

# The Solarbotics Symet Parts Bundle

The Symet is a simple BEAM device that is self-sufficient enough to bop around its environment under its own power. We don't call these "true robots" because they don't interact with their environment any more than a book interacts with a floor when it falls from a table. Nonetheless, we do like to think of them as BEAM "Plant-life", and often use them to keep things stirred up in a robot display case!

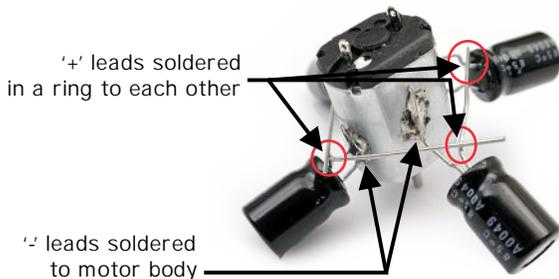


Solarbotics does not sell this bundle as a fully-supported kit - there is no performance or satisfaction guarantee as there is with our standard kits. To keep the costs to a bare minimum on these BEAM experiment bundles, we cannot offer any further service or support on these beyond the contents of the bundle.

The Symet consists of a solarengine circuit, a motor, a boundary ring and a rotating pivot point on the end of the motor shaft. These first two pages show how to assemble the main body of the Symet out of the motor, capacitors, and paperclips, and the last page will detail the actual solarengine construction.

## Parts List:

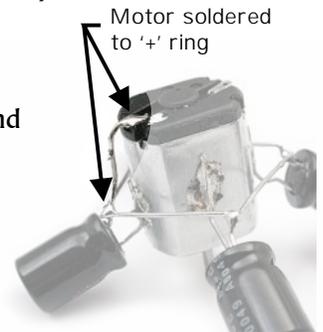
- Solarengine electronics
- Four 1000 $\mu$ F capacitors
- SCC2433 solar cell
- One Motor
- 1/2" Silicone tubing
- Length of 2-conductor wire
- Small black plastic hub
- Three Paperclips



1) Arrange the four capacitors so they're soldered by the shorter lead (the one nearest the stripe on the side) to the motor body. You want to arrange the capacitors so they are balanced around the tip of the motor shaft.

2) Next, connect all the longer capacitor leads (the '+' leads) together by bending one over to the next capacitor, until they're all connected like a giant ring. These leads cannot touch the metal motor body!

3) Take one of the spare lead clippings and solder one of the motor leads to the '+' capacitor ring.



4) Skip ahead, and build your solarengine circuit. When done, install it tight to one side of the motor. The right leg of the 3904 goes to the other motor connection tab, the 3904 left leg solders to the motor body ('-'), and the left leg of the 3906 solders to any point of the '+' ring.

5) Solder a short length of wire to your solar cell, red on '+', black on '-'.

Solder the black to the motor case, and the red to the '+' connector ring.

Now you should be able to hold the solar cell up to an incandescent light (or the sun) to make sure the motor spins! If it doesn't, double and triple check your solar-engine assembly, and how you've got it soldered to the main body. A voltmeter is very handy for checking to see if the solar cell is charging up the storage capacitors. Don't go any further until you get the motor spinning!



6) Time to get to the business end of the Symet - the motor shaft.

Your motor should come with a white plastic hub on it.

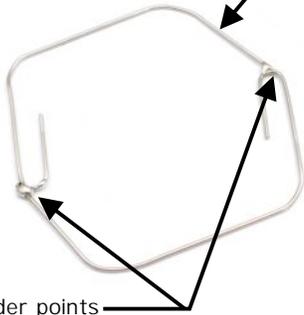


7) If your silicone tubing is a bit long, make sure you cut it down so it's no longer than the length of the motor shaft.

Moisten the plastic hub, and slide the tubing over the hub so it's nice and even. This will give your Symet a nice, grippy tire to roll around on!



Unfolded paperclip



Solder points

8) The last thing you should add to your Symet is some sort of bumper ring. Something that will make it easy for the Symet to tilt over to a new side if it bumps in to something.

Having a ring mounted up high around the level of the solar cell works best, but experiment to see what works best for you. The paperclips we've included solder nicely, and are easy to form into rings or other strange geometric shapes (see the one on the front cover). We've formed circles, hexagons, and other strange shapes that add character to our Symets.

