

## Contributors



**Noach Amitay** (M'60) was born in Tel Aviv, Israel, on April 30, 1930. He received the B.Sc. and Dipl. Ing. degrees in electrical engineering from Technion, Israel Institute of Technology, Haifa, in 1953 and 1954, respectively, and the M.Sc. and Ph.D. degrees in electrical engineering from Carnegie Institute of Technology, Pittsburgh, Pa., in 1957 and 1960, respectively.

From 1954 to 1956 he directed the Electronic Measuring and Aligning Instruments Department of the Signal Corps, Defense Army of Israel. He was a Research Assistant in 1957, a Project Engineer in 1958, and an Instructor in 1959, all at Carnegie Institute of Technology. He served as a consultant on electronic instrumentation for Magnetics, Inc., Butler, Pa., from 1957 to 1958 and from 1960 to 1961. From 1960 to 1962 he was an Assistant Professor in the Department of Electrical Engineering, Carnegie Institute of Technology, and a part-time employee of the New Products Laboratories of Westinghouse Electric Corporation, Pittsburgh, Pa. He joined the Bell Telephone Laboratories, Inc., Whippany, N. J., in 1962, where he has been engaged in antenna and phased array research. In recent years he has been involved in studies of satellite communication antennas.

Dr. Amitay is a member of Sigma Xi.



**James A. Benet** (S'65-M'66) was born in New York, N. Y., on June 30, 1941. He received the B.S. degree in electrical engineering from the University of Colorado, Boulder, in 1966.

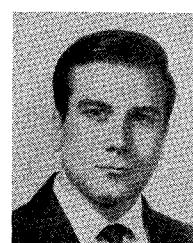
From 1966 to 1970 he worked on the design and development of microwave ferrite phase shifters for Emerson Electric Company, St. Louis, Mo. Presently, he is a design engineer with Spartan Manufacturing Co., Flora, Ill.



**Camillo Borghese** was born in Rome, Italy, on October 30, 1927. He received the degree of Dottore in Matematica e Fisica from the University of Rome, Rome, Italy, in 1952. From 1952 to 1954 he attended postgraduate courses at the Scuola Nazionale di Alta Matematica, Rome, Italy.

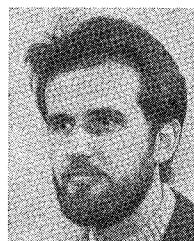
In 1955 he was appointed Research Assistant at the University of Rome, where he was concerned with research in probability theory. In 1957 he joined the Research Institute of Montecatini S.p.A. in Ferrara, Italy, where he was involved in research on the physics of high polymers. In 1960 he was at the Research Institute of Polymer S.p.A., Terni, Italy, studying the distribution of molecular weights of synthetic isotactic polymers. In 1962 he joined Selenia S.p.A., Rome, Italy, where he has been working on the synthesis and physical characterization of new microwave ferrites. Also in 1962, he spent eight months at the Research Division of Raytheon Co., Waltham, Mass. Since then he has been involved in research on the cation distribution in spinels and garnets, and in the magnetization, high-power, and loss properties of microwave materials from *L* to *K* band. He is presently Chief of the Materials Research Laboratory of Selenia S.p.A. He holds two industrial patents and is author of several papers on the cation distribution and on the threshold field and loss properties of ferrites.

Dr. Borghese is a member of the Unione Matematica Italiana and of the American Physical Society.



**Giuseppe Cattarin** was born in Rome, Italy, on July 25, 1944. He received the degree of Perito Industriale in Telecommunicazioni from the E. Fermi Institute of Rome, Rome, Italy, in 1964.

In 1965 he joined the Research Division of Selenia S.p.A. where he was engaged in measurements of the microwave properties of ferrite materials at low- and high-peak powers. He is presently working on the development of several advanced high-power ferrite devices



**John W. Bandler** (S'66-M'66) was born in Jerusalem, Palestine, on November 9, 1941. He received the B.Sc. (Eng.) degree in 1963, and the Ph.D. degree and the Diploma of Imperial College, both in 1967, all from the Imperial College of Science and Technology, University of London, London, England. He held Research Studentship from the Science Research Council at Imperial College from 1963 to 1966.

