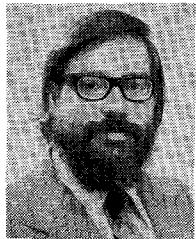


## Contributors



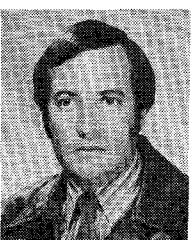
**John Acevedo** was born in San Juan, Puerto Rico, in October 1945. He received the S.B. degree from the Massachusetts Institute of Technology, Cambridge, in 1967, and the M.S. degree from the University of Maryland, College Park, in 1973, both in physics.

Since 1968 he has been employed with the Electromagnetic Technology Laboratory, Westinghouse Electric Corporation, Baltimore, Md., where he has concentrated mainly in microwave integrated circuits, circuitry fabrication, thin-film technology, vacuum processing, and computer-controlled mask making. He has also been engaged heavily in research and development of acoustic surface wave devices for signal processing.



**Ali E. Atia** (S'67-M'69) was born in Cairo, United Arab Republic, on August 10, 1941. He received the B.S. degree with honors from Ain Shams University, Cairo, in 1962, and the M.S. and Ph.D. degrees from the University of California, Berkeley, in 1966 and 1969, respectively, all in electrical engineering.

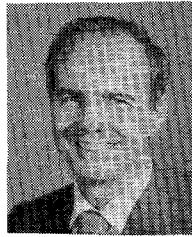
From 1962 to 1964 he was a Lecturer in the Department of Electrical Engineering, Ain Shams University. From 1965 to 1968 he was a Research Assistant in the Electronics Research Laboratory, University of California. From 1968 to 1969 he was a Teaching Fellow and Assistant Professor in the Department of Electrical Engineering and Computer Sciences, University of California. Currently, he is a technical staff member of the Transponders Department, RF Transmission Laboratory, COMSAT Laboratories, Clarksburg, Md., where he is engaged in the development of various microwave subsystems for communication satellite transponders.



**H. Clark Bell, Jr.** (M'67) was born in San Diego, Calif., on September 13, 1944. He received the B.S. degree in physics and the M.S. degree in engineering, both from the University of California, Los Angeles, in 1966 and 1969, respectively. Since 1969 he has been studying for the Ph.D. degree at the University of California.

From 1966 to 1968 he was with the Rantec Division of the Emerson Electric Company, Calabasas, Calif., where he worked on ferrite phase shifters. Since 1969 he has been with the Hughes Aircraft Company, El Segundo, Calif., where he has worked on ferrite phase shifters, solid-state millimeter-wave components, and is currently working on microwave filters for communications satellites. Since 1969 he has also been with the Department of Electrical Sciences and Engineering, University of California, on a Hughes Doctoral Fellowship, where he is currently doing research in microwave filter synthesis techniques.

Mr. Bell is a member of Sigma Pi Sigma.



**Charles R. Boyd, Jr.** (S'52-M'58-SM'63) was born in Pittsburgh, Pa., on October 21, 1932. He received the B.S.E.E. degree from Carnegie Institute of Technology, Pittsburgh, Pa., in 1953, and the M.E.E. and Ph.D. degrees in electrical engineering from Syracuse University, Syracuse, N. Y., in 1962 and 1964, respectively. He is also a graduate of the General Electric Company's Advanced Courses in Engineering, a three-year program of part-time graduate level studies, which he completed in 1959.

From 1953 to 1956 he was a Field Engineer with Westinghouse Electric Corporation, where he worked on developmental autopilot and side-looking radar equipment. In 1956 he joined General Electric, Utica, N. Y., where he helped design a missile transponder for the early Atlas guidance system. He transferred to the General Electric Electronics Laboratory, Syracuse, N. Y., in 1957, and carried out development of advanced microwave semiconductor and ferrite circuits. From 1961 to 1962 he was on academic leave at Syracuse University, and from 1962 to 1963 he supervised and taught a portion of the General Electric Advanced Courses in Engineering, returning in each case to active work at the General Electric Electronics Laboratory. In 1965 he joined Rantec Corporation, Calabasas, Calif., where he managed an engineering group engaged in development and design of microwave solid-state components. He was on the faculty of the University of California, Los Angeles, from 1967 to 1970. He is a cofounder of Microwave Applications Group, Chatsworth, Calif., and serves as Technical Director.

