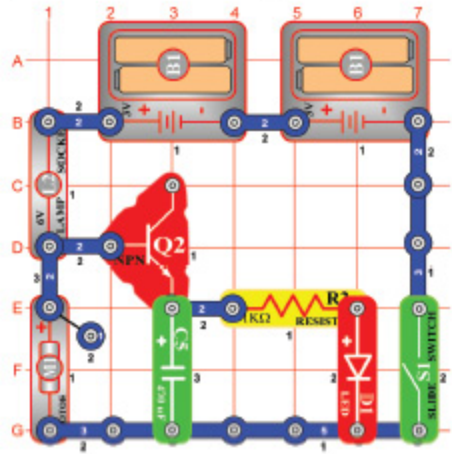
Project #300

Simple Rectifier (II)



WARNING:
Moving parts.
Do not touch the fan or motor during operation.

OBJECTIVE: *To convert a changing voltage into a constant voltage.*

Build the circuit shown but leave the fan off the motor (M1). Turn on the slide switch (S1); the motor spins and the 6V lamp (L2) and the LED (D1) light. The LED will not be very bright so turn off the room lights, or hold your fingers around it to see it better.

Now remove the 470μF capacitor (C5) from the circuit. The motor spins just as fast and the lamp is still bright, but the LED is very dim. Why?

The spinning shaft in the motor creates a changing voltage, which can barely light the LED. The 470μF capacitor can store electricity, and it combines with the NPN transistor (Q2) to make a rectifier. This rectifier converts the changing voltage from the motor into a constant voltage, which makes the LED bright.

Place the capacitor back into the circuit and place the fan on the motor. Now the motor spins more slowly and the LED is off again, but the 6V lamp is slightly brighter. The motor has less voltage when it spins slower, so the LED stays off. But there is more voltage across the lamp now, making it brighter.

The electricity supplied to your home by your electric company is actually a changing voltage. Many electronic products use rectifier circuits to convert this into a constant voltage like a battery provides.