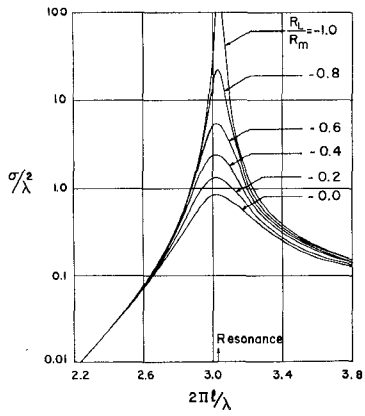


Fig. 1—Theoretical σ/λ^2 for a loaded dipole of length l, diameter $l/900$, center loaded by a negative resistance R_L.

behavior for a center loaded dipole. Because of (3), the bandwidth of a small loaded scatterer can be increased only by reducing σ, and vice versa.

Restricting the discussion now to tunnel-diode loads, one has a very effective way of modulating the scattered signal by modulating the bias on the diode. A voltage modulation of a few millivolts can swing a tunnel diode from the negative resistance region to the positive resistance region. The advantages of using a modulated scatterer for field measurements have been discussed in the literature.[4,5] If the bias were provided by a photoelectric cell, one could obtain the modulation by shining a modulated light on the cell. This would be similar to the technique of Vural, *et al.*,[6] but much more sensitive.

ACKNOWLEDGMENT

I wish to acknowledge the help of T. Bristol in calculating Fig. 1.

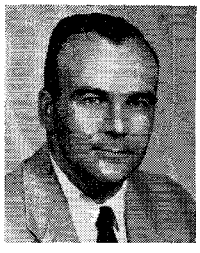
ROGER F. HARRINGTON
of Elec. Engrg. Dept.
Syracuse University
Syracuse, N. Y.

[4] J. H. Richmond, "A modulated scattering technique for measurement of field distributions," IRE TRANS. ON MICROWAVE THEORY AND TECHNIQUES, vol. MTT-3, pp. 13–15; July, 1955.

[5] M. K. Hu, "On measurement of $\overline{E}$ and $\overline{H}$ field distributions by using modulated scattering methods," IRE TRANS. ON MICROWAVE THEORY AND TECHNIQUES, vol. MTT-8, pp. 295–300; May, 1960.

[6] A. Vural, D. K. Cheng, and B. J. Strait, "Measurement of diffraction fields of finite cores by a scattering technique using light modulation," IEEE TRANSACTIONS ON ANTENNAS AND PROPAGATION, vol. AP-11, pp. 200–201; March, 1963.

Contributors



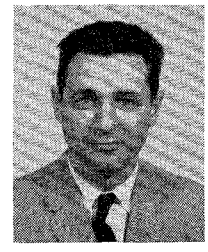
Jack R. Baird (S'60–M'63) was born in Colchester, Ill., on May 1, 1931. He received the B.S. and M.S. degrees in electrical engineering in 1958 and 1959, respectively, from the University of Illinois, Urbana, where he is presently working on the Ph.D. degree.

From 1951 through 1954 he served in the U. S. Air Force as an Instructor in radar and radar test equipment at Lowry Air Force Base, Colo. He joined the Ultramicrowave Group at the University of Illinois in 1956 as an Undergraduate Technician designing and constructing high-power modulators, waveform generators, and special power supplies for low millimeter wavetubes. Since 1958 he has been actively engaged in research in the field of millimeter wave generation and detection. His research interests have included such problems as harmonic generation by field emission, frequency multiplication and mixing in a microwave discharge, megavolt electronics, and electron beam type frequency multipliers.

Mr. Baird is a member of Tau Beta Pi.

❖

Eric Brannen was born in Manchester, England, on September 25, 1921. He received the B.A. and M.A. degrees from the University of Toronto, Canada, in 1944 and 1946, respectively, and the Ph.D. degree from McGill University, Montreal, Canada, in 1948.



