Using the Song Meter SM2 with External Power

This document describes how to set up the Song Meter SM2 and SM2BAT to run on an external battery power source with or without a solar panel charger.

Choosing Equipment

The following components have been selected because they are lightweight and affordeable. These components are all readily available in the US. Please consult your local stores for international availability or local comparable substitutes.

SM2 Power Adapter

The SM2 can be powered with an external battery source using the Wildlife Acoustics External Power Adapter, available from our online store for US$125. This adapter is designed to attach directly to a 6V or 12V battery source. The SM2PWR adapter provides over-voltage and reverse voltage protection to the SM2. The adapter is fully weatherproof and does not need additional protection.

Battery

Since the SM2 only requires 6V, we recommend building the system on a 6V solar panel/battery system. For a given capacity, a 12V system will cost and weigh double with no advantage in increased deployment longevity. You can use a 12V system if you already have the equipment; it is just not optimal.

You will want to select a battery designed for deep cycle so it won't be damaged by the SM2 regularly depleting the charge. An AGM lead acid battery or a Gel Cell lead acid battery will work well. The batteries job is to hold the charge and provide power during inclement weather when the solar panel might not receive sun. This battery http://www.atbatt.com/product/3594.asp would be suitable for the SM2BAT on a nightly recording schedule. It would power the SM2BAT for over two weeks of nightly recordings with no charging from the panel. For the SM2 acoustic, you could use a smaller/lighter battery found at http://www.atbatt.com/product/3592.asp. This battery would power continuous recordings for at least two weeks.

Solar Panel

For calculating the necessary solar panel size, the following example is a useful guide. You may substitute the numbers based on your actual deployment.

A customer wants to record bats for 12-hour nights and wants to run 3 seasons in Canada. The necessary panel size will vary enormously across the seasons,

especially in northern regions where it is necessary to record longer nights with shorter days to charge the panel. The 192kHz SM2BAT in stereo uses about 195mA. (The SM2 with acoustic sample rates uses about 60mA in stereo) To convert to watts, it is .195 amps * 6 volts = 1.17 watts. Assuming 12 hours of nightly recording, that's 1.17 watts * 12 = 14.1 watt-hours. You can find your "solar insolation number" (a metric of available solar energy in your area) at http://solarelectricityhandbook.com/solar-irradiance.html. For this example we will use Kelowna, BC, Canada. Make sure to select “Facing directly South” for the direction and “Optimal Year Round” for the solar panel angle. You may want to deviate from this angle if you are only interested in summer or winter recordings. We suggest experimentation by choosing different angles on the website and seeing the effect on the insolation number (bigger is better). A larger number indicates more light is available to convert to power. Facing South is ALWAYS the best choice in any season. Back to this example, the number is 3.46 for February. We will use this number since this customer wants to record three seasons and the only worse months are November, December, January. You divide the needed watts calculated above by this insolation number. So you would need in this example a minimum of 14.1 Watts/3.46 = 4.1 watt panel. Rounding up to 6 watts would provide a nice safety margin. Be sure to configure the panel such that it is facing south (unless you are south of the equator!) and tilted back about 40 degrees from vertical for optimal performance. You can also wire solar panels in parallel if you need more watts from panels you already own. And too many watts will not hurt anything, so you can always use something larger than necessary. Too high of a voltage rating however WILL hurt your charge conditioner (see next section) so be careful. A couple good sources of cost effective panels is silconsolar.com and Amazon. Please contact Wildlife Acoustics support if you need help in finding a suitable panel.

