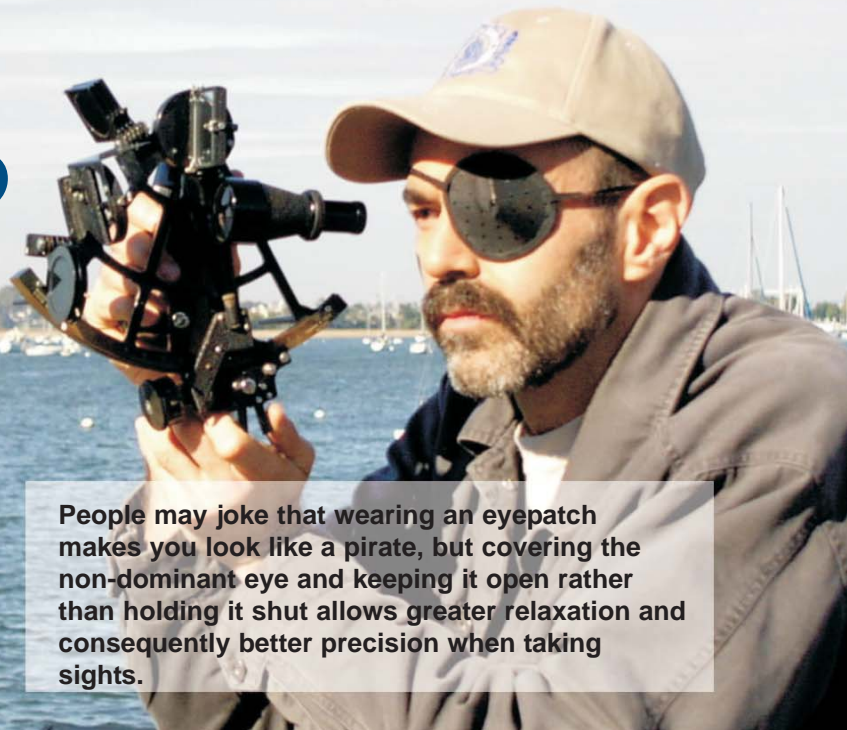


# What Good Is Celestial Navigation?



People may joke that wearing an eyepatch makes you look like a pirate, but covering the non-dominant eye and keeping it open rather than holding it shut allows greater relaxation and consequently better precision when taking sights.

By James M. Maloney

I did all of my seafaring before the days of GPS. That fact is significant not because it has been so long since I've sailed deep-sea (1988 really wasn't so long ago), but because it indicates that GPS is, after all, still pretty new. And THAT fact, coupled with (a) an increasing accumulation of "space junk" that may one day decommission one or more satellites on very short notice, (b) the apparently increasing technological sophistication of terrorists, and (c) Murphy's Law, at least ought to make the prudent navigator aware that a "backup" system is absolutely necessary.

That "backup," of course, is celestial navigation. The obstacle to having it available is that we tend to lose what we don't use. So, when an LCD readout of one's latitude and longitude is constantly at hand, it is often tempting to leave the sextant safely in its box and focus on more pressing matters like coffee and conversation. Over time, skills wane, theories are forgotten,

and the sextant box may not make it up to the bridge, or even to the ship.

On May 21, 1998, *The New York Times* reported that the U.S. Naval Academy had announced a decision to delete celestial navigation from its curriculum. A few days later, after publishing a fair number of letters to the editor criticizing that decision (mine among them), the *Times* essentially reported that it had all been a misunderstanding and that Annapolis was simply revising, but not deleting, its celestial navigation curriculum. Whether that was really a case of service-academy administrative backpedaling I will probably never know, but I do believe that there is a tendency in modern nautical education, as increasing regulatory requirements compete for credits and class time, to "dumb down" the study of celestial navigation. Rather than give the students a thorough understanding of the discipline, courses may rush through or totally omit the theoretical aspects and focus exclusively or primarily on the rote step-by-step elements of how to turn a sight into a line of position. And that, I

think, is a big mistake.

