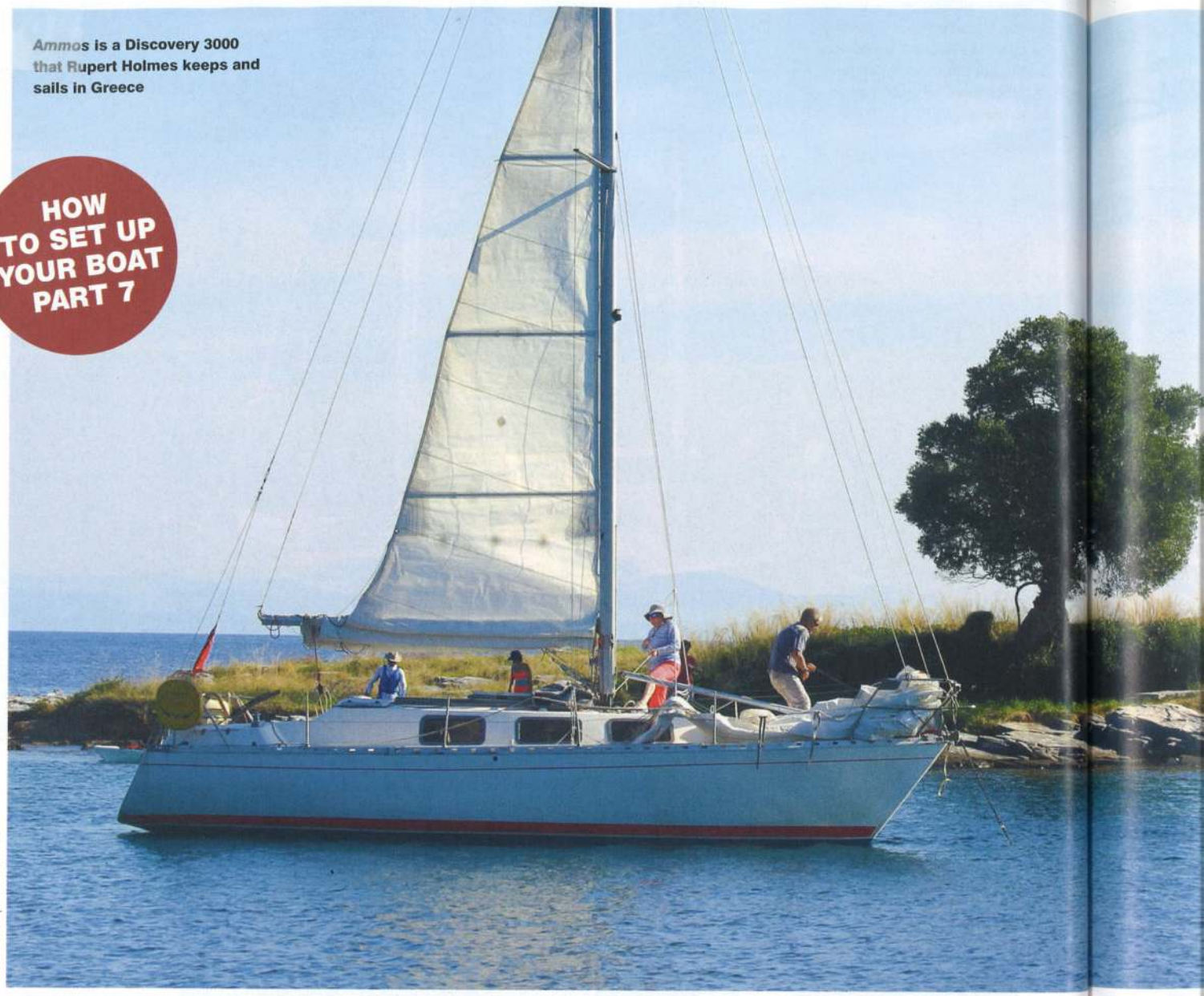


Ammos is a Discovery 3000 that Rupert Holmes keeps and sails in Greece

HOW TO SET UP YOUR BOAT PART 7

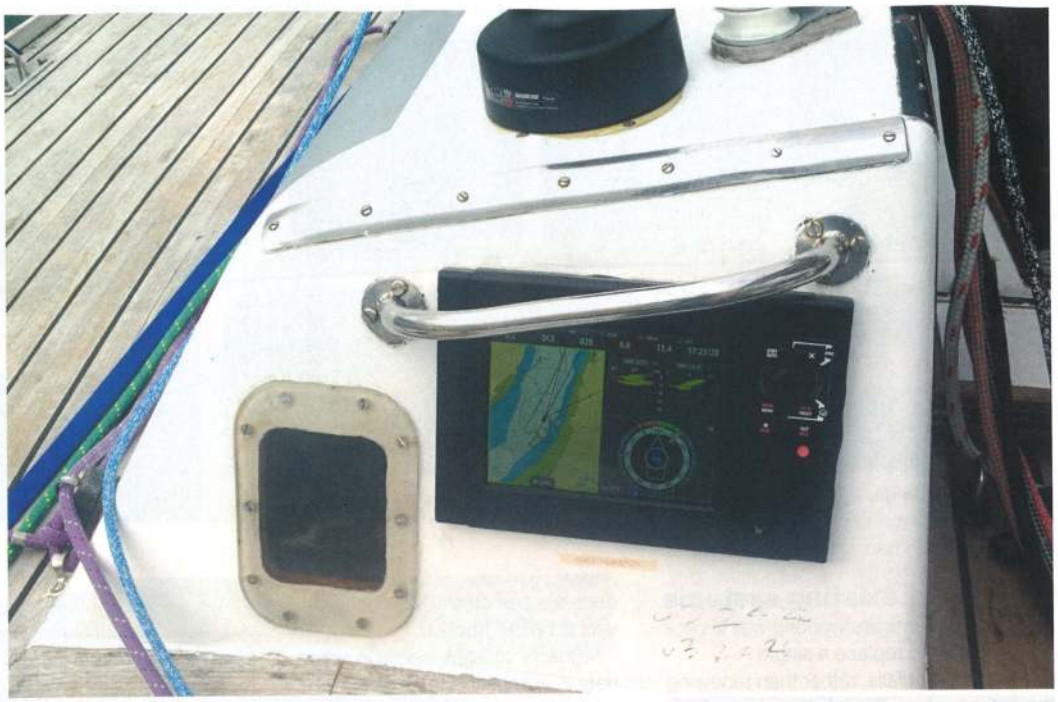
Photos: Rupert Holmes

Nav equipment and electronics

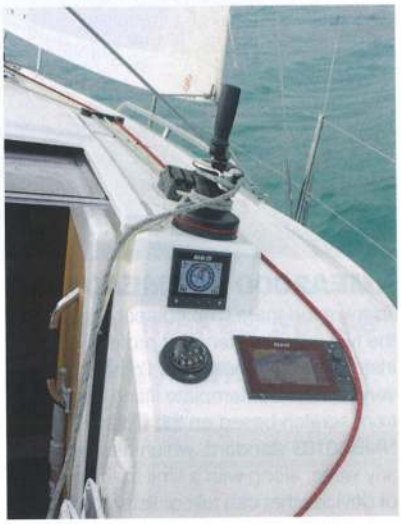
What's essential when updating your nav station? Rupert Holmes looks at everything from AIS to radar, sonar and MFDs

Marine electronics have come a long way since the days when a log, depth sounder, VHF and GPS, or even Decca, were the norm for many boats. It's now possible to spend the entire value of an older 25-30ft yacht on electronics and still not have a totally comprehensive system. So what are the best options for those who don't want to splash large amounts of cash on gizmos?

