

What Makes A Good Marine PC?

With an ever increasing range of marine PC navigation, communication and weather systems now available to the leisure sailor, along with the demand for internet access, entertainment and the "floating office" many boaters are seriously considering fitting an onboard PC system, if they haven't already done so. And as PCs get smaller and more portable, they seem to be an ideal and practical solution. But if you're thinking of joining the ranks of the floating PC users can you just go down to your local Dixons or Comet and pick up a cheap laptop or compact desktop system and expect it to operate reliably under the sort of conditions you experience at sea? Here at DigitalYacht we offer a range of marinised PCs, but why should you pay the additional cost for such a setup when the High Street offers such a wide range of systems, many of which at first glance would appear to be ideal to your needs?

THE PROBLEMS

Let's consider the kind of problems a PC has to deal with on board a small yacht or powerboat and how a professional, marinised PC system deals with them:

- **Damp, salty air** - making the PC waterproof may seem to be the solution, but this will create it's own problems - to make a PC waterproof it will have to be fully sealed, which will create thermal problems. PCs get very hot and need good ventilation and airflow to keep the components cool, this is why most computers have internal fans. As a matter of fact, getting soaked is generally not an issue - most vessels have a location which is dry enough for a PC. Over the past 5-6 years we have seen very few cases of acute water ingress on standard PCs which have failed. In general it's long term chronic exposure to the damp atmosphere that ultimately causes failure.



Compact commercial case with rugged front panel



Ventilation holes required for cooling but filters added for models with a fanned processor

- **Pitching, rolling and pounding** - you can't just plonk your laptop or desktop PC and monitor onto the chart table and expect it to stay there, it needs to be mounted securely to a horizontal or vertical bulkhead. Most off-the-shelf PCs don't include hard mounting points like this. Even if it's securely strapped in place, when you're falling off waves or being to windward, everything on the boat is being exposed to surprisingly high G force loads.



Mounting brackets to screw unit down to horizontal or vertical bulkhead



All cables secured with cable ties

- **Vibration** - Long term stress fatigue. The continuous vibration and pounding will kill a normal desktop PC long before corrosion does. Hard disk drives and graphics cards are the most common points of failure.



Solid state hard drive - no moving parts to break or skip



Industrial shock mounts fitted to conventional hard drives

- **Power Supply** - small boats have a 12v or 24v DC system. The majority of PCs are designed for mains operation - even laptops usually can't be charged directly from the boat's supply. Inverters are inefficient and another system to go wrong.
- **Noisy, fluctuating voltages** - When batteries are low and the engine is started, "brownouts" - voltages less than 10v are not uncommon. When the engine is running the voltage can rise to 14.5v or more and this can damage "12v" PCs. Electrical noise from other equipment or the alternator can cause problems too.



The latest DC to DC power adaptors avoid the use of inverters and mains voltages. Developed for commercial trucks, they are over 95% efficient and have high input ranges 6v to 32v for reliable 12v or 24v operation.

- **Limited battery capacity** - Let's face it, when batteries were first fitted to yachts there wasn't the kind of demand on them that we see now. Chartplotters, radars, VHF radios, instruments, televisions are all common sights on modern yachts and there's only so much you can squeeze out of a battery. Sailboat owners constantly worry about power consumption and normal PCs consume a LOT of power. More Processing Power = More Electrical Power



The Digital Yacht Aqua PC is fanless with an Intel Atom N270 processor and consumes just 1.5A

The top of the range AquaPro has a solid state hard drive, Intel Core i3 processor with integral graphics for 3D charting and still only consumes 3.5A

OTHER THINGS TO CONSIDER

- **Confined space for electronics** - Space is always at a premium on most boats. Unless a manufacturer states their PC can be mounted in an enclosed space, assume that good air circulation is necessary to avoid over-heating. Don't ever cover up ventilation holes in the PC case under the mistaken impression that you're "waterproofing" your PC. You also need to allow room to access connections at the rear of the PC or enough spare cable to remove the PC without pulling cables out. A remote power switch and USB socket is useful if the PC is going to be mounted in a difficult to access location.

There are a lot of really compact PCs available on the market, but actually the smallest PC may not be the best long term investment as you need to consider upgradability and compatibility.

- **Interfacing** - NMEA0183 is the most common form of interface on board modern boats. It's a serial interface and will work with the RS232 (COM) Serial Ports found on older PCs, but these are becoming less common on newer PCs. It's very useful if your Marine PC has some COM ports but if not, NMEA to USB interfaces are available - make sure that compatible drivers exist for the version of Windows you are running. NMEA2000 is the latest interfacing standard and is based on the CAN Bus technology found in cars. To interface with NMEA 2000 systems you will need a PC with an NMEA2000 interface built-in or one of the USB to NMEA 2000 Gateway devices that are now available. More reason not to go for the smallest PC you can afford.
- **Equipment has to work reliably** - If you're going to switch to a PC based navigation system then you're going to want it to be reliable - the last thing you need is for the system to pack up at a critical moment. Dedicated marine electronics manufacturers spend a huge amount of resources making their equipment rugged and reliable because they know how demanding the marine environment is. Having said that, modern PCs are much more reliable than they were five or six years ago. Aside from the hardware issues we've already looked at, three other factors significantly affect reliability, and it's basically the same issues that you usually run up against with your PC at home:

Operating System: We recommend Windows 7 (32 bit)

Drivers: always ensure devices are properly installed and have the latest drivers

Software: Avoid installing / uninstalling lots of different software and if possible avoid having an internet connection on your navigation PC - if you're using your boat PC for navigation, use an old laptop or cheap Netbook for surfing the internet, playing games, etc.

To summarise - **get everything working and then don't change anything!**

CONCLUSION

We firmly believe that PCs have a place on board today's leisure boats, there's some great marine software on the market and an increasing range of hardware specifically designed for integration with onboard computers. They offer greater flexibility and upgradability than dedicated marine electronic equipment, but if you want to go down this path, our advice is that you invest in a DigitalYacht professional marinised PC system.