MIKE TONSING

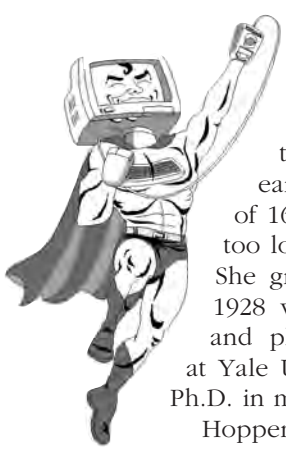
A Cyberian Legend Remembered As We Near the 20th Anniversary of Her Death

This month's column celebrates the life of a Cyberian woman who died nearly 20 years ago, a few years before this column's inception. Though not a lawyer, her Cyberian service to the U.S. government is the stuff of legends. If you don't know her story, you should. According to one of her biographers, she was as important in the history of computers as Bill Gates. (*Grace Hopper and the Invention of the Information Age* (Lemelson Center Studies in Invention and Innovation series) by Kurt W. Beyer (Hardcover, 2009) available at www.amazon.com.)

Rear Admiral Grace Murray Hopper (Dec. 9, 1906–Jan. 1, 1992) was an American computer scientist and an officer in the U.S. Navy. But that description sells her short. It does not suggest why she deserves your attention and your admiration.

Because of the breadth of her accomplishments and her naval rank, she was sometimes referred to with awe as "Amazing Grace." A U.S. Navy destroyer, the *USS Hopper* (DDG-70), was named for her. Her final resting place is Arlington National Cemetery—a location befitting her stature.

According to Wikipedia, Hopper was born Grace Brewster Murray in New York City and was the oldest of three children. She was curious as a child, a lifelong trait that served her and her country very well.



At the age of seven, as the story goes, young Grace decided to determine how an alarm clock worked. She dismantled seven alarm clocks before her mother realized what she was doing. She was then limited to one clock. Rejected for early admission to Vassar College at the age of 16 (her test scores in Latin were reportedly too low), she was admitted the following year. She graduated Phi Beta Kappa from Vassar in 1928 with a bachelor's degree in mathematics and physics. She earned her master's degree at Yale University in 1930. In 1934, she earned a Ph.D. in mathematics from Yale.

Hopper had already begun teaching mathematics at Vassar in 1931, and she was promoted to associate professor in 1941. In 1943, Hopper obtained a leave of absence from Vassar and was sworn into the U.S. Navy Reserve—one of many women who volunteered to serve in the WAVES. The diminutive enlistee had to get an exemption, because Grace was 15 pounds below the Navy's minimum weight requirement of 120 pounds. She reported for duty in December 1943, exemption in hand, and trained at the Naval Reserve's wartime Midshipmen's School at Smith College in Northampton, Mass.

Perhaps not surprisingly, Hopper graduated first in her class. She was assigned to the Bureau of Ships Computation Project at Harvard University as a lieutenant, junior grade. She served on the Mark I computer programming staff headed by another pioneering professor, Howard H. Aiken.

Hopper and Professor Aiken co-authored three papers on the Mark I (one of the first, very primitive computers), also known as the Automatic Sequence Controlled Calculator. Hopper's request to transfer to the regular Navy at the end of the war was declined because of her age (then a ripe old 38). However, she continued to serve in the Naval Reserve. Hopper remained at the Harvard Computation Lab as a civilian until 1949, turning down a full professorship at Vassar in favor of working as a research fellow under a U.S. Navy contract at Harvard.

