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## Contributors



**J. Robert Ashley** (S'52-A'53-SM'61) was born in Kansas City, MO, in 1927. His first acquaintance with microwave transmitters came in 1947 as an Electronics Technician in the U.S. Navy. He received the B.S.E.E. degree from the University of Kansas, Lawrence, in 1952. After a year of work on high-power klystrons at the Sperry Gyroscope Company in New York, he returned to the University of Kansas as an Instructor and received the M.S.E.E. degree in 1956. He joined the Sperry Electronic Tube

Division, Gainesville, FL, as a Senior Engineer and was first assigned to a low-noise two-cavity klystron oscillator development. Research on the noise performance of this family of oscillators (the Sperry SOX-239) introduced him to the measurement of oscillator noise. Until 1961 the klystrons were below the noise floor of the measurement equipment, and this experience has had lasting influence.

In 1965 an NSF Engineering Traineeship made possible the full-time attendance at the University of Florida, Gainesville, from which he received the Ph.D. degree in electrical engineering in 1967. His Ph.D. dissertation was based on the background of electron beam and gun design for microwave tubes. In 1967 he joined the University of Colorado as an Associate Professor in the College of Engineering to help with the development of an Electrical Engineering Department in Colorado Springs. He was promoted to Professor in 1973 by the University of Colorado at Colorado Springs. His teaching duties have included microwave-oriented courses as well as computing and electroacoustics. To continue his work in microwave noise, he has served as a consultant to the microwave departments in the Sperry-Rand Corp., the National Bureau of Standards, Boulder, CO, Hewlett-Packard, and the U.S. Army Missile Command. Summer work for the U.S. Army brought about the invention of the transmission line discriminators. Three patents have been issued and two additional patents have been applied for as a result of this work.

Dr. Ashley has presented much of this research to the IEEE Microwave Theory and Techniques Society at conventions and in the TRANSACTIONS. These presentations include an invited lecture at the 1970 International Microwave Symposium, several appearances as a panelist on noise topics, two papers and several correspondence items in the IEEE Trans. MTT. He has served on the Steering Committee for the 1973 Symposium and on the technical program committee for the 1975 Symposium. Other IEEE activities include serving on the Editorial Review Board for the IEEE Trans. MTT and the recent appointment as Associate Editor, Transducers, IEEE Trans. Acoustics Speech and Signal Processing. He is a senior member of the Society of Computer Simulation, a fellow of the Audio Engineering Society, and has been elected to seven honorary and fraternal societies.



**Michael Balister** was born in Bushey, England, on January 5, 1935. He received the B.Sc. degree in physics from the University of Bristol, Bristol, England, in 1956.

After completing a two-year graduate apprenticeship course with the G.E.C. Coventry England, he was a member of the Scientific Staff at the G.E.C. Applied Electronics Laboratory at Stanmore, England, where he worked on radar and broad-band receiver design. In 1963 he joined the Canadian Westinghouse Electronics Division at Hamilton, Ontario, and worked on radar and countermeasure systems. In 1966 he joined the National Radio Astronomy Observatory, Green Bank, WV, and has been working in the field of low-noise receivers and associated equipment for radio astronomy. In 1974 he took a leave of absence from NRAO, and spent two years as a Principal Research Scientist at the Commonwealth Scientific and Industrial Research Organization, Division of Radiophysics, Epping, N.S.W., Australia, where he worked on cooled mixer millimeter receivers. On his return to the NRAO, he became the Acting Head of the Electronics Division in Charlottesville, VA.

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**Thomas A. Barley** (M'56) was born in Sedalia, MO, on May 23, 1931. He received the B.E.E. and M.S.E.E. degrees from the Georgia Institute of Technology, Atlanta, in 1956 and 1968, respectively.

From 1956 to 1963 he was employed by the U.S. Air Force at Robins AFB, Georgia, where he performed and directed engineering studies related to airborne fire control systems. Since 1963 he has been employed by the U.S. Army Missile Command in the U.S. Army Missile Research, Development, and Engineering Laboratory at Redstone Arsenal, Alabama. His work there has been related to radars for tactical missile systems with primary emphasis directed toward development of signal generation and analysis techniques.

Mr. Barley is coinventor on seven patents related to his primary work and is a Registered Professional Engineer in the State of Alabama.



**Walter S. Benson, Jr.**, was born in Medford, MA, on May 12, 1949. He received the B.S.E.E. and M.S.E.E. degrees, both from Tufts University, Medford, MA, in 1972 and 1975, respectively.

