

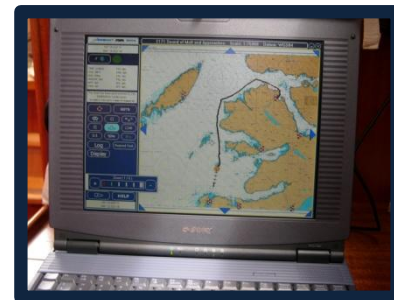


GPS & Chart-plotters

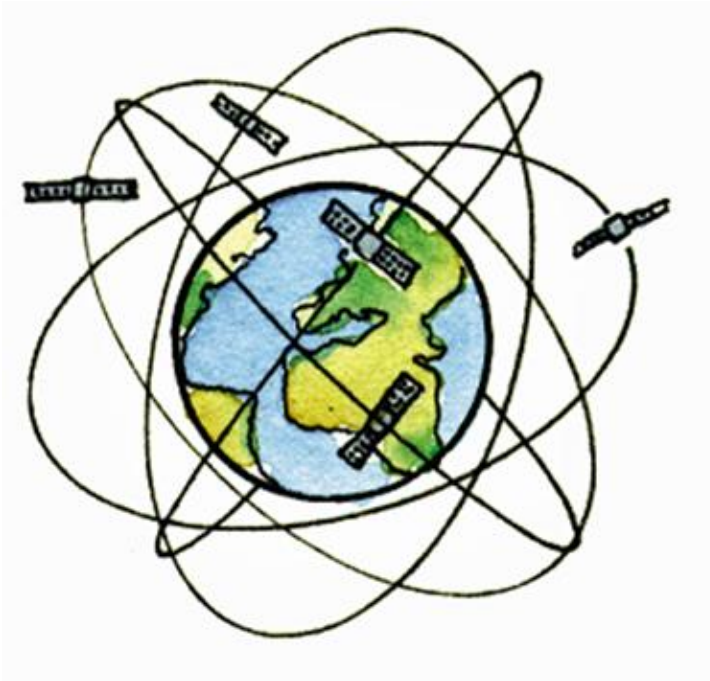
Introduction

This presentation outlines GPS receivers and chart-plotters. Modern navigation aids have mushroomed in recent years and navigation software today can be used on a wide range of electronic devices, including smart-phones & tablets

Remember though, it is good practice to carry paper charts and to record passages down in logbooks. Electronic navigation does not replace traditional navigation, it just enhances it.

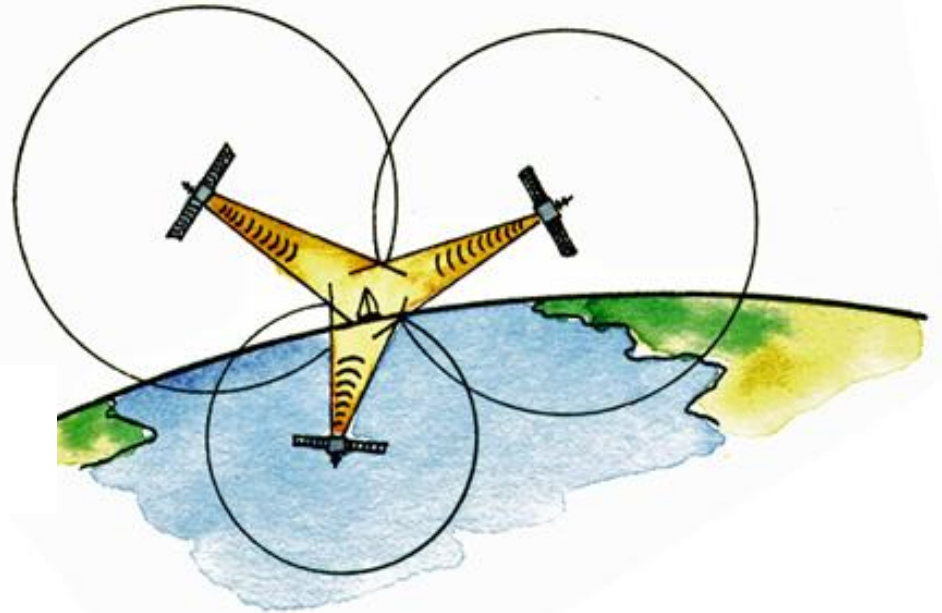


GPS – Position Fixing



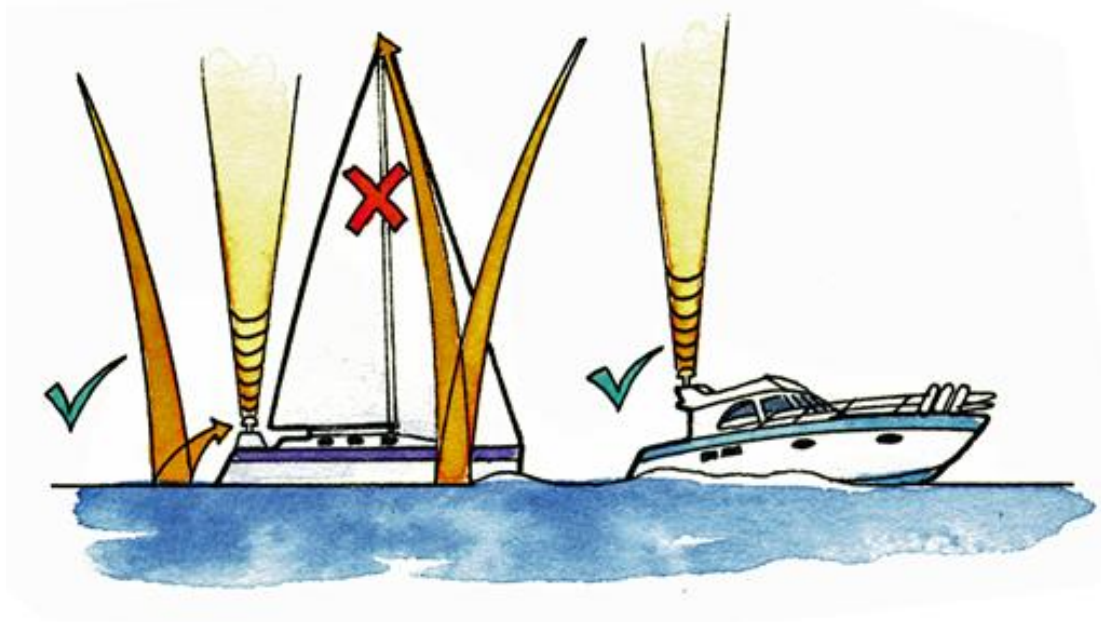
A GPS receiver obtains a fix from signals transmitted by orbiting satellites

Requires three satellites for a fix



GPS – Position Fixing

Site the aerial low down to avoid signal bounce...



