

Remodel and Old-Work Wiring

YES Electric • NEC 2026 with NEC 2023 numbers in parentheses

Draft 1 (October 2026). This chapter is under review. Code numbers are NEC 2026. Your local inspector may use an earlier edition, so ask your journeyman which one applies. Boxes marked "Picture coming" will get drawings and photos in a later version.

Course: YES Electric Residential Electrical Course, Phase 1 (Install) **Read first:** R1.2 (How a House Is Wired), R1.3 (R1.3_Cable_Wiring_Methods_NM_UF_MC_and_Boxes.md), R1.4 (R1.4_Receptacles_Switches_and_Branch_Circuits.md), R1.6 (Grounding and Bonding). **Read with:** R1.5 (Panel Upgrades and Service Changes) for subpanels and panel work, R1.8 (Smoke and CO Alarms) for alarm upgrades, R-OLDHOUSE for knob-and-tube, aluminum branch wiring, and other pre-1975 systems, R3.3 for pricing remodel scopes. **Code edition:** This module cites NEC 2026. Where a section moved, the NEC 2023 number is in parentheses. The local inspector (the AHJ, "authority having jurisdiction") may enforce an earlier edition, so ask your journeyman which one applies before your first inspection.

1. Learning Objectives

When you finish this module you will be able to:

1. Plan a new circuit through a finished house so it does the least damage: pick the route, the access points, and the tools before you cut anything.
2. Fish cable up from a basement or crawl space, down from an attic, and across a finished ceiling, using a fish tape, glow rods, and a flex bit.
3. Cut in an old-work box so it is solid, flush, and inside the code's gap and setback limits.
4. Add a circuit to a full panel the right way: a tandem breaker only where the panel label allows it, or a subpanel when it does not.
5. Wire a kitchen, bathroom, or laundry remodel to current code even when the rest of the house is old.
6. Know when touching an old circuit triggers AFCI protection (210.12(E)), GFCI protection, or tamper-resistant receptacles, and when a remodel triggers a smoke and CO alarm upgrade.
7. Pull the permit and get through the rough-in and final inspections.

R1.2 shows how to wire a house with the studs open. R1.3 covers the cable rules (setbacks, stapling, nail plates, box fill). This module is about doing that same work when the walls are closed and the customer is living in the house.

2. Background in Plain Language

2.1 What "old work" means

New work is wiring with the framing open: you can see every stud, drill straight through, staple every 4½ feet, and nail boxes to studs. **Old work** (also called remodel or retrofit work) is wiring in a finished building. The drywall or plaster is up, the floors are down, and someone lives there.

Old work takes longer and needs more planning. Commercial module 3.3 covers how finished-space work raises labor hours. The extra time goes into finding a route, fishing, cutting small holes in the right places, and patching.

The code allows for this. Several rules that apply to new work have exceptions for cable fished in finished walls:

Rule in new work	Old-work relief	NEC 2026
Secure NM every 4½ ft and within 12 in. of each box	Cable fished between access points in finished buildings may be unsupported and unsecured where support is impracticable	334.30(B)(1)
Keep cable 1¼ in. from the edge of framing it runs parallel to, or add a steel plate	Concealed work in finished buildings may be fished between access points where supporting is impracticable	300.6(D) Exception No. 2 (2023: 300.4(D))
Boxes fastened to framing	Boxes in finished surfaces may be secured to the surface with clamps, anchors, or fittings identified for the use	314.23(C)

The relief is for the part you cannot reach. Anywhere you can reach the cable, such as in an open attic, an unfinished basement, or a crawl space, the full new-work rules apply.

2.2 How old houses are built, and why it matters for fishing

You fish cable through the hollow spaces inside walls and ceilings. What blocks you is wood: plates, blocking, and fire stops.

Framing part	Where it is	What it does to your fish
Bottom plate (sole plate)	Bottom of every wall, on the floor	You drill up through it from the basement or crawl space
Top plate (usually doubled)	Top of every wall, under the ceiling	You drill down through it from the attic
Fire blocking	Horizontal 2x pieces partway up some walls, often at 4 ft in older houses or between floors	Stops a fish tape cold; needs a flex bit or a small hole
Ceiling joists	Run one direction across the ceiling, usually 16 in. apart	Easy to fish parallel to them, hard to fish across them
Headers	Above doors and windows	Solid wood; route around them
Plaster and lath	Pre-1950s houses	Lath strips are nailed every few inches; plaster cracks when you cut

Croft, *Wiring of Finished Buildings* (1915), Chapter IX "Tools and Manipulation," pp. 190–191, describes how frame houses of that era were often built with outside-wall stud cavities open from the cellar to the attic, because a "ribbon" board supported the second-floor joists instead of a full plate. That framing is called **balloon framing**. In a balloon-framed house you can sometimes drop a weight from the attic straight into the basement. It also means a fire can run up the same cavity, which is why later code required fire blocking.