In 1972 he joined GTE Sylvania Electronics Systems Group, Eastern Division, Needham, MA, where he is currently participating in the design and development of signal processing, performance assessment, and high-speed digital communications systems.

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**Martin F. Bottjer** was born in New York City, NY, on July 1, 1932. He attended Hofstra College, Hempstead, NY, from 1956 to 1958.

From 1952 to 1956 he served as an Electronic Technician with the U.S. Air Force. Also prior to college, he was employed as an Electronic Technician with the Hazeltine Company, Little Neck, NY. From 1958 to 1962 he was a Standards Engineer at Hughes Aircraft Company, Culver City, CA. He is presently at Research Associate at the Aero-

space Corporation, El Segundo, CA.

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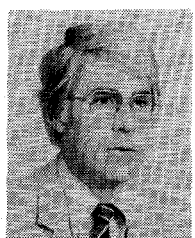


**Jochen Edrich** (SM'76) was born in Munich, Germany, in 1937. He received the Dipl. Ing. and Dr. Ing. degrees in electrical engineering from the Technical University of Munich, Munich, Germany, in 1962 and 1966, respectively.

From 1962 to 1967 he was employed by the Central Communications Research Laboratory of Siemens AG in Munich where he was engaged in research on time division multiplex devices and low-noise receivers for the first satellite communications link. From 1967 to 1971 he led the low-noise and millimeter-wave groups at the National Radio Astronomy Observatory, Charlottesville, VA, in the development of paramp and mixer receivers between 1 and 85 GHz. He was also Lecturer in Electrical Engineering at the University of Virginia. Since 1971 he has been with the University of Denver, Denver, CO, as Associate Professor in the Electrical Engineering Department and Senior Research Engineer in the Denver Research Institute where his research has concentrated on ferrites, millimeter-wave paramps, Josephson-effect mixers, and biomedical application of millimeter waves. He is also an Adjunct Associate Professor in Electrical Engineering at the University of Colorado, Boulder.

Dr. Edrich is a member of the German Communications Society NTG, and has been serving in various program functions of the European Microwave Conference.

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**Jasper J. Goedbloed** was born in Biervliet, The Netherlands, on January 5, 1937. He received the B.S. degree in physics and the M.S. degree in experimental physics, both from the Municipal University of Amsterdam, The Netherlands, in 1964 and 1967, respectively. He received the Ph.D. degree from the Technical University of Eindhoven, The Netherlands, in 1973.

From 1954 to 1961 he was with Philips Research Laboratories, Eindhoven, The Netherlands,

where he was engaged in studies of electromechanical coupling systems employing the Eddy-current effect. From 1964 to 1967 he was with the Municipal University of Amsterdam, conducting research on gamma irradiation of silicon. In 1967 he rejoined Philips Research Laboratories, where he has been engaged in the study of noise in

avalanche diode oscillators and amplifiers, and at present, is working on avalanche photodiodes.

Dr. Goedbloed is a member of the Dutch Physical Society.

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**Alexander J. Kelly** (S'65-M'68-SM'76) was born in Brooklyn, NY, on March 25, 1941. He received the B.E.E. degree from Manhattan College, New York, NY, in 1962, and the M.S.E.E. degree from the Polytechnic Institute of Brooklyn, Brooklyn, NY, in 1964.

In 1973 he joined LNR Communications, Inc., Hauppauge, NY, and is presently a Group Leader in the Research and Development Department. His responsibilities include the development of receivers using low-noise

mixers, and the design of video and message receivers for satellite earth stations. From 1971 to 1973 he was a Senior Engineer in the Aviation Systems Department of Cardion Electronics, Woodbury, NY. He designed front ends for equipment used with IFF and ILS systems. As Manager of Microwave Engineer for the LEL Division of Varian Associates, Copiague, NY, he directed a staff designing front ends and front-end components for radars, communication systems, and electronic warfare systems. From 1965 to 1968 he was an Engineer in the Radar Techniques Department of the AIL Division of Cutler-Hammer, working on programs related to phased arrays and high resolution radars. With Wheeler Laboratories, Great Neck, NY, from 1962 to 1965, he participated in antenna development.

Mr. Kelly is the Junior Past Chairman of the NY/LI Chapter of S-MTT. He is a member of Sigma Xi and Eta Kappa Nu. He is a Registered Professional Engineer in the State of New York.

