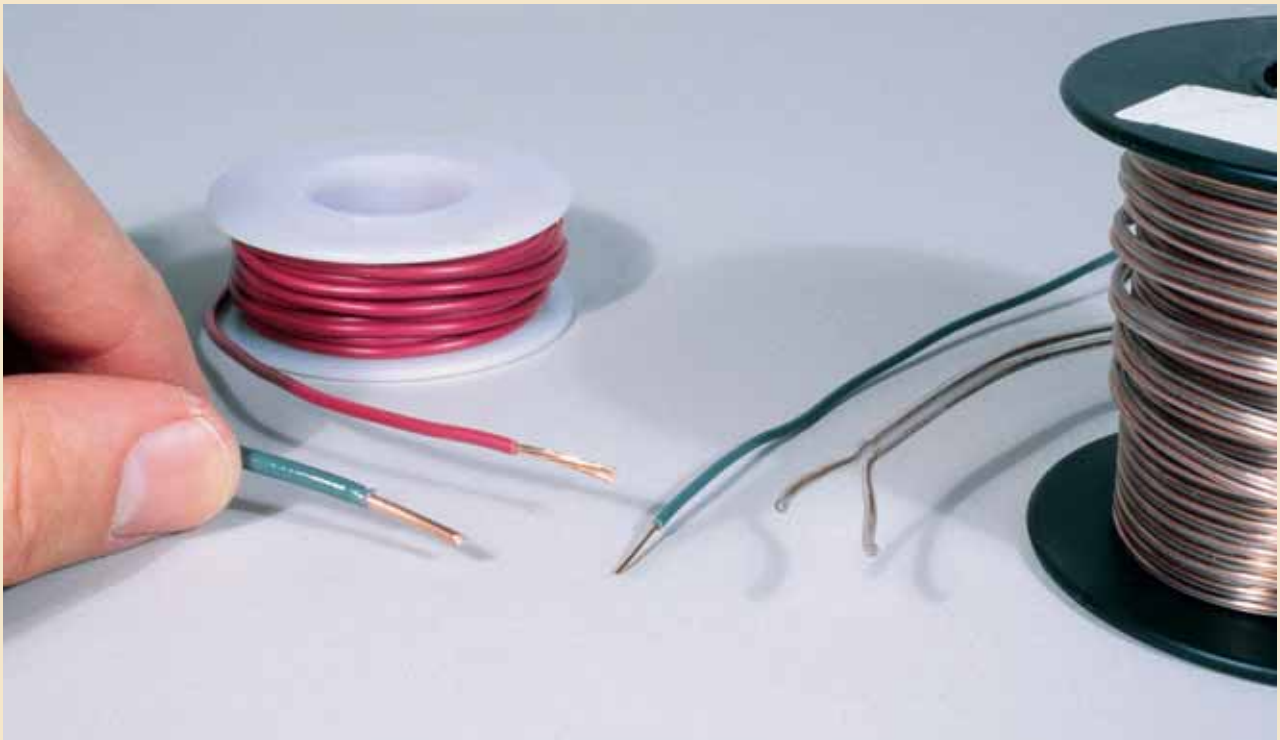


Working with wire

Once you begin building a layout, you quickly discover you need a lot of wire. Knowing what different types of wire can do, what tools and connectors are available, and what connection options you have can help you wire your layout more quickly and easily.

In this section, we'll talk about types of wire and connectors, as well as the basic tools you need to work with them. In the next section, we'll dive into wiring your layout.

Wire

Insulated copper wire is the standard for electrical wiring. Wire is identified by two key characteristics: its gauge (diameter) and whether it's stranded or solid.

Wire gauge is indicated by a number, as in 22AWG (American Wire Gauge) or 14AWG. The smaller the number, the larger the diameter of the wire. The larger the wire, the more current it can handle, as the table (far right) indicates.

Select a wire size to fit your needs, but avoid using anything smaller than the AWG sizes shown in the table. Electricity flows through wire like water through a pipe, so you're better off with excess capacity (larger AWG). Wire that's too small restricts the flow of current, causing your trains to lose speed or power at distant points.

Most 110-volt household wiring is 12- and 14-gauge wire. Either will work well for main power supply wires on model railroads. Smaller wire, such as 20- or 22-gauge, is okay for track feeders, but shouldn't be used for long runs, because the voltage will steadily drop the farther the wire is from the power source.