...ensure the aerial has a clear view of the sky and is not shielded in any way

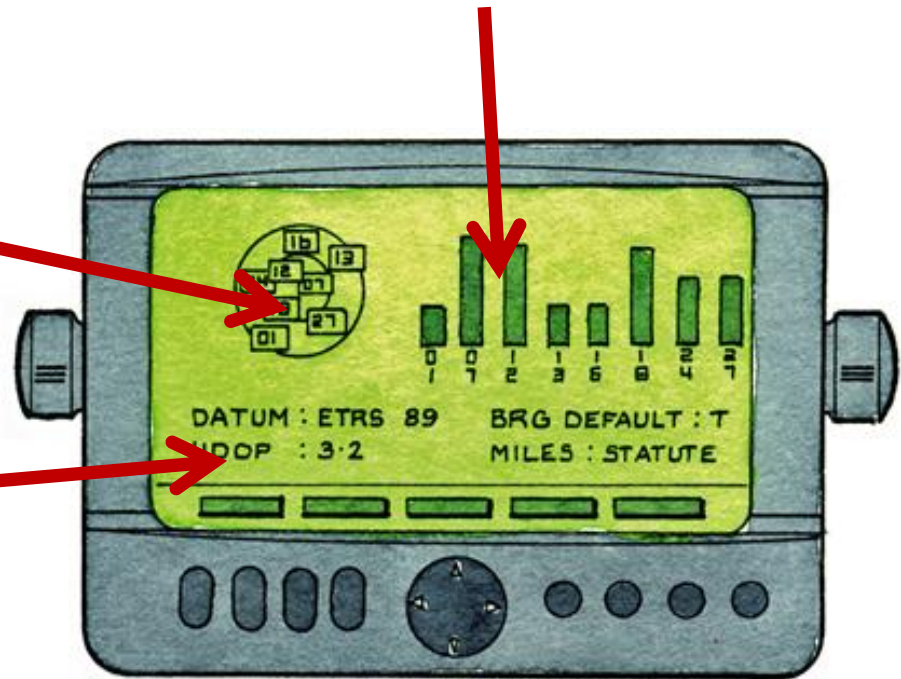
GPS – Set up & Display

Some typical display features

Signal status, shows which satellites are in view

Signal strength, indicates which satellites have the strongest signal

Horizontal Dilution of Precision, showing error and accuracy



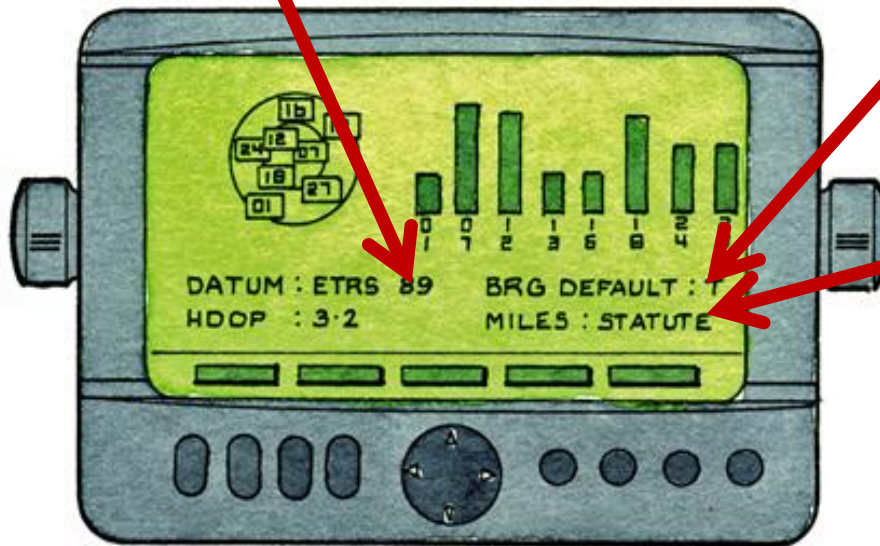
GPS – Set up & Display

Some typical display features

Geodetic datum, make sure it matches the datum of your current chart

Bearing in °(T) or °(M), user changeable

Distance, ensure that this is set for nautical miles



