



# JAMES U. LEMKE

1929–2019

Elected in 1988

*“For lifelong leadership in magnetic recording theory and practice,  
including both engineering design and materials science.”*

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**J**AMES UNDERWOOD LEMKE died February 22, 2019, in La Jolla, California, at the age of 89. He was born December 26, 1929, to Andrew and Frances Lemke, in Grand Rapids, Michigan. His father was a Congregationalist minister.

Live life to the fullest, do no harm, and help when you can. That was Jim Lemke’s life philosophy, and he lived by these guiding principles until his death at home in the early morning hours.

After blowing the eyebrows off his 4th grade teacher in Princeton, Illinois, with homemade gunpowder (not intentionally, it was the teacher’s fault), he went on to graduate from the Illinois Institute of Technology with a bachelor of science degree in 1959 and the following year got his master of science degree, both in physics, from Northwestern University, where he was a Woodrow Wilson Fellow. In 1966 he received his PhD in theoretical physics from the University of California, Santa Barbara. (His comparatively late degrees were because he couldn’t afford college right away—and companies kept hiring him for good jobs, giving him offers he couldn’t refuse.)

During his varied career and rich life he started six high-tech research and development companies, owned and flew multiple airplanes, and enjoyed high-performance automobiles.

He mentored many, and excelled at surrounding himself with smart, talented people who helped him fulfill his visions for all the companies he started.

Although his formal training was as a physicist, his intellectual curiosity and appetite for learning went far beyond that, as evidenced by his 114 US and foreign patents in the fields of information theory, magnetic materials, information storage devices, aviation, and internal combustion engines.

His industrial career began in 1948, when at the age of 19 he joined the new IBM Watson Scientific Computing Laboratory at Columbia University, where he spent 3 years working on plated drum memories for IBM computers.

He then worked at TEMCO on high-speed teletype encryption devices before moving to AV Manufacturing Company in New York as vice president of engineering, developing multi-track instrumentation recorders. He also spent about a year in Key West, Florida, working as a civilian for the US Navy in its underwater ordnance program, involved in testing. In 1957 he was hired by Armour Research Foundation in Chicago to coordinate its work on magnetic recording.

In 1960 he joined the Bell and Howell Research Center in Pasadena, California, as director of magnetic research. He worked on the development of high-density instrumentation and PCM recorders and in magnetics research.

One of Jim's greatest commercial successes was as founder of Spin Physics, Inc. (SPI), his first company, launched in San Diego in 1968. At one time, 50 percent of the broadcast hours on television worldwide were recorded on magnetic heads from Jim's company, and 90 percent of the recorders at the National Security Agency used SPI heads. In 1973, after serving as CEO and CTO and building up its workforce to 650 employees, Jim sold the company to Eastman Kodak and became a fellow of the Kodak Research Laboratories in Rochester, NY. Whenever he flew east to attend Kodak board meetings, he would wear his dinosaur tie as a subtle message that Kodak would go extinct unless it adapted to change. He tried to convince them that digital was the wave of the future, but the board members simply saw Kodak as a chemical company.

Meanwhile, in San Diego he founded two startups, Recording Physics, Inc. and VISqUS Corp. The former was a defense and science contractor (including for DARPA) focused on high-speed recording; VISqUS offered a technology based on a head-disk air bearing—with the air replaced by a liquid.

In 1978 he founded Aerolift, Inc., his fourth company, to manufacture a through-the-propeller radar that he invented for single-engine airplanes. This required timing the radar pulses to the rapidly changing positions of the propeller.

Four years later, in 1982, Jim was pivotal in establishing the Center for Magnetic Recording Research at the University of California, San Diego. He obtained corporate donations to fund a new building for the center, four endowed professorships, and the purchase of scientific equipment.

From 1982 on, Jim was an adjunct professor in the UCSD Department of Electrical and Computer Engineering. In 1993 he received the Revelle Medal for distinguished and sustained service to the university.

In 1998 he began his quest to design a new internal combustion engine. He initially was searching for a lightweight, high-power-density engine that could serve as a backup for a primary power airplane engine if it failed—he had personally experienced three such failures in his planes.

While on a beach vacation reading *The Internal Combustion Engine in Theory and Practice* by Charles Fayette Taylor, considered the “internal combustion engine bible” by many, he learned about the Junkers Jumo opposed-piston diesel aircraft engine that set records for fuel efficiency in the days preceding World War II. Unfortunately, although the Junkers Jumo engine was very fuel efficient, it suffered from a number of issues including thermal-related piston/liner durability, wrist pin durability, and high oil consumption.

Jim’s vision was to essentially “resurrect” the Junkers Jumo engine with its inherent fuel economy advantages while using the much more advanced computer engineering tools of the late 20th century to overcome the previous design challenges.

To that end, he founded Achatas Power in 2004 with funding from his friend and fellow pilot, John Walton (son of the

founder of Walmart), to pursue development of the two-cycle, opposed-piston internal combustion engine. He named the company after a character in Virgil's *Aeneid*, the faithful friend to Aeneas—just as he hoped this engine would be a “faithful friend.”

Achates Power has been working with Cummins, Peterbilt, Isuzu, and other major original equipment manufacturers (OEMs) around the world to make Jim's vision a reality. As just one example, Cummins is working with Achates on a revolutionary new diesel engine for the US Army that provides significant advantages in power density (size and weight), fuel efficiency, and heat rejection. Jim continued to play a leadership role at Achates through 2018, until his health prevented him from continuing.

In late 2018 the employees demonstrated to Jim a Ford F-150 pickup truck equipped with an Achates Power 2.7-liter opposed-piston diesel engine. This engine project was funded in part by ARPA-E, the advanced development arm of the US Department of Energy, and the technology is being marketed to a number of global OEMs.

Even after leaving an active management role at Achates, Jim's intellectual curiosity and investigations into other engineering opportunities continued. At the time of his death, he was working on a revolutionary noninvasive way to detect breast cancer.

In recognition of his many accomplishments, Jim received a number of honors. He was an elected member of the National Academy of Engineering, senior fellow of the California Council on Science and Technology, fellow of the Institute of Electrical and Electronics Engineers and American Association for the Advancement of Science, and member of the American Physical Society. In 1995 he received the IEEE Reynold B. Johnson Storage Award for “contributions to advancing the science and technology of high-density magnetic data storage.”

Jim's interest in education was also a big part of who he was and what was important to him. He believed in the discovery method of teaching and learning mathematics and spent countless hours traveling the country working with the

mathematics departments at various universities to encourage them to adopt the Moore method. He mentored many people through college and beyond, from his closest friends like Bill McHargue to waitresses he befriended at favorite restaurants. If anyone showed an interest in furthering their education, he would help in any way he could, with financial support, with tutoring, or both.

Jim distinguished himself as a physicist, entrepreneur, inventor, nonconformist, rule breaker, mentor, aviator, and all-round great and generous guy. Everyone who knew him treasured time spent with him. In addition to solving partial differential equations and piloting airplanes, he loved classical music, a good martini, jokes, one-liners, and hearing, telling, and writing limericks. One of his favorite sayings was that “one should never argue with others about politics, religion, or antenna design,” which usually left the listener a bit dumbfounded.

Jim is survived by his wife of 65 years, Ann (née Raiguel Stickley), daughters Cate Bell (Barry) and Susan, son Michael, and four grandchildren.