

Undercabinet Lighting

Low-voltage fixtures put kitchen light where you need it most

BY ROBERT C. GREY



Undercabinet lighting used to mean the bluish light and electric hum of bulky fluorescent fixtures. My, how things have changed. Undercabinet lights now come in a wide variety of fixtures, illuminating a wide color spectrum. Although lighting companies now offer fluorescent bulbs emitting warm light, I prefer low-voltage incandescent fixtures for undercabinet lighting because of their versatility and ease of installation.

Standard dimmers don't work for low voltage

With low-voltage lights, you need to run 110v power to a transformer, which reduces the voltage to 12v or 24v. You then need to get the lower-voltage power to the undercabinet lights, which are controlled by a switch or dimmer.

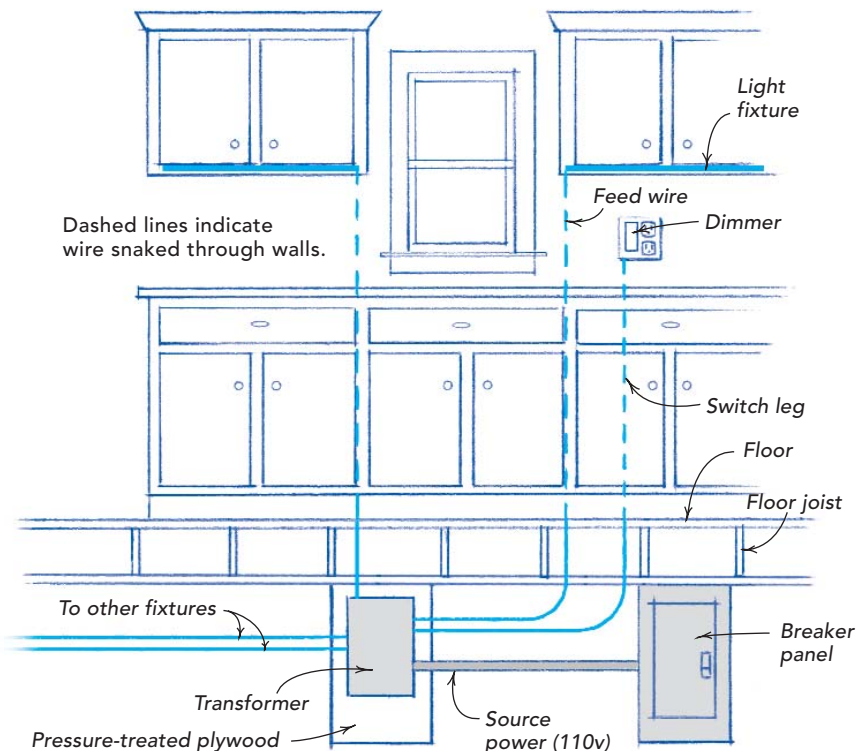
Most people want all the undercabinet lights controlled by a single dimmer switch so that they can alternate easily between bright task lighting and dim mood lighting. That's what is used in this kitchen.

Dimmer switches for low-voltage lighting are specialized for low-voltage power; standard dimmers will burn out a transformer prematurely. Low-voltage dimmers come in two types: magnetic (for larger transformers like the one used in this article) and electronic (for smaller transformers). The dimmer I used for this project is a magnetic type made by Lutron (888-588-7661; www.lutron.com).

Don't put lights on a 20-amp circuit

Usually, there's an accessible attic or an unfinished basement or crawlspace where you can tap into a power source. If not, almost all kitchens have an overhead light with a switch next to the sink. This spot is an easy place to tap into the power.

