



G. H. Wagnick

ARTHUR HENRY WAYNICK

1905-1982

BY ERIC A. WALKER

ARTHUR H. WAYNICK, an internationally known scientist, engineer, and educator, died in London on August 31, 1982. He had retired in 1971 as Director and Founder of the Ionosphere Research Laboratory and Head of the Department of Electrical Engineering at the Pennsylvania State University. He had also been the first individual there to hold the A. Robert Noll Distinguished Chair in Electrical Engineering.

His long interest in communications engineering won him distinction in the field of the ionosphere. He may not have discovered the ionosphere (Kennelly and Heaviside guessed it was there about the time Arthur Waynick was born), but he and Appleton and Radcliffe, at the Cavendish Laboratory in Cambridge, first measured it, described it, and taught us how to use it. In 1948 he organized the Ionosphere Research Laboratory, which brought together a large group of experts to study the ionosphere. His expertise in the field led to involvement in the basic science aspects of the U.S. space program from its inception. Prior to his appointment to the Pennsylvania State University, Dr. Waynick served on the faculties of Wayne State, Harvard, and Cambridge universities.

He was born in Spokane, Washington, on November 9, 1905. His father's small hardware store was bringing slim returns in the 1921 depression, so the family pulled up stakes and moved to Detroit, answering an ad by Henry Ford offering jobs to mechanics at \$5 per day. Art Waynick developed an interest in radio while he was still in

grade school; he got his amateur license, 8AW, when he was only twelve years old. He was in contact with the airship *Shenandoah* as she was going down in the Pacific, and also communicated with the *Hindenburg*, which caught fire at Lakewood, New Jersey.

However, radio was expensive; he could ill afford the resistors, condensers, and those new vacuum tubes with which a transmitter could be built. Money was in such short supply that his uncle gave him some for a new suit for high school graduation. On that memorable day, however, his mother found him sitting in the audience instead of on the graduation platform—he had spent the suit money on a couple of UX 11s for his receiver!

He tried to save money for a college education by building radio receivers for a small manufacturer, but his money evaporated in the bank closings of the Depression. It took thirteen years, with his employer allowing him to work after classes from 3:00 P.M. to 11:00 P.M., for him to put together enough credits to earn a B.S. in physics from Wayne State University in 1935. It is alleged that his knowledge far exceeded that of his instructors, and he was quickly signed on as an instructor in physics. At this time he met and married Lillian Wait, with whom he raised a family of three, two boys and a girl.

He was at Wayne State for two years, during which time he became interested in the propagation of high-frequency radio waves in the atmosphere. He received a Guggenheim Fellowship to study physics at Cambridge, and he went with great enthusiasm, anticipating that his studies would lead to a doctor's degree. His love of science was fulfilled by his study of the ionosphere in the Cavendish Laboratory with Appleton and Radcliffe, but all was interrupted by the start of World War II. His plans had to be changed, and he returned to the United States in 1939 and became an Assistant Professor of Physics at Wayne State University.

Another good opportunity appeared in 1940 when Ted Hunt was putting together what later became the Harvard Underwater Sound Laboratory, formed to do work on underwater sound for submarine detection. Joining that group allowed Arthur Waynick to have connections with the Cruft Laboratory and Professors Chaffee and Pierce and Mimno, who were also interested in radio propagation.

While at Harvard, he also received his Sc.D. in communications engineering in 1943.

The Harvard Underwater Sound Laboratory was asked to work on the development of an acoustic homing torpedo, and Art's electronic knowledge was extremely valuable. He devised a binaural listening system and a servomechanism that would allow the torpedo to steer toward an acoustic target. This later led to the first of the acoustic torpedoes, which was launched from an airplane to drop into the water and then, turning on its steering and propulsion mechanisms, pursue a rapidly moving submarine. This was one of the devices that broke the back of the submarine menace in World War II and led to the formation of the Ordnance Research Laboratory, which still serves the Navy from Pennsylvania State University. Dr. Waynick became the Assistant Director in charge of electronics at that laboratory.

In 1945 he was able to establish the Ionosphere Research Laboratory at Penn State, dealing with his original interests. This laboratory, still in existence, deals with the propagation of radio waves through the ionosphere. Its organization and scientific objectives were laid out by Dr. Waynick in the late 1940s, and they are still being followed. The laboratory is a source of much valuable scientific information and has proved to be the educational vehicle by which many scholars have obtained their doctor's degrees.

Some of his important contributions included participation in the design, construction, and operation of numerous ground-based and rocket systems for the exploration of the Earth's upper atmosphere, particularly in the ionospheric D-region (50–90 kilometers in altitude). These studies resulted in the first definitive models of D-region ionization and provided a new basis for the prediction of long-distance radio propagation by the National Bureau of Standards. They have also greatly improved the understanding of radio blackouts associated with solar flares and nuclear explosions, to mention a few.

Work also included the design and construction of facilities for the first long-wave pulse sounding of the lower ionosphere; planning and construction of the only combined phase and amplitude wave-interaction facility in the world for D-region studies; the first rocket