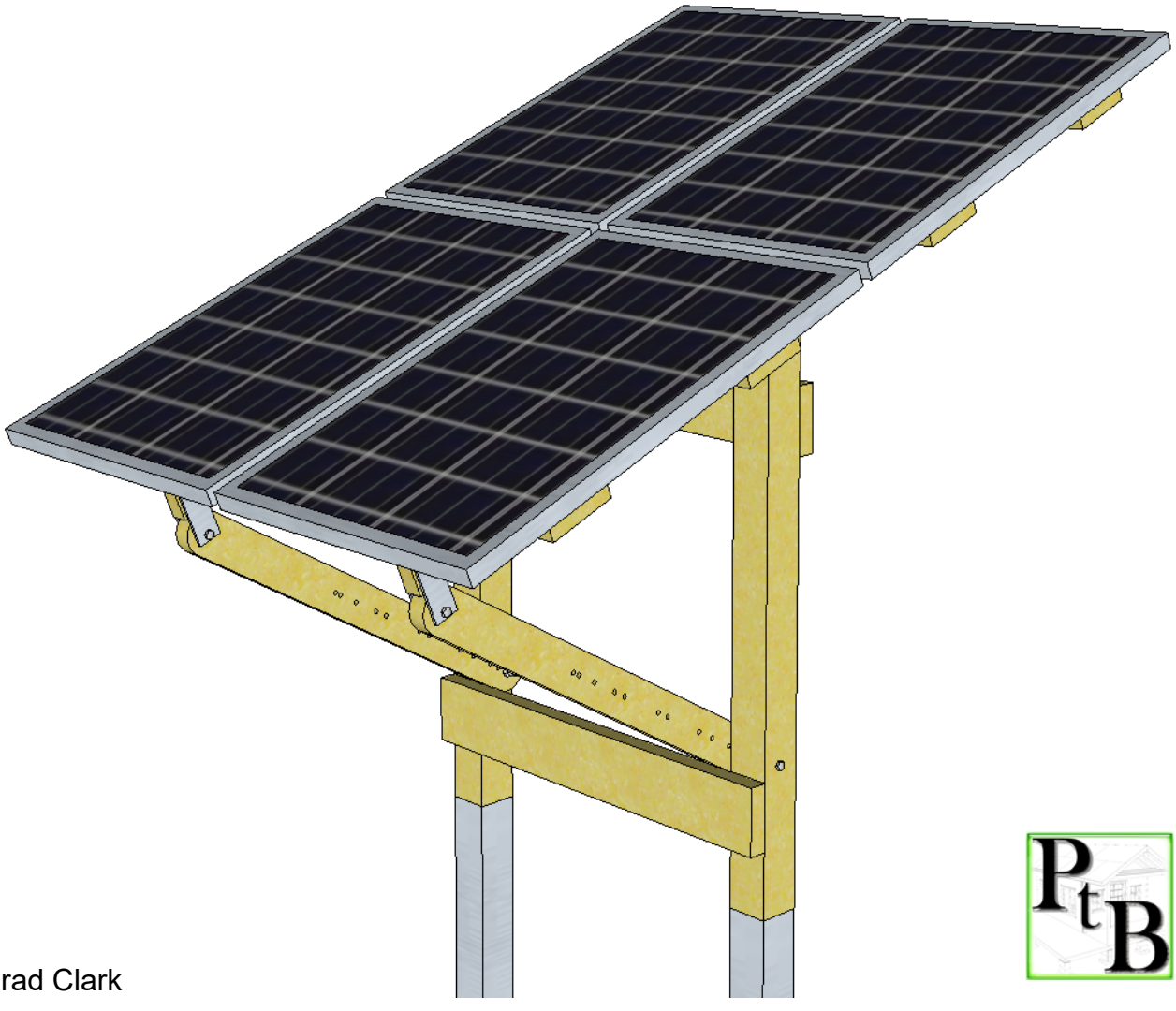
ORIGINAL PLANS

By

Brad Clark

Adjustable Solar Array
12 volt 400 Watt
HQST-100P Modules



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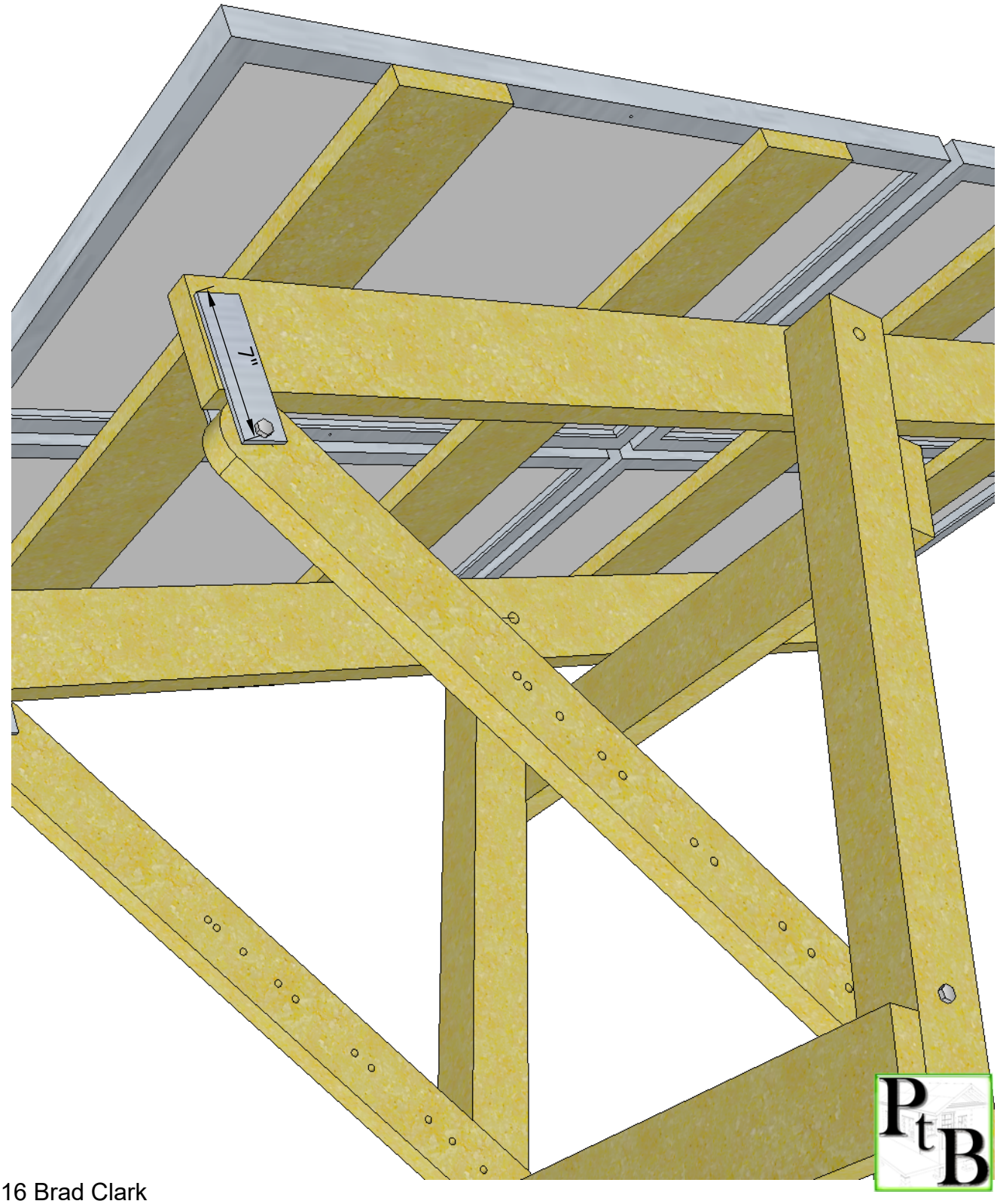
This array has been designed to be adjustable and to be made out of commonly available products at most home improvement stores. For my situation I have decided to set the adjustments to coincide with each month of the year to match my local Lat/Lon coordinates and should provide the most efficient angle per month. It could easily be tailored to your specific area by manually adjusting the angle, then drilling holes in the cross braces for each setting you would like to make. Solar angle calculators are available all over the internet and is what I used to provide the suggested angle for my area.



