

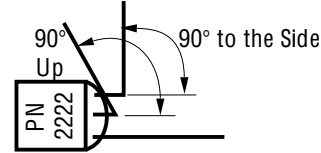
# The Free-Form Miller Solarengine

Find a solar cell without the circuit board on it?  
Build your own "free-form" version!

You will need a PN2222 transistor, a diode, a 1381 trigger (C or E), a storage capacitor (1000 $\mu$ F or higher), a timing capacitor (0.47 $\mu$ F to 10 $\mu$ F), wire, a motor and a solarcell (solarcell must generate 3.2V MINIMUM).

(And it's all fit onto one easy-to-read single instruction page!)

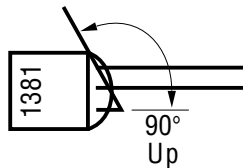
## 1 PN2222 Transistor



Bend the right side lead (the *collector*) 90° to the side.

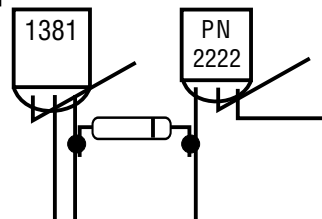
Bend the middle lead (the *base*) 90° up, so it points up at you.

## 2 1381 Voltage Trigger



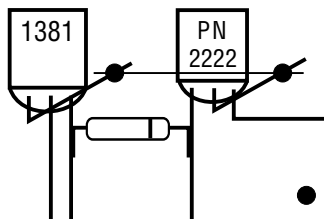
Bend the left side lead (the *output*) 90° up so it points towards you.

## 3 1381/PN2222/Diode



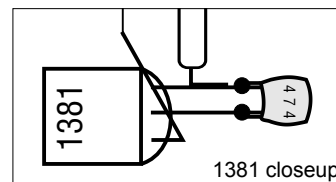
Place the 1381 and PN2222 transistor side-by-side, and join the inner legs with the diode as shown. Note that the black band of the diode is on the RIGHT side.

## 4 Wire



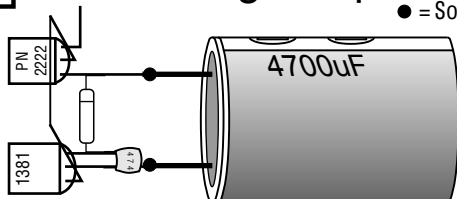
Bridge the vertical legs of the 1381 & the PN2222 with a wire, then cut off the excess leads. If you can bend & solder the legs together, you won't need a wire at all.

## 5 Timer Capacitor



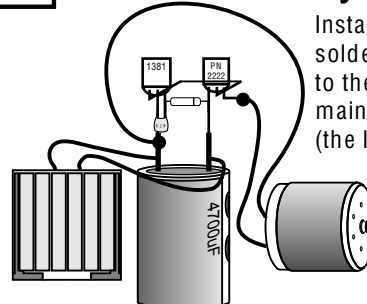
Mount the desired discharge timer capacitor (in this case, 0.47 $\mu$ F) across the middle and right legs of the 1381. If the capacitor has polarity, connect positive (+) to the middle leg of the 1381.

## 6 Main Storage Capacitor



Solder the main capacitor so the capacitor leg *nearest the stripe* on the capacitor body (-) is soldered to the left leg of the PN2222, and the other leg (+) is soldered to the middle leg of the 1381.

## 7 Final Assembly



Install the motor by soldering one connection to the (+) side of the main storage capacitor (the lead opposite the striped side). Solder the other connection to the right leg of the PN2222 transistor.