Dr. Boyd is a member of Eta Kappa Nu and is a Registered Professional Engineer in the State of New York.



**Metro M. Chrepta** was born in Watervliet, N. Y., on November 2, 1924. He received the B.S. degree in physics from Siena College, Loudonville, N. Y., in 1950, and later did graduate and postgraduate studies at M.I.T., Cambridge, Mass., and the University of California.

From 1952 to the present he has worked in the U. S. Army Electronics Command, Ft. Monmouth, N. J., in the Electronic Components Laboratory. He has worked in the high power gas and vacuum tube modulator group primarily on research in the physical electronics of modulator devices. During the past four years he has worked on bulk semiconductor devices for millimeter wave applications in the Advanced Semiconductor Devices Team.



**Chimmoi Das Gupta** (M'72) was born in Chittagong, Bangladesh, India, on January 17, 1940. He received the B.Tel.E. degree from Jadavpur University, Calcutta, India, in 1961, and the M.Tech. degree from the Indian Institute of Technology, Bombay, India, in 1963.

From August 1963 to October 1965 he served as Associate Lecturer in the Department of Electrical Engineering, Indian Institute of Technology, Delhi, India. In 1965 he

was awarded the USSR Government Scholarship for postgraduate studies and research. In November 1966, after completing the Preparatory Faculty at Leningrad Polytechnic Institute, Leningrad, USSR, he joined the Leningrad Electrotechnical Institute, Leningrad, USSR, in order to carry out Ph.D. work in microwave methods of measurements. In April 1970, after receiving the Ph.D. degree, he joined the Council of Scientific and Industrial Research, New Delhi, India and then served as Senior Developmental Engineer with Bharat Electronics Ltd., India, from September 1971 to September 1972. He is currently working as a Research Engineer for the ESRO project on radiometry systems, the Catholic University of Louvain, Belgium. His research interests include microwave methods of measurement, microwave integrated circuits, noise measurements, and microwave components and systems.



**Walter N. Hardy** was born in Vancouver, B.C., Canada, in 1940. He received the B.Sc. degree with honors in mathematics and physics and the Ph.D. degree, in 1961 and 1965, respectively, from the University of British Columbia, Vancouver, B.C., Canada.

From 1964 to 1966 he was a National Research Council (Canada) Postdoctorate Fellow at the Centre d'Etudes Nucleaire de Saclay. From 1966 to 1971 he was a member of the technical staff at the Science Center of the Rockwell International Corporation, Thousand Oaks, Calif. In 1971 he returned to the University of British Columbia, where he is now an Associate Professor in the Department of Physics.

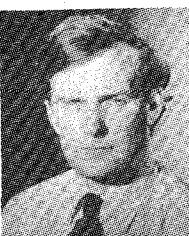
Dr. Hardy is a member of the American Physical Society.



**Attilio J. Giarola** (M'58) was born in Jundiai, Sao Paulo, Brazil, on October 26, 1930. He received the B.S. degree in electrical and mechanical engineering from the University of Sao Paulo, Sao Paulo, Brazil, in 1954, and the M.S. and Ph.D. degrees in electrical engineering from the University of Washington, Seattle, in 1959 and 1963, respectively.

Before obtaining his Ph.D. degree he taught for several years at the Instituto Tecnologico de Aeronautica, Sao Jose Dos Campos, Sao Paulo, Brazil, at Seattle University, Seattle, Wash., and at the University of Washington. In 1962 he joined the staff of the Boeing Company in Seattle and was responsible for research on infrared detectors and microwave devices. While on leave of absence from the Boeing Company, he spent two years in Brazil as an Associate Professor of Electrical Engineering at the Instituto Tecnologico de Aeronautica and as a Visiting Professor at the University of Sao Paulo. During this time he was the Program Chairman of the First National Electronics Conference in Brazil. Since 1968 he has been an Associate Professor of Electrical Engineering at Texas A&M University, College Station, where he is teaching and conducting research on electromagnetics, particularly on electromagnetic susceptibility.