In this kitchen, there's an outlet and switch on each side of the sink. One

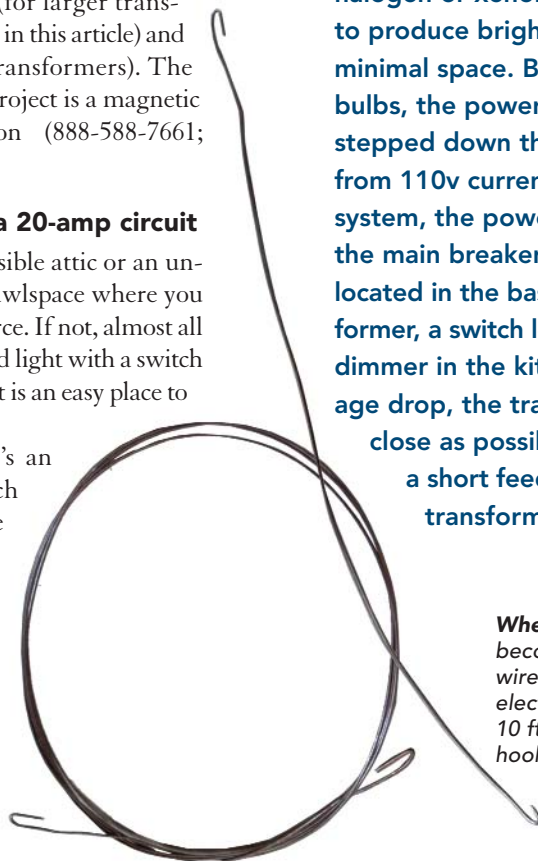


Understanding low-voltage lighting

For undercabinet lighting, low-voltage systems have a size advantage over fluorescent and other line-voltage (110v) systems. Low-voltage systems often use halogen or xenon automotive lightbulbs to produce bright light while taking up minimal space. But because of the small bulbs, the power supply needs to be stepped down through a transformer from 110v current to 12v or 24v. In this system, the power supply comes from the main breaker panel to a transformer located in the basement. From the transformer, a switch leg runs to a low-voltage dimmer in the kitchen. To prevent voltage drop, the transformer is located as close as possible to the fixtures, and a short feed wire runs from the transformer to each fixture.



When remodeling work takes you inside an electrical box, make sure all the power to that box is turned off.

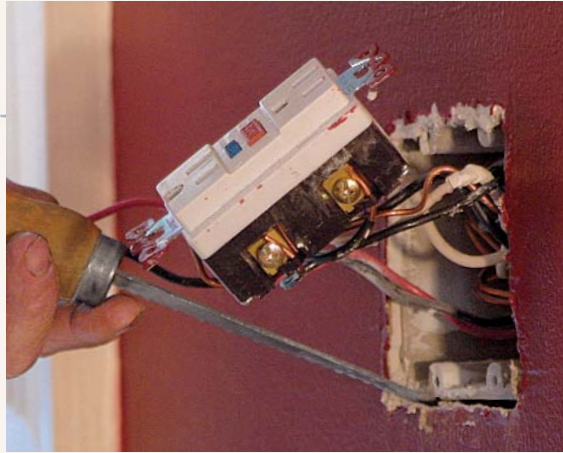
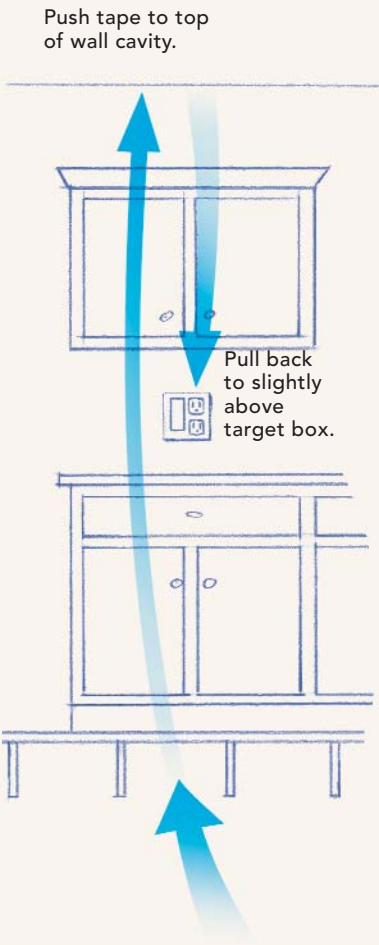


When retrofitting wire in a finished wall, a fish tape will become your new best friend. Made out of hardened wire with hooks on each end, fish tape is available at electrical-supply stores. The author uses two—one about 10 ft. long and the other 3 ft. long. Large and small hooks on the short wire expand fishing capabilities.

