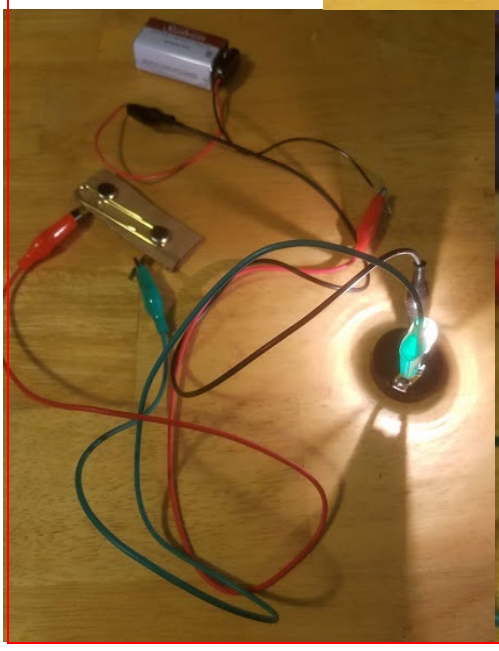
Constructing Electricity



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ISBN: 978-1-936984-64-0

Cover Design: Monica Burch

In this workshop, you will create a simple circuit, a switch, and opening up that circuit at the power source.

Materials:

- *6.3V/250mA Incandescent Flashlight Bulb & Motor*
- *Bulb Holder*
- *Heavy-Duty 9V Snap Connectors*
- *3- Standard Alligator Lead Cables*
- *2 "x 1" inch piece of cardboard,*
- *One paper clip*
- *Two paper fasteners*
- *Sample Conductors/ Insulator – a piece of copper, aluminum foil, cardboard, and rubber band*

Need:

- *9V Battery*

The first experiment is to reproduce the basic closed circuit. Electricity flows in a closed circuit so everything must be connected. The power source in this experiment is the battery; electrons flow from the batteries through the metal part of the wires. Not, the colored plastic part of the wires.

Let's create a simple circuit using a bulb, lamp, batteries, and two wires with alligator clips. This should take about ten minutes.

INSTRUCTIONS FOR EXERCISE I

1. Attach the 9V Snap connectors to a 9V battery.
2. Place the flashlight bulb in the bulb holder.
3. Attach a red and black wire (Alligator lead set) via the alligator clip to the wires on the snap connector and then to the light bulb holder.
4. The light bulb holder should have either two attached screws or two prongs. The goal is to create a closed circuit. Now, this circuit is a basic circuit used in most devices.

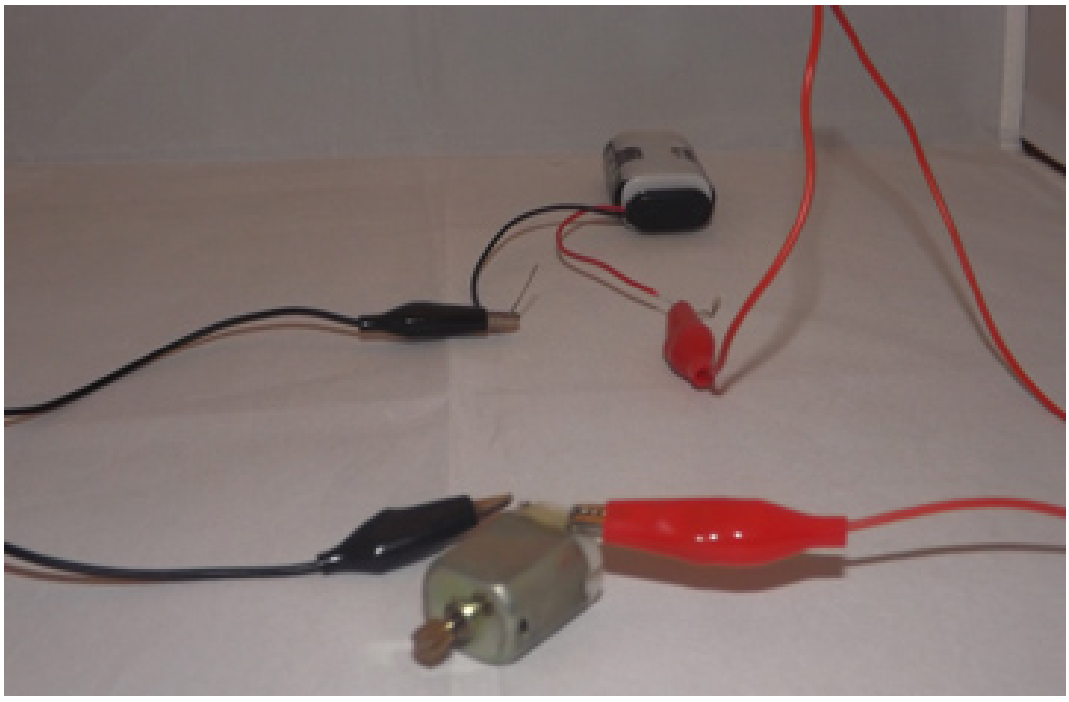
Electricity for the circuit comes from the battery – Show how the batteries can be connected to the motor with the lead wire and mention energy conversion and wires. A battery is a device that can store electrical energy in the form of chemical energy and convert that energy into electricity.