What's the least that you need to stay safe? My boat in Greece, which I keep to a very basic specification (as much as anything to reduce unnecessary time spent on maintenance) has only fixed and handheld VHFs, plus an EPIRB as dedicated equipment. Both the depth sounder and speed/distance log that I fitted when I bought the boat in 2001 gave up long ago and haven't been replaced.



ABOVE My preference is to mount an MFD on deck and use a tablet as a repeater at the chart table below



RIGHT Other examples of MFDs and instruments on deck

Of course it's important to know the depth when anchoring, but if you approach reasonably slowly it can be fathomed with a lead line. I rarely anchor in more than 10-12m, so this doesn't need to be particularly long and is therefore easy to use after a bit of practice.

Navigation is done on phone and tablet apps, with the hardware protected by waterproof and shockproof cases. As backup I still have steering and hand-bearing compasses, as well as paper charts. I recently also bought an elderly tiller pilot, which does a much better job, other than when close-hauled, than the length of stout shock cord I'd used for the previous 14 years. More on that later.

In other parts of the world, and especially much of our home waters, a depth sounder is a more fundamental item that few people would want to be without.

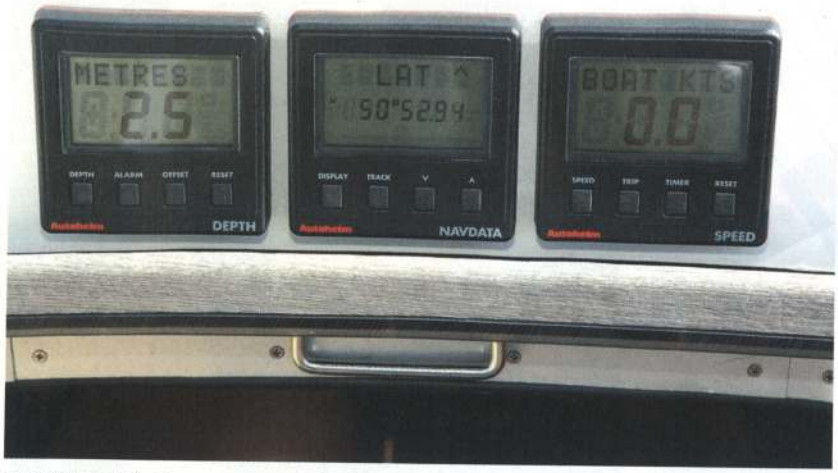
The same is true for a speed and distance log when sailing in tidal areas. Beyond these items, with the exception of AIS (and arguably radar for some), there's a sense in which everything else is merely a matter of convenience or efficiency. Of course, the latter can lead to faster passage making, which naturally some will welcome.

'Many MFDs of the last five years have a built-in wifi hub so that the screen can be mirrored onto a tablet or iPad'

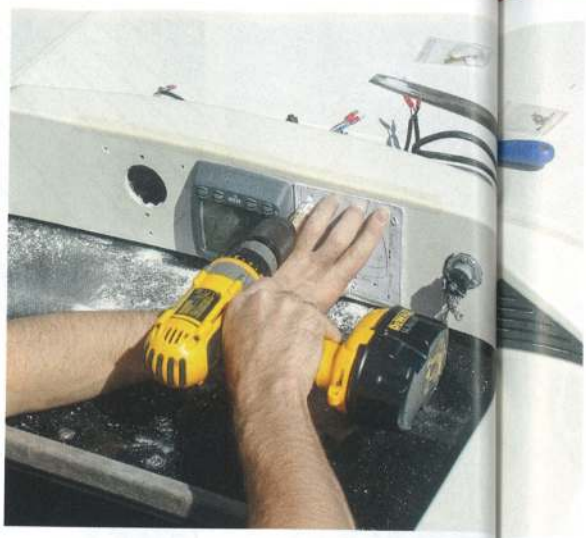
At the other end of the scale are yachts with sensors for a wider range of parameters, including gyro compasses or 9-axis motion sensors, wind speed and angle, AIS transponders, radar, plus on-deck multifunction displays (MFDs) that are enormously more powerful in what they can display than even the very best of old-school chartplotters.

