Choosing and Configuring a Computer for a Boat

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Many boats rely on a computer onboard. These perform tasks like chart plotter, communications, routing, planning, and more. Offshore, the computer may be running 24x7 and may even provide data for instrument display.

To perform these functions, you'll need to power the computer, you'll need the appropriate software, and you'll need to connect the computer to your boat's data network to get things like GPS, speed, heading into the system.

Generally, a laptop is the most cost-effective and convenient solution.

1) Start with a new PC (or refurbished)

a) Nothing wrong with using your old "work" laptop, but you'll want to clear off ALL the accumulated junk on it. A great way to do that is a complete Windows reset. Be sure to save the files you don't want to lose.

b) A new or refurb is good too. Check power requirements (wattage of power adapter and claimed battery life are good indications. "Gaming" computers tend to be ridiculous power hogs. Refurbs can be very inexpensive and may have more features you want. The features I like:

i) 14" screen. 11 was too small for our older eyes. A remote monitor and keyboard can be larger, and can allow you to place the laptop in a spot protected from shock and spray.

ii) Ethernet port. Several devices communicate this way and I prefer hardwire. Should have wifi too, of course.

iii) Runs on 12V if you can find it. If not, a mobile adapter.

iv) USB ports. If only one, you'll likely need a hub. Modern machines like USB-C.

v) SSD (solid state drive) rather than spinning disc hard drive; it's faster, less fragile, and more energy efficient. Should be at least 128GB. Also want 8 GB RAM.

vi) Some maker claim of ruggedness.

vii) Windows 10. If it's the less able 10s, you can easily convert that to normal.

c) My latest choice: an ASUS student computer. Inexpensive with a 2-year damage coverage. Previously: two refurbished Lenovo 460 from Tiger Direct. Configured the same. One kept in a flat Pelican case as a backup. These both failed after 5000 miles. I believe this was due to shock or vibration dislocating power modules.

2) Unbox and plug in per supplier's instructions

3) Commence Windows setup.

a) Language and Keyboard selection, then connect to a network and let things happen for a while

b) Accept License

c) If offered choose "Set Up for Personal Use"

d) Enter Windows Account. **Strongly Advise Creating a Separate Account for your boat.**

e) Add a PIN and other login options as available
f) Decline all other options, and skip the "Customize your device"
g) Decline "activity history" and "use your phone from your PC"
h) "Only save files to this PC"
i) Microsoft 365… up to you. I skip for now
j) No Cortana. Ugh.
k) Whew. Then let it run for a while. This might take several minutes.
l) It should then dump you into the main windows theme

4) Windows Customizations

a) Screen resolution and Type Size. If you already know what you like, go for it.
b) Disable Microsoft Serial Ballpoint Mouse. If you get GPS data over a serial converter, Windows may mistake it for a serial ballpoint mouse and go crazy.

   i) Tap the Windows key to begin a start menu search
   ii) Start typing regedit and when the menu entry for Registry Editor App appears
   iii) Right click the menu entry and choose Run as administrator
   iv) When the **Do you want this app to make changes to your device?** prompt appears choose the Yes button
   v) Go to HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\sermouse
   vi) Since Windows 10 updates will sometimes change this value back to the default, bookmark this entry so you can get back to it easily in the future.
   vii) Change the value of the Start key from 3 to 4
   viii) Close Registry Editor and reboot the PC

c) Set whether the top row of keys is F-keys or things like brightness
d) Set your default time zone. I like to have the PC at UTC with a secondary display of my favored (Pacific and Hawaii) other time zones. Use the "Add clocks…" option in the Windows "Date and Time" settings page.

5) Okay, now it's time to install the software you NEEED on the laptop.

Here's my list:

a) Expedition or other navigation software
   i) Expedition. Gold standard among US racers. https://www.expeditionmarine.com/support/downloads/
   ii) SEA CLEAR II. Perfectly serviceable chartplotter. Free. http://www.sping.com/seaclear/
   iii) Open CPN. Free open source. Add the routing module to get that function. https://opencpn.org/
b) Airmail (Sailmail)
   i) https://sailmail.com/category/downloads/
c) Google Chrome (my preference)
   i) https://www.google.com/chrome/
d) Word Processor and Spreadsheet. You may want or need to compose messages and calculate things.
   i) Share a MS office subscription with this PC. See Below.
   ii) Use another program such as the offline versions of Google Docs and Google Sheets. https://support.google.com/docs/answer/6388102

e) Adobe Reader
    i) https://get.adobe.com/reader/

6) Email.

It's wise to have a dedicated email account for the boat. This can be a free gmail account or something else, such as a SailMail subscription account. On land, you can fetch your email using Internet. Offshore, you'll need SSB or satellite connections, and will want to be VERY strict about what you get. I prefer not to use Outlook for email but rely on web interfaces on land.

7) Remote management.

