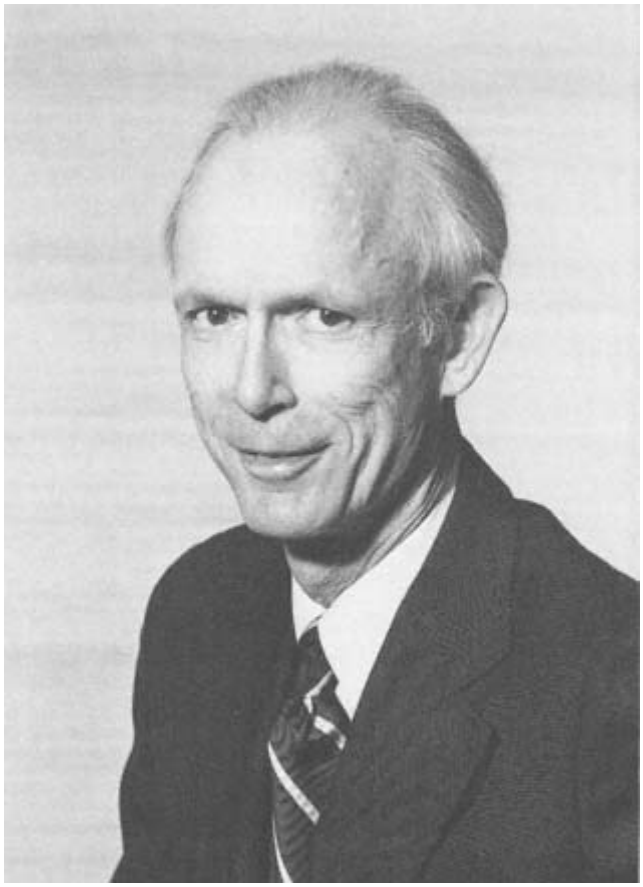

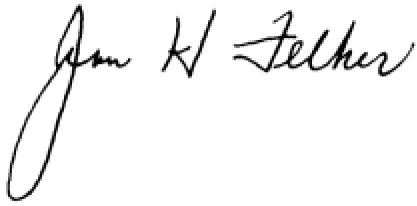

Jean Howard Felker

1919-1994

By Brockway Mcmillan

Jean Howard Felker, a retired vice-president of AT&T Bell Laboratories, died on February 27, 1994. He had been a member of the National Academy of Engineering since 1974.

Born in Centralia, Illinois, on March 14, 1919, Felker received a bachelor of science degree in electrical engineering from Washington University in St. Louis, Missouri, in June 1941. He worked briefly for Emerson Electric Company and then taught mathematics at a training school for naval recruits. Commissioned in October 1942 as a second lieutenant in the Signal Corps, he went to England to learn radar at the Military College of Science. After a four-month tour he was returned to Fort Monmouth, New Jersey, to write and edit radar manuals until mustering out in 1945.

In December 1945 Felker joined Bell Laboratories at the Whippany, New Jersey, location in the Military Systems Laboratory. In 1948 he received three point-contact transistors, the first of a meager trickle allocated to that laboratory. By late 1950 he had demonstrated, with such devices, all the basic logic circuits of a digital computer, operating at a one megahertz rate, and had described in memoranda the architecture of a computer built on such elements. He had already dubbed this computer TRADIC— Transistor Digital Computer.

By 1951 Felker had demonstrated serial adders and multipliers and delay-line storage registers, all operating at one megahertz. In his notebooks of that time can be found preliminary analyses of bombsight and gun-laying computers. He had already concluded that a digital bombsight, as distinct from a gun controller, would not need a magnetic drum—the only mass storage medium then at hand—because of the relative simplicity of its ballistic tables. By late 1951 he had discussed with colleagues the feasibility of building a flyable model of a bombsight.

Drawing on this work, Bell Laboratories contracted with the Air Force in 1953 to design and develop a solid-state digital computer. The specific objective was to test ("demonstrate," said the optimists) feasibility for tactical applications. The project officially adopted the name TRADIC, and Felker was put in charge. Phase I was completed, at some effort, in one year. In that year it consumed the whole factory output of point-contact transistors-some 5,000. With its cathode-ray displays, this primitive computer demonstrated to the skeptics in the Air Force that digital machines could simulate the continuous actions of analog devices.