While with the Department of Electrical Engineering, he was concerned with the stability and optimization of microwave tunnel-diode amplifiers. He joined the Microwave Diode Applications Group at Mullard Research Laboratories, Redhill, Surrey, England, in 1966, continuing with research in the same field and with diode measurements. From 1967 to 1969 he was a Postdoctorate Fellow in the Department of Electrical Engineering, University of Manitoba, Winnipeg, Man., Canada. He worked on optimization methods and their application to computer-aided network design. As a Sessional Lecturer he also lectured on microwave circuits and optimization methods for computer-aided design. He is now Associate Professor with the Department of Electrical Engineering, McMaster University, Hamilton, Ont., Canada. He is also an Associate Member of the Department of Applied Mathematics and a member of the Communications Research Laboratory. He is currently lecturing and carrying out research in the areas of circuit theory, computer-aided design, and optimization methods.

Dr. Bandler is an Associate of the City and Guilds of London Institute and an associate member of the Institution of Electrical Engineers, Great Britain. He is a member of the G-MTT Technical Committee on Computer-Oriented Microwave Practices. He is also currently an Associate Editor of the IEEE TRANSACTIONS ON MICROWAVE THEORY AND TECHNIQUES.

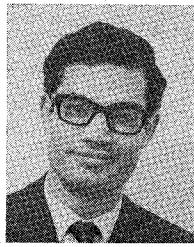
from *L* to *X* band.



**Said M. El-Dinary** was born in Tanta, Egypt, on July 22, 1935. He received the B.Sc. degree in electrical engineering with honors from Cairo University in 1958, the M.Sc. and the Ph.D. degrees in electrical engineering from Purdue University, West Lafayette, Ind., in 1961 and 1964, respectively.

Since 1964 he has been working at the Egyptian Atomic Energy Establishment as an Assistant Professor in the Engineering Department, where he has been in charge of the Research Laboratory. In addition, he has been involved in research activities at the National Research Center in Cairo. At present he is doing research on radiation effects on semiconductor devices, and on wave interactions in semiconductors. Also, he is a part-time Lecturer in the Egyptian universities and institutes.

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**Ismail I. Eldumiati** (S'65-M'70) was born in Damanhour, Egypt, on January 19, 1940. He received the B.S.E.E. degree from the University of Alexandria, Alexandria, Egypt, in 1962, the M.S. degree in electrical engineering, the M.S. degree in physics, and the Ph.D. degree in electrical engineering, all from the University of Michigan, Ann Arbor, in 1966, 1968, and 1970, respectively.

From 1967 to 1970 he was a Research Assistant in the Electron Physics Laboratory of the University of Michigan, where he was engaged in research on bulk semiconductors and millimeter- and submillimeter-wave detectors. He has been with the Biophysics Division of Sensors, Inc., Ann Arbor, Mich., since October 1970.

Dr. Eldumiati is a member of Eta Kappa Nu, Sigma Xi, Phi Kappa Phi, and the American Association for the Advancement of Science.

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**M. Ezzat El-Shandwily** (S'63-M'66) was born in Shandwil, Egypt, on September 5, 1934. He received the B.Sc. degree in electrical engineering with honors from Cairo University, Cairo, Egypt, in 1957, and the M.Sc. degree in electrical engineering, the M.Sc. degree in physics, and the Ph.D. degree in electrical engineering from the University of Michigan, Ann Arbor, in 1961, 1964, and 1965, respectively.

From 1957 to 1960 he was an Instructor in the Faculty of Engineering, Cairo University. During the same period he was a student in the Faculty of Science where he was studying pure and applied mathematics in the Mathematics Department for five semesters. During the summer 1962 he worked as a Research Assistant on microwave antennas at Cooley Electronic Laboratory, University of Michigan. He worked as a Research Associate in Electron Physics Laboratory at University of Michigan from 1963 to 1965 where he was engaged in research on microwave devices. In 1965 he joined the Electronic Engineering Research Laboratory, National Research Center, Cairo, as an Assistant Professor. He also works as part-time Lecturer in the Egyptian universities and institutes. He is currently engaged in research on microwave tubes, wave interactions in semiconductors, quantum modulators and detectors, and ferrite applications in microwave devices.

Dr. El-Shandwily is a member of Sigma Xi.



