Frederick E. Terman
FREDERICK EMMONS TERNAN
1900–1982
JOSEPH M. PETTIT

FREDERICK EMMONS TERNAN, one of the twenty-five founders of the National Academy of Engineering, died at Stanford University on December 19, 1982, at the age of eighty-two. He will long be remembered as one of the outstanding teachers, textbook authors, and educational leaders of his generation. His organizational leadership left a permanent mark on the history of Stanford University and its surrounding industrial complex.

Frederick Terman was born on June 7, 1900, in English, Indiana, but moved with his family in 1910 to the Stanford University campus where his father, Lewis M. Terman, became Professor and Head of the Psychology Department. His father was coauthor of the Stanford-Binet IQ test, a landmark in educational testing. Both father and son were to become famous, and both were elected to the National Academy of Sciences.

Frederick Terman entered Stanford and graduated in 1920 in industrial chemistry. In his graduate work he shifted to electrical engineering, receiving the degree of Engineer at Stanford in 1922. He continued his studies at the Massachusetts Institute of Technology, where he received his doctorate in 1924 under Vannevar Bush.

He became an instructor at Stanford in 1925, and except for a leave of absence during World War II, his career at Stanford was continuous until his retirement in 1965. He advanced through the ranks in electrical engineering, becoming Professor and Head of the department in 1937. He went on leave in 1942 to head the Radio

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Research Laboratory at Harvard University, a wartime research and development laboratory that specialized in radar countermeasures and had a staff of more than 800 persons. The work at this laboratory had great significance in the detection, analysis, and jamming of German and Japanese radar. Dr. Terman was decorated by the British Government and by our own, receiving our Presidential Medal of Merit in 1948.

After World War II Dr. Terman returned to Stanford as Dean of the School of Engineering, a position he held until 1958. Stanford appointed him to the post of Provost in 1955 and in 1959 added the title of Vice-President.

Dr. Terman’s early fame came through his textbook, Radio Engineering, first published in 1932; there were four editions of the book, which became the bible of the profession. Its success was due to a blend of conventional radio theory and advanced electric circuit analysis that Dr. Terman learned from Vannevar Bush. His technique for updating this book was interesting. He subscribed to about five journals and religiously scanned every article, preparing an abstract on a file card for each one. These he cataloged according to the chapters of his book. In later editions of the book, he called in several of his younger colleagues, including this writer, to take over certain of the newer fields. The book finally had to be set to rest because radio engineering as a field melted into the broader landscape of electronics.

He was a diligent writer, and when his younger colleagues had trouble producing intended books, he would advise them to write one page a day—that way one would have a 365-page book at the end of the year. He was so disciplined that he did produce something on each day of the year.

Dr. Terman certainly qualified as a leading educator, although one would have to say that he was not a good lecturer—he was warm, but shy, and no orator. But he believed in learning, and his students were obliged to learn as he drilled each class in the contents of his book. He had good contacts with industry, and he brought various of his engineer friends in industry into his classes to have them narrate new developments in which they were involved.

Perhaps his best contribution to education was institution building
at Stanford University. He had the highest standards for new faculty, and participated in building up Stanford University from a good regional institution to one of distinction. He advocated the “steeples of excellence” theory, saying that a city skyline is noted for its high steeples rather than for the average height of all its buildings. He also urged his “mainstream” theory, saying that even the best university cannot be outstanding in everything, but that it is important that its chosen fields lie along the mainstream of intellectual development. A major contribution was to build up Stanford as a strong research university. As Gene Bylinsky wrote in Fortune magazine: “While training a whole generation of scientist-entrepreneurs, Terman had built up the prestige and quality of Stanford’s engineering school to a level that attracted outstanding graduate students from all over the country. For more than a decade, Stanford has awarded more Ph.D.‘s in electrical engineering than any other school, including M.I.T.”

Finally, he was recognized in later years as a region builder, receiving much of the credit for the evolution of “Silicon Valley.” He encouraged Stanford graduates like William Hewlett and David Packard to start companies in the Palo Alto area. Gene Bylinsky further wrote in the Fortune article that the concentration of 800 technology companies along the southwestern shore of San Francisco Bay “has created an innovative ferment on a scale without precedent in industrial history. No other center of advanced technology in the U.S. can match Santa Clara County’s performance—and the buildup of creative technology in Santa Clara County was almost wholly the handiwork of Frederick Terman, an enthusiastic and inspiring teacher at Stanford.”

Dr. Terman described the ideal relationship, which was achieved in the Stanford area, as a “modern community of scholars” whereby, through continuous cooperation and interchange of ideas between the university and its surrounding industry, an important intellectual community could arise that would encourage the growth of industry. He persuaded the university to create the Stanford Industrial Park, in which many of these firms were ultimately located.

He was active in national technical societies, including the Ameri-
can Institute of Electrical Engineers (AIEE) and the Institute of Radio Engineers (IRE), the two forerunners of the present Institute of Electrical and Electronics Engineers.

He was also elected to the top honorary societies. He was elected to the National Academy of Sciences (NAS) in 1946, and helped found the National Academy of Engineering in 1964. He was Chairman of the NAS Engineering Division during 1953–1956 and served on the NAS Council during 1956–1959. His other honorary memberships included Tau Beta Pi, Phi Beta Kappa, Eta Kappa Nu, and Sigma Xi. His social fraternity was Theta Xi, and he was a longtime member of the Bohemian Club in San Francisco.

He served as adviser to the U.S. Government in many important positions. During World War II he served the National Defense Research Committee and in Division 14 (Radar) and Division 25 (Electronic Countermeasures) of the Office of Scientific Research Development. In the important postwar period when the federal role in research and development was taking form as a continuing national commitment, he served as an adviser to the Department of Commerce (1946–1947), in the Department of Defense Special Technical Advisory Group (1950–1953), and in the Research and Development Advisory Committee of the U.S. Army Signal Corps (1954–1962). He was a member of the Naval Research Advisory Committee in 1956–1964, serving as Chairman in 1957–1958. He was a member of the Defense Science Board in 1957–1958. He served the National Science Foundation as a member of the Advisory Committee for the Division of Mathematical, Physical, and Engineering Sciences during 1955–1959 and as Chairman during 1958–1959. He served as a consultant to the President’s Science Advisory Committee and was a Trustee of the Institute for Defense Analysis.

Dr. Terman’s honors were many. He received honorary doctorates from Harvard, the University of British Columbia, and Syracuse University. Stanford University, which does not give honorary degrees, honored him in equivalent ways: the Herbert Hoover Medal in 1970 and the special designation of “Uncommon Man” in 1979. In 1956 the AIEE awarded him its first Education Medal. The IRE gave him the Medal of Honor in 1950 and the Founders Award
in 1962. The ASEE awarded him the Lamme Medal and elected him in 1966 to the special grade of Honorary Member. Eta Kappa Nu made him an Eminent Member in 1951. For his service in Korea in founding a new graduate school in engineering and science, the government gave him the medal of the Order of Civil Merit in 1975. Finally, in 1976, President Ford conferred upon him the National Medal of Science.

As this writer can attest, having succeeded Frederick Terman at Stanford, it can truly be said that he erected a high platform upon which his successors could stand and from which they could see and reach farther than had been possible before.