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**The Last Full Measure: Building the
First Submarines - II**

Lead: For 400 years service men and women have fought to carve out and defend freedom and the civilization we know as America. This series on *A Moment in Time* is presented by the people of General Dynamics and is devoted to the memory of those warriors, whose sacrifice gave, in the words of Lincoln at Gettysburg, *the last full measure*.

Intro.: *A Moment in Time* with Dan Roberts.

Content: With the arrival of electric and diesel propulsion, the necessary components for a successful submarine were in place. Two of the main inventive rivals in the early years were John Philip Holland and Simon Lake. Eventually, Holland won the competition as the U.S. Navy built its craft using his designs, but he had a worthy opponent in his rival on submarine construction, Simon Lake.

Lake came from a New England family of inventors and mechanics. Oyster farming, tracked vehicles, and even the rollup window shade were a

part of the family portfolio of successful creations, but Simon, after reading Jules Verne's *Twenty-thousand Leagues Under the Sea*, became obsessed with underwater craft.

In the late 1880s the U.S. Navy began to get serious about the military application of submarine technology. They held a series of design competitions and in 1893, Lake and Holland went head to head. Lake's design incorporated highly advanced features, such as a snorkel, which allowed a submarine to remain underwater almost permanently, a diver's air lock for underwater egress, and wheels for rolling on the bottom.

Holland won the design wars, but Lake did not give up. Raising money on his own, he built a wooden demonstration model and then a full-sized steel vessel, *Argonaut I*, which he sent in summer 1898 from New York to Norfolk. It was the first long distance off-shore voyage of a modern submarine, most of the way rolling on the bottom. Lake built subs for the Russians and Germans and eventually, during WWI for the U.S.

Ever the practical engineer, Holland was inspired by reading the accounts of the Civil War conflict between the ironclads *Monitor* and *Merrimac*. He was an Irish immigrant schoolteacher, but spent

the second half of his life designing, testing, and trying to convince the US Navy that submarines were a viable weapon's system as the age of sail was coming to an end.

Financed by private investors, Holland constructed several demonstration craft such as the *Holland I*, *Holland II (Fenian Ram)*, *Holland III*, *Zalinski Boat*, and *Plunger*. Gradually the Holland signature design emerged which incorporated "reserve buoyancy," a constant center of gravity and balance maintained by the use of trimming tanks, and the use of dual power, internal combustion for surface running and electric power for submerged work.

During the Spanish-American War, Holland offered to sink the Spanish fleet in the harbor of Santiago with *Holland* if the Navy would agree to transport the boat—and to buy it if his efforts succeeded.

In spite of some embarrassing and dangerous failures during trials, Holland persisted until the *Holland VI* successfully dove and surfaced in the Potomac on March 14, 1900. One of the watching Navy officials, Admiral George Dewey, commented “If [the Spanish navy] had two of those things in Manila, I could never have held it with the squadron I had.” *USS Holland* was commissioned on October, 12, 1900.

For a time he worked for the Electric Boat Company, but left to start his own firm in 1904. While some of Holland's design features were temporarily abandoned after he sold control of the design, later developments such as nuclear power proved the genius of his vision.

Holland did not live to see the vindication of his inventiveness, as he died in 1914 just before the beginning of World War I, but his legacy provided the foundation for modern submarine design.

Both Lake and Holland possessed the intuitive genius that made possible striking innovation and

progress, but their lack of business sense meant that others would organize the fruit of their intellect, take their insights and reap the financial rewards these two fathers of the submarine made possible.

At the University of Richmond, this is Dan Roberts.

Resources

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