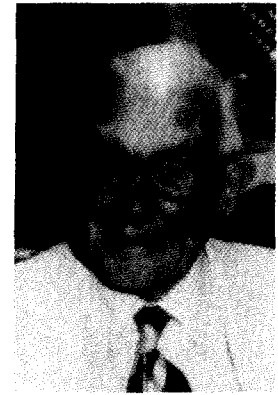


# 1985 Microwave Career Award

## Harold M. Barlow

*The Microwave Career Award* is presented to an individual "for a career of meritorious achievement and outstanding technical contribution in the field of microwave theory and techniques." The 1985 Microwave Career Award has been awarded to Dr. Harold M. Barlow.



Harold M. Barlow was born on November 15, 1899 in London, England. He received the BS (Engineering) degree in 1921 and the PhD (Science) in 1924 from London University. During the First World War, he served one and a half years with the British Navy working on long-wave radio in submarines. For his work he received from the Admiralty the citation "has performed valuable service in connection with the development of apparatus for naval communications." After graduating from London University, he joined his father in the family electrical contracting business, Barlow and Young Ltd. He began his long academic career in 1924, when his former professor Sir Ambrose Fleming offered him a post at the College of London as Assistant Lecturer in Design of Electrical Machines. His career at London University was broken only by service with the British Air Ministry during the six years of the Second World War. During World War II he worked on radio including microwaves and became Superintendent of the Radio Department at the Royal Aircraft Establishment, Farnborough, England.

The great developments in radar during World War II inspired him to concentrate his research on microwaves when he returned to University College London in 1946 as Professor of Electrical Engineering. It was a very difficult task to build up the resources for this new research school, particularly because the laboratories had been completely bombed out. "The effort was greatly helped by the splendid group of research workers who happily joined in the enterprise." He founded at University College the most important university center in microwaves in Great Britain. He exerted great influence there on the progress of microwaves, became very well recognized, and trained many students who later became prominent in their own right.

Dr. Barlow is now Professor Emeritus of University College London, having retired in 1967 after serving as Head of the Department of Electronic and Electrical Engineering for seventeen years. During his career he has participated in most of the varied activities of professional electrical engineers. He was a Director of Marconi Instruments Ltd., a consulting engineer with his own firm Barlow, Leslie, and Partners, and involved in a wide variety of academic pursuits. He published about fifty papers on microwave topics, including microwave measurements, surface waves, and oversized circular waveguides for telecommunications. His pioneering contributions, both theoretical and experimental, on surface waves were his most important. He wrote three books: **Microwaves and Waveguides**, 1950, **Microwave Measurements** (with A. L. Cullen), 1952, and **Radio Surface Waves** (with J. Brown), 1961. At the age of eighty-five, he is still contributing scientific papers, particularly on optical fibers.

Dr. Barlow has received numerous honors and awards. He has honorary Doctor of Science Degrees from Heriot Watt University, Edinburgh, and Sheffield University, England. He is an IEEE Fellow and a Fellow of the Royal Society (1961). The latter honor is particularly significant as Dr. Barlow was the first person in this field to be so elected, paving the way later for A. L. Cullen and E. A. Ash. He is recipient of the Faraday Medal (IEE), 1967, Dellinger Gold Medal (International Radio Union), 1969, Harold Hartley Medal, (Institute of Measurement and Control), 1973, Mervin J. Kelly Award (IEEE), 1975, and the Kelvin Premium, Fleming Premium, J. J. Thompson Premium, and the Oliver Lodge Premium, all IEE awards. Dr. Barlow is also a Honorary Member of the Japanese Institute of Electronics and Communications Engineers, a Foreign Associate of the US National Academy of Engineering, 1979, and Chairman British National Committee for Radio Science, 1968.

Dr. Barlow has served on many professional committees and was chairman and organizer of several symposia concerned with microwaves. For example, he was the general chairman of the first European Microwave Conference which was held in London in 1969. He also was general chairman of a symposium on "long-haul communications," mostly  $H_{01}$  mode in over-moded circular waveguide.

