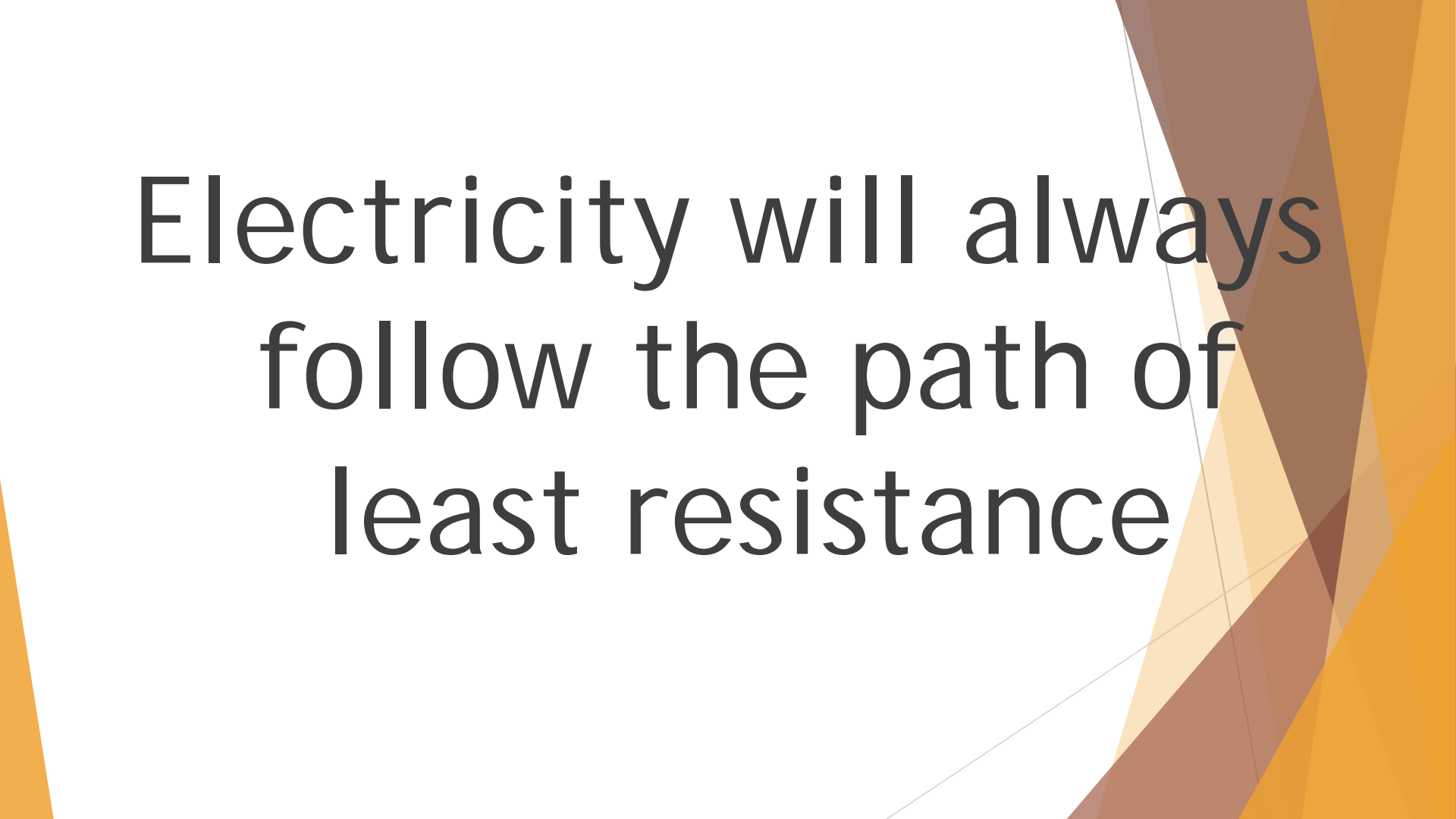


Electricity & Components



Electricity will always
follow the path of
least resistance

+

-

Anode vs Cathode

- ▶ An anode is an electrode through which positive electric charge flows into a polarized electrical device.
 - ▶ Anode Current Into Device
 - ▶ Anode is usually the positive pole (+)
- ▶ A cathode is the electrode from which a conventional current leaves a polarized electrical device.
 - ▶ cathode current departs
 - ▶ Cathode is usually the negative pole (-)