For many, much of this kit is by no means essential, but it makes life much easier, especially approaching an unfamiliar port at night and in the rain. It also aids efficient sailing, whether you're racing or simply want to knock an hour or two off passage times for longer trips.

Relatively recent software developments that include lay lines to waypoints when tacking towards them and wind graphs that help to spots trends in changes to strength or direction are very helpful in this respect.



Few things date the appearance of a boat more than old electronics



Upgrading existing systems

If existing systems are working well it's often feasible to replace a single component that fails, rather than renewing the entire system. There's therefore a brisk trade in second-hand displays, sensors and other essential items on ebay.

These often change hands at surprisingly high prices for items that may be 15 or more years old, but it can make sense for the buyer if replacing one element postpones renewing an entire system that could cost several thousand pounds to replace.

On the other hand, in many cases paying a high price for second-hand equipment may make little long-term sense for someone wanting to install a system from scratch, unless they are on the tightest of budgets.

In both cases it's well worth making a realistic assessment of what you actually need. For instance, is a wind instrument absolutely necessary?

Historically wind sensors have been one of the most unreliable elements of marine electronics, which also means working ones are particularly sought after on the second-hand market.

Arguably, the only sense in which wind data is essential is to enable an autopilot to steer to the wind angle. The ability to do this is very important for sailing close hauled (or indeed downwind angles) for any length of time.

In Greece I don't have wind data for the pilot to use, which is why my length of shock cord works well when close hauled in a consistent breeze, providing the sails are carefully trimmed to make the boat properly balanced.

NMEA2000 vs NMEA0183

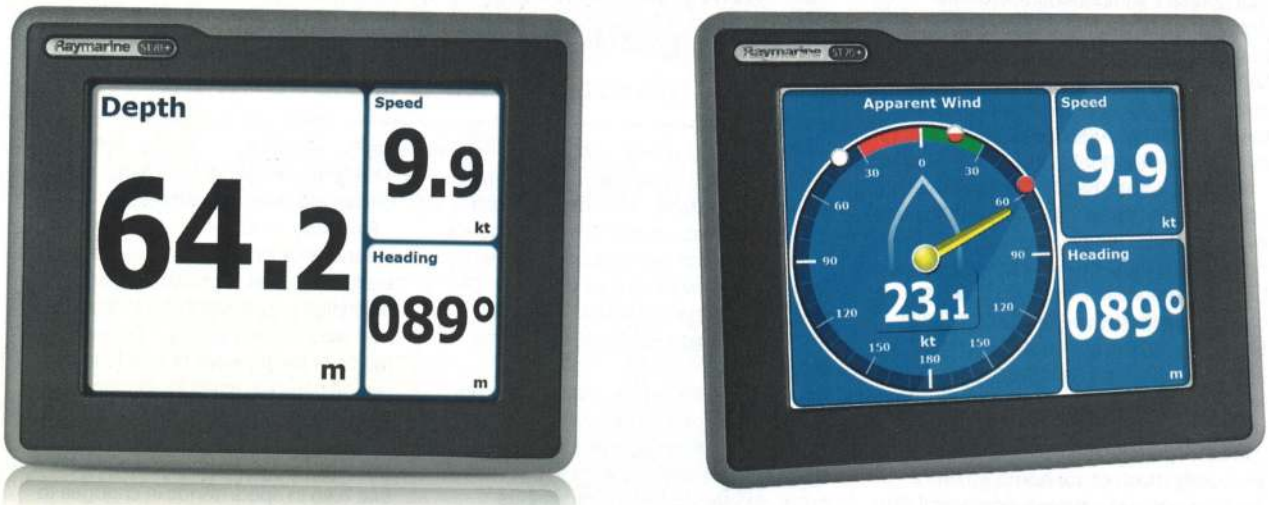
To my mind there's no contest between the two industry standard protocols for instrument data networks. I'd have to be very skint to contemplate fitting a network from scratch based on the older NMEA0183 standard, which has arrays of tiny wires, along with a limit to the number of devices that can talk or listen on the network. This makes installation of anything beyond a simple log and depth sounder a laborious and fiddly process.

