

RV 12 and 120 Volt Electrical Systems

Last updated October, 2022

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12-volt Stuff

I recommend you upgrade your RV battery bank to a pair of 6 volt "golf cart" deep cycle batteries size GC-1. You should get at least 5 nights camping out of these without running a generator or plugging in to recharge them unless it is cold and the furnace runs a lot. If you are so inclined, you can also use a solar panel to recharge them but although the price is coming down, in my opinion, they are not yet cost effective compared to a good inverter style portable generator or a built-in genny.

If you have the space, 4 6-volt golf cart batteries are even better. It is important to use batteries from the same manufacturing batch. Don't mix and match batteries made a long time apart, from different manufacturers or of different capacities. The weak one will discharge the strong one and leave you with less usable power. Generally, two 6-volt batteries will give you significantly more usable power for longer than will a pair of 12-volt batteries.

The 12v system feeds your interior lights, smoke and propane detectors, the brains in your fridge and hot water heater, and the thermostat and fans in the furnace. The 120v system feeds the roof air, TV, microwave, toaster oven, coffee maker and so on.

Transfer Switch

The transfer switch automatically transfers (hence the clever name) the source of the RV's power between your 12v battery bank, the shore power cable when plugged into the campground, and a running generator. You'll sometimes hear a thunk when it switches. It sends the power from either source to your converter. The converter takes 120v in from the outside world and feeds the 120v systems with a pass through and it feeds the 12v systems, including a battery charger which is built in. If there is only 12v coming into the converter, it just passes it through to the trailer's 12v systems and the 120v systems don't work.

Converter (120v to 12v)

Most RV manufacturers build in the cheapest components they can find in order to sell at the lowest price. That's why original equipment is usually a single 12v battery instead of two 6v ones. The converter is no different. Chances are you have a low cost unit with limited battery recharging capability (when plugged into 120v power). The converter is a rectangular metal box, usually dark brown, with a door or panel that can be opened or removed. Inside are circuit breakers for the 120v systems and fuses for the 12v systems. There is a label on the door with the specifications.

You need to determine the total 12-volt DC amperage it can produce (30, 50, etc) and the maximum it can send back to the batteries to recharge them. The original equipment converter in our last motorhome had an output of 55 amps which is lots. The problem was that it could only send 1.5 amps to the batteries. It was useless as a battery charger so I upgraded the internals of it

to a 40 amp charger out of a 60 amp system total. Less than a half hour a day of generator time recharged the batteries nicely. That's about the time needed to make coffee and toast. The upgrade is easy enough to do and half the cost of a whole new unit. You can order it on line or through eBay like I did or check around the RV parts stores in town.

Inverter (12v to 120v)

Another toy that you might find useful is an inverter. This little box takes 12 volt DC power and magics it into 120v AC power. There are cheap ones called modified sine wave which will run most things like an electric chain saw. For electronics such as computers or televisions, you should use a true sine wave model. This is the type of power that comes out of a generator or a household circuit. They are also expensive and I think if you need clean 120v power, buy a generator. One other thing about inverters, they are power pigs. Most are in the 70% efficient range and Ohm's law applies. To get 10 amps of 120V AC power (1200 watts), you will draw 100 amps of 12v DC power, plus the 30% loss or some 130 amps out of your battery bank. You'll drain them pretty quickly. Buy a generator.

Generator

Portable generators have a habit of getting stolen so make sure it is welded or chained down. If you can get one with a remote control, it is worth the extra few dollars. Do you really want to go out in the rain to manually start your portable generator so you can make your morning coffee? Remotes are good!

Also, while I think of it, genny ratings are usually for peak power, not continuous output. The Honda 3000 for example puts out a full 3,000 watts for a few seconds to allow a big roof air to start, then reduces its power output to 2,600. We have a 5,500 watt genny and it cannot start both roof airs at once. The power management system delays starting the second one until the first is running smoothly and drawing less power.

Recharging 12v

The 12-volt power systems that run your RV and those that run your engine and other automotive systems do not talk to each other. Both are recharged via the alternator on the engine in motorhomes. Some but not all trailers are also recharged from the tow vehicle's alternator. If not, you need to connect to shore power or to a battery charger to get them ready for your next trip. You should recharge them as soon as practical because lead-acid batteries don't like to be stored with only a partial charge and will punish you with a shorter lifespan.