In 1949, Hopper became an employee of the Eckert-Mauchly Computer Corporation as a senior mathematician and joined the team developing what to many was the country's first "real" computer, vacuum tubes and all: the UNIVAC I. Many of Hopper's former colleagues from that era later served on the committee that defined the new computer programming language, COBOL. It was she who had championed with them the belief that computer programs should be written in a language that was close to English, and, once again she turned out to be right. COBOL went on to be the most ubiquitous business language in the history of computers to date. Though lower on the scale of importance, Hopper is also credited with popularizing the term "debugging," which is used to describe fixing computer glitches. (Apparently, the term was coined when an actual moth was removed from the computer. According to Naval historians, the moth was found trapped between points at Relay #70, Panel F, of the Mark II Aiken Relay Calculator while it was being tested at Harvard University on Sept. 9, 1947. The operators affixed the moth to the computer log with the entry: "First actual case of bug being found." Hopper put out the word that they had "debugged" the machine, thus introducing the term "debugging"

a computer program. In 1988, the log, with the moth still taped to the entry, was ensconced in the Naval Surface Warfare Center Computer Museum in Dahlgren, Va.

Hopper retired from the Naval Reserves with the rank of commander at the end of 1966. However, she was recalled to active duty in August 1967 for a six-month period that turned into an indefinite assignment. She again retired in 1971 but was asked to return to active duty again in 1972. She was promoted to captain in 1973 by Admiral Elmo R. Zumwalt Jr.

After then Congressman Philip Crane (R-Ill.) saw her on a March 1983 segment of "60 Minutes," he championed H.J. Res. 341, a joint resolution that led to her promotion to commodore by special presidential appointment. (In 1985, the rank of commodore was renamed "rear admiral, lower half.") Rear Admiral Hopper retired (involuntarily) from the Navy—this time for good—on Aug. 14, 1986.

At a celebration held in Boston aboard the *USS Constitution* to mark her retirement, Hopper was awarded the Defense Distinguished Service Medal, the highest noncombat award given by the Department of Defense. At the time of her retirement, she was the oldest commissioned officer in the U.S. Navy (79 years, eight months, and five days), and was standing aboard the oldest commissioned ship in the U.S. Navy (188 years, nine months, and 23 days).

After her final retirement from the Navy, Rear Admiral Hopper was hired as a senior consultant to Digital Equipment Corporation. Her primary activity in this capacity was as a goodwill ambassador, lecturing widely on the early days of computers, her career, and efforts that computer vendors could take to make life easier for their users. She visited a large fraction of Digital's engineering facilities, where she generally received a standing ovation at the conclusion of her remarks. Although she was an interesting and competent speaker, the most memorable part of these talks was her illustration of a nanosecond. She salvaged obsolete Bell System telephone cable, cut it to 11.8-inch lengths (which is the distance that light travels in one nanosecond), and handed out the individual wires to her awed, but chuckling, listeners. Although no longer a serving officer, she always proudly wore her Navy full dress uniform to these lectures.

Rear Admiral Grace Murray Hopper (ret.), still working for Digital, died at the age of 85. She was laid to rest with full military honors in Arlington National Cemetery, Section 59, grave 973.

If you suspect that Rear Admiral Hopper was a dull public speaker, you owe it to yourself to check in with this true American treasure who, fittingly, lives on forever on the Internet. Look first at an interview she did on the David Letterman Show—in full dress uniform—shortly after her final retirement from the Navy in 1986. (www.youtube.com/watch?v=RZ0g5_NgRao) Then, take a look at her two-part interview with Morley Safer on "60 Minutes," on which she also appeared in uniform when she was a mere 76 years old. (www.youtube.com/watch?v=7sUT7gFQEsY&feature=related and www.youtube.com/watch?v=cBZWFvT2Xwc&feature=related) And then, visit a site that memorializes some of the Rear Admiral Hopper's favorite sayings. (www.youtube.com/watch?v=GZAYikJFxhk) For example, she said that, "[I]n most cases, the information is more valuable than the hardware which processes it." She also said that, "You cannot manage men into battle. You lead men. You manage things." For a few good photos of her, go to www.history.navy.mil/photos/pers-us/uspers-h/g-hoppr.htm.

We'd all do well to follow her words. They certainly worked for Amazing Grace.

Conclusion

There are many heroes in Cyberia, but not many measure up to Rear Admiral Grace Murray Hopper. If you live anywhere near Arlington Cemetery, as I know many readers of this column do, you might consider visiting her grave site on the occasion of the 20th anniversary of her death. **TFL**

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