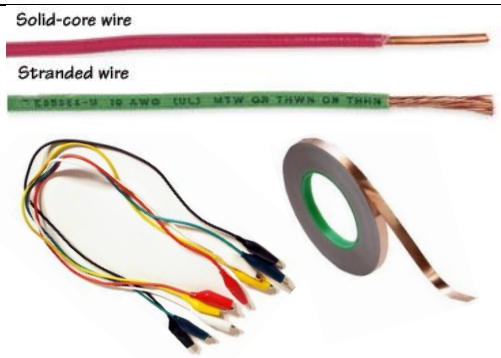
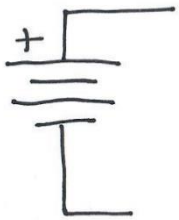
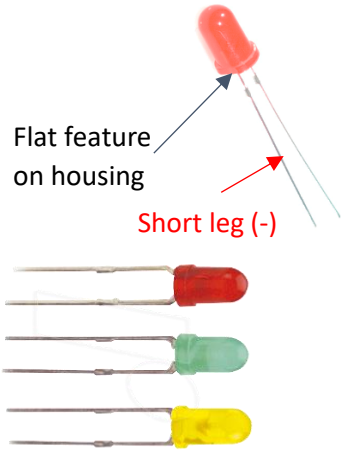
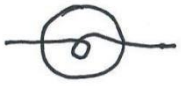
Circuit Components

Name and Definition	Physical appearance	Schematic Symbol
Conductor: Any material, usually metal, that carries an electrical current, such as wire, alligator clips, or copper tape.		
Battery: A device that converts chemical energy into electrical energy and provides direct current (DC) power. The common household batteries (sizes AAA, AA, C, D) all provide 1.5 Volts. Larger batteries can provide greater current. Coin Cells provide 3V with a low current. Battery holders are often used to connect batteries in series and create higher voltages. A 9 Volt battery actually has 6 small 1.5 Volt batteries inside the case.		
LED: Light Emitting Diodes are components that give off light when current goes through in the correct direction, as indicated by the "arrow" in the symbol. LEDs usually come with 1 leg longer than the other. Connect the higher voltage to the longer end for proper current flow. The negative end is also indicated a by a small flat on the bottom of the plastic housing. In circuits with 9 Volt batteries, LEDs are wired in series with a resistor to prevent them from burning out.		
Lamp: This traditional device converts electrical energy into light (and lots of heat) using a resistive filament. Increasing the voltage will increase the brightness.		

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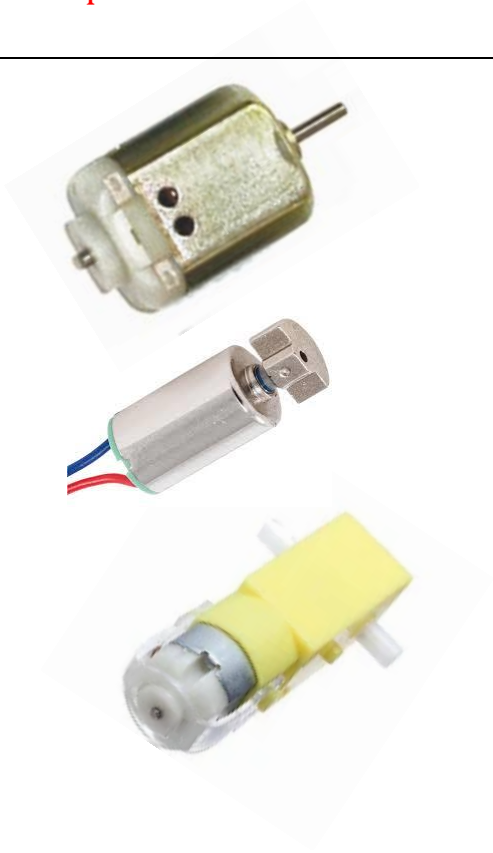
Motor: There are many types of electric motors, but all convert electrical energy into rotary motion of an output shaft. Small DC motors are usually appropriate for low-voltage electronics. These motors have output shafts that spin very fast with low torque (turning force). Gears are often used to achieve greater torque and lower rotation speeds. A **Vibrating Motor** has an unbalanced weight on the output shaft which causes objects to vibrate when it is powered. **Gear Motors** are motors with a "gear box" connected to the output shaft to create rotary motion at a lower speed and with a higher torque. They typically have a reduction of 48:1, and are useful to drive wheels on small robots or cars.		
Piezo Buzzer: Piezoelectric materials are special semiconductors that can be used to convert electrical energy to motion, and can also convert mechanical motion to electrical energy. The piezos used for electronics are often packaged with a small circuit board that creates an oscillating electrical signal that is then used to drive the piezo material. The frequency of the signal determines the pitch of the tone created by the device. Piezo components only work when current flows from the positive side (red wire) to the negative side (black wire).		

