

### 3.2 Components and Units



Resistor – opposes the flow of current in a circuit.

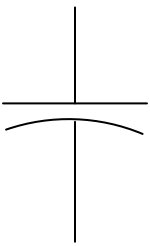
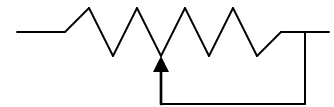
Resistance is the opposition to the flow of current.  
The symbol for resistance is a capital R.

The unit of resistance is the Ohm.

The abbreviation for Ohm is the Greek letter omega  $\Omega$ .



Variable resistor – also called a potentiometer  
Often used as an adjustable volume control  
Resistance is controlled by a potentiometer.

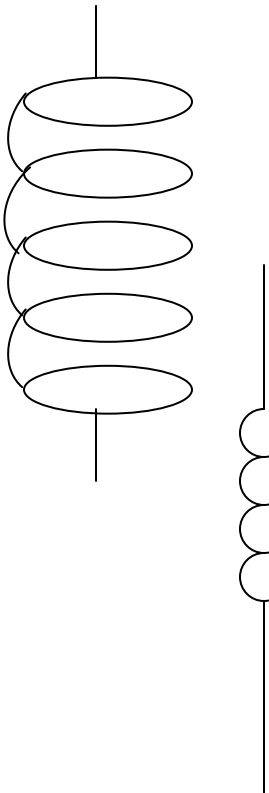
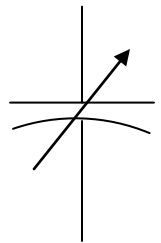


Capacitor – two or more conductive surfaces separated by an insulator  
stores energy in an electric field

Capacitance is the ability to store energy in an electric field.  
The symbol for capacitance is a capital C.

The unit of capacitance is the Farad.

The abbreviation for Farad is a capital F.



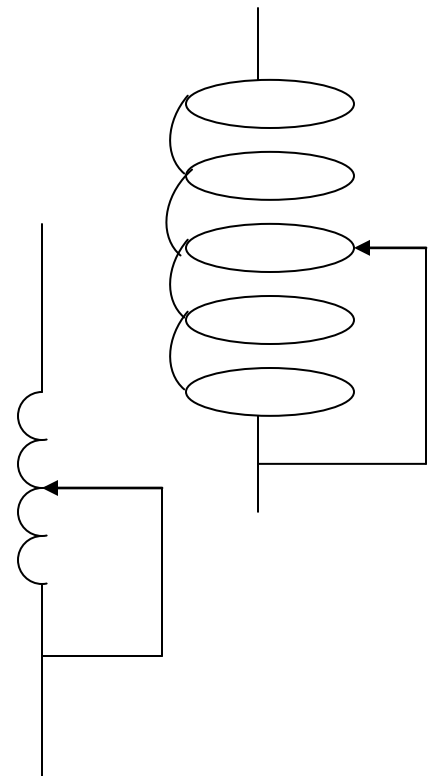
Inductor – usually composed of a coil of wire  
stores energy in a magnetic field

Inductance is the ability to store energy in a  
magnetic field.

The symbol for inductance is a capital L.

The unit of inductance is the Henry.

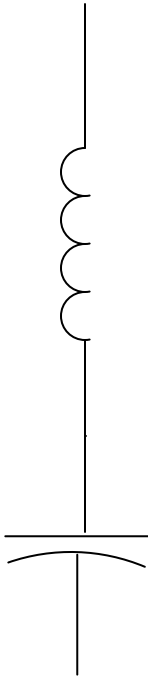
The abbreviation for Henry is a capital H.



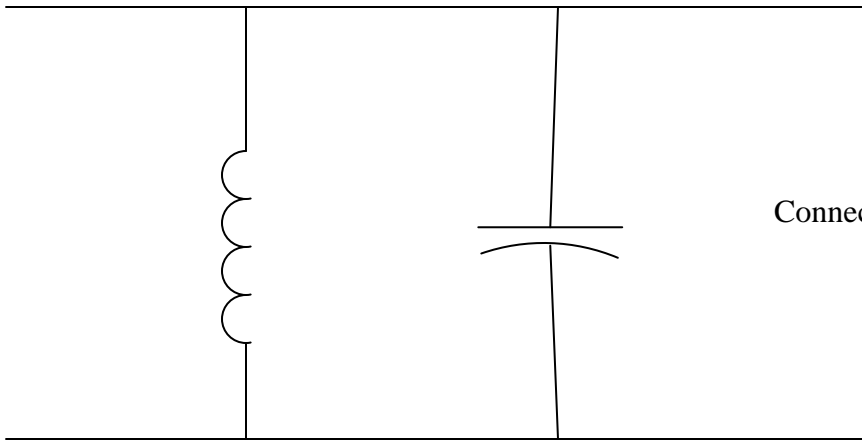
## Resonant or Tuned Circuits

A circuit with an inductor and a capacitor is a resonant or tuned circuit.

An inductor and a capacitor connected in series or parallel to form a filter is a simple resonant or tuned circuit.



Connected in series



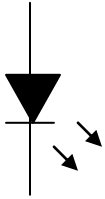
Connected in parallel.