He served as Radar Officer in the RCNVR on loan to the Royal Navy in 1945. Since 1949 he has been a member of the Physics Department of the University of Western Ontario, London, Ont., Canada, where he is now Professor of Physics. His research work has been concerned with photon correlation in coherent light beams, nuclear decay schemes, electron dosimetry, the design and characteristics of the conventional and racetrack microtron electron accelerators, the interaction of high energy electron beams with materials, in particular, Cerenkov and transition radiation, applied to the generation of millimeter and submillimeter radiation, optical techniques in the submillimeter region and the interaction of submillimeter waves with various materials.

Dr. Brannen is a member of the American Physical Society and the Canadian Association of Physicists.

❖

Charles A. Burrus, Jr. was born in Shelby, N. C., on July 16, 1927. He received the B.S. degree, *cum laude*, from Davidson College, Davidson, N. C., in 1950, the M.S. degree from Emory University, Atlanta, Ga., in 1951, and the Ph.D. degree from Duke University, Durham, N. C., in 1955, all in physics.

At Duke University he studied under Texas Company and Shell Company Fellowships, and was employed at the University as Research Associate in 1954–1955. In 1955, he joined the Technical Staff of the Bell Telephone Laboratories, Holmdel, N. J. His work has been concerned primarily with microwave spectroscopy at millimeter and submillimeter wave frequencies, and with millimeter wave diodes.

Dr. Burrus is a member of Phi Beta Kappa, Sigma Pi Sigma, Sigma Xi, the American Physical Society and the American Association for the Advancement of Science.

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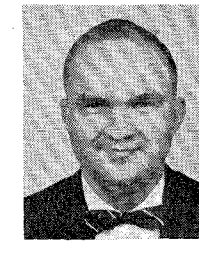

J. Clark Butterworth was born in Atlanta, Ga., on April 6, 1930. He received the Associate in Science degree from Southern Technical Institute, Chamblee, Ga., in 1951.

Since 1951, he has been on the staff of the Engineering Experiment Station, Georgia Institute of Technology, Atlanta, except for two years' service in the U. S. Army as

an Instructor in microwave radio repair. His research work at Georgia Tech has been primarily concerned with microwave aspects of radar and antenna projects, and he served as engineering representative during Army tests of a battlefield surveillance radar. His recent efforts have been in development of millimeter wave detection systems.

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John F. Byrne (SM'45–F'50), was born in Cincinnati, Ohio, on October 26, 1905. He attended The Ohio State University, Columbus, receiving the B.S. degree in engineering physics in 1927 and the M.S. degree in electrical engineering in 1928.

After a year with the Bell Telephone Laboratories, he returned to Ohio State as a faculty member; he was Assistant Professor of Electrical Engineering when he left the university in 1937 to join the Collins Radio Company. In 1942, he became associated with the newly-formed Radio Research Laboratory at Harvard University, the first laboratory organization to devote its time exclusively to the development of electronic countermeasures equipment and techniques. He was appointed Associate Director of the Laboratory in January, 1945. From 1946 to 1950 he was Vice-President in charge of research and engineering at the Airborne Instruments Laboratory. Mr. Byrne has served on several government committees and was Chairman of the Electronic Countermeasures Panel of the Research and Development Board, 1949–1951. With Motorola since 1950, he was first Director of Engineering for the Communications Division, then General Manager of the Systems Research Laboratory, Riverside, Calif., and is now Assistant to Executive Vice-President of the Technical Products Divisions, Phoenix, Ariz.

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

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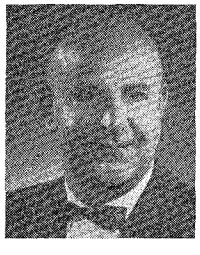

Paul D. Coleman (A'45 – M'55 – F'62) was born in Stoystown, Pa., on June 4, 1918. He received the B.A. degree fron Susquehana University, Selinsgrove, Pa., in 1940, the M.S. degree in physics from Pennsylvania State University, University Park, in 1942, and the Ph.D. degree in physics from the Massachusetts Institute of Technology, Cambridge, in 1951.

