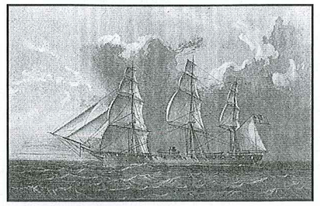
Captain Philip Weems: Refining Navigation

by William J. Cook

From the time that sailing vessels rendered the rowing galley obsolete until the era of steam-propelled ships, very little changed in the technology of ships and their equipment. Huge topsails were split into upper and lower topsails; bonnets made way for reefing systems; fore-and-aft sails were cut flatter and eventually constructed with cotton duck rather than flax linen—but these changes were nothing drastic. Little changed for the mariner as he signed off one ship and on to another. In fact, had the mariner signed off one vessel and on to another one hundred years later, he would have had few problems figuring out how to work his new ship. Navigational instruments and methods paralleled the same slow evolution as did technology for the ships themselves. The magnetic compass can be traced to the thirteenth century. During Columbus's transatlantic crossings, he used dead reckoning and a quadrant. In that era, mariners crossing the Atlantic sailed to a known line of latitude, then headed east or west, staying as close to that parallel as possible. The marine sextant was introduced in 1731 and today's sextants differ little from that earlier version.

Some big names come to mind in the advancement of navigational technology and knowledge: Nathaniel Bowditch and Matthew Fontaine Maury, for example. John Henry Harrison must be included also for his accurate and practical chronometer, which he invented and modified for more practical use in the middle of the 1700s. In the early part of the nineteenth century, the Sumner method of plotting celestial position lines was introduced. Until the 1930s, these advancements represented nearly the whole of navigational evolution.

A more modern day "big name" in navigation was Captain Philip Weems (1889-1979) who succeeded in making navigational methods simpler and more practical for all mariners, but who also made it reasonable for use by aviators. Weems career spanned an age where transportation changed in a relatively short time compared to hundreds of years before him. He served on the last cruise of the USS *Hartford*, a square-rigged sailing ship, in 1908 and lived to assist famous aviators Charles Lindbergh and Douglas



USS *Hartford*

"Wrong-way" Corrigan. After his retirement, the Navy asked him back in 1961 to assist in developing a system of navigation for space travel.

Weems the Man

Philip Van Horn Weems was born in 1889 and grew up on a small farm in Tennessee. He was forced to feel the weight of adult responsibilities at an early age, when his widowed mother passed away, leaving him and his siblings to look after themselves. In 1908, he entered the US Naval Academy and graduated in 1912. It was at the Academy that he first became interested in astronomy and celestial navigation—both would become life-long interests. In 1919 Lt. Commander Weems was assigned to one of the many station tracking ships strewn across the North Atlantic to aid three small planes in their attempt to make the first transAtlantic flight. Thinking of all the time, energy, and money being expended on positioning and maintaining this flotilla, Weems felt there had to be a better way, and the experience sealed his fate as one who would forever change the heart and soul of celestial navigation.

As a man driven by the desire to advance the technology and methodology associated with navigation, Weems recognized the need for new types of navigational instruments, and went about to purchase, modify, or design them from scratch. One such device was the bubble sextant. Proven practical by Portuguese Admiral, Gago Coutinho, in 1921, aviators could use these instruments without having to see the horizon. This was important because poor visibility often made viewing the horizon difficult to impossible. Weems invented the "second setting watch," a timepiece with a face that could be turned precisely above the second hand to ensure synchronization with the ship's chronometer, and the now-famous Weems plotter, which combined a protractor, straight edge, and parallel rule in one device.

More than dedicated, Weems was focused. Over the next few years, he made many brilliant observations, published numerous books and articles related to navigation, and took on a position as an instructor of navigation at the Naval Academy. In 1928, Weems opened his own navigation school in Coronado,

California, where he was stationed at the time. There he taught The Weems System of Navigation and sold accoutrements and publications associated with the craft. This brought on a long-lasting relationship with Germany's Carl Plath.