## Semiconductors



**Diode** allows current to flow in only one direction  
has two electrodes: the anode and the cathode  
the cathode is usually identified by a stripe

A rectifier is a heavy-duty diode that can withstand large voltages and currents.  
A rectifier changes an alternating current into a varying direct current.

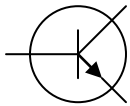


**Light Emitting Diode LED** gives off light when current flows through it  
commonly used as a visual indicator

## Transistors

The function of a transistor is to control the flow of current.  
A transistor uses a voltage or current signal to control current flow.  
A transistor can be used as an electronic switch.  
A transistor can be used as an amplifier.  
A transistor's ability to amplify a signal is called gain.

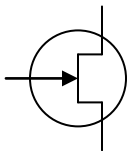
### PNP Transistors and NPN Transistors



PNP Transistors and NPN Transistors are made of three layers of semiconductor material.

PNP Transistors and NPN Transistors have three electrodes:  
Collector, Base, Emitter

### Field Effect Transistor FET



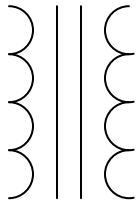
Field Effect Transistors have three electrodes:

Source, Gate, Drain

Diodes and transistors are semiconductors.

An integrated circuit is a device that combines several semiconductors and other components into one package.

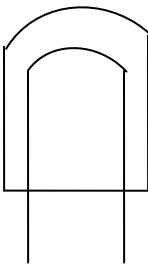
## Transformers



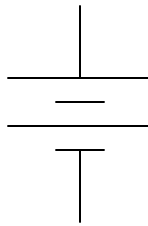
A transformer changes AC voltages.

A transformer is commonly used to change 120 V AC house current to a lower AC voltage for other uses.

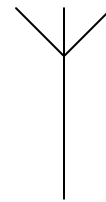
## Lamp



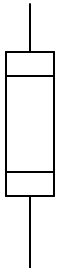
## Battery



## Antenna



## Protective Devices



Fuse – is used to protect other circuit components from current overloads  
interrupts power in case of overload

Never replace a fuse with a fuse that has a higher current rating.  
The excessive current could cause a fire.

A switch is used to connect or disconnect electrical circuits.



Single-pole single-throw switch

## Relays

A relay is a switch controlled by an electromagnet.

## Meters

A meter displays information on a numeric scale.

## Schematic symbols

The preceding drawings of components are schematic symbols.

Schematic symbols are standardized representations of components in an electrical wiring diagram.

## Schematic diagrams

A schematic diagram accurately represents the way components are interconnected.

A schematic diagram does not show the physical layout of the circuit, the physical appearance of the components, or the wire length.

The symbols on an electrical circuit schematic diagram represent electrical components.

For the Technician Class Question Pool expiring June 30, 2018:

You DO NOT have to draw schematic diagrams.

An electrical circuit schematic diagram accurately represents the way components are interconnected.

An electrical circuit schematic diagram DOES NOT show the physical layout of the circuit, the physical appearance of the components, or the wire length.

You DO NOT have to draw schematic symbols.

You have to recognize the schematic symbols for the following components:

- resistor
- variable resistor
- capacitor
- variable inductor
- Light Emitting Diode
- NPN transistor
- Transformer
- lamp
- battery
- antenna
- single-pole single-throw switch

Schematic symbols are standardized representations of components in an electrical wiring diagram.

The symbols on an electrical circuit diagram represent electrical components.

A resistor is used to oppose the flow of current in a DC circuit.

A potentiometer is often used as an adjustable volume control.

Resistance is controlled by a potentiometer.

Capacitance is the ability to store energy in an electric field.

The unit of capacitance is the Farad.

A capacitor consists of two or more conductive surfaces separated by an insulator.

A capacitor stores energy in an electric field.

Inductance is the ability to store energy in a magnetic field.

The unit of inductance is the Henry.

An inductor is usually composed of a coil of wire.

An inductor stores energy in a magnetic field.

A capacitor is used together with an inductor to make a resonant or tuned circuit.

An inductor and a capacitor connected in series or parallel to form a filter is a simple resonant or tuned circuit.

A diode allows current to flow in only one direction.

The two electrodes of a diode are the anode and the cathode.

The cathode lead of a semiconductor diode is usually identified with a stripe.

A rectifier changes an alternating current into a varying direct current.

The abbreviation LED stands for Light Emitting Diode.

An LED is commonly used as a visual indicator.

The function of a transistor is to control the flow of current.

Transistors are capable of using a voltage or current signal to control current flow.

A transistor can be used as an electronic switch or amplifier.

A transistor can amplify signals.

The term that describes a transistor's ability to amplify a signal is gain.

A transistor can be made of three layers of semiconductor material.

The three electrodes of a PNP or NPN transistor are the emitter, base, and collector.

The abbreviation FET stands for Field Effect Transistor.

The three electrodes of a Field Effect Transistor are the source, gate, and drain.

A transformer is commonly used to change 120 V AC house current to a lower AC voltage for other uses.

A fuse is used to protect other circuit components from current overloads.

The purpose of a fuse in an electrical circuit is to interrupt power in case of overload.

It is unwise to install a 20-ampere fuse in the place of a 5-ampere fuse because the excessive current could cause a fire.

A switch is used to connect or disconnect electrical circuits.

A relay is a switch controlled by an electromagnet.

A meter can be used to display signal strength on a numeric scale.