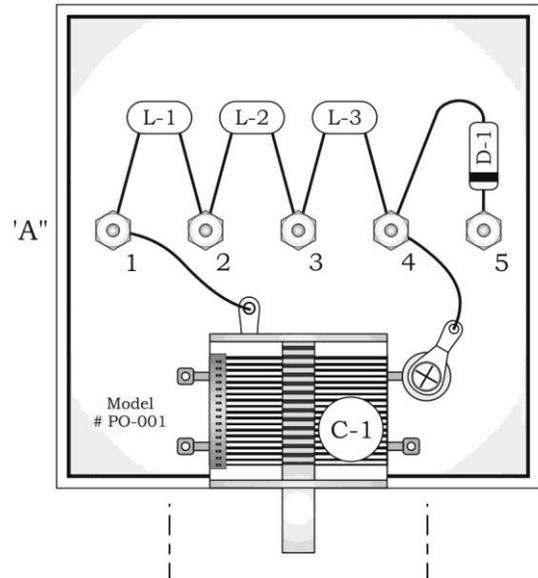


# How to Read Schematics

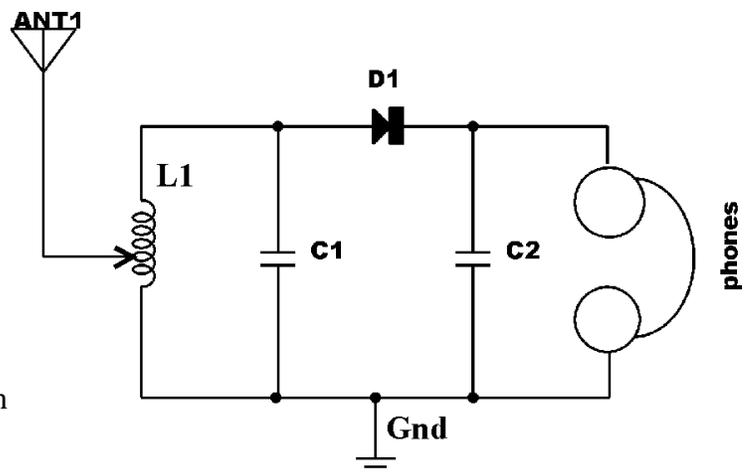
In the first half of the twentieth century, one could pick any number of magazines, like Mechanics Illustrated, describing crystal sets and other electrical devices. It was popular and practical to present a crystal set using a line drawing, such as that shown to the right, which is a portion of a crystal set designed by Mike Peebles and presented in the March 2005 issue of the Society Newsletter. These wonderful drawings not only presented an overall picture of the set but clearly displayed wire routing and other physical features.



As time marched on, designers found it quicker and easier to document the electrical aspects of sets using what we call today a schematic presentation. Schematics are two-dimensional, not pictorial. Nearly all articles or documents of electronics found today use this format. Pictures are not included generally, leaving wire routing and mechanic layout a potential mystery. Too bad! Quality manuals and kits should include enough pictures to tell the story left untold without the old-time illustrated drawings.

Since schematics dominate now, let's see how to read them. We'll use the schematic of a basic crystal set, shown at right, as our example.

In order to represent a circuit on paper (in two-dimensions), symbols were developed for each type of component used.



- An antenna is often shown as an inverted triangle, as shown at upper-left.
- A section of hookup wire is drawn as a dark line, and an alligator or other clip at the end of the wire is drawn as an arrow.
- A coil, see L1 in the figure, is drawn somewhat like a mechanical spring, with a series of looping wires.

- A capacitor, which is generally constructed by arranging two metal plates one atop another with insulation in between, is drawn as two dark lines parallel to each other. C1 is a capacitor.
- The symbol for a detector diode is a bit more complicated and is shown in the figure as D1. Early diodes were constructed using a small wire – called a cat whisker – and a hunk of galena rock. The arrow on the symbol represents the wire pressed against the rock and the black rectangle denotes the body of the rock. Old style drawing would actually sketch out the rock. Today we're modern and have reduced that ragged rock to a rectangle.
- Headphones or earplugs are used to listen to the audio signal produced by a crystal set. The two circles and a strap connecting them make this symbol pretty obvious.
- For some time now, most schematics place a dark dot on lines that cross each other, if and only if those lines are connected physically. Note in the figure that a dot after the diode, D1, denotes that D1 is wired to one lead on the phones and to the top lead of capacitor C2. Saying it another way, the output lead of the diode is connected to the phones, and the output of the diode is also connected to one of the leads of the capacitor.
- Finally, the symbol at the bottom of the schematic, the arrow that is made up of a number of tapered horizontal lines (and labeled as GND) represents the electrical ground connection of the set. That means that the bottom of coil L1, the bottom of C1, the bottom of C2 and the second lead of the phones are all connected to the ground of the circuit.
- Extra hookup wire is generally required to interconnect the component leads, since these leads on each component are short. Hence, the line representing the lead from the bottom of coil L1 includes the coil lead and some hookup wire soldered together. The end of the wire then attaches to the ground or to one of the other components in the ground circuit.

Congratulations! You've just read your first schematic.