With each passing year, Weems perfected new, simpler methods of navigation,

Captain Weems (middle) and Charles Lindbergh (right)

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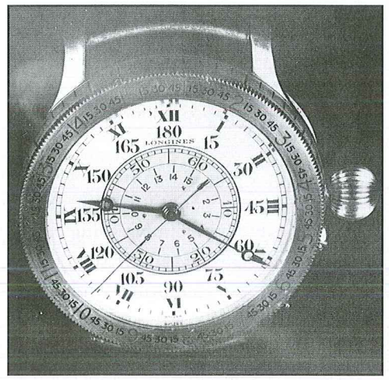
expanded his business, and came to rub shoulders with and/or teach some of the greatest navigators and adventurers of his day. At one time or another, his students included Admiral Richard E. Byrd, Charles Lindbergh, and "Wrong-way" Corrigan. The latter had always professed his 1938 flight from New York to Ireland was made in error—that he had simply misread his compass, having intended to fly west to California. Weems's records, however, show that Corrigan had purchased a number of charts in preparation for the flight—all covering the North Atlantic!



Weems's second setting watch that he designed for Charles Lindbergh's famous flight.

Weems & Plath

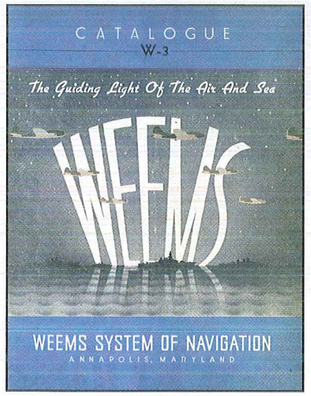
Like so many German businesses, C. Plath Navigation was devastated by the Second World War. In a ten-day period in 1943, 48,000 of Hamburg's inhabitants were killed and C. Plath's headquarters was reduced to ashes. In 1943, however, the Plath organization had been in business for 106 years, and had developed an aversion to giving up easily on anything. By 1952, C. Plath had again acquired a good international reputation and was looking to gain a larger market share in other countries, and in 1953, Plath's Johannes Boysen contracted for Weems to be Plath's sextant vendor in the United States. At that time, the relationship that dated back to 1928 became cemented and the names Weems & Plath became the trademark of a company that became known to mariners and aviators alike for the best in navigational instruments and guides.

Captain Weems Moves On

In 1960, at the age of 71, Captain Weems sold his business to the Times Mirror Company and thus started a long chain of new owners. Having lived a full life, and having made so many important contributions, one would think that Weems would have been content to relax and enjoy memories of a productive life. That, however, was not his way, and in 1961 he began working with scientists to develop a navigation system suitable for space travel.

Weems retired again at the end of the Second World War, but he kept as busy as ever. One of his achievements, in his spare time, was to co-found the United States Institute of Navigation in 1945.

Weems had several other distinctions besides his achievements in aviation. He was on the Olympic wrestling team in Antwerp in 1920, he was an All-American center with the Navy football team, he won the South Atlantic amateur light-heavyweight wrestling championship in



1925 when he was 30, he was a proficient skin-diver, and in 1959 he joined an expedition to explore Port Royal in Jamaica, where the pirates of the Spanish Main had their capital two centuries ago.

Despite so many successes in his career, his personal life was devastated twice,

Lt. Commander Philip Weems demonstrating a modified sextant, which could be used independently of a visible horizon. Weems is wearing his second-setting watch on his left arm.

as he survived the deaths of both his sons. Major Philip Van Horn Jr. was killed in the South Pacific in 1943 and his other son, Lt. Commander George Thrackray, died in 1951 testing an aircraft. Weems and his wife Margaret had a married daughter, Margaret Dodds, who had three children.

In memory and in honor of Weems significant contributions to navigation, The Institute of Navigation created an award given annually to an outstanding individual "For Continuing Contributions to the Art and Science of Navigation."