He was employed as a Physicist with the U. S. Signal Corps, Dayton, Ohio, and subsequently with the U. S. Air Force at Wright Air Development Center, Ohio, from 1942 to 1946. During this period he worked on electromagnetic theory, and received the AAF Meritorious Civilian Award in 1946 for his contribution to aircraft antenna theory. From 1946 to 1951 he was a Physicist with the U. S. Air Force Cambridge Air Research Center, Bedford, Mass., and later a Research Associate in Physics at the Research Laboratory of Electronics, M.I.T., where he was concerned with the generation of submillimeter waves. In 1951 he became an Associate Professor of Electrical Engineering at the University of Illinois, Urbana, where he established the Ultramicrowave Group in the Electrical Engineering Research Laboratory. He is presently a Professor on the graduate electrical engineering staff, teaching and directing research on submillimeter wave generation, detection, and propagation. In September, 1962, he accepted a one year Visiting Professorship in the Microwave Laboratory, Stanford University, Calif., where he is pursuing research on quantum electronics.

Dr. Coleman is Chairman of the Board of Technological Counselors of FXR, Inc., Woodside, N. Y. He is a member of Sigma Xi, the American Physical Society, and Pi Mu Epsilon.

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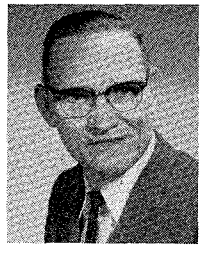

Charles F. Cook was born in Whitewater, Wis., on August 7, 1910. He attended George Washington University, Washington, D. C.

He was with the National Bureau of Standards, Washington, D. C., in the fields of electronic computation and missile system dynamics from 1942 to 1950. Next, he was with the Naval Ordnance Laboratory at Corona, Calif., until 1953. From 1953 to the present time he has served the Motorola Systems Research Laboratory, Riverside, Calif., as Senior Scientist in the field of electronic computation and systems analysis.

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John M. Cotton, Jr. (M'63) was born in Plymouth, N. H., on April 26, 1930. He received the A.B. degree in physical sciences from Harvard University, Cambridge, Mass., in 1951.

From 1951 to 1956 he served in the Air Force as a Pilot. From 1956 to 1957 he worked as an Engineer with the Baltimore Gas and Electric Co. From 1957 to 1961 he was employed by the Johns Hopkins University Radiation Laboratory, Baltimore, Md., where he worked on design of millimeter wave measurement systems and conducted experiments on electromagnetic scattering. In 1961 he joined the staff at the Research Division of Electronic Communications, Inc., Timonium, Md. Since that time he has been primarily engaged in millimeter and submillimeter component design, investigations of transmission methods and development of submillimeter measurement techniques.

Mr. Cotton is an associate member of Sigma Xi.

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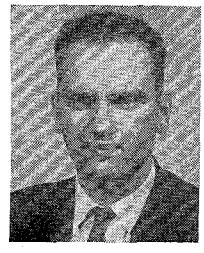

Heinrich R. Froelich was born in Kamien, Poland, on September 15, 1928. He received the equivalent of the B.Sc. degree in physics from the Technical University, Berlin, Germany in 1954 and the M.Sc. and Ph.D. degrees from the University of Western Ontario, London, Ont., Canada, in 1958 and 1962, respectively.

He is now working as a Research Associate and Lecturer in the Department of Physics of the University of Western Ontario. His research is concerned with the development of a racetrack microtron and its application to the generation of millimeter and submillimeter waves.

Dr. Froelich is a member of the Canadian Association of Physicists.