Solid wire should be your first choice for most model railroad wiring applications. It's easy to strip off the insulation and prepare solid wire for soldering. Solid wire can also be used with crimp-on terminals. Use stranded wire where flexibility is important.

Wire types. Many types and sizes of wire are available. Shown here (left to right) are 14-gauge solid, 18-gauge stranded, 22-gauge solid, and two-conductor 24-gauge solid (speaker wire).

You can find smaller sizes of wire at electronics stores like RadioShack and at many hobby shops. For heavier wire, check hardware stores or home improvement centers. Heavy wire can be purchased either by the foot or in spools of 100 to 500 feet.

Commercial wire sources are plentiful, so shop around for the best price. Wire is sold in many colors, so plan ahead

Wire sizes

Choose wire of sufficient size to carry the load you plan to use.

AWG[1] wire sizes vs. usable output in amps:

Distance[2]	1A	3A	5A	10A
8 feet	22	20	18	16
12 feet	20	18	16	14
20 feet	18	16	14	12
30 feet	16	14	12	10

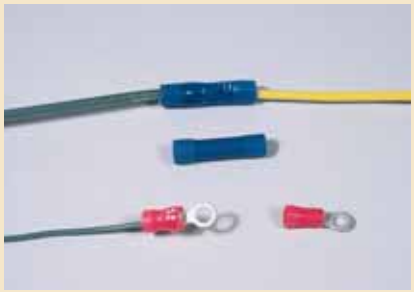
[1]American Wire Gauge

[2]Maximum length of wire in one side of the circuit

1 Tools. Small and large (6" and 8") wire cutters and a combination wire stripper/crimper are vital for working with wire.

2 Soldering iron. A 30-watt pencil-type iron with stand and rosin-core solder will handle most soldering jobs on your model railroad.

3 Solderless connectors. Use the crimping tool (a special pliers) to permanently crimp solderless connectors onto the ends of wires.



4 Other crimped connections. Butt joints (top), as well as ring terminals, can be attached to wire with a crimping tool.

5 Crimping. Attach solderless connectors to wire by threading them onto the stripped end and crimping them in place.

6 Terminal strips. Barrier terminal strips keep the loose stands of wire from touching each other.

for any color coding you may want to use. (For example, I use orange and white for all of the track feeders and reserve red, green, and black for connecting turnouts and accessories.)

You may also want to check the Yellow Pages for a used wire distributor. A *Model Railroader* magazine staff member found one offering 1,000-foot rolls of 14AWG stranded wire for about half the price of new wire. Color choice was limited, and each roll contained three or four long pieces that were simply tied together (not spliced) when it was cleaned and rewound on the spool. Even so, the used wire worked fine on his layout.

Tools

Layout wiring doesn't require a lot of fancy tools, but the items shown in photo **1** make the job a lot easier. Get a good-quality screwdriver that fits snugly into the slots of the screw terminals on your power pack or terminal strips. The rounded edges of worn screwdrivers will cause the blade to slip and damage the slot in the screw.

Long-nose pliers with side cutters are useful for cutting and forming the wire to fit around screw terminals.

Wire strippers remove insulation from wire ends without nicking the metal wire. Just be sure to select the proper size stripper blades for your wire size; a nicked wire will usually break when it's moved.

If done properly, soldering makes solid connections that are as strong as the wire itself (we'll show you how later on—see page 13). A pencil-type soldering iron rated at 25 or 30 watts works well for smaller wires, **2**, but the larger pistol-style soldering guns (100 to 140 watts) are handy for heavy wire. I prefer a pencil-type iron—it provides enough heat for most track-wiring applications.

Connectors

One quick and easy way to connect a wire to a screw terminal (such as on a power pack or terminal strip) is to put a solderless connector, **3**, on the end of it.

The most common solderless connectors (sometimes also called crimp-on connectors) are the two-pronged spade type, but there are others as well. Photo **4** shows two other crimp-on connectors—butt splices and ring terminals. They all work basically the same way.

Strip the end of the wire, ensuring that none of the bare wire is exposed beyond the connector. The connector is made of galvanized steel and has a serrated tube that slips onto the bare wire end. Crush the tube gently around the wire with the crimping tool for a permanent connection, **5**.

Terminal strips, **6**, are available in many shapes and sizes. They are a great way to