GPS Other Functions

Common terms found on a GPS display

present position shown in latitude and longitude

course over the ground

speed over the ground

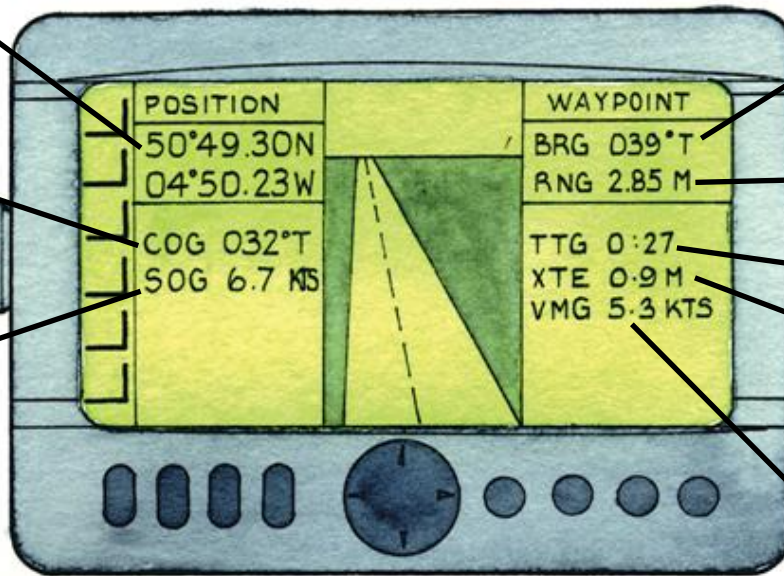
bearing to WPT from present position

range to WPT from present position

time to go to WPT

cross track error

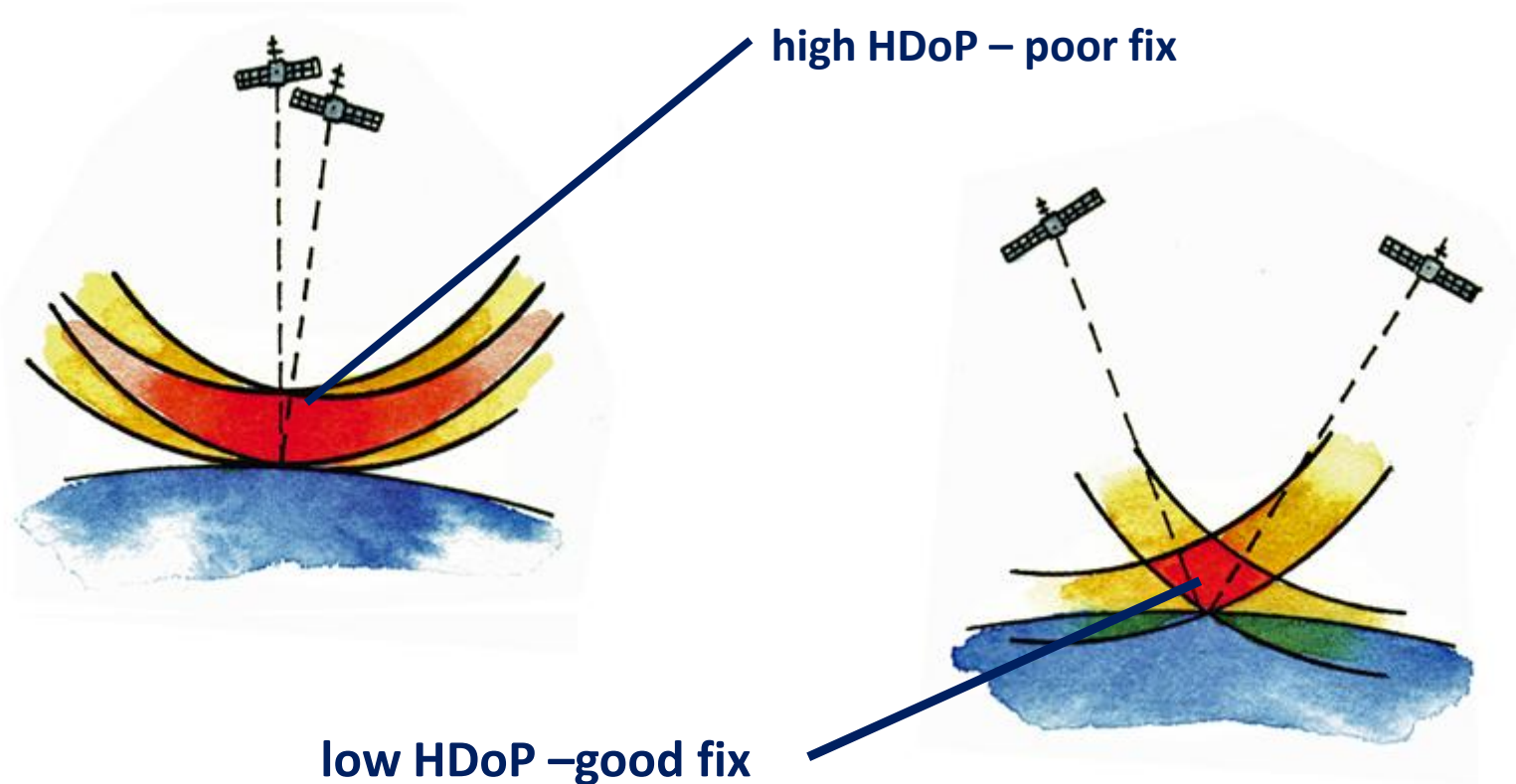
velocity made good



GPS – Accuracy

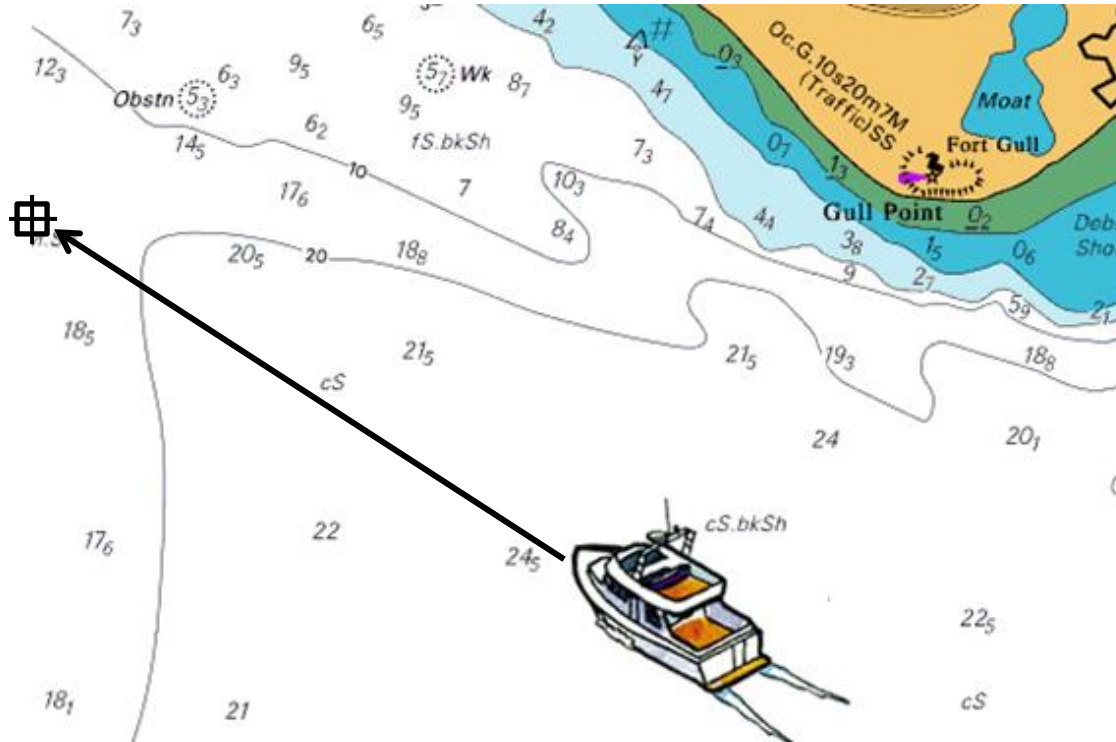
HDoP - Theoretical best 1.4.

Double figures = poor accuracy



GPS – Waypoints

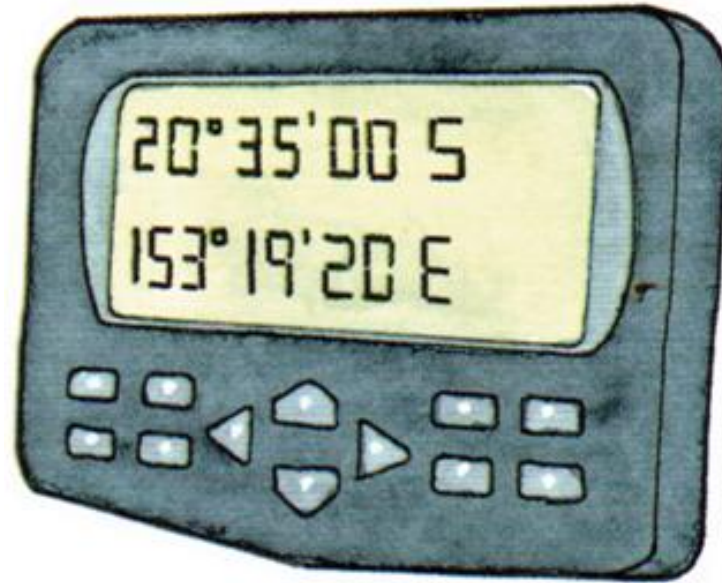
Waypoints are tools to help you navigate.....



