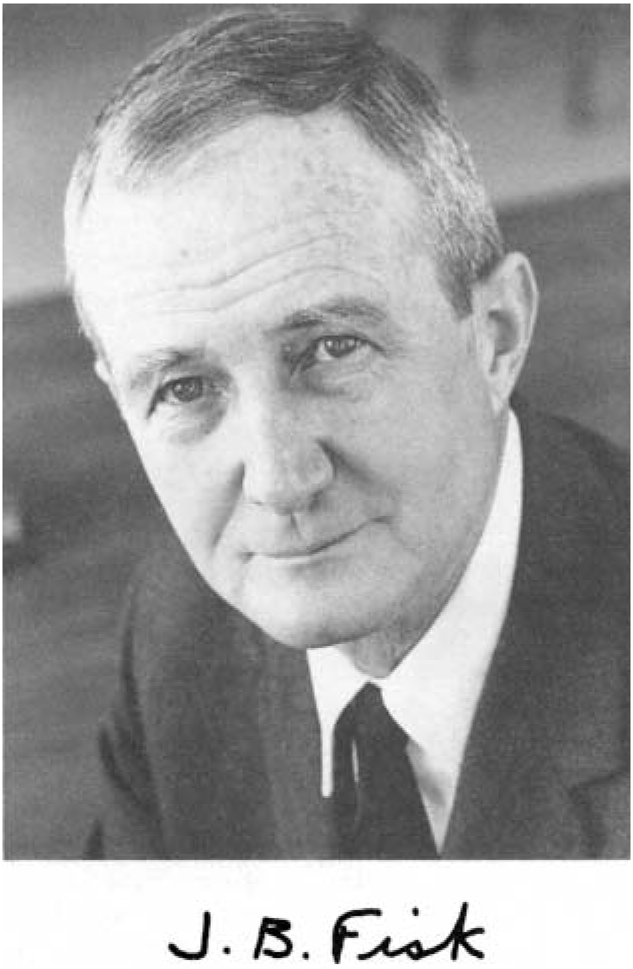

James Brown Fisk

1910-1981

By William Baker

James B. Fisk, a principal figure in the joining of modern physical science to technology on behalf of the telecommunications industry and national security in the electronics, atomic, and space eras, died in Elizabethtown, New York, on August 10, 1981. He had retired as chairman of Bell Laboratories in 1974, having served as executive vice-president from 1955 and president from 1959. The eighteen years in which he was thus directly responsible for all technical programs pursued by Bell Laboratories for AT&T and its Bell System also included major sensor and information work for the Department of Defense, the organization and operation of Bellcomm in support of the national Apollo lunar exploration, and close affiliation with the Sandia Laboratories in nuclear systems research and engineering. He was especially admired for the ways in which he joined the keenest of minds to a warm-hearted regard for his associates and friends, and brought wit and humor to positions of high authority and challenging responsibility.

James Fisk's father was in business in Rhode Island when he moved his wife and family to Tacoma, Washington, where the children's early schooling was interruped by the untimely death of Mrs. Fisk. Her parents persuaded the family that the children should return and pursue their schooling in Providence, Rhode Island.

In 1927 Fisk enrolled in the Massachusetts Institute of Technology (MIT). With an especially strong instinct for mechanisms and the engineering base of invention and creativity, Fisk's undergraduate concentration was in the new pursuits of aeronautical engineering. Further, he had come to know Professor Charles Stark Draper, who was then just beginning his lasting role at MIT. Also, in addition to his technical high school experience, Fisk was much impressed by Professor Taylor in mathematics, a field which appealed to him more strongly than the relatively descriptive (and pre-quantum theory) physics and chemistry as they were then taught. Likewise, as Fisk came to know Draper and his work in more depth and became his assistant in the engine laboratory, he noticed that the physical sciences were being animated at MIT through the leadership of the new president, Professor Karl Compton (from Princeton). Accordingly, this especially decisive period in Fisk's growth involved a remarkable combination of his early and innate interest in engineering, which was expertly fortified during the MIT undergraduate years and by the influence of Draper, and the oncoming era of quantum mechanics and atomic and molecular structure. For the latter, Draper recognized the young Fisk's strong potential, and urged him to learn more about this new wave of study of matter and energy. Fisk enrolled in one of James Slater's earliest courses in theoretical physics and caught the excitement of the new fields. Then receiving the Redfield Procter Traveling Fellowship in 1932, he went to Cambridge University where he worked with those who were probing the nucleus, the atom, the particle, and thinking about the new shape of natural science.

On his return to MIT, Fisk was fully involved in modern physics and qualified for the Ph.D. general examination without taking the traditional extended course work. He then undertook research with Professor Philip Morse on collision cross-sections of diatomic gases when bombarded with electrons.

