

# Solar Notebook Charger (NB4 & NB42)- Instructions

## Description

The Solar Notebook Charger is a direct current solar charger that can charge a range of battery-based electronic devices, such as cell phones, iPods, MP3 players, and power banks. This particular design is based on a custom solar module designed by Solar Schoolhouse to produce 8v and 400mA in clear sunlight. The 8 volts is slightly higher than the minimum input to a USB car charger, which outputs the USB 5 volt standard. Thus any device that can be charged with a USB connection, can be charged with this solar charger. For some devices, we've found that the charging process works best to charge a power bank **first**, then use the power bank to charge a phone. This strategy allows one to leave a power bank charging in the sun during the day, and then give your phone a boost when needed.

The Solar Notebook Charger encourages you to design and build your own enclosure using cardboard (or coroplast) and duct tape. The steps shown here illustrate both solder-based and solder-free options.



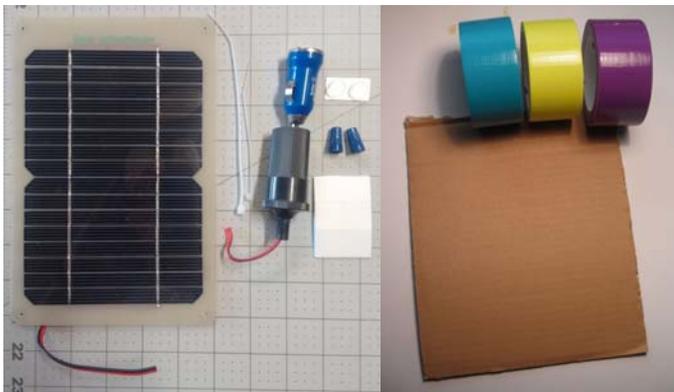
*This notebook is shown with one Solar Module (NB4)*

## Materials:

- (1) 8 Volt\* 400 mA, 3.2 watt Solar Module (v.NB4)[2 modules for vNB42]
- (6) double-sided 3/4" foam tape squares [double this number for NB42]
- (2) wire nuts
- (2) rubber bumpers
- (1) USB car charger
- (1) DC Auto socket ("cigarette lighter") with ~ 3" wire
- (2) cable 'Zip' ties

You supply: Duct tape, clear packing tape, cardboard or coroplast, old magazines to create 'renewable energy' collage for outer cover.

Tools: wire stripper/cutter, utility blade or snap knife, pencil/ sharpie, ruler, Solder Iron (optional), Heat Gun (optional, use if soldering), Digital Multimeter (optional)