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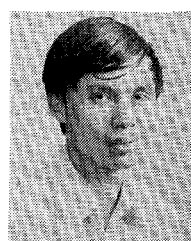


**Curt A. Levis** (S'48-A'52-M'57-SM'59) was born in Germany in 1926 and came to the United States in 1938. He served in the U.S. Navy from 1944 to 1946 as an Electronics Technician. In 1949 he received the B.S.E.E. degree from Case Institute of Technology, Cleveland, OH, and the A.M. degree in 1950 from Harvard University, Cambridge, MA, where he was Gerard Swope Fellow. In 1956 he received the Ph.D. degree from Ohio State University, Columbus.

Since 1950 he has been a member of the staff of the Ohio State University ElectroScience Laboratory, and he served as its Director from 1961 to 1969. He is Professor of Electrical Engineering and has taught since 1956. Currently, he is on leave from Ohio State as Senior Postdoctoral Fellow at the National Center for Atmospheric Research, Boulder, CO. His research interests have been primarily the system aspects of antennas and propagation.

Dr. Levis has held various offices in the Columbus joint Chapter of S-MTT/AP-S and has also served as Region 2 Chairman and on the Administration Committee of the Antenna and Propagation Society. He is a member of Tau Beta Pi, Eta Kappa Nu, and Sigma Xi, and is listed in Who's Who in America, American Men and Women of Science, and Leaders in American Science.

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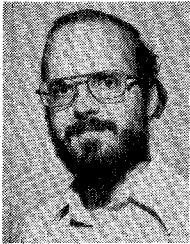
**Heng-Cheng Lin** (S'74) was born in Taiwan, China, in 1949. He graduated from the Taipei Institute of Technology, Taipei, Taiwan, in 1970. He received the M.S. degree in electrical engineering in 1975, and is currently working on the Ph.D. degree at Ohio State University, Columbus.

Between 1969 and 1973 he was employed by the following: Beta Electronics Corporation, Taiwan Electronics Corporation, and Taipei Institute of Technology. He was involved in the

manufacture and maintenance of electronic instruments and the design

and teaching of electronic circuits. Since 1974 he has been with the ElectroScience Laboratory, Ohio State University, where he has been engaged in research on noise of antenna arrays and pattern recognition. Mr. Lin is an associate member of Sigma Xi.

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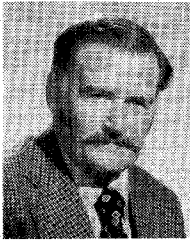
**Stephen Maas** (M'74) was born in Quincy, MA, on June 25, 1949. He received the B.S. and M.S. degrees in electrical engineering from the University of Pennsylvania, Philadelphia, in 1971 and 1972, respectively.

Upon graduation he was offered a one-year appointment with the National Oceanic and Atmospheric Administration in Boulder, CO, where he helped develop a mobile LIDAR system for atmospheric remote sensing. In 1974 he joined the National Radio Astronomy Observatory, Socorro, NM, and worked on the development and construction of low-noise receivers and components for the very large array.

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**Malcolm McColl**, for a photograph and biography please see page 81 of the January 1977 issue of this TRANSACTIONS.

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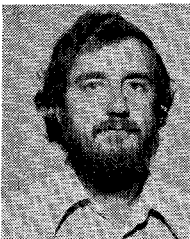


**Michael F. Millea** was born in Chicago, IL, on May 31, 1929. He received the B.S., M.S., and Ph.D. degrees from the University of Illinois, Champaign-Urbana, in 1952, 1954, and 1957, respectively.

From 1957 until 1962 he was engaged in semiconductor device research and advanced device development at Pacific Semiconductors, Inc. (TRW Semiconductors). In 1957 he joined the Electronics Research Laboratory of the Aerospace Corporation, El Segundo, CA,

where he is currently a Senior Staff Scientist. His main area of research is directed toward semiconductor device physics.

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**Peter J. Napier** was born in London, England, on December 29, 1945. He received the B.Eng. degree in 1968 and the Ph.D. degree in electrical engineering in 1972, from the University of Canterbury, Christchurch, New Zealand.

From 1972 to 1973 he was a Research Associate at the National Radio Astronomy Observatory, Charlottesville, VA, where he worked on data reduction techniques for radio interferometry. In 1973 he joined the Very Large Array (VLA) Electronics Group where

he was responsible for the design of the feed system for the VLA antennas. He is currently group leader for the VLA Front-End Group and Assistant Head of Electronics at the NRAO, Socorro, NM.