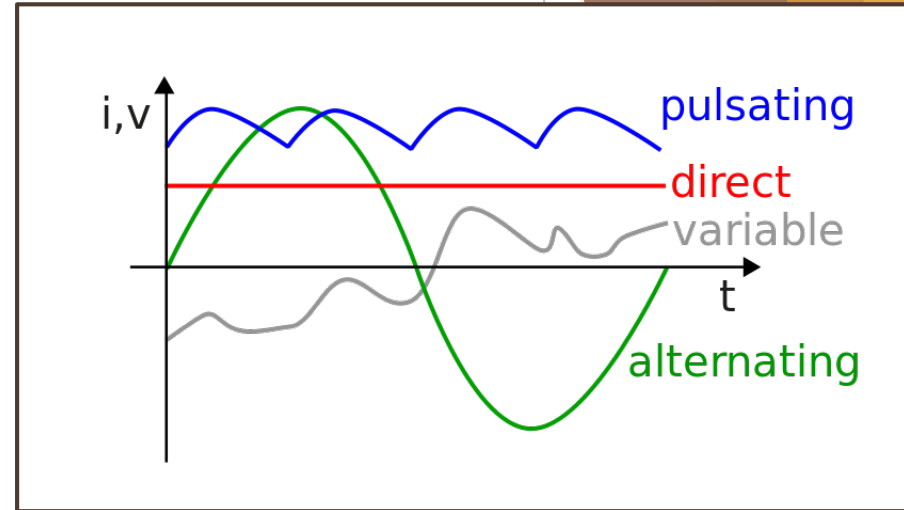
AC vs DC

Alternating Current

- ▶ The flow of electric charge periodically reverses direction

Direct Current

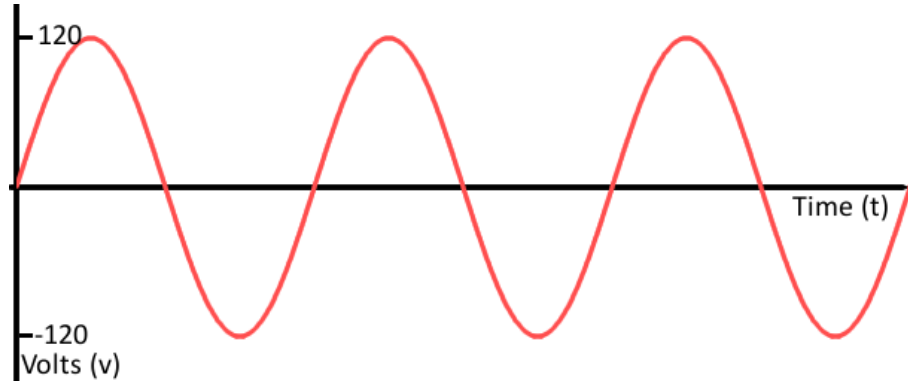
- ▶ The flow of electric charge is only in one direction.



