# CELESTIAL NAVIGATION

"So easy when you know how," is a truism that applies especially to skiing, sailing, flying, and celestial navigation. Each requires learning a new physical skill, a new way of seeing, and a new vocabulary.

First comes the physical skill. You can read about all of these activities till the cows come home, but until you strap on skis, hoist sails, lift off on wings or raise a sextant to your eye, you will never get to "know how."

Unlike skiing, flying and sailing, though, acquiring skill with the sextant is the easy part. It's mainly hand-eye coordination, like shooting, not a total-body-immersion thing like the other three. It's fun to use a sextant. It's what students want to get at first, and most of mine are quickly peer to me, the (aging) professor.

When you actually do celestial navigation at sea, however, you spend a very small amount of time on deck taking sextant sights. When you sail, ski or fly, on the other hand, you spend all of your time on a boat, in a plane, or on skis. Ditto when you are learning them.

In contrast, the nice thing about celestial is you can learn everything ashore, including taking sights. Then the only things you must adapt to one great day is working from the deck of a boat and on a chart table that's likely a lot smaller than your office desk or kitchen table.

It's commonly believed that the hard part of celestial navigation is its theory.
Not so. The principle was worked out way before telescopes, sextants or logarithms by a Greek philosopher in 200 BC. He used his theory to figure out the circumference of the earth, and he came quite close to today's accepted figure.

He was Eratosthenes and you can show his method on a blackboard in a minute with a circle and three straight lines - two parallel and one from the circle's center. (As the old joke goes, you just have to know where to draw the lines.) My version of Eratosthenes' great discovery is on pages 116-120 of *Celestial Navigation in a Nutshell.*

The difficult part of celestial is not sextant or theory, it's the books you need to use - books whose pages are nothing but columns of numbers. They are the Nautical Almanac and one of three others called generically Sight Reduction Tables; specifically (and opaquely) HO 249, HO 229, and NASR.

Then there is the new vocabulary. Celestial navigation is an offshoot of astronomy. Beginning in the 15th century astronomers made the almanacs, and their terms stuck. So, in the Nautical Almanac, latitude is **declination**; longitude is **hour-angle**; terrestrial Greenwich is where hour-angles begin for the sun, moon and planets; but the stars start in the sky from an hour-angle called **Aries**.

Worse, the common English word, 'apparent' which often connotes "maybe yes, maybe no," in celestial-speak denotes a specific angle or time to the hundredth decimal. Similarly, 'local' which in normal parlance means "in this general area," is celestial talk for hour-angle to as many decimals as you care to measure.

So, the difficult skills in celestial navigation are learning to read books which contain nothing but column after column of numbers and picking up a new language - i.e., becoming what an old shipmate of mine calls a "Jargonaut."

When it comes to dealing with the tables, it's just a matter of learning where to pick from the welter of numbers the one or two you need. There is a system to the way the columns are organized. You learn the system. Then you practice using it.

Explaining the system and guiding the practice is the way I and all celestial navigation instructors ease sailors into the "know how" of this quaint old art.

Welcome to our antique world.

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