Houses built after about 1950 are usually **platform framed**: each floor sits on its own plates, so every wall cavity is closed at the top and bottom by a plate. You drill through one plate at a time.

2.3 How old circuits are usually routed

Before you tap into or extend an old circuit, guess how it runs. Kuhlman, *Residential Electrical Troubleshooting*, pp. 77–78, explains two patterns:

- Electricians wire with the least cable they can, so a circuit usually starts at the receptacle nearest the panel and hops to the next nearest one.
- In homes with original wiring from before the 1980s, the feed often goes up to the ceiling light box first and branches from there to the switch and the receptacles. After the 1980s, feeds usually go to receptacles and switches, not to lights. Kuhlman notes this is not a guarantee; it depends on who wired the house.

That tells you where to look for an always-hot and a neutral when you need to tap a circuit: in an old house, open the ceiling box first.

2.4 What a remodel triggers

When you add, extend, or replace wiring in an old house, some new-work protections come with it. You will be asked about these by the customer and by the inspector.

What you do	What it triggers	NEC 2026
Modify, replace, or extend branch-circuit wiring in a kitchen, family room, dining room, living room, parlor, library, den, bedroom, sunroom, recreation room, closet, hallway, laundry area, or similar area	AFCI protection for that branch circuit, either by any 210.12(A) method or by an outlet branch-circuit AFCI at the first receptacle or switch of the existing circuit. Exception: an extension of 6 ft or less with no new outlets or devices, other than splicing devices.	210.12(E)
Replace a receptacle in any of those AFCI areas	The replacement must be an outlet AFCI receptacle, be protected by an upstream outlet AFCI receptacle, or be protected by a combination AFCI breaker	406.12(D)(4) (2023: 406.4(D)(4))
Replace a receptacle where GFCI is now required	The replacement must be GFCI protected, unless the box is too small, no upstream box can take a GFCI, and a GFCI breaker cannot do it	406.12(D)(3)
Replace a receptacle where tamper-resistant is now required	The replacement must be tamper-resistant, except non-grounding replaced with non-grounding, or aluminum conductors landed on CO/ALR replacement receptacles	406.12(D)(5)
Replace a two-prong receptacle with no ground available	Use one of the three legal options (non-grounding, GFCI marked "No Equipment Ground," or grounding-type downstream of a GFCI marked "GFCI Protected" and "No Equipment Ground")	406.12(D)(2); see R1.6
Replace equipment on an outlet that needs GFCI under 210.8	The outlet must be supplied with GFCI protection	210.8 (final paragraph after (F))
Add a circuit or remodel a room	Smoke and CO alarms may need to be added or upgraded under the building code, not the NEC	IRC R314 and R315; see R1.8

The extension exception in 210.12(E) is narrow. It covers a short splice-and-extend, such as moving a panel and lengthening the circuits to reach the new location. It does not cover adding a single new receptacle, because that adds an outlet.

2.5 Panel space is the first question on every remodel

Every new circuit needs a breaker. Before you promise a customer a new circuit, open the panel cover (dead front) and look at:

1. **How many spaces are open.** Count them.
2. **The panel's label.** It tells you the panel's maximum number of circuits, which breakers are listed for it, and whether tandem breakers may be used and in which slots.

3. **The load.** A full panel on a 100-amp service may not have the capacity for a new 50-amp range circuit even if it has space. That is a load calc (R-LOAD).

NEC 408.54 says a panelboard must have physical means to prevent installing more overcurrent devices than the number the panel is designed, rated, and listed for. NEC 110.3(B) says listed equipment must be installed per its listing and labeling. Together, those mean the panel label decides where tandems may go. A tandem in a slot the label does not allow is a code violation even if it physically snaps in.

3. Step-by-Step Procedures

Procedure 3.1: Survey and plan the route

Do the planning in the house before you cut a single hole. A good plan saves more time than any tool.