There are at least three reasons that I can offer to support my position. One is simply that, precisely because celestial navigation is the “back-up” and may fall into disuse under ordinary conditions, a solid foundation should be built. If one understands, for example, WHY dip varies with height of eye, or HOW the coordinates of the celestial sphere relate a celestial body’s location to earth-based frames of reference, it is much easier, years later, to reconstruct those parts of the rote step-by-step elements that one may have forgotten. Depth of understanding is a rust inhibitor. The second consideration relates to the fact that celestial navigation is nowadays in large part a “survival” skill. Accordingly, understanding something of the theoretical underpinnings will always allow greater flexibility in improvising solutions to unforeseen problems. Third, and perhaps most important, is that to gain a true appreciation of and zeal for celestial navigation one must delve into it fairly deeply. Merely learning how to turn numbers on a sextant into numbers on a plotting sheet will not light the flame.

Gaining a real understanding of the movements of the earth and other bodies in space, and an appreciation of how an observer on the surface can use that information to fix a position, certainly will. And the latter navigator is far more likely to maintain his or her skills than the former. As I mentioned earlier, my deep-sea sailing days ended in the late 1980s. But my celestial navigation days are still ongoing. I have used it on land, and I teach an adult education course in it. (I guess you could say that I fall into the “zealous” category.)

One of the land-based applications I have formulated, and which I used frequently through the 1990s (and hope to use frequently again when

my sons are old enough to go hiking and camping with me), is an innovation of mine that I call *celestial orienteering*. This has NOTHING to do with fixing one’s position, but it has EVERYTHING to do with finding direction. It is worth explaining here in some detail in the hope that others will try it.

Most deckies will remember that, in addition to lines of position, celestial navigation can be used to calculate the azimuth (direction) of a body such as the sun from a known position. In practical application at sea, this is used for checking compasses. Using the tables, one would employ the rather tedious “triple interpolation” method, but of course a navigational calculator is much faster. However, my celestial orienteering technique is designed for easy calculations using either table or calculator. This is

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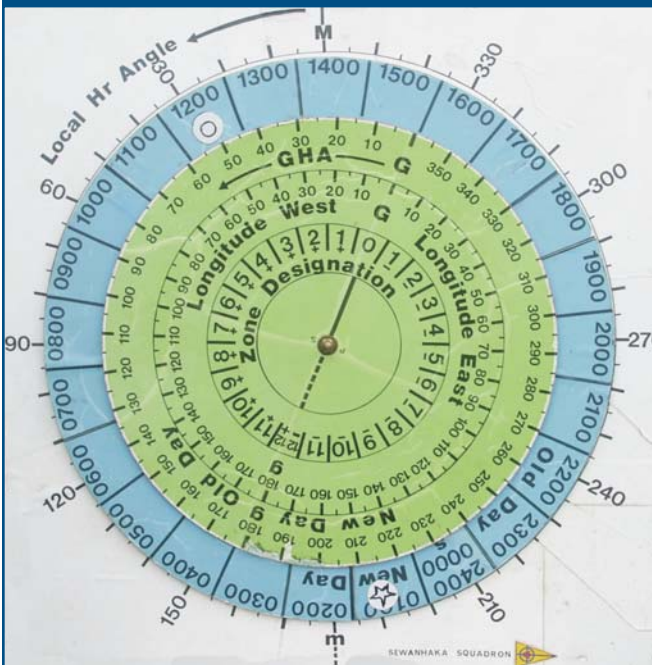
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how it works: let’s say you’re hiking or camping in a known area and will be there for one to three days. Before you go off into the woods, you go into the Nautical Almanac and obtain the declination of the sun for the midpoint of your stay. If working from the tables, you round it up or down to a

whole number. You also round the latitude to a whole number. Then you pick an assumed longitude in the area you’re hiking that will give you a whole-number LHA for a morning hour (say 8:00 a.m. local time) at the start of your hike or camping trip. You then go into the tables (or use a calculator, in which case you need not round off the declination, latitude and GHA) to obtain the true azimuth of the sun at the starting time. Using this information, you begin preparing what I call a “cheat sheet”: an index card or piece of paper that lists the azimuths of the sun hour by hour through the day (see page 25 for an example). After obtaining the first LHA (for a morning starting hour), you simply add 15 degrees to



ABOVE: Edward G. Bing and his son Roger (Class of 1961) display the Complete LHA Finder (closeup shown BELOW), which has moving wheels to display unlimited combinations of GHA, LHA, SHA, etc. Edward used it as a teaching tool during the 43 years that he taught Celestial Navigation at the Sewanhaka Power Squadron. Edward's grandson Roger E. Bing (not shown) is also a Maritime College graduate (Class of 2003).

