

Obituary

Marvin Camras

Marvin Camras, an Honorary Member and Life Fellow of the Society, died June 23, 1995, at the age of 79.

Technology historians have described Dr. Camras as the "father of modern American magnetic recording." His inventions form the foundation of magnetic audio and video recording, analog and digital. He received more than 500 patents for his inventions, covering high-frequency record bias, head technology, wire and tape media, magnetic sound for motion pictures, multitrack tape recorders, stereophonic sound reproduction, and videotape recording.

In the late 1930s, while Camras was an engineering student at the Armour Institute of Technology in Chicago (now the Illinois Institute of Technology), he created the first wire recorder with reasonably high audio fidelity. While the Germans with tape and the Japanese with wire were working on magnetic recorders of their own designs, Camras was the first in America to bring together all the elements necessary for high-quality magnetic recording in a practical commercial package: good electronics (AC record bias); magnetic recording material with consistently high coercivity (18-8 stainless steel wire); an efficient record/playback head; and a stable transport. Camras's AC bias and other magnetic recording patents in part dominated the American entertainment and information technology industries for decades.

Camras's work at Armour in Chicago and S. J. Begun's at Brush Development in Cleveland in the mid-to-late 1930s came just in time to serve the Allied Forces during World War II. Unlike acetate or wax discs, wire recorders were unaffected by shock, vibration, and extreme temperatures. Wire recorder uses among the Allied Forces were almost unlimited. Air Force "spotters" used wire to record their airborne observations for later transcription and analysis on the ground. The Army and Navy monitored radio intelligence traffic. Navy submarines had them on board to record sonar for later analysis. American Forces Radio used wire recorders for audio "field-gathering" and for "time-shifting" broadcasts. For the invasion of Europe on D-Day, to confuse the enemy about the real Allied landing areas, Camras helped develop a system using wire recorders to play back battle sounds amplified by powerful amplifiers.

Military recorders came in all shapes and sizes. The classic wartime recorder, the 1943 Armour Model 50, built in a



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small, Camras-designed factory at the school, became the most successful of the military wire machines and the first American production magnetic recorder to employ electronic amplifiers and high-frequency AC bias.

The public first heard of Camras's work after the war, when a promising new consumer wire recorder industry emerged. Wire would quickly be replaced by magnetic tape recorders from Ampex, Magnecord, and others, all based on Camras's patents. Camras was responsible for many of the popular postwar wire recorders licensed by Armour to the then-robust American consumer electronics industry, including Webster-Chicago (later called Webcor), Pentron, Peirce, Crescent, Astra-Sonic, and Magnecord.

His consumer designs were clever; the Crescent/Astra-Sonic Model W-748 featured a combination phonograph/wire transport. The large take-up spool, which turned at 78 rpm, the standard for Webcor and others, also served as a turntable for the 78 rpm phonograph! Revealing the practical side of a brilliant inventor, Camras said, "We were creating the consumer wire recorder standard, so we thought, why not make the take-up reel turn at 78 rpm and get some other use out of it?"

Camras's work in magnetics didn't stop with wire. At the Society of Motion Picture Engineers (SMPE, now the SMPTE) Fall Conference in 1946, he introduced magnetic sound for motion pictures with full magnetic coatings on 35mm film for multiple tracks, and magnetic stripes for 35mm, 16mm and 8mm film. Within two years, the major motion picture studios were mastering their audio tracks on magnetic film, largely replacing optical recording.

Camras patents led directly to the timely development of the videotape recorder (VTR) in 1956. In 1950, Bing Crosby Electronics, under John T. Mullin, showed a prototype videotape recorder that sent a wake-up call to Ampex and to RCA. The Mullin-Crosby VTR used fixed heads and fast tape speeds.

In 1951, after talking to Camras in Chicago, Ampex engineers had new ideas on how to record the wide video bandwidths on magnetic media, including the heart of all analog and digital VTRs to this day, the spinning head. Camras had developed and patented a prototype rotating head disc that lay parallel to two-inch-wide tape and magnetically scribed an "arcuit sweep" across the face of the media.

Ampex adapted the Camras spinning head concept, changing the head wheel to a transverse position, the heart of the "quad" VTR, introduced in 1956. Ampex VTR engineers, including Ray M. Dolby and team leader Charles P. Ginsburg, have often expressed their debt to Marvin Camras and his genius at adapting magnetic theory to practical audio, video, and data recording. Dolby adds, "The basic principles he explored and designed are still used in the tapes and recorder designs in our machines today."

Camras enjoyed several hobbies outside of his important engineering work. He was an enthusiastic, lifelong radio amateur with the call letters W9CSX (advanced class) and was an avid photographer. Out of his love of classical music and his enjoyment of woodworking came his hobby of building violins and other stringed instruments from scratch.

Marvin Camras was not one to retire. At the time of his death at age 79 from kidney disease, he was a research professor and senior scientific advisor at the Illinois Institute of Technology. Besides his high-ranking membership in the SMPTE, he was active in the Audio Engineering Society, the Institute of Electrical and Electronic Engineers, and the Acoustical Society of America.

His awards included the Inventor of the Year, the John Scott Medal, the National Medal of Technology, and the Washington Award. He was a member of the National Academy of Engineering, and an inductee of the National Inventors Hall of Fame.

Camras was the author of more than 40 publications, including two landmark reference books, *Magnetic Tape Recording* and *The Magnetic Recording Handbook*.

Marvin Camras is survived by his wife, Isabelle, four sons and a daughter, and six grandchildren.

—Peter Hammar