1. **Get the scope in writing.** Where does the customer want each new outlet, switch, and light? Mark each spot with blue painter's tape on the wall or ceiling.
2. **Find the panel and check space** (Section 2.5). If there is no legal space, the job includes a subpanel or a panel change. Stop and tell the office before you go further.
3. **Look above and below.** Go into the attic and the basement or crawl space. Note: - Which way the ceiling joists run. - Where the walls you need are, seen from above (top plates) and below (bottom plates and floor joists). - Ducts, pipes, and old wiring in the way. - Insulation type and depth. Blown insulation over 6 inches deep hides top plates. - Any knob-and-tube wiring. See R-OLDHOUSE. Do not tap into it.
4. **Locate the walls from above or below precisely.** Pick a fixed reference you can find on both sides: a plumbing vent pipe, a supply duct boot, a corner, or the chimney. Measure from that reference to the wall in the room, then measure the same distance in the attic or basement.
5. **Drill a locator hole if you are unsure.** From inside the room, drill a 1/8-inch hole straight down through the floor right next to the baseboard, or straight up through the ceiling next to the wall. Push a long piece of stiff wire (a coat hanger or a 12 AWG solid scrap) through the hole. Find the wire from the basement or attic. That marks the cavity.
6. **Pick the route with the fewest crossings.** Parallel to joists is easy. Across joists is hard. Up from below or down from above is easier than sideways through studs.
7. **Choose where to cut access holes, if needed.** Plan them behind furniture, inside closets, or where a new outlet or light will cover them. A hole that will be covered by a switch plate, a light canopy, or a cabinet costs nothing to patch.
8. **Tell the customer what you will open.** Show them each spot on the wall. Agree on who patches and paints. Write it on the work order.
9. **Lay down drop cloths and set up dust control.** Shoe covers on. A shop vac with a fine filter at every cut.

Picture coming: Cutaway of a two-story platform-framed house showing four fishing routes, each in a different color: (1) basement up through a floor joist bay and a bottom plate into a first-floor wall to a new outlet; (2) attic down through a doubled top plate into a second-floor wall to a new switch; (3) attic across the ceiling parallel to the joists to a new fan box; (4) a route stopped by a fire block halfway up a wall, with a flex bit drilling through it from a cut-in box hole. Labels on bottom plate, top plate, fire block, ceiling joists, header over a door, and a plumbing vent used as a reference point.

Procedure 3.2: The old-work tool kit

Tool	What it does	Notes
Steel fish tape, 50–100 ft	Pushes through long, open cavities and across ceilings; pulls cable back	Stiff; can be hooked; do not use near live parts
Fiberglass glow rods (fish sticks), screw-together sections	Push through insulation and across ceilings; light end glows so you can see it	Hook and ring tips; will bend around obstacles
Flex bit, 54 in. or 72 in., with a bell-hanger tip	Drills through plates and fire blocks from a box hole or from above/below	The tip has a small hole to pull cable back through the hole it just drilled
Flex bit guide (bit holder)	Lets you steer the flex bit	Keeps it from whipping
Fish chain or weighted line ("mouse")	Dropped from the attic into a wall cavity	Croft, pp. 184–186, describes lead-weight and chain mice
Magnet retrieval system	A magnet on the fish line and a magnet wand to find it through drywall	Fast on open cavities
Drywall saw and oscillating multi-tool	Cut box holes and access holes	Oscillating tool cuts plaster cleanly
Old-work box template, level, and pencil	Lay out cuts	Use the template that matches your box
Stud finder with AC detect	Finds framing and live wires	Confirm with a test hole; stud finders lie in plaster
Inspection camera (borescope)	Look inside a cavity before you drill	Shows pipes, wires, blocking
Right-angle drill and auger bits	Drill plates and joists where you can reach	Use a $\frac{5}{8}$ in. or $\frac{3}{4}$ in. auger for one or two cables
Nail plates (steel, at least 1/16 in. thick)	Protect cable within 1¼ in. of the face of framing	300.6(A)
Shop vac, drop cloths, painter's tape	Keep the house clean	A clean job gets referrals

Croft (p. 187) wrote in 1915 that two people are usually needed to fish a wall or ceiling: one pushing the fish wire and one at the outlet hole catching it. That is still true. The person at the hole listens for the fish tape scraping along the cavity and grabs it with a hook as soon as it is close.

Procedure 3.3: Cut in an old-work box

An old-work box (cut-in box, remodel box) has ears or wings that clamp to the back of the drywall or plaster. It mounts to the wall surface, not to a stud.

1. **Check the spot.** Use the stud finder. Then drill a $\frac{1}{8}$ -inch test hole inside where the box will go. Bend a stiff wire into an L, push it in, and spin it. If it hits a stud, pipe, or duct, move over.

WARNING: Scan for live wires with the stud finder's AC mode and look in the attic or basement for cables running in that cavity. A drywall saw goes through NM cable without warning.

