Fishing Boat Fitout

by Simon Hutton

WHEN *it comes to boating, one of the most important, yet least understood systems would have to be the electrical power source system – The marine battery.*

A battery is an electrical storage device. A common misconception is that batteries make electricity. This is not true. They store it. Just as a water tank stores water for future use. As the chemicals in a battery change, electrical energy is stored or released. The advantage of having a rechargeable battery is that this process can be repeated many times. Batteries are never 100% efficient. This means that some energy is lost as heat and chemicals react when the battery is charging and discharging.

The battery is the 'heart' of your boat. Obviously, the battery is needed to get your outboard started and to power the electronics and some of the other creature comforts you may have on your boat. As with your own body, if your heart isn't in good shape and working properly, you don't function properly.

Marine batteries come in different kinds and sizes and as is usually the case – You get what you pay for.

Car vs Boat

While researching this topic, I found that one of the most frequently asked questions was whether or not you could use the battery from your car in your boat? The truth is, yes, you can use a car battery in your boat. But, you'll be lucky if you get a few trips out of it.

Why is this? There is a big difference between a car and a marine battery. The first is the location of the lead plates within. In a marine battery, the plates are elevated. The second thing is, they use a special bonding process. The positive and negative plates must be separated to prevent short circuits. Separators are thin sheets of porous fiberglass-like insulating material used as spacers. Fine pores in the separators allow electrical current to flow between the plates. These separators keep things inside the battery in place. So as the boat pounds around, the elements don't short out. Using a car battery under usual seagoing situations, with all that pounding, will soon kill it.

Kinds of batteries

There are three different kinds of marine batteries to choose from. Deep Cycle, Cranking Amp and Gell Cell.

Deep Cycle – This battery type is used mainly for running your accessories and/or allowing your electronics to remain on while your motor is off. The plates in the Deep Cycle battery are spaced further apart and have a greater surface area. This allows the battery to discharge at a much slower rate. This means it will also take longer to charge.

Cranking Amp – This battery is used mainly for starting. This battery has more plates that are close together. These allow the current to flow quickly through the battery for quick, powerful starting power. This means it will take less time to recharge.

Gell Cell – These batteries use the same technology as the aforementioned batteries. The difference being, they contain gel inside rather than water. This battery is better suited to sailing vessels where the vessel spends a lot of time tilted to the side. Since these batteries contain gel and are sealed, they are perfectly suited to this use. They will not leak water or acid when off centre.

Like the deep cycle and cranking amp batteries, these batteries will also give off gas when charging. This gas is captured and recombined in the battery and is known as the oxygen recombination cycle. However, these batteries have a vent or valve to allow gases to escape if internal pressure exceeds a certain threshold. Otherwise if the charge rate was too high, it may result in case rupture or internal damage.

Ratings

Every battery, regardless of whether it is a car or marine battery comes with a rating. This rating relates to the job they are intended to do.

Cold cranking amps refers to the power output, or the amount of power required to start a motor. This is the number of amperes a fully charged battery can deliver at -18degC for 30 seconds while maintaining a voltage of at least 7.2 volts. This is for a 12 volt battery.

Cranking amps refers is the number of amperes a fully charged battery can constantly deliver at 0degC for 30 seconds while maintaining a voltage of at least 7.2 volts. This is also for a 12 volt battery. This is also referred to as marine cranking amps (MCA). The cranking amps required to start an outboard are usually less than that required to start a car. However, there are some exceptions when it comes to some of the larger motors.

Batteries also have a reserve capacity rating. This is basically the number of minutes a fully charged 12 volt battery at 26degC will discharge 25 amperes until the battery drops below 10.5 volts. This is the point at which the battery needs to be recharged. The reserve capacity also depends on the current draw from the appliances you are running off your battery.

Ampere Hours (Ah) are the amount of time from the start to the end of discharge, multiplied by the discharge current. Say a battery can deliver 10 amps for 5 hours; its 5 hour rate is 50 Ah.

'Open' and 'Closed' Batteries

With batteries you have either open or closed types. Open means you have access to check the water levels. Closed batteries (sealed lead acid) mean you do not. Simple as that. With larger closed batteries you usually get an indicator that shows as green when good or as red or black when not.