Because of his age and severe arthritis, it is not possible for Dr. Barlow to attend the symposium. The Microwave Career Award will be presented to him in a ceremony in England.



# 1985 Microwave Career Award

## Nathan Marcuvitz

*The Microwave Career Award* is presented to an individual “for a career of meritorious achievement and outstanding technical contribution in the field of microwave theory and techniques.” The 1985 Microwave Career Award has been awarded to Dr. Nathan Marcuvitz.

Nathan Marcuvitz was born December 29, 1913 in New York, New York. He received the B.S. degree in electrical engineering in 1935, the M.S. degree in 1941, and the Doctorate in electrophysics in 1947 all from the Polytechnic Institute of Brooklyn. He joined the RCA Laboratories as a student engineer in 1936 and performed research on electron tubes, iconoscopes, and orthicons for television applications. Dr. Marcuvitz joined the Radiation Laboratory of the Massachusetts Institute of Technology in December 1941 where he was engaged in microwave research until 1946.

Dr. Marcuvitz returned to the Polytechnic Institute of Brooklyn in 1946 as an assistant professor in the Department of Electrical Engineering. He obtained an associate professorship in 1949 and a full professorship in 1951. In 1957, he was appointed Director of the Microwave Research Institute, serving in this capacity until 1961, when he became Chairman of the newly formed Department of Electrophysics. Shortly thereafter and until 1963, Dr. Marcuvitz served as Vice-President of research as well as Acting Dean of the Graduate Center.

On leave from the Polytechnic Institute of Brooklyn, Dr. Marcuvitz became Assistant Director of Defense Research and Engineering for the Department of Defense in Washington, D.C. from 1963 to 1964. He was then appointed Dean of Research and Dean of the Graduate Center at the Polytechnic Institute of Brooklyn. In 1965 he became an Institute Professor, the first appointment of this kind at the Polytechnic.

In February 1966, Dr. Marcuvitz joined the faculty of the School of Engineering and Science at New York University as Professor of Applied Physics. He returned to the newly merged Polytechnic Institute of New York with the same position and is currently an Institute Professor.

Dr. Marcuvitz has over thirty publications or paper presentations. He edited the **Waveguide Handbook**, Volume 10, and wrote Chapter 8 of **Principles of Microwave Circuits**, Volume 8, of the MIT Radiation Laboratory Series. With L. Felsen, he coauthored the book **Radiation and Scattering of Waves** which was published in 1973.

One of Dr. Marcuvitz's most important contributions was the microwave network formulation of electromagnetic field problems. During World War II, he helped to rephrase Schwinger's theoretical results in engineering terms. His work was very systematic and thorough. He exerted great influence through his seminars on colleagues and students. As an extension of this work, Dr. Marcuvitz also derived transmission line formulations for nonuniform waveguides and for periodic structures. He developed radial transmission line theory and spherical transmission line theory. His approach for periodic structures has been widely used.

During World War II at the MIT Radiation Laboratory, he developed precision microwave measurement methods for waveguide discontinuities and coordinated them with theoretical results derived by Schwinger and others. He showed that the results for small aperture theory derived first by Lord Rayleigh and later by H. A. Bethe can be deduced rigorously from general theoretical considerations. He rephrased the results in simple and practical engineering form. He then used the method to derive theoretical expressions for many new discontinuity structures. Almost one-third of the discontinuities contained in the **Waveguide Handbook** were treated in this way by Dr. Marcuvitz.

