USING YOUR ***SOLLIGHT™*** SOLAR-POWERED LIGHTCAP™

There are several aspects of any solar-powered product that you need to understand in order to use them efficiently. Our solar lights feature three main components that all work together to enable you to get the most from your product.

SOLAR PANELS

The first is the *solar panel* (also known as a photo-voltaic cell, or PV). Basically, the solar panel converts light into power. The brighter and more direct the light that falls on the PV, the more energy it will convert to electricity. This is an important aspect of speed at which the solar panel can create electricity, the other being the size of the PV: the larger it is, the more energy it can take in and ultimately give off in the form of electricity.

Because of the small size of the LightCap PV, it can only give off a small amount of electricity; in our case around 160mA for the LightCap300 and around 110mA for the LightCap200. This number signifies the amount of DC electric current that the PV will produce in one hour.

INTERNAL BATTERY

The second main component of the LightCap is the internal battery, since there needs to be somewhere to store the energy that the solar panel is producing until it is needed. Again, because of the constraints of the small size of the LightCap we are limited in the size of the battery we can use. In the LightCap300, there is a rechargeable AA battery that will hold up to 1,800mA; in the LightCap200, the AAA battery will hold up to 1,000mA.

So doing some simple math, if the solar panel in the LightCap300 is exposed to bright, direct sunlight, it will fully charge the battery in around eleven hours. Of course this is in a perfect world, not the one we really live in. Accounting for dull or indirect light, as well as some power loss due to the voltage conversion, charge safety controller and switching circuit, it can easily take a few days to fully charge the battery.

LEDs

The third component of the LightCap is the actual LEDs. LEDs are a very efficient light source since they use only a small fraction of the electricity needed for an incandescent bulb giving off the same amount of light. The more LEDs you have, the brighter the light; of course this also means the more power is needed. Red LEDs use 50% less energy than white LEDs, so they will produce light much longer while using the same amount of battery power.

Both the LightCap300 and LightCap200 have four (4) white LEDs, each needing around 60mA of power, for a total of 240mA to light the cap. Using the above figures for battery capacity, this means that a fully charged LightCap300 will

ideally stay lit for around seven hours while the LightCap200 will stay lit for around four hours. Temperature will somewhat affect the battery performance (less in very cold or hot conditions), and after a couple hours the LEDs will begin to dim slightly – this is simply one of the realities of LED technology.

WORKING TOGETHER

So as you can see, these three components need to work together and the length of time the light will stay lit is dependent on many factors.

There is, however, one additional factor to remember. Rechargeable batteries have 'internal resistance'. This means that if the amount of energy stored in the battery is greater than the energy source that is trying to put power back into the battery (in our case, a small solar panel), the battery will fight back and prevent charging. This unfortunate attribute is especially important with solar charging: if the solar panel isn't producing enough voltage to over come the internal resistance of the battery (due to indirect or dull light), it won't charge the battery. This is most obvious when the battery is completely drained or almost full.

CHARGING

In the case of a completely drained battery, it will be necessary to 'jump-start' the charging process in order to begin charging. This is done by exposing the solar panel to either direct sunlight or a bright (100w) incandescent bulb (florescent won't work) for at least a minute. This will tell the battery to start charging: you *really* mean business!

The same goes for a 90% charged battery; dull light will not provide enough energy to bring it up to 100%. This is simply the realities of a small solar system.

The main thing to remember about the lighting system in the LightCaps is that the solar panel is simply there to *charge the internal* battery. It does *not* directly light the LEDs. The batteries store the power for later use. So you'll always want to keep the batteries charged. Rechargeable NiMH batteries will lose1-2% of their charge every day unless there is a slight 'trickle' charge feeding into them. So if you store your LightCap in a drawer for a month, chances are it won't work when you take it out. For that reason it is always best to leave your LightCap out on a window sill or somewhere with some light in order to keep the batteries charging.