Dr. Napier is a member of URSI Commission J.



**Herman C. Okean** (S'55-M'57-SM'66-F'75) was born in New York, NY, on September 28, 1933. He received the B.A. and B.S. degrees in electrical engineering from Columbia University, New York, NY, in 1955 and 1956, the M.E.E. degree from New York University, New York, NY, in 1960, and the Ph.D. degree in engineering science from Columbia University in 1965.

He is presently the Manager of Research and Development at LNR Communications, Inc.,

Happauge, NY. He is well known for his contributions in the fields of parametric and tunnel diode amplifiers, and microwave integrated circuit receiver components and subsystems. In his present capacity, he is responsible for a variety of advanced millimeter and microwave parametric amplifier, mixer upconverter, and heterodyne receiver development programs. From 1956 to 1966, he was employed at Bell Laboratories, Whippany and Murray Hill, NJ, as a Member of the Technical Staff. From 1966 to June 1971, he was employed as a Consultant in the Advanced Receiver Components Subsystems Department of AIL, Melville, NY. As author or coauthor, he has published numerous papers which were also presented at engineering conferences and symposia. He has been a frequent invited lecturer and panelist. He is the author of a 150 page chapter entitled "Tunnel diodes," in Volume 7B of the series, *Semiconductors and Semimetals*, published by Academic Press, 1971.

Dr. Okean is 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. He is also a member of Phi Beta Kappa, Tau Beta Pi, and Eta Kappa Nu.

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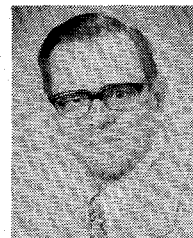


**Robert J. Pedersen** (M'57) was born in Staten Island, NY, on November 26, 1928. He received the B.E.E. degree from the Polytechnic Institute of Brooklyn, Brooklyn, NY, in 1950 and the M.S. and Ph.D. degrees in electrical engineering from the University of Southern California, Los Angeles, in 1955 and 1971, respectively.

He joined the technical staff of the Hughes Aircraft Company in 1953 under the Hughes Master of Science Program and remained on the staff until 1961. Since 1961 he has been a member of the technical staff of the Aerospace Corporation, El Segundo, CA, and is presently Staff Scientist, Solid State Electronics, Electronics Research Laboratory. His fields of activity include antenna development, microwave components, thin films, cryogenics, and superconductivity.

Dr. Pedersen is a member of the American Physical Society, Eta Kappa Nu, and Tau Beta Pi.

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**Gustaf J. Rast, Jr.**, was born in Humboldt township, MI, in 1928. He received the B.E.E. degree from the University of Florida, Gainesville, in 1951 and the M.S.E. degree in electromagnetics from the University of Alabama, Huntsville, in 1974.

From 1952 to 1957 he was a Staff Field Engineer for the Corps of Engineers, Jacksonville, FL, district, coordinating electrical design and construction of missile launch support facilities at the Cape Canaveral launch complex.

In 1957 he joined the eastern GEEIA region, U.S. Air Force at Robins AFB, Georgia, where he worked as a telephone inside plant (switching equipment) design engineer. In 1959 he transferred into the Airborne Fire Control Group at Robins AFB, Georgia, as an Electronics Engineer working primarily with Airborne Radars and digital computers supporting these RADAR systems. Since 1962 he has been employed by the U.S. Army Missile Command in the U.S. Army Missile Research, Development and Engineering Laboratory at Redstone Arsenal, Alabama. His work there has been related to Radars for Tactical Missile Systems. His primary interest is directed toward

development of Radar Transmitters with emphasis on signal generation and analysis techniques.

Mr. Rast is coinventor on seven patents related to radar systems. He is a Registered Professional Engineer in the State of Georgia.

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**Arnold H. Silver** (M'74) received the B.S. (1952), M.S. (1954), and Ph.D. (1958) degrees from Rensselaer Polytechnic Institute, Troy, NY, with a major in physics.

From 1957 to 1969 he conducted fundamental and applied research at the Scientific Laboratory of the Ford Motor Company. Since 1969 he has been Director of the Electronics Research Laboratory of the Aerospace Corporation, El Segundo, CA, and directs the programs in millimeter-wave technology, solid-state technology, laser and optics technology, and millimeter-wave radio astronomy. He has specialized in solid-state physics, RF and microwave spin resonance techniques, RF spectroscopy, superconductivity and superconducting devices, and electronic techniques and instrumentation.