Fisk served from 1936 to 1939 as a junior fellow at Harvard.

After working on particle accelerators and an electrostatic generator at Harvard, and with further work at MIT, he accepted a job on the faculty of physics at the University of North Carolina.

In 1939 Bell Laboratories, a separate corporation in the Bell System wholly owned by the AT&T Company and the Western Electric Company, sought to add cautiously to its technical staff. This was part of the evidence of preparing for the future that led Dr. James Fisk to accept the invitation of Mervin Kelly to join Bell Laboratories. For what was being sought was, of course, a new direction of science and technology, recognizing what the era of electronics might mean in the business of telecommunications. Although these prospects were soon to be perturbed by a world at war, the goals remained and the work toward them was only delayed.

So the original excitement of the new electronics in 1939 had to be deferred for more than six years, when all Bell Labs' efforts were converted to the development of resources in defense of the nation. But Fisk's intrinsic capacity for leadership soon emerged in the radar work to which he was assigned. In collaboration with Paul Hartman and Homer Hagstrum, Fisk fully exercised the remarkable abilities for joining engineering and scientific theory. In little more than sixty days of intense design and development, this group brought to production, for a host of vital wartime systems, precise wave generators reaching eventually into the 3-centimeter and 1.25-centimeter wavelength region.

Jim Fisk's effective conduct of the wartime work, for which he received the Presidential Certificate of Merit in 1946, also provided occasion for his broader and lifelong interest in public service. He collaborated with William Shockley in the independent derivation of conditions for the critical mass and sustained chain reaction of an atomic pile. These studies convinced Fisk of the dramatic recasting of world peace and stability implicit in the production of atomic weapons as well as in the potential of nuclear energy generally.

He was, in 1947, appointed the first director of research of the U.S. Atomic Energy Commission.

Because he had become a valued friend, collaborator, and adviser of the leading scientific and engineering personalities of the time, he was uniquely prepared to work with President Eisenhower and James Killian in the formation of the Office of Science and Technology in the White House in the late 1950s. He served as vice-chairman of the President's Science Advisory Committee from 1957 to 1960 and as consultant from 1960 to 1973. In 1958-59 he was chairman of the U.S. Technical Delegation to the Geneva Test Ban Conference with the Soviets. In the protracted 1959 discussions on tests and verifications of nuclear weapons development, he foresaw and introduced many of the scientific and engineering issues that remain central today in arms limitation and disarmament negotiations.

Concurrent with these notable undertakings was, of course, the renewed interest in the earlier visions of Kelly and others of the future of telecommunications. The Laboratories' administration proposed in 1946 a prominent role for Fisk as assistant director of Physical Research.

In this context Fisk immediately applied his enthusiasm for recruitment of genius and, likewise, set up special links to the Chemical Laboratories and other sections of the research area. These efforts were accompanied by seminars and conferences generated originally by Shockley, in which we drew together the many new streams of science coming from preware Europe and especially the United Kingdom and the postwar science and technology of the United States. With Fisk's special new direction, connections were established with universities worldwide. As a result, the Laboratories' science and engineering staff, through these connections, recruited directly rather than through the conventional routes that industry had followed of Personnel Department mediation. We arranged a network throughout the Bell Laboratories' engineering and scientific organizations that was responsible for this vital acquisition of gifted graduates. Fisk was an ardent supporter of this strategy from its inception.

Naturally, these strong sensibilities about human abilities coincided with Fisk's inclination to academic communities and enterprises. After deep consideration and consultation with his family, wife Cynthia whom he married in 1938, and sons Samuel, Zachary, and Charles, Fisk accepted in 1947 an appointment as Gordon McKay Professor of Applied Physics at Harvard. As noted, he was immediately diverted to his post in the Atomic Energy Commission, but did return to Harvard to teach until 1949. Then he was again persuaded by Kelly and Ralph Bown, the director of research at Bell Laboratories, that the opportunities and challenges there matched Fisk's basic career goals. Fisk returned in mid-1949 to the expanded Murray Hill headquarters.

Kelly and Bown had revised the organization of the Research Department to accommodate new frontiers that we saw taking form, and where the invention of transistors in 1947-48 had affirmed the onset of an era of solid-state science and engineering that would, as the century advanced, be the base for an information communications age.

Ralph Bown was an unsurpassed sponsor of this, bridging as he did the productive, classical times of radio carrier cables and early microwave technology with a keen and perceptive appreciation of the wave/particle potentials of solid-state physics, chemistry, and metallurgy. These fields were encompassed in the new organization by the Division of Physical Sciences, of which Fisk became the executive director. He moved to vice-president of research in 1954. Already it was evident that Fisk's early, deep interest in engineering applications and expression of new knowledge in makeable and useable operating systems would be broadly exercised in the integrated Bell Systems. Accordingly, in 1955 he was elected executive vice-president in charge of all scientific and technical programs at Bell Laboratories.