1. **Pick the box.** Choose an old-work box with enough cubic inches for the conductors, device, and clamps. Do the box-fill count from R1.3. In old work, fishing is hard, so leave room for one extra cable if you might need it later.
2. **Trace the box.** Hold the template (or the box itself, face down) level at the right height. Match nearby outlets: use the same height to center as the existing ones in that room. Trace the outline, not the ears.
3. **Cut.** Drywall: cut on the line with a drywall saw. Plaster and lath: score the outline with a utility knife first so the plaster does not crack outside the line, then cut with an oscillating tool. Try to center the box on one lath strip so the screws in the ears bite on both sides.
4. **Fish the cable to the hole** (Procedures 3.4 to 3.7). Pull 8 to 12 inches of cable out of the hole.
5. **Feed the cable into the box.** Knock out the cable entry. Push the cable in so the sheath extends at least $\frac{1}{4}$ inch inside the box past the clamp (314.17(B)(2)).
6. **Set the box.** Push the box into the hole. It should sit flush with the wall surface. Per 314.20(B), in a wood or other combustible surface the box must be flush with the finished surface or stick out from it. Per 314.20(A), in drywall, plaster, tile, or other noncombustible material, the box may be set back no more than $\frac{1}{4}$ inch.
7. **Tighten the ears.** Turn the screws until the wings swing out and clamp the back of the wall. Stop when the box is tight. Overtightening cracks drywall.
8. **Check the gap around the box.** Per 314.21, if the drywall or plaster around a flush box is broken, it must be repaired so there are no gaps larger than $\frac{1}{8}$ inch at the edge of the box. Mud it before the cover plate goes on.

Picture coming: Three-step drawing: (1) trace: a level old-work box template held against drywall, pencil outline, a small test hole with an L-shaped wire spinning inside; (2) cut: a drywall saw following the outline, with an inset showing plaster scored with a utility knife first; (3) clamp: the box pushed in flush, the cable sheath visible $\frac{3}{4}$ inch past the internal clamp, and the two side wings swung out behind the drywall, with dimension callouts "flush" and "gap $\leq \frac{1}{8}$ in."

Procedure 3.4: Fish up from a basement or crawl space

This is the most common route for a new receptacle on a first floor over a basement or crawl space.

1. **Cut in the box hole first** (Procedure 3.3, Steps 1–4). Do not set the box yet.
2. **Find the bottom plate from below.** Measure from your reference point. Or push a wire down through the floor next to the baseboard right below the box hole (a $\frac{1}{8}$ -inch hole in the carpet edge or flooring gap is easy to hide).
3. **Drill up through the bottom plate.** Use a $\frac{3}{4}$ -inch auger bit on a right-angle drill or a long-shank bit. Drill straight up in the center of the plate. If the plate is doubled, or the subfloor and plate together are thick, use a longer bit.

WARNING: Wear eye protection when drilling overhead. Sawdust falls straight into your face. In a crawl space, look for standing water and damaged wiring before you lie down in it, and watch for the HVAC ducts and gas lines.

1. **Push the fish tape or glow rod up through the hole.** Your partner at the box hole listens and looks for it. When it shows in the hole, they grab it.
2. **If it will not come up:** the cavity may be blocked by a fire block or a horizontal brace. Put the inspection camera into the box hole and look down. If there is a block, go to Procedure 3.7.
3. **Attach the cable to the fish tape.** Strip about 6 inches of sheath. Bend the conductors through the fish tape's hook loop and fold them back. Wrap the whole joint with electrical tape into a smooth, tapered head so it does not snag.
4. **Pull the cable.** The person below feeds while the person above pulls. Feed slack; do not let the cable kink.
5. **In the basement or crawl space, follow new-work rules.** Run the cable through bored holes in the joists or along running boards, secured within 12 inches of the bottom plate hole and at least every $4\frac{1}{2}$ feet (334.30). Per 334.15(C), in unfinished basements and crawl spaces, cable smaller than two 6 AWG or three 8 AWG conductors run at angles to joists must go through bored holes or on running boards, not stapled to the joist bottoms.
6. **Set the box** (Procedure 3.3, Steps 6–9).

Picture coming: Section through a first floor over a basement: a new old-work box hole in a wall, the bottom plate with a $\frac{3}{4}$ -inch hole drilled up from below, a fish tape coming up through the plate into the wall cavity and out the box hole where a hand is grabbing it. Below, NM cable running through bored holes in floor joists, stapled at $4\frac{1}{2}$ ft and within 12 in. of the plate hole. Labels: "drill center of plate," "secure within 12 in.," "holes in joists, not stapled to bottoms."

Procedure 3.5: Fish down from an attic

Use this for a new switch or receptacle on a top-floor wall, or for a ceiling light fed from the attic.

1. **Cut in the box hole first.**
2. **Find the top plate in the attic.** Use your reference measurement, or push a wire up through the ceiling right against the wall. In deep blown insulation, use a long stick to probe for the plate. Wear a respirator, long sleeves, and gloves in fiberglass insulation.

WARNING: Attic heat in an Alabama summer can pass 130°F by midday. Work attics early in the day, take water up with you, and come down every 20 to 30 minutes. Step only on joists or on boards laid across them. A foot through the ceiling hurts you and costs the job its profit.