Dr. Silver is a member of the American Association for the Advancement of Science, Scientific Research Society of America, and a Fellow of the American Physical Society.

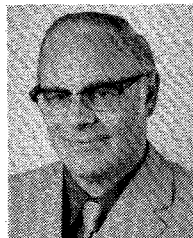
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**Arthur Uhlir, Jr.** (A'53-SM'58-F'67) was born in Chicago, IL, on February 2, 1926. He received the B.S. and M.S. degrees in chemical engineering from the Illinois Institute of Technology, Chicago, in 1945 and 1948, and the S.M. and Ph.D. degrees in physics from the University of Chicago, Chicago, IL, in 1950 and 1952.

He worked at Douglas Aircraft and Armour Research Foundation in Chicago. From 1952 to 1958 he was in transistor development at Bell Telephone Laboratories in Murray Hill, NJ, and was Director of Semiconductor Development and later Vice President and Director at Microwave Associates, Inc., Burlington, MA, from 1958 to 1969. He was Director of Research of Computer Metrics, Inc., Rochelle Park, NJ, from 1969 to 1973. In 1970 he joined Tufts University, Medford, MA, as Professor and Chairman of electrical engineering. Since 1975 he has been Dean of the College of Engineering. His research has involved varactor parametric amplifiers.

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**Bernard F. van der Heyden** was born in Amsterdam, The Netherlands, on August 28, 1925. He received a degree in physical engineering from the Technical University of Delft, Delft, The Netherlands, in 1952, after first having studied chemistry in Amsterdam during the war.

After a two-year service in the Dutch Army as an officer, he joined the National Aeronautical and Space Research Institute in Amsterdam from 1954 to 1960, where he conducted research and development on special antennas and telemetry equipment. In this period he had an executive function in the Dutch Royal Institute of Engineers, and became an associate member of the British Institute of Electrical Engineers. In 1960 he joined the Philips Development Laboratories for Transmitting Tubes and Microwave Components, Eindhoven, The Netherlands, where he has been engaged in the design and development of megawatt amplifiers for *L* and *S* band and of high-power traveling-wave tubes for UHF television transponders. Presently, he is working on solid-state microwave devices and, more in particular, on highly stable low-noise oscillators.



**Frank L. Vernon, Jr.** (S'50-A'51-M'57) received the B.S.E.E. degree from Southern Methodist University, Dallas, TX, in 1949, the M.S.E.E. degree from the University of California, Berkeley, in 1952, and the Ph.D. degree in electrical engineering and physics from the California Institute of Technology, Pasadena, in 1959.

From 1952 to 1961 he was employed by Hughes Aircraft Company, working on microwave components, ferrite devices, traveling-wave tubes, and superconducting devices. From 1959 to 1960 he held a part-time appointment as Research Fellow in Physics at Caltech. Since 1961 he has been employed by the Aerospace Corporation, El Segundo, CA, in the Electronics Research Laboratory. He has worked in the areas of low temperature physics, particularly emphasizing the high-frequency properties of superconducting tunneling phenomena, millimeter-wave radiometric measurements, lasers, and semiconductors. Presently, he is Senior Staff Scientist in the Electronics Research Laboratory.

Dr. Vernon is a member of Sigma Xi and the American Physical Society.

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**Marinus T. Vlaardingerbroek** (SM'69) was born in The Hague, The Netherlands, on July 2, 1931. He received the M.Sc. degree in physical engineering from the Technical University of Delft, The Netherlands, in 1954, and the Ph.D. degree from the Technical University of Eindhoven, The Netherlands, in 1959.

He joined the Philips Research Laboratories, Eindhoven, The Netherlands, in 1954, where he was first concerned with microwave tubes. Subsequently, his main interest changed to beam-plasma systems; in connection with this study he joined the research staff of MIT, Cambridge, for the period 1963-1964. From 1964 to 1976 he has been supervising a group at the Philips Research Laboratories engaged in the study of microwave solid-state devices and, more recently, injection lasers and avalanche photodiodes. Since the beginning of 1976 he has been responsible for the development of transmitting and microwave devices and subassemblies for the main industry group for Electronic Components and Materials (Elcoma) of the Philips Company.

Dr. Vlaardingerbroek is a member of the Dutch Physical Society.

