



Samuel Silver

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1915-1976

By John R. Whinnery

Samuel Silver, Professor of Engineering Science at the University of California, Berkeley, died of a heart attack on November 5, 1976. He left a legacy of elegantly framed research results in antenna theory and upper atmosphere physics, of institutions he had built that carry on creative research in electronics and the space sciences, and of many contributions of talent and of wisdom to engineering education and to his profession.

Dr. Silver was born in Philadelphia, Pennsylvania, February 25, 1915. He received his Bachelor of Arts and Master of Arts degrees in physics from Temple University in 1935 and 1937, respectively, and his Doctor of Philosophy degree in solid-state physics from the Massachusetts Institute of Technology (MIT) in 1940. He served as a postdoctoral Research Assistant at the Ohio State University in 1940-41 and as an Instructor and Assistant Professor of Physics at the University of Oklahoma from 1941 to 1943. He then joined the antenna group of the Radiation Laboratory, MIT, and remained there until that laboratory closed at the end of World War II. Following a year in the Antenna Research Branch of the Naval Research Laboratory, he was appointed Lecturer and then Associate Professor in the Electrical Engineering Department of the University of California at Berkeley, becoming Professor in 1950. He was a member of that department until his death. Administrative service at the University included assignments as Director of

the Electronics Research Laboratory from 1956 until 1960 and as Director of the Space Science Laboratory from 1960 until 1970.

The University of California used Dr. Silver's talents for many committee assignments in addition to the formal administrative assignments. Among these was an important committee leading to the formation of the Radio Astronomy Laboratory and another resulting in the Electronics Research Laboratory. He was advisor and consultant to industry and to government organizations, including the Naval Research Laboratory and the National Aeronautics and Space Administration. Activities in the Institute of Electrical and Electronics Engineers (IEEE) included membership on the Awards Board and several assignments on the WESCON technical program committees. His continuing service for the National Research Council of the National Academy of Sciences was through the International Radio Scientific Union (URSI). He was Chairman of U.S. Commission 6 from 1950 to 1954, and then held posts of Secretary and Vice-Chairman of the National Committee. He became Chairman of the International Commission 6 in 1952, Vice-President in 1963, and was its President from 1966 to 1969. In 1972 he received the unusual distinction of becoming its permanent Honorary President.

Dr. Silver's first research contributions were in the theory of solid state, extending methods developed by the great John C. Slater, his Ph.D. mentor. Upon accepting assignment in the antenna group of the MIT Radiation Laboratory, he concentrated upon fundamental diffraction problems as applied to microwave radar antennas. Several elegant papers and the definitive book, *Microwave Antenna Theory and Design*, record much of the work of that period. He continued work on diffraction and scattering theory at Berkeley, concentrating on limits of accuracy in geometrical optics and other approximations. He also studied existence and uniqueness theorems for the exterior problem of electromagnetics. His students built a carefully designed experimental facility to make measurements designed to check the validity of these theories. Although he always retained an interest in the continuing work on this facility, his main interest in recent years was in radio astronomy and the upper atmosphere. Using microwave and millimeter-wave

techniques, he and his students studied radiation from the planets and the absorption characteristics of ozone in the upper atmosphere. The program that he organized at the Space Science Laboratory included research in the spectroscopy of planetary atmospheres, lunar geology, the physics of the upper atmosphere, information-processing of satellite data, and the social uses of the space program.

Dr. Silver received many honors for his personal and professional contributions. He was a Fellow of the Institute of Electrical and Electronics Engineers, of the American Geophysical Union, and of the American Physical Society. He was a recipient of a John Simon Guggenheim Memorial Fellowship in 1953 for his work on scattering and diffraction of electromagnetic waves and again in 1960 for his research in physics of the upper atmosphere. He was, as noted earlier, permanent Honorary President of URSI. He was elected to the National Academy of Engineering in 1968 and was the second recipient of the John T. Bolljahn Memorial Award for contributions to antenna theory. He received an honorary degree of Doctor of Science in 1963 and a Distinguished Alumnus Award in 1964 from Temple University.

The characteristic of Samuel Silver's contributions to everything he did—teaching, guiding research, advising his colleagues in and out of the university, or undertaking hobbies such as photography and writing—was a concern for excellence and an equal concern for human values and the highest of ethical standards. His family was always his first priority, so that his wife, Marjorie, his son, Daniel, his daughter, Deborah Brewer, and all of their families have experienced a deep sense of loss, as have his friends and colleagues. But he will be remembered through this lasting contribution to the institutions he helped build and to the attitudes of everyone he worked with.