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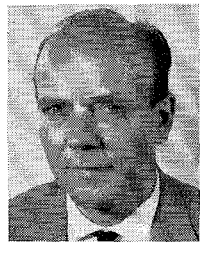

L. Genzel was born in Bad Nauheim, Germany, on February 17, 1922. He studied physics at the University of Frankfurt-Main, Germany, and received the Diplom-Physiker degree in 1949, the Ph.D. degree in 1951. and the Privat-Dozent (Habilitation) in 1956.

Since April, 1960, he has an appointment as an Professor of Experimental Physics at the University of Freiburg, Germany. He is working mainly with his group in the field of solid-state physics in connection with far infrared spectroscopy.

Dr. Genzel is a member of the German Physical Society.

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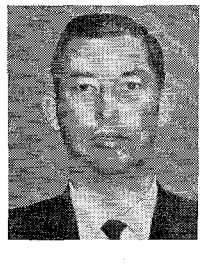

Gordan R. Harrison (M'62) was born in Wister, Okla. on December 14, 1931. He received the B.S. degree in physics in 1952 from Arkansas State Teachers College, Jonesboro. He attended the Graduate School of Vanderbilt University, Nashville, Tenn., where he

held an AEC Fellowship in radiological physics and various research and teaching assistantships, receiving the M.S. degree in 1954 and the Ph.D. degree in physics in 1958. His graduate research was in the field of nuclear physics where he studied the interaction of low energy particles with matter.

He joined the Applied Physics Section of the Sperry Microwave Electronics Company in September, 1957, and has since been engaged in research and development on the fabrication and application of ferrimagnetic materials to microwave devices. He is at present responsible for Advanced Studies on Microwave Solid-State Devices and Materials in the Advanced Microwave Techniques Department.

Dr. Harrison is a member of Sigma Xi, the American Physical Society, and the American Ceramic Society.

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Otto F. Hinckelmann (S'57–M'61) was born in Flushing, N. Y., on April 21, 1931. He received the B.E.E. in 1959, and the M.E.E. degree (as a David Sarnoff Fellow) in 1960, both from New York University, N. Y. His thesis work was concerned with microwave network theory.

He served in the U. S. Navy from 1950 to 1954, specializing in radar and communication electronics, and from 1954 to 1955 he was employed as a Technical Representative to the U. S. Air Force by the Philco Corporation. Since 1960 he has been with the Airborne Instruments Laboratory, Deer Park, N. Y., where he is a Group Leader in the Applied Electronics Department. He has done work on microwave filters, solid-state devices, multimode waveguide problems, and millimeter wave techniques.

Mr. Hinckelmann is a member of Sigma Xi, Tau Beta Pi, and Eta Kappa Nu.

❖

Harvey J. Hindin (S'59–M'61) was born in New York, N. Y., on October 21, 1937. He received the B.E.E. and M.E.E. degrees from the Polytechnic Institute of Brooklyn, N. Y., in 1958 and 1962, respectively.

He served as an Instructor in the Department of Electrical Engineering of the Polytechnic Institute as the recipient of a teaching fellowship for the 1960 academic year. He worked on microwave components at the Sperry Gyroscope Company, Great Neck, N. Y., W. L. Maxson Corporation, New York, N. Y., and Radio Receptor Company, Westbury, N. Y. before joining the Applied Electronics Department of Airborne Instruments Laboratory, Deer Park, N. Y., in November, 1961, where he has been concerned with quasi-optical component development for millimeter and submillimeter wavelengths, and filter theory.

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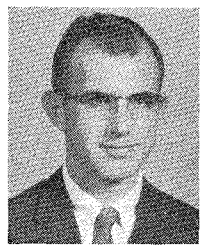

L. R. Hodges, Jr., was born in Brunswick, Ga., on August 13, 1931. He received the Bachelor of Ceramic Engineering degree in 1957 from the Georgia Institute of Technology, Atlanta, after serving in the Air Force. He then did ceramic research related to space re-entry problems at the Ceramic Branch of the Engineering Experiment Station.

He joined the Sperry Microwave Electronics Company in the summer of 1958 as an Engineer in the Applied Physics Section and has been engaged since in research and development work on ferrimagnetic materials. He is presently responsible for the Research and Development Materials Laboratory.