.....they are positions stored in the memory of a GPS that are used as reference points

GPS – Waypoints

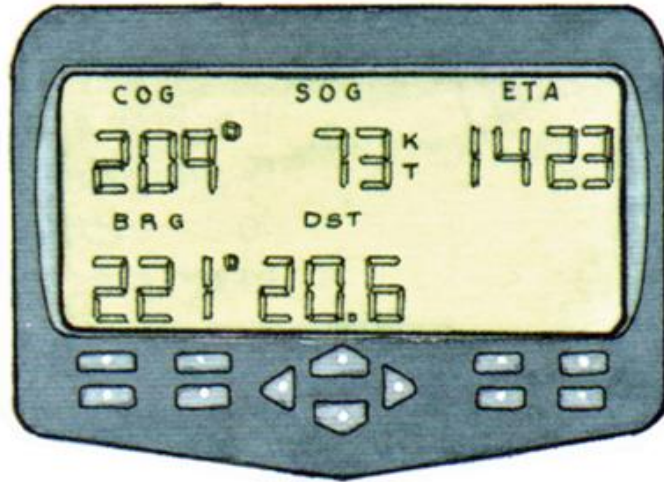
Take care when putting WPT positions into a GPS receiver...



...it's easy to miss-key latitude and longitude

GPS – Waypoints

Before relying on GPS information such as the distance and bearing to WPT...

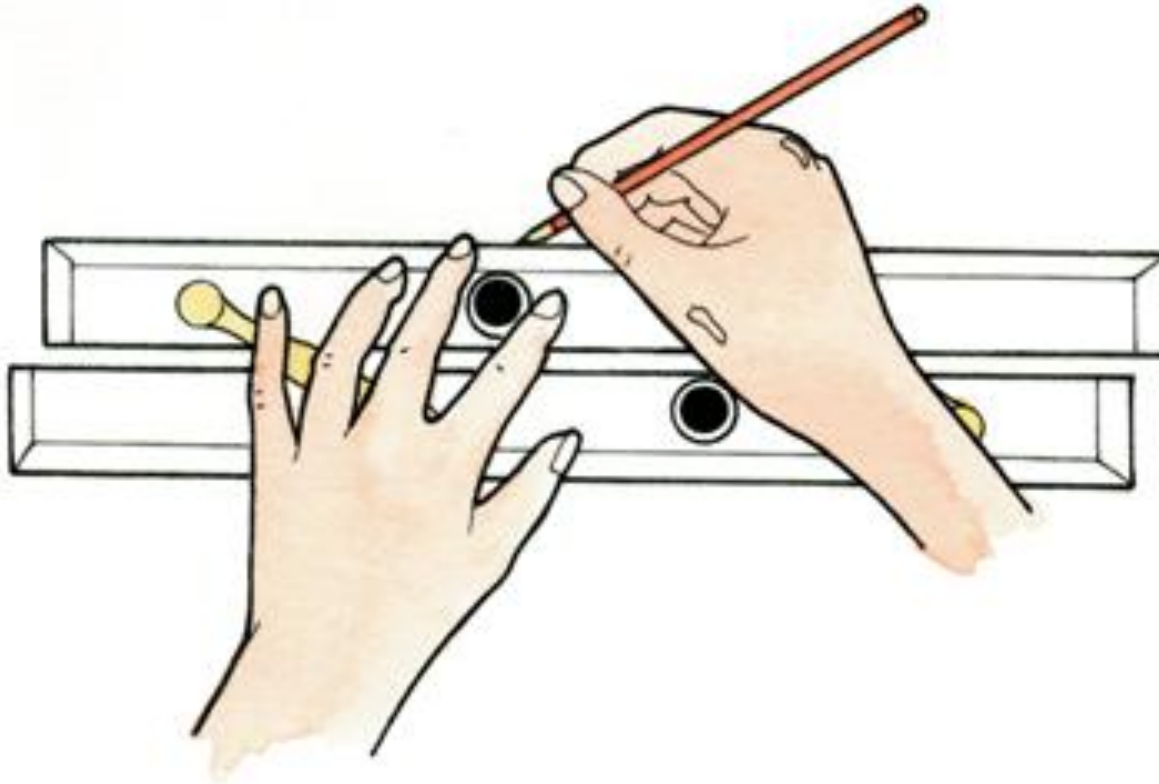


...check that it's correct by plotting on a chart

GPS – Waypoints

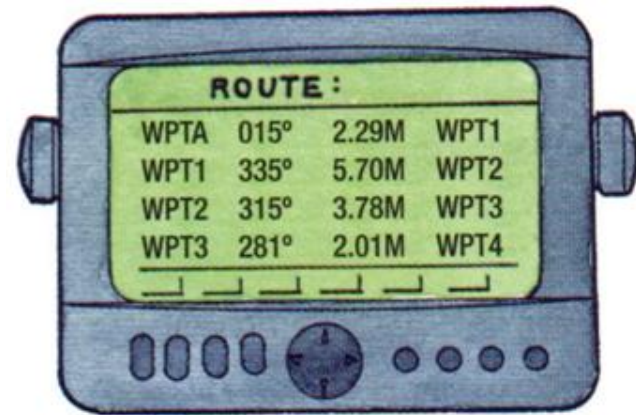
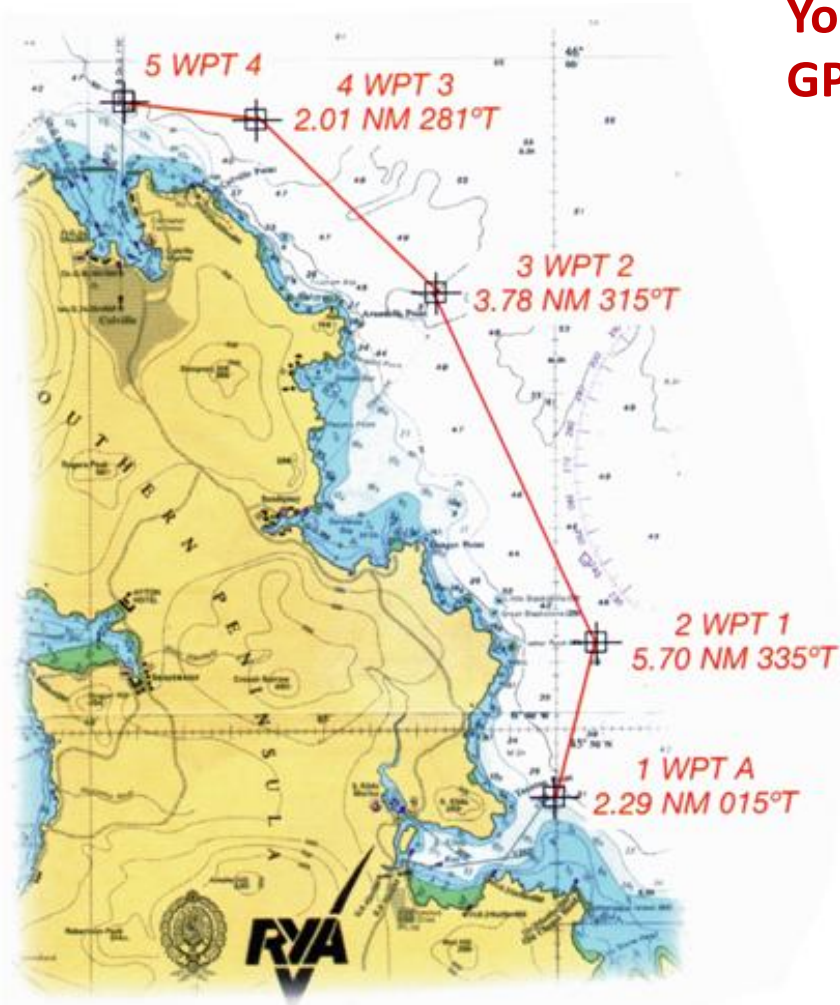
So important, we are saying it TWICE.....