On the other hand, if you've inherited instruments that don't work with a recently bought boat, time invested in tracing the wiring and making good any problems might be rewarded with working electronics.

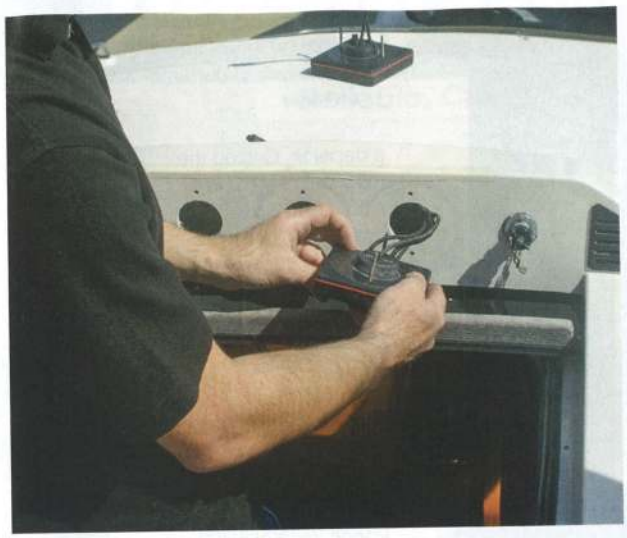
The plug and play simplicity of NMEA2000 (sometimes referred to as N2K) makes installation a relative breeze, reliability is greatly improved and when something does go wrong fault-finding is enormously simplified. This system also makes it easier to add additional functionality or displays of all types at a later date.

On the downside, the cables can be eyewateringly expensive.

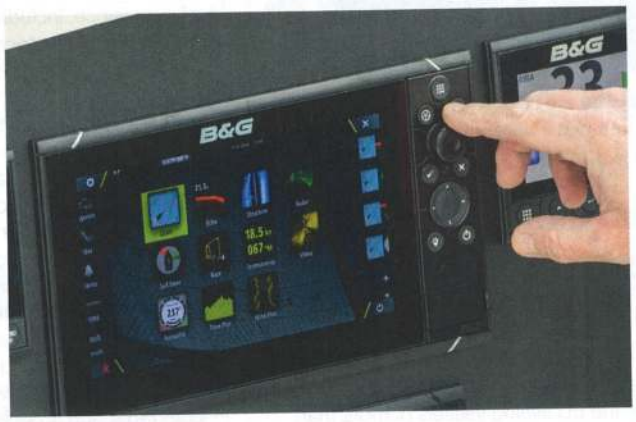
N2K systems (and the proprietary protocols that work on the same basis) enable individual displays to be used for multiple purposes, rather than being a dedicated depth sounder, log, wind instrument and so on. For instance, a display might be used to show wind data in open water, but changed at the touch of a button to a colour depth graph, plus big numeric read out, when approaching more confined waters.



Raymarine's ST70 series can be configured to show different data



LEFT Installing a new set of displays can be relatively straightforward



RIGHT B&G Zeus 3: the latest systems are hugely powerful and flexible, but can be expensive

'Fitting radar without AIS only makes sense for vessels that are crewed by a number of experienced people'

Autopilots

This is an area in which it's all but impossible for budget-conscious sailors to avoid big compromises in performance. There have been enormous changes in this field over the past six to eight years and today's pilots are easier to set up, easier to use and hugely better at holding a course than their predecessors. If properly commissioned, even mid-range systems can be relied on to hold course in challenging conditions, providing you're not attempting to sail dead downwind.

