

Multimedia Wiring

With this step-by-step guide, you can make telephone, Internet, video, and audio connections anywhere in the house

BY BRIAN WALO



VOICE
& DATA



VIDEO



AUDIO

Because I'm an electrician, the responsibility for installing the wiring for the phone, TV, Internet, home-network, and various audio systems often falls on my shoulders. I'm a big fan of technology, so this type of wiring tweaks my inner geek. These systems are radically different from each other, but don't be intimidated. Each relies on low-voltage wiring that is bought in bulk and can be

routed through your house following a few basic guidelines. The only major differences are the terminations on each end of the various types of wiring, and subsequently how each of the systems connects.

Brian Walo is an electrician in Mount Pleasant, S.C.
Photos by Rodney Diaz.

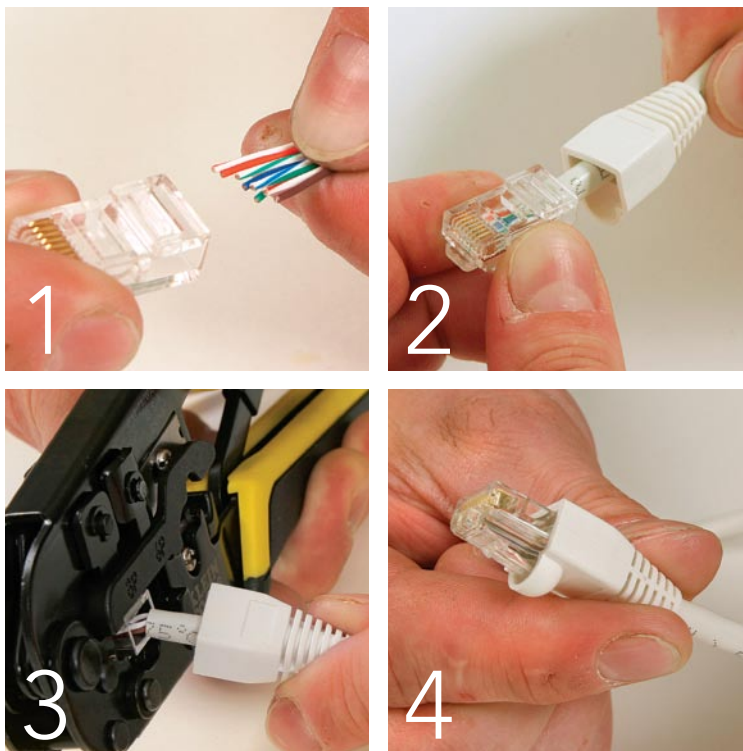


VOICE & DATA

Wireless connectivity is quickly gaining momentum, but given the speeds and reliability with which information can be transmitted, Cat5 cable is still the workhorse of the data-networking world and has replaced two-wire telephone lines as well. Cat5 has become a generic term, but Cat5e, which is backward compatible, is the more common choice nowadays.