Always check waypoints by plotting them on a chart



GPS – Routes

You can enter a series of waypoints into a GPS to make a route



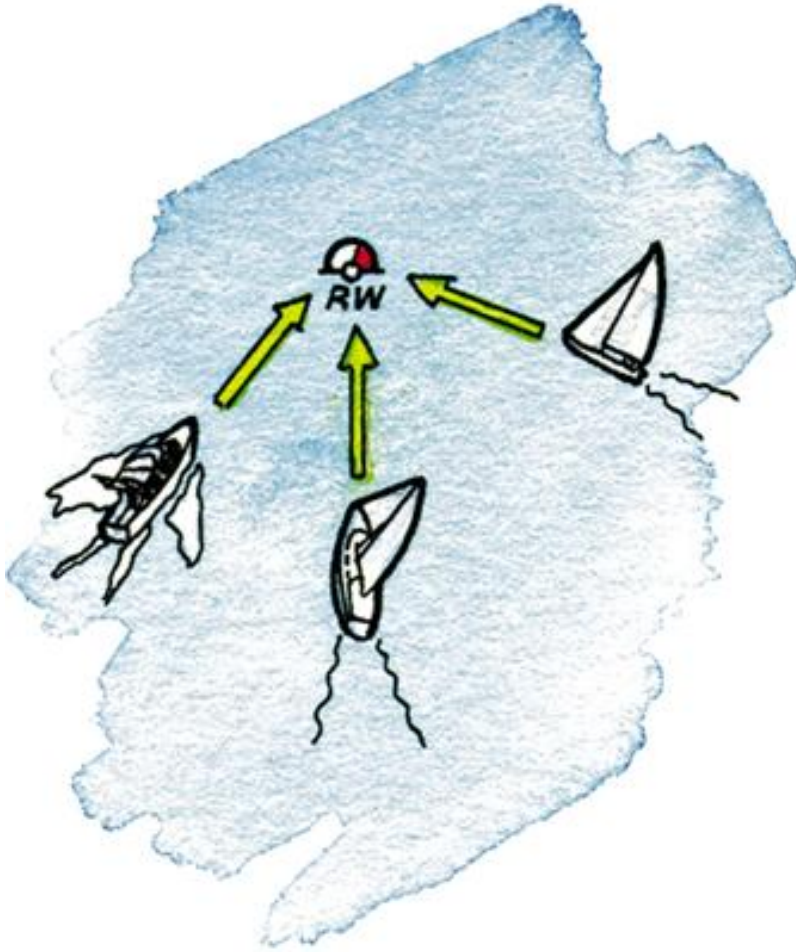
Always plot the waypoints on a chart and check the distances and bearings between them

GPS – Routes



Plot your waypoints adjacent to rather than directly on charted objects

GPS – Routes

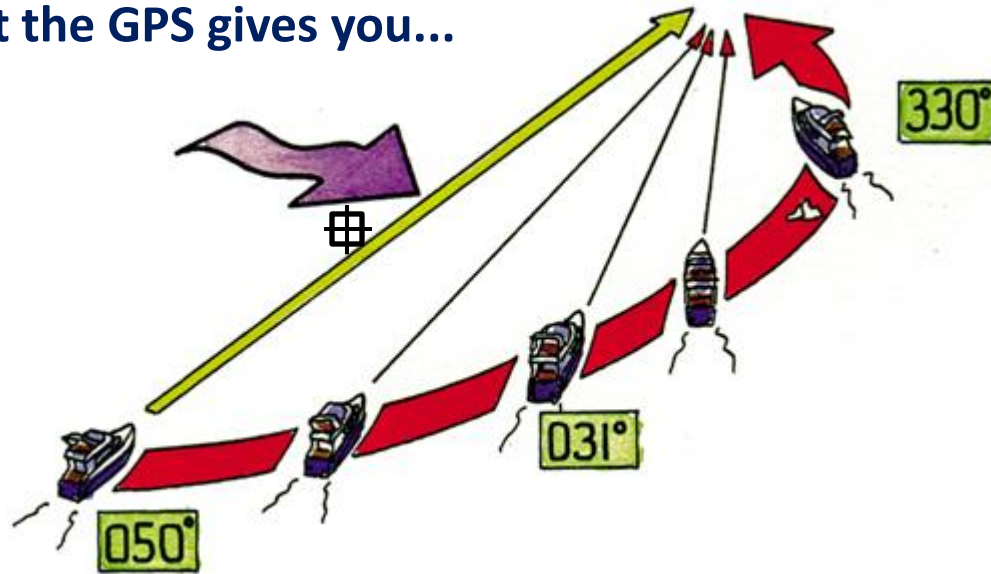


In busy areas, bear in mind that lots of other boats could be using the same waypoint

