



**Celestial Navigation for
the Complete Idiot:
A Simple Explanation**
By Gene Grossman

Magic Lamp



Press™

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From the Editor

CLAVIN NOTES:

Quite often you will note a parenthetical section of this book called a *Clavin Note*. These notes have been named after the fictional character Cliff Clavin, featured for many years on the popular television series about the goings-on at a bar in Boston, named *Cheers*.

Cliff Clavin was a regular at *Cheers*, and was best known for his habit of bringing up trivial, irritating factual matter that the other bar patrons didn't care about – but that Cliff always thought was relevant to whatever subject was being discussed at the time.

The editors at Magic Lamp Press have long viewed the author of this book as the Cliff Clavin of non-fiction, so they have decided to separate out some of the facts contained herein as *Clavin Notes*, and labeled them as so, for a caution to the unsuspecting readers.

INTRODUCTION

Some time ago I signed on as crew with a friend of mine named Ron Curry, who was delivering a *Force 50* Taiwan ketch from California to a charter company on one of those tropical islands down past Florida. The trip would require going through the Panama Canal, and because I had a month or so to kill between trials (I was still an active lawyer in those days), I decided to go along for the ride.

On that first evening when we pulled out of Marina del Rey, a brief conversation between Rona and I took place, during which I asked him a simple question. “Ron, who's the navigator on this trip.”

His answer didn't surprise me at first. “I am, Gene.” But, when I thought about it for a second or two and took into consideration that the boat's only electronics were a VHF radio, with nothing in the navigation department, I had to ask.

“Oh, really? When did you learn celestial navigation?”

He quite calmly answered: “I didn't.”

At this point I thought it might be nice to point something out to him about the trip we'd just embarked on. "You know, from here down to Cabo San Lucas, all you have to do is keep land on your left and you'll be okay... and then it's a couple of hundred miles across the Sea of Cortez to the Mexican mainland where we'll probably pull into Mazatlan or Puerto Vallarta - but sooner or later we'll be going through the ditch [nickname for the Panama Canal]. We'll be out of sight of land for quite a while, and without celestial or any navigational electronics on board, we may have a slight problem.

When he answered, I found out the method to his uninformed madness: "Not to worry, Gene, by the time we get to Cabo, I'll know all the celestial navigation I'll ever need."

"How are you going to do that Ron?"

"You're going to teach me."

I'm a pretty hard person to surprise, but I have to admit that he caught me with that remark, and felt that a confession was in order: "Ron, I don't know how to tell you this, but... I don't know anything about celestial navigation. I'm a lawyer and I have a sailboat, but my idea of using a sextant is to peer through the lens to look at the read-out on my GPS unit." [Actually, I said "Sat-Nav", because that was before GPS became available, but I want this book to sound a little more up-to-date]

His answer was a pleasant surprise, in that he obviously had more respect for my brain power than I realized... in fact he had more confidence in it than I did.

"That's okay Gene, I've got several books on it on board, and I know you went to college, so you can learn it and teach me. We'll be stopping at Catalina Island for a few days, and then in San Diego for about a week, and we'll probably be hanging out down in Cabo [Cabo San Lucas, at the bottom tip of Baja] for at least a week or two, so you'll have about a month to learn all about it and give me some lessons before we make our first crossing on our way to Puerto Vallarta. And if it'll be any help, you're excused from watch duty. There are seven of us on board, so all you'll have to do is study for the next couple of weeks."

Well, I don't think I have to tell you that I immediately turned into a student, but that wasn't too bad, because it was a nice situation: a delightful downhill cruise on a 50-foot sailing yacht, with nothing to do but read about a popular and interesting boating subject.

I really enjoyed getting into the subject, but was disappointed in the instructions in Ron's books - so much so, that after making our layover stops at Catalina, San Diego, and Ensenada, I bought every book on the subject I could find, and by the time we anchored in the outer bay at Cabo San Luca, I was having fun giving celestial navigation lectures on the beach to other boaters.

