B.S. degree in electrical engineering from Walla Walla College in 1965 and a Ph.D. degree in electrical engineering from Stanford University in 1970.

He joined the Varian Research Center of Varian Associates in Palo Alto, CA in 1969 and has since been responsible for advanced studies on III-V discrete FETs for use in low noise and power applications. In 1975, he was appointed manager of the Microwave Device Group, and in 1985 became manager of the Microwave Circuits and Devices Group of the Research Center. In 1990, the group was broadened to the Electron Device Group, including such activities as vacuum microelectronics, medical imaging and signal processing. He has published more than 30 papers on microwave solid-state devices and circuits, and holds several patents in these areas.

Dr. Bandy is a member of Sigma Xi.

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**Zoilo C. H. Tan**, received the B.S. degree in chemical engineering from Cheng Kung University, Taiwan, in 1963, the M.S. degree in physical chemistry from the University of Arkansas in 1966, and the Ph.D. degree in nuclear chemistry from the Massachusetts Institute of Technology in 1969.

His research interests are in the development of resist and processes for advanced microlithography. He was the key inventor of Kodak MX 771 X-ray resist and ZX 784 e-beam resist. Following a brief career as staff scientist at Synertek Inc., he joined the Gate Array Division of Fairchild Semiconductor in 1985, where he was engaged in various resist processes for both optical and e-beam lithography. He is currently Manager of the E-Beam Center, Varian Research Center, Varian Associates, Inc., Palo Alto, CA

# 1992 Distinguished Service Award

## Richard A. Sparks



The Distinguished Service Award is presented to honor an individual who has given outstanding service over a period of years for the benefit and advancement of MTT-S.

This years honoree is Richard A Sparks, retired Consulting Engineer of Raytheon's Radar Systems Laboratory.

Mr Sparks has served MTT-S in many functions and in all of them he has served honorably and always in the best interest of our members.

The citation for his distinguished service reads:

**"FOR HIS OUTSTANDING AND DEDICATED SERVICE TO THE SOCIETY".**

The award consists of a plaque and a certificate.

**Richard A. Sparks** was born in Philadelphia, PA on 16 December 1931. He graduated from the Central High School and spent four years in the U.S. Navy during the Korean War. He received the BA degree in Physics from Temple University and MS degree in Physics from the University of Maryland.

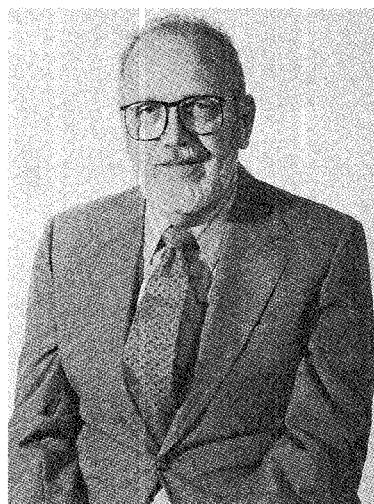
His early professional employment included Johns Hopkins University Applied Physics Laboratory, Litton Systems and Microwave Associates. From 1967 to 1991 he worked at Raytheon Missile Systems Division, the last nine years as a Consulting Engineer in the Radar Systems Laboratory. He currently works as an independent consultant. Mr. Sparks is the author of more than 50 papers and presentations and has been awarded seven patents.

Mr. Sparks has been a member of the IEEE Microwave Theory and Techniques Society since 1960 and served as Program Chairman of the Washington, DC Chapter in 1964-65. On moving to the New England area in 1966 he was a member of the Local Arrangements Committee for the 1968 International Microwave Symposium and Secretary-Treasurer, Vice Chairman and Chairman of the Boston MTT-S Chapter during 1967-1970. He was an appointed member of the MTT-S Administrative Committee from 1970-1973 and an elected member from 1974-1982 serving as Vice President and President in 1981 and 1982, respectively. Following three years as ex-officio member AdCom, Mr. Sparks was Chairman of the International Liaison/Transnational Committee from 1984-1991. He was a recipient of the IEEE-MTT-S Centennial Medal in 1984 and the MTT-S Meritorious Service Award in 1986. Mr. Sparks also served as Vice Chairman of the 1991 IMS Steering Committee.

As a member of the Boston Section IEEE Executive Committee from 1986 to the present Mr. Sparks has served as Elected Committeeman, Secretary-Treasurer, Vice Chairman, Chairman and currently is Jr. Past Chairman. During this period he has organized microwave lectures series on packaging and computer aided design.

