

Navigating safely is about knowing where you are, where you are going and the best way of getting there.

But before you set out, remember your duty of care to the crew is paramount so monitoring the weather, checking for hazards and planning for emergencies should be all part of your job as the skipper. Having items such as a hand-held GPS and VHF in the emergency 'grab bag' are essential for when that lightning strike takes out the electrics or you have to abandon ship, such as happened in the Flinders Islet incident last year. Of course much of this knowledge comes from the classroom, so it's worth going through the navigation basics, such as chart work, before heading out on the briny.



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## GET YOUR BEARINGS

LEARNING TO NAVIGATE SAFELY OPENS UP A WORLD OF POSSIBILITIES FOR SAILORS. IN THIS ARTICLE, KEVIN GREEN AND PACIFIC SAILING SCHOOL HELP NOVICE SKIPPERS FIND THEIR WAY IN BASIC NAVIGATION.

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### TOOLS OF THE TRADE

The best tools for chart work are: a plastic plotter with multiple scales and compass rose, pencil and eraser. The basics of plotting a course from A to B involve drawing bearing lines or transits and measuring distance in nautical miles.

Good seamanship dictates that you factor in any other conditions affecting your course, such as tide, wind and terrain. Tidal movement can push the vessel in any direction, while the wind acting on the sails can push the boat sideways, causing leeway. So plotting an accurate course involves making allowances for these factors by adding a few degrees of leeway in order to give a heading.

But it gets more complicated still – now you must take into account a factor called “variation”, the movement of the earth’s magnetic field. This is done by marking it on your plastic plotter’s compass rose (or typing it into your chart plotter). Once done it’s easily calculated.





### ON TOP OF THE CHARTS

Plotting a fix is the process of marking your coordinates with respect to longitude and latitude on your chart. By doing this, you'll not only know where you are but you'll be creating a valuable legal document as you go, should any problem occur.

Unfold a paper chart and you'll see a kaleidoscope of colours, each denoting a different feature of the aquatic landscape: white means deep, pale blue represents navigable inshore waters, green are drying areas with land represented as yellow. You'll also see symbols, such as tidal diamonds, which allow the novice navigator to gain a three dimensional picture of where he is travelling. Depth is always shown as the minimum on all charts, so it's greatly affected by tidal height. Chart symbols are an endless area of wonder for the sailor but the essential features are navigation marks and lights. Green to green and red to red when approaching from seaward is the rule of thumb for channel markers. As for buoys and other markers, a good tip to remember is that anything with black on it generally means trouble – black and yellow cardinal marks warn of dangers using the compass quadrant, and black vertical lines warn of isolated dangers.

Just like driving in your car, there are road rules when at sea and they are essential knowledge for any skipper. One of the most basic principles is that powered vessels generally give way to sailing vessels, however there are exceptions – such as on Sydney Harbour, the ferries always have right of way. Remember that the moment you drop sails and switch on the motor, you become a powered vessel and have a different set of rules to follow, such as turning to starboard when meeting another similar vessel. And signal flags are still important and require learning – for instance the 'A' flag, warning of divers below the surface, is a common sight in Australian waters.

### SAFE PASSAGE

The beauty of mastering chart work is that it liberates the novice navigator to confidently venture beyond familiar waters. That next bay up the coast, which has always beckoned you, becomes within reach.

Safely making your first trip further afield involves planning the voyage and also brings the art of pilotage into play. An enjoyable evening can be spent at home poring over the charts

and referring to the pilot book – for Australian east coast sailors, Alan Lucas's *Cruising the New South Wales Coast* is recommended reading. Possible anchorages can be studied and waypoints prepared for input into the charter plotter. But for the novice navigator any preoccupation with electronics should be tempered with a good general knowledge of the route, with features such as shipping lanes, obstructions, navigation marks and ports of refuge all noted. Tidal heights for bar crossings are a common East Coast necessity – greatly helped now by the use of internet bar cams so that a navigator can see what conditions are like ahead of time (if he has internet access at sea). Alternatively using a VHF radio to call up the nearest Coastal Patrol base is a common option, as you should already have logged your departure with them anyway.