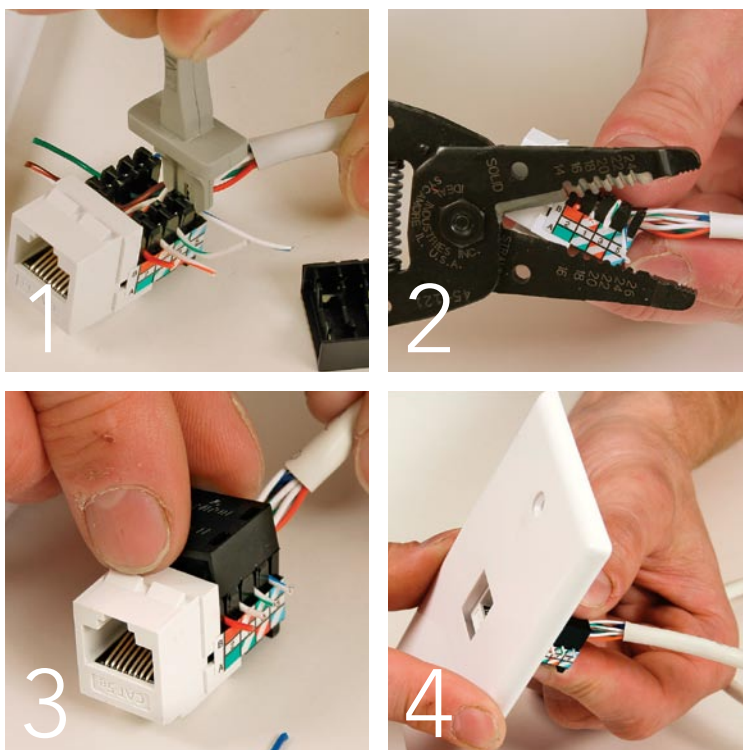
RJ45 PLUGS

- 1 Untwist and arrange the pairs of wires in preparation for the fitting (see chart at right).
- 2 Slide all the ordered wires into the fitting at the same time, making sure that they are seated fully.
- 3 Insert the fitting into the crimping tool, and squeeze to secure the wires in place.
- 4 Slide the strain-relief boot in place to protect the wires from damage.



RJ45 WALL PLATES

- 1 Use a punch-down tool to set each unstripped wire into the appropriate slot in the jack.
- 2 Once all the wires are inserted into the appropriate colored slot, snip off the waste.
- 3 Press down the included cover to protect and secure the wires.
- 4 Slide the jack into the back side of a wall plate to finish the job.



Invest in a set of crimpers

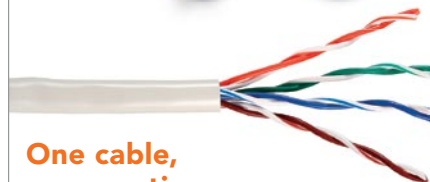
Besides a pair of wire strippers that can handle small gauges (24AWG), Cat5 installations require crimpers to attach the RJ45 and RJ11 fittings.



TOOLBOX

One cable, many options

Each Cat5 cable has four pairs of color-coded copper wires (one solid, one striped). The cable can be used for phone or data; only the fittings and wire configurations change. RJ45 data plugs can be wired in two ways (T568A and T568B). Both configurations are compatible from cable to cable but must be kept consistent within the same cable. RJ11 phone fittings use only three of the four pairs, which is enough for three phone lines.



T568A



T568B



RJ11 plug

Cat5 comes in colors

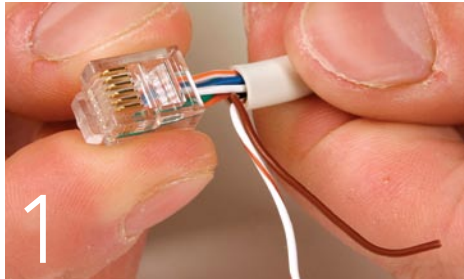
Cat5 is available in many colors, making it easier to keep track of multiple runs.



Basic phone connections

Up to three separate phone lines can be carried by one Cat5 cable. Blue wires are often used for the primary phone line, but it doesn't matter which pair you use as long as it's consistent from one end of the cable to the other.

RJ11 PLUGS

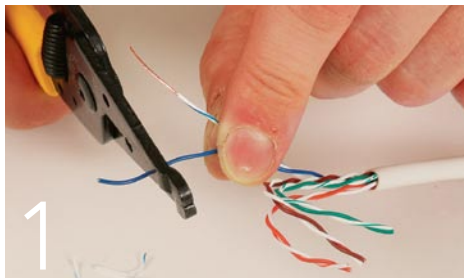


Untwist three of the four pairs of wires, arrange them using the chart (facing page), and clip the ends ½ in. from the sheathing.

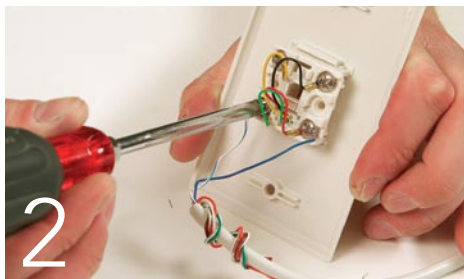


Insert the ordered wires into the fitting; then secure them with the crimpers to complete the termination.

RJ11 WALL PLATES



Strip about ½ in. off the sheathing on the pair of blue wires so that they can be wrapped on a screw terminal.



Attach the solid-blue wire to the red terminal and the striped-blue wire to the green terminal on the back of the jack.