Two terminals made of different metals, the anode, and the cathode; and the electrolyte is a chemical medium that allows the flow of electrical charge between the cathode and anode. When a device is connected to a battery; a chemical reaction occurs on the electrodes that create a flow of electrical energy to the device. (More Details in Constructing the Batteries)

MOTOR-INSTRUCTIONS FOR EXERCISE II

1. Attach a 9V battery in the battery clip. Choose red and black wires.

2. Attach a red and black wire via the alligator clip to the battery and the motor. The motor should have either two attached wires or two prongs. The goal is to create a closed circuit. Do not touch the gear on the motor as it spins round. Now, this circuit is a simple circuit used in most devices.



SWITCH-INSTRUCTIONS FOR EXERCISE III

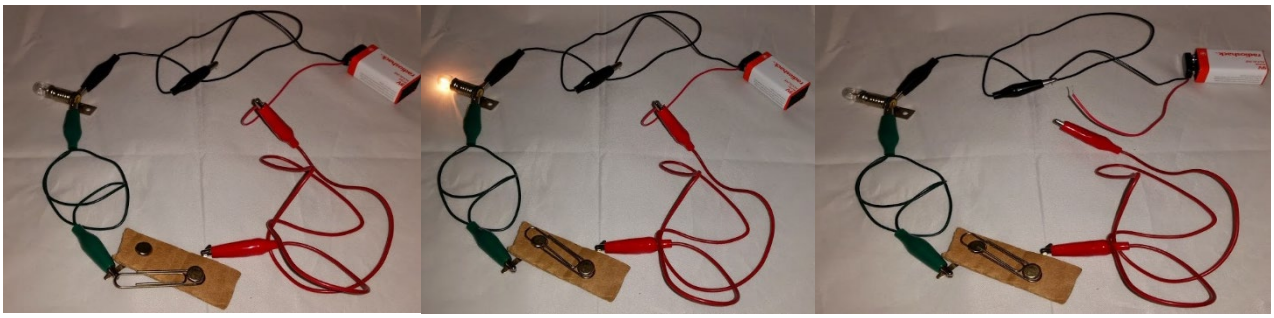
A switch allows you to try a circuit on and off. So let's build a switch to show how to control the flow of electricity with a switch.

1. An easy way to build a switch is with a piece of 2”x 1” inch piece of cardboard, 1 paper clip, and 2 paper fasteners.
2. Place one paper fastener inside the paper clip, and push the paper fastener with the attached paper clip through the cardboard. If the cardboard is too hard to puncture, use a pair of scissors to make a small hole first.
3. After the paper fastener is through the cardboard, open up the fastener on both ends, pull it tight and make an "I" shape, with one part sticking out of the side of the cardboard and the other bent underneath. Make sure the two legs of the "I" do not touch. The top of the cardboard should contain the button top of the paper fastener and the paperclip.
4. Move the paperclip on the cardboard to make an acute angle, but keep the paper clip resting on the cardboard. Now insert the other paper fastener in the cardboard so that the paper clip when straightening touches the button part of the fastener. Underneath make another "I" shape, but make sure the two legs of the "I" do not touch.