Analog vs Digital

► Analog

- Infinite Possibilities
- signals may be limited to a **range** of maximum and minimum values, there are still an infinite number of possible values within that range.
- Analog waves are smooth and continuous



► Digital

- Discrete Possibilities
- Most commonly digital signals will be one of **two values**
- Digital waves are stepping, square, and discrete.




$$\text{Watts} = \text{Volts} * \text{Amps}$$

Water Analogy

- ▶ Understand the relationship between Volts and Amps

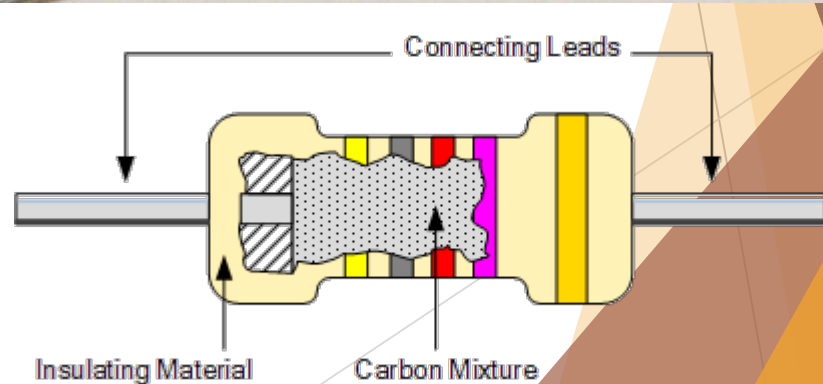
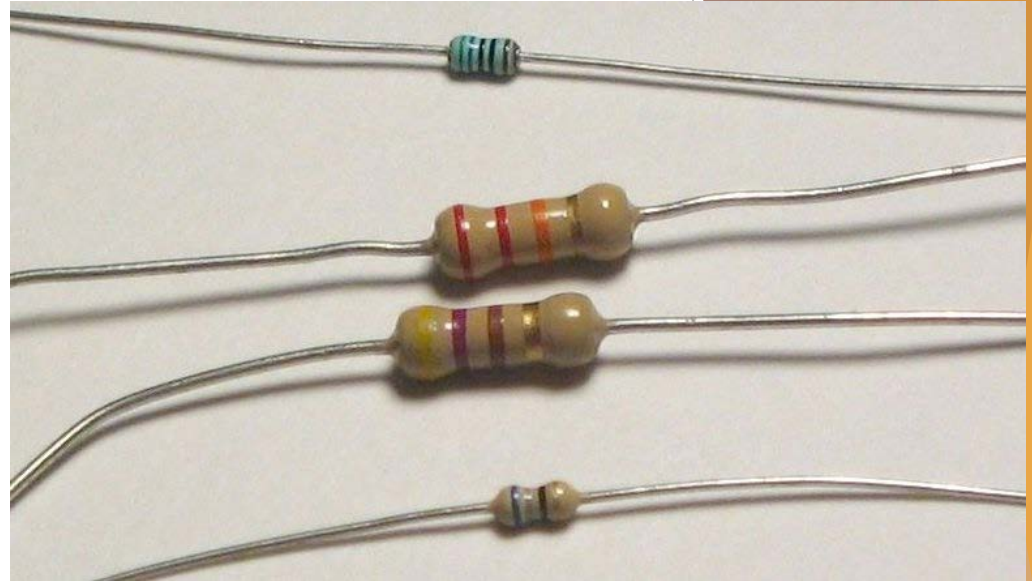
Volts – Water Pressure

Amps – Flow

Resistance – Size of pipe

Resistor

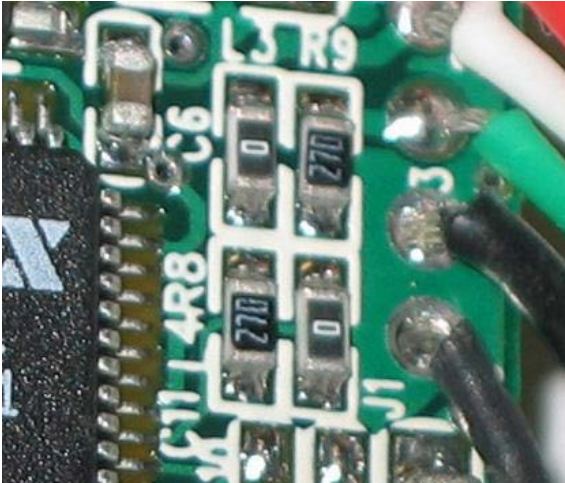
- ▶ Resistors act to reduce current flow, and, at the same time, act to lower voltage levels within circuits.
- ▶ Measured in Ohms



Resistor - Ohm's Law

- ▶ Ohm's law states that the voltage (V) across a resistor is proportional to the current (I), where the constant of proportionality is the resistance (R).
- ▶ For example, if a 220 ohm resistor is attached across the terminals of a 5 volt battery, then a current of $5 / 200 = 0.02$ amperes or 20 milliamps, flows through that resistor.