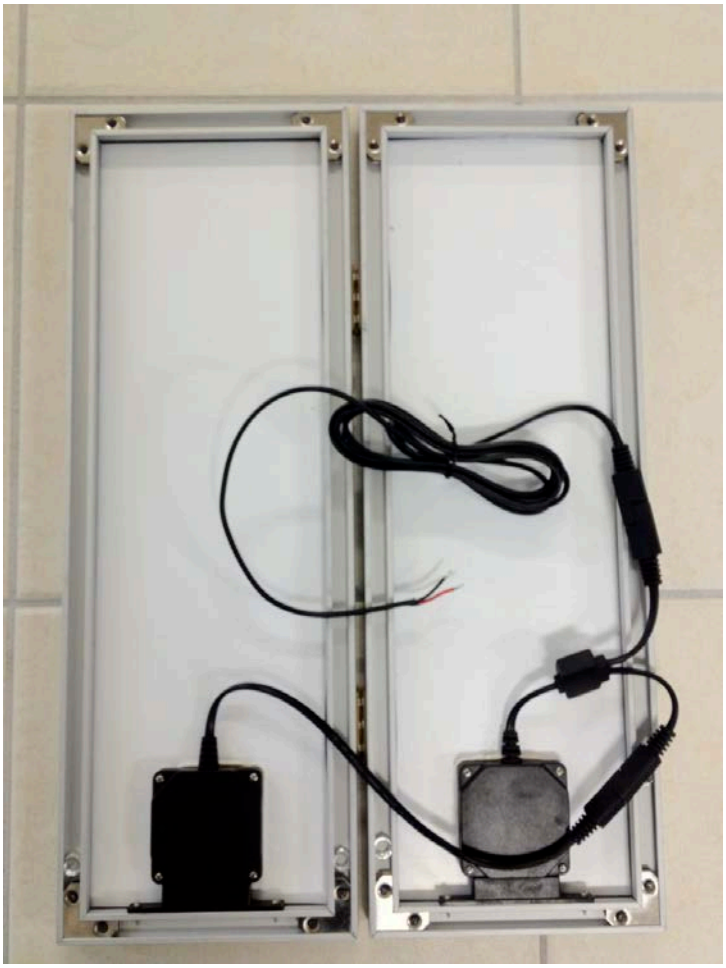
Charge Conditioner

The last bit you need for the solar setup is a charge conditioner. The charge condition goes in between the solar panel and the battery. It decides how much power should be transferred from the panel to the battery such that the battery does not get over charged, charged too fast, etc. An affordable 6V conditioner can be found at: http://stores.rogue-engr.com/-strse-7/Rhino-dsh-5-Charge-Controllers/Detail.bok You want the 1950-136 model. This is really high quality; all the internal electronics are potted with epoxy so it should be quite robust out in the elements.

Setup

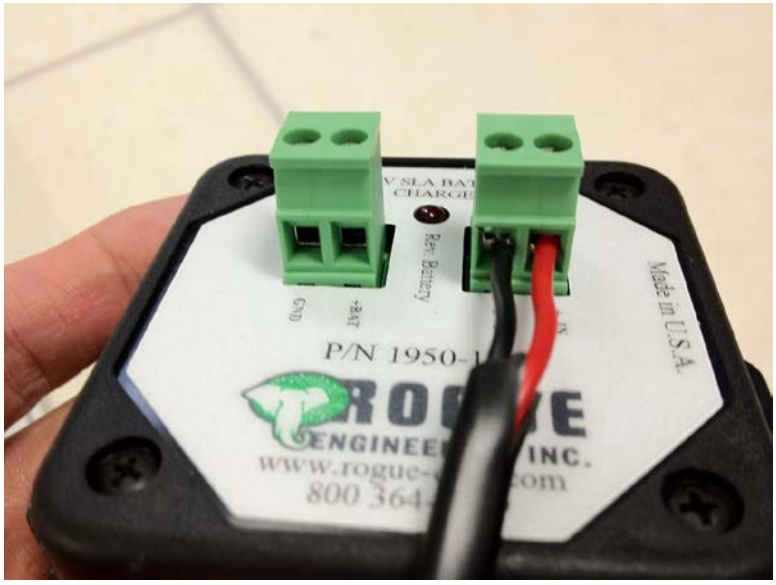
The setup is really divided into two systems. There is the SM2 attached to the battery though the SM2 External Power Adapter and a solar panel attached to the battery through a charge conditioner.

Reference the following photos in sequence to understand the installation process. Please note, this task involves stripping and soldering wires, so you will need to possess (or have the means to ensnare someone who possesses) this skill.



Cut off the included connector on the solar panel and strip and solder tin the wire ends (the process of adding solder to the copper strands to strengthen them). You want about .25” soldered leads. The example panel we are using is a folding type that is actually two panels in parallel. In this case, the two “sides” of the panel should be wired in parallel by attaching the long wire from the one panel, to either connector on the Y cable from the other side, the two connectors are in parallel, so which you connect to does not matter.

Turn the screw terminals counter clockwise on all four terminals of the charge conditioner to open the “jaws” to allow wire insertion.



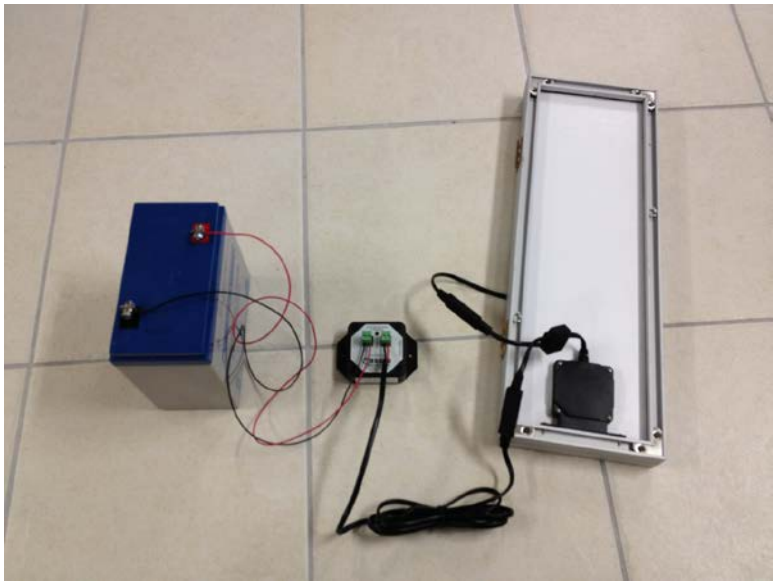
Insert the wires from the solar panel and tighten screws to close the “jaws” tightly. The red goes into “+In”

Cut two pieces of 18-guage wire to a sufficient length to connect from the charge conditioner to the battery. Though Wildlife Acoustics has tested the components of this system unprotected in rain and snow with no ill effect, you might want to place the battery and conditioner in a container. Your ultimate placement will dictate the length of needed wire. Strip and solder tin one side straight to about .25”. Strip the other end to about .5” and wrap it around the screw that comes attached to the batteries terminals. Solder tin to that curvature.