This is particularly true for wheel-steered boats, with a pilot that drives a below-deck quadrant. These systems are now in general very reliable (though I'd certainly want to take a spare if crossing an ocean), while a growing range of inputs, including those from 9-axis sensors that measure rate of yaw and changes in heel angle, have helped to transform course keeping. A rudder angle sensor is also an important element for these systems, as knowledge of the helm angle helps the course computer's algorithms steer more accurately.

Tiller-steered boats that don't have a quadrant below deck are therefore at a significant disadvantage in this respect, although the Canadian-produced Octopus cable drive can offer a solution that's almost as good as the best below-deck wheel pilots. Pelagic, a relatively recently developed Californian brand, may also be worth considering.

Beyond this, there has been little development of tiller pilots for more than 20 years and the all-in-one type is difficult to waterproof effectively. Raymarine's EV100 tiller pilot, in which the drive is separate from the course computer and sensor inputs, is the best option, though it lacks a clutch, so has to be manually moved on and off the tiller, and rudder angle feedback is not available.

Resilience of systems

Today's electronics are far more reliable than in the past, but they're still by no means infallible. The greater the extent to which you can run the boat without sophisticated electronics, the smaller the chance of being caught out by a big repair bill, or having a weekend or summer cruise spoiled.

This applies just as much to a boat with basic electronics as to one with comprehensive systems.

Given the number of GPS-enabled devices we now own it's fairly easy to carry backups, but they do need to have suitable protection against the elements and being accidentally dropped down the companionway or catapulted across the cabin in rough seas.

MFDs

The humble standalone chartplotter has morphed into more powerful and sophisticated networked devices that combine a computer processor and software with a display.

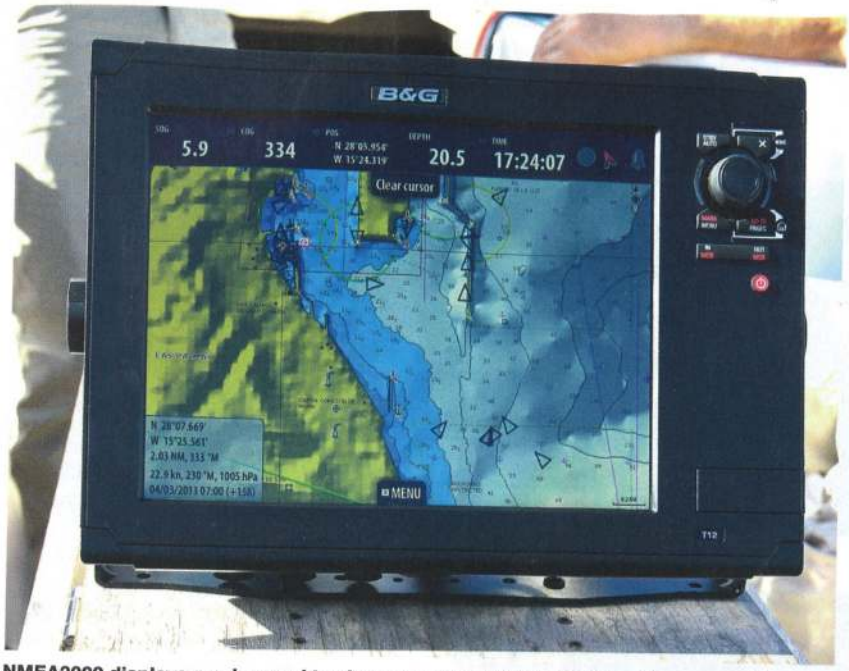
As a result, as well as showing charts, all other system data can be displayed, while output from networked AIS and radar units can be overlaid on the chart to make this information easier to interpret. This is perhaps the biggest single difference between a system that might have been installed 15 years ago and today's marine electronics.