Resistor - Identify



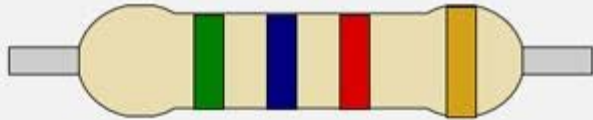
Resistor - Identify

EEWeb Resistance Calculator

Choose Type

- 4 Band
- 5 Band
- 6 Band

4 Band Resistor



1st Digit 2nd Digit Multiplier Tolerance

Black		0	x1	
Brown	1	1	x10	± 1%
Red	2	2	x100	± 2%
Orange	3	3	x1K	± 3%
Yellow	4	4	x10K	± 4%
Green	5	5	x100K	± 0.5%
Blue	6	6	x1M	± 0.25%
Violet	7	7	x10M	± 0.10%
Grey	8	8	x100M	± 0.05%
White	9	9	x1G	
Gold			- 10	± 5%
Silver			+ 100	± 10%

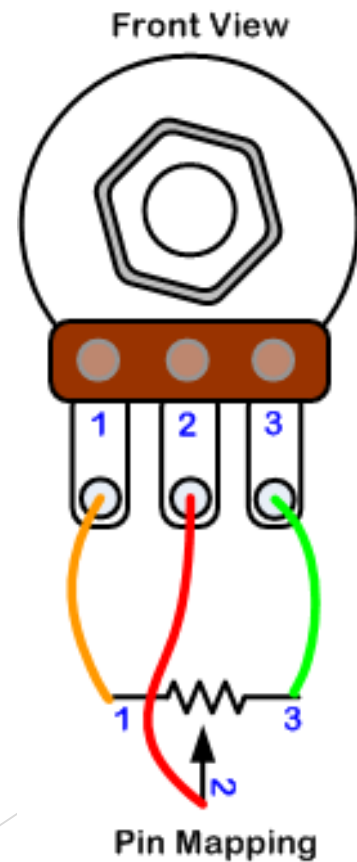
Outputs

Resistance: 5.60k ohms

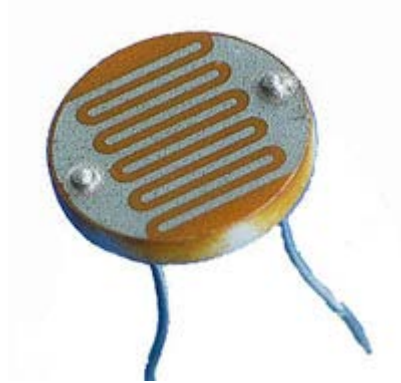
Tolerance: ± 5%

Potentiometer - Pot

- Variable Resistor



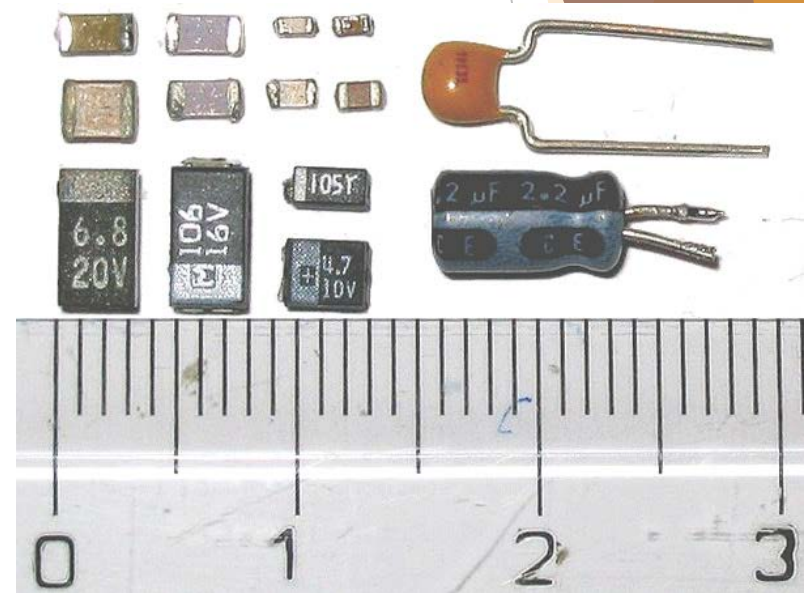
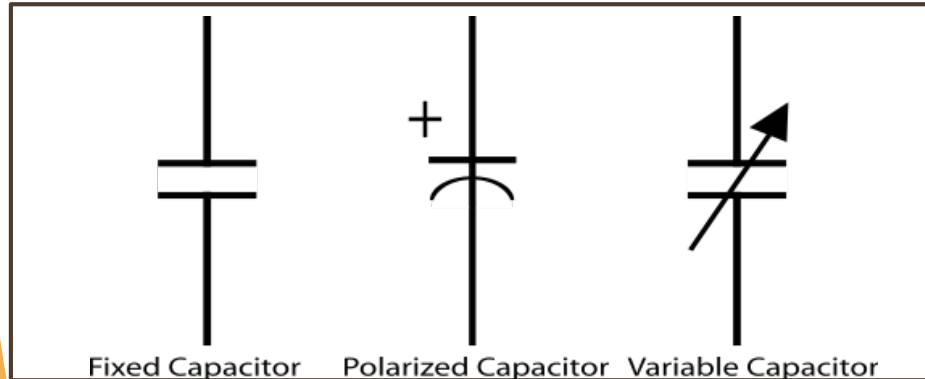
Other Variable Resistors



A thermistor is a type of resistor whose resistance varies significantly with temperature.

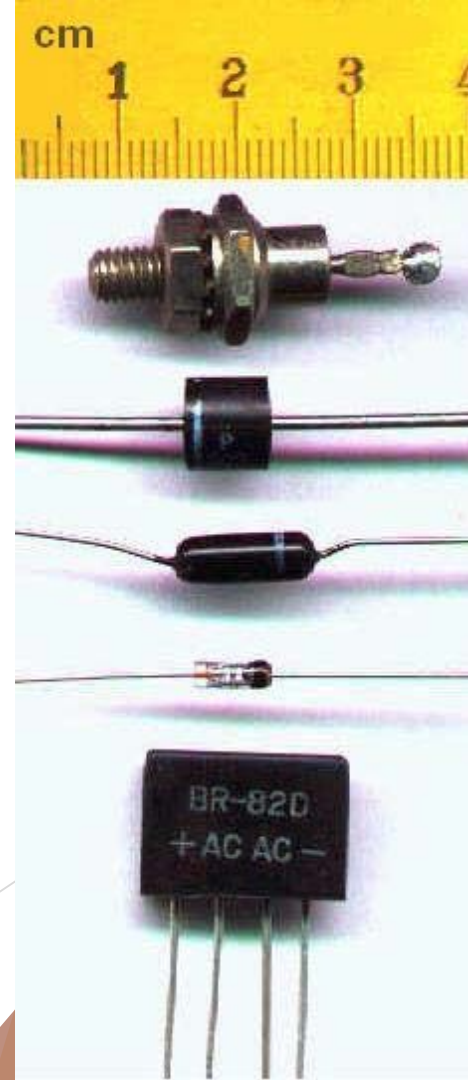
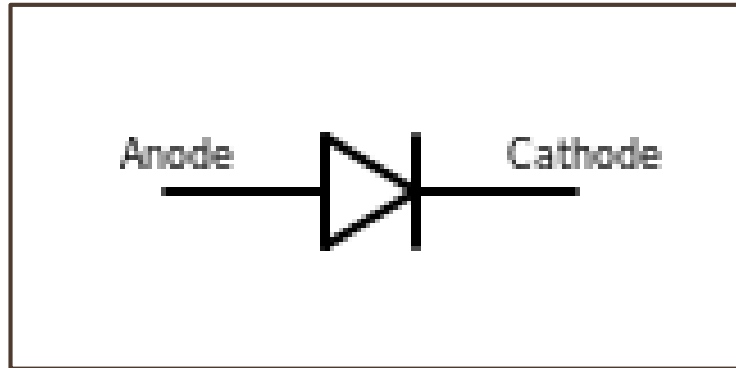
Capacitor