**George I. Haddad** (S'57-M'61-SM'66) was born in Aindara, Lebanon, on April 7, 1935. He received the B.S.E., M.S.E., and Ph.D. degrees in electrical engineering in 1956, 1958, and 1963, respectively, all from the University of Michigan, Ann Arbor, Mich.

From 1957 to 1958 he was associated with the Engineering Research Institute of the University of Michigan, where he was engaged in research on electromagnetic accelerators. In 1958 he joined the Electron Physics Laboratory, where he has been engaged in research on masers, parametric amplifiers, detectors, electron-beam devices, and microwave solid-state devices. He held a University of Michigan Research Institute Fellowship for the academic year of 1958-1959 and a sponsored research fellowship for the spring semester of 1959-1960. He served successively as Instructor, Assistant Professor, and Associate Professor in the Electrical Engineering Department from 1960 to 1969. He is presently a Professor and Director of the Electron Physics Laboratory.

Dr. Haddad received the 1970 Curtis W. McGraw Research Award of the American Society for Engineering Education for outstanding achievements by an engineering teacher. He is a member of Eta Kappa Nu, Sigma Xi, Phi Kappa Phi, the American Physical Society, and the American Society for Engineering Education.

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**Karl Hartmann** (S'71) was born in Henggart, Kanton Zurich, Switzerland, on March 12, 1944. After one year of study at Balzers AG (high vacuum technique and thin films), Fuerstentum, Liechtenstein, and Faselec AG (semiconductor), Zurich, he received the Diploma in electrical engineering from the Swiss Federal Institute of Technology, Zurich, Switzerland, in 1970.

Since 1970 he has been with the Department of Advanced Electrical Engineering, the Swiss Federal Institute of Technology, doing research work on a project connected with the small-signal behavior and noise properties of microwave bipolar transistors up to 12 GHz.

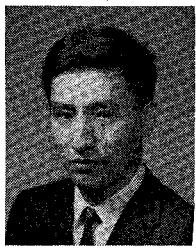
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**William E. Hord** (S'57-M'69) was born in Leola, S. Dak., on October 17, 1938. He received the B.S. degree in electrical engineering from the Missouri School of Mines and Metallurgy, Rolla, in 1959 and the M.S. and Ph.D. degrees in electrical engineering from the University of Missouri, Rolla, in 1963 and 1966, respectively.

From 1959 to 1960 he worked at the Sperry Gyroscope Co. on the development of high-power klystrons. From 1960 to 1966 he was a member of the faculty of the Department of Electrical Engineering, University of Missouri, Rolla. From 1966 to 1969 he was with the Emerson Electric Co., St. Louis, Mo. as a Senior Engineering Specialist engaged in the research and development of microwave components for phased-array radar. In 1969 he joined the Faculty of Engineering at Southern Illinois University, Edwardsville, as Associate Professor.

Dr. Hord is a member of Eta Kappa Nu, Tau Beta Pi, Phi Kappa Phi, and Sigma Xi.

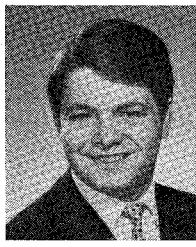


**Tatsuo Itoh** (S'69-M'69) was born in Tokyo, Japan, on May 5, 1940. He received the B.S. and M.S. degrees in electrical engineering from the Yokohama National University, Yokohama, Japan, in 1964 and 1966, respectively, and the Ph.D. degree in electrical engineering from the University of Illinois,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

Since September 1966 he has been with the Antenna Laboratory, University of Illinois, where he is now a Research Assistant Professor. His research has been on open resonators, quasi-optical gratings, waveguide discontinuity problems, microstrip transmission lines, and numerical techniques.

Dr. Itoh is a member of the Institute of Electronics and Communication Engineers of Japan and Sigma Xi.

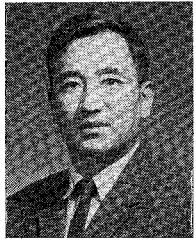
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**Willi Kotyczka** (S'68-M'70) was born in Bern, Switzerland, on June 14, 1943. After working as an exchange student at Western Electric's Research Center, Princeton, N. J., in 1966, he received the Diploma in electrical engineering and the Ph.D. degree in 1967 and 1971, respectively, both from the Swiss Federal Institute of Technology, Zurich, Switzerland.