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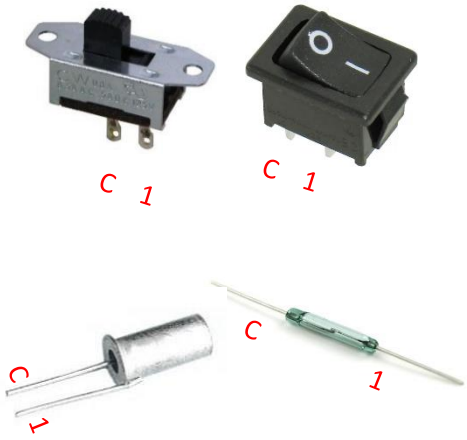
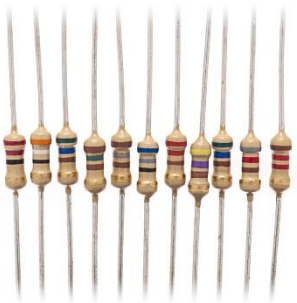
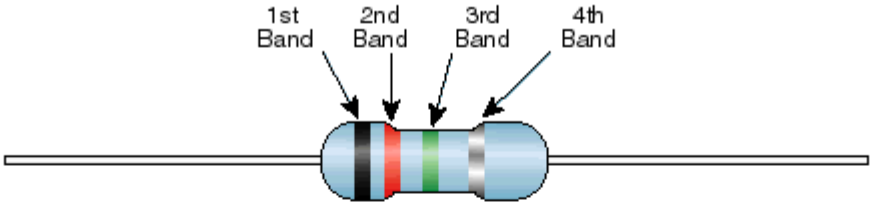
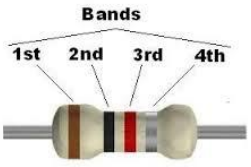
Switch SPST (Single Pole Single Throw): Toggle switches stay on the On or Off positions. Common toggles switches are Slide, Rocker, and Lever switches. Toggle SPST switches are often serve as an On/Off switches in a circuit. The handle moves side to side to open or close the circuit. The tabs can b e thought of as Common (C) and tab 1. It is connected to a small conductive piece that makes contact between the Center tab "C" and tab 1 when it is over at side 1.		
Switch SPDT (Single Pole Double Throw): This switch is often used to switch power between 2 circuit paths. On a Slide switch, the handle is moved side to side to open one circuit and close the other. It either closes the circuit between the Center tab C and tab 1, or C and tab 2. A Lever switch has a Common (C) tab, one tab that is Normally Closed (NC) and one that is Normally Open (NO). When the lever **is not** pressed, the Common (C) tab is connected only to the NC tab. When the lever **is** depressed, the C tab is connected to the NO tab.		
Resistor: Electronic component that slows the flow of electricity. Resistors are used in a circuit to set the electric current to a desired level. This is similar to the way that a valve is used to control the flow of water from a hose. Resistors have a color code that specifies the amount of resistance they provide.		

Standard EIA Color Code Table 4 Band: ±2%, ±5%, and ±10%



Color	1st Band (1st figure)	2nd Band (2nd figure)	3rd Band (multiplier)	4th Band (tolerance)
Black	0	0	10^0	
Brown	1	1	10^1	
Red	2	2	10^2	±2%
Orange	3	3	10^3	
Yellow	4	4	10^4	
Green	5	5	10^5	
Blue	6	6	10^6	
Violet	7	7	10^7	
Gray	8	8	10^8	
White	9	9	10^9	
Gold			10^{-1}	±5%
Silver			10^{-2}	±10%

Chart Provided By XICON



A 1,000 ohm resistor

Potentiometer: This device works as a variable resistor. It has 3 contact points. A resistive element goes from one outer contact, A, to the other, B. The middle contact is connected to a sliding center tap that moves along the resistive element. When the resistance between C and A decreases, the resistance between C and B increases. The total resistance between A and B remains constant.

Potentiometers are often used to control volume or brightness.