



James R. Burnett

JAMES R. BURNETT

1925–2012

Elected in 1975

“Contributions in guidance and control for space systems and in the engineering development of US strategic weapon systems.”

BY GERARD W. ELVERUM

JAMES ROBERT BURNETT, a pioneer in the development of guidance, control, and total weapon systems engineering of ballistic missiles and critical defense satellites, died at his home in Carlsbad, California, on April 8, 2012, at the age of 86.

Bob was born on November 27, 1925, in Eldorado, Illinois, to James Lawrence Burnett and Edith Lillian (Bramlett) Burnett. He and his younger sister, Mary Jean, grew up and attended grade school and high school in nearby Carbondale. His father, an engineer for the state highway department, instilled in him a desire to understand how things worked and encouraged his interest in ham radio technology, chemistry, and mathematics.

When Bob graduated from high school, the United States was fully engaged in World War II. He joined the US Marine Corps and, based on his high school record, interests, and enlistment aptitude test, was placed in a Navy V-12 engineering program at Purdue University. Because the Navy could see the crucial operational importance of advances in electrical engineering and of the embryonic discipline of electronics to technologies such as radar and weapon control, they assigned him to an electrical engineering curriculum. What a fortuitous choice that turned out to be for the defense and security of the nation.

By the time Bob graduated with a BS in EE and a commission as a lieutenant in the Marine Corps, World War II was over. The Marine Corps asked him to sign up for a 4-year tour of active duty as a radar officer, but he declined in favor of staying at Purdue for an MS in EE. While earning his master's degree he met a young lady by the name of Anne Knox who was studying home economics at Purdue. They decided to get married, but because she wanted to finish her schooling he elected to stay at Purdue and earn a PhD, which he did in 1949. His dissertation title was "Use of Laguerre Polynomial Approximations in Non-linear Controls."

Bob was very enthusiastic about the technologies he was working on, so when the head of the Electrical Engineering School suggested he stay at Purdue and become a professor, he accepted. As associate professor of electrical engineering, he helped create a modern control systems curriculum. He soon realized that the evolving capabilities of digital computers could numerically compute nonlinear control system answers much faster than the approximation methods of his dissertation. Recognizing the power of digital methods to engineering, he formed a close association with the Math Department to evolve a new digital computer sciences capability at Purdue.

In 1955 one of his students, Robert K. Whitford, received his PhD and went out to California to work at a small company called Ramo Wooldridge, incorporated in 1953. Knowing that associate professors needed to consult in the summer to survive, Whitford called Bob in the spring of 1956 and suggested he apply to consult at RW for the summer—the company was doing work that needed just the kind of special disciplines that Bob had been evolving at Purdue.

When Bob arrived at RW he found that they were providing systems engineering and technical support to the US Air Force on development of the ballistic missiles Atlas, Thor, and Titan. This was a critical period for the United States to establish an unassailable position of strength as the Cold War was ramping up. Bob realized that here was an urgent national need for which his entire academic training, professional interests, and experience qualified him to contribute to the nation's defense.

Also, as he said in an interview, “there was a set of people, headed by Simon Ramo, who from an intellectual point of view were the brightest set of guys I’d ever run across in one place in my entire life.” He never returned to the academic life.

At RW Bob was assigned as senior staff in the Guidance and Controls Department of the Guided Missile Research Division (GMRD). The complexity of developing and fielding a complete guided missile weapon system in as short a time as possible required the simultaneous evolution of a new engineering discipline called systems engineering, which in turn had to be combined with a new management discipline that could direct the efforts of dozens of large corporations.

Bob’s training and superb skills enabled him to provide specific solutions to many critical missile control problems and to advance the systems engineering methodology. And his leadership skills contributed greatly to establishing the effectiveness and acceptability of a “technical direction” organization under contract to the Air Force’s Ballistic Missile Command.

In late 1958, RW was reincorporated as Thompson Ramo Wooldridge (TRW); GMRD was dissolved and its elements reorganized into a separate new corporation called Space Technology Laboratories (STL), which would develop and deliver spacecraft systems while retaining a Systems Engineering Division (with total hardware/software product exclusion) with technical direction responsibility for Atlas, Titan II, and Minuteman.

Bob was appointed associate director and later director of the STL Electromechanical Laboratory, with responsibility for fundamental decisions about the final selection of the control subsystems for Titan II and Minuteman II. He became program manager of TRW’s Minuteman program in 1961 and was a driving force behind the operationally advanced Minuteman III in 1965. That year he received the Air Force Systems Command Award in recognition of his outstanding contributions to the development and operational deployment of the Minuteman group of weapon systems.

In 1965 STL became TRW Systems, and a few years later Bob was promoted to vice president and general manager of

the company's Systems Engineering and Integration Division. His accomplishments and importance were recognized by appointment as vice president and general manager of TRW's Defense Systems Group in 1980. He retired in 1991 as executive vice president and deputy general manager of the company's Space and Defense Sector.

Throughout his career Bob also served on numerous national task groups and advisory committees. These included almost ten years as a member of the Scientific Advisory Committee of the Defense Intelligence Agency, chair of the Scientific Advisory Board of the National Security Agency, member of the Defense Science Board, and chair of the Scientific Advisory Panel for the DOD Joint Strategic Targeting Group. After his retirement he remained active on advisory committees to elements of the government.

He was a member of Sigma Xi, Theta Tau Professional Fraternity, and Tau Beta Pi Engineering Honor Society. He received an honorary doctor of engineering degree from Purdue in 1969 and in 1992 was honored with the university's Outstanding Electrical Engineer Award. In 1975 he was elected a member of the National Academy of Engineering, and in 1981 a fellow of the American Institute of Aeronautics and Astronautics. He was selected in 2006 for the DOD Eugene G. Fubini Award, established to recognize "outstanding service to the defense community and the nation in an advisory capacity."

In 2003 Bob and Anne made a major gift to create and endow the Bob and Anne Burnett Professorship in Electrical and Computer Engineering at Purdue. Bob said at the time, "My Purdue education was the key to my professional career, and I want to give back."

Bob is survived by his wife of 66 years, Anne Knox Burnett; their children James W. Burnett (Kathy), Karen B. Cofer, Susan B. Hicks (Stephen), and Janice B. Clark (Kim); and 12 grandchildren.

Jim Burnett observed that "Dad always wanted to know how things worked. His academic and professional success was all due to his ability to understand how things worked

and apply that knowledge to accomplish whatever he was working on.”

Janice remembers how devoted her dad was to his family: “He was proud of his children and grandchildren. He loved spending time with everyone and hearing all about their adventures and experiences.” Bob was an avid photographer all his life, and she recalls that “It was quite a feat to organize all of us and get us all in the annual Christmas picture.” That was probably among his most enjoyable systems engineering and technical direction projects.

Bob Burnett possessed a combination of technical background, enthusiasm, integrity, and leadership skills that made him a unique and major contributor to the success of the nation’s crucial intercontinental ballistic missile (ICBM) and military spacecraft programs. It was my great privilege to work closely with this brilliant scientist and engineer for over 30 years in providing rocket propulsion engineering support for the ICBM programs and propulsion subsystems for all TRW spacecraft. He was an inspiring leader and gentleman who energized everyone on his teams. I always will remember him with fondness.