Chapter 2
Power Sources Answers

Batteries

Your batteries are the **central hub** of your power system.

They are the only power source that **stores** energy to be used for later when no other power sources are available.

Ways to charge batteries:

- **Shore power**
- **Generator**
- **Solar**
- **Towing**

The most common battery type is **lead-acid** or **AGM**.

These batteries are **cheap** and **dumb** (in a good way).

Qualities: They are **big**, **heavy**, **inefficient**, and they need to be **vented** to the outside.

Use **lithium** batteries for extended off-grid stays.

Qualities: They are **smaller**, **lighter**, **sustain** their power,and don't need to be **vented** to the outside.

Lithium batteries need a **brain or BMS** to protect them.

The size of your battery bank will affect which **appliances** you can run, and how **long** you can run them for.

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Shore Power

When connected to a 30-amp or 50-amp pedestal at a campground, it enables **120-volt** power natively throughout the rig. Here's what happens:

- All your household **outlets** are energized.
- Certain appliances switch over from **propane** and from 12 volt to 120 volt.
- You can run high draw **appliances** like air conditioner, microwave, and convection oven.
- Your **converter** converts the 120-volt into 12-volt power to run low voltage appliances.
- Your converter charges the **batteries** until full.

Generator

A generator is just a tiny, portable **engine** that runs on gas or propane to create energy.

Contractor or open frame generators create big nasty raw power.

Inverter generators not only have built in inverters, but create very clean and stable power.

Your generator's **wattage** output will determine what you can run inside the RV while connected.

Generators do create **noise** and **exhaust** fumes which can bother your neighbors.

Some campgrounds have specific **policies** around generator usage.

Did you know that **elevation** altitude affects your generator?

You'll lose 10 percent of the rated output every time you gain **3,000** feet in altitude.

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Tow Vehicle Pigtail

Here's what happens when you connect your pigtail to your tow vehicle:

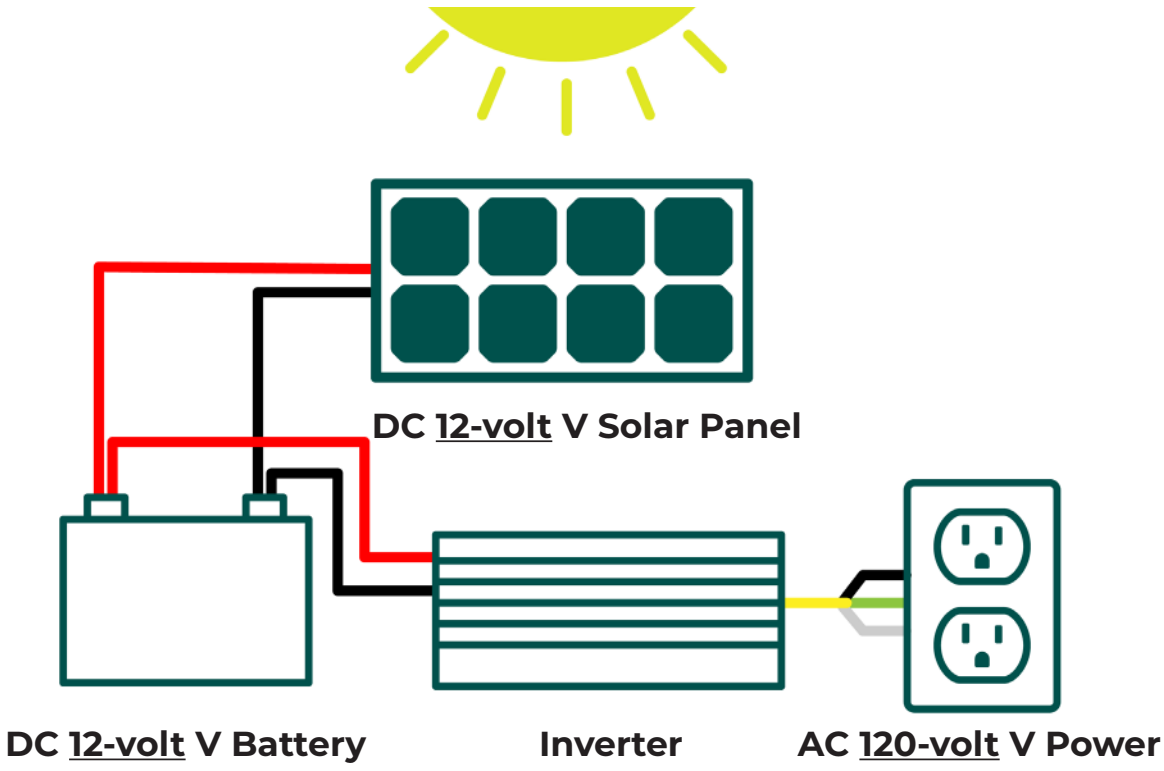
- It enables **running** lights, turn **signals**, brake lights, and **reverse** lights on the RV.
- The vehicle can communicate with your RV **brakes** to slow down more safely.
- It connects to your RV **battery** to trickle charge.

This trickle charge doesn't provide any **meaningful** charge, so don't count on it.

Solar

Solar panels are just creating **DC** power.

AC appliances you want to run are still limited by your **battery** bank and **inverter** size.



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Solar (Continued)

Invest in a **solar** charge controller. This will make sure you charge and float your batteries safely at the correct voltages and don't overcharge them.

A single 100-watt panel can put out up to **5** amps per hour at its peak.

Clouds and **shade** will affect the output of your panels.

Can I run my air conditioner with solar? **It depends**.

Technically, you can build a power system in your RV that can run your A/C. Let's say you have a small 13,500 BTU RV air conditioner. Here's how much power it needs:

- On startup, it uses up to 3,000 watts
- It continuously uses 1,500 watts
- This translates to about 150 amps per hour from your batteries

To run A/C on solar, you'd need:

- **2,000** watts of solar panels
- **800** amp hours of lithium batteries
- A **3,500** watt inverter or larger
- All new larger gauge trunk **wires** to handle the voltage increase
- Not to mention all the other parts of the system, like a **BMS**, solar charge controller(s), and more

The easiest way to add solar is to get a **ground deploy** panel or solar **suitcase**.

The best long term solution is to **mount** as many panels as you can on the **roof**.

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Propane

Propane gives you the option of making food and staying warm while using virtually **no** power.

You can find propane easily at many **gas stations**.