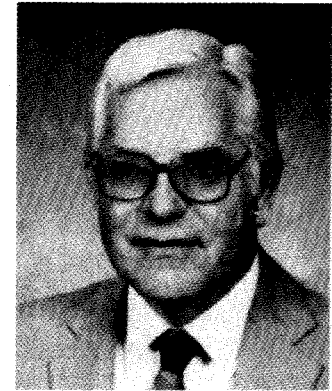
There was much confusion during the 1950's regarding the physical nature of leaky waves. Dr. Marcuvitz was the first to explain them and to show how to compute their properties. In later years, he tackled some very difficult problems, including nonlinear and turbulent plasmas. He attempted to simplify such problems by using microwave network formulations and by introducing “quasi-particles.”

Dr. Marcuvitz was elected to the National Academy of Engineering in 1978. He is also a Fellow of the IEEE, a member of the American Physical Society, Tau Beta Pi, Eta Kappa Nu, and Sigma Xi.

# 1985 Microwave Applications Award

## James Cheal

The *Microwave Applications Award* is presented to an individual for outstanding application of microwave theory and techniques. The 1985 award is to Mr. James Cheal of Southwest Microwave for "Contributions to the design, engineering development, and refinement of the OSM connector which came to be designated SMA."



James Cheal was born in 1924 at Sunfield, Michigan. He received his B.S.E.E. at Michigan State University in 1950. He worked for IBM for two years as a Field Engineer, and then joined Bendix Research Laboratories in 1952 where he was responsible for the development of missile guidance antennas. From 1955 to 1956 he was a Systems Engineer at the Burroughs Corporation and developed radar/computer interface equipment for the Sage System.

Mr. Cheal rejoined Bendix in 1956 where he worked on a wide range of microwave components including ferrite circulators, phase shifters, filters, mixers, directional couplers and electronically scanned antennas. As the head of the Microwave and Antenna Group, he was responsible for the development of a miniaturized antenna and microwave subsystem. These were early examples of microwave integrated circuits using multiple layer suspended substrate stripline along with coaxial ferrite and mechanical switch components.

Mr. Cheal designed the prototype of a new coaxial connector in 1958 and applied it to solve a system need. The connector was designated BRM by the Bendix Corporation. It potentially solved a need in design of coaxial and related broadband TEM-type (stripline and microstrip) circuits and components and their testing and assembly into complex microwave packages. The design opened up the top half of the microwave frequency range to use of coax.

As a founder and the Vice-President for Engineering of Omni Spectra, Inc. starting in 1962, Mr. Cheal was the main contributor to the engineering development and refinement of the connector design called OSM, for use on the company's microwave components and test equipment items. This was followed by a very extensive engineering and development program for a complete product line of many configurations, each optimized for microwave performance and use in almost any location or environment. Mr. Cheal was largely responsible for coordinating and sorting the many suggestions and inputs which contributed to the cooperation of users, and other manufacturers, enabling the final documentation and specification for the SMA design to be adapted with a minimum of difficulty in 1968. The attractiveness of the design was recognized soon after its introduction, and is now widely used. While at Omni Spectra, he also continued development work on microwave integrated circuits, microwave subsystems, intrusion detectors and microwave proximity fuze systems.

Mr. Cheal left M/A-COM-Omni Spectra in 1983 to join Southwest Microwave where he currently serves as a board member and a full time consultant.

Mr. Cheal was an active member of the joint military industrial committee which prepared the performance standards for RF connectors, including OSM (SMA) under MIL STD 39012. He was also member and chairman of the Joint Industry Research Committee for Standardization of Miniature Precision Coaxial Connectors.

Mr. Cheal has published three papers and holds seven U.S. patents relating to antennas, phase shifters, and microwave intrusion alarms.

# 1985 MTT-S Microwave Prize

The *Microwave Prize* is awarded annually to the paper making the most significant contribution to the field of interest of the Microwave Theory and Techniques Society. The paper must have been published in an official IEEE publication during the year ending June 30.

The 1985 Microwave Prize is awarded to Karl B. Niclas and Brett A. Tucker for their paper titled, "*On Noise in Distributed Amplifiers at Microwave Frequencies*," published in IEEE Transactions on Microwave Theory and Techniques, Vol. MTT-31, No. 8, August 1983, pp. 661-668.

