WE’RE LUCKY IN BRITISH Columbia and the Pacific North- west to have so many idyllic destinations within reach. With the abundance of nearby marinas, it’s easy to enjoy a holiday hopping from port to port. But for many boaters, experiencing all that the Gulf Islands have to offer, or visiting Desolation Sound, will require some time at anchor.

Staying at an anchorage means leaving the luxuries of easily accessible shore power, water, fuel, and food behind; therefore, boaters need to prepare before a trip to remote waters. To maximize safety and comfort, you should also ensure your boat has a power system designed for nights away from AC shore power.

Since we bought our boat we’ve made improvements to the systems to adapt them for local cruising. Boats at anchor need to at least run the anchor lights overnight, and most people enjoy having a few comforts like refrigeration, music, lights, or even a television.

Unfortunately, many battery systems designed for marina cruising either aren’t large enough to provide all the desired comforts, or don’t protect the engine starting power. After a comfortable night on the hook, many a boater has woken up to find...
that the batteries are too drained to start the engine, putting the safety of the passengers at risk. A generator combined with a battery charger will, with time, get you out of trouble, however, those without one will need assistance.

**SYSTEMS FOR STARTING THE ENGINE RELIABLY**

Battery capacity isn’t the only reason engines don’t start. Most boats that have been designed with marina-hopping in mind use a battery system that, if not used properly, allows the lights and other house loads to drain all the batteries on the boat—similar to your headlights draining the car battery. This means that when the boat is away from shore power overnight, by the morning there isn’t enough power in any of the batteries to start the engine.

This is called a one-two battery system and is very common. Let’s take a closer look at battery system options.

**ONE-TWO BATTERY SYSTEMS**

In this system, there are two groups of batteries called battery bank one and battery bank two. This setup was designed to offer complete flexibility. You generally have the option to power the house and the engine from either battery bank one or two, or you can combine both battery banks together for more power.

Unfortunately, this system requires a high level of boater involvement in making sure the battery switches are set properly. In many of these systems, both battery banks have no way to be charged except by combining the batteries, which must be done manually by turning the switch. When combined, any loads will drain both batteries. To preserve power to start the engine, one battery should be kept completely charged, so the switches must be switched back to only connect one bank when charging is complete. Forgetting to turn a switch back to the one or two position from the combine position could leave you stranded with no power to start the engine in the morning.

A second problem with the one-two system is that battery bank one and battery bank two are typically the same type of battery, with both house and engine loads powered from them. A house load is very different from a starter engine load, so “dual-purpose” batteries can be used as a compromise. Unfortunately a dual-purpose battery is not great at either.

Starting batteries deliver a high amount of power for a very short time, and will last a long time when only used to start the engine. Deep cycle batteries deliver a low amount of power for extended periods, and are ideal for powering house loads. Dual-purpose batteries are constructed to deliver a modest amount of power, and can handle being discharged a modest amount. The end result is that the batteries don’t run the house loads or start the engine efficiently, effectively shortening battery life.

**HOUSE-ENGINE BATTERY SYSTEMS**

The primary alternative to the one-two battery system is to have one battery bank as a dedicated engine bank and the other as a dedicated house bank for everything else.

The main benefit of this setup is its simplicity. There is a single switch that controls two connections—think of it as one switch that has two halves. On one half the house batteries connect to the house loads. On the other half the engine battery connects to the engine starter. These systems work best when a deep cycle battery is used for the house loads, and a starter battery is used for the engine. By matching the loads to their ideal type of battery, this system ensures your batteries are treated well and charged and discharged how they were designed, increasing the battery’s lifetime.

In a house-engine battery setup, the switch is typically either off or on; there are no options about where power will come from, and both circuits (house and engine) are powered in sync. The engine battery is connected to the engine only, which means that it can start the engine even if there are lights, laptops, fridges, or other house loads left on, and the house battery is nearly depleted. As a safety measure, the house and engine battery banks can be combined in an emergency to start the engine. The only disadvantage of the house-engine battery system is that you cannot disconnect one battery bank and still have power from the other. This is
because there is only a single switch which simultaneously switches both engine and house. Turning off the switch turns off both the house and the engine circuits.

For charging, a newer device commonly used in a house-engine setup is an automatic charging relay or voltage sensitive relay. This device automatically ensures that both battery banks are charged together, so no switches have to be turned. If you don't have one installed, you will need to turn the switch to manually combine the battery banks, only when the engine is running.

Ultimately, by removing most user-error from the system, a house-engine battery system is more reliable than a one-two battery system. We expect our cars to always start when we turn the key (without relying on a friendly onlooker with booster cables), and we shouldn’t expect less from our boats. By setting up your batteries this way, you can expect your engine to always start and get the reliability you need.

USING YOUR SWITCHES
Regardless of which kind of battery system you have on your boat, it’s important to know how to properly control your switches. This will extend the lifetime of your batteries, and ensure that they deliver the highest amount of power when you’re away from shore.

