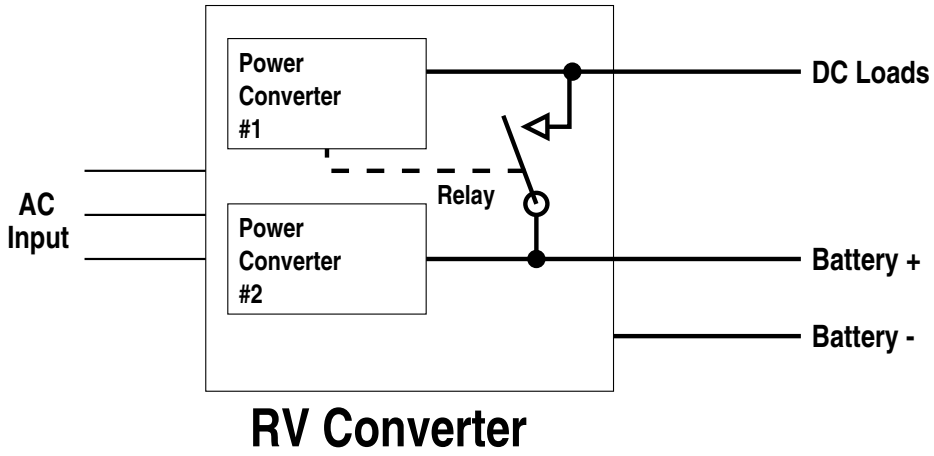
Ample Power Company



RV Converters

A Very Bad Idea!

Despite their wide spread usage, we happen to think that the RV Converter is one or the worst electrical ideas. We'd be interested in knowing what arguments led to its acceptance as part of an RV electrical system.

The Case Against the Converter

The sketch shown above shows the major blocks of a converter. Inside the box are two power converters that take AC power and convert it to DC. An isolation/step–down transformer is used to prevent shock hazard and to reduce the AC line voltage to 12 Volt DC levels.

Power Converter #1 is the main power converter and has to be rated for the maximum current that the DC loads can draw. Short term overloads end up with sags in power which can cause lights to dim, and maybe reset some of the microcomputers in clocks and other appliances.

Power Converter #2 is rated much lower than #1. Its purpose is to supply a trickle charge to the batteries when connected to AC. Converter #2 is poorly regulated, and will destroy most batteries if AC power is present for too long. Destruction will result from over or under charge. As a low power trickle charger, Power Converter #2 is practically worthless if you're running a generator to charge batteries.

Relibility Issues

The relay shown in the converter connects the DC loads to the battery whenever there is no AC present. That is, AC holds the relay open so that the battery and DC loads are isolated. Using a relay in load distribution circuits just adds another failure point to the system. When you are on battery power the relay contacts may get welded together by a huge DC load. If that happens, then the batteries will be seriously overcharged by Power Converter #1 the next time you hook up to AC. Hopefully there will be breakers or fuses to tell you there is a problem, because otherwise your first indication might be the smell of battery acid.

Of course the relay can fail in an open mode. That is, the contacts could get carbon build up from the arcs that occur everytime the loads are transferred to the batteries. If that happens, you'll lose all DC power once AC is disconnected.

Inefficient Power Delivery

Another design flaw with the converter prevents maximum utilization of Power Converter #1. If DC loads are minimal, the excess capability of Power Converter #1 is wasted, where it otherwise might be used to charge the battery faster.

The major faults are summarized here:

- DC loads cannot exceed the capability of Power Converter #1.
- Power Converter #2 is poorly regulated.
- Power Converter #2 is only good for trickle charging.
- Relay in load distribution reduces system reliability.
- Failure of the relay may go unnoticed, causing battery problems.

- Power Converter #1 can't supply battery power when the DC loads are light.

Retro–fit Suggestions

What can you do about the RV converter? Call your local recycler and have them recover the copper wire in the transformer. There's no fix that can be done.

To retrofit the system with minimal effort, remove the converter and connect the DC load and Battery positive wires together with a good connector or distribution post. In place of the converter, install a good smart charger that can not only supply power to the DC loads when connected to AC, but also provide a reasonably fast charge to the batteries.

Rating the charger depends on how battery charging is mostly done. If you're charging from a generator, we presume you want to minimize the charge time. This calls for a bigger charger than if most charging is done from utility power and you have 8–10 hours to charge.

For generator fast charges, select a charger that can provide at least 25% of battery capacity, that is 50 Amps for a house bank of 200 Amp–hours, (two golf cart batteries). Keep in mind that the charger can't deliver 50 Amps to the batteries if you're using 20 of them to power DC loads.

If you're using gel or AGM batteries, and you will be if you're interested in fast charge rates, then size the charger for 50% of battery capacity. Using two 55 Amp Ample Power Smart Chargers on a house bank of two Group 31 or two 6 Volt GC2 batteries will minimize generator run time, and assure you of power for DC loads during charging.

And they lived happily ever after!

If you want to live unplugged from the AC power pole, the RV Converter has to be removed and replaced with a Smart Charger. If you want to run the generator for an hour everyday, you'll need an appropriate battery bank and a charger to match. More information about system design can be found in the Ample Power Primer. Just remember, buzz words don't charge.

To manage the system, you will need a minimum of voltage, current, and Amp–hour information. Without this information you won't know when to charge, and when to stop charging.