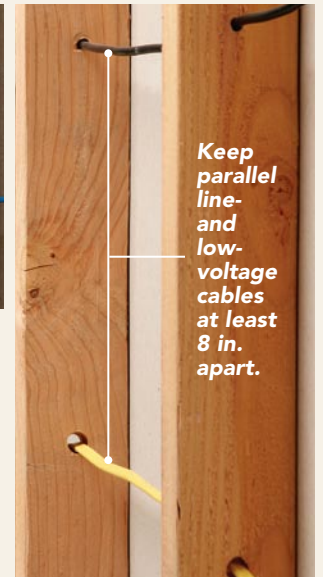
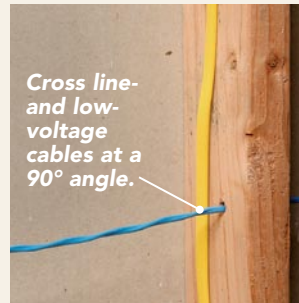
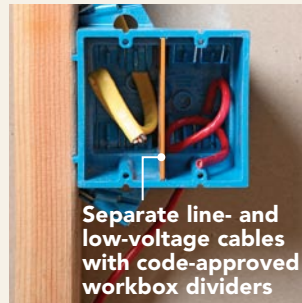
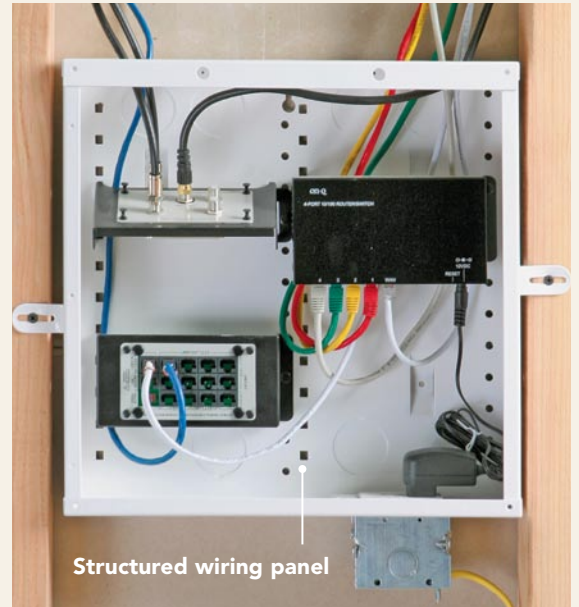
DON'T TAKE SHORTCUTS WHEN RUNNING LOW-VOLTAGE CABLES; FOLLOW THE CODE

Although low-voltage wiring doesn't carry enough power to electrocute you, a sloppy installation can create nicks in adjacent low-voltage and line-voltage cables. This can lead to line voltages running unexpectedly through low-voltage cables, posing a serious risk of electrocution or fire.

Structured wiring panels

Structured wiring panels are a dedicated point of convergence for all your home audio, video, and data systems. These boxes are usually one part of a family of components designed to work together. My favorite system is OnQ, made by Legrand.

Traditionally, low-voltage cable is run from one jack to the next in a series, but a structured wiring panel allows for a better method of wiring. The "home run" method, which uses a single length of cable from the panel to each intended location, uses more cable and takes longer to install, but it greatly increases signal quality.



Watch out for crosstalk

Never run low- and line-voltage cables into the same workbox unless there is a code-approved divider. You also never should route low- and line-voltage cables through the same holes or share staples. If the cables became chafed during the installation, the low-voltage wires could present shock and fire hazards. Finally, maintain a gap between parallel cables. If they must cross paths, have them do so at a 90° angle to minimize overlap.

Drilling holes in wall framing

Holes can't be larger than 40% of the stud depth in load-bearing walls (60% in nonbearing walls), or larger than one-third the height of the framing member. They can be anywhere along the length of a joist, rafter, header, or beam, but they must be a minimum of 2 in. from the top and bottom edges of the wood, and at least 2 in. away from any other holes. Any holes made at floor and ceiling levels must be sealed to create a fire barrier between floors, and any holes within ¼ in. of the edge of the framing member must be protected with a ¼-in.-thick metal plate to prevent damage from errant fasteners.





VIDEO

Coaxial cable has been around for a long time, and it is still the carrier of choice for both cable and satellite television feeds. Most installers have upgraded from the old RG59 coaxial cable to the thicker RG6. There are many variations, such as RG6U and RG6Q, but aside from features such as UV-resistance and slight differences in applying fittings, I treat all the RG6 varieties as equal.



