

Elements

By Kevin Pegg

Battery Power

Love them or hate them, batteries are a reality in most off-grid power systems



The sooner you make peace with — and have a common understanding of — your batteries, the sooner you can spend time on leisure activities. After all, that is why you have a cottage in the first place, right?

Types of Batteries

There's much confusion out there as to what the best batteries are for your application. Let's start with what you do want: A motive power deep cycle battery. Motive power implies these cells are designed for an electric vehicle — such as a golf cart or a forklift — which operates in a similar environment as off-grid users (i.e., slow discharges over a long period of time, and long charge cycles). The six-volt golf cart batteries and two-volt forklift cells are common.

The two-volt tubular motive power cells will offer you the longest life. Generally speaking, they are twice the cost up front of an equiva-

lent capacity six-volt bank. Over a 20-year life of these cells, they are half the price.

A starting battery is completely different in design. Its purpose is to deliver a large amount of current for a short amount of time and to be charged right back up again (once the engine starts). As anyone who has drained their car battery will attest, do that a few times and it's time to buy a new battery. Yes, this does mean the large 8D or 4D caterpillar battery (which is designed to start a large engine) is the wrong battery for you. A lot of people use them, but that doesn't mean it's the right battery for the application.

Caution: The phrase "deep cycle" is often misused by people wanting to sell you batteries. Keep in mind battery companies make money by selling batteries! If the battery has a Cold Cranking Amps (CCA) rating, it's not deep cycle, pure and simple. Run rapidly in the opposite direction from anything that says "Marine" or "RV" on it.

They are a compromise between starting and cycling, and does neither particularly well. You will pay too much and be shopping for new batteries within a year.

For those who just know they won't maintain their battery bank properly, sealed maintenance free batteries are an option. Prices have dropped significantly, but still expect to pay a lot more than regular golf cart cells.

Used Batteries

When someone asks my opinion on buying used batteries, my first question is, "Are you a gambling person?" Most people respond negatively. I then ask, "Would you take the money you plan on spending on this used bank and run down to the casino with it? What would your spouse say on the matter?" Statistically speaking, I will offer this anecdotal survey: 10 per cent of people end up with a great deal on good batteries with many

years left, 30 per cent of people end up with an OK deal on batteries with some life left, and the remaining 60 per cent end up with a toxic liability on their hands. I had a client, so very proud of his 4000 lbs of used telecom batteries. When load tested, he had the equivalent capacity of two golf cart batteries weighing 120 pounds.

Maintenance

Like most devices, preventative maintenance goes a very long way for batteries. Perform maintenance at the start and end of each season, at least every three months if you enjoy a long stay at the cottage. Since you are working with dangerous, corrosive and explosive chemicals, extreme caution must be exercised. Wear goggles, gloves, protective clothing (rubber aprons are ideal) and no jewellery!

Charging

It's important that your batteries are being charged at the proper rate. Always refer to battery instructions and ensure your charge controller, inverter, etc., are all charging at the proper voltage/current. The default setting on most controllers and inverters is such that it will not damage the batteries, but may not be charging them optimally.

If you are charging with a generator, ensure you have a large enough battery charger. Most automotive type chargers are not suitable, and are much more expensive than the proper chargers. Modern inverters have very robust and programmable chargers integrated.

Monitoring

Most of us would not want to drive a vehicle with no fuel gauge or speedometer. Your battery system is no different. And much like the fuel gauge isn't located in the trunk of your car, your battery monitor should be somewhere visible by all — not buried in the electrical room. These items range from a very basic volt reading, to more advanced state-of-charge (i.e. your batteries are at 75 per cent) meters. By ensuring you are not cycling your batteries too deeply, you will extend the life of your batteries. A meter will also help you predict pending failure. Some of the new meters can also be web-enabled, so that you can monitor your battery voltage remotely, or be notified if they are too high or too low voltage.

Installation Issues

Batteries of the non-sealed variety produce hydrogen when under use. Hydrogen is both

explosive and corrosive, but not toxic. Avoid breathing it all the same. These batteries should always be housed in a protective enclosure. It keeps them clean and keeps kids and animals out of harm's way. If the enclosure is properly sealed, it's easy to vent the battery box. As hydrogen is lighter than air, all you need to do is provide a vertical exhaust path. Central vacuum plumbing is a good option. An intake at the bottom on the opposite side of the battery enclosure will allow it to self-vent. Some situations do require a power-assist vent — such as when horizontal runs are required, or very large battery banks.

Under-sized wiring is a common installation no-no. Keep those wires fat and tight. Interconnects between batteries should be sized at least as large as the largest conductor in the system — 2/0 or 4/0 wire typically.

All your loads connected to batteries must be fused. Inverters, lights, and pumps — they all need fusing. Think of fusing like insurance. You hope you don't need it but, when you do, you are glad you paid for it.

There are many other considerations around batteries. Make sure you are working with a quality installer who knows what he is doing. Ask for references and photos from previous installations. As with most things, investing time in proper maintenance will save you from future headaches and expenses. ☺

CLEANING TIPS

- Dirt and moisture on the top of cells can cause them to self-discharge.
- Any corroded terminals should be disconnected and cleaned with a wire brush.
- Petroleum jelly (Vaseline) will help protect against corrosion.
- Inspect all wire connections and repair any damaged ones.
- Electrolyte levels should be inspected and topped up with distilled or reverse-osmosis water.
- Perform an equalization charge. This is a controlled overcharge. You should always follow the manufacturer's instructions, as charge characteristics vary from battery to battery. If your battery supplier does not provide you with instructions for this, consider another supplier!



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