- ▶ Used to store energy
- ▶ Measured in farads
- ▶ Common types are: Ceramic or Electrolytic
- ▶ Electrolytic have polarity (+ Long leg and - is the short leg)
- ▶ Ceramic no polarity



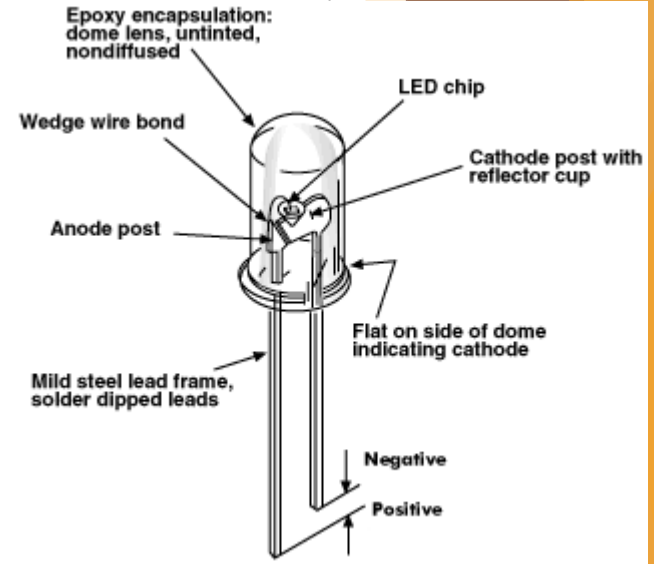
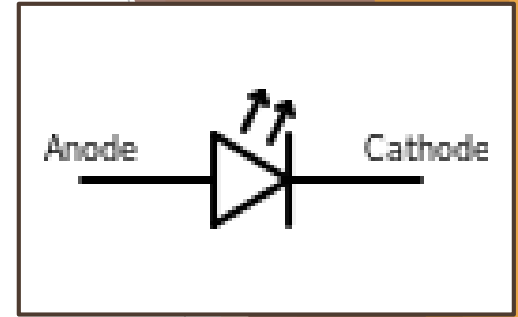
Diode

- ▶ The most common function of a diode is to allow an electric current to pass in one direction (called the diode's forward direction), while blocking current in the opposite direction (the reverse direction).