Mr. Hodges is a member of Keramos and the American Ceramic Society.

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Emanuel Kramer (S'53 A'55–M'60), for a photograph and biography, please see page 616 of the November, 1962, issue of these TRANSACTIONS.

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Maurice W. Long (S'47–A'51–SM'55) was born in Madisonville, Ky. on April 20, 1925. He received the B.E.E. degree from the Georgia Institute of Technology, Atlanta, in 1946, and the M.S.E.E. degree from the University of Kentucky, Lexington, in 1948. He did a year of graduate work at Columbia University, New York, N. Y., and received the Ph.D. degree in physics from the Georgia Institute of Technology in 1959.

After spending 1943 to 1946 in the U. S. Navy, he was employed as a Research Assistant during parts of 1946, 1947, and 1948 at Georgia Tech. From 1947 to 1949 he was an Instructor of Electrical Engineering at the University of Kentucky. Since 1950 he has been at the Engineering Experiment Station of the Georgia Institute of Technology, where he is presently Chief of the Electronics Division.

Dr. Long is a member of Sigma Xi, Sigma Pi Sigma, and the American Physical Society.

Ronald Meredith was born in South Wales, England on May 31, 1921. He was educated in South Wales and Hampshire, England. From 1941 to 1946 he served in the Royal Air Force as a Navigator. He received the B.Sc. (Special) degree in physics from University College, London University, England in 1949.

In 1950 he joined the Telecommunications Research Establishment (now the Royal Radar Establishment) where he has spent the greater part of his time on millimeter wave research and currently heads the Millimeter Wave Division.

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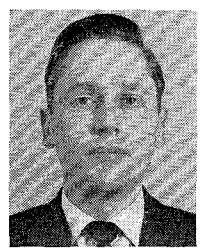

Henri J. Oguey (M'60) was born in Geneva, Switzerland, on December 10, 1928. He received the B.S.E.E. degree from the Ecole Polytechnique, Lausanne, Switzerland, in 1952, and the Ph.D. degree in electrical engineering from the Federal Institute of Technology, Zurich, Switzerland, in 1956.

Since 1956, he has been associated with IBM Research, and has worked at the Zurich Laboratory, except for a period of two years spent at the Thomas J. Watson Research Center, Yorktown Heights, N. Y. His work has been in the area of magnetic recording, magnetic testing equipment, switching and high-frequency circuits involving magnetic cores, magnetic films and tunnel diodes.

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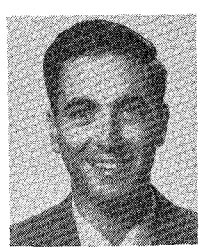

Richard H. Pantell (S'54–A'55–M'60) was born in New York, N. Y. on December 25, 1927. He received the B.S. and M.S. degrees from Massachusetts Institute of Technology, Cambridge, in 1950. He received his Ph.D. degree in electrical engineering from Stanford University, Calif., in 1954.

From 1950–1951 he taught electrical engineering at the Polytechnical Institute, Brooklyn, N. Y., and from 1951 to 1954 he was engaged as Research Assistant at the Stanford Electronics Research Laboratory, investigating new techniques for network synthesis. For the next two years, he was Assistant Professor of Electrical Engineering at Stanford University, and Research Associate in the Microwave Laboratory. While teaching graduate courses in network synthesis, he performed research on the development of a high power traveling-wave tube.

Granted a leave of absence to become Visiting Assistant Professor at the University of Illinois in Urbana in 1956–57, he worked on the generation of millimeter waves. A second leave of absence from Stanford during the 1962–63 academic year brought him to Standard Telecommunications Laboratories, Harlow, England. His most recent work at Stanford University is concerned with ferroelectrics, cyclotron resonance in electron beams, multiple quantum processes, and nonlinear optical effects.