Materials Supplied

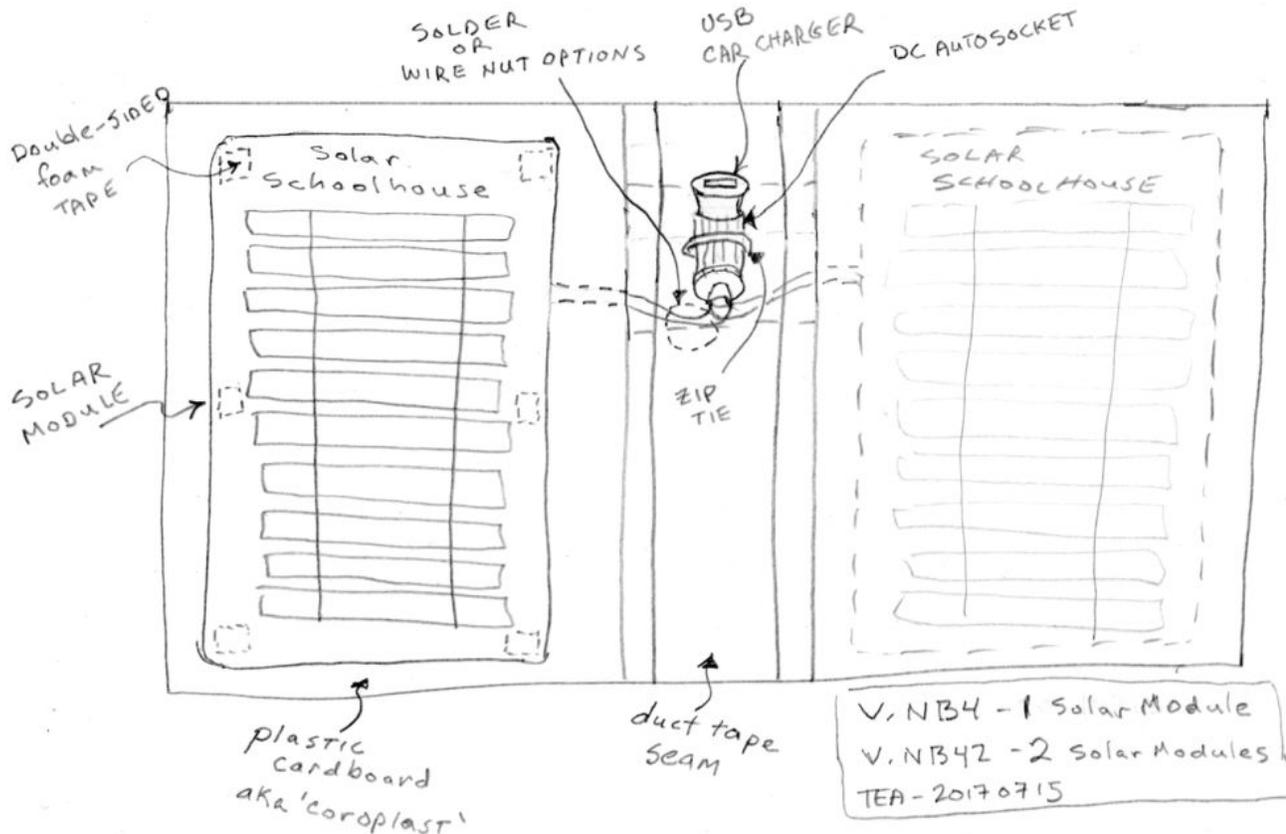
You Supply



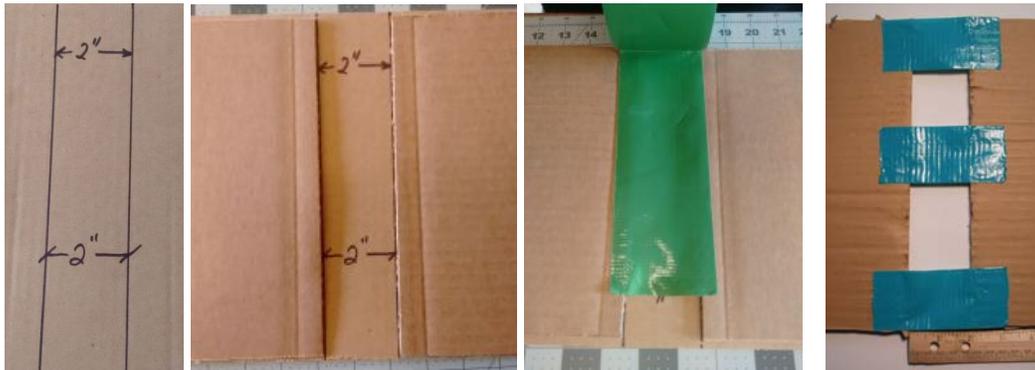
Tools

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## Directions:



1. Cut two pieces of 4mm thick corrugated plastic (aka coroplast) ~ 7.5 x 9.5". (These dimensions can vary but you should allow minimum ½ inch border on all sides around the solar module, with >1 inch border along the seam). The channels in the coroplast should align with the short (7.5") side, so that one has the option of threading the wires through channels to the seam.
2. Create a binding for your solar notebook by duct-taping the two cardboard pieces together on one of the long edges. Leave a two inch gap between cardboard pieces. This will allow room for wires and the auto socket later. . A seam can be made using 2" wide duct tape or 3" wide



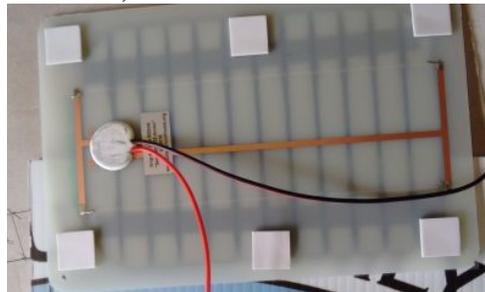
1. Make a 2" guide. 2. use the guide to maintain the 2" gap when making the seam with either 3" wide duct tape or 2" wide duct tape.

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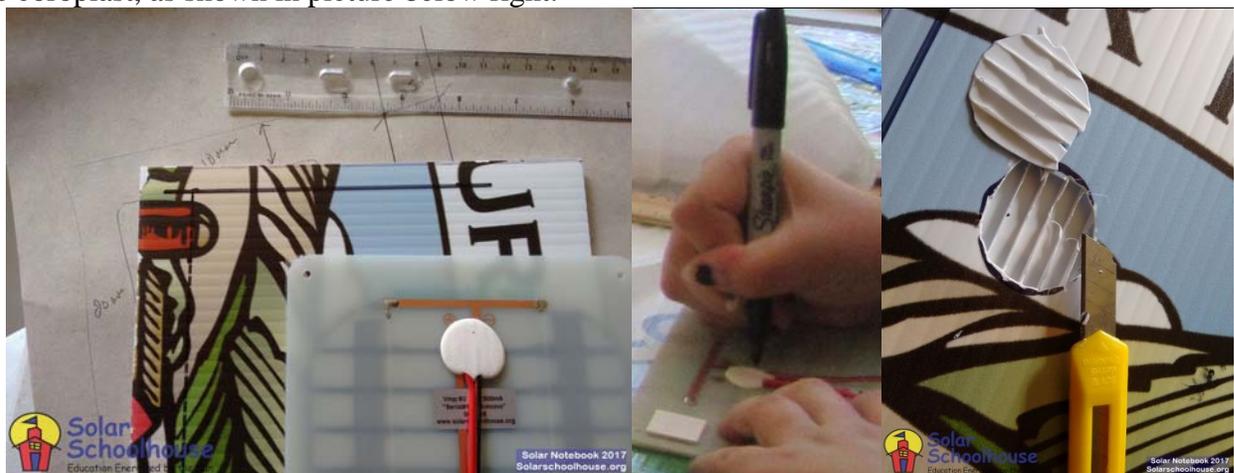


Notebook with 2” seam, using 3” wide Duct Tape. Do this before adding the solar module

- Place foam tape on back of solar module, in corners and middle. As shown.