## Karl B. Niclas

Karl B. Niclas was born November 11, 1930, in Ludenscheid, Germany. He received the Dipl.-Ing. and the Doctor of Engineering degrees from the Technical University of Aachen, West Germany, in 1956 and 1962 respectively.

In 1956 he joined the Telefunken G.m.b.H, Ulma-Donau, West Germany, where he was engaged in research and development of low-noise and medium power traveling-wave tubes. In 1958 he became Head of the TWT Section and Assistant Manager of the company's Microwave Tube Department. From April 1962 until November 1963, he was employed as Senior Project Engineer by the General Electric Microwave Laboratory at Stanford, CA. Subsequently, Dr. Niclas joined the Technical Staff of Watkins-Johnson Company, Palo Alto, CA, where he is presently a Consultant to the Vice-President, Devices Group. From 1967 until 1976 he was Manager of the company's Tube Division and prior to that he was Head of the Low-Noise TWT Research and development Section. His R/D activities in the field of microwave tubes included the design of low-noise and medium power TWTs, as well as the development of advanced permanent magnet focusing structures for low-noise TWTs and new concepts of achieving high efficiencies in power TWTs. His current efforts are focused on very wide-band GaAs FET amplifiers and power combining techniques.

Dr. Niclas received the 1962 Outstanding Publications Award of the German Society of Radio Engineers (NTG). He has published more than 30 papers on microwave devices and holds seven patents in the same field.

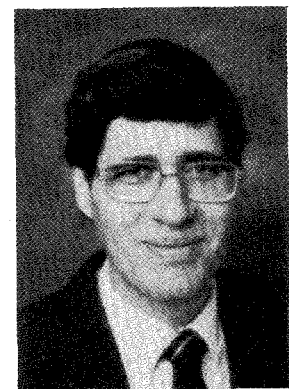


## Brett A. Tucker

Brett A. Tucker was born in Elizabeth, N.J. on January 13, 1951. He received the B.S. degree in Physics from the California Institute of Technology in 1973. From 1973 to 1975 he was teaching assistant and from 1975 to 1980 a research assistant in the physics department at the University of California at Berkeley. His area of research was the application of Josephson junctions in low-noise microwave receivers.

In 1980, he joined Watkins-Johnson Company, Palo Alto, CA, where he has been working on the design of monolithic GaAs MICs as well as broadband hybrid amplifiers. He is currently a Ph.D. candidate at the University of California at Berkeley.

Mr. Tucker is a member of Tau Beta Pi.



# 1985 Distinguished Service Award



## G. P. Rodrigue

*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 the Microwave Theory and Techniques Society.

The Administrative Committee of the Microwave Theory and Techniques Society has selected G. P. Rodrigue as the recipient of the 1985 Distinguished Service Award "for his outstanding and dedicated service to the Society."

G. P (Pete) Rodrigue was born in Paincourtville, Louisiana in 1931 and received his undergraduate education at Louisiana State University. He received his Ph.D. in 1958 from Harvard University, working under Professor C. L. Hogan. From 1958 to 1968 he was with the Sperry Microwave Electronics Company in Clearwater, Florida where he worked on ferrite materials and devices, parametric amplifiers, ultrasonic devices, and microwave integrated circuits.

In 1968 he joined the faculty of the School of Electrical Engineering at Georgia Tech where he is now a Regents' Professor. He teaches graduate and undergraduate courses in electromagnetics, solid state, and circuits. His research activities have included antenna measurements and microwave devices. He was the recipient of Outstanding Teacher Awards at Georgia Tech in 1971, 1972, and 1979. In 1984, he was awarded the first IEEE Region 3 Outstanding Engineering Educator Award. He has served on a number of Institute Committees and was Chairman of the Georgia Tech Executive Board in 1981-82.