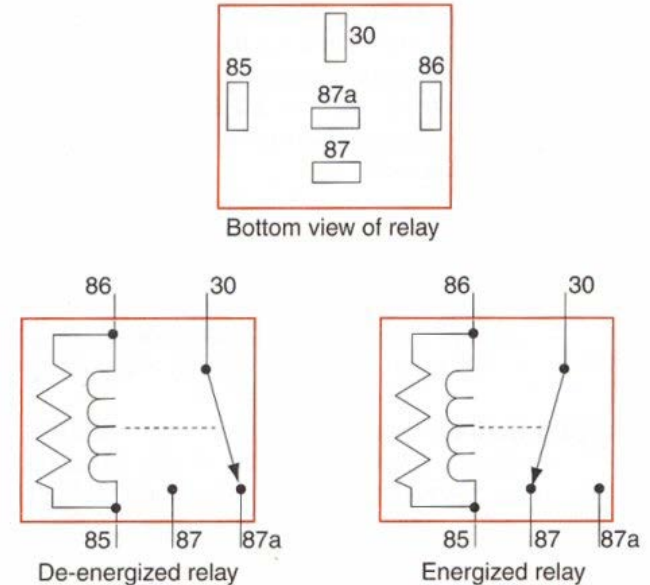
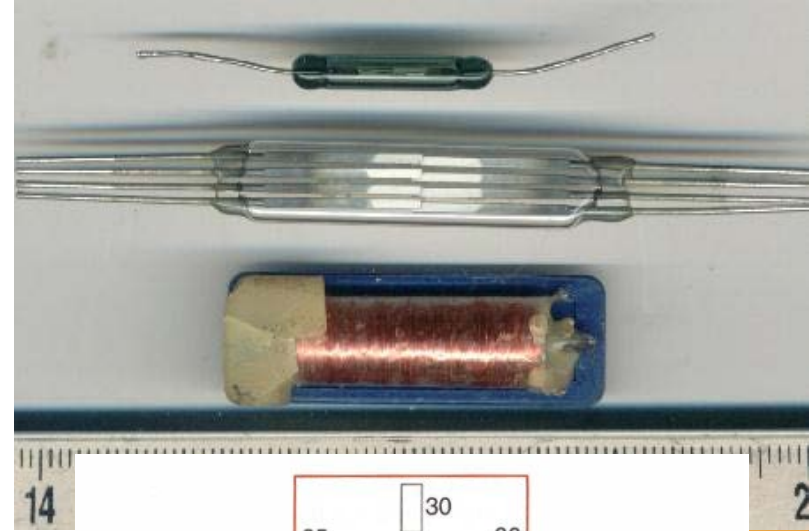
LED - Light Emitting Diode

- ▶ two-lead semiconductor light source
- ▶ Has polarity
- ▶ Long leg Anode (Positive +)
- ▶ Short leg Cathode (Negative -)



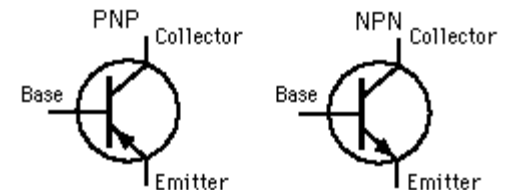
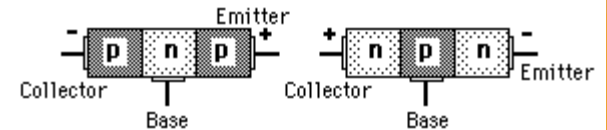
Relay

- ▶ electrically operated switch.
- ▶ Many relays use an electromagnet to mechanically operate a switch
- ▶ Relays are used where it is necessary to control a circuit by a low-power signal (with complete electrical isolation between control and controlled circuits), or where several circuits must be controlled by one signal.
- ▶ https://www.youtube.com/watch?v=Lhv2SZmlk_Q