Since 1967 he has been with the Department of Advanced Electrical Engineering, the Swiss Federal Institute of Technology, working on noise measurements and small-signal behavior of microwave transistors.

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**Ti-Shu Li** (S'69) was born in Chingtao, China, on August 9, 1931. He graduated from Chinese Naval Academy, Tsoying, Taiwan, in 1955 and received the M.S.E.E. degree from the University of Texas, Austin, in 1964. He is currently working toward the Ph.D. degree in electrical engineering at the University of Illinois, Urbana.

Mr. Li is a member of Eta Kappa Nu and Tau Beta Pi.

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**Paul J. Meier** (S'55-M'59-SM'69) was born in New York, N. Y., on April 10, 1936. He received the B.E.E. degree from Manhattan College, New York, N. Y., in 1958, and the M.S. degree from Long Island University, Brookville, N. Y., in 1969.

During the summers of 1955-1957, he held engineering positions at the Navy's Bureau of Aeronautics, Washington, D. C., and the Arma Corporation, Garden City, N. Y. From 1958 to 1965 he was a Development Engineer, and later a Senior Development Engineer, at Wheeler Laboratories, Great Neck, N. Y., where he developed microwave components for the Thor-Delta missile and the SPG-55A antenna. He was also re-

sponsible for the development of a fenestrated metal radome and the application of waveguide simulation techniques to the design of the antenna elements for several phased-array systems. His work included the study of dielectric-lined and periodically loaded circular waveguides and their application to radiators and polarization converters. In 1966 he joined the Airborne Instruments Laboratory Division of Cutler-Hammer, Melville, N. Y., where as a Project Engineer in the Radar Techniques Department, he was responsible for the investigation of advanced antenna-element configurations suitable for conformal multifunction arrays. He also developed several types of ferrite phase shifters in microstrip and waveguide, including a unique latching Faraday rotator. He has served as a Project Engineer in the Applied Electronics Division on programs directed toward the development of a high-power solid-state switch and an integrated sweeping receiver. He is currently developing microstrip circulators and wide-band low-noise amplifiers.

Mr. Meier is a member of Eta Kappa Nu and the Long Island G-MTT Committee.

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**Raj Mittra** (S'54-M'57-SM'69-F'71) received the Ph.D. degree in electrical engineering from the University of Toronto, Ont., Canada, in 1957.

He was a visiting Assistant Professor at Pennsylvania State University, University Park, from 1956 to 1957; a Guggenheim Fellow and a visiting Professor of Engineering Science at Oxford University, Oxford, England, in 1965; and an Associate with the Center for Advanced Study, University of Illinois, Urbana, from 1968 to 1969. He is currently a Professor of Electrical Engineering at the University of Illinois, where he is also associated with the Coordinated Science Laboratory, and a visiting Professor at the Laboratory for Electromagnetic Theory, the Technical University of Denmark, Copenhagen. In addition to the traditional aspects of electromagnetic theory, his interests include the topics of modern optics, computer application to electromagnetics, biomedical image processing, environmental sensing, holography, and societal aspects of engineering.

Dr. Mittra is a member of Sigma Xi and Commission VI of the International Scientific Radio Union.

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**Herman C. Okean** (S'55-M'57-SM'66) was born in New York, N.Y., on September 28, 1933. He received the B.A. and B.S. degrees in electrical engineering from Columbia University, New York, in 1955 and 1956, respectively, the M.E.E. degree from New York University, New York, in 1960, and the Eng.Sc.D. degree from Columbia University, in 1965.

He joined Bell Telephone Laboratories, New York, in 1955 as a summer employee and worked as a Technical Assistant in the Electronic Power Development Department. He returned to Bell Telephone Laboratories, Whippany, N. J., in 1956, as a Member of the Technical Staff. From 1956 to 1960 he worked in the Military Systems Development Department and was engaged in the design and development of radar and missile guidance circuits. From 1961 to 1966 he was at the Murray Hill Laboratory where he was involved in research in the field

