

## In Memoriam

**Hugh Shaler Knowles**, past president, fellow, and honorary member of the Audio Engineering Society, died on 1988 April 21 at the age of 83.

To many, he will be remembered for his leadership and devotion to the development of miniature microphones and receivers that played a major role in the miniaturization of hearing aids over the last 30 years. To many he will be remembered for informative chapters on loudspeaker design in engineering handbooks published after World War II. To others he will be remembered for his interest in and support of research to understand and improve hearing, and to some, he will be remembered for his participation in and devotion to the standards work of both U.S. and international working groups and committees. To all who came in contact with him he will be remembered as a man with understanding, patience, and conviction. We who had the privilege of working and associating with him will miss his insights and counsel.

Hugh was born in Hynes, Iowa, and spent most of his youth in Mexico where his father was a mining engineer. After graduating from high school in San Antonio, Texas, at the age of 14, he attended Alabama Polytechnic Institute, Auburn University, and then Columbia University with a scholarship in radio engineering. Many of his college funds were earned by working as an underage wireless operator on merchant ships. After graduation from Columbia, Hugh did postgraduate work in physics at the University of Chicago and was a lecturer in graduate physics at the university. With the financial demands of supporting a family, Hugh shifted from the academic environment to the commercial and business world. He became vice president and chief engineer of Jensen Manufacturing Co. (loudspeakers), where he is credited with applying the term "bass reflex" to vented loudspeaker enclosures.

During World War II, Hugh was a



H. S. Knowles

consulting engineer to the U.S. government, working on blast-resistant loudspeakers for Navy ships, bullhorns for aircraft carriers, and fuses for artillery and antiaircraft shells. From 1948 to 1950 he was chairman of the acoustics panel of the Defense Department's Research and Development Board.

Since 1946, Hugh had been founder, president, and technical director of Industrial Research Products, Inc. and since 1954, founder, president and chairman of Knowles Electronics Inc. Over the years he worked for these firms they developed and manufactured progressively smaller transducers less than one fiftieth the size of the first units. He held more than 50 patents.

In addition to his active support and participation in the affairs of the Audio Engineering Society, which awarded him its Gold Medal in 1978, Hugh Knowles was a fellow, past president, and recipient of the Silver Medal in engineering acoustics of the Acoustical Society of America, a fellow of the Institute of Electrical and Electronics Engineers, and national chairman of the audio and electroacoustics group, the predecessor of the present Acoustics, Speech, and Signal Processing Society, and a member of the board of

editors of the IEEE for 15 years. He was elected to the National Academy of Engineers and served on the executive committee of the National Research Council Science Division and on various committees concerned with prosthetic devices. In 1978, Hugh was the first American to receive the Hearing Aid Society of Germany's Alexander Graham Bell Award for his work on hearing aids. In 1982 Northwestern University awarded Hugh Knowles an honorary doctorate for his contributions to improvement of hearing aids. The Hugh Knowles Center for Clinical and Basic Science in Hearing and Its Disorders is being established on the Evanston Campus of Northwestern University, a timely and fitting tribute to his vision and leadership.

Hugh's energy, vision, enthusiasm, integrity, and leadership were directed toward dependable acoustical devices that represent the best that current technology can provide. His persevering efforts have contributed to improved communication for millions of hearing-impaired persons around the world. His contributions have satisfied needs and created pleasure for many, many people.

MAHLON D. BURKHARD