Many MFDs of the last five years have a built-in wifi hub so that the screen can be mirrored onto a tablet or iPad.

Alternatively a separate wifi hub can be added to most NMEA2000 systems to achieve the same result.

A common question is whether it's

Neat plug-and-play connections on a NMEA2000 system



NMEA2000 displays can be used to show any data on the network – they are much more flexible than old-school electronics where each unit had a different function

'The best sonar systems have sufficient resolution to show patches of sea grass in an anchorage'

better to mount the MFD at the chart table and use the tablet on deck, or vice versa.

There's a good reason why I'd always opt to fit the MFD on deck. Firstly they tend to have good sunlight readable displays, with the latest models particularly good in this respect. By contrast, with the exception of a handful of ruggedised (and relatively expensive) devices, smartphone and tablet screens are notoriously difficult to read in bright sun, although later high-spec models are certainly better in this respect.

The same applies at night, where many apps fail to dim the screen sufficiently to prevent night vision being eliminated. Phones and tablets are also difficult to operate in properly wet conditions when on deck, while the screens of MFDs, particularly more recent models, are significantly better.

AIS and radar

These two technologies can be extremely useful for avoiding collision in poor visibility and if decisions need to be made at a long range, such as when crossing the English Channel's busy shipping lanes. Historically, radar was also heavily used as a navigation aid.

Radar has the benefit of equipping your boat to directly detect other vessels and hazards, whereas you can only see AIS targets from craft that are actively transmitting their own signal. Given that only commercial craft over 300 tons, and in the EU fishing vessels of more than 15m length, are required to carry AIS transponders you may encounter many craft without.

If budget only allows you to fit one system there are strong arguments in favour of radar. However, it's vital to appreciate the downsides before making a decision. Getting the most out of radar is a skilled and time-consuming task, while skimping this role risks adding to the already long list of radar assisted collisions.

Fitting radar without AIS therefore only makes sense for vessels that are crewed by a number of people who have the benefit of proper training in the use of radar and plenty of experience, including at night and in restricted visibility. However, that's not how most of us sail – even those with the knowledge to use radar effectively may be standing watch alone, or managing a crew that's at risk of becoming cold, tired and seasick.

This is when AIS scores highly. Key data, including Closest Point of Approach (CPA) and time to CPA, are calculated and accessed easily for every target. In addition, if your boat is fitted with an AIS transponder, other vessels will be able to see your location, course and speed.

Of course, if you have the budget, buy both radar and an AIS transponder. Today's radar systems are particularly good – they are easier to use and there's far less chance of over-zealous manual application of rain and wave clutter controls completely tuning out important targets. Having said that, before fitting radar I'd add a radar target enhancer. This device amplifies the reflection of radar signals from other vessels and therefore means your boat is far more likely to show as a clear target.

An active radar reflector will ensure your boat shows as a clear target on radar

Sonar

This is very much an optional extra, but could be of interest to those keen on fishing, or scoping out new anchorages. There's been a lot of recent development in this area, both in standalone products and those that can be interfaced with an MFD, thanks to the enormous fishing market in North America.

Low cost systems, with prices starting from as little as £200, tend to have a transducer mounted on the stern of the boat that shows targets out to each side. The very best systems now have sufficient resolution to show patches of sea grass in an anchorage.

Forward-looking sonar tends to be more limited in its scope and is not a budget buy, with typical prices upwards of £700. It can scan a 15° arc to show depths up to 90m ahead of the boat, although gently shelving mud may bring the viable range in shallow water down to as little as 25m.

Taking care of gear

If you plan to use a smartphone or tablet for navigation, even if only as a backup, it should be in an impact resistant and waterproof case.

This is how I protect my IP67 waterproof specification iPhone and iPad, having learnt the hard way (more than once) that such protection is essential if these devices are to be relied on at sea.

Tablets used for navigation are useless if smashed or waterlogged