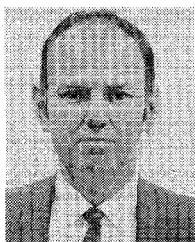
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**Sander Weinreb** (S'56-M'63-SM'71) was born in New York City, NY, on December 9, 1936. He received the B.S. (1958) and Ph.D. (1963) degrees in electrical engineering from the Massachusetts Institute of Technology, Cambridge.

From 1960 until 1963 he was a Research Assistant at MIT, engaged in investigations of varactor frequency multipliers and digital autocorrelation techniques. In 1963 he joined Lincoln Laboratory where he was responsible for the radiometric equipment for the Haystack antenna. In 1965 he joined the National Radio Astronomy Observatory, Charlottesville, VA, where he is currently Head of the Electronics Division, and is responsible for development of radio astronomy equipment. At the present time he is on sabbatical leave at the University of California, Berkeley.

Dr. Weinreb is a member of Sigma Xi, Eta Kappa Nu, Tau Beta Pi, and the International Scientific Radio Union. He is an advisor to The Netherlands Foundation for Radio Astronomy and serves on the Arecibo Scientific Advisory Committee.



**James J. Whelehan** (S'59-M'60) received the B.E.E. degree in 1959 and the M.S.E.E. degree in 1965 from the Polytechnic Institute of Brooklyn, Brooklyn, NY.

He joined the AIL, a division of Cutler-Hammer, in 1959 and is currently Department Head of the Advanced Microwave Systems Department. He is presently directing the development of numerous microwave and millimeter programs including both cooled and uncooled state-of-the-art parametric amplifiers.

These programs include an extremely sophisticated broad-band cryogenically cooled parametric amplifier system that has very stringent gain and phase characteristics. The developmental work in these programs has required advances in the state-of-the-art of both circulator and parametric amplifier performance as well as extensive theoretical extensions of present day broad-banding theory. From 1964 to the present, he has been heavily involved in the development of solid-state power generation and parametric amplifier programs. This included cryogenically cooled parametric amplifier systems with the use of closed-cycle refrigerators. During this period, a 500-MHz C-band cryogenically cooled system was developed, as well as a voltage-tunable cryogenically cooled X-band system for the military communication band, and a 200-MHz bandwidth system at 4 GHz for NASA for the ATS experiments. In addition, he directed the development of numerous other cryogenically cooled parametric amplifier systems from S band to K<sub>a</sub> band that were developed as complete radiometer systems for many radio observatories throughout the world. He has directed the development of avalanche diode oscillators and varactor multipliers for use in various parametric amplifier systems. From 1959 to 1964, he was responsible for the development of numerous parametric amplifiers that significantly advanced the state-of-the-art. He participated in the development of both tunable and broad-band one-port parametric amplifiers and a lower sideband upconverter in the UHF frequency range. He also developed a three-channel voltage-tunable C-band parametric amplifier that had both amplitude and phase tracking requirements that was successfully retrofitted for use with the AN/

FPS-16 radar. Further work at C band included the development of a fixed-tuned wide-band amplifier that had precise amplitude and phase characteristics. He also directed the development of a highly sensitive radiometer system including a C-band degenerate parametric amplifier. He also was responsible for the development of a tunable dual-channel low-noise K<sub>a</sub>-band parametric amplifier for use in an aircraft electronic system. He served as a Sonar Technician and Operator in the United States Navy from 1951 to 1955. He has received a parametric amplifier patent, has two applications currently pending, and has authored numerous technical papers and reports.

Mr. Whelehan is a member of Eta Kappa Nu.

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**William J. Wilson** was born in Spokane, WA, on December 16, 1939. He received the B.S.E.E. degree from the University of Washington, Seattle, in 1961 and the M.S.E.E., Electrical Engineers, and Ph.D. degrees in electrical engineering from the Massachusetts Institute of Technology, Cambridge, in 1963, 1964, and 1970, respectively.

From 1964 to 1967 he served in the U.S. Air Force working on military communication satellites. In 1970 he joined The Aerospace Corporation and was closely involved in the design and construction of the millimeter-wave spectral line receiver system in addition to studying millimeter-wave molecular emission from interstellar sources and planetary atmospheres. In 1976 he joined the Electrical Engineering Faculty at the University of Texas, Austin, and is also associated with the UT Millimeter-Wave Observatory.

Dr. Wilson is a member of the American Astronomical Society, Commission V of the International Union of Radio Sciences (URSI), the International Astronomical Union, Tau Beta Pi, and an associate member of Sigma Xi.