He demonstrated then, as later, adept and enthusiastic liaison with his associates in administration and in scientific and engineering performance. This cooperation was built around encouraging and expecting these contemporaries to work as individuals—to work for the advancement of the institution and the community but to take individual initiatives and responsibilities. He would not allow some amorphous shifting of the load to an undefined institution. Rather, each of Jim's associates and friends knew everyday and in every way his expectations of individuality of task.

Returning to Bell Labs as the discovery of the transistor was opening a new realm of communications computing and information handling, Fisk soon became a leader in realization of Kelly's and Bown's aspirations to pursue Shockley's convictions about the electronics of solids. The challenge of rapid application of research that Fisk promoted and assured was reflected in development response to such findings as the crucial oxide masking process of treating thin films of silicon. This was preeminent in the production of semiconductor devices and circuitry for the next twenty-five years. Along with initiation of epitaxial growth in 1960 and preparing for the thin-film integrated circuitry at the frontier of semiconductor systems in the 1980s, research findings of the solar battery, and advanced traveling wave tubes and solid-state parametric amplifiers and masers paved the way for the experiments of the Echo passive communications satellite of 1960 and its successor, Telstar, a couple of years later.

Fisk also pursued with Kelly, and onward into his own administration of the 1960s and early 1970s, transfer of the new materials science and engineering into much of Western Electric manufacturing and the Laboratories' product designs. An example was the substitution of synthetic polymer sheathing for traditional carrier, exchange, and other cable construction—a move that was later said to have saved, in cost of the expanded Bell System plants, more than the cost of the total research budget of Bell Labs for the decade in which the innovation was worked out.

Likewise, Jim Fisk was alertly sympathetic to the wide theoretic and operational significance of mathematics research. A range of actions during that period, such as the creation of the first transistorized digital computer, the TRADIC, for a government contract at the Laboratories, heightened Fisk's understanding that the new transistorized/digital era would be not only revolutionary for information and communications but also for national strategy and the economy generally.

As noted, he served in the White House Science Office during this period, and in the 1960s was a member of Presidential committees to conduct technical missions to Europe and Asia. As a member of the board of overseers of Harvard from 1961 to 1967 and for twenty-two years on the MIT Corporation, being on the executive committee from 1959 to 1978, he maintained close connections with leaders in academic and government communities.

He was also an active member of the National Academy of Sciences; founding member of the National Academy of Engineering; trustee of the John Simon Guggenheim Memorial Foundation, the Alfred P. Sloan Foundation, the Sloan-Kettering Institute for Cancer Research; member of the American Philosophical Society; and a fellow of the American Physical Society and the Institute of Electrical and Electronics Engineers.

As a result of his endeavors on behalf of industry, academia, and government, he received honorary doctor of engineering degrees from the University of Michigan (1963) and the University of Akron (1963); and doctor of science degrees from Carnegie Tech (1956), Williams (1958), Newark College of Engineering (1959), Columbia (1960), Colby (1962), New York University (1963), and Rutgers (1967). These were augmented by honorary doctor of laws degrees from Lehigh (1967) and the Illinois Institute of Technology (1968).

Jim Fisk's patriotism showed up in ways outside even his unexcelled role in national defense and in the building of a new American telecommunications network. Jim took the lead in working out a response to requests from the White House and the National Aeronautics and Space Administration that the Bell System set up an engineering cadre to assist the moon landing program. This required a good deal of rearrangement, among the Bell System's research development groups, that resulted in Bellcomm.

But overarching these activities was his steady effort in Bell Labs for technical and operational gains for the AT&T Bell Telephone System. In switching, the pioneering #1 ESS and 2A ESS, international dialing, and new traffic service systems; in transmission, new carrier, microwave transocean (4,000 miles with 845 two-way voice channels), and satellite systems; in telephone terminals, call distributors, data sets, mobile radio, and answering units, all were among new products developed. Some thirty-three "expert systems" of computer software were created for advancing telephone system reliability and efficiency.

Recognition of these accomplishments, which affected so much of the technical and engineering base of the last half of the century, took many forms. These included among others the Medal of the Industrial Research Institute in 1963, being voted an "outstanding citizen of New Jersey" citation that same year, the Washington Award of the Western Society of Engineers in 1968, the Advancement of Research Award of the American Society of Metals in 1974, the Hoover Medal in 1975, and also in 1975 the Founders Medal of the National Academy of Engineering.

As our nation seeks now to revive and extend excellence in citizens' thought and action, we are grateful to have had the model that Jim Fisk embodied. The pride he took in the 1975 establishment of James B. Fisk Scholarships, annually awarded to children of members of Bell Laboratories, and in the successes of his family are samples of the enduring themes that carry onward his quest for quality.