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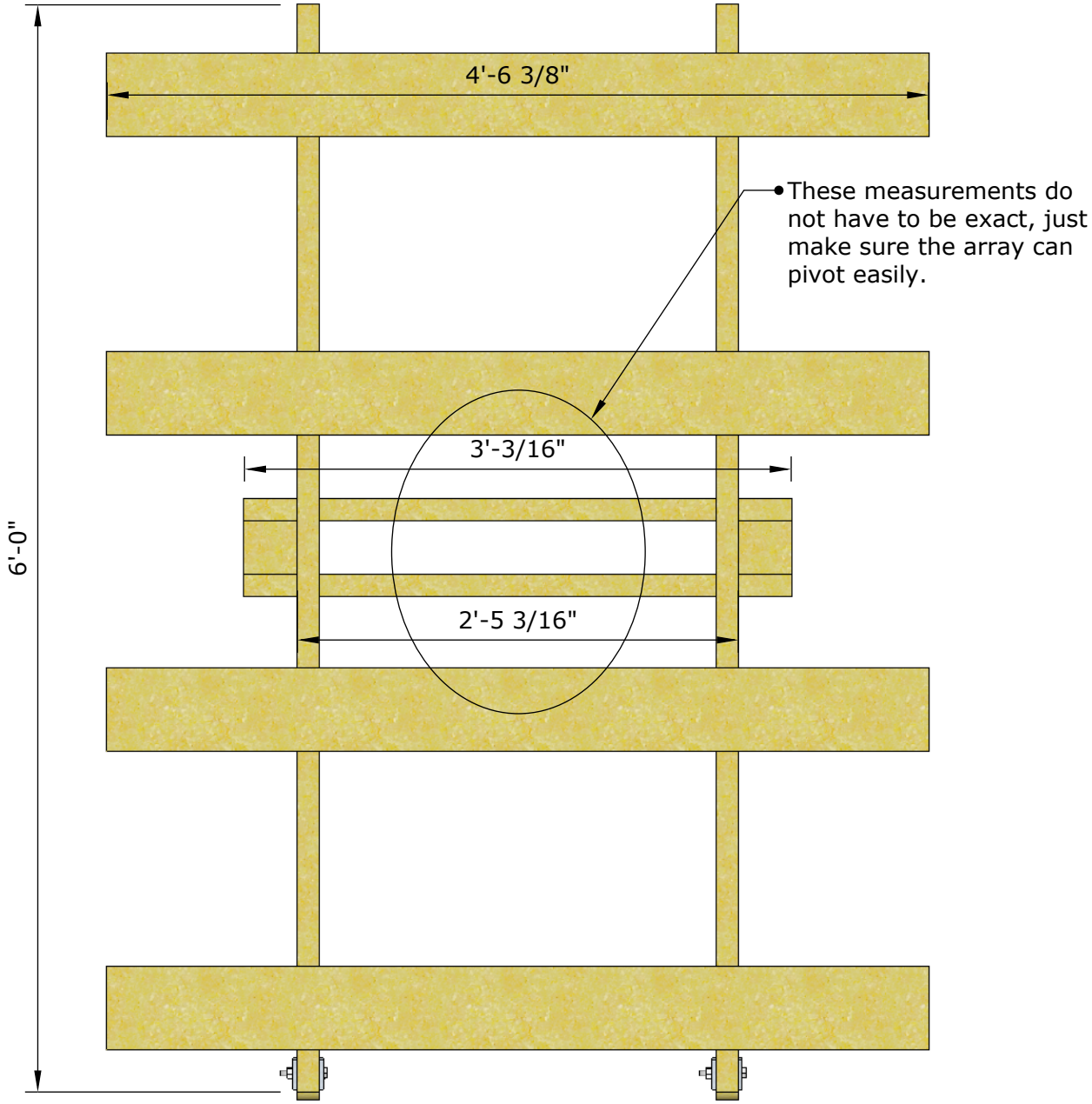
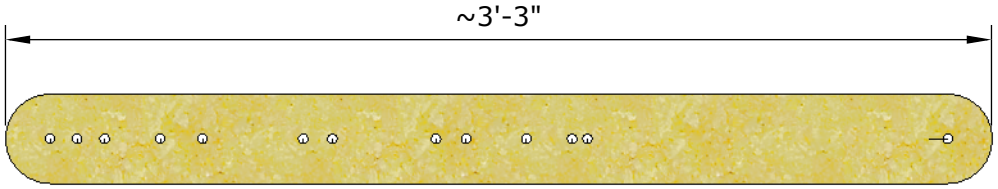
Solar Array Mount