Dr. Giarola is a member of Eta Kappa Nu and Sigma Xi.



**Kenneth W. Gray** was born in Southampton, England, in 1939. He received the B.Sc. and Ph.D. degrees in physics from the University of Wales, Bangor, Wales, in 1960 and 1963, respectively.

From 1963 to 1965 he was a National Research Council (Canada) Postdoctoral Research Fellow at the University of British Columbia, Vancouver, B.C., Canada. In 1965 he joined the Science Center of Rockwell International Corporation, Thousand Oaks, Calif., to undertake research in nuclear and electron paramagnetic resonance. In 1970 he left the Science Center and returned to England, where he is currently a member of the staff of the Royal Radar Establishment, Great Malvern, Worcs.

Dr. Gray is a member of the American Physical Society, the Institute of Physics, and the Physical Society.



**Joseph Helszajn** (M'64) was born in Brussels, Belgium, in 1934. He received the Full Technological Certificate of the City and Guilds of London Institute from Northern Polytechnic, London, England, in 1955, the M.S.E.E. degree from the University of Santa Clara, Santa Clara, Calif., in 1964, and the Ph.D. degree from the University of Leeds, Leeds, England, in 1969.

He has held a number of positions in the microwave industry. From 1964 to 1966 he was Product Line Manager at Microwave Associates, Inc., Burlington, Mass. Currently, he is working as a consultant. He is also a Senior Research Fellow at Heriot-Watt University, Edinburgh, Scotland. He is the author of the book *Principles of Microwave Ferrite Engineering* (N. Y.: Wiley).

Dr. Helszajn is a fellow of the Institution of Electronic and Radio Engineers (England). In 1968 he was awarded the Insignia Award of the City and Guilds of London Institute.



**Tatsuo Itoh** (S'69-M'69) was born in Tokyo, Japan, on May 5, 1940. He received the B.S. and M.S. degrees in electrical engineering from the Yokohama National University, Yokohama, Japan, in 1964 and 1966, respectively, and the Ph.D. degree in electrical engineering from the University of Illinois, Urbana, in 1969.

Since September 1966 he has been with the Electromagnetics Laboratory (formerly the Antenna Laboratory), University of Illinois, where he is now a Research Assistant Professor. During 1972-1973, he was appointed as a Fellow of the Center for Advanced Study, University of Illinois. His research has been on electromagnetic theory, microwave techniques, optical communication, and numerical techniques.

Dr. Itoh is a member of the Institute of Electronics and Communication Engineers of Japan and Sigma Xi, and is an associate member of Commission VI of the International Scientific Radio Union.



**Harold Jacobs** was born in Port Chester, N. Y., in 1917 and received the B.A. degree from Johns Hopkins University, Baltimore, Md., and the Ph.D. degree from New York University, N. Y., in 1945.

He has worked in industry for the RCA Manufacturing Company, Sylvania Electric Corporation, and the CBS Laboratories. In 1950 he joined the U. S. Army Electronics Command at Fort Monmouth, N. J. He has contributed about 50 papers in the areas of silicon transistors, lasers, microwave devices, millimeter-wave integrated circuits and quasi-optical systems. He is also active on a part-time basis in engineering education, serving as Professor and Chairman of the Electronic Engineering Department, Monmouth College, West Long Branch, N. J.

Dr. Jacobs received the IEEE Fellow Award for semiconductor contributions in 1967. In 1969 he was awarded the "Decoration for Exceptional Civilian Service" by the U. S. Army for his work on millimeter- and submillimeter-wave devices. In November 1973, he was given the Harry Diamond Award for work on new millimeter-wave concepts.