When batteries are charged via an alternator or other charging device, they heat up a little and this causes some of the water within the battery to evaporate. With an open battery, you can top up these levels. With a closed battery you cannot replace the lost water. One other thing to note with a closed system is that when this heat and evaporation occurs, pressure also increases. This can cause a problem if over charging. It is probably advisable to use an open battery system when using a cranking amp or deep cycle battery.

Beginning with Batteries...

The basics; types, systems, charging

With a gel cell, and the system being totally closed, the biggest problem is over charging. A gel cell battery can only be charged to 14.3 volts, Anything over this may cause a rapid breakdown within the battery. The advantage of a gel cell battery is its quick discharge and quick recharge capabilities. When connected to a high charge alternator, this type of battery may take as little as half an hour to one hour to recharge.

Setting Up

When it comes to setting up your boat's battery system. Smaller boats that run on only one battery should opt for a multi-purpose battery. This is a battery with properties of both the cranking and deep-cycle battery. This way you have enough cranking power for starting and the reserve time is longer. Remember, this means more time for running your accessories with the engine off. When purchasing a new battery, ensure you refer to your outboard handbook for the correct sizing.

For larger boats that have the room, a better system involves using two batteries and a battery switch that allows you to run either one battery or both batteries simultaneously. The best way to set this up is to use a cranking battery (#1) as the starter battery and a deep cycle battery (#2) to run your accessories. During your day on the water you would start your engine with #1 and run your accessories with #2. When it's time to head home, start the engine with both #1 and #2 selected on the switch. This will recharge both batteries at the same time while you're underway.

There is a much better way to handle this though; installing a VSR (or Voltage Sensing Relay). For any dual battery system the most important thing is that the engine starting battery is fully charged. This is the job of the VSR. It does this by staying open during engine starting, isolating the electronics from most spikes, and remains in the open position until the starting batteries voltage reaches 13.7 volts. Upon reaching 13.7 volts, the relay closes. This then allows both batteries to charge together. When the engine is switched off and the voltage drops below 12.7 volts, the VSR re-opens, thus separating the two batteries leaving the starting battery safely isolated and fully charged. Without a VSR installed, batteries may only become partly charged which may result in not enough charge to start the motor.

For larger vessels such as launches, the best way to set up the battery system is with dual battery banks with the addition of an isolator. An isolator is a diode that allows both batteries to be charged simultaneously with neither affecting the other. These systems require a separate feed from an alternator. As there will be a voltage drop through the diode, an alternator with a sensing cable after the diode is required to ensure the battery is fully charged.

Safety First

Whenever you install a battery or do any work on battery systems, safety is your number one concern. Batteries can have pressure and contain hydrogen gas which is explosive. The acid can also burn skin and eyes. This can lead to danger if handled incorrectly. Always wear a form of eye protection when handling batteries. Wash well after handling your battery.

For a battery system to work properly, the polarity must be correct. This means positive (red) to positive and negative (black) to negative. Always connect the negative (black) first. As with a car battery, connecting the negative wire last can cause a spark. A spark may ignite any gas escaping from the battery and cause an explosion.

Battery Aging

As batteries age, their maintenance requirements change. This means longer charging time and/or higher finish rate (higher amperage at the end of charge). Usually older batteries need to be watered more often. And, their capacity decreases.

Letting the acid level fall below the top of the plates will kill a battery quickly. Use distilled water to top up batteries. If distilled water is unavailable, tap water is an okay substitute if it's clear, not 'hard' and non-chlorinated. Let the cold tap run for a minute or so to clear metal ions out of the pipes and use a well rinsed glass or plastic container to transfer.

What Happens to Dead Batteries?

Lead acid batteries are 100% recyclable. Lead is the most recycled metal in the world today. The plastic components of old batteries are neutralized, reground and used in the manufacture of new batteries. The electrolyte can be processed for recycled waste water uses. In some cases, the electrolyte is cleaned and reprocessed and then sold as battery grade electrolyte. The sulphur content may also be removed as ammonia sulfate and used in fertilizers. The separators are often used as a fuel source for the recycling process.

You can take your old batteries to the battery retailer, service station, battery manufacturer or collection centre for recycling.

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