Cross Brace



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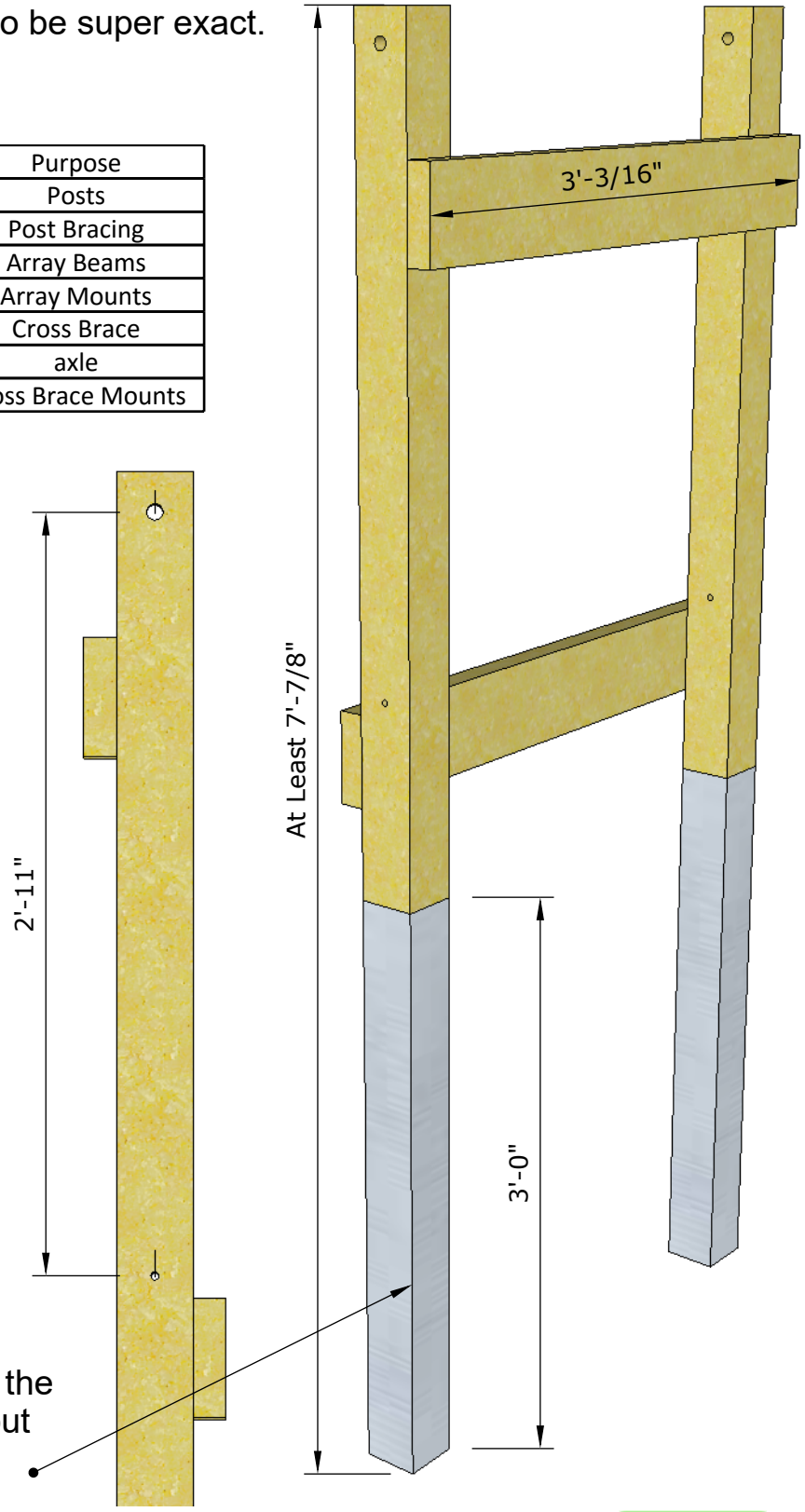
Posts and bracing

The way this thing is designed, there aren't too many measurements that need to be super exact.