**Nobuaki Kumagai** (M'59-SM'71) was born in Ryojun, Japan, on May 19, 1929. He received the B.Eng. and D.Eng. degrees from Osaka University, Osaka, Japan, in 1953 and 1959, respectively.

From 1958 to 1960 he was a visiting Senior Research Engineer at the Electronics Research Laboratory of the University of California, Berkeley, where he was engaged in research on electromagnetic wave scattering and parametric amplifiers. From 1960 to 1970, he was an Associate Professor of Communication Engineering at Osaka University. In 1966, he was invited to the 11th G-MTT International Symposium held at Palo Alto, Calif., as an invited speaker. Since 1971, he has been a Professor of Communication Engineering at Osaka University, engaged in research and education in electromagnetic theory, microwave and millimeter wave engineering, optical circuits and devices, lasers and their applications.

Dr. Kumagai is a member of the Institute of Electronics and Communication Engineers of Japan, the Institute of Electrical Engineers of Japan, the Japan Society of Applied Physics, and the Physical Society of Japan.



**Kiyohiro Kawasaki** was born in Hiroshima, Japan, on September 28, 1945. He received the M.S. degree in electronic engineering from Nagoya University, Nagoya, Japan, in 1971.

He is currently a postgraduate student in the Department of Electronic Engineering at Nagoya University. He has been engaged in research on the microwave properties of ferrites and the application to microwave components.

Mr. Kawasaki is a member of the Institute of Electronics and Communication Engineers of Japan.



**Kenneth M. Lakin** (S'65-M'70) was born in Grand Rapids, Mich., on January 14, 1941. He received the B.E. degree in electronics, physics, and mathematics, and the M.S.E. degree in electronics from the University of Michigan, Ann Arbor, in 1964 and 1965, respectively. He received the Ph.D. degree in applied physics from Stanford University, Stanford, Calif., in 1969.

In 1969 he joined the Departments of Material Sciences and Electrical Engineering, University of Southern California, Los Angeles, where he has been conducting research on surface acoustic wave materials and devices.



**W. F. Krueger** was born near Riesel, Tex., on October 12, 1921. He received the B.S. degree from Texas A&M University, College Station. After World War II, he returned to Texas A&M University and received the M.S. degree in poultry science (genetics and physiology) and later received the Ph.D. degree in population genetics and animal breeding (population genetics, physiology, and statistics), from the University of Missouri, Columbia.

He has been a Public School Principal and Teacher; an Instructor at Mississippi State University, State College; an Instructor and Assistant Professor, Department of Poultry Science, University of Missouri; Assistant Professor, Associate Professor, and Professor, Department of Poultry Science, Texas A&M University. He is currently the Head of this department.

Dr. Krueger is a member of the Poultry Science Association, the World's Poultry Science Association, the American Genetics Association, the American Society of Naturalists, the American Association for the Advancement of Science, the Association of Southern Agricultural Workers, Sigma Xi, Phi Kappa Phi (Immediate Past President), and Gamma Sigma Delta (Past President). He is an Associate Editor of *Poultry Science*. He has authored and coauthored numerous publications in avian genetics, incubation and embryology, and environmental physiology.



**Lawrence E. Larsen** was born in Denver, Colo., on April 20, 1943. He received the M.D. degree from the University of Colorado, Boulder, in 1968.

From 1968 to 1970 he was a National Institute of Health Postdoctoral Fellow at the Brain Research Institute, University of California, Los Angeles. From 1970 to 1973 he served at MAJ (MC) at the Department of Microwave Research, Walter Reed Army Institute of Research. Currently, he is an Assistant Professor of Physiology, Methodist Hospital and Baylor College of Medicine, Houston, Tex.

Dr. Larsen is a member of the Biometric Society, the Society for Neuroscience, Alpha Epsilon Delta, and Alpha Omega Alpha.



**A. W. Love** (M'58) was born in Toronto, Ont., Canada. He received the B.A. degree in mathematics and physics, the M.A. degree in physics, and the Ph.D. degree in microwave physics in 1938, 1939, and 1951, respectively, all from the University of Toronto, Toronto, Ont., Canada.