If you want to be able to remotely manage your boat computer, perhaps you are leaving it on and onboard, you'll need some sort of tool. Options include

i) My current favorite: TeamViewer. Free for personal use. https://www.teamviewer.com/en-us/
ii) Also very good: GoToMyPC Free for 7 days: https://get.gotomypc.com/
iii) Windows 10 pro includes a remote desktop tool. I have not had the opportunity to test it
iv) Splashtop: highly recommended by some whom I respect. Free for local use. Charge for over internet. https://www.splashtop.com/personal

8) Microsoft Apps Note

a) There are fine alternatives. My preference is to deal with the monster.
b) From my home PC, log in to Microsoft account that owns Office 365 subscription
c) Navigate to "Share Subscription," and send an invite to the email you'll be using for the boat pc. Send.
d) Go to the boat PC and accept. Install the apps you want, following instructions
e) **BE VERY CAREFUL.**
    i) Microsoft wants to store all your documents in the cloud. When you go offshore, these will not be accessible except by satellite, which can be costly, slow, and uncertain. Pay close attention.

9) Before you go offshore, disable any kind of automatic update, download, etc.

Do not do a bunch of software upgrades the night before you depart. Settings can change, incompatibilities can arise.

10) Power. You have several choices:

a) Inverter plus laptop power adapter. Reliable. 12V -> 120V ->19V
b) Auto adapter power supply (*e.g.*, directly converts 12v to 19v). May be more efficient.
c) Directly power from boat's battery. If it works, can be most efficient, but spikes in your power supply might wreck the computer.

11) Connections.

Depending on what software you are using, you'll want to connect some or all of your boat's devices to your laptop. The methods vary considerably, but here are some considerations:

a) **NMEA0183**: generally can receive this with an inexpensive RS232 to USB converter. You may need to fiddle around with the settings. Default is "4800-N-1". You may need to figure out the wires too.
b) **NMEA2000**: this will require a more elaborate adapter to get into your PC. A dedicated N2K-to-USB converter may do the trick, or some other device may be doing the conversion for you (*e.g.,* Vesper XB8000 or B&G H5000)
c) **Ethernet:** Some advanced products share information on an ethernet network. This may require an ethernet jack, or you'll either need an ethernet adapter or plug the instrument into a wireless access point. The instrument manual should offer advice on setting up your IP address.
d) **WiFi:** Some devices communicate their data over WiFi. The Vesper XB8000 and an Iridium GO! are examples. You can treat these like "hot spots" and connect directly to them, or you may be able to connect them to an on-board router as a "client" and access them via the router.
e) **DHCP etc.** You may need to do some sleuthing to find the address for a given device on your local system. This may be manually set, or available on a screen, or something else. Read the manual.

12) Extras? Depending on your level of "focus," these can enhance or annoy the trip.

a) Printer. A small mobile printer can let you create charts and printouts of emails
b) Media stuff. DVD player, speakers. The laptop can serve as an entertainment center, unless you are racing, then no.
c) Manuals! Find and downloads the complete manual for everything on your boat.

13) Secure.

a) Tie it down. I loop a light cord around the screen hinge and tie that to a fixed point at the nav table.
b) Not in use? Have a reasonably watertight and shock resistant storage spot. Possibly the case the PC was shipped in, or a nifty Pelican laptop case like my boat partner cleverly called for.
c) Backup plan. What happens if it gets drenched, or zapped, or something? Is this your only source of charts? Communications? If so, bad idea.

14) Limit Bandwidth Use

Needed if you are connected to something that charges by data use.

a) Consider installing "Glasswire" which acts as a firewall and data supervisor.
b) Enable "Metered Connection"
    a. Windows-I. Select "Network and Internet". For Ethernet connections, click on the Ethernet option and turn on "Metered Connection." For wifi connections, select WiFi and then "Manage Known Networks." Turn on metering for the networks that are limited. For my boat, *boat* wifi is unlimited, but *Iridium* wifi IS limited.
c) Another way to go is to set a data limit. This is in "advanced network settings." Even if you don't use the limit, you can see what your PC has used lately.
d) Turn off certain apps use of data:
    a. Press the Windows key + I shortcut and launch the Settings menu.
    b. Click on Privacy -> App Permissions.
    c. Pick the app you'd like to stop, then toggle it off.
e) Special case: Windows

    a. Pause updates (updates from the dashboard)
    b. Turn off oneDrive
        i. “Go to PC Settings, using the PC Settings tile in the Start menu, or swipe in from the right edge of the screen, select Settings, and then select Change PC settings. Under PC settings, select OneDrive. On the File Storage tab, turn off the switch at Save documents to OneDrive by default.”

f) How do I keep Windows Mail from running in the background?
    a. Stop an app from running in the background
    b. Select Start , then select Settings > Apps > Apps & features.
    c. Scroll to the desired app, select More options on the right edge of the window, then select Advanced options.
    d. In the Background apps permissions section, under Let this app run in the background, select Never.

g) Even with all these steps, we still had significant unplanned downloading (for a fee) via our Iridium Exec. The total was about half of our usage. Not the end of the world, but maddening.

15) Before you Head Out

a) DO NOT do a “last minute” upgrade of anything.
    i) These sometimes wipe out critical settings or compatibility
b) Make sure you have all needed chargers.
    i) Consider a backup charger, and even a whole backup computer
c) Think through what you will do if you have no computer
    i) These things can be fragile.
d) Practice using your system underway in icky weather
    i) Things shift around, and so will you.

16) Appendix

Appendix: B&G ethernet adapter