

\$1 Solar Light Hack



This document details how to hack two different \$1 solar lights from Dollar Tree for use in science experiments and invention projects.

Solar-Powered White Desk Lamps (SKU#: 175177)

Hack for: solar panel, three high intensity LEDs, switch, rechargeable AAA battery, parts

Stainless-Steel Solar-Powered Garden Lights with Stakes, 10" (SKU#: 175127)

Hack for: solar panel, high intensity LED, rechargeable AAA battery, parts

Required Tools for Hack: small Phillips head and flat screwdriver and scissors (or wire cutters)

Solar-Powered White Desk Lamp Hack Directions

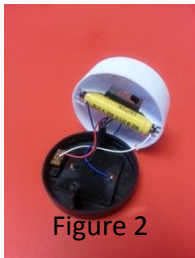


Figure 2

1) Take apart the lamp, as shown in **Figure 1**. The plastic cover for the LEDs is removed by twisting first. Everything else is simply press fit together so pull the pieces apart.

2) Unscrew the two screws holding the solar assembly together to reveal the wires and rechargeable battery, as shown in **Figure 2**.

3) Cut all five wires right in the middle of their length, including the one tucked in the white plastic housing, as shown in **Figure 3**. This can be done either with scissors or wire cutters. The solar panel (in the black plastic housing) will now be separated from the white plastic housing. **NOTE:** The colors of insulation around the wires in each light vary.

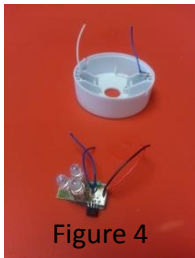


Figure 4

4) Remove the rechargeable battery from the white plastic housing, as shown in **Figure 3**. Remove the screw from the green circuit board to free the high intensity LEDs as shown in **Figure 4**. **NOTE:** Do NOT remove the LEDs from the circuit board.

5) Using a flathead screwdriver, pry the switch off the black plastic housing shown in **Figure 5**. It is simply held on with some melted plastic and should come free with a little pressure as shown in **Figure 6**.

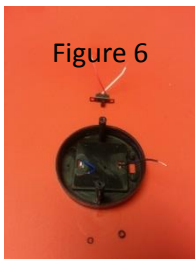


Figure 6

NOTE: You will need to use the scissors to score (gently cut) the insulation a quarter of an inch from the end of each wire and pull the insulation off to reveal the bare copper wire. This will allow you to connect the test leads.

Figure 7 shows the high intensity LEDs connected to the battery using test leads to light them up.

Figure 8 shows the solar panel connected to a multimeter using test leads to measure the voltage output of the solar panel.



Figure 1

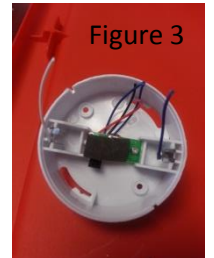


Figure 3

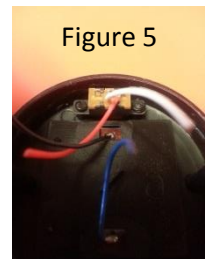


Figure 5

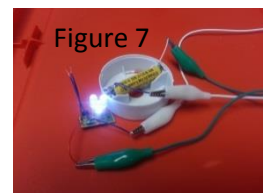


Figure 7



Figure 8

NOTE: Multimeter shown is Item#98025 and the test leads are Item#66717 from Harbor Freight (<http://www.harborfreight.com/>).

Stainless-Steel Solar-Powered Garden Light Hack Directions



Required Tools for Hack: small Phillips head screwdriver and scissors (or wire cutters)

1) Unscrew the two screws holding the solar assembly together as shown in **Figure 1**. This will allow the solar assembly to come apart as shown in **Figure 2**.



2) Cut all four wires in the middle of their length as shown in **Figure 3**. This will free the solar housing from the battery housing.



Figure 1

3) Unscrew the screw holding the green circuit board to the battery housing to free the high intensity LED. As shown in **Figure 4**, all the components should be now be separate – the circuit board with LED, the solar housing, and the battery housing.

NOTE: Do NOT remove the high intensity LED from the circuit board.

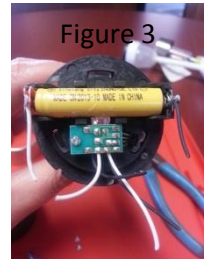


Figure 3



Figure 4

Figure 5 shows the extraneous parts of the garden light which can be used for all manner of invention at the will of the creativity of your students.

NOTE: You will need to use the scissors to score (gently cut) the insulation a quarter of an inch from the end of each wire and pull the insulation off to reveal the bare copper wire. This will allow you to connect the test leads.

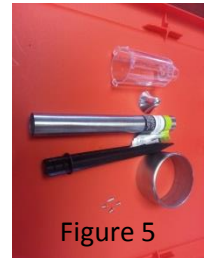


Figure 5

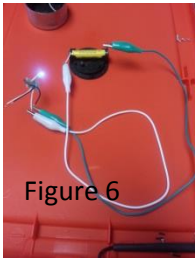


Figure 6

Figure 6 shows the high intensity LED connected to the rechargeable battery using test leads. **NOTE:** LEDs are directional so if the LED does not light up, switch the test leads coming from the battery.

Figure 7 shows the solar panel connected to a multimeter measuring the voltage output. **NOTE:** If the voltage is negative, you can simply switch the test leads connected to the multimeter. It should not change the magnitude of the measured voltage, only get rid of the negative sign.

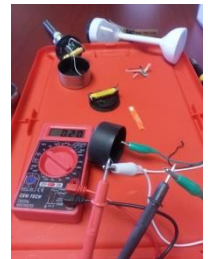


Figure 7



Figure 8

Figure 8 shows the components all reconnected as they were originally using test leads where the wires were cut. **NOTE:** The circuit board knows if the solar panel is in light charging the battery. For the LED to work, the solar panel must be covered.

NOTE: Multimeter shown is Item#98025 and the test leads are Item#66717 from Harbor Freight (<http://www.harborfreight.com/>).

Special thanks to Ann Marie Condes, Physics/Engineering teacher at Palo Verde High School, for this fantastic hack idea!