

# Electronic Component Lists and Schematic Symbols

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When creating new electronics, designers and engineers must have a common language to describe the components that go into their new project. This language comes in the form of electronic component schematic symbols that unambiguously describe the position, type, and function of a component within a project.

Experienced designers may not even need text descriptions of components, as long as they have a reliable memory for electronic component schematic symbols. Schematic symbols can vary slightly depending on the area of the world in which they are found, so designers sometimes need to be aware that multiple symbols may mean the same thing. There are a wide variety of electronic component schematic symbols, with this article only covering the 50 most common symbols.

## What is an Electronic Component Schematic Symbol?

An electronic component schematic symbol is a pictorial representation of an electronic component, usually standardized by an international electronics industry body. Such standards organizations include:

- International Electrotechnical Commission: IEC 60617 – [Graphical Symbols for Diagrams](#). The IEC database requires a yearly subscription and offers designers access to one of the most comprehensive groups of schematic symbols. The vast majority of designers and manufacturers use this standard directly or base their own standards on it.

- IPC-2612-1 – [Sectional Requirements for Electronic Diagramming Symbol Generation Methodology](#). This IPC standard defines strategies for creating new schematic symbols that are compliant with norms in the electronics industry. It's accessible through a one-time purchase.

Historically, [CAD librarians](#) needed to memorize many of these symbols or refer to industry reference literature when creating or cataloging components. Today, they are widely available at many reputable websites, along with design [footprints and schematics](#).

Schematic symbols include a wide variety of component types and circuit features. Most people who have seen simple electrical diagrams are familiar with symbols for resistors, switches, fuses, and other passives. However, electronic component symbols can involve more complex circuit features such as batteries with single or multiple cells, inductors, capacitors, and transformers.

There are even schematic symbols for some simple machines that may be integrated into a circuit, like buzzers, speakers, relays, and motors. With extremely complex machines, it may be unnecessary, too time-consuming, or too difficult to depict all components they contain within a schematic. Schematic symbols, then, can simplify a project by using a single symbol for complex machines.

## Table of Schematic Symbols

It's important for designers to know many of these older schematic symbols if they are upgrading or analyzing older technology. If a designer or engineer is only creating completely new electronics projects, knowledge of older symbols is not as important (but may be useful once in a while). As the use of technology grows rapidly, the new IPC standard that governs the creation of new schematic symbols may be especially helpful to designers.

If there are two symbols present for a given component, the first symbol is the international variant, while the second is the United States variant. The symbols shown below follow the IEEE/ANSI specifications, as these are most commonly used in schematic editors in ECAD software. However, many designers and some open-source ECAD programs use the IEC symbols or a mix of the IEEE/ANSI symbols. Due to the popularity of the IEEE/ANSI symbols in major ECAD platforms, they are listed below for reference.

Name	Symbol
AC Power Supply	
Ammeter	
Amplifier (Operational) / Op-	

Battery	
Battery Cell	
Branching Box	
Cable Termination	
Capacitor (Non-Polarized)	
Capacitor (Polarized / Electrolytic)	
Capacitor (Variable)	
Cathode Ray Oscilloscope / CRO	
DC Power Supply	
DC Power Supply (Variable)	
Diode (Junction)	
Diode (Light Emitting) / LED	
Diode (Photo)	

Electrical Appliance	
Filament Bulb	
Fuse	
Galvanometer	
Inductor	
Integrated Circuit / IC	
Impedance Element	
Logic Gate (AND)	
Logic Gate (OR)	
Logic Gate (XOR)	
Loudspeaker	
Microphone	
Motor	
Multiple Conductor Line	
Potentiometer / Voltage Divider	
Resistor	

Resistor (Thermal) / Thermistor	
Resistor (Variable)	
Socket Outlet (Telecom Indication)	
Socket Outlet (TV and Radio Aerial)	
Transformer (Iron-Cored)	
Transformer (Iron-Cored, 2 Secondary Windings)	
Transistor (NPN)	
Transistor (N-Type Junction Field Effect) / NJFET	
Transistor (PNP)	
Transistor (P-Type Junction Field Effect) / PJFET	
Voltmeter	
Wiring (Concealed)	
Wiring (Conduit)	

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Wiring (Tanking)



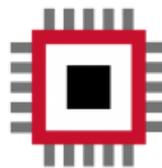
## PCB Designers Need Complete Libraries with Schematic Symbols

Today's ECAD tools generally include most or all of the symbols shown above in their built-in libraries. In addition, most designers don't refer to one of the standards listed above when adding schematic symbols to a component library. Instead, the most common components are called out with a specific designator prefix (R = resistor, C = capacitor, L = inductor, U = integrated circuit). Oftentimes, a schematic symbol will be provided with a note describing the part number or type of component. As long as the schematic symbol contains the appropriate designator prefix or is a self-explanatory symbol, many designers will not worry about which standard the symbol follows.

For integrated circuits and connectors, the schematic symbol needs to match the pinout shown in the [component datasheet](#). Then, this needs to be added to a component library with [PCB footprints](#) and 3D models. Instead of creating every component from scratch, PCB designers can use an [electronic parts search engine](#) to find the component data they need, including sourcing data, specifications, and datasheets for components.

**When you need to find electronic component schematic symbols, PCB footprints, sourcing data, and datasheets, you should use the search engine features provided by [Ultra Librarian](#). Working with Ultra Librarian takes the guesswork out of preparing for your next great device and puts your ideas on the road to success. [Register today](#) for free.**

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