

In his “Now Hear This” article (July 2008), Commander Carl Forkner makes some interesting points regarding the importance of retaining basic skills and equipment needed for traditional methods of navigation. The U.S. Naval Observatory (USNO) continues to provide strong support, at several levels, for celestial navigation. At the most basic level, the USNO, in collaboration with Her Majesty’s Nautical Almanac Office in the United Kingdom, produces annually *The Nautical Almanac*, the essential publication needed for practicing celestial navigation at sea. The USNO also produces *The Air Almanac*, the analogous annual publication containing the data needed for celestial navigation from aircraft. In response to declining practice, the latter publication recently became available only on CD-ROM, which reduces production costs while still allowing relevant pages to be printed prior to a specific mission.

In the mid-1990s, in response to a request from the Fleet Training Center Norfolk, USNO produced *STELLA* (*System To Estimate Latitude and Longitude Astronomically*), PC-based software that provides marine navigators with a standard, automated means of performing the computations required for celestial navigation. *STELLA* performs six major tasks for the navigator, including sight planning and sight reduction, thus permitting instructors to focus on teaching sextant skills rather than wasting precious classroom time correcting math blunders. *STELLA* is based on new mathematical approaches to celestial navigation, and as a result, carries out celestial navigation from a unique and computationally correct approach. *STELLA*’s computations are performed to one-arcsecond precision—about 30 meters on the surface of the Earth—far exceeding the accuracy attainable by hand-held sextants.

Intrigued by the possibilities offered by the *STELLA* computational methods, USNO, in collaboration with the Space and Naval Warfare System Center San Diego and industry partners, began development of fully automated celestial navigation systems for use on surface and air platforms. The availability of inexpensive electronic cameras operating in the visible and near-infrared portions of the spectrum, modern computer technology, large computer-based star catalogs, and advanced computational techniques (including *STELLA*) provides a technological path to reliable positioning, navigation, and orientation systems, operating day and night, for surface and air applications. Such systems hold promise as backups to GPS, should the radionavigation signal be denied or unavailable.

Finally, OPNAV Instruction 9420.1B of 29 June 2007, “Positioning, Navigation and Timing (PNT) Policy; Administration and Planning,” supports continued use of traditional methods of navigation. While affirming “...GPS is the primary positioning and navigation system for U.S. Naval operations...,” the instruction also states, “...proficiency in both primary and alternate means [of navigation] must be maintained. ...position determination by dead reckoning and celestial should not be precluded.” Furthermore, “Use of the ...*STELLA* software remains authorized... The U.S. Naval Observatory will publish the annual Nautical Almanac which if preferred, may be used.”

While *STELLA* greatly facilitates the practice of celestial navigation, it does not eliminate the need for training in basic concepts of celestial navigation and use of the sextant.

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