# The Light Emitting Diode

A diode is a device which permits current to flow in one direction, but blocks it in the reverse direction. Another way to say the same thing would be to say that it has a low resistance to current flowing in one direction, but high resistance to current flowing in the opposite direction. Diodes can be used to change alternating current into direct current, acting as "one-way valves" for the current.

A light emitting diode (LED) is a device which gives off light when current passes through it. Being a diode, however, the standard LED will pass current in one direction, and not in the other direction.

LED's can handle a limited amount of current. If you pass too much current through the diode it generates too much heat and burns out. For that reason, if an LED is used in a circuit there is usually a resistor wired in series with the diode to limit the current to a safe value.

Procedure:

1. Look at the DIODE AND LED IDENTIFICATION diagram, and at the LED you have been given. Identify which lead of the diode is the cathode and the anode of your diode.

2. Draw a schematic diagram with the +5 volt supply connected to one lead of a 470 ohm resistor, the other end of the resistor connected to the anode of the LED, and the cathode of the LED connected to the ground. When the anode is more positive than the cathode the diode is said to be forward biased. In the circuit you have just drawn the diode is forward biased.

3. Now connect up the circuit, check it carefully, and turn on the power. What do you see?

4. Break the connection between the diode and the ground and insert a milliammeter into the circuit with the + of the milliammeter connected to the diode and the - side of the meter connected to the ground. Record the amount of current flowing. Use the voltmeter to measure the voltage across the resistor. Record it. Also use the voltmeter to measure the voltage across the diode. Record it.

5. Draw a schematic diagram with the +5 volt supply connected to one lead of a 470 ohm resistor, the other end of the resistor connected to the cathode of the LED, and the anode of the LED connected to the ground. When the cathode is more positive than the anode the diode is said to be reverse biased. In the circuit you have just drawn the diode is reverse biased.

6. Now connect up the circuit, check it carefully and turn on the power. What do you see?

7. Break the connection between the diode and the ground and insert a milliammeter into the circuit with the + of the milliammeter connected to the diode and the - side of the meter connected to the ground. Record the amount of current flowing. Use the voltmeter to measure the voltage across the resistor. Record it. Also use the voltmeter to measure the voltage across the diode. Record it.

8. You will be given another device which looks like an LED, except it is in a clear package. Construct a forward biased circuit using this device (see steps 2,3 and 4 above). Record your observations.

9. Construct a reverse biased circuit using this device (see steps 5,6, and 7 above). Record your observations.

Questions:

1. From the response of the diode and the meter, what can you conclude about the presence or absence of current when a diode is forward biased?

2. From the response of the diode and the meter, what can you conclude about the presence or absence of current when a diode is reverse biased?

3. From its response, what would you conclude is in the clear plastic package used in steps 8 and 9?

Include your observations in step 3,6,8,9 and data table in your report.

| Step | Current | Voltage Across R | Voltage Across D |
|---|---|---|---|
| | (Amps) | (Volts) | (Volts) |
| | | | |
| 4 | | | |
| | | | |
| 7 | | | |
| | | | |
| 8 | | | |
| | | | |
| 9 | | | |