SLAKING WIRES THROUGH WALLS



Slide the long fish tape into an existing hole, or drill a new one. The NM cable in this photo leads to the target box above. The author slides the tape to the target easily. If you haven't done this a lot, it may help to find the target by sliding the tape up to the top of the wall, then pulling it down 3 ft. to 4 ft., placing it just above the target box. Backing the tape down from the top of the wall makes it easier to visualize where the hook is.

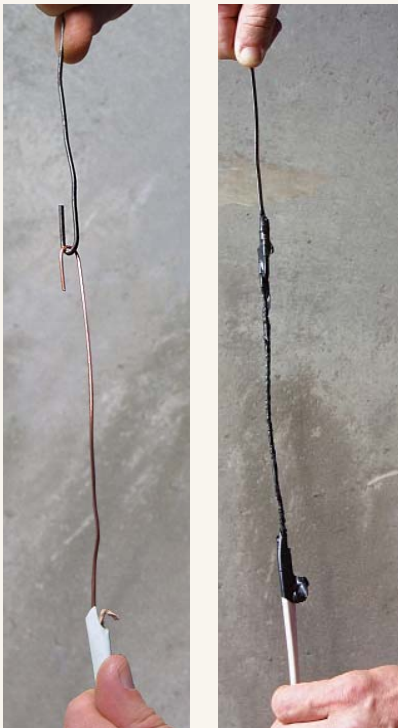


Finding the fish tape is easier if you can see it. Cut away some of the drywall below the outlet box to look for the fish tape in the wall cavity. Poke a hole in the back of the box with a screwdriver, insert the short wire, and start fishing.



Got it! Hook the long wire with the short fish tape. You may need to move below and back off the long wire until the hooks engage.

Hook the ground wire to the fish wire... Cutting back the white and black wires, but leaving the ground wire long, makes it easier to pull cable through small holes.



...and wrap the connection with electrician's tape. Folding the end over on itself makes unwrapping the tape easier.



Pull the cable through the box. The tape wrap allows a smooth pull-through from the basement.



Customizing a stock cabinet. A 1-in.-wide channel cut in the bottom of the cabinet sides allows for a continuous track. Cutting the channel 2 in. back from the front of the cabinet keeps the track concealed behind the bottom lip of the cabinet and will shine light directly on the work zone in the middle of the countertop.



The plastic track is cut easily. After removing a bulb, cut the track 2 in. short of the cabinet length with a hacksaw. Holding the light track 1 in. short of the cabinet sides avoids a bright glare at the end of cabinet runs.

switch controls the sink light, and the other controlled the dishwasher.

Adding a switch to an existing gang box usually means cutting in a bigger gang box. But for this job, I moved the dishwasher switch and used its place for the dimmer, eliminating the need for a bigger box while keeping a symmetrical switch placement.

When tapping into the power source, keep in mind that the National Electrical Code (NEC) requires lighting to be on a 15-amp circuit. Because I placed the switch in a box containing 20-amp appliance circuits, I couldn't tap into the power there. With an open basement and the main electrical panel close by, it was easy to bring a new feed from the panel to the transformer and run a switch leg up to the kitchen (sidebar p. 63).

You have to hide the transformer

Transformers come in many types, plug-mounted, track-mounted, and remote-mounted among them. I prefer a remote-mounted transformer to a track-mounted one simply because a transformer mounted to the lighting track steals 8 in. to 10 in. of light space and creates an ugly shadow in the process. Also, a track-mounted transformer

usually is 1½ in. tall, so to hide it under a cabinet, the light fixtures need to be mounted farther to the back of the cabinet, which isn't where you need light.

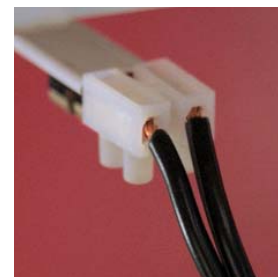
I mounted this particular transformer in the basement, roughly in the middle of all the wiring to keep the runs as short as possible, avoiding voltage drop. Voltage drop is caused by resistance over long runs of wire; bigger, shorter wire minimizes this phenomenon. In the past, I've also placed transformers in base cabinets. The unused space of a corner cabinet with a lazy susan is a good choice. If you mount the transformer close to the fixtures, you can use 12v lighting, but because the price difference between 12v and 24v fixtures is negligible, I prefer 24v to reduce the potential for voltage drop and to increase the options for adding lights later.