GPS – Routes

Remember – GPS doesn't allow for tide

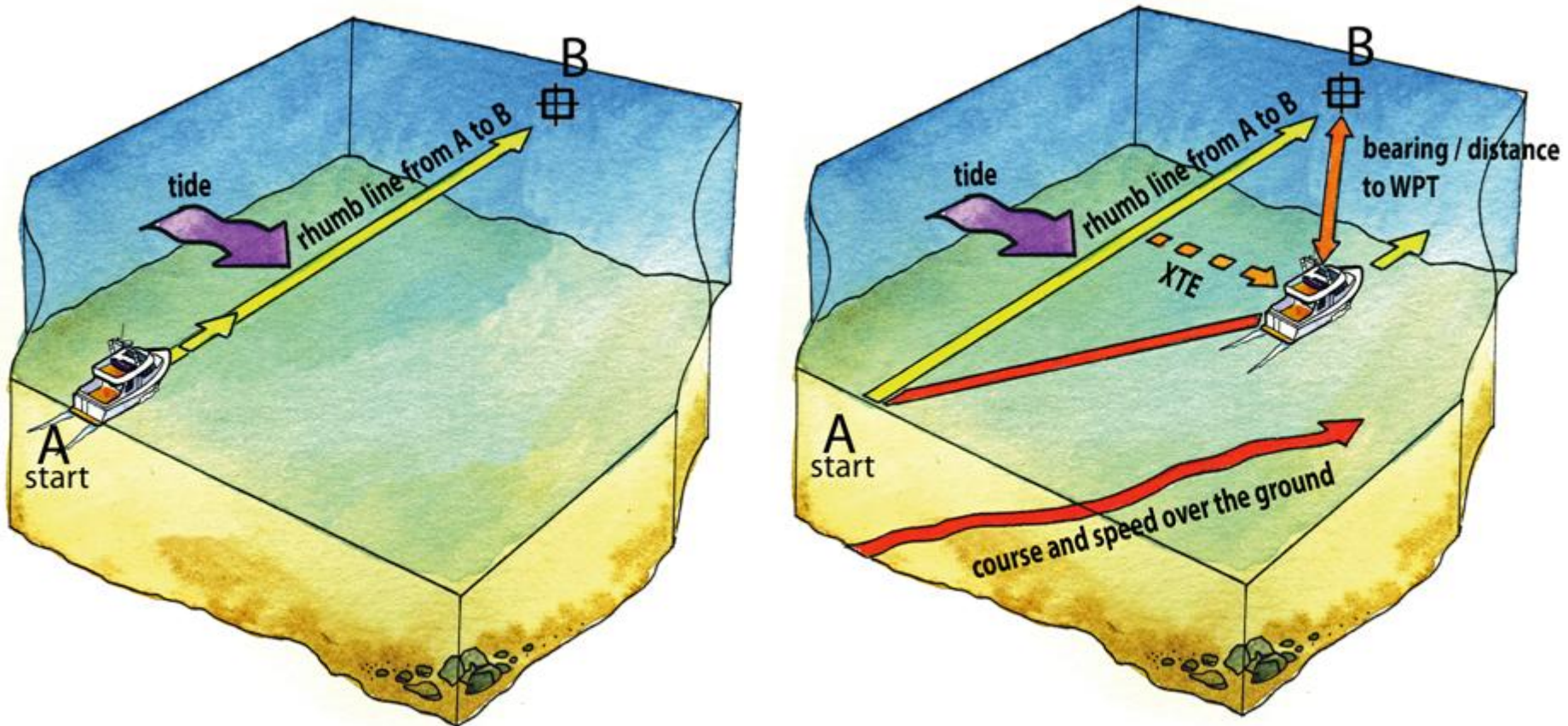
So it may seem easy just to steer the bearing that the GPS gives you...



...but in cross tide you might be swept towards danger

GPS – Cross Track Error

The cross track error (XTE) function shows your lateral distance from the rhumb line between two waypoints

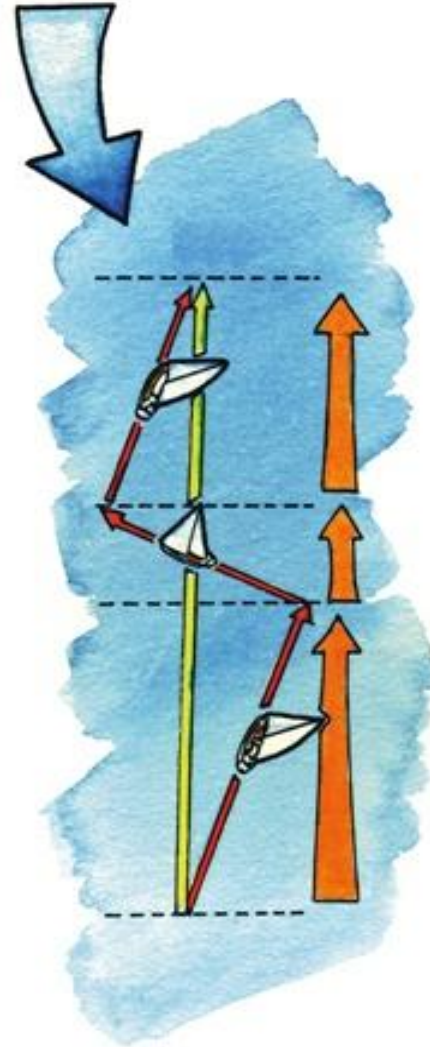


GPS – VMG

GPS

VELOCITY MADE GOOD

The VMG function displays your progress towards a waypoint



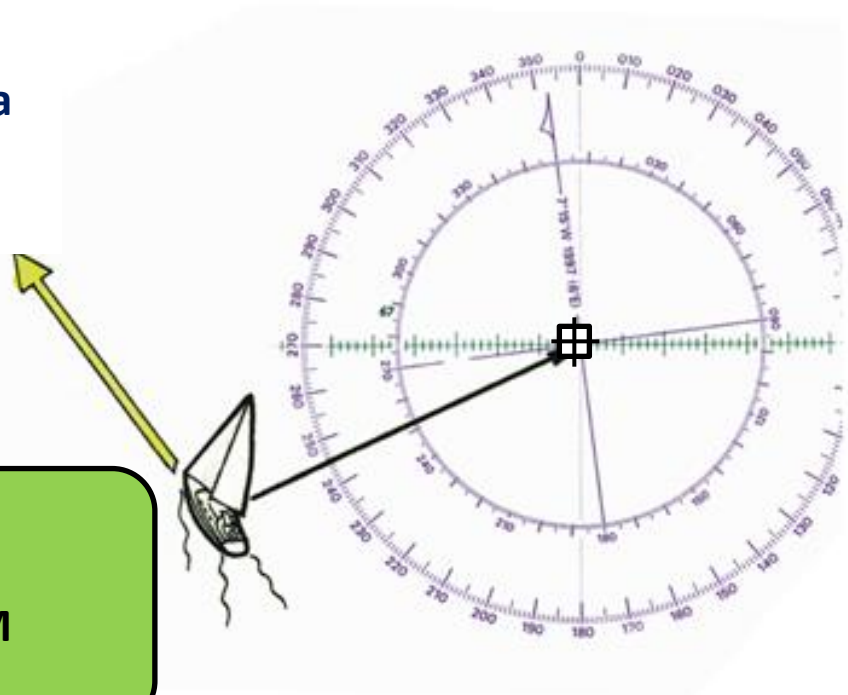
GPS – Other ways of using WPTs

You can plot your position quickly by entering easily found charted positions as waypoints

Putting a waypoint at the centre of a compass rose...