1. **Drill down through the top plate.** Most top plates are two 2x4s stacked, about 3 inches total. Drill in the center.
2. **Drop a fish chain or weighted line,** or push a fish tape or glow rod down the hole. Your partner at the box hole catches it.
3. **Pull the cable from the attic down** to the box, using the same taped head as in Procedure 3.4, Step 6.
4. **In the attic, follow new-work rules.** Secure the cable. If you run it across the tops of joists or across rafters within 7 feet of the floor in an attic reached by permanent stairs or a ladder, protect it with guard strips at least as high as the cable. If the attic has only a scuttle hole, guard strips are needed only within 6 feet of the scuttle or attic entrance edge. Cable run along the sides of joists needs no guard strips. (334.23 points to the AC cable attic rule. In the NEC 2026 text that rule is at 320.23.)
5. **Keep the cable out of the way** of future insulation work and anyone walking. Run along the sides of joists where you can.

Procedure 3.6: Fish across a finished ceiling

Use this for a new ceiling fan, light, or recessed can where you have attic access above, or when you have to go from wall to wall across a ceiling with a floor above it.

Case A: Parallel to the joists (the easy case)

1. Cut the ceiling hole for the new box or light.

2. If there is attic access, go above, find the hole, and run the cable to it from the attic. Secure it in the attic per Procedure 3.5, Step 6.
3. If there is a floor above (no attic), push glow rods from the new hole along the joist bay toward the wall. Watch for blocking (solid bridging) partway across, often at mid-span.
4. At the wall, cut a small access hole in the ceiling right at the corner, or drill up through the top plate from the wall cavity with a flex bit through the switch box hole. Hook the glow rod and pull the cable back.

Case B: Across the joists (the hard case)

1. You cannot push a fish tape through solid joists. You have three choices: - **Go around.** Route the cable through the attic above or the basement below and come in from a direction that runs parallel to the joists. - **Use a flex bit.** From a hole in the ceiling, steer a long flex bit through each joist in turn. This works for one or two joists close to the hole. - **Notch and patch.** Cut a narrow strip of drywall out of the ceiling across the joists, notch or drill each joist, run the cable, install nail plates, and patch the strip. The customer must agree first.
2. Where you drill or notch a joist, keep holes in the middle of the joist depth and notches small. Ask your journeyman before notching any joist, because notches weaken framing. 300.6(A)(2) allows notches only where the structure is not weakened, and the cable in the notch must be covered by a steel plate at least 1/16 inch thick before the finish goes on.
3. Wherever a cable passes through a bored hole closer than 1¼ inch to the face of the framing, cover that spot with a steel plate at least 1/16 inch thick (300.6(A)(1)).

Picture coming: Plan view looking up at a finished ceiling with joists shown dashed. Case A: a new fan box hole and a straight path along one joist bay to the wall, with a glow rod in it. Case B: a path crossing three joists, shown three ways: around through the attic (arrow up and over), through with a flex bit from the box hole (curved arrow), and as a narrow cut strip in the drywall with nail plates on each joist (dimension "1/16 in. steel plate").

Procedure 3.7: Getting past fire blocks and going sideways through studs

Horizontal runs through a finished wall and walls with fire blocks are where a flex bit earns its cost.

Fire block in the path of a vertical fish

1. From the new box hole (or a small hole cut at the block, which a cover plate or a patch will hide), feed the flex bit up or down to the block.
2. Use the bit guide to keep the bit straight against the face of the block, not angled toward the drywall.
3. Drill through. Check with the camera that you did not drill into the back of the drywall on the far side.
4. Attach the cable to the bell-hanger hole in the bit tip and pull the bit back through. The cable comes with it.

Sideways along a wall (for example, to add a receptacle 6 feet down the same wall)

1. Remove the baseboard carefully with a flat bar. Score the paint line first.
2. Cut a strip of drywall behind where the baseboard was, about 2 inches high, from the existing receptacle's cavity to the new one.
3. Notch or drill each stud low, in the strip. Run the cable.
4. Cover each stud crossing with a steel nail plate at least 1/16 inch thick, because the cable is within 1¼ inch of the face (300.6(A)).
5. Reinstall the baseboard. Nail it above or below the plates, not into them.

Croft (pp. 159–168) describes the same idea a century ago: lift a floor board or remove a piece of trim, make a "pocket," pass the wire, and put the trim back. Trim and baseboards are still the best place to hide an access cut.

WARNING: Before you drill sideways through studs in an exterior wall, check for a water supply line to an outside faucet and for the gas line to a fireplace. Look in the basement under the wall first.

Procedure 3.8: Tap into an existing circuit, or run a new home run?