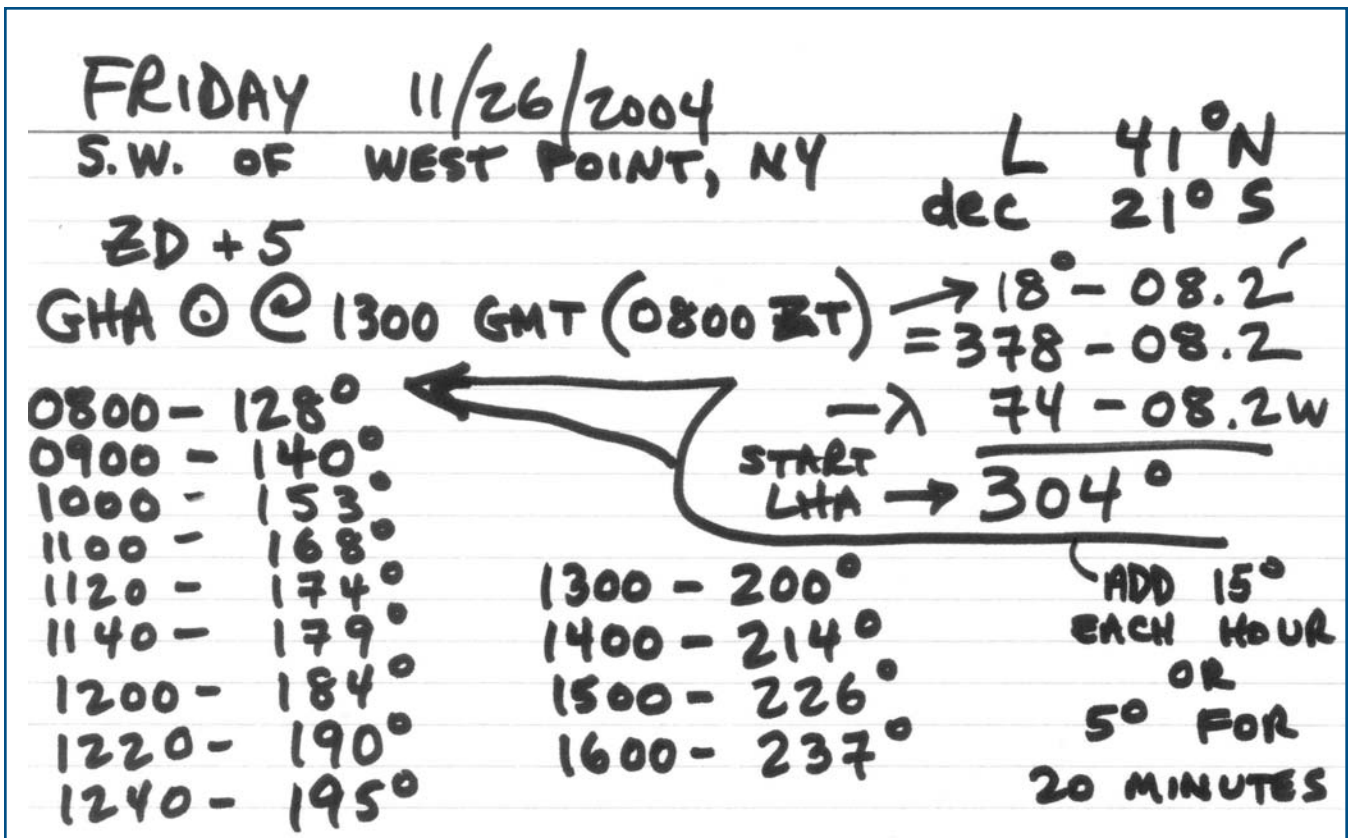


that starting LHA, keeping the latitude and declination the same, and use the new set of variables to look up the azimuth one hour later, repeating the process through the course of the day. Once you have finished preparing your “cheat sheet,” you will have a reasonably accurate listing of the true azimuths of the sun throughout the day as observed from the area you’ll be hiking. If you are planning to be there for three days or even five, using the middle day’s information from the Nautical Almanac will yield accurate enough