ADD SWITCH TO CIRCUIT -INSTRUCTIONS FOR EXERCISE IV

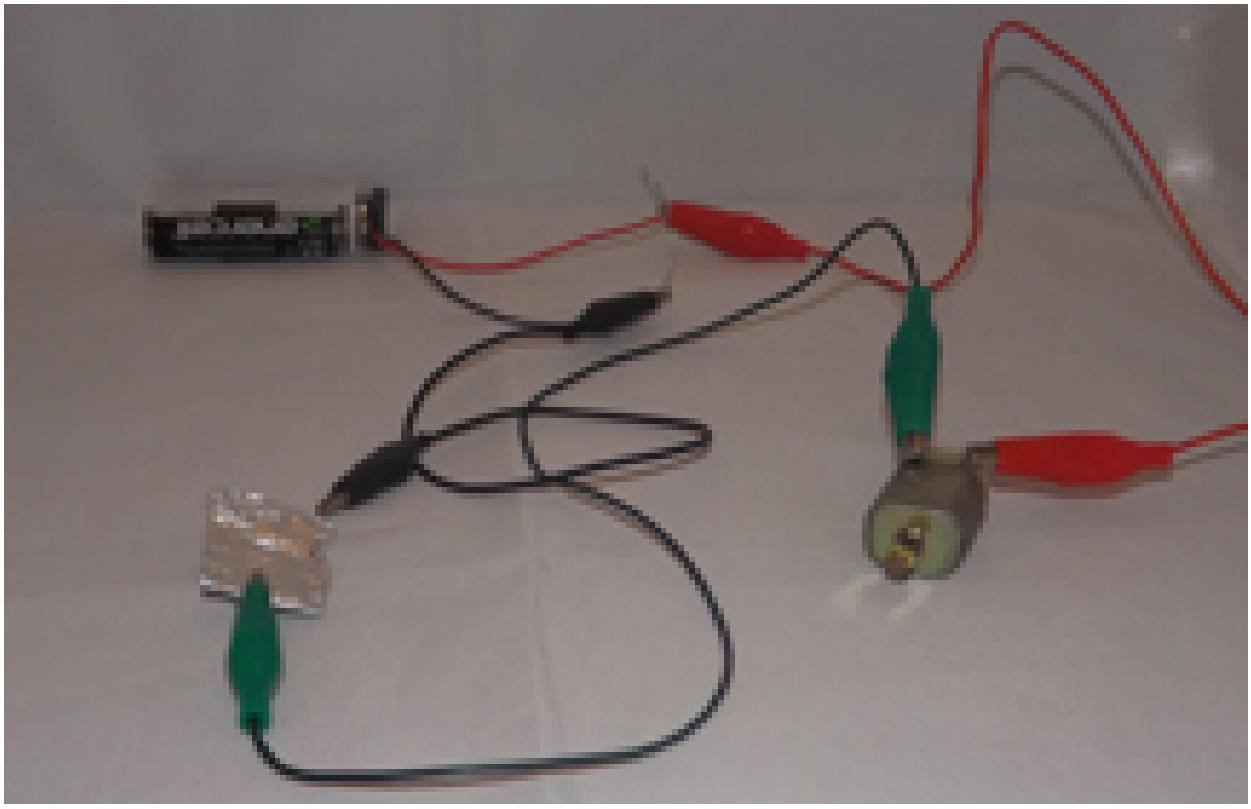
From the above circuit, detach the red cable from the light.

1. Find another cable – any color – and the switch.
2. Let's insert the switch.
3. Attach the new cable, I used a green wire, to the paper fastener on the left, then attach the other fastener to the red cable that is also connected to the light.
4. Now touch paper clip to the fastener. The paper clip and fastener are "conductors," as is any material that electrical current can flow through.
5. Do not touch the plastic on the alligator clip- plastic is an insulator, and will protect you from the electrical current. Electricity cannot flow through "insulators." When the paper clips touch the paper fastener, which is attached to the alligator clip, the circuit is complete.
6. Disconnect the alligator clippers from the power source, the battery. What happens? The circuit needs to be closed for electricity to flow so by disconnecting the wire, the circuit is now opened, and electricity is not flowing.



CONDUCTORS/INSULATORS-INSTRUCTIONS FOR EXERCISE V

Test Conductors and Insulators - Remove the switch in the circuit and place one of the items listed as Conductors and Insulators create a complete loop by touching one wire to one end of the Conductors or Insulators and the other wire to the other end. Write down the results.

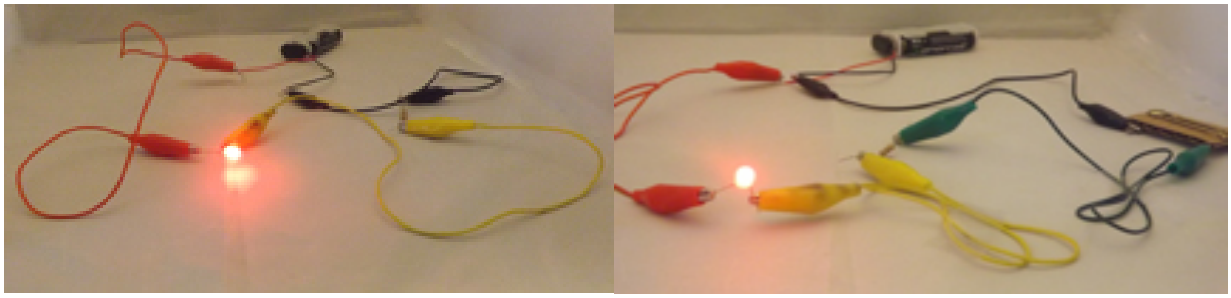


LED - INSTRUCTIONS FOR EXERCISE VI

In this exercise, you will need a battery, three wires, a LED, and a 100-ohm resistor. The LED does not need much electricity to light up, so you can limit it by placing a resistor in the circuit between the source of the current and the LED.

INSTRUCTIONS:

1. Attach a cable the positive (+) part of the battery, then to the resistor. Attach another cable from the resistor to the long leg of the LED, then from the LED to the negative side of the battery.
2. Now let's add a switch, like the one we built in Project Seven.



Electricity is a natural phenomenon that occurs throughout nature. Electricity is the flow of moving electrons. When the electrons flow, it is called an electrical current.

Current (amperage) is the flow of electric charge in a conductor. Compare electricity to water and think of current as the amount of water flowing through a tube. The higher the current, the more water that is moving in the tube. Low current would be similar to less water flowing in the same size tube

Voltage (Volt) is the measurement of the potential energy of the battery. Voltage is like water pressure. Low voltage is similar to water under low pressure. High voltage is similar to water under high pressure.