Dr. Rodrigue was first elected to the Administrative Committee of the MTT Society in 1970 and served continuously through 1980. He was MTT-S President in 1976 and Vice-President in 1975. During his time on ADCOM he was Editor of the MTT Newsletter (71-74), Chairman of the Membership Services Committee, and Chairman of the Awards Committee. He served as Chairman of the Steering Committee for the 1974 International Microwave Symposium in Atlanta, and as Keynote Speaker at the 1976 Symposium in Cherry Hill, New Jersey. He has been a member of the Program Committee for many of the MTT Symposia, and has served on the Editorial Board of the MTT-S Transactions since 1965. He was MTT-S representative on the IEEE Technical Activities Board and Division IV Representative on the IEEE Publication Board. He was the recipient of an IEEE Centennial Medal on behalf of MTT-S.

Dr. Rodrigue has served the IEEE as its Vice President-Publication Activities (1982-83), on the IEEE Board of Directors and its Executive Committee, on the IEEE Long Range Planning Committee, and on the Nominations and Appointments Committee. He was a member of the IEEE Technical Activities Board in 1976, and in 1979 and 1980 was Chairman of Technology Committees Administration. He served on the IEEE Publication Board in 1977 and 1978, and 1982 through 1984. He was named a Fellow of the IEEE in 1975.

He has also been on the Steering and Program Committees of the Conference on Magnetism and Magnetic Materials, the Intermag Conference, and the Ultrasonics Symposium. He was one of the organizers of the Atlanta Section Joint MTT-S/AP-S Chapter and was its first Chairman. He has also served the Atlanta Section in various capacities.

# 1984-85 Distinguished Microwave Lecturers

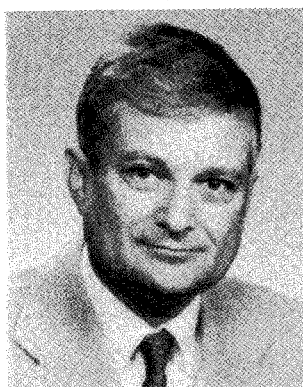
## **High Speed Digital IC Performance Outlook**

Paul T. Greiling



To meet the functional throughput requirements of future high speed signal processing systems and commercial computers, GaAs digital integrated circuits are being developed. Advances in GaAs logic gates will provide performance enhancements of one to two orders of magnitude for digital communications, memories and computers. In order to assess GaAs technology, the lecture reviews the device technology and issues related to device/circuit design and fabrication of MSI/LSI complexity circuits operating at gigahertz clock frequencies, compares GaAs technology with competing Si technologies, and presents applications of significant impact.

Dr. Greiling has taught at both Northeastern University in Boston and UCLA in Los Angeles during which times he consulted for local industry in the area of microwave solid state devices. Since 1976, he has been with Hughes Research Laboratory working on high speed digital GaAs ICs. Dr. Greiling is a member of MTT-S ADCOM, Eta Kappa Nu, Tau Beta Pi, Sigma Xi, and a Fellow of IEEE.



## **Radio Astronomy - A Challenge to the Microwave Engineer**

Sander Weinreb

During the past 50 years, the development of the technology to measure the spectra, angle of arrival, polarization, and time variation of radio waves has greatly increased our knowledge of the universe and led to the discovery of objects such as quasars, pulsars, the cosmic background, and interstellar molecules. Microwave engineers have played a key role in the development of this technology. Some of the fruits of this work and the radio astronomy techniques in the areas of antennas, arrays, low-noise receivers, and wide-band communications are presented in the lecture.

Dr. Weinreb is a world leader in radio astronomy instrumentation and very low-noise receivers. He was Head of the Electronics Division of National Radio Astronomy Observatory from 1965 until 1976 and led the electronics design team for the Very Large Array. He performed research and taught at the University of California, Berkeley, during 1976-1978 and then returned to the National Radio Astronomy Observatory to develop millimeter-wave components and very low-noise microwave receivers. He is a Fellow of the IEEE, a Research Professor at the University of Virginia, and the author of over 50 publications.