Ron also picked up the subject quite nicely - which was a good thing, because when checking in with my office, I learned that I'd have to jump ship and return to L.A. for a re-scheduled jury trial. After two days in Puerto Vallarta, I flew back to California, feeling secure that Ron would be able to bring the boat to its destination - and he ultimately did.

Coincidentally, a few years later, a motion picture named *Captain Ron* was released starring Kurt Russell and Martin Short, about a family hiring a guy named Ron (Russell) to help them sail their boat - one identical to the one captained by Ron Curry on our trip south.

In addition to practicing law back then, I also owned a small equipment rental company that serviced low-budget film productions, so in response to many of my boating friends, and my own personal difficulties in trying to learn this subject strictly from the books that were available, I wrote, produced, and 'starred' in my first video production: *Celestial Navigation: Sextant Use and the Sun Noon Shot*. At that time, it was the first professionally produced nautical video on that subject in the country, and after being advertised in all of the national boating magazines [there was no Internet for folks like us back in those days before 1990], it became quite popular and started a series of more than 50 nautical titles that we produced over the following years.

At the time, I was living aboard my Columbia 50 sloop in Marina del Rey California, and wanted to show off my new video to several dock neighbors. These guys in the 60 foot slips were not just your average boat bums: keeping a big boat looking nice, in a big slip, in a classy marina, is not an inexpensive

thing to do, so our dock was occupied by persons of a higher than average socio-economic level... doctors, cops, robbers, celebs, etc., etc... most of which had also had a higher-than-average or advanced college education.

[**Clavin Note:** Johnny Carson's huge yacht *Serengeti* was parked across from ours]

To my surprise, when showing the video box (that was before DVDs) to one of my neighbors, a well respected heart surgeon, his response was much like the ones from other neighbors: he shrunk back like a vampire being scared by someone waving a cross, blurting out, "Oh no, that's not for me... I'm an idiot when it comes to stuff like celestial navigation!"

I think it was the title that scared him off, because it must have given him the impression it was some thorough and difficult treatise requiring superior mathematical skills – which it wasn't. To shoot the Sun at Noon, all you really have to be able to do is subtract any number from 90, and do some other minor arithmetical tasks of addition and subtraction.

I took his negative response into consideration for a while, and several years later decided to make the explanation even simpler, making a new title named *Celestial Navigation for the Complete Idiot*. It was a self-effacing type of title that had a little humor in it, and became even more popular than the first video – which people usually wound up buying, after watching the one for 'Idiots.'

Plug: all the nautical DVD titles mentioned in this booklet are available from Magic Lamp. See full details on each one at www.BoatingDVDs.com

1 THE BASICS

Before getting into navigation, you should know the three most important rules of safe boating. Once you've got these rules down pat, you're on the way to many enjoyable boating experiences:

Rule #1: Keep the People IN the boat

Rule #2: Keep the Water OUT of the boat

Rule #3: Try not to get lost or bump into anything.

Now that we've got safety taken care of, we can get started with navigation, and to do that we should briefly review Coastal Piloting, because as you're going to find out, it's very similar to celestial navigation.

Coastal piloting is navigating within sight of land by taking sights of known landmarks. The most valuable device in this practice is called a Reciprocal Bearing, and all that means is the *opposite direction*. So, if you use your compass and see that an object on land is bearing 50 degrees from your boat, it means that someone standing on that object on land and looking at your boat will notice that you are bearing 130 degrees from the land object.

If you haven't already noticed, to determine the Reciprocal Bearing, all you have to do is either add or subtract 180 degrees thusly: if your bearing to the land object is *less* than 180 degrees, then ADD 180 to it to determine the reciprocal bearing. On the other hand, if your bearing to a land object is *more* than 180 degrees, then SUBTRACT 180 degrees from it to get the reciprocal bearing from the land object back to your ship. That's all there is to it. If you're working with a nautical chart, you'll notice that there exists on every official chart a 'compass' rose – a circle with all the degrees on it, and a mention of local compass variation.

