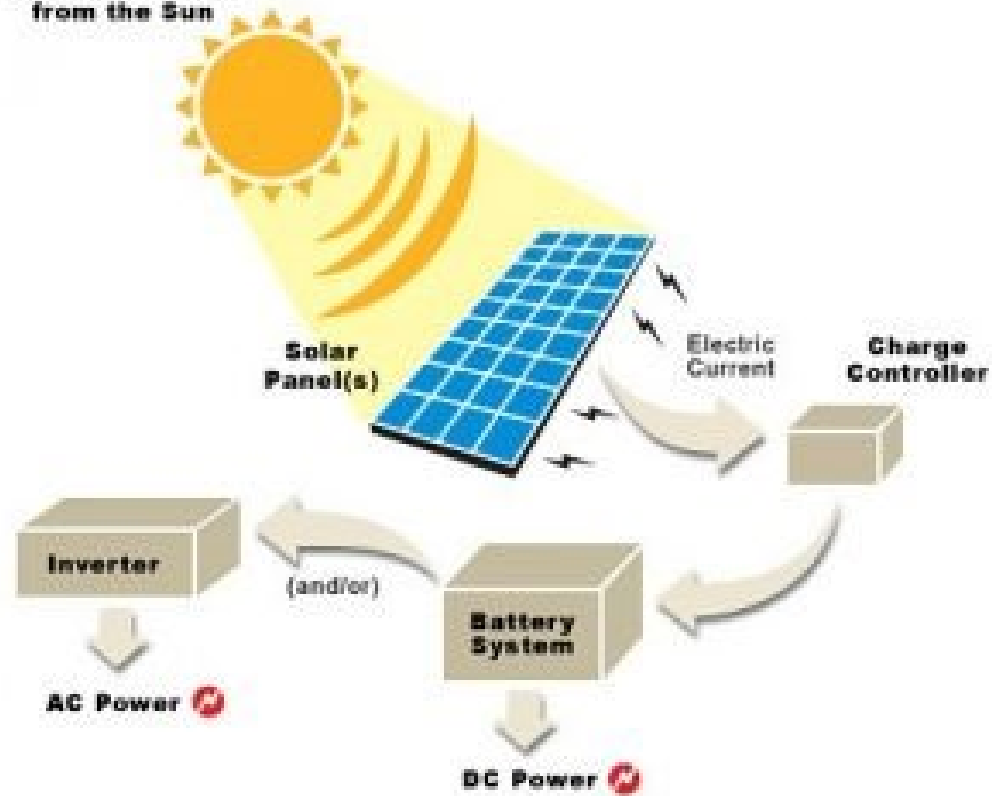


Solar Irradiance
from the Sun

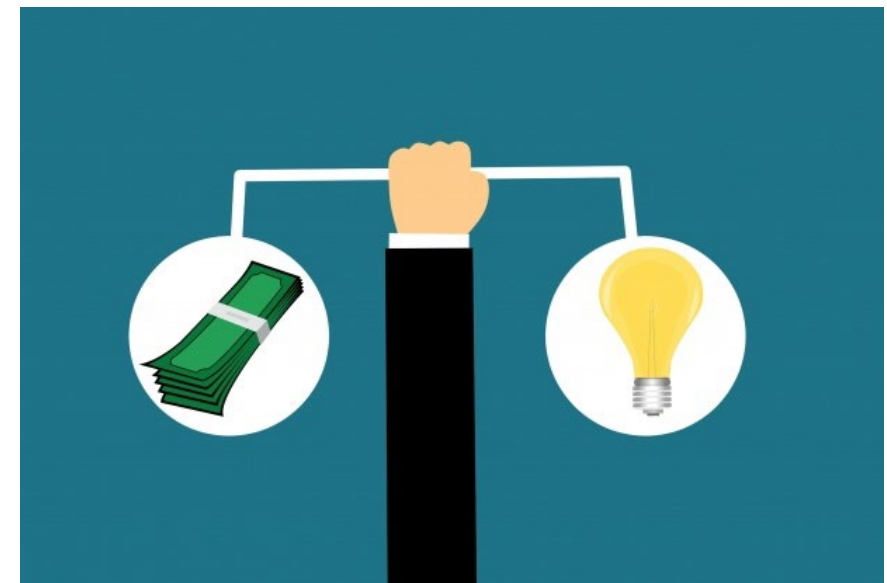


Solar Power for your Station

How to add solar/photovoltaic
power to your ham radio station

Step 1

- Determine your power budget.
 - How many radios and peripherals will you be powering?
 - What is your duty cycle, (how much time do you transmit, receive, offline)?
- What is your financial budget?
 - A typical installation can cost \$2000 or more.
- Do you live in an area that receives abundant sunshine?
 - Are there lots of trees, other buildings that would block the sun?
 - Do you have HOA rules that would affect the installation of solar panels?



