



Passagemaking

Since most of our readers are not experienced boaters, it strikes us that we should explain how we get from point A to point B, those two points being hundreds of miles apart, often separated by the open ocean.

Not so many decades ago a boat with only a magnetic compass, depth sounder and maybe also a speed log was the norm. RADAR and satellite positioning equipment was exotica; electronic plotters were not yet invented. Positions were fixed at the start of a journey and advanced on the chart by "dead reckoning", knowing the approximate vessel speed and direction, until something known was encountered, like an island. Then a fix was taken and the DR position was updated. Any error gave a clue as to the effects of winds and currents. On the high seas, positions were fixed by taking sights on stars, using a sextant. Louise-Ann and I have studied and used this sort of navigation, and have taught it to others. In a pinch, such as when all the electronics fail due to a lightning strike, this is what we would have to revert to. However, navigating the ship is normally quite easy, thanks to modern electronics.

At the other extreme is Personal Computer based navigation, where the charts are all stored in the PC, all the other instrumentation is routed to the PC, and the computer does everything, using a highly specialized suite of navigation software. Louise-Ann and I don't do that, if for no other reason than we simply don't trust Bill Gates' products enough to let him have a hand in steering AKAMA! We do have the computer and the electronic charts of the world, but we use it this system only for planning and reference. We don't even have it hooked to the autopilot, lest we be tempted to become lazy.

Our approach is in-between the two extremes. First, we research our destination and the route. There are notes from other cruisers, some available by subscription and some which are routinely exchanged among yachters, there are cruising guides that one can buy, and most importantly there are the charts (maps) of the area. Charts are hellishly expensive these days, a consequence of government agencies becoming profit centres. Those useful for navigation within a few hundred miles of land only cover a relatively small area; so you need many of them. Other sorts of charts, those intended to be used close to land and in harbours, cover still smaller areas.

We establish an intended course on the chart(s), setting "waypoints" at any place where we will stop, change course or where there is a notable feature, such as an island or atoll. The course is plotted on the paper chart(s) and the waypoints are numbered.

The locations (latitude and longitude) of the numbered waypoints are entered into the memory bank of our GPS. A GPS is first and foremost a black box that knows within about 10 yards accuracy where AKAMA is on the face of the earth, using satellites. Yes, we have a sextant and a computer program that gives star/planet locations for backup, but frankly, these are unlikely to ever be used, as we also have a backup GPS (much more convenient). The GPS is also a little computer; once the waypoints are entered, it can tell us how far the next waypoint is and in what direction. When we are under way, the GPS computes our ground speed and calculates our ETA at the next waypoint. When we are near the

waypoint, the GPS sounds a chime. We stop what we were doing and alter the ship's course to coincide with the track to the next waypoint. One can have the GPS make this course change automatically; there are some things best done manually and in our opinion this is one of them.

The GPS also keeps track of where we actually are, compared to where we intended to be (that intended course line we plotted), and it generates a "cross track error" signal (i.e., how far off the track we are and whether it's to port or starboard). The cross track error signal is fed to the autopilot, another black box. The autopilot is hooked by electronics and hydraulics to the rudder. Except when we are docking or undocking, we don't normally steer the bo...the autopilot does that. It looks at the cross track error signal from the GPS and steers the boat to eliminate the error (i.e., put us on course and keep us there). It can also steer the boat in any particular direction independent of the GPS, by steering according to the electronic compass. In this mode, it does not account for AKAMA being moved off course by currents or winds; all it cares about is that the ship's head is pointed in a given direction. Sometimes we run AKAMA that way just for something to do and to keep our skills well honed, making the set, drift and cross track correction calculations and correcting the course manually.

Normally, however, the boat drives itself to the next waypoint, while we sit in the pilothouse, relaxing, eating, reading, looking around and chatting. At sea, except for brief periods, both of us are normally in the pilothouse; one of us is always there "on watch". About once an hour, we plot our actual location on the paper chart. This is done manually, but with electronic assistance. Here's how. The paper chart sits on a special chart table, called a Yeoman, which has a sort of computer mouse on it. It is similar to a graphics plotting pad on a PC. Three reference points on the chart are entered into the Yeoman; thereafter, it knows the exact latitude and longitude of the location of its mouse. The Yeoman is hooked to the GPS, so it also knows AKAMA's exact location on the earth. There are four little lights on the mouse (N, S, E & W), which light up to tell us where to move the mouse so that it will be over the exact spot on the chart that corresponds to our position on the earth. Of course, we know roughly where we are supposed to be, so this process is about ten times harder to explain than to actually accomplish. We move the mouse about and when the four lights go out, that is where we are; we make a mark and jot in the time. Sometimes, though, we take the position from the GPS and using dividers locate the position on the chart, just to keep in practice. Once we have our position fixed, we look at the chart to see the depth of the water at that spot, and compare it to our depth sounder reading.

Also about once an hour we log the readings on the gauges for the engine and other systems on the boat. And, we open the day hatch to the engine room and the hatch to the mechanical room from time to time and have a quick look at things.

Meanwhile, back in the pilothouse, if we see a notable object, such as an island, we take bearings on it with our hand bearing compass and usually also with the RADAR. These bearings are plotted on the chart to confirm our location. This is most important (and often ignored by yachters), as charts are far from perfect. First, some of the information on charts dates back centuries (yes, really), and they are drawn to different "datum" (geophysical reference standards). The GPS works by default to a datum known as WGS-84, and if the chart is not accurate or if it is drawn to a different datum, then things can be way off, sometimes by miles, even if we switch to the correct datum I the GPS. Taking the occasional bearings and fixes "the old fashioned way" helps to flush out these problems before they become serious.

That's about it! For the most part, unless there is a storm, some fishing nets in the way, or something unforeseen happens, it can be a bit boring, miles of ocean punctuated by the occasional island, fishing boat or passing freighter.

Oh yes, freighters, they can be a problem. Our cruising speed is about 7 knots. Most old freighters do twice that and the newer ones much more than that. They can creep up quickly behind us or approach from either side at any angle. Once in the open ocean, there are no "roads". You would think that professional mariners would be the "nautical Knights of the road", true professionals. While many are, fact is, it is not at all uncommon for these freighters to steam straight towards a yacht, oblivious to its presence. They have even been known to run yachts down. These ships have the same sort of apparatus controlling them that AKAMA has, just described above. If the helmsman falls asleep, or leaves the bridge for a pee then spends some time chatting with his mates below decks, the ship can travel for miles with no regard to what it might plough into. When I started driving, my mother told me, "Be careful; drive as if all those around you are nuts." Good advice at sea.