When Captain Weems first turned his attention to the stars, he entered a world in which navigators were using the same instruments and methods as their counterparts three centuries earlier, while aviators traveled at speeds more than ten times those of marine navigators. As if determined to personally make up for all that lost time, through his books, tables, formulas, and inventions, he proceeded to revolutionize navigation in all its arenas: earth, sea, sky and beyond.

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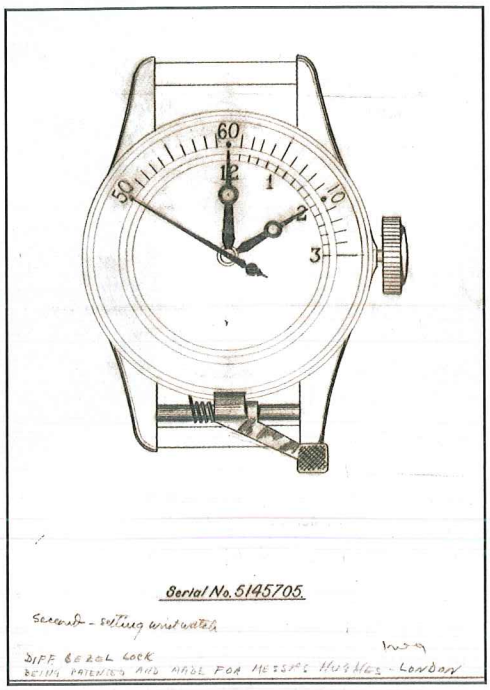
Additional information for this article came from Norman Emmott and Joseph Portney's article on Captain Weems posted on the Weems and Plath web site: www.weems-plath.com. All images for this article courtesy of Peter and Cathie Trogdon, owners of Weems and Plath.



Another of Weems' inventions was the second-setting watch. At sea, celestial sights had to be taken with the aid of a hack watch which was set to the ship's chronometer. It was difficult, however, to set the watch exactly, which meant that it differed slightly from the chronometer, which in turn differed from Greenwich Mean Time. Weems reasoned that the difficulty in setting the watch came from the fact that at the time it was almost impossible to set the second hand exactly. However, if the second hand could not be set to match the dial perfectly, it might be possible to make the dial movable, so that the dial and the second hand were synchronized at the right time. —NWE ⚓

Weems Chronology and Accomplishments

- Born 1889
- 1908, entered the US Naval Academy, graduated in 1912
- 1919 served aboard beacon ship during transAtlantic flights
- 1920, member of Olympic wrestling team in Antwerp
- 1925, won the South Atlantic amateur light-heavyweight wrestling championship
- 1928, founded Weems System of Navigation in Coronado, California (where Weems was stationed at the time)
- 1928, taught celestial navigation to Charles Lindbergh
- 1929, developed Lunar Ephemeris for Aviators and served as an Instructor of Navigation at the Naval Academy
- 1933, published "Air Almanac" and Star-Altitude Curves
- 1933, retired with the rank of Commander
- Recalled to service for 3 years, promoted to Captain, and served as Convoy Commodore in 1942
- Published Air Navigation, and authored Line of Position Book and 15 other books on various aspects of navigation
- Designed the Weems Plotter
- Created the second-setting watch, first constructed by J. Jessop Jewelers in San Diego, and later made in quantity by Longines
- Developed a complete celestial navigation system and a sunset-sunrise computer
- 1945, helped establish the US Institute of Navigation
- 1948, flew to the North Pole
- 1950, flew around the world
- 1959, joined scuba diving expedition to explore Port Royal in Jamaica
- 1960, sold Weems & Plath
- 1961, recalled to service for 6 months at age 71 to help develop a system for space navigation
- 1979, died at the age of ninety on June 2
- 1981, The Institute of Navigation created an annual award in his honor *For Continuing Contributions to the Art and Science of Navigation*
- 2003, inducted to the Annapolis Maritime Hall of Fame, posthumously