Solder the ring into a convenient geometry, and then solder the ring to either the motor body, or the capacitor '+' ring. Remember, the ring conducts, so you don't want to connect it to any two points that may accidentally create a short-circuit (that's why we tested it before this step).

There! This page (along with the Solarengine page) shows you how to build a basic Symet, but don't let that make you think it has to look exactly like ours. Feel free to experiment with shapes and geometries. Try 3 capacitors, or 5. Add another solar cell. Make it HUGE, or make it tiny - it's all up to you!



# SOLARBOTICS Ltd

101, 3740D 11A St N.E., Calgary, Alberta, Canada T2E 6M6 Ph: (866)276-2687 / (403)232-6268 Fax:(403)226-3741

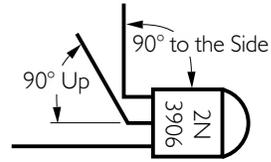
# The Solarbotics Symet Freeform 1381-Solarengine

## Parts List:

- PN3904 Transistor
- PN3906 Transistor
- 2.2k Resistor
- 1381 'E' Trigger
- 0.1 $\mu$ F capacitor
- Diode
- Motor
- 3V + Solar cell

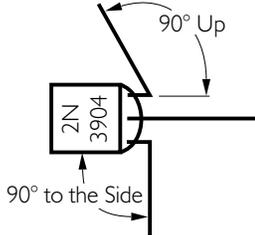
Take your time and be careful, and you'll end up with a functional free-form solarengine.

## 1 2N3906 Transistor



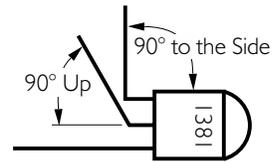
Bend the centre lead of the 2N3906 up at a 90° angle, and the left lead 90° to the left side.

## 2 2N3904 Transistor



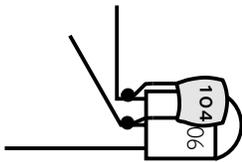
Bend the right side lead 90° up, so it points at you. Bend the left side lead 90° to the left side.

## 3 1381 Trigger



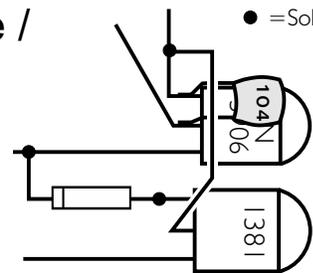
Just like with the 3906, bend the centre lead of the 1381 up at a 90° angle, and the left lead 90° to the left side.

## 4 0.1 $\mu$ F Capacitor



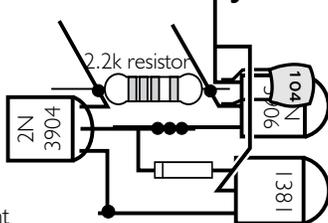
Trim the leads on the 0.1 $\mu$ F capacitor (marked "104") so it can be easily soldered to the left and middle legs of the 3906.

## 5 Diode / 1381



Solder the diode to the 1381 *left leg*, THEN to the 3906 transistor as shown, with the 1381 *middle leg* connected to the 3906 *left leg*, and the 1381 *left leg* connected to the 3906 *right leg*.

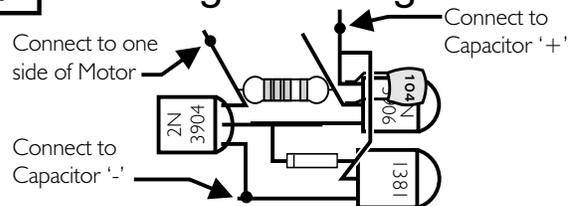
## 6 Circuit Assembly



• = Solder point

Solder the *middle lead* of the 3904 to the *right lead* of the 3906 with about 5mm (3/8") overlap. Solder the *right leg* of the 1381 to the *left leg* of the 3904. Solder the resistor across the two vertical legs, and trim the excess off.

## 7 Solarengine Wiring



Now your Symet Solarengine is ready to connect to the rest of the Symet. Use these electrical connection points to install it. Remember to watch for touching wires that might short it out!