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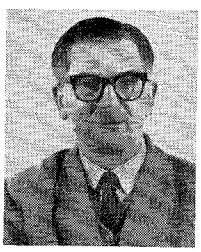

Geoffrey H. Preece was born in Rugby, Warwickshire, England, on July 29, 1917, and was educated there at the Lawrence Sheriff School.

He joined the Post Office in 1935 and took the Post Office Inspectors Examination in 1938, while working at the Rugby Radio Station. In 1940 he joined the Telecommunications Research Establishment (now the Royal Radar Establishment) and has worked on IF amplifiers, high power modulators and microwave waveguide systems. In 1956 he took his Higher National Certificate in Electrical Engineering by external examination. Since 1959 he has worked on the development of millimeter wave components at R.R.E.

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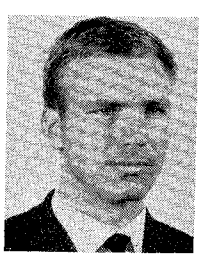

K. F. Renk was born in Schopfheim, Ger., on July 24, 1938. For his work on Fabry-Perot interferometers for the far infrared, he received the Diplom-Physiker degree from the University of Freiburg, Ger., in 1962.

Since May, 1962, he has been working for the Ph.D. degree at the University of Freiburg. His dissertation is concerned with the infrared absorption of ideal and disturbed homopolar crystals.

Mr. Renk is a member of the German Physical Society.

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Fred J. Rosenbaum (S'58) was born in Chicago, Illinois, on February 15, 1937. He received the B.S., M.S. and Ph.D. degrees in electrical engineering, all from the University of Illinois, Urbana, Illinois, in 1959, 1960 and 1963, respectively.

He joined the Ultramicrowave Group at the University of Illinois in 1959 as a Graduate Research Assistant. His research interests have included problems in megavolt electronics, linear accelerators, and Cerenkov radiation.

Dr. Rosenbaum is a member of Eta Kappa Nu, Sigma Tau, and Sigma Xi.

❖

G. P. Rodrigue was born in Paincourtville, La., on June 19, 1931. He attended Southwestern Louisiana Institute, Lafayette, in 1948–1949 and received the B.S. and M.S. degrees in physics from Louisiana State University, Baton Rouge, in 1952 and 1954, respectively. In 1958 he received the Ph.D. degree in applied physics from Harvard University, Cambridge, Mass. While at Harvard he studied the resonance properties of single and polycrystals of ferrimagnetic garnet materials.

During the summer of 1954 he worked with the power transistor development group at Bell Telephone Laboratories. He has been employed for the past five years by Sperry Microwave Electronics Company, Clearwater, Fla., where his work has been concerned with parametric amplification and microwave properties and applications of a wide variety of magnetic materials.

Dr. Rodrigue is a member of the Harvard Engineering Society, Sigma Pi Sigma, Sigma Xi and the American Physical Society.

❖

Elizabeth M. Rutz-Philipp (SM'56), for a photograph and biography, please see page 618 of the November, 1962, issue of these TRANSACTIONS.

❖

Alan J. Simmons (A'47–SM'60) was born on October 14, 1924, in New York, N. Y. He received the B.S. degree from Harvard University, Cambridge, Mass., in 1945, the M.S. degree from the Massachusetts Institute of Technology, Cambridge, in 1948 and the Ph.D. degree in electrical engineering from the University of Maryland, College Park in 1957.

From 1944 to 1946 he was an Electronics officer in the U. S. Navy, from 1946 to 1948, a Research Assistant at the Research Laboratory for Electronics, Massachusetts Institute of Technology. From 1948 to 1957 he was employed as an Engineer at the Naval Research Laboratory, Washington D. C., where he worked in the Microwave and Antenna Branch on development and study of a variety of antennas and components. In 1957 he joined Technical Research Group, Inc. to help form in Boston, Mass., a branch of that company to be devoted to the microwave component and antenna field. He is presently Director of Research for the Boston branch of TRG, Inc.