information for the entire period. A few degrees of error is tolerable for the use to which the azimuths will be put.

The “cheat sheet” then becomes the basis for your “compass in the sky.” At any given time, you can estimate the true direction of the sun within a few degrees, and thus use the sun as a source of direction with a precision and reliability far greater than the old Boy Scout “point-the-little-hand-on-your-watch” method. If, for example, the time is 1100 hours, and your “cheat sheet” notes that the sun is bearing 135 degrees true, and you want to walk due east, you simply keep the sun 45 degrees to the right of dead ahead (i.e., broad on your starboard bow). Naturally you will have to be able to estimate angles, and perform some “eyeball” interpolations between the hourly listings on your “cheat sheet,” but this is not very difficult in practice. One thing that does come in handy is making the “cheat sheet” listings more frequently, say every 20 minutes instead of hourly, just before and just after local apparent noon (LAN), since the azimuth of the sun changes relatively rapidly during this part of the day. For 20-minute intervals, one simply adds 5 degrees to the LHA rather than the 15 that would be associated with a full hour. (I am hopeful that at least a few of my readers will recall that one can tell when LAN occurs by, among other things, the fact that the sun’s azimuth is going to be due south or due north.)

I have used my celestial orienteering method while hiking off the trails in the woods with great success. It is far preferable to a magnetic compass because, for one thing, variation (the difference between magnetic north and true north, which landlubbers for some reason call “declination”) need not be considered. Also, taking an occasional peek at the “cheat sheet” and constantly being aware of the direction of the sun is a far easier (and safer) thing to do while walking in the woods than is trying to hold a magnetic compass steady and looking down at it. Of course, having a “backup” magnetic compass in your pocket or backpack is still “prudent navigation.” Once, in early spring in the Green Mountain National Forest in Vermont, I was hik-



A "cheat sheet" as described in the text, for use the day after Thanksgiving 2004 on the western side of the Hudson River south of West Point. It shows the true azimuths of the sun from 0800 through 1600, an hour apart except just before and after LAN (20-minute intervals).

ing and camping off the trails. I had my "cheat sheet," but no magnetic compass. On the second day, unexpectedly, it became overcast and a snowstorm rolled in, preventing me from seeing the sun to find my way out. So I had to stay in the woods an extra day. Fortunately, my failure to bring a magnetic compass was not accompanied by a failure to bring extra provisions.

Using celestial navigation techniques ashore is one of the things that has helped me to keep my skills from atrophying even more than a decade after I stopped going to sea. Another is that for the past few years I have been teaching an Introduction to Celestial Navigation course offered through my local school district's continuing education program. I have also recently launched a website, [www.cybersextant.com](http://www.cybersextant.com), that began as an on-line supplement to the course. But all this is possible only because "Hap" Parnham and Fred Hess, along with quite a few of my classmates back in the late 1970s when I was a cadet, instilled in me a deep appreciation of the many facets of the art and science of

celestial navigation. I can only hope that the advent of GPS will not encourage so much laxity as to make this most fascinating aspect of nautical education an anachronism.

For any readers in the New York area who may have been inspired by this article to rush out to New York Nautical to buy a copy of the Nautical Almanac, please note the following: New York Nautical Instrument & Service Corp., a venerable institution that for decades has served the maritime community, has recently closed the store that had been located at 140 West Broadway. Fortunately, they have opened a new, somewhat smaller store around the corner at 158 Duane Street. Their phone number is still (212) 962-4522. We at The MARINER are happy to inform you that they are still in business and intend to remain so.