Ask your journeyman each time. The rules of thumb:

1. **Run a new home run from the panel** when the new load is a kitchen countertop, bathroom, laundry, or appliance circuit (those must be separate circuits, Section 3.11), or when the existing circuit is already loaded, or when it is old wiring you do not trust.
2. **Tap an existing circuit** only when all of these are true: - It is a general-purpose circuit and the added outlets are general-purpose. - You know what else is on it. Map it with a tracer (R1.2). - The existing wiring has an equipment ground, or you will add one (R1.6). - The wiring is copper in good shape. If you find aluminum branch-circuit wiring, stop. Do not splice copper to it with ordinary twist-on connectors. Aluminum-to-copper connections need connectors listed for that use and a specific method. See R-OLDHOUSE and talk to your journeyman. - The circuit will get the AFCI protection 210.12(E) requires (Section 3.10).
3. **Where to tap:** at an existing box with room for more conductors (check box fill, R1.3). Kuhlman (pp. 77–78) suggests that in pre-1980s homes the ceiling light box often holds the feed. A receptacle box that is the end of a run has only one cable and is easiest to extend .
4. **Make the splice with pigtails.** Do not use the receptacle's screws or backstab holes to carry power through to your new cable. Splice incoming, outgoing, and a pigtail to the device together. That way a failed device does not kill everything downstream.

Procedure 3.9: Adding circuits to a full panel

Step 1: Read the label. The panel's label is usually on the inside of the door or on the dead front. Find:

- The catalog number and the line that gives the number of spaces and circuits, such as "30 spaces, 40 circuits" or "20/40."
- The list of breaker types listed for the panel.
- A diagram or note showing which slots accept tandem (twin) breakers. Square D QO labels mark tandem-capable slots; the Arc Guide (Part 8) notes the QO tandem is the QO2020 and that slots are marked. Read the actual label; do not go by memory.

Step 2: Understand the numbers. Kuhlman (p. 34) gives the example of a common 100-amp panel marked 30/40: it takes a maximum of 30 full-size breakers, but 10 of those spaces can take twin breakers, for 40 circuits total. Once the panel reaches 40 circuits, it is full, even if a tandem would physically fit in another slot. 408.54 requires the panel to have physical means to stop over-filling. Newer tandem breakers have a rejection feature that only fits listed slots. Older panels may not stop you, which is why you read the label.

Step 3: Choose.

Situation	What to do
Open full-size space and capacity	Add the breaker.
No open space, label allows tandems in slots where full-size breakers sit, circuit count under the label max	Replace a full-size breaker with a listed tandem in an allowed slot, moving two existing 120 V circuits onto it, which frees a space.
Label does not allow tandems, or the circuit max is reached	Add a subpanel (Step 4), or change the panel (R1.5).
Panel is a brand with known problems (Federal Pacific Stab-Lok, Zinsco)	Do not add to it. Write it up for the office as a panel change (R1.5, R2.7).

WARNING: Do not install tandems in slots the label does not allow, and do not use a breaker brand that is not listed for that panel. Kuhlman (pp. 34–35) describes seeing twin breakers melting where several were packed into a panel not rated for them. Each wrong tandem works fine on the day you put it in. The heat shows up years later.

Step 4: Add a subpanel when there is no legal space. R1.5 covers panel work in depth. The short version for a 60-amp subpanel in the same building:

1. Pick a load center with at least the spaces you need plus some spare.
2. Feed it with a 2-pole 60-amp breaker in the main panel. That takes two full-size spaces, so you may first need to move two 120-volt circuits onto a listed tandem in an allowed slot, or the main panel needs one open double space.

3. Use 6 AWG copper NM-B cable with two hots, a neutral, and a ground (6/3 with ground). NM ampacity is limited to the 60°C column (334.80). Table 310.16 gives 55 amps for 6 AWG copper at 60°C. 240.4(B) allows the next standard breaker size above the conductor ampacity, 60 amps, because a feeder is not a branch circuit serving multiple receptacles. The equipment grounding conductor for a 60-amp circuit must be at least 10 AWG copper (Table 250.122). Confirm the ground in the cable you buy meets that.
4. In the subpanel, keep neutrals and grounds separate. Remove or do not install the bonding screw or strap. Land neutrals on the isolated neutral bar and grounds on a ground bar bonded to the can (408.40). 250.24(B) (2023: 250.24(A)(5)) prohibits connecting the neutral to ground on the load side of the service disconnect.
5. Move circuits from the main panel to the subpanel, or put the new circuits there.
6. Label both panels.

If the subpanel is in a **detached** garage or shop, it is a separate building. 250.32 requires a grounding electrode system at that building and an equipment grounding conductor run with the feeder, with the neutral kept off the grounding electrode and the equipment ground. That building also needs its own disconnect. Do that job with a journeyman and read R1.5 and R1.6 first.