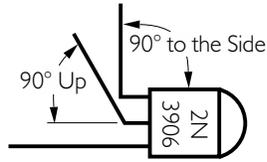
# The Solarbotics Flashing LED Solarengine

Take your time and be careful, and you'll end up with a functional free-form solarengine.

## Parts List:

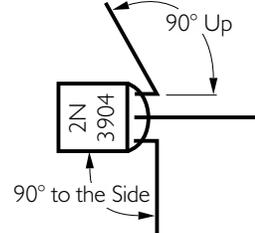
- PN3904 Transistor
- PN3906 Transistor
- 2.2k Resistor
- Flashing LED
- 0.1 $\mu$ F Capacitor
- Heat-shrink tubing
- Motor
- 3V + Solar cell

## 1 2N3906 Transistor



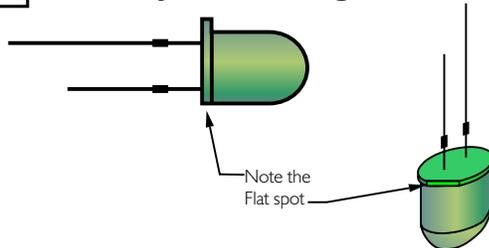
Bend the centre lead of the 2N3906 up at a 90° angle, and the left lead 90° to the left side.

## 2 2N3904 Transistor



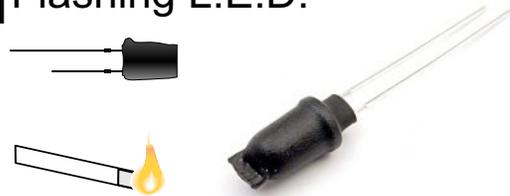
Bend the right side lead 90° up, so it points at you. Bend the left side lead 90° to the left side.

## 3 Identify Flashing LED Legs



The shorter leg (nearest the flat spot) is the negative lead. Remember this!

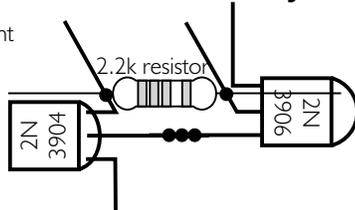
## 4 Flashing L.E.D.



Try to stretch the heat-shrink tubing a bit so you can slip it **TOTALLY** over the Flashing LED, then shrink it down with a heat-gun or match. You want to hide it from the light the best you can, as outside light can make the FLED "lock-up" and stop working.

## 5 Transistor Assembly

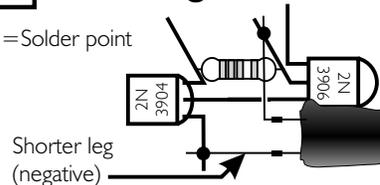
● = Solder point



Solder the middle lead of the 2N3904 to the right lead of the 2N3906 with about 5mm (3/8") overlap. Solder the resistor across the two vertical legs, and trim the excess off.

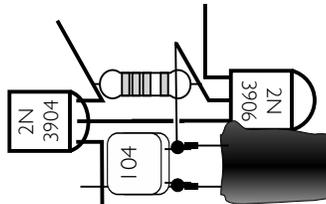
## 6 Flashing LED Installation

● = Solder point



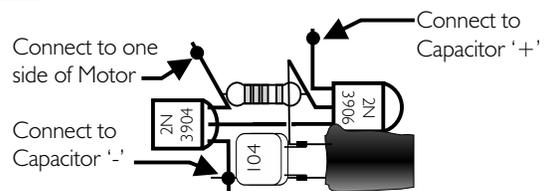
Place the covered FLED next to the 3906, and solder the shorter leg to the 3904. Bend the longer FLED lead over to the middle leg of the 3906, and solder it on. Don't get it backwards!

## 7 Capacitor Installation



Solder the 0.1 $\mu$ F capacitor across the leads of the Flashing LED. It doesn't matter which lead goes where - it won't care. But the Solarengine will, and will behave *much* better because of it.

## 8 Solarengine Wiring



Now your Symet Solarengine is ready to connect to the rest of the Symet. Use these electrical connection points to install it. Remember to watch for touching wires that might short it out!