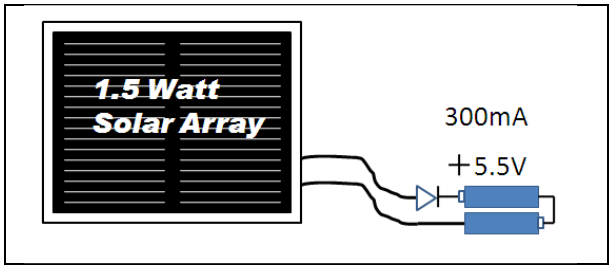
"Leave no Trace"

Compact Solar Charger to Keep GPS running for 2 Weeks

Philmont discourages electronic equipment in the backcountry. There are only three battery powered devices that the Ranch mentions – flashlight, camera, and GPS. Of these three devices, the GPS eats batteries and these dead batteries end up in the Philmont trash cans. The design goal of this Compact Solar Charger project is to be able to fully charge two AA 2500mAh NiMH batteries in a single day of sunlight. These AA batteries can then be used to keep a GPS charged indefinitely, a camera taking pictures, and flashlight working when one of your scouts leaves it on.

A search of available solar chargers on the market (there are many) didn't turn up a single one that could charge two high-capacity AA batteries in a single day of sunlight. My calculations showed that it requires about a 1.5 watt solar panel to generate the needed 5000mAh in one day.

I did a web search for 1.5 watt solar panels and found that there are many to be found. I had purchased a few high efficiency polycrystalline solar cells and panels over the years. I looked through my collection when I started this project and saw I had a 1.5W solar panel, but it did not have the correct voltage to be able to charge AA batteries. I invited a friend who tinkers with electronics all the time to help me rewire the solar panel to become an AA charger. Truth is I'm pretty incompetent with a soldering iron; my friend did all the work. My desire was to get an output of 2.5 volts so I could charge the two batteries in parallel. But that wasn't possible with this panel. He ripped out all the electronics except the solar cells in the panel and figured out how to solder wires to the panel to get an output of 5.5V and 300mA. That was sufficient to build an AA charger with two batteries in series. He did all these tests of the response of the panel to different resistance loads (the batteries are the resistance in the circuit). I was clueless to whether the test results were good or bad. But my friend finished and said, "This panel should work just fine with just an extra diode right here." With that he soldered in a diode he had pulled out of an old broken transistor radio I had laying around. The circuit diagram turned out to be quite simple.



Here is a top view of the charger showing its compact size when folded up. Clamshell design protects the high efficiency solar cells from damage while stuffed in a backpack.

The edge of the charger case has a wide strap hook for carrying the open charger on top of the backpack while hiking. Also seen in this picture is the small black button that opens the clamshell.

Here is a view of the charger open. Another advantage of the clamshell design is it allows doubling the area of solar cells by putting them on both sides of the open charger. An obvious idea, but one that a number of other solar charger products fail to take advantage of. Despite their small surface area, the high efficiency solar cells put out 1.5 watts in full sun.

Loading batteries in the back for recharging. My experiments with the charger showed that the DeLorme PN20 would run one hour for every hour these batteries were charged. At Philmont I would set the charger up in the sun as soon as we got to camp. Being at higher elevation and brighter sun helped (and it was light until 7pm.

Back of case with battery compartment closed

I worried about rain showers while away at program. If it looked like rain, then I slipped the open charger into a quart ziplock bag, and left it out in the sun. In the 10 days out on the trail, I only carried the two extra batteries and rotated them with those in GPS. Mission accomplished – never had dead batteries in my GPS.