Dr. Simmons is 1962–1963 chairman of the Boston Chapter of the Professional Group on Antennas and Propagation.

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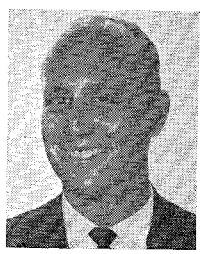

Richard G. Smith (S'57–M'63) was born in Flint, Mich., on January 19, 1937. He received the B.S. degree (with great distinction) in electrical engineering, and the M.S. and Ph.D. degrees from Stanford University, Calif., in 1958, 1959, and 1963, respectively.

From 1958 to 1961 he was a Charles Coffin Fellow, an Edward Rice Fellow and a National Science Foundation Fellow. From 1961 to 1963 he was a Research Assistant at the W. W. Hansen Microwave Laboratory, Stanford University, where he did research on nonlinear quantum effects. At present he is at the Bell Telephone Laboratories, Murray Hill, N. J., in the Solid State Device Development Group.

Dr. Smith is a member of Tau Beta Pi, Phi Beta Kappa, Sigma Xi and the American Physical Society.

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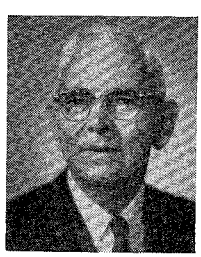

Archie W. Straiton (M'47–SM'49–F'53) was born in Arlington, Tex., on August 27, 1907. He received the B.S. in electrical engineering M.A., and Ph.D. degrees from The University of Texas, Austin, in 1929, 1931, and 1939, respectively.

He was employed for one year by the Bell Telephone Laboratories in New York, N. Y., and taught for eleven years at the Texas College of Arts and Industries, Kingsville. In 1943 he came to The University of Texas as Associate Professor in Electrical Engineering and was appointed Professor in 1949, and holds this position to the present time. In addition he joined with Dr. E. W. Hamlin and Dr. F. E. Brooks, Jr., in 1945 in establishing the Electrical Engineering Research Laboratory at The University of Texas and has served as its Director since 1947. This laboratory has been actively engaged in research on the effect of the atmosphere on radio wave transmission, atmospheric refractometry, millimeter radio waves, magnetic and earth current variations, radio climatology and other meteorological applications.

Dr. Straiton has served as Regional Director for two years and on several national committees of the IRE. He is former Chair-

man of Commission II and a member of the U.S.A. National Committee of the International Scientific Radio Union, and has been a delegate to three General International Assemblies of this International Union. He is a member of Tau Beta Pi, Phi Kappa Phi, Sigma Xi and Eta Kappa Nu and is a registered professional engineer in the state of Texas.

❖

Donald R. Taft (M'58) was born in Mendon, Mass. on October 1, 1928. He received the B.A. degree in physics in 1957 from the University of New Hampshire, Durham. He has done extensive graduate work in the fields of solid-state and microwave physics at the Brooklyn Polytechnic Institute, N. Y., and the University of Florida, Gainesville.

He joined the Solid-State Development group of Sperry Microwave Electronics Company in 1957 and has since been engaged in advanced development work on devices employing ferrites and garnets.

Mr. Taft is a member of the American Physical Society and S.E.A.P.S.

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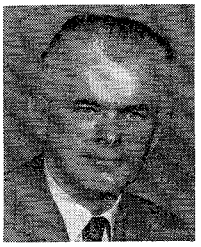

Frederick J. Tischer (SM'55–F'62) was born in Plan, Austria, on March 14, 1913. He received the Ph.D. degree from the University of Prag, Czechoslovakia, in 1938, and did advanced study at the University of Berlin, Germany. He came to the United States from the Royal Institute of Technology in Stockholm, Sweden, where he directed activities in the field of microwaves and served as a Lecturer.

