OTTO H. SCHADE, SR.

1903-1981

BY WILLIAM M. WEBSTER

O T T O H . S C H A D E , S R . , died in West Caldwell, New Jersey, on April 28, 1981, following his seventy-eighth birthday. He was an eminent authority on image evaluation in motion picture and television systems. He is best known for developing the concept of the modulation transfer function, which is widely applied to the evaluation of optical, photographic, and electronic image systems and to studies of the eye.

Otto H. Schade, Sr., was born in Schmalkalden, Germany, in 1903 and was educated in Germany. He came to the United States in 1926 and worked with the firm of Atwater Kent in Philadelphia.

Five years later he joined the Radio Corporation of America (RCA) Tube Department in Harrison, New Jersey, the start of a lifetime career. Mr. Schade retired from RCA in 1968 as Staff Engineer, a position first created for him. He continued as a consultant to RCA until 1974. In the course of this career, Otto Schade presented or published more than thirty papers and received eighty-five patents and numerous awards, including an honorary Doctorate of Engineering from Rensselaer Polytechnic Institute.

The first widely recognized achievement of Mr. Schade was the subject of his presentation in 1936 before the Institute of Radio Engineers on the electron optics behind the beam power tube, typified by the well-known 6L6. Many of his colleagues can recall that this history-making vacuum tube was not the first important new product developed at RCA's Harrison plant. Years before, the
Harrison building complex was known as the Edison Lamp Works; Mr. Schade’s laboratory in Building 17-3 had also been used by Thomas Edison. The burn marks on the wooden lab floor bore testimony to the molten glass and vacuum technology practiced by Edison—a technology later used by Mr. Schade and his co-workers in electronic developments dimly, if at all, envisioned by Edison when he discovered the diode effect that today bears his name.

Other landmark accomplishments in electron tube design resulted in Mr. Schade’s “Analysis of Rectifier Operation” and “R-F Operated High-Voltage Supplies,” both published in 1943. In 1958 he began a study that resulted in successful manufacture of the Nuvistor line of low-noise tubes for TV receiver tuners, designed to supplement the emerging semiconductor products in “hybrid” equipment.

In 1938 he began specialized studies of television circuits, camera tubes, picture tubes, and the analysis of television systems performance. From 1944 to 1957 he worked on a unified general method of image analysis and specification, including practical methods for measuring the modulation transfer function and noise in optical, photographic, and electronic imaging systems. In the August 1976 *Scientific American*, William H. Price of Kodak wrote: “Much of the mystery surrounding lens ‘quality’ was cleared up in 1951 when Otto H. Schade, Sr., of the Radio Corporation of America, described his investigation of lenses used in the entire chain of information transmission represented by a television system.” He adds that with Otto Schade’s concepts and a computer, “[now] we can mathematically model the entire photographic system, beginning with the subject and ending with the transfer function of the viewer’s eye.”

Mr. Schade subsequently developed an accurate method for calculating the resolving power of photographic and television systems to assist in the evaluation of high-definition TV systems for the Air Force. He developed new electron optics that provided uniform resolution in TV camera tubes with larger formats (50 × 50 millimeters) and special high-resolution electron guns to realize resolutions on the order of 100 line pairs per millimeter.

After his retirement from RCA in 1968, he continued his valuable affiliation as a consultant for six more years.
In 1946 he received RCA's highest citation, the RCA Victor Award of Merit, for his contributions in the field of television. Mr. Schade, a Fellow of the Institute of Electrical and Electronics Engineers and the Society of Motion Picture and Television Engineers (SMPTE), also received numerous other honors, including the Modern Pioneer Award of the National Association of Manufacturers (1940) and the Morris N. Liebman Memorial Prize of the Institute of Radio Engineers (1950). He was the first recipient of the David Sarnoff Gold Medal Award of the SMPTE (1951).

In June 1953 Otto Schade, Sr., was invested with the honorary degree of Doctor of Engineering by Rensselaer Polytechnic Institute. In 1960 he received the Progress Medal Award of the SMPTE for his outstanding contribution in the engineering phases of the motion picture and television industries, and in 1965 he received the Journal Award of the SMPTE for his paper entitled "An Evaluation of Photographic Image Quality and Resolving Power," published in February 1964. In 1968 he received the David Sarnoff Outstanding Achievement Award from RCA for the conception of electronic techniques to determine accurately the response of the total television system, including lenses and photographic films. In 1969 he received the Technical Achievement Award from the American Society of Magazine Photographers for "effecting a marriage of electronics and optics making possible sophisticated designs of lenses." In 1969 he received the Vladimir K. Zworykin Award for outstanding technical contribution to electronic television from the Institute of Electrical and Electronics Engineers.

Otto Schade, Sr., received two additional awards: "The Karl Fairbanks Memorial Award to Dr. Otto H. Schade, Sr., who through his work in industry has contributed significantly to the advancement of photo-optical instrumentation engineering" (1974), and the Special Recognition Award in 1975 "for the pioneering application of frequency response concepts to the analysis and optimization of electro-optic systems" by the Society for Information Display (SID). He was elected to the National Academy of Engineering in 1977.

His acclaimed television accomplishments are perhaps best represented by his formal treatises, "Electro-Optical Characteristics of

In 1975 RCA published “Image Quality: A Comparison of Photographic and Television Systems” as a definitive treatise and also as a tribute to Mr. Schade.

By those who had the good fortune to work with Otto Schade, Sr., or even to know him in a passing fashion, he would be characterized as a gentle, unassuming, thoughtful man who combined the Old World ideals of perfection with understanding of the real world’s deficiencies. He was a superb teacher of the younger engineers who worked with him and, often, of the older managers he worked for.