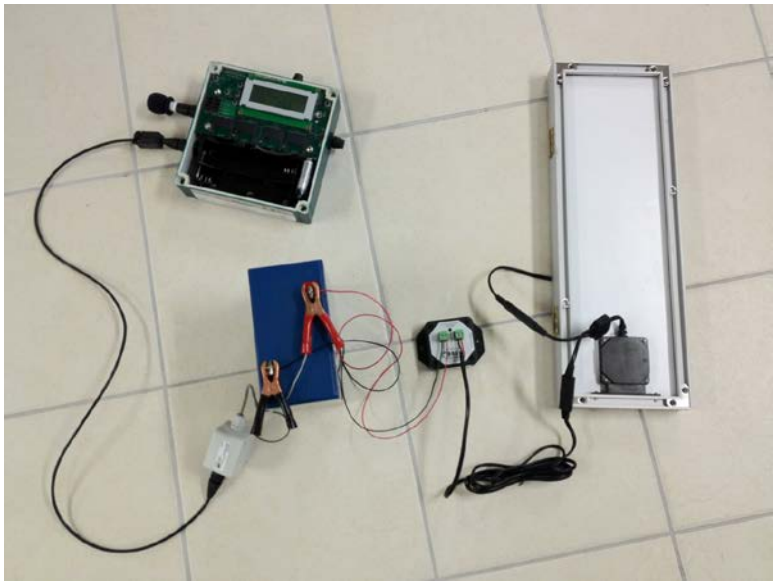
Make sure to use 18-guage wire or thicker (smaller gauge numbers are thicker) since this is minimum required to handle the amount of current that could flow from the conditioner to the battery.

Close up of tinned ends.

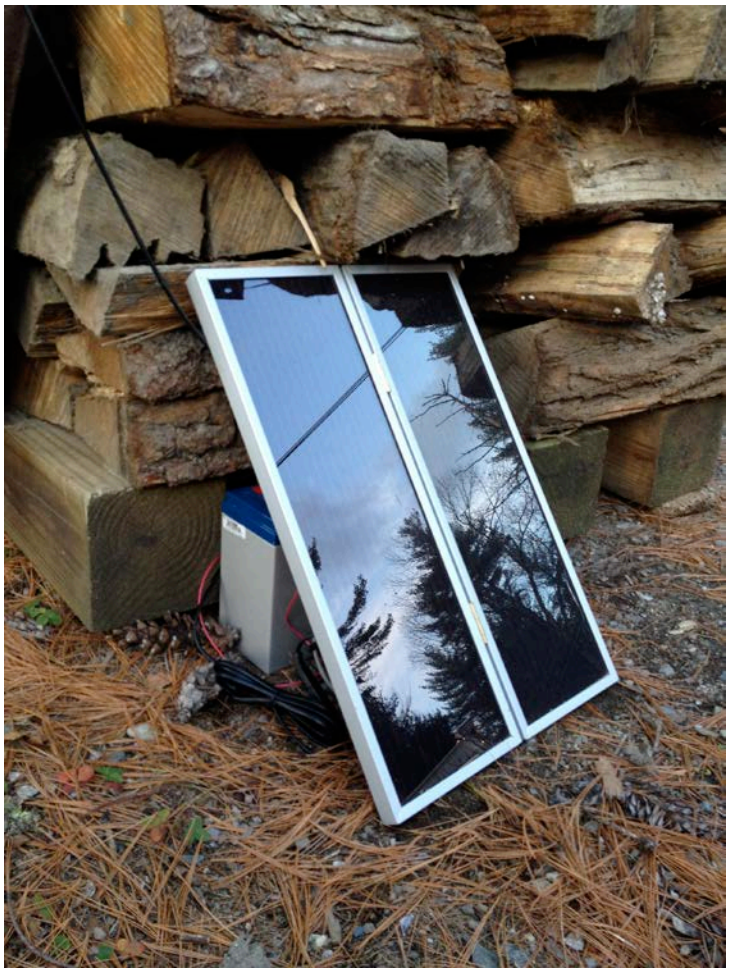
Insert the straight ends of the wires into the charge conditioner and tighten the “jaws”
The Red wire goes into “+BAT”



Place the curved ends of the wires around the battery terminal screws and tighten in between the two washers. Red is positive.



Attach the SM2 power adapter to the SM2 and clip the battery clips to the battery terminals. You could cut off the battery clips and terminate the wires with a solder tin curve similar to the wires attached to the charge conditioner if you want a more permanent installation.



Here is the final set-up. Here the panel is used to shelter the battery and other components. Alternatively, it is advised to enclose them in a cheap plastic “Rubbermaid” enclosure with a hole for the wires.