He is now an American citizen. From 1956 to 1962 he taught and did research at The Ohio State University, Columbus. After resigning he became a Professor at the University of Alabama, Huntsville, where he also serves as Assistant Director of the Research Institute. He is the author of "Microwave Measurements," and has published numerous papers in the fields of communication theory, electromagnetics, microwaves and space communications. He holds a number of patents in these fields; the traveling-wave resonator and the H guide are among his inventions.

Dr. Tischer is a member of Sigma Xi.

Jesse J. Taub (S'48–A'50–M'55–SM'61) was born in New York, N. Y., on April 27, 1927. He received the B.E.E. degree from the City College of New York, N. Y., in 1948, and the M.E.E. degree from Polytechnic Institute of Brooklyn, N. Y., in 1949.

From 1945 to 1946 he served in the U. S. Navy as an Electronics Technician. In 1949, he joined the microwave tube section of the Naval Material Laboratory, Brooklyn, N. Y., as a Project Engineer, and in 1951, he became Supervisor of the klystron and microwave semiconductor unit. In 1955, he joined Airborne Instruments Laboratory, Deer Park, N. Y., where he is now a Consultant in the Applied Electronics Department. He has been concerned with the development of microwave filters, parametric amplifiers, multimode waveguide measurements, and quasi-optical components for millimeter and submillimeter wavelengths. He has been a part-time member of the graduate faculty of the City College of New York since 1960.

Mr. Taub is a member of Sigma Xi.

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Charles Walter Tolbert (M'49–SM'55) was born in Homer, La., on August 28, 1920. He received the B.S. degree in general engineering from the Texas College of Arts and Industries, Kingsville, in 1943.

From 1943 to 1945 he was employed by the National Geophysical Company, Dallas, Texas. In January, 1945 he came to The University of Texas, Austin, as Instructor in war training courses. In October, 1945, he joined the staff of the Electrical Engineering Research Laboratory of The University of Texas. As Systems Development Specialist of this laboratory, he has been in charge of research on radio wave propagation, antenna development and instrumentation. Since 1951 he has been in charge of millimeter radio wave research on absorption, refraction and scattering of millimeter radio waves by the atmosphere and its constituents. He has also pioneered in millimeter radio astronomy.

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R. Ulrich (S'56–M'58) was born in Wuppertal, Germany, on February 22, 1935. He studied at the Universities of Hamburg, Frankfurt and Freiburg. In 1961 he received the Diplom-Physiker degree for a work on a high voltage electron gun.

Since 1962 he has an appointment as Assistant at the Freiburg University, Germany, and is currently working for his Ph.D. degree. His thesis research is concerned with the Cerenkov effect at submillimeter frequencies.

Mr. Ulrich is a member of the German Physical Society.

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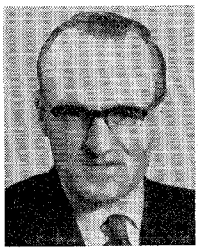

Frank L. Warner was born in Kineton, Warwickshire, England on September 30, 1925. He attended King Edward VI School at Stratford-on-Avon, England.

In 1942 he joined the Telecommunications Research Establishment (now the Royal Radar Establishment) and has worked there since then on radar and millimeter waves. For several years he has specialized in millimeter wave radiometers.

Mr. Warner is a Graduate of the Institution of Electrical Engineers.

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M. Lattimer Wright (S'56–M'58) was born in Chattanooga, Tenn., on December 25, 1935. He received the B.S.E.E. degree from the Massachusetts Institute of Technology, Cambridge, in 1957.

Since 1957 he has been associated with Airborne Instruments Laboratory, Deer Park, N. Y., except for a period in 1958 when he served with the Signal Corps at USASRDL, Ft. Monmouth, N. J. While at AIL he has worked on parametric amplifiers, ferrite devices, filters, and millimeter and submillimeter wave components.

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Robert W. Zimmerer, for a photograph and biography, please see page 157 of the March, 1963, issue of these TRANSACTIONS.