



Marvin Camras

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1916-1995

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Marvin Camras, often referred to as "the Father of Magnetic Recording," was born in Chicago on January 1, 1916, and died on June 23, 1995, at the age of seventy-nine. He was clearly an individual of extraordinary drive, imagination, and persistence.

As an undergraduate in electrical engineering at the Armour Institute of Technology (now Illinois Institute of Technology [IIT]), Marvin Camras became interested in magnetic recording. This is an old art, which had been the subject of laboratory investigation for many years. Camras brought to it a fresh and ingenious approach that resulted in outstanding improvements in high-frequency fidelity, signal-to-noise ratio, and freedom from distortion.

Marvin Camras's interest in recording sound came about because of his cousin's desire to be an opera singer. His cousin asked Marv if there was an inexpensive way to record and play back his voice. Marv, a junior in electrical engineering, recalled reading of Danish Professor Vlademar Poulsen's experiments with magnetic wire recording. However, these experiments failed in the marketplace because whenever the wire twisted, the magnetic signal was changed, resulting in distortion in the audio playback.

To solve this problem, Marv built a recorder in which the steel thread passed longitudinally through a small object about the size of a lump of sugar. This insignificant-looking item is

what turned the trick. This was the recording head; it made wire recording possible by magnetizing the wire longitudinally and symmetrically about its axis, permitting a clear playback. The sound fidelity achieved was so dramatic that his professors urged him to join Armour Research Foundation (now IIT Research Institute [IITRI]) to continue the development of the recorder. In 1940 Camras joined IITRI and after further research, perfected "high-frequency bias," which greatly reduced noise and distortion. He continued to work on magnetic recording, bringing forth major improvements from 1940 to 1987.

When Camras joined IITRI in 1940, it was just small enough for his idea to reach the then director of IITRI, Thomas C. Poulter, and just large enough with mechanical, electrical, and metallurgical engineering departments to help bring his idea to the patent stage.

Camras's life was exemplified by the theme of Daniel Rosenthal's book, *A Blueprint for Living*. Rosenthal's three-part motto was "you will live as long as you learn, you will learn as long as it is interesting, and it will be interesting as long as it is fun."

Camras continued his academic studies at night school and earned a master of science degree in 1942. He received an honorary doctorate in 1968 from IIT. In addition, he took evening courses in nonengineering subjects such as biology, chemistry, physics, and social and political sciences at the University of Chicago.

As a result of his social science studies, he wrote a paper of some merit about a rural group in the vicinity of Washington, D.C. This paper served as excellent background material for University of Chicago researchers.

One of Marv's interests had been the building of decorative furniture. Possibly because his father had been a very skilled craftsman, Marv's designs had enough merit for woodworking instructors to use them as models for their classes.

In a short span of time, only seven years after graduation from IIT, Camras made outstanding contributions in the field of magnetic recording, contributions that created a new commercial product and a new industry. In those seven years,

thirty-eight patents were issued with Camras as the inventor, and he applied for an additional seventy-five patents. By 1995 Marvin Camras had more than 500 patents for the invention and refinement of the technology that is the basis for audio and video recording and computer data storage. His accomplishments include the discovery of high-frequency bias, magnetic coatings using acicular particles of gamma ferric oxide, development of multitrack tape recording, magnetic sound for motion pictures, and stereophonic sound reproduction. His inventions launched what has become a multibillion-dollar electronic communications industry, and his patents have been licensed to more than one hundred manufacturers, including GE, Ampex, IBM, Wollensak, 3M, Kodak, and Sony.

Although Camras had no musical training, his firm belief in Daniel Rosenthal's motto made it easy for him to help his grade-school daughter, Ruth, when she needed a better violin in order to play in the school orchestra. Marv and Ruth went to dealers and found that they were asking \$1,000 for violins that Marv considered to be of poor quality. A really good violin costs at least \$10,000. It seemed to Marv that since he had been doing woodworking all his life, had access to excellent libraries, and knew how to use them, he should be able to build a violin that would be at least as good as the less expensive models. So he began making violins and soon succeeded in making one that he felt was good enough for Ruth to use. Being an experimentalist, Marv had made a total of thirty instruments (violins, violas, and cellos) by 1933, no two alike. Ruth, who is now a concert violinist, uses one of Marv's violins in her recitals. Her husband, who is the first violist of the Chicago Symphony Orchestra, has played in concerts on a viola made by his father-in-law. Marv's ambition was to improve on Stradivarius.

After retiring from IITRI in 1987, he continued to teach electrical engineering at IIT until 1994. He published numerous papers and wrote two books. He was inducted into the National Inventors Hall of Fame in 1985; and, in recognition of his enormous contributions, President George Bush in 1990

awarded Camras the National Medal of Technology, the nation's highest award for technological achievement. He received many other awards, including the John H. Potts Memorial Award, the IEEE Consumer Electronics Award, the U.S. Camera Award for Outstanding Contributions to Motion Picture Photography, the Institute of Radio Engineers PGA Achievement Award, the IEEE Information Storage Award, and the IIT Alumni Distinguished Service Award. He was a member of the National Academy of Engineering and a fellow in many organizations, including the IEEE, the Acoustical Society of America, the American Association for the Advancement of Science, and the Society of Motion Picture and Television Engineers.

Those of us who worked closely with Marvin Camras had a profound respect for his intellectual capacity, inventiveness, capacity for hard work, and modesty. Scientist, engineer, inventor, teacher, entrepreneur, husband, parent, mentor, and friend, Marvin Camras exemplified the best that America stands for, and one like him will not soon pass this way again.

