

## Planning for Solar Power

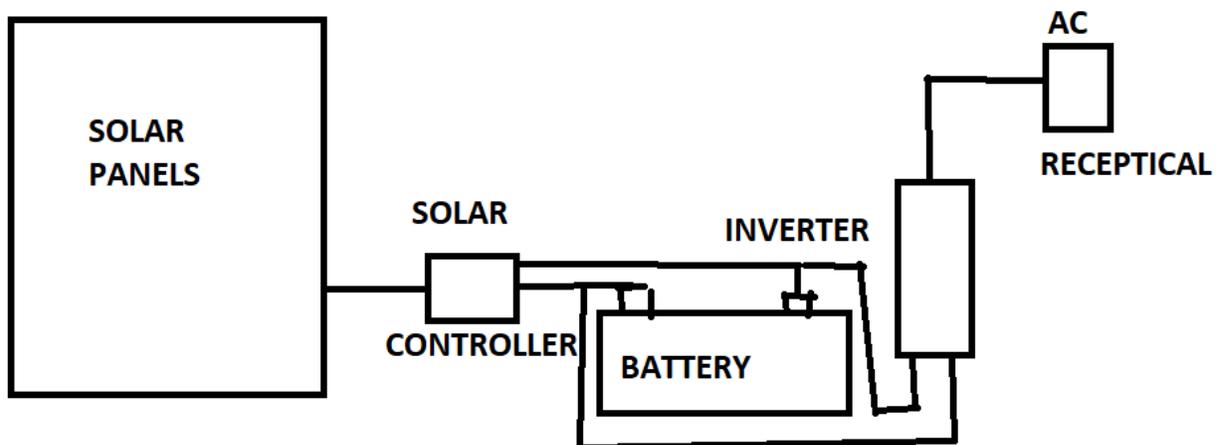
Here is a method of planning for Solar power. I used it a few years ago to size a system for my son's shed on property he was to build on. He had a nice 20x40 shed and wanted lights inside for when he would visit after dark. After wiring the shed, we used a small generator but it took longer to set the generator up than the time spent in the shed so a different solution was needed.

Step 1: Determine the load.

He wanted to use 6 LED shop lights, each drawing 0.1 Amp of 120 Volt power. So the load was 72 Watts of 120 V power. We estimated that he would use it for a maximum of 3 hours per night.

Step 2: System plan

The Solar system would charge a battery which connected to a 400 Watt inverter (which we had at the time) and feed 120 V power to the AC Panel.



Step 3: Size the battery:

We planned on the inverter being 50 % efficient so to deliver 72 Watts. It used 144 Watts of 12 v or  $(144/12 = 12 \text{ Amps} \times 3 \text{ hours} = 36 \text{ Amp-Hours})$ . I found a 100 Amp =Hour Battery at a Ham fest for \$100. Still have it today on my camper.

Step 4; size the Solar Array:

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So if we used 36 Amp hours per night, we would have to put it back during the day. I used 6 hours of daylight to charge the battery so the array had to be  $36/6 = 6\text{Amps per hour} * 12\text{ V} = 72\text{ Watts}$ . A 100 Watt panel setup from Harbor Freight would fit nicely,

### Implementation:

We mounted the panels on a makeshift platform about 2 feet off the ground on the South side of the building. Ran the Solar DC wire into the shed. inside the South wall we placed the Battery on a 2x8 to keep it off the concrete, connected the inverter and made a cable from the inverter output to a nearby 120v receptacle. We connected the battery to Solar controller. We verified the outlet being fed was on the same circuit as the lights and turned on the light switch. The inverter started singing and the lights came on. Lastly we plugged in the solar panel to the controller and measured the battery voltage, 13.6, perfect.

For the first few months we checked the battery voltage monthly but after 3 months of full charge readings we stopped. We used this system for 3 years until he built a house on the property and fed the shed with 60A 220v power.

### 12 Volt only load:

If you are only having a 12V load, say a string of LED lights that draw 0.5Amp but want to run them all night, you should use a switch of some kind to turn on after sunset and off at sunrise or a timer. if you plan on a 12 hour run, that would be 6 Amp-Hours, your battery should be at least 12 Amp-hours so that you don't deplete it more than  $\frac{1}{2}$  way. Panel size needs to be  $6\text{AH} * 12 = 72 / 6\text{hrs of daylight} = 12\text{ Watts!}$  More is better.