

VALLEY OF THE GIANTS



HARDY W. TROLANDER

Hardy W. Trolander was born in Chicago, Illinois in 1921, and attended public schools there, graduating from Morgan Park High School in 1939. He attended Purdue University 1939-40 and transferred to Antioch in September, 1940. While in Antioch's workstudy program he was employed by the Museum of Science and Industry in Chicago and later at the Sperry Gyroscope Company radar laboratory in Garden City, New York, where he worked for Russell Varian, the inventor of the Klystron tube.

He enlisted in the Army Air Corps in early 1943, and in 1944 received his commission as a communications officer from the Air Corps' Officers School at Yale University. This was followed by radar countermeasures (now known as electronic warfare) work at both Boca Raton and Eglin Fields in Florida. Assigned to fly unescorted single plane missions along the coast of Japan in a B-24 ferret aircraft to detect and locate Japanese radar installations, he was relieved of this duty by the dropping of the first nuclear bomb prior to his first mission.

Returning to Antioch in 1946, he graduated with a BS in Engineering in 1947, and remained there as a temporary instructor in Physics and Engineering for the following year. During that year he suggested to two of his Antioch classmates, one a recent graduate in chemistry and the other in mechanical engineering, that they start an engineering laboratory. Beginning in the Science Building of Antioch, the Yellow Springs Instrument Company (YSI) was established by the three partners in June, 1948.

Among YSI's early developments was a very accurate camera timer for the Air Force. In order to achieve the necessary accuracy at its highest setting, 0.005 percent, Trolander conceived a form of early computer circuit employing vacuum tube flip-flops and stepping relays. Today it would be characterized as a 16K ROM with onboard crystal clock and heavy duty input and output gates, but in 1959 some of these terms were vet to come into use. Several hundred of the timers were produced and were employed in the training of Air Force bombardiers.

His next important development occurred in 1952 when he and Leland Clark, Jr. conceived the telethermometer, the first practical medical electronic thermometer. An early model introduced in 1954 remains in production at YSI 40 years later. Trolander's subsequent invention of a process and means for tightening the tolerance of thermistors used as the sensors for these thermometers to better than 0.1 degrees was the major step in ensuring their acceptance. Continuing to employ the same process, YSI remains the world's leading producer of these sensors for biomedical, environmental, and aerospace applications.

Other inventions followed and included an n-term electrical network in 1967 making use of two or more non-linear thermistors to achieve a highly linear response from these non-linear elements. This resulted in the awarding of one of the first Russian patents granted to an American inventor.

In 1978, almost 20 years after first noticing an apparent inconsistency between the behavior of thermistors and their accepted theory, Trolander conceived of a new form of their structure that resulted in improving their long-term stability by greater than an order of magnitude. YSI remains the only firm to produce them.

Trolander retired in 1986 after nearly 40 years as YSI's first President, having seen the firm grow from three employees in a small rented college laboratory to about 400 people working in plants in Yellow Springs, in New Mexico, and in Japan in what was one of the largest employee-owned firms in the area. And among its other "firsts" was the membrane polarograph electrode, invented by Leland Clark, and the first true biosensor, conceived by Leland Clark and made practical by a young YSI engineer, David Newman.

Trolander benefited from help from a number of mentors. Frederick J. Hooven, an inventor and Fellow of the Dayton Engineers Club collaborated with Trolander in many ventures over many years. Charles F. Kettering was a regular visitor at YSI during its early years, and Trolander personally handled three assignments from Kettering: "What a boost to my self-esteem," says Trolander.

Antioch professors Gwilym Owen and Constantin Dimitri Barbulesco were both inspiring and facilitating. He knew, and was helped by, George Leland. A very long-term relationship began in 1940 when Trolander, then manag-

Continued on Page 10

1917 Cabs With Taximeters

Continued from Page 1

Ford, shear off the section behind the front seat, extend the chassis, widen the frame, adapt and stick on the Hansom cab, weld, sand, paint, and add a roof covering, and have a taxi for \$1,500 to \$1,700.

In fact, the picture shows what can be considered the first customized stretch car. Surviving elements of the old Hansom include the kerosene-fueled lanterns on the side, the rings for door handles, and the two large leaved springs that extend out in front of the radiator grille.

The arrowhead-shaped plate riveted to the side behind the front fender is the cab's medallion, its official license (New York cabs today still bear licenses in the form of metal medallions; they now ride atop the hood on the passenger side). The medallion allowed the car's owner to cruise city streets in search of passengers. In 1919 there were 4,000 medallions in use; by 1925 the number would reach 21,000, after thousands were issued at low prices to unemployed World War I veterans. Perhaps the driver of this cab was a veteran; there is a war-bond sticker on the windshield, with its "V for victory" and the single word "invest."

The driver, in his seat behind the wheel, wears a uniform. The times, and his clientele, demanded it. Taxis were a convenience for the well-to-do, and the cabby's job was not only to drive and collect fares but to get out at each stop and open and close the door for

his passengers. He himself, on the other hand, has no door; on his left he is protected by a metal wall welded into place from the fire wall to the center post; on his right is an exposed space where Pullman suitcases and steamer trunks could be stowed, strapped down with the large belt that hangs under the meter. Furthermore, the cab had no headlights, tail lights, or rear reflectors. Driving at night, the cabby relied solely on the illumination from streetlamps. He probably never ventured beyond city limits, where no highways would have been lit; and he most likely avoided driving in rain when he could, as the cab had no windshield wipers.

The driver had to have a Spartan attitude toward his job; he had no heater in the car and no way to keep out the freezing winds of winter. He could wrap rags around his calves, and don an overcoat that almost touched the ground, gloves, a scarf, and the slouch cap that would soon become his trademark. Why he remained at the job at all is a good question. It's a question I sometimes ask myself, for I've been doing the same job, though under much better working conditions, for more than 30 years. I guess the best answer is that some of us love it. We have enjoyed hearing passengers say "punch me out a receipt" ever since this photograph was taken.

Valley of the Giants

Continued from Page 4

ing a predecessor of the current FM station, WYSO, bought radio parts from Dayton's Standard Radio Co. In that connection, Hyde Ruble and Harry Friedman later helped YSI get started and become Trolander's life-long friends; they are all missed.

Trolander is an elected member of the National Academy of Engineering and is working on several of its programs. He is a trustee of the Yellow Springs Community Foundation, which he co-founded in 1974; the Engineering and Science Foundation of Dayton; The Dayton Engineers Club Foundation; and the Foundation for Skeletal Health. He has been honored by the ACLU, Antioch and the Dayton Engineers Club.

Hardy Trolander is also a Senior member of IEEE, and is either a current or past member of the following organizations (some of which he was either Founder or Chairman, or both): International Institute for Medical Electronics and Biological Engineering, American Institute of Biological Sciences, International Organization for Legal Metrology, National Bureau of Standards, American Assn. for Advancement of Science, Dartmouth's Thayer School of Engineering, American Civil Liberties Union, Scientific Apparatus Mfr's Assn, Antioch College Board, United Way of Greater Dayton, Greene County Health Commission, Health Care Project of Southern Ohio, Miami Valley Business Innovators, and Yellow Springs Community Foundation.

Hardy Trolander has been awarded 15 patents in fields of power, electronic instrumentation, and in medical apparatus. He has directed research in many other related fields and has authored more than 50 publications. The Engineers Club selected Trolander to be the 1992 recipient of its Annual Fellow Award.

Hardy married Imogene Davenport in 1946. They have two daughters, Megan and Patricia.

It is an honor to add the name of Hardy W. Trolander, as an outstanding example among those listed in our VALLEY OF THE GIANTS!