Terms

- Amps: current flow in a wire
- Watts: current times voltage, Ohm's Law stuff
- Amp-Hours: Battery Capacity to produce a 1-amp supply over several hours
- Watthours: amp-hours times voltage, more Ohm's Law stuff

Step 2

- Site Survey

- The process of deciding where to mount the solar panels for maximum output.

- House or Shed or pole mounted?

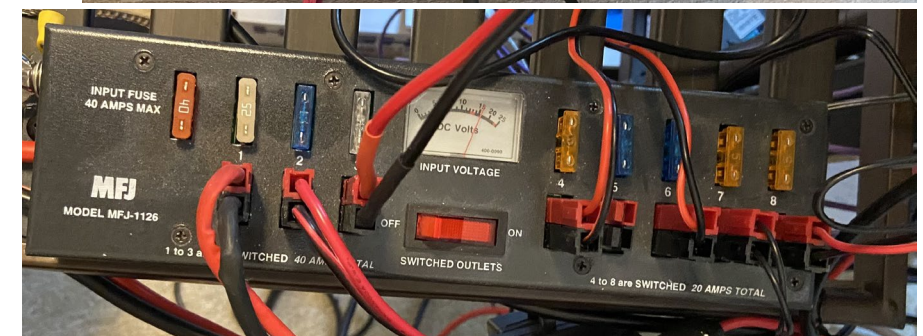
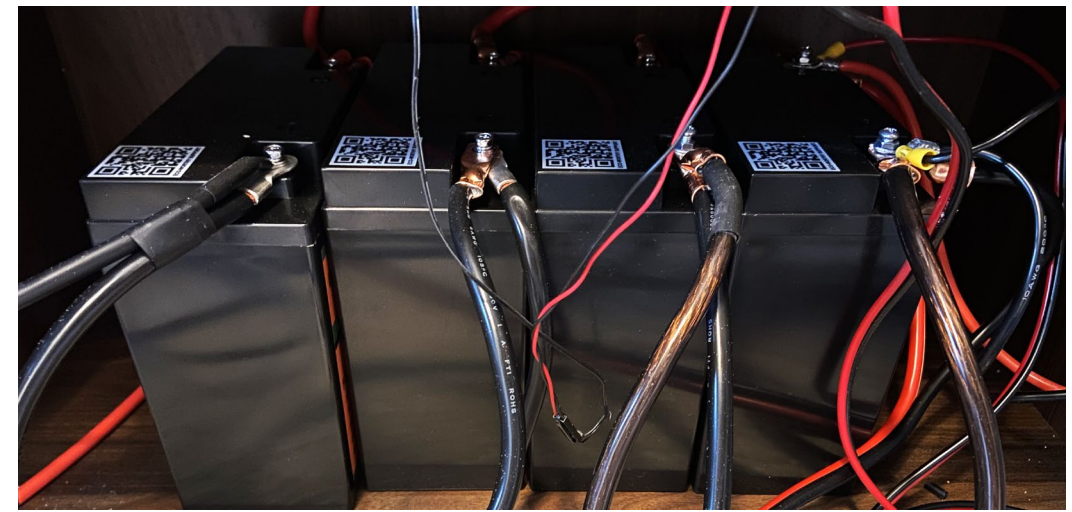
- Wiring

