



Project #16: Simple Solar Cell Circuits

NOTE: This project uses the Solar Cell Classroom Set from www.solarschoolhouse.org.

Explore series and parallel circuits with a photovoltaic cell (solar cell) and a DC motor. Find out how to make the motor turn faster, and which circuit works better on a cloudy day.

Record your results for the following experiments on a separate sheet of paper.

Materials

- Solar cells (also called PV cells)
- Direct current hobby motor
- Plastic fan

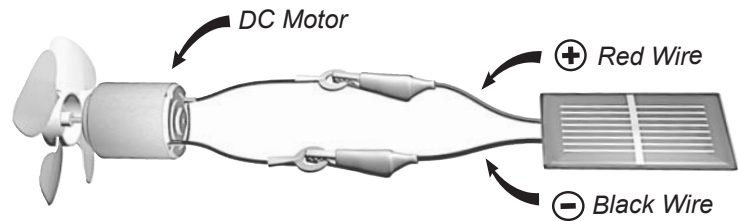
Set Up

1. Push a fan onto the motor shaft about 1/8" to 1/4." Once attached, leave the fan connected to the motor; the blades might break if you try to remove the fan.

Simple Circuit to Motor

A simple circuit includes a power source (the solar cell), conductors to carry electricity (wires), and a load (the motor).

1. Clip the wires from the solar cell to the metal rings at the end of the motor wires. Aim the solar cell at the sun and observe. Change the angle of the solar cell to the sun. What angle makes the motor spin fastest?
2. Notice which way the motor spins. Reverse polarity by switching the alligator clip connections on the motor wires, and observe. What happens when you reverse polarity?



Series Circuit to Motor

Series wiring connects PV cells in a chain, from positive (+) to negative (-) between each cell. There's only one path for the electricity to follow: through one cell after another & then through the load.

1. Connect the black (-) wire of one solar cell to the red (+) wire of another cell. Connect the remaining wire from each cell to the motor wires. Is the motor's speed different than it was in the simple circuit? How?
2. What happens to the motor's speed when you connect more cells in series?
3. What happens when you shade one cell? Why do you think this happens in a series circuit?



Parallel Circuit to Motor

When PV cells are wired in parallel, the positives (+) of each cell are connected to one side of the load, and the negatives (-) of each cell are connected to the other. This gives two paths for the current to follow through the load.

1. Clip the red wires from two solar cells onto the metal ring on one motor wire. Clip the black wires from the cells onto the other motor wire ring. What is the speed of the motor compared to the simple and series circuits?
2. What happens when you shade one cell? Why do you think this happens in a parallel circuit?

NOTE: Parallel circuits are useful for powering loads when there is less sunlight, like on a cloudy day.

