The Design Process, Part 4
-
Building the Library: Drawing things in the library - Logic Components

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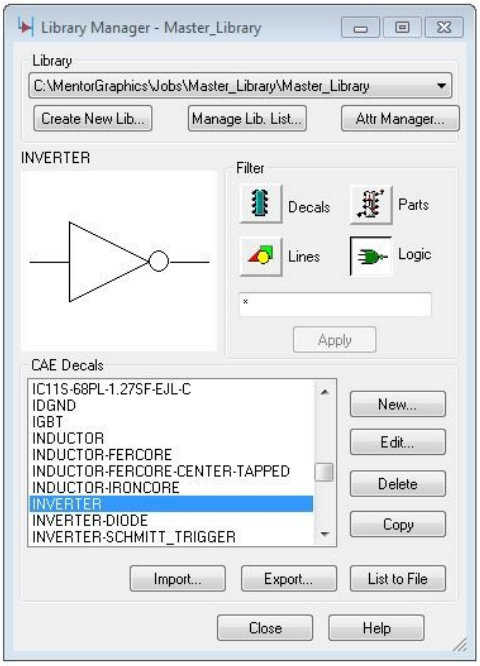
The next step in building the part library is creating the Logic symbols for the parts you will be entering in your schematic (the brains of the PC Board). Some parts may only contain one symbol with very few pins and they will be identified by a simple Reference Designator, such as U1. However, more complex parts may contain more than one symbol and more than one type of symbols. They will be built in sections called Gates which will instead be designated as U1-A, U1-B, etc.

Sometimes components may be drawn as a box with the individual Gates drawn or indicated internally. In certain circumstances, this is fine, but if the internal parts are spread over a larger part of the design, often the individual Gates are preferred. It depends on the particular case.



To the right we see the Logic section of the Library, where Logic symbols are drawn. These symbols represent the function of the particular component or sub-part of it drawn in such a way as to relate to every day life.

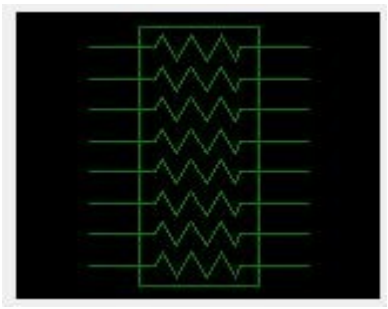
This particular symbol shown is an Inverter. The Signal Flow is from the left to the right. If the Logic signal coming into the Inverter is True, then the signal coming out is False, and vice versa. The circle, called a Bubble, is used to negate.

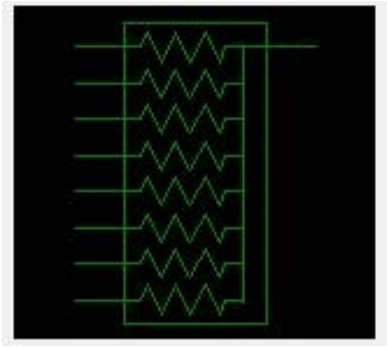
As another example, below is the symbol for a Resistor, whose function is to limit the electrical current flow through a given section of the circuit. The two straight lines at the edges are the Pins that connect the component to the Wires that enable the flow of electrical current. The Pins are a special type of line that has a small electrical node at their ends that tells the software how to connect them. Since the resistor's purpose is to restrict the flow of electricity, the component is drawn in a zig-zag manner, causing the electricity to be restricted and have to "slow down" in order to safely get to the other end. Think of a road or sidewalk, you can go faster when it's straight.

Resistors come in different values. The lower the value means that it restricts less flow and the higher value restricts more flow.

The Resistor symbol above may represent a unique component, or it may act as a Gate in a larger component.

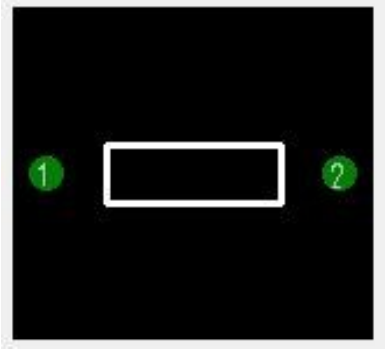
Resistors often come in groups called Packs and may be drawn either as a series of individual Gates: designated as R1-A, R2-B, etc., or may be drawn as one Gate as in the following examples. Here, it would be simply designated as R1.





In each of these examples, the resistor pack contains 8 individual resistors and, as they are in a pack, they would normally have the same value, the same amount of resistivity. The ones on the left are totally independent and are able to connect to either the same or different wires leading to different parts of the circuit. However the group on the right are connected to different wires on one end and internally to the same wire on the other. Usually, but not always, this common connection goes to either power or ground.

One unfortunate practice has come about in redrawing some of the symbols. In Europe, it is becoming a standard practice to represent Resistors as simply an elongated rectangle with one Pin on either end. While a physical standard resistor is rectangular in shape, see below, this type of symbol does nothing to indicate its function.



And, as before, the standard symbols and reference designators are found here: The ANSI (American National Standards Institute) standard, ANSI E32.2-1975, on this web page for explanations of the schematic symbols and their reference designators.