of microwave solid-state device applications with particular emphasis on the exploratory development of tunnel-diode amplifiers and varactor harmonic generators. From 1966 to 1971 he was with AIL, a Division of Cutler-Hammer, as a Department Consultant in the Applied Electronics Division. In this capacity he has explored the application of microwave integrated circuit techniques and flat-gain-linear-phase negative resistance amplifier broad-banding theory to the development of broad-band parametric and tunnel-diode amplifiers in several frequency bands. In addition, he investigated the circuit applications of bulk-effect devices and monolithic integrated circuits fabricated in the Central Research Group, AIL. Most recently, he directed programs involving the development of micro-miniature all-solid-state parametric amplifier systems, swept tunnel-diode receivers, and is currently directing a comprehensive program for development of wide-band integrated microwave receivers. He is presently employed by LNR Communications, Inc. in the capacity of Manager of Research and Development. He has published, as author or co-author, many papers in the fields of microwave low-noise amplifiers and microwave integrated circuits, of which he has presented several at conferences and symposia. In addition, he has been an Invited Lecturer or Panelist at a number of IEEE presentations, and has recently contributed a chapter on tunnel diodes to a recently published book on microwave semiconductor device applications. Finally, he has several patents pending on microwave components applicable to these general fields.

Dr. Okean is a member of Phi Beta Kappa, Tau Beta Pi, and Eta Kappa Nu. He is currently a member of the editorial board of the IEEE TRANSACTIONS ON MICROWAVE THEORY AND TECHNIQUES and of the G-MTT Technical Committee on Microwave Integrated Circuits.

In 1965 he became a Member of the Faculty of Washington University, St. Louis, Mo., where he is now an Associate Professor of Electrical Engineering. At the university he directs graduate research in the areas of microwave circuit design, the Gunn effect, microwave acoustics, optical demodulation, microwave ferrites, microwave integrated circuits, and low-cost microwave receivers.

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**Riccardo Roveda** was born in Rome, Italy, on September 23, 1937. He received the degree of Dottore in Ingegneria Elettronica with highest honors from the University of Rome, Rome, Italy, in 1964.

He joined the Research Division of Selenia S.p.A. in 1965, where he has been working on new microwave device development and on the study of linear and nonlinear properties of microwave ferrites. His research concerns ferrite properties, high-power ferrite devices,

and microwave integrated circuits. He is the author of several articles and technical reports.

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**Robert H. Pflieger** (M'65) was born in Milwaukee, Wis., on July 29, 1937. He received the B.S. degree in electrical engineering from the Massachusetts Institute of Technology, Cambridge, in 1959, and the M.S. degree in electrophysics from the Polytechnic Institute of Brooklyn, Brooklyn, N. Y., in 1965.

From 1959 to 1966 he was employed by the Sperry Gyroscope Company, Great Neck, N. Y., working on the development of high-power microwave hardware components, parametric amplifiers, tunnel-diode amplifiers, and transistorized IF amplifiers. From 1966 to 1967 he worked for the General Microwave Corporation, Farmingdale, N. Y., developing microwave instrumentation in the areas of swept-VSWR measurement, precision-noise measurement, and precision-power measurement. Since joining AIL, a Division of Cutler-Hammer, Melville, N. Y., in 1967, he has been involved in the development of MIC p-i-n diode switches and attenuators, MIC transistor oscillators, wide-band mixers, and spaceborne radiometers.



**Eugene W. Sard** (M'55-SM'69) was born in Brooklyn, N. Y., on December 21, 1923. He received the B.S. and M.S. degrees in electrical engineering from the Massachusetts Institute of Technology, Cambridge, in 1944 and 1948, respectively.

From 1944 to 1946 he served in the U. S. Naval Reserve as a Research Assistant in the Department of Electrical Engineering, Massachusetts Institute of Technology, working on digital computers. Since 1948 he has been with AIL, a Division of Cutler-Hammer, Melville, N. Y., at first in the Radar Department, and then in the Applied Electronics Division, where he is presently a Department Consultant. For the past 12 years he has been working on semiconductor devices with special emphasis on the application of varactors and tunnel diodes to various fields including fast switching, harmonic generation, low-noise amplification, frequency conversion, and detection. He is currently working on the development of integrated electronically tuned microwave oscillator circuits.

Mr. Sard is a member of Sigma Xi.

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**Fred J. Rosenbaum** (S'57-M'63-SM'70) was born in Chicago, Ill., on February 15, 1937. He received the B.S., M.S., and Ph.D. degrees in electrical engineering from the University of Illinois, Urbana, in 1959, 1960, and 1963, respectively.