Picture coming: Close-up of a load center label (generic, no brand) with a table reading "Max 30 spaces / 40 circuits" and a slot diagram where the bottom 10 positions on each side are highlighted and marked "Tandem breakers permitted in these positions only." Beside it, the panel with one tandem installed in a highlighted slot (green check) and one tandem in an unhighlighted upper slot (red X).

Procedure 3.10: Meeting 210.12(E) when you extend or modify a circuit

1. **Decide whether the circuit is in a 210.12(B) area.** If the branch circuit supplies outlets or devices in a kitchen, family room, dining room, living room, parlor, library, den, bedroom, sunroom, recreation room, closet, hallway, laundry area, or similar area, it is.
2. **Decide whether you are modifying, replacing, or extending it.** Adding an outlet, moving a box, or replacing a length of the cable counts.
3. **Check the exception.** If you are only extending the conductors 6 feet or less and adding no outlets or devices other than splicing devices, AFCI is not required. Measure the extension outside boxes; conductors inside an enclosure, cabinet, or box do not count toward the 6 feet.
4. **Pick the protection.** 210.12(E) allows: - Any 210.12(A) method. The usual one is a listed combination-type AFCI breaker at the panel. Check that the panel has a listed AFCI breaker for its brand. - A listed outlet branch-circuit-type AFCI (an AFCI receptacle) at the first receptacle outlet or switch of the existing branch circuit. "First" means the first outlet from the panel, not the first one in the room.
5. **If you use an AFCI breaker on an old circuit, expect trips.** Old circuits often have a shared neutral with another circuit, a neutral touching ground somewhere, or a backstabbed device arcing. AFCI breakers detect some ground faults as well as arcs, so a

neutral-to-ground contact anywhere on the circuit can trip one. Find and fix the fault; do not swap back to a standard breaker. See R2.4 for AFCI troubleshooting.

6. **For a multiwire branch circuit** (two hots sharing one neutral), use a 2-pole AFCI breaker listed for it, or separate the circuits.

Procedure 3.11: Kitchen, bathroom, and laundry remodels

When a room is remodeled, wire it to current code for that room even if the rest of the house is old. The inspector looks at the remodeled room as new work.

Kitchen

Requirement	Rule	NEC 2026
Small-appliance branch circuits	At least two 20-amp circuits for the countertop, wall, floor, and dining receptacles in the kitchen, pantry, breakfast room, and dining room. No other outlets on them.	210.11(C)(1), 210.52(B)
Countertop receptacle spacing	Every counter 12 in. wide or more. No point along the wall line more than 24 in. from a receptacle.	210.52(C)(1)
Receptacle height	On or above the countertop, not more than 20 in. above it, or in the countertop with assemblies listed for countertops	210.52(C)(3)
Island or peninsula	If a receptacle is not provided at the island or peninsula, provisions for a future receptacle must be installed there	210.52(C)(2)
GFCI, receptacles	All receptacles in kitchens, and any within 6 ft of a sink bowl edge	210.8(A)(7), 210.8(A)(9)
GFCI, appliances	The circuit or outlet for dishwashers, electric ranges, wall-mounted ovens, counter-mounted cooking units, and microwave ovens (150 V or less to ground, 60 A or less)	210.8(D)
AFCI	Kitchen 120-volt 15- and 20-amp circuits	210.12(B)(1)
Lighting	At least one wall-switch-controlled lighting outlet	210.70(A)(1)

The kitchen will usually have its small-appliance circuits on dual-function (AFCI and GFCI) breakers or on AFCI breakers with GFCI receptacles, a separate lighting circuit, and individual circuits for the dishwasher, disposal, microwave, range, and refrigerator as each appliance's instructions require. R1.13 covers the appliance hookups.

Bathroom

Requirement	Rule	NEC 2026
Bathroom circuit	At least one 20-amp, 120-volt circuit for bathroom receptacles; no other outlets. If it serves a single bathroom, it may also serve other equipment in that bathroom per 210.23.	210.11(C)(3)
Receptacle	At least one within 3 ft of the outside edge of each sink, on an adjacent wall, on the countertop, or on the side or face of the sink cabinet, not more than 12 in. below the sink top	210.52(D)
GFCI	All bathroom receptacles	210.8(A)(1)
Lights and fans near the tub or shower	Zone 3 ft horizontal and 8 ft vertical from tub rim or shower threshold	410.10(D), 422.18(B); see R1.7

Bathrooms are not on the 210.12(B) AFCI list for dwellings.