Fishing the wire through interior walls is easier

I fished all wire from the basement to the kitchen: one NM cable (nonmetallic sheathed) to the switch box and four low-voltage wires to the cabinets. Each light fixture has its own separate feed. I used outdoor landscape-lighting wire to feed the fixtures

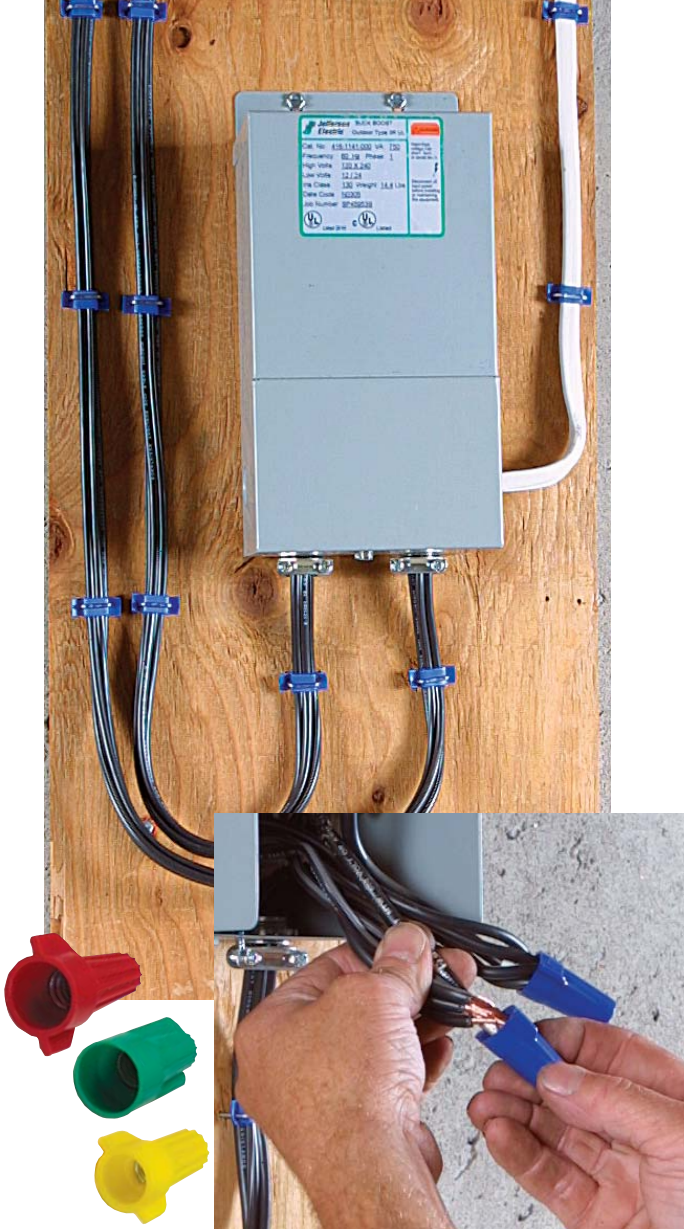


You need short screws and a little screw-driver. An adhesive strip holds the track in place while the track is fastened with short screws. A terminal block at the end has small screw-down connectors for the wire.



The last step is connecting wires at the transformer. The author uses outdoor landscape-lighting wire to feed power to the light fixtures. After twisting wire together, he screws on a wire nut. When the wire starts to twist along with the nut, he gives the nut a tug to make sure the connection is good.

Wire nuts are color-coded for a reason. Each color can handle a different combination of wires. The two most common, yellow and red, can splice three and four 12-ga. wires respectively. Blue is for large connections (i.e., five 12-ga. wires), and orange is for small projects such as speaker wire. Green is used for ground wires. Although many manufacturers stick to the color standard, some don't. Check the label for the proper applications.



rather than NM cable because the wire is smaller, is more flexible, and looks better. The price difference is negligible.