# 1992 Pioneer Award

## Robert M. Barrett



The Pioneer Award recognizes contributions which have made major impact on our field and have stood the test of time. The basis for the nomination is an archival paper in the field of interest of MTT-S, published at least 20 years prior to the year of the award. It recognizes important technical contributions that have had a continuing impact on the practice of microwave engineering, for a period exceeding two decades.

The 1992 recipient is Mr Robert M. Barrett, retired Director of the Solid State Sciences Directorate, Rome Air Development Center, at Hanscom Air Force Base, Bedford, MA.

Mr Barrett is cited "For Pioneering the Development of the Strip Transmission Line."

The work was first published in two papers entitled: "Microwave Printed Circuits," Radio and T.V. News, vol. 46, p. 16, Sept 1951. "Etched sheets serve as microwave components," Electronics, vol. 25, p. 114, June 1952. The impact of stripline technology on our industry is obvious and needs no further amplification.

The Pioneer Award consists of a plaque and a cash sum of US\$1000.

**Robert M. Barrett** was born in Farmington Utah, graduated from the University of California, Berkeley, with a B.S. in Electrical Engineering (1942). He did graduate work in physics at Boston University and the Massachusetts Institute of Technology.

During World War II he, as a Major in the Air Force, was responsible for radio and radar installation and maintenance at the Sacramento Air Depot, Air Material Command, California and for the Air Transport Command, Caribbean Wing, Morrison Field Florida.

Subsequent to the war Mr Barrett worked as a civilian scientist at the Air Force Cambridge Research Laboratories. During his career he was the chief of the Airborne Antenna Section, and the Instrumentation Section, of the Antenna Laboratory where he was concerned with missile antennas, microwave lenses, electronic scanning, transmission systems, and innovative instrumentation development. He later became the Deputy Director of the Electronics Research Directorate.

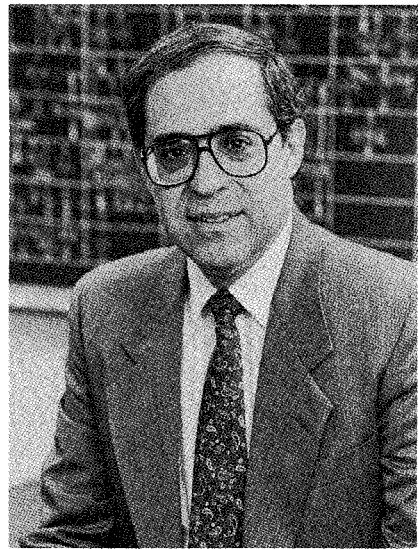
When the transistor started to be an important factor in the laboratories program he changed disciplines and became the chief of the Solid State Laboratory and at the time of his retirement he was the Director of the Solid State Sciences Directorate, Rome Air Development Center, at the Hanscom Air Force Base, Bedford MA.

He was responsible for the growth of the Solid State Sciences Directorate to the leading Department of Defense laboratory in this field. As the Director of Solid State Sciences Mr. Barrett was responsible for the establishment of innovative programs on the effect of radiation on solid state devices and their hardening as well as the well known program on the development of solid state materials.

During his scientific career Mr. Barrett also pursued photography, partially as a hobby and partially in connection with his work. He has recently retired from active laboratory work and has established a free-lance photography and desktop publishing business under the name of BARRETT PhotoGRAPHICS. He has exhibited widely and had a number of one man shows of his work. He is currently a resident of Bedford, MA.

# 1992 N. Walter Cox Award

**Barry E. Spielman**



The N. Walter Cox Award has been established in recognition of the qualities of N. Walter Cox and his service to the MTT Society prior to his untimely death in 1988.

It is given aperiodically to a Society volunteer whose efforts on behalf of MTT-S best exemplify his spirit and dedication. It consists of a plaque.

This year's recipient is Dr. Barry Spielman. He served in many different MTT-S functions, including as 1988 President. In all his assignments he distinguished himself through his talent to very discretely use his moderating influence to defuse critical situations while still keeping the goals in focus.

The citation reads: "For Exemplary Service Given in a Spirit of Selfless Dedication and Cooperation".

**Barry E. Spielman** (Senior Member, IEEE) received the B.S.E.E. degree from the Illinois Institute of Technology, Chicago, Illinois in 1964. He received the M.S.E.E. degree from the Pennsylvania State University in 1967; and the Ph.D. EE degree from Syracuse University, NY, in 1971.