Parts List

QTY	Type	Size	Purpose
2	Treated	4x4x8	Posts
1	Treated	2x6x8	Post Bracing
2	Treated	2x6x12	Array Beams
2	Treated	5/4x6x10	Array Mounts
1	Treated	2x4x8	Cross Brace
1	Dowel	48x.75	axle
1	Slotted Flat Bar	3-ft x 1-3/8-in	Cross Brace Mounts

Tools I think I'll need:
Skill Saw
Drill
Drills 7/8, 3/4, 1/2, 3/8, 1/4
Phillips Driver Bit
Extension cord
Post Hole Shovel
Magnetic Base Protractor
Wood Screws
Level
Speed Square



The grey portions of the post indicates the part that would be in the ground. You should shoot for about 3' into the ground if possible and cement them in making sure everything is level.

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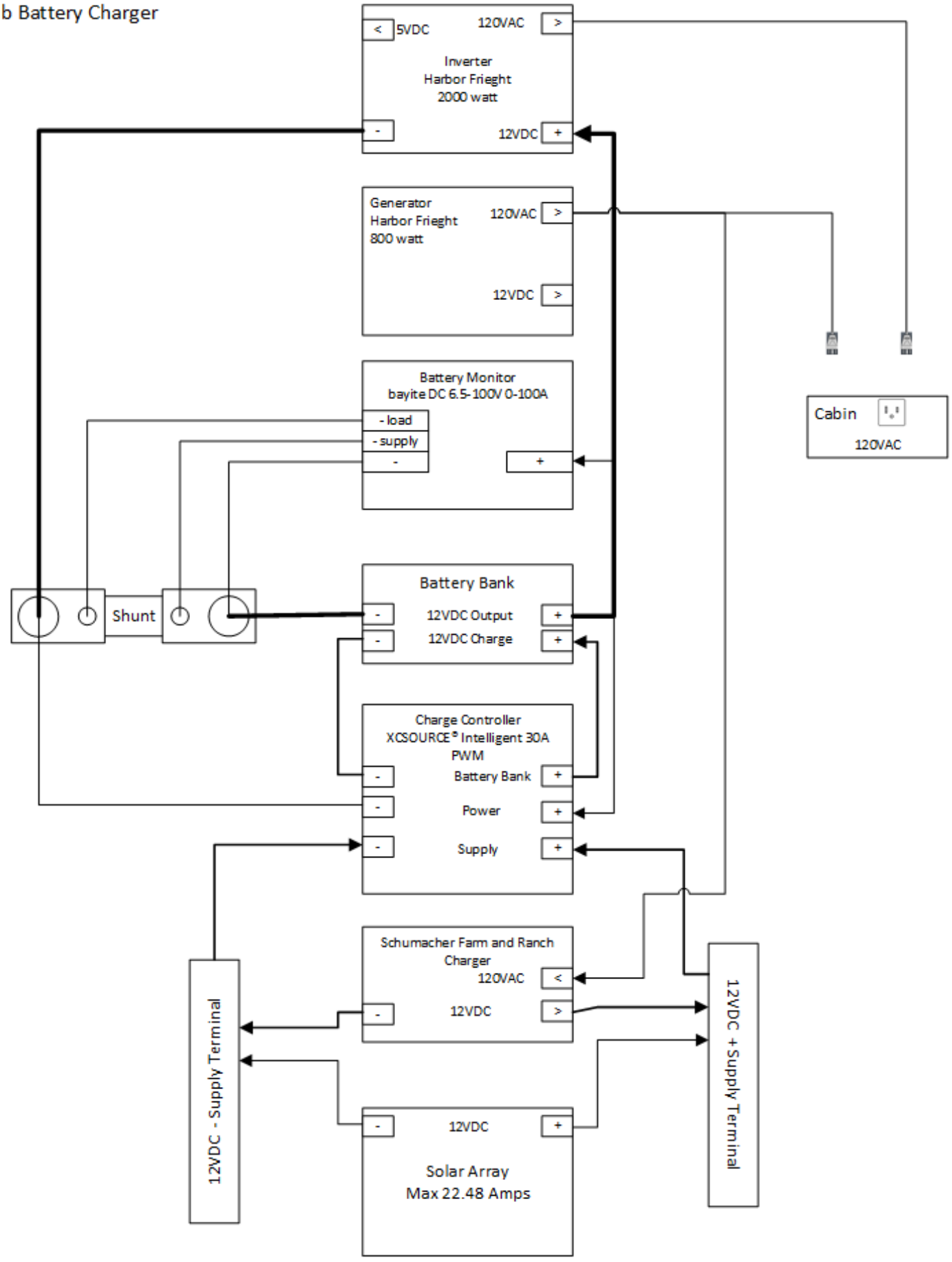
My Power Setup