**WEATHER WATCHING**

Weather is a major variable in the navigator's equation so an understanding of basic meteorology is necessary. Identifying a cloud formation up ahead as either



harmless or a harbinger of doom can easily make or break your day. Similarly, using the daylight sea breeze to lift you along the coast, as opposed to pushing you out to sea when the evening land breeze comes into play, can make for a more enjoyable voyage.

Wind blows from high to low pressure (like a leaking tyre) and the steeper the pressure gradient

(as shown by tighter bands on the synoptic chart), the stronger the wind.

Fog can be a real hazard for the navigator. It's caused by condensed air – warm air cooling over cold water which picks up moisture as it passes over. Modern compact radar sets and VHF ship identifying technology known as AIS can help the fully-equipped navigator. Good seamanship, though, dictates

**TOP 10 TIPS**

1. Use any known buoyage or features to give a quick position fix
2. Use a transit bearing as a quick guide to give you a rough position
3. Black in buoyage means danger whereas white means safe water
4. Known depths are a useful navigation aid in restricted waters and contour lines can be followed
5. GPS has limited use in close quarters pilotage where speed and visuals are essential

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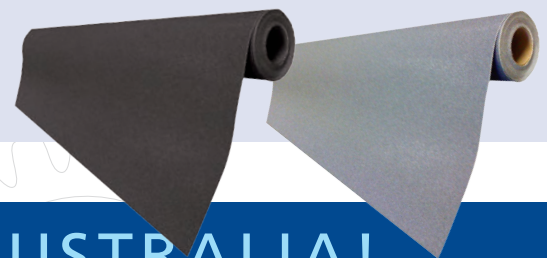
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**6.** Chart precision may be less than GPS accuracy causing an inaccuracy

**7.** Beware of slavish GPS use that can create a virtual world rather than a real situation

**8.** Lay off bearings in Magnetic for quick pilotage planning using the compass

**9.** Slow the boat down when doing tricky pilotage and navigation

**10.** The navigator sticks to his/her job rather than steers as well

avoiding proceeding in fog where possible, while also taking action. Take a position fix, move out of any shipping channels, anchor safely or proceed with extreme caution slowly. Another inshore fog technique is using your echo-sounder to follow depth contours on the chart – this is an exercise often asked for during Yachtmaster practical examinations.

#### PLOT DEVICES

Electronic aids to navigation have many advantages once the novice navigator understands the underlying theory that informs these devices. Electronic charts that run on plotters and computers come from two sources – raster charts are like photocopies of the original paper ones, whereas the more comprehensive vector charts have layers of information that can be switched on as needed. For example, the latest versions from leading industry supplier Navionics are great for pilotage as they give pictorial views of harbours and even come with bathyscope details showing the underwater approaches as well. These, combined with position fixes

from the GPS which input to the chart, give the navigator a virtual picture of his progress. The final input is periodic downloading of weather GRIB files which, along with tidal vectors, give a complete picture. A common navigation technique is to use a GPS position fix in conjunction with the paper chart, however you should ensure that the paper chart datum has been adjusted for GPS use (satellite derived positions using the WGS84 standard). Of course, commonsense should always be applied at times, so for instance, check the position fix on the chart with any nearby coastal features. Make sure they match.

Passage planning with waypoints programmed into your GPS can greatly help voyage planning. It can allow the navigator to establish course, distance and any tidal/wind affects during each leg of the voyage. Done properly, this automated navigation can be a real boon to the short-handed sailor as it can free him from being fixated by navigation while he has a boat to run and a crew to manage safely. ⚓

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## Compass Control

- + Direction is measured from North (000) in three figure notation
- + True North is a fixed direction at the top of the world and top of your chart
- + Magnetic North varies over time giving rise to Variation
- + Deviation is local magnetic anomalies affecting your compass
- + Compass Course to steer is found by taking into account true north (from chart), variation (from chart) and deviation (from a table of figures)

**SAFE PASSAGE**  
 Opposite page: World champion yachtswoman Adrienne Cahalan practised flawless navigation skills for her round-the-world speed record of 58 days, 9 hrs.

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