1 Remove ¼ in. of the outer layers to expose the central copper conductor.



2 Carefully strip away ¼ in. of the outer jacket to expose the braided shielding.



3 Gently fold back the braided shielding to expose the foil-covered white dielectric.



4 Slip the fitting over the stripped cable until it's flush with the receiving end.



5 Open the crimper tool, and insert the cable assembly into the handle.



6 Squeeze the crimper firmly to compress the fitting onto the end of the cable.

Coaxial tools are a must

Because coax is a wire within a wire and any connection must keep those two wires separate from one another, you need special tools that remove the layered material in stages. These two get the job done.



TOOLBOX

Four fittings to choose from

The standard fitting for coaxial cable is called an F-connector, and it is sold in a variety of styles. Whichever style you choose, make sure that it's designed for use with the cable you're installing. For instance, an RG6Q cable needs an RG6Q connector.

Twist and push-on

Both twist and push-on fittings are aimed at the do-it-yourself crowd because they can be installed without any special tools. Both are also difficult to use and are more likely to come loose.

Crimp

These connectors require a hexagonally shaped or similar crimping mechanism that equally distributes the pressure on the cable lines without damaging the cable itself.

Compression

By far the easiest to install, compression fittings are the least likely to damage the cable and are the only type I use. However, they require a special crimper (shown above).

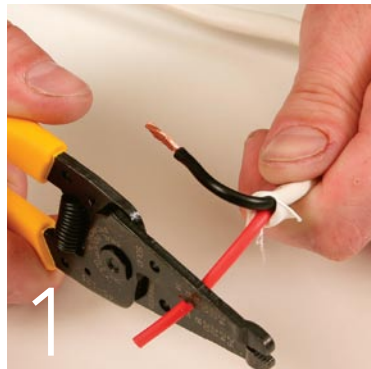




AUDIO

Almost every remodeling project these days includes some sort of audio wiring. Common requests are for simple things like running wires for the rear-channel speakers in a surround-sound setup. The tricky part of audio wiring is sorting out and keeping track of the components. Remember, no matter how complicated the installation, you're just connecting the dots between point A (the source) and point B (the speaker). Label everything at both ends of each wire as you go.

AUDIO CABLES



1 Peel back the outer jacket, and strip ½ in. off the red and black wires.

2 Slip the base of the connector over the wire, leaving ¼ in. of copper exposed.

3 Fold the stranded wire over the tip of the base.

4 Screw on your choice of fitting.

AUDIO WALL PLATES



1 Insert ½ in. of bare wire into the back of each binding post, and tighten the set screws.

2 Snap the posts into the back of the wall plate.

SOURCES Most of the bulk cable, tools, and other materials necessary for these installations are widely available online and in local big-box stores. Here are sources for some of the products featured in this article.

www.carlon.com • www.datasharktools.com • www.idealindustries.com
www.kleintools.com • www.legrand.us/onq • www.leviton.com • www.monstercable.com

Stranded strippers
 All that you really need for working on audio cable is a decent pair of wire strippers, but make sure they are designed to be used with stranded wire.

Choose the right wire gauge
 Rather than getting caught up in marketing hype, just check the output ratings for each of the speaker connections for all your equipment. The largest wattage rating for each run determines the wire size. Distance factors into the choice as well. Use 16-ga. wiring for runs up to 80 ft., 14-ga. wiring for runs between 80 ft. and 200 ft., and 12-ga. wiring for anything longer than 200 ft. When in doubt, step up the wire gauge to a larger size.

The fuss over fittings

Leaving the ends of audio wiring bare is the simplest route. The only danger here is the potential for stranded wires to unravel and fray, leading to a poor connection or a short circuit. The other option is to terminate audio cables with a pair of screw-clamp connectors so that installation involves just sliding the stranded wire into the fitting.

Pin connectors

A step up from bare wires, pin connectors provide a cleaner connection without risking frayed wires. They fit in both spring clips and binding posts.

Spade connectors

The forked ends of these fittings slide around the sides of a binding post to provide a solid connection. If you choose them, make sure that the size of the spade matches the size of the binding post.

Banana plugs

These are a popular choice because rather than being connected to a spring clip, they plug directly into the center of a binding post.



Pin Spade Banana

TOOLBOX