- Place the solar modules on the coroplast. Using a ruler draw a guideline approximately 10mm from the top and bottom, and 20mm from the side. Leave more space toward the seam (where the duct tape is). Use a Sharpie to “ink” the silicon Blob on the back of the solar module, then place the module where you want it and press down. This will leave a mark on the coroplast. Use a snap knife (or xacto knife) to cut a circle around the area of the blob identified by the sharpie mark, halfway through the coroplast, as shown in picture below right.

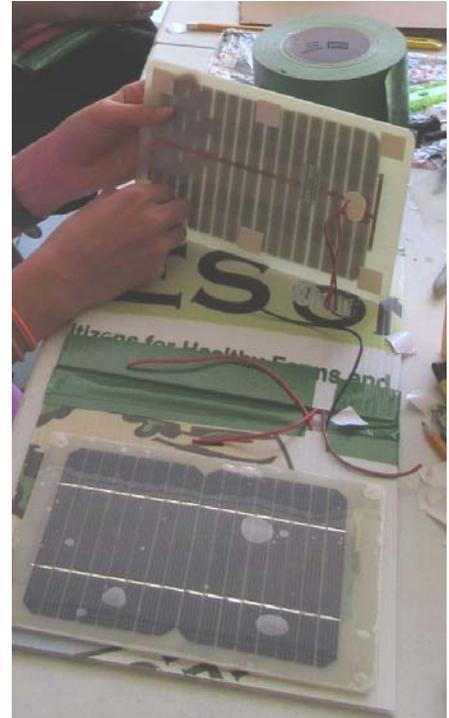


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6. Thread the Red and Black wires from the solar module through the hole and along one or two channels toward the seam. You should have left a section in the seam without duct tape, so that you can pull the wires through.
7. Connect the Solar Module wires to the Autosocket via the SOLDER option or SOLDER-FREE option. (see below)

7a. (SOLDER OPTION) – Unscrew the cap of the autosocket. Using the hot soldering iron, heat the solder on the wire connections to loosen them, and remove the existing ~ 3” pieces of wire. Take care to avoid touching the plastic part of the autosocket as it will melt. (Alternatively one could snip them off with wire snips.) Strip ~ ¼” of the insulation off the Solar Mod wires. “Tin” the tips – ie. Add a little solder to the ends before connecting to the autosocket. This will make it easier to connect the two. Be sure to thread the wires through the autosocket cap before soldering to the socket. The RED (+) wire connects to the MIDDLE contact on the socket, while the BLACK (-) wire connects to either of the OUTER contacts. Be sure there is NO wires bridging between the Middle and outer contacts – this will short your circuit, keeping the solar electrons from reaching their desired destination. Screw the cap back in place to complete. *IF 2 solar modules, then solder BOTH Red wires to the center, and BOTH Black wires to the outer contact.*



7b. [SOLDER FREE OPTION] Strip ~ ½” of the insulation off of the solar module wires AND the wires attached to the autosocket. Twist the RED (+) wires together and secure with a wire nut. Repeat with the Black (-) wires. Ok to unscrew the cap to see which color wire is connected to the MIDDLE contact. This is Always the Positive (+) contact.



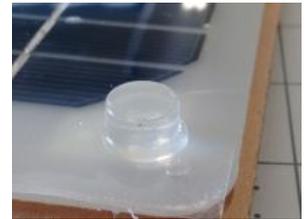
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- Position the solar module on the notebook as shown. Be sure to adjust the wire so that it lies as flat as possible underneath the module. Remove the protective paper on the foam tape squares and carefully place the module in desired location. Press down for a good connection. Secure the autosocket in the seam area using either a zip tie, or duct tape. Insert the USB Car Charger in the Autosocket. TEST the charger in sunshine and see if the green or red light on the USB car charger lights up. Green light means it works!!



*This picture shows paper cardboard base. If using coroplast the wires could thread through the channels to the seam for improved wire management.*

Place a clear rubber bumper on the outside corners of two of the solar panels. This will help protect the module when closing the Solar Notebook. You may choose to leave the clear protective film on the solar module to protect against scratching.



- You are now ready to charge your device. Be sure to decorate the outside of your Solar Notebook Charger. You may also consider making a pocket using duct tape or other materials, to hold your cell phone, powerbank, and any wires. Be Creative!
- Best charging results in direct Sunlight. ie. Doesn't work that great (or at all) indoors.



Note: most portable electronics use Lithium-Ion batteries. Li-On batteries have a very high energy density, allowing for more power in a smaller space. Li-On cell voltage is typically 3.7volts. USB ports are designed at 5 volts. The USB car charge has a built-in voltage reducer to convert the input 12volts to the 5v that is compatible with your phone/ipod.