While at the university he conducted research on ferrites and Cerenkov radiation. In 1963 he joined the Research Division of McDonnell Aircraft Corp., St. Louis, Mo., where he worked on masers and dielectric resonators.



**Rudolph E. Seviora** (S'69-M'70) was born in Jihlava, Czechoslovakia, in 1941. He received the E.E. degree from the Czech Technical University, Prague, Czechoslovakia, in 1964.

From 1964 to 1968 he was with the Institute of Radio Engineering and Electronics, Czechoslovak Academy of Sciences, Prague. He is presently completing his Ph.D. dissertation on generalized filtering in the Department of Electrical Engineering, University of Toronto, Ont., Canada.



**P. I. Somlo** was born in Budapest, Hungary, on May 15, 1933. He graduated from the University of Technology of Budapest, Budapest, Hungary, in 1956.

After graduation he joined the Fine Mechanics Company, Budapest, where he was engaged in the development and design of high-frequency laboratory equipment. In 1957 he joined the Standard Telephone and Cables Company, London, England, where his work was concerned with microwave repeater stations. In 1957 he joined the Standard Telephone and Cables Company, Liverpool, N.S.W., Australia, where he was engaged in developing pulse-technique circuitry. In late 1957 he joined the National Standards Laboratory of the Commonwealth Scientific and Industrial Research Organization, Sydney, Australia, where his work involves VHF-UHF impedance standards and the development of associated measuring techniques.

Mr. Somlo is an associate member of the Institution of Engineers (Australia).

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**Max J. O. Strutt** (SM'46-F'56) was born in Surakarta, Java, on October 2, 1903. He attended the University of Munich, Munich, Germany, and the Institute of Technology, Munich. He received the M.Sc. and D.Sc. degrees (cum laude) in 1926 and 1927, respectively, from the Institute of Technology, Delft, The Netherlands.

He was a Research Engineer at the N. V. Philips Company, Ltd., Eindhoven, The Netherlands, from 1927 to 1948. Since 1948

he has been Professor and Director of the Department of Advanced Electrical Engineering, Swiss Federal Institute of Technology, Zurich, Switzerland, and from 1958 to 1960, Chairman of the Division of Electrical Engineering there. In 1961, 1962, and 1963 he was Visiting McKay Professor of Electrical Engineering at the University of California, Berkeley.

Dr. Strutt holds more than seventy United States patents on electron tubes and circuits, especially VHF and UHF. Among his

awards are the Doctor Honoris Causa, conferred by the Institute of Technology, Karlsruhe, Germany, in 1950, and the Karl Friedrich Gauss Medal of the Society of Sciences, Brunswick, Germany, received in 1954. He was awarded a Senior Foreign Scientist Fellowship by the National Science Foundation in Washington, D. C., in 1966. In addition, he is a member of the Swiss Society of Electrical Engineers, the German Society of Electrical Engineers, the Swiss Society of Sciences at Berne, the German Physical Society, the Swiss Mathematical Society, and the Zurich Physical Society. He is an honorary member of the Society of Sciences at Brunswick (1956), the International Television Committee (1956), the Electronics Association of Japan (1966), and the Institute of Electronics and Communications Engineers of Japan (1967).

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**Henry Zucker** (M'58) was born in Poland on November 25, 1922. He received the Dipl. Ing. degree in communication engineering from the Technische Hochschule, Munich, Germany, in 1950, and the M.S. and Ph.D. degrees in electrical engineering in 1954 and 1959, respectively, both from Illinois Institute of Technology, Chicago.

From 1951 to 1952 he was employed by Radio Craftsmen, from 1952 to 1953 by the Admiral Corporation, and from 1953 to 1956 by the Raytheon Manufacturing Company, all in Chicago, Ill. During this time he was concerned with the design and development of black and white and color TV receiver components and circuits. From 1956 to 1964 he has been associated with Armour Research Foundation, Chicago, where he has been engaged in the development of UHF and microwave components, antenna analysis, and also in electromagnetic-wave propagation in nonuniform and time-varying dielectric media. From 1959 to 1961 he was also Assistant Professor at Illinois Institute of Technology. Since 1964 he has been associated with Bell Telephone Laboratories, Whippny, N. J., where he is concerned with problems related to electromagnetic theory and optics.

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