If you're not in the mood for the type of high-level arithmetic required to calculate reciprocal bearing, you can use the compass rose. Simply find the bearing from your vessel to the land object on the compass rose and place a straight edge on the compass rose that goes from your bearing to the land object and

through the center of the compass rose. Wherever the straight edge comes out on the other side of the compass rose (180 degrees away), that's your reciprocal bearing.

Now that you know how to determine a reciprocal bearing, you can easily triangulate your position by taking bearings of more than one land object. Here's how it works:

First, take some bearings of at least two recognizable objects on land, preferably some items that appear on your nautical chart.

Second, using the method described above, determine the reciprocal bearings from those two land objects back to your boat.

Third, using a nautical chart of the area, find the two land objects and plot the reciprocal bearings, drawing lines of position from those objects out into the water towards your vessel.

Wherever those lines cross, you will have fixed your probable position out in the water, but keep in mind that you should also take into consideration your boat's deviation factor (effect of metal on board to the boat's compass) and local variation (difference between true north and compass north, depending on your proximity to the magnetic north pole).

It would be nice if we only have to use one known land object, but in order to do that successfully, we'd have to know not only the bearing to that object, but also its distance... and that's a lot like what celestial navigation can do for you, as you'll see in the next section of this book.

Triangulation is probably the simplest means of determining position, and is much easier and quicker than doubling the angle on the bow, bow and beam bearings, dead reckoning, using fathom curves, or any of the other methods all fully described in our 2-hour DVD #301 *Coastal Piloting*, used for instruction by everyone from Power Squadrons to the U.S. Coast Guard and Navy. It is available at

<http://www.BoatingDVDs.com>

There is a tag-line used by a popular credit-card company: "Don't leave home without it..." and the same can be said about coastal piloting tools like Parallel rulers, Dividers, Pencils, at least a hand-held Compass in addition to the ship's compass, Binoculars, and an accurate quartz watch with a stopwatch function.

I'm happy to report that our Coastal Piloting program is one of the most popular nautical DVDs sold. Boat owners and skippers all over the world have told us that they will routinely give a copy of this program to guests, in advance of the boating day. In this way, the guests all at least *feel* like they're part of the operation of the boat, instead of just sitting around and feeling like helpless bumps on a log... even though when you get right down to it, that's really all that they are.

Before leaving our summary of basic Coastal Piloting techniques, we feel that you should have some familiarity with terms used above: Variation and Deviation.

There are at least two 'Norths' you should be aware of: True North (the earth's North Pole location), and Magnetic North, which is **not** at the North Pole. The absolute geographic northern spot on this planet; is about 1,500 miles away. As far as the compass is concerned, the Magnetic north of this planet is at Prince of Wales Island in the Northwest Territories of Canada.

This means that to be accurate, any coastal piloting you do must take variation into consideration – and it will vary depending on where you are with respect to the magnetic north pole.

The difference between these two 'norths' has been proposed as one of the reasons there were losses of ships and planes in the Bermuda Triangle, because there is a narrow lane there from which True North and Magnetic North are exactly the same bearing – with no compass correction necessary.

If you are in a narrow lane like that and do not know it, you might make a variation correction anyway, and can throw you far enough off course so that you run out of fuel (in a plane) while still over water.

Deviation is a completely different type of correction that you should be aware of. It has nothing to do with where you are located, but only which direction you are pointing in. Deviation is a compass error caused by magnetic interference from metallic objects on your boat – like the engine, electronic devices, etc.

Before embarking on any cruise, you should 'swing your boat,' This means going into some protected harbor where there is a Range – usually a pair of markers that indicate True North. With that range in

sight, you should rotate the position of your boat, so that you can see what effect deviation has on your compass reading while on a bow, beam and stern bearing. Deviation will change slightly when you place the boat and its interference objects at differing angles with respect to true north. Experienced skippers will usually make a Deviation Chart that shows the deviation on each course heading, so that more accurate charting can be done.