...enables position to be plotted easily by range and bearing

BRG 065°T
RNG 14.3M

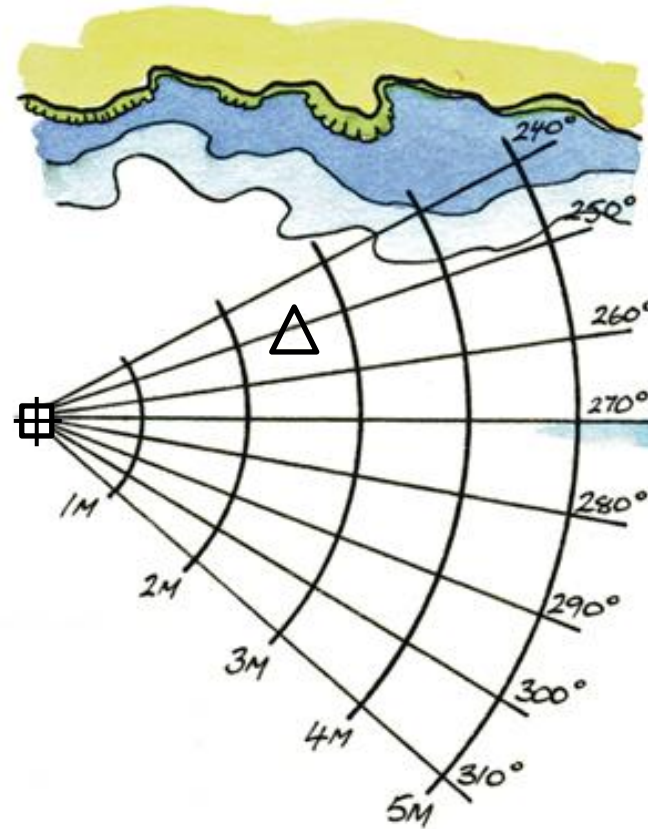


GPS – Other ways of using WPTs

Pre-drawing a web of distances and bearings from a waypoint...

BRG 250°T

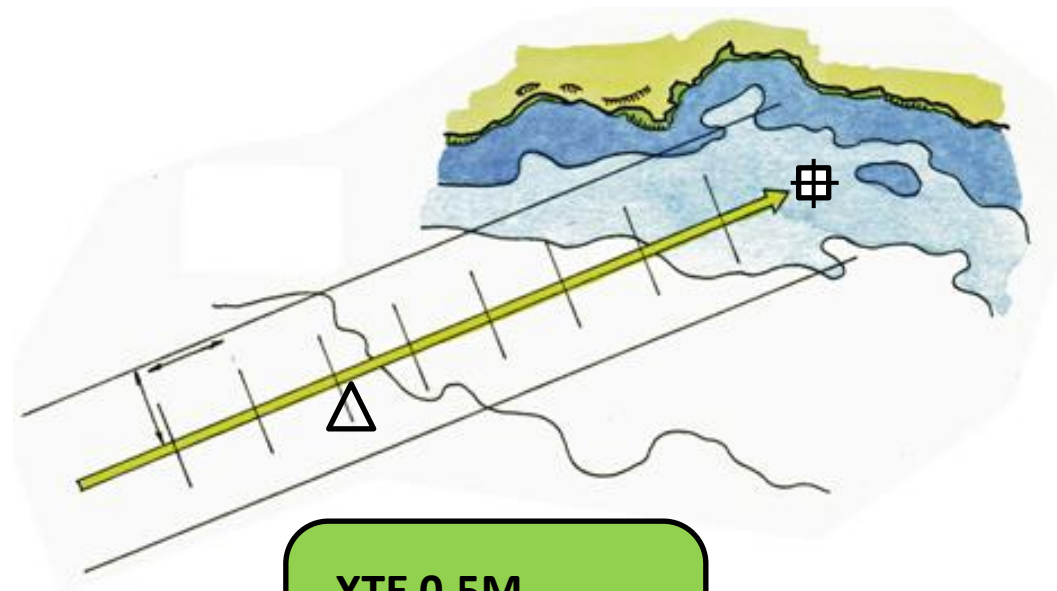
RNG 2.5M



...is useful for keeping track of a vessel's progress

GPS – Other ways of using WPTs

Another way of easily plotting position is to draw a XTE ladder...



XTE 0.5M
RNG 6.0M

GPS – Good Practice

Plan ahead

Retrospective plotting of your GPS position means you will always be playing catch up...



...pilotage is often a more appropriate method of navigation when in close proximity to hazards

GPS – Reliability

GPS is generally reliable and accurate but as with all electronics it can go wrong

Things to watch out for.....



...power failure



...poorly sited or shielded aerial

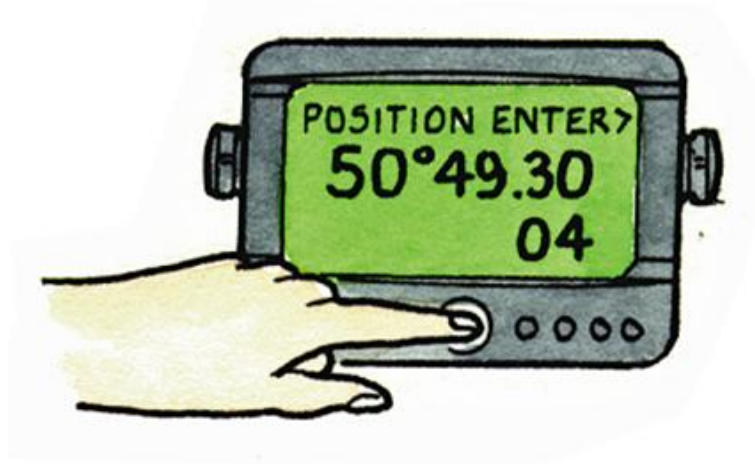


...interruption or changes to the satellite system

GPS – Reliability

Things to watch out for.....

