

## In Memoriam: Walter Richard Evans

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Walter Evans, brilliant electrical engineer, developer of the Root Locus Method, author, founder and president of The Spirule Company, inspiring mentor, husband, father, and volunteer, was influential in many people's lives. He had a way of taking complex problems, finding answers to them, and communicating the process to people of more ordinary intellectual ability. The practicality and simplicity of his ideas made Root-Locus Analysis a major advancement in the development of feedback control systems and dynamics systems.

Mr. Evans was awarded the prestigious Rufus Oldenburger Medal by the American Society of Mechanical Engineers in 1987, and the Richard E. Bellman Control Heritage Award by the American Automatic Control Council in 1988. Although a genius, he never looked down on others. He sought to teach, instruct, be a model, and serve.

Evans was born in Saint Louis, Missouri, and his love of math began at an early age. His father was an engineer, and Walt knew when he was young that he wanted to be one, too. He learned to play chess from his grandmother, Eveline Burgess, U.S. Women's Champion for thirty years, 1906-1936, thus enhancing his ability to think a problem through many steps to a solution. Walt's widow, Arline, recalls sitting in front of him in geometry class when they were sophomores in high school, where he would bring in models to prove his answers.

Walt earned his B.S. in Electrical Engineering from Washington University in St. Louis in 1941, completed the three-year Advanced Engineering Training Program at the General Electric Company in 1944, worked as an instructor at Washington University from 1946 to 1948, and obtained his M.S. in Electrical Engineering from the University of California, Los Angeles, in 1951.

His thoughts on learning and teaching are reflected in these quotes:

*The main key to learning, in my opinion, is to treat the problem as a game using all the simplifications possible to get the approximate answer.*

*It seems to me the real bulk of learning takes place in self-study and problem solving with a lot of positive feedback around that loop. The function of the teacher is to pressure the lazy, inspire the bored, deflate the cocky, encourage the timid, detect and correct individual flaws, and broaden the viewpoint of all.*

In 1948, John R. Moore offered Walt a summer job (which turned into a full-time job) at Autonetics, a division of North American Aviation (now Rockwell International) in southern California. There, in a class Mr. Evans was teaching, a student asked what would happen to a typical control system if a certain quadratic approximation broke down. This was the inspiration for Root Locus.

Dr. Robert H. Cannon, Jr., Chairman of the Aeronautics and Astronautics Department at Stanford University when Walter

Evans was awarded the Rufus Oldenburger Medal, noted, "At North American Aviation's Aerophysics Laboratory where Evans worked, it (the Root-Locus Method) had already become the primary method for designing automatic pilots for high performance aircraft and for the X10 pilotless missile, which was at the time the first operational supersonic aircraft – either piloted or unpiloted."

Don Bently, Founder, Owner, Chairman, and Chief Executive Officer of Bently Nevada, who also worked for John Moore, recalls, "Walt was a most influential person in both my career and in the companies I have founded. While at North American Aviation during the 1950s, it was my privilege to work alongside Walt doing important work on advanced controls for inertial guidance systems. Some of this work was used in the Polaris submarine program that sent U.S. subs beneath the Polar ice cap.

Walt's work on Root Locus Theory found direct application to much of the work I have been involved with over the past forty-four years, by helping me characterize the behavior of rotating machinery. Walt was a very capable teacher at imparting advanced control theory. In fact, an item I am very proud to have in my personal library is a copy of Walt's book Control-System Dynamics, published in 1954 and signed by Walt himself. It continues to influence ongoing work today, such as a new fluid bearing that I invented and is now being commercialized."

Walt worked on the technical staff of the Guidance and Control Department of the Re-Entry Systems Operation of the Ford Aeronautic Company from 1959 to 1971, and then returned to Autonetics, where he worked on the technical

staff of the Strategic Systems Division until his retirement in 1980.

The Rufus Oldenburger Medal was awarded to him in recognition of his significant contributions and outstanding achievements in the field of automatic control, including his development of the Root-Locus Method, the Spirule (coined as a combination of the words "Spiral" and "Slide Rule"), and his book, Control-System Dynamics.

Walter was not only a genius of the first degree, but he was also a humanitarian. He loved his family (wife, four children, and grandchildren) and his community. He volunteered in the Boy Scouts of America, the United Way, and his church. His daughter Nancy recalls, "He did things differently and would think 'outside the box'; he encouraged us kids to think for ourselves."

His son Greg said, "I remember some of [Dad's] ideas didn't catch on at the time: spray painting tennis balls bright yellow and orange to improve their visibility, mounting wheels on luggage to enhance their transportability, and staggering work hours to ease traffic congestion. Let's face it, [Dad was] often ahead of the times."

Even after he had a stroke and was partially paralyzed, he was able to teach and encourage others. His daughter Nancy said that he played chess at the senior center and taught the young volunteers to play. When the game was half over, he would turn the board around and play the other side, thus giving them a chance to win. His colleague and friend, Frank Pelton, concludes, "The world has lost a great technological genius. May he rest in peace."