Phase I led at once to TRADIC Phase II—the flyable model of a digital bombsight. Using the basic circuits and architecture of Phase I, with consultation provided by Felker's laboratory, a group experienced in the design of the analog bombsight provided the final product. The airborne environment was a harsh one for point-contact transistors, but flight tests were ultimately successful.

Formally, Felker and his pioneering colleagues faced in Phase I of TRADIC such questions as: synchronous or nonsynchronous? (answer: synchronous); binary or decimal? (answer: binary); magnetic memory or semiconductor? (answer: for a tactical computer with a fixed program, transistor registers). Actually, these major design decisions were all founded on Felker's notes and memoranda of 1951 and earlier. They governed in Phase II, and the resulting architecture was basic to Phase III.

As fast junction transistors became available, Felker convinced the Air Force to undertake Phase III. This was a general-purpose digital computer with a magnetic-core memory, taking its program input from plug boards. Scaled to the capacity of the

Massachusetts Institute of Technology Whirlwind computer, model III occupied a case about the size of an office filing cabinet, contained 100,000 transistors, and consumed 50 watts. For a year it did general computing at Bell Laboratories in the military development laboratory, before delivery to the Air Force.

In 1955 Felker turned to a new assignment—to establish an organization for planning digital transmission services to be offered by the Bell System, for planning the associated digital systems, and for developing data processing systems to automate clerical and engineering functions common throughout the Bell System. By 1959 the latter function had evolved to the point that a separate organization was created to automate those functions suitable for general-purpose computers. Felker then moved to AT&T headquarters to become transmission engineer and later assistant chief engineer, of the AT&T Company. In 1962 he transferred to the New Jersey Bell Telephone Company as vice-president of operations. In the latter position he was a member of the board of directors and of its executive committee.

Felker retired from the Bell System in 1969 and set up in private consulting practice. In March 1971 he returned to Bell Laboratories as vice-president in charge of business information systems. In 1979 Bell Laboratories appointed him vice-president for software and processor technologies. He retired in May 1981.

The Institute of Electrical Engineers honored Felker as a fellow in 1959. The National Academy of Engineering elected him to membership in 1973, citing him for "design of the first transistorized digital computer and for the engineering of digital systems." He was a founding director of Bellcomm, the systems engineering organization that served the National Aeronautics and Space Administration for the moon landings and thereafter, and was a director of the Colonial Life Insurance Company and its successors for some twenty-five years.

It is clear from scraps of memoir that, from boyhood, Felker was both a practical tinkerer with things mechanical or electrical, and a dreamer. As an engineer, he was at once an ingenious inventor and a rational and imaginative planner. His sixteen patents range from transistor logic circuits to computer

and memory systems. His many published articles cover a similar range, from techniques for logic circuit design to the basic principles underlying the organization of TRADIC III.

In all matters, Jean Felker was an original thinker. He heard his own drum —literally in at least one instance. I recall his amusement at the inability of the army drill instructors to reform his shambling gait. Neither in his engineering nor in his private life did he accept conventional wisdom without supporting evidence. He respected facts. A quiet iconoclast with a sharp sense of humor, indeed in many ways a determined nonconformist, he was not a revolutionary. When he chose his own way he did so with reason and good humor, and he did not impose it on others.

Jean Felker had an extraordinary sensitivity to and understanding of the feelings and needs of the people with whom he dealt. During the three extended periods, separate in time and in context, that I worked closely with him, I never saw him use this remarkable talent to any but constructive ends. He was never manipulative, always tactful, considerate, and humane.

Jean had a restless spirit. During his first brief retirement, he began painting with oils. The products I have seen are large abstractions, exactly geometric, complex in their symmetries, and rendered with exquisite precision in beautifully controlled textures and soft colors. He continued this hobby for many years. Restless also in mind, he was an omnivorous reader, an acute observer of the contemporary scene, and a student of history. Upon his second retirement, he bought a historic dwelling on the Delaware Canal. Soon, however, he set about to plan a permanent home in the rolling hills of nearby Durham, Pennsylvania. The construction and landscaping of this estate occupied him thereafter, and it is in this house that he died.