Fishing wire through an interior wall avoids tangling with insulation and eliminates a penetration into the building envelope. For the two runs I made into the exterior wall, I sealed the hole with expanding foam insulation when I was done.

Install the light fixtures toward the front of the cabinet

After running wire to the cabinets, I installed the light fixtures. First, I cut a channel for the track in the bottom of the cabinet sides, roughly 2 in. from the front (photo top left, p. 65). This location places the light directly above the work zone and softens the reflection off the wall. When installing track lighting in a corner with a 45° cabinet, such as this one, I don't follow the line of the cabinets with the track. Instead, I run the track straight back and form a 90° corner. This approach not only is easier, but it also shoots light back into the deep, dark corner.

The track I used in this kitchen comes in 1-ft. increments up to 16 ft. and can be cut to size using a hacksaw (photo top right, p. 65). An adhesive strip and predrilled holes for the screws every 1 ft. allow you to screw the track in place without having to hold it steady (bottom photos, p. 65). With these light fixtures, you have to remove the bulbs above the holes, screw the track to the cabinet, and then replace the bulbs.

Because an ounce of prevention is worth a pound of cure, I'll say it: Screws need to be short enough not to break through the bottom of the cabinet.

To power the track, strip ¼ in. off the ends of the low-voltage wires, slip them into the screw-down terminals of the end block, and tighten the screws. Run the wires tight into the corners and secure them with staples for a cleaner appearance.

With the track lights connected to the wire, I moved to the basement, where I connected all the wires to the transformer, following the manufacturer's schematic (photos left). Always double-check your work against the schematic, and make sure the line voltage (feed) and load voltage (output) are wired correctly: A mistake can ruin the transformer. □

Robert C. Grey is an electrician working for Doctor Electric in Brookfield, Conn. Photos by Daniel S. Morrison.

continued

My favorite low-voltage system

The lights I chose for this project are part of the Klikstrip Low Voltage Lighting System by Ardee Lighting Inc. (704-482-2811; www.ardeelighting.com). Wires run the length of a plastic track that holds metal clips to make the electrical connection between the wires and the bulbs. The track is extremely versatile: The 5w bulbs can be switched for 3w, 6w, or 10w bulbs in different colors.

I like the Klikstrip system because it provides a continuous line of light—no shadows. Many other systems have spaced bulbs, yielding uneven light. Some of these other systems allow you to squeeze the bulbs closer together, but by the time you've done that and bought all the extra clips and bulbs, the price difference is nearly a wash. Klikstrip comes with bulbs installed and ready to go for about \$30 per ft. The material cost for this project, including wire, dimmer, and transformer, was about \$750.

An even simpler system is made by Westek (800-777-0802; www.amertac.com). The transformers are built in, the main unit plugs into the wall outlet, and all light fixtures can be piggyback wired (parallel) together. The Westek system is great for retrofit situations. And these particular lights can be dimmed with a standard 110v dimmer switch. —R. C. G.



Reader Response

Lighting allowed on most 20-amp circuits

In “Undercabinet Lighting” (*FHB* #158, pp. 62-66), Robert Grey writes, “When tapping into a power source, keep in mind that the National Electrical Code requires lighting to be on a 15-amp circuit.” That is not true. He continues, “Because I placed the switch in a box containing a 20-amp appliance circuit, I couldn’t tap into the power there.” True, but because it is an appliance circuit, not because it happened to be a 20-amp circuit.

Article 210.23 (A) and exception cover this case: “15- and 20-Ampere Branch Circuits. A 15- or 20-ampere branch circuit shall be permitted to supply lighting units or other utilization equipment, or a combination of both, and shall comply with 210.23 (A)(1) and (A)(2). Exception: The small-appliance branch circuits, laundry branch circuits, and bathroom circuits required in dwelling unit(s) by 210.11 (C)(1),(2), and (3) shall supply only the receptacle outlets specified in that section.”

—JON TANDY
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