.....and, the most common issue



Operator Error

GPS – Back up

Always back up your GPS position with information from another source



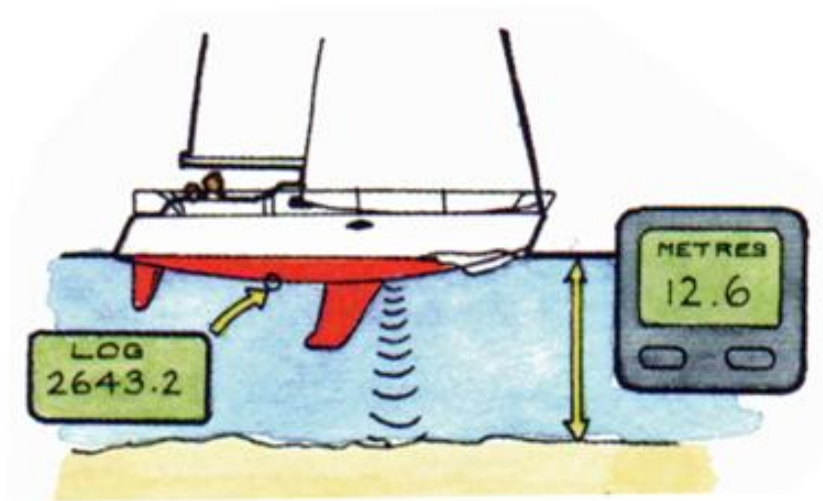
Hand bearing compass bearings

Passing charted objects



GPS – Back up

Always back up your GPS position with information from another source



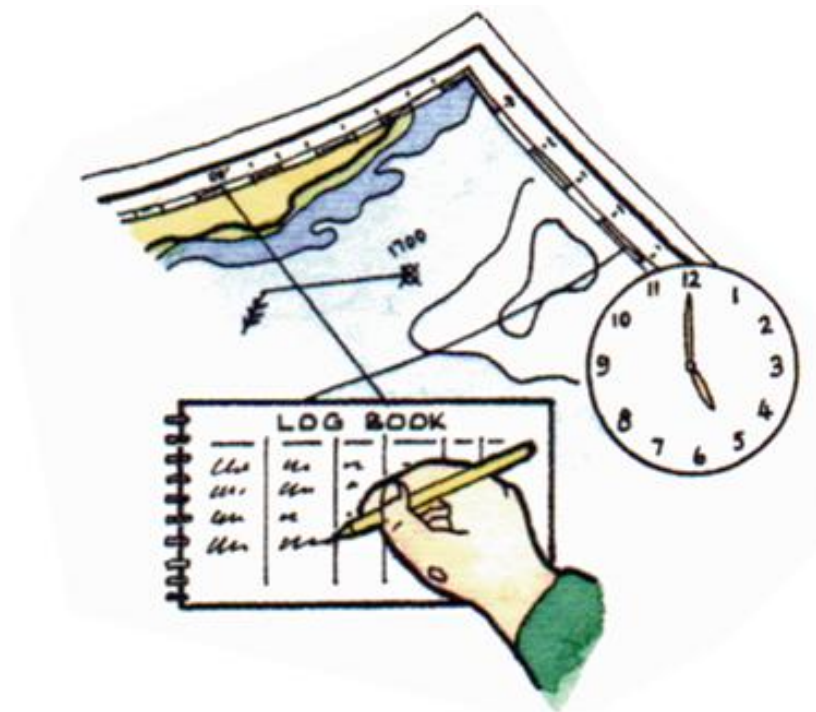
Depth, allowing for height of tide and distance run



Radar range/bearing

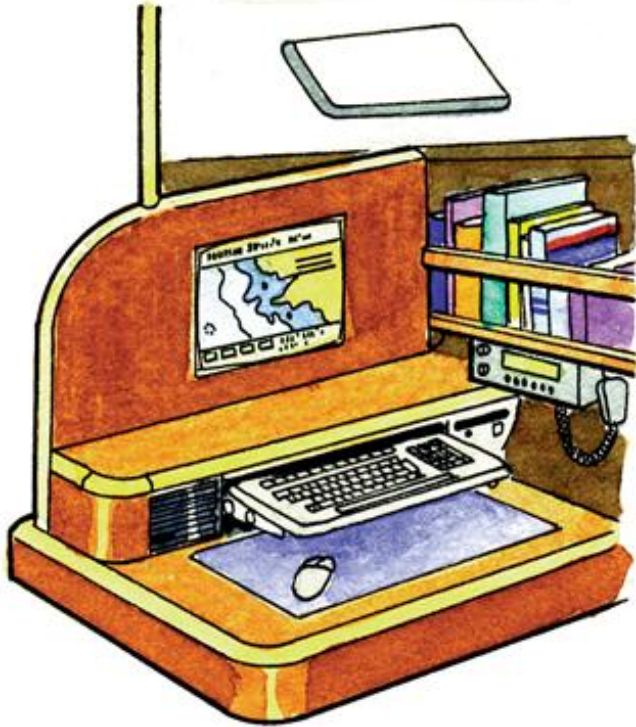
GPS – Good Practice

Keep a record of your position at regular intervals on the chart and in the ship's log



Electronic Charts

Two main types



Raster charts

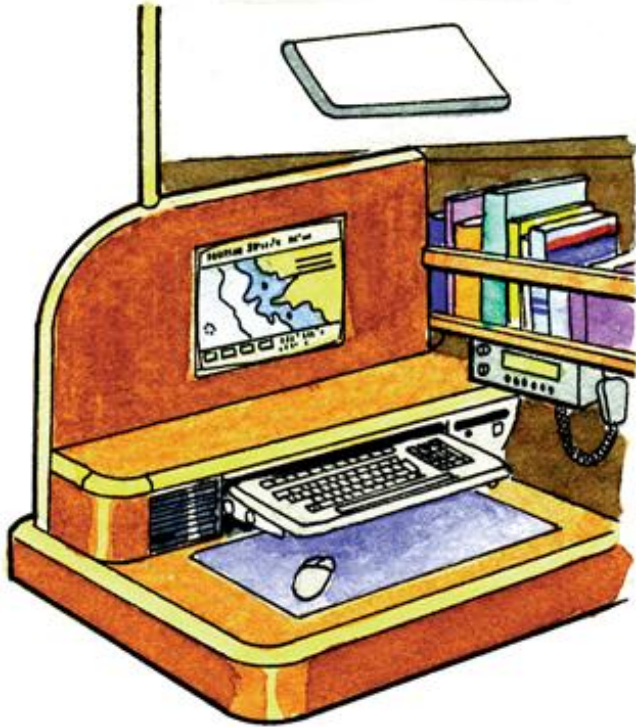
Scanned equivalent of paper charts...

...they have the same familiar look

...zooming facility is limited

Electronic Charts

Two main types



Vector charts

Produced from layers of information...

...you can select which features to display

...can be set with warnings and limits

Electronic Charts

GPS – Interface

Some systems combine the use of paper charts with the electronics



Electronic Charts

GPS interface

Electronic chart plotters can be interfaced with GPS to give position in real time on the screen



Best practice

Remember...



1. Always carry paper charts
2. Be aware that the displayed position is from a single source
3. Back up your position from another source of information
4. Keep a separate record of your position

This website helps support us and our families.
If you found this document useful please consider donating £3.50 to
the running of this website.

[CLICK HERE TO DONATE](#)

Thank you for your honesty.

Further Reading



We highly recommend Tim Bartlett's
RYA Navigation Handbook (G6)

You can buy a copy of this book by visiting our on-line shop

www.penguinsailing.com