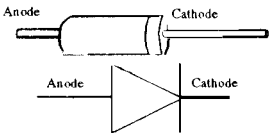
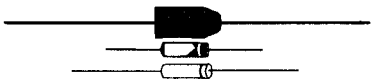
the DIODE

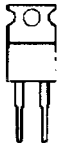
The diode is easy to understand if you visualize a one-way garden gate; it swings open easily in one direction but will not open when pushed upon from the other direction. In short, the diode will let current flow in one direction and not in the other. When the voltage is higher on the positive lead, the cathode (about 0.65 volts higher), then the voltage will flow. The resistance is very high in the other direction and voltage won't flow at all. Well actually, if wrong-way voltage should happen to get high enough, the diode breaks down and the current flows like water through a broken dam. The part is now defective (*shorted out*).



The diode is a two leaded device, some are very small and clear glass with a band on the cathode end. The clear glass diodes are about half the diameter of a 1/4 watt resistor. Others are black plastic with a band at the cathode end or they may be bullet shaped or even more like a rocket nose-cone shape. Power diodes can be much larger and in a metal case with a tophat; some mount using a threaded stud that acts as a heat sink. .



Diodes come in various shapes, tiny ones made from germanium and power rectifier diodes made from silicon. The later are frequently used in power supplies to ***rectify*** Alternating Current (A.C.) and convert it to Direct Current (D.C.). When four diodes are used in *bridge circuits*, they can produce pure D.C. from your wall outlet or other A.C. sources of power. Some additional parts, such as a transformer and capacitors are needed too. Because bridge circuits are so important, we suggest that you look them up and understand how a 'full wave bridge rectifier' circuit works.



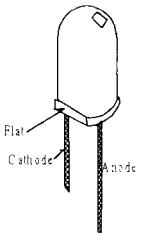
At first, you'll probably see only the very small, tubular shaped diodes, which are common in kits and low voltage circuits found in books and magazines. Later, when dealing with higher electrical power, you'll encounter power rectifiers such as the one on your left that looks like it is built attached to a bolt (it is). And the TO-220 style case on the right is another shape. Both are built to handle power and dissipate the associated heat by way of their built-in metal mountings.

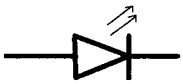
The diode is definitely "polarity conscious" i.e. be sure to solder it into your circuit facing the correct direction. The stripe on one end indicates the cathode end; the PC board will show either the symbol or an outline of the part much like the above drawing. Don't worry about connecting the large 'rectifiers' at this time. (We'll touch on that under "industry standards".

DIODE Markings: Tiny diodes may not be marked, keep track of their industry number when you buy them. But just as often you'll find an industry number on the part, such as **1N64A** or **1N914** and you will want to keep a magnifying lens at the work bench to help you read the very tiny ones.

The LED (light emitting diode).

Often referred to as the LED (like 'lead' in a pencil). The Light Emitting Diode is common in red and green, but also comes in white, orange, yellow and even blue. The schematic diagram is the same as for the diode except that the arrows have been added to indicate light emission. You've probably got LED's around you everywhere such as on your personal stereo and TV remote. They make great indicator lamps on equipment because they almost never burn out (unless you exceed the current limit)





cathode on right

The LED only draws 20mA at a couple of volts or so (really big LED's @ 40mA maximum) which is very low and makes them ideal for use in battery operated equipment. The shape to your right is common; but some LED's are square or rectangular. Some have a diffused lens, meaning that you can see their light from a wide angle. Some are Jumbo LED's, 3 times bigger than most. Some are supplied in a "bezel", which is a holder that gives a sharp, finished look when mounted in an instrument panel.

Polarity is important, you have to mount it facing the "right direction". By that we mean that the cathode must be connected where the circuit indicates or it won't work; same for the anode. The industry method for identifying which lead is what calls for two different lead lengths, the short one being the cathode. Or, there will be a 'flat' on the LED body nearest to the cathode lead wire. If you run into a three lead LED, it is bicolor, and will light green with current in one direction and red in the other. LED's are rarely marked with an industry number.