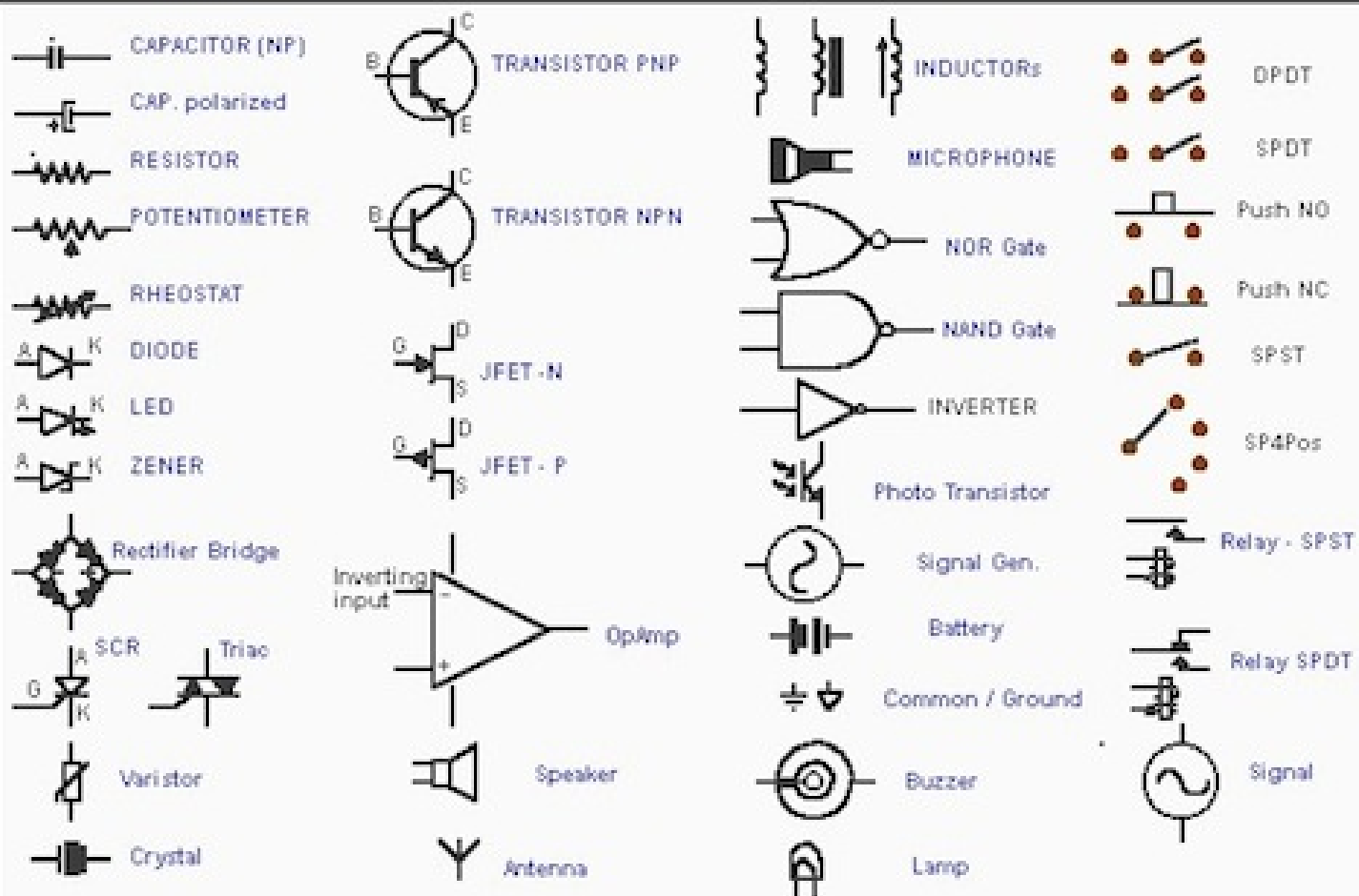


Transistor

- ▶ semiconductor device used to amplify and switch electronic signals and electrical power
- ▶ 2 main types NPN and PNP
 - ▶ NPN
 - ▶ Add a positive charge to make a connection between 2 negative signals
 - ▶ PNP
 - ▶ Add a negative charge to make a connection between 2 positive signals

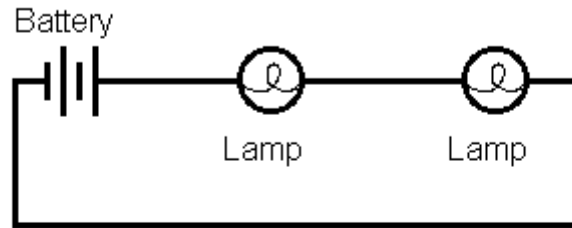


Some Basic electronic symbols



Series vs Parallel

SERIES



PARALLEL