Following service in World War II, he spent two years as a Research Officer in the Commonwealth Scientific and Industrial Research Organization, Sydney, Australia. His

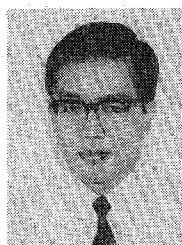
work on noise standards in that organization's Radiophysics Laboratory led to interests in radio astronomy and microwave radiometry that he still maintains today. After six years of mining geophysical activity with Newmont Exploration Limited, Jerome, Ariz., he entered the aerospace field in 1957 with the Wiley Electronics Company, Phoenix, Ariz. In 1963 he joined the Autonetics Division, Rockwell International Corporation, Anaheim, Calif., in charge of advanced antenna development. This was followed by two years in ECM and reentry systems work with the National Engineering Science Company, Newport Beach, Calif. Returning to the Autonetics Division in late 1965, he engaged, for a time, in studies related to infrared and microwave emission processes in planetary atmospheres, then undertook development of single and dual polarized line source feeds for spherical reflectors. Since 1971 he has been with the Space Division of the Rockwell International Corporation, Seal Beach, Calif., pursuing the development of precision microwave radiometers and high beam efficiency antennas for the remote measurement of sea surface temperature from an orbiting satellite.



wave networks. He is currently the President of Kitami Institute of Technology, Kitami, Hokkaido, Japan. His research interest is in the field of circuit theory. He is Editor of *Microwave Filters and Circuits*, published in 1970.



**Raj Mittra** (S'54-M'57-SM'69-F'71) is Professor of Electrical Engineering and Associate Director of the Electromagnetics Laboratory at the University of Illinois, Urbana. He is internationally recognized for his many contributions in the areas of microwave theory, electromagnetics, and modern optics.



**Masanori Matsuhara** was born in Fukui, Japan, on February 14, 1941. He received the B.E. degree in electrical engineering from Fukui University, Fukui, Japan, in 1963, and the M.E. and Ph.D. degrees in electrical communication engineering from Osaka University, Osaka, Japan, in 1965 and 1968, respectively.

He was a Research Associate from 1968 to 1972, and since 1972 he has been an Associate Professor of Electrical Communication Engineering at Osaka University. He is engaged in studies of optical transmission lines and optical integrated circuits.

Dr. Matsuhara is a member of the Institute of Electronics and Communication Engineers of Japan.



**Robert Avery Moore** (S'54-M'58-SM'67) was born in Cullman, Ala., on August 12, 1932. He received the B.S. degree from the University of Alabama, University, in 1954, and the M.S. and Ph.D. degrees from Northwestern University, Evanston, Ill., in 1956 and 1960, respectively, all in electrical engineering.

Except for six months active army duty at the Switching Devices Group, Ft. Monmouth, N. J., where he conducted research on ferrite devices, he has been employed by the Aerospace Division, Defense and Space Center, Westinghouse Electric Corporation, Baltimore, Md. During this period he has conducted studies on microwave propagation and radar systems. More recently he has been concerned with ferrimagnetic techniques and devices. He is presently in charge of the Solid-State Microwaves Group, where he is concerned with the development of microwave integrated circuit devices.

Dr. Moore is a member of the American Institute of Physics, and a past chairman of the Baltimore Chapter of the IEEE Groups on Antennas and Propagation and Microwave Theory and Techniques.



**Akio Matsumoto** (SM'62-F'73) was born in Date, Hokkaido, Japan, on October 13, 1908. He received the B.E. degree from Hokkaido University, Sapporo, Hokkaido, Japan, in 1931, and the Ph.D. degree in engineering from Tohoku University, Sendai, Japan, in 1942.