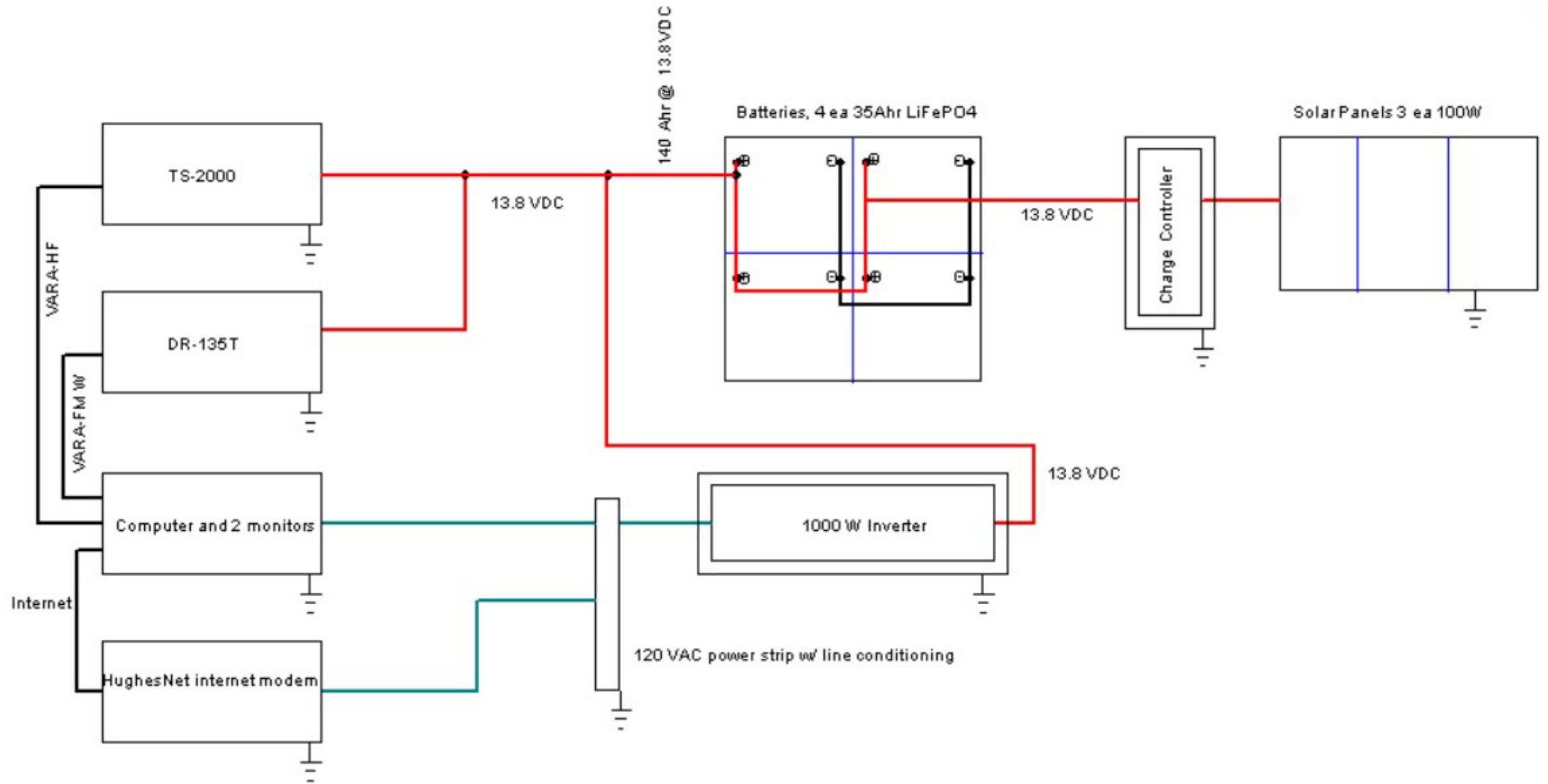
- Use sufficient wire gauge to handle the current safely
 - Typical house wire, 12-2 or 14-2 is insufficient
 - Use 2 or 4 ga
 - Resistive losses are greater at DC than at 60 Hz AC



Step 3

- Design
 - Select batteries
 - AGM or LiFePO4
 - Battery size (capacity) in amp-hours
 - Select Charge Controller to match the type of batteries
 - Power distribution system
 - Proper grounding and bonding
 - Fusing
 - Inverter?
 - Inverters generate RFI
- Draw out your system before you start.





Equipment procurement

- Find a good source for batteries
 - Batteries+Bulbs
 - Amazon
 - Others
- Find a good source for solar panels
 - Amazon
 - Others
- Select the proper charge controller to match the type of batteries
- Purchase a fused power distribution system capable of handling worst-case current load, (all radios in transmit mode at max power, simultaneously)
 - MFJ-1126

Actual installation

- Mount solar panels but **do not connect them!**
- Wire panels in series to increase supply current
- Run wire from charge controller to panels
 - Keep this run as short as possible
- Run wire from charge controller to batteries
 - Keep this run as short as possible
- Connect batteries in series to add amp-hour capacity
- Wire from batteries to power distribution device
 - Keep this run as short as possible
- Ground panels, charge controller, power distribution device to station ground, (you do have a station ground, right?)
- **LAST STEP!** Connect solar panels

Peripherals

- Backup charging system
- Other devices needing 12VDC
- Inverter to provide 120VAC

Safety Concerns

- Keep it safe
 - Don't connect the panels until everything else is properly terminated, fused, and grounded
 - Always assume that a wire is "hot"
 - Current on these wires can reach 60 amps or more
 - Follow the NEC for proper wiring standards
 - This is considered a "low voltage" installation
 - View my presentation "The real dirt on Ground"
 - <https://www.olyham.org/articles/grounding>