Rev 1
Using Charge Controller with
Supply from array and
Dumb Battery Charger



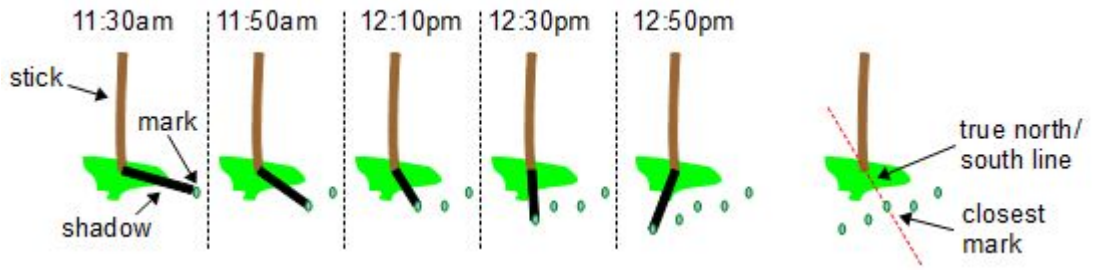
Method 1: The shortest shadow method

Place a stick standing straight up in flat ground on a day when it's sunny out around midday. The stick's shadow will appear on the ground. When the sun is highest in the sky, the shadow will be the shortest it will be that day and it will be aligned with true south and true north.

The stick must be straight up with respect to the center of the Earth and the ground where the shadow will be must be flat and perpendicular to the stick at all points. If the ground is uneven or slanted with respect to the stick then the shadow may be at its shortest when the sun is not at its highest.

To make sure the stick is straight up, tie a weight to one end of a string and hold on to the other end of the string. Once the weight is hanging and not swaying around, the string is now straight up with respect to center of the Earth. Make the stick match the orientation of the string or just use the string itself instead of a stick.

To find the shortest shadow, every few minutes as the shadow moves make a mark in the ground at the end of the shadow. After the shadows start getting longer instead of shorter look for the mark that is closest to the base of the stick. A line between that mark and the base of the stick is aligned with true south/north.
The shortest shadow method for finding true south and true north.



Method 2: Using a shadow at solar noon

Perhaps the simplest way to find true south is to wait until noon and then look at your shadows. The edges of the shadows of things that are perpendicular to the earth/standing straight up line up with true south/north.

However, as the diagram below shows, 12:00 noon is not necessarily the right time. You actually want solar noon. Solar noon is the moment when the sun crosses the meridian line for your location and when the sun is the highest in the sky. 12:00 noon standard time is the same for the entire time zone that you live in but the sun can't be highest at the same time for every point across that entire time zone! Solar noon is different across the entire time zone.

A meridian is a line of longitude, a line extending from the true north pole to the true south pole.
Solar noon compared to standard time. Diagram showing what solar noon is.

One way to find solar noon is to find out what times sunrise and sunset are. Solar noon is midway between those times. Sunrise and sunset times are often in local newspapers and weather websites.

To find solar noon you can also use an online calculator. Here's a popular one:
http://www.spot-on-sundials.co.uk/calculator.html. You'll need your latitude and longitude (see the section above if you don't know how to get these.)

Once you know when solar noon is, go outdoors when the sun is out and look at shadows of things that are aligned straight up, such as the edge of a building. If there are none where you plan on putting your collector then bring along a stick or just use your body to make a shadow.

36.831579, -78.228738 Solar Noon for 8/27 is 12:14:01