Generally, for battery longevity, deep-cycle or dual-purpose batteries should never be discharged to below 50 percent of their...
capacity, and starter batteries should only be used for starting the engine.

Be careful if you only have the engine on for very short periods, or are having fuel problems and repeatedly cranking the engine. It may not be charging the batteries enough when it’s on to make up for the power it’s using at start up.

As well, regardless of switch setup, most battery chargers have multiple connections for each battery bank, and bilge pumps are un-switched. If this is how your system is set up, when docked and connected to shore power you will typically turn the switch to off. Ensure you see a charging voltage (greater than 13-volts) on your volt gauge. And very importantly, make sure your bilge pumps are powered even when the switch is in the off position.

**ONE-TWO BATTERY SWITCHES**

There are many variations of a one-two battery setup, depending on how loads are split up, but in all of them the switches have three connection points: loads are connected to the output of the switch, while battery bank one and bank two are each connected to one of the two inputs of the switch. Your switches will read “Off–1–2–All” (sometimes ‘All’ is named ‘Both’). Turning the switch allows the boater to choose which battery bank to power the loads from, or to draw power from both banks together.

In its simplest form, an “Off–1–2–All” switch setup has both engine and house loads on a single switch. Both battery banks are identical, using dual-purpose batteries. When turning on the boat, the boater chooses a battery bank to power all these loads and can change it if the bank doesn’t have enough power.

It’s critical to reserve enough power to start the engine and avoid being stranded. To ensure you don’t drain both battery banks, follow these easy steps.

1) When turning on your boat, choose battery bank one or two. Always select your battery bank to keep the other fully charged to start the engine. This will ensure you can crank the engine multiple times, as is sometimes needed.

2) If you run a battery bank down, either start your engine to charge the batteries, or turn off your lights and appliances. Never run other house loads from another full-charged bank until the depleted battery is fully recharged.

3) Turn the switch to All when the engine is running to charge both banks from the alternator. If the switch is left on one or two, only one of the battery banks will charge. Alternatively, install an automatic charging relay or voltage sensitive relay, which does this for you.

4) Except when charging, the switch should not be set to All. This will prevent both battery banks being accidentally drained.

5) Batteries have a limited number of discharge cycles, after which they need to be replaced. To keep both your battery banks working, aim to discharge them an equal number of times in a given trip. This means alternating which bank is kept charged.

6) In case both battery banks have been run down, turning the switch to All can sometimes give enough power to allow the engine to be started. This is an emergency backup and should not be relied upon.

If you have this system, closely monitor your switch settings to ensure one battery bank is always reserved at full charge for engine starting and both banks are charged when your engine is running. If you are unhappy with the complications of this set-up, it is possible to change to a house-engine battery system.

**HOUSE-ENGINE BATTERY SYSTEMS**

A house-engine battery setup is much easier to use. In a house-engine battery system, there is typically one main battery switch reading “Off-On-Combine,” a deep-cycle type house battery bank, and a starting type engine battery.

1) When you are using your boat, turn the switch to On. This connects the house loads to the house battery bank and the engine to the engine battery. Both of these happen with one switch, making it a lot simpler for the boater, while keeping...
the house and engine batteries separate.

2) If you do not have an automatic charging relay or voltage sensitive relay installed in your system, turn the switch to Combine when the engine is running. This is very important, otherwise both your battery banks will not charge.

3) The switch should never be left on Combine when the engine is not running, as it allows the house loads to drain the engine batteries or vice-versa, eradicating the main benefit of this system.

4) In case the engine battery is run down, turning the switch to Combine allows the engine to be started from both the engine and house battery banks. This is an emergency backup that you’ll almost never need to use.

There’s no decision to be made in typical operations with a house-engine battery setup—all the boat loads (engine and house) are off or on. While this setup is easy to manage, it’s not fool-proof. An awareness of how much power is left in your batteries, regardless of the type of system you have, will go a long way toward keeping your boat out of trouble.

JEFF COTE

Jeff is a systems design engineer and owner of Pacific Yacht Systems, a full service shop delivering marine electrical and navigation solutions for recreational boats. This column focuses on the changing world of technology and boating.

---

SHRINK WRAP BOAT COVERS

LONGTERM STORAGE • SHIPPING/TRUCKING

• Complete protection for your boat  • UV Protection
• Limits Moisture Buildup  • Access doors available
• Boat arrives clean  • Prevents damage from road grit/insects
• Prevents exhaust damage  • All boat types and sizes

CALL TODAY

You’ll be surprised how inexpensive it is!

“Corrosion Intercept” Shrinkwrap - New Technology

EPC ENVIRONMENT PROTECTION COVERS

604-669-5666 • epcestro@telus.net • www.epcsrinkingwrapping.com