



Bringing Two-Wire Circuits Up to Code

Article courtesy of the Journal of Light Construction

Q. What's the quickest and easiest way to bring a two-wire circuit up to code?

A. Peitsa Hirvonen, a licensed electrical contractor and the owner of SESCO Electrical Inc. in Berkeley, Calif., responds: Generally speaking, if an electrical circuit was properly wired and up to code when it was first installed, then it's up to code now. Most inspectors will not make you change out existing wiring if it appears to be sound and correctly wired and has not been modified or added to in an illegal way. But when a contractor completely opens the walls, floors, or ceilings and makes it easy to access the wiring, most inspectors will require those areas to be rewired to meet current code.

The problem, of course, with a two-wire circuit is that it's not grounded. The old Romex (NM) and BX (AC) cables had no separate grounding conductor, or the conductor was so small (16 or 18 AWG) that it wouldn't count by today's code. This type of cable can usually be identified by the sheathing, which looks like snake skin or tarred cloth. However, there is some old two-wire Romex out there that looks like the modern plastic/vinyl sheathed kind, so don't automatically assume there is a grounding wire. Open the box and check.

In the case of old steel-clad armored cable (BX), it's still legal to use the metal shield as a ground, but I wouldn't do it. If you must, make sure the BX connector has a screw or some type of clamp that really bites into the metal of the shield, and that the connector is very securely tightened against the side of a metal box with the lock ring. The grounding path could fail if any one of these connections is not absolutely secure. If the two-wire circuit happens to be in a conduit (rigid or EMT), you may use the conduit as a grounding path, provided all of the connectors and couplings are tight. Still, I prefer not to rely on the conduit, and instead always pull a separate, appropriately sized green grounding conductor.

There are a couple of ways to deal with two-wire Romex or knob and tube. It's legal to exchange a two-prong receptacle for a GFCI receptacle or to put the whole circuit behind a GFCI breaker. However, you may not be able to get the GFCI breaker to hold, because old circuits tend to have some ground leaking. The GFCI protection is actually much better at preventing electrocution than grounding is, though you will be required to mark every outlet with the words "no grounding conductor present." This is to remind people not to plug a surge protector into that circuit, because a surge protector won't work unless it's properly grounded.

It is possible to upgrade a circuit by running a separate grounding conductor to the nearest panel, the service main, or the system grounding electrode. This would make sense only if the circuit you were upgrading was close to the grounding electrode and far from any panels, including the main. In the time it takes to run a grounding wire to a panel, you could just as easily run a new cable with a grounding wire in it.

By the way, it used to be considered okay to run a grounding wire to the nearest cold-water pipe, and I've seen them run to cast-iron drain pipes, gas pipes, metal ducts, and driven ground rods. Please don't do any of those things! Pipes and ducts present a real hazard when energized without clearing the fault, and dirt is a high-impedance grounding path.

In the end, the best and often the fastest way to bring a two-wire circuit to code is simply to rewire it. When that's not possible, your inspector may accept one of the methods described above.