In 1971, he joined the Naval Research Laboratory (NRL), Washington, D.C., as a research electronics engineer at which time he performed research involving application of numerical computational and classical methods of applied mathematics for analyzing isolated and coupled, novel, planar transmission structures leading to microwave integrated circuit (IC) components such as directional couplers, filters, and phase shifters. He corroborated analyzed performance using experimental models. He became Head to the Solid State Circuits Section at NRL in 1978 at which time he performed and led a variety of research projects in the areas of microwave and millimeter-wave component technology, encompassing both monolithic and hybrid IC technologies. These projects spanned research activity on electromagnetic wave propagation in arbitrary, mixed metal and dielectric planar media, dielectric planar resonators, fin line Schottky mixers for the mm-wave regime, nonlinear MESFET device and circuit modeling leading to microwave amplifiers, oscillators, multipliers, and active filters, InP mm-wave monolithic circuits, and microwave and mm-wave control components. He became Head of the Microwave Technology Branch at NRL in 1984. In this position he performed and supervised research on and exploratory development of devices, circuits and components for RF and signal processing functions, spanning frequencies from about 1 to 1000 GHz. More specifically, some of this work included R&D of electrically-large and heterostructure semi-conductor devices, monolithic circuits in III-Vs and silicon, low-loss dielectric-based guiding and resonant structures, and superconducting mixers/detectors. This research group became the focal point for the Navy's GaAs MMIC R&D activity. In 1987, he joined the Washington University in St. Louis, MO, where he currently serves as Professor in and Chairman of the Department of Electrical Engineering. He is currently engaged in research on thin-film, superconducting, microwave electronics. He has published and delivered more than sixty publications and presentations in the microwave field.

Dr. Spielman has served as President of the Microwave Theory and Techniques Society Administrative Committee.



# 1992 New IEEE Fellows

Fourteen MTT-S members who were evaluated by our Society were elected to the grade of Fellow effective January 1, 1992. The grade of Fellow is conferred in recognition of unusual professional distinction. It is awarded at the initiation of the IEEE Board of Directors after a rigorous nomination and evaluation process. Individuals receiving this distinction have demonstrated extraordinary contributions to one or more fields of electrical engineering, electronics, computer engineering and related sciences. This grade is not conferred automatically on nomination; only a fraction of those nominated are honored by elevation to the grade of Fellow IEEE.

<b>Dr. Krishna K. Agarwal</b>	<i>For pioneering the insertion of GaAs FETs in high-performance microwave receivers.</i>
<b>Norman R. Dietrich</b>	<i>For contributions to microwave circuit techniques and their application to microwave and lightwave components and subsystems.</i>
<b>Prof. Carl H. Durney</b>	<i>For contributions to electromagnetic dosimetry, the application of electromagnetics to health care, and to the interactions of electromagnetic fields with biological systems.</i>
<b>Dr. S. Jerry Fiedziuszko</b>	<i>For contributions to the advancement of dielectric resonator filters and multiplexers, especially for satellite applications.</i>
<b>Prof. Hans L. Hartnagel</b>	<i>For contributions to the field of microwave GaAs device design, optimization and applications.</i>
<b>Dr. Joseph Helszajn</b>	<i>For contributions to the theory and practice of ferrite engineering.</i>
<b>Terence H. Oxley</b>	<i>For contributions and technical leadership in the development of microwave and millimeter-wave components and subsystems.</i>
<b>Dr. Marian W. Pospieszalski</b>	<i>For contributions to the understanding and development of ultra-low-noise microwave amplifiers.</i>
<b>Dr. Arye Rosen</b>	<i>For innovation in semiconductor devices and circuits for use in microwave systems and for microwave applications to medicine.</i>
<b>Prof. Steven E. Schwarz</b>	<i>For contributions to engineering education, electronics, and microwave technology.</i>
<b>Dr. Craig P. Snapp</b>	<i>For leadership in and technical contributions to the development of silicon bipolar transistors and monolithic integrated circuit products for RF and microwave applications.</i>
<b>Dr. Hua Quen Tserng</b>	<i>For contributions to GaAs microwave devices and their application to monolithic microwave.</i>
<b>Dr. Kikuo Wakino</b>	<i>For the development of high-quality ceramic dielectric materials, and for contributions to their application.</i>
<b>Prof. Jerald A. Weiss</b>	<i>For contributions to the theory and design of planar waveguides and to the development of magnetic microwave devices.</i>