From 1931 to 1935 he was with the Ministry of Communications; from 1935 to 1938 with the Furukawa Electric Company; from 1938 to 1939 with the Ministry of Communications; from 1939 to 1947 with the International Telecommunications Company; from 1947 to 1970 with the Research Institute of Applied Electricity, Hokkaido University. From 1961 to 1962 he was a Visiting Research Associate with the Polytechnic Institute of Brooklyn, Brooklyn, N. Y., where he did research work on micro-

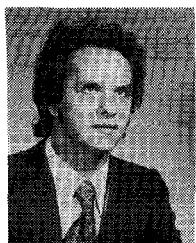


**Nobuo Nagai** (M'74) was born in Tokyo, Japan, on January 5, 1938. He received the B.S. and Dr.Eng. degrees from Hokkaido University, Sapporo, Hokkaido, Japan, in 1961 and 1971, respectively.

He is currently an Associate Professor with the Research Institute of Applied Electricity, Hokkaido University. He has been engaged in research on distributed networks. He was with Cornell University, Ithaca, N. Y., as a Visiting Research Associate for one year, from September 1972.

Dr. Nagai is a member of the Institute of Electronics and Communications Engineers of Japan.





Yahya Rahmat-Samii  
University of Illinois.

**Yahya Rahmat-Samii** (S'73) was born in Tehran, Iran, on August 20, 1948. He received the B.S. degree in electrical engineering from the University of Tehran, Tehran, Iran, in 1970, and the M.S. degree in electrical engineering from the University of Illinois, Urbana, in 1972, where he is presently studying towards the Ph.D. degree in electrical engineering.

Since 1971 he has been a Research Assistant in the Electromagnetics Laboratory, University of Illinois.



**J. David Rhodes** (M'67) was born in Doncaster, Yorks., England, on October 9, 1943. He received the B.Sc. and Ph.D. degrees in electrical engineering, both from the University of Leeds, Leeds, England in 1964 and 1966, respectively.

From 1966 to 1967 he was a Research Fellow in the Department of Electrical and Electronic Engineering, University of Leeds, and then joined Microwave Development Laboratories, Inc., Natick, Mass., as a Senior

Research Engineer. He is currently a Reader at Leeds University and also Consultant in Microwave Engineering to Microwave Development Laboratories, U. S. A., and Ferranti, Ltd., England.

In 1969 he was awarded the "Microwave Prize" by the professional group on Microwave Theory and Techniques, in 1970 the IEEE Browder J. Thompson Award, and the J. J. Thompson Award from the Institute of Electrical Engineering, London, in both 1971 and 1973.



University, Nagoya, Japan, in 1967. He is currently an Associate Professor in the Department of Electronic Engineering at Nagoya University. He has been engaged in research on the interaction of electromagnetic waves (laser and microwave) with semiconductors and ferrimagnets.

**Masayoshi Umeno** (M'72) was born in Nara, Japan, on March 10, 1938. He received the M.S. degree in electronic engineering from the Tokyo Institute of Technology, Tokyo, Japan, in 1962, and the Ph.D. degree in electronic engineering, from Nagoya University, Nagoya, Japan, in 1967.

He is currently an Associate Professor in the Department of Electronic Engineering at Nagoya University. He has been engaged in research on the interaction of electromagnetic waves (laser and microwave) with semiconductors and ferrimagnets.

Dr. Umeno is a member of the Japan Society of Applied Physics, the Physical Society of Japan, the Institute of Electronics and Communication Engineers of Japan, and the Information Processing Society of Japan. In 1967 he received the first Yonezawa Award of the Institute of Electronics and Communication Engineers of Japan.



**Albert E. Williams** (S'66-M'66) was born in Albany, Australia, on March 27, 1940. He received the B.E. degree in electrical engineering from the University of Western Australia, Nedlands, Australia, in 1962, and the Ph.D. degree from University College, London, England, in 1966.

From 1966 to 1968 he was a Lecturer in the Department of Electrical Engineering, University of Western Australia. Currently, he is a technical staff member of the Transponders Department, RF Transmission Laboratory, COMSAT Laboratories, Clarksburg, Md., where he is actively engaged in the development of mixers and light-weight filters for satellite transponders.

Dr. Williams was a joint recipient of the Institute of Electrical Engineers (London) Sylvanus P. Thompson Premium award in 1966.