M. ROBERT AARON, a key contributor to the design of the T1 carrier system, the first practical digital system in the world designed for the exchange telephone plant, died on June 16, 2007, at his home in West Palm Beach, Florida, at the age of 84. He was elected to NAE in 1979 for “contributions to design tools and systems concepts essential for the realization of digital communications on the telephone network.”

Bob was born on August 21, 1922, in Philadelphia, Pennsylvania. He met Wilma Spiegelman in 1942, shortly before he joined the U.S. Coast Guard during World War II. They were married in 1944, after he returned from active duty. He then studied electrical engineering at the University of Pennsylvania in Philadelphia, where he received his B.S. in 1949 and M.S. in 1951. After graduation, he joined Bell Laboratories in New Jersey, where he worked until his retirement in 1989.

During his career at Bell Labs, Bob was associated with many “firsts.” Initially, he worked on the design of networks, filters, and repeaters for a variety of circuits for analog transmission systems, such as the equipment for the first color transmission of the Orange Bowl football game and equalizers for the L3 coaxial system. He made fundamental contributions to computer-aided design and applied these techniques to the development of the first repeatered transatlantic cable system in 1956.
Also in 1956, he began working on the development of digital transmission systems. The T1 carrier system was introduced by Bell into commercial service in 1962. One of Bob’s former colleagues at Bell Labs, Dr. John Mayo, writes: “Six problems threatened the viability of high-speed digital communications in the telephone network. Bob Aaron made major contributions to overcoming five and had a strong supporting role in overcoming the sixth. His role was at the very heart of innovation, for he analyzed every aspect of what became the T1 carrier system [which] remains an essential element in global digital communications.” Dr. Irwin Dorros, another former colleague at Bell Labs, described the T1 format as an influence on “the backbone of Internet transmission.”

Bob’s next focus was on the search for new techniques for high-speed digital systems. From 1968 until his retirement in 1989, he was head of the Digital Technologies Department. Initially, he was involved in the development of a variety of digital terminals for transmission and switching. In later years, he was responsible for exploratory development of digital signal processing terminals and techniques.

Over the years, Bob published more than 50 papers and was awarded many patents in circuit design, control, and communications. Several of his papers have been republished in collections of benchmark publications. He also gave many technical presentations, taught short courses at universities, chaired international meetings, and published some original poems in technical journals.

As an undergraduate, Bob had been president of the student branch of the joint AIEE/IRE society, the forerunner of IEEE, at the University of Pennsylvania, and he continued to be an active member of IEEE in various capacities after joining Bell Labs. He was a key player in the establishment of the IEEE Control Systems Society, was chairman of the first Papers Review Committee, and was secretary of the organization. He was an associate editor of the IEEE Transactions on Circuits and Systems from July 1969 to June 1971, and president of the IEEE Circuits and Systems Society in 1973. He was also a member of the Publications Committee of the Technical Activities Board (TAB), a working member of many
other IEEE committees, a member of the TAB Finance Committee, and chairman of the Digital Systems Subcommittee of the IEEE Communications Society.

Bob received many awards and honors for his professional accomplishments. He was elected a fellow of IEEE in 1968 “for contributions to the analysis of PCM systems” and a fellow of the American Association for the Advancement of Science. He was co-recipient, with John S. Mayo and Eric E. Sumner, of the 1978 IEEE Alexander Graham Bell Medal “for personal contributions to, and leadership in, the practical realization of high-speed digital communications” and the 1988 NEC C&C Prize for “pioneering contributions to the establishment of a basic technology for digital communications by development of world’s first practical commercial high-speed digital communication system: T1.” He received the IEEE Centennial Medal in 1984, the McClellan Award of the IEEE Communications Society in 1985, and a Lifetime Service Award from the IEEE Communications Society in 1997. In 1999, he was the recipient of the International Telecommunications “Cristoforo Colombo” Award for his contributions to the development of digital communications systems, reduced bit-rate coding, and fast packet-switching systems.

Dr. John Mayo, Bob’s colleague, remembered that “Upon winning the Japanese C&C Prize, [Bob] decided to deliver his acceptance speech in Japanese, even though he had no knowledge of the language. When asked why, he replied, ‘Because they would appreciate it.’ That showed the sensitivity, commitment, diligence, confidence, and excellence that Bob brought to all his work. And when the speech was over, the Japanese said exactly what his co-workers said about all Bob’s work, “Done perfectly.”

Dr. David Messerschmitt, who worked in Bob’s group in the 1970s before joining the University of California, Berkeley, as a professor, recalls that “Bob was always a friend more than a boss. He was supportive in every way imaginable and was always available, including for lunch and coffee breaks, to interact informally with the ‘troops’. By the time I knew him, Bob took the role of facilitator rather than individual technical contributor.
He mostly worked through us, seeding us with ideas and disabusing us of our misconceptions.”

I joined Bob’s group at Bell Labs in New Jersey, after a two-hour telephone interview with him, and met him for the first time in July 1965. He became my mentor and great friend, and I benefited tremendously from my friendship and close association with him. We collaborated on several projects, which led to several papers. After about a year, I informed Bob of my intention to take an academic post on the West Coast. He was supportive of my decision as he felt academe would be beneficial to Bell Labs in the long run.

Professor David Messerschmitt made a similar observation. “At one point I made it known that I was really interested in a career in academe. Although [Bob] was conflicted about this, he always saw academe as complementary rather than competitive. He never wavered in fully supporting my personal goals, while, at the same time, he manipulated the system to make it more attractive for me to stay. His approach was always the carrot, never the stick.”

A very fine athlete, Bob enjoyed playing tennis, basketball, and ping-pong. He picked up golf in his later years. Professor Ernest S. Kuh remembers, “Socially I got to know his interest in sports and found out he was a wonderful ping-pong player. We played during lunch hour and decided to join a competition at Murray Hill. We were thrilled that before long we won the championship for doubles.”

Bob always found time to participate in community activities. He was a member of the local school board in the 1960s when his two sons were in elementary school. In the 1970s, he was a tutor for the local branch of the NAACP. He was actively involved in the Union of Concerned Scientists.

After being diagnosed with multiple myeloma, Bob worked with the International Myeloma Foundation to promote the education and support of people with this form of cancer. Dr. Irwin Dorros, a colleague at Bell Labs, commented, “In his final years . . . he took part in his own medical treatments by making a second career of studying the causes and the options for the treatment of his ailments. He became a very active participant
in the promotion of stem cell research and received major recognition in a field of much younger researchers.” He also volunteered at the local Cancer Institute helping other cancer patients.

I kept in touch with Bob and Wilma regularly after leaving Bell Labs, and visited them whenever I was near their home, otherwise by telephone. In June 2007, when I telephoned Bob and I asked how he was doing, he said, in a very soft voice, “Sanjit, I am very sick.” I didn’t realize at the time that would be the last time I spoke to him. I and everyone else who worked with him at Bell Labs and elsewhere will miss him greatly.

Bob and Wilma had two children, Richard and James. Richard died a few years ago of a brain tumor. Bob is survived by Wilma, James, and James’ two children.