Laundry

Requirement	Rule	NEC 2026
Laundry circuit	At least one 20-amp circuit for the laundry receptacle outlets; no other outlets	210.11(C)(2)
Receptacle	At least one in the area for laundry equipment	210.52(F)
GFCI	Laundry area receptacles; the dryer outlet under 210.8(D)(11)	210.8(A)(12), 210.8(D)
AFCI	Laundry areas	210.12(B)(13)

Procedure 3.12: Permit and inspections

1. **Confirm the permit before you start.** The Arc Guide (Job 7) notes that running a new circuit is a permit job in most places and says to confirm the permit with the office first. At YES, the office pulls the permit. Do not open walls on a remodel until you know it is pulled.
2. **Rough-in inspection.** After all boxes are set and all cable is run and secured, but before any wall is closed or devices are installed, call for rough-in. In old work, much of the cable is already hidden. Leave access holes open, take photos of every fished run and every nail plate, and have the route sketched for the inspector.
3. **Make up the boxes.** Grounds spliced and pigtailed, neutrals spliced, hots spliced, all folded neatly. Some inspectors want to see made-up boxes at rough; ask.
4. **Patch.** After rough passes, patch access holes or hand off to the drywall trade.
5. **Trim out.** Install devices, plates, and fixtures. Install the AFCI and GFCI breakers or devices.
6. **Test.** Every receptacle with a plug-in tester. Every GFCI with its test button and with a GFCI tester. Every AFCI breaker with its test button. Every switch and light. Label the panel directory for each new circuit.

7. Final inspection.

8. **Smoke and CO alarms.** Remodel permits may trigger alarm upgrades under the building code. Check with the office before final (R1.8).

4. Worked Examples

4.1 Does 210.12(E) apply?

Job	AFCI required?	Why
Panel moved 3 ft; every bedroom circuit spliced in a junction box and extended 4 ft to the new panel	No	Extension is 6 ft or less with no new outlets (210.12(E) Exception)
Same panel move, but the extension is 8 ft	Yes	Over 6 ft
One new receptacle added to a living room circuit, cable fished 10 ft from the existing receptacle	Yes	Adds an outlet; the exception does not apply
Bathroom receptacle circuit extended for a new vanity receptacle	No (AFCI), yes (GFCI)	Bathrooms are not in 210.12(B); GFCI per 210.8(A)(1)
Bedroom receptacle replaced like for like, no wiring changed	Yes, by 406.12(D)(4)	Replacement receptacles in AFCI areas need AFCI protection
Kitchen counter receptacle extended 2 ft to a new location (moved, no new outlet)	Yes for AFCI unless within the exception; GFCI yes	2 ft with no new outlet meets the AFCI exception; kitchen receptacles need GFCI regardless

For the last row, work through it carefully. The receptacle is moved, not added. The conductors are extended 2 feet outside boxes. No new outlets or devices other than a splicing device. So 210.12(E) does not require AFCI for that change. GFCI is still required because 210.8(A)(7) covers all kitchen receptacles. When in doubt, add the AFCI and tell the customer why. It protects them and avoids a failed inspection.

4.2 Tandem count on a 30/40 panel

A 100-amp panel is labeled "30 spaces, 40 circuits" with tandems allowed in the bottom 10 spaces. The panel has 30 full-size spaces filled: 4 two-pole breakers (8 spaces) and 22 single-pole breakers. One tandem is already installed in an allowed bottom slot.

- Count circuits now: 4 two-pole breakers count as 2 each per 408.54 = 8. 22 single-pole spaces, minus the one holding the tandem = 21 singles = 21. The tandem = 2. Total = 8 + 21 + 2 = 31 circuits.
- Room left: $40 - 31 = 9$ more circuits, if the slots allow.

3. Allowed tandem slots: 10. One is used. 9 are left, but only if each of those 9 slots currently holds a single-pole breaker you can replace. If a two-pole breaker sits in some of them, you cannot use those slots for tandems without moving the two-pole.
4. For one new circuit: replace a single-pole breaker in an allowed bottom slot with a listed tandem. Put the old circuit on one half and the new one on the other.

Before adding the new circuit, check load capacity. A 100-amp service with central air, an electric range, and an electric dryer may already be near its limit. That is an R-LOAD calc.

4.3 Kitchen remodel circuit plan

A customer is remodeling a 12 × 14 foot kitchen in a 1962 house. The new plan has: an 11-foot wall counter with the sink in it, a 4-foot peninsula, a dishwasher, a disposal, an over-range microwave, a 40-amp electric range, a refrigerator, recessed lights, and under-cabinet lights.

Circuit	Breaker	Cable	Protection	Serves
1	20 A 1-pole	12-2	AFCI + GFCI (dual-function breaker)	Small-appliance circuit A: left half of wall counter, peninsula
2	20 A 1-pole	12-2	AFCI + GFCI	Small-appliance circuit B: right half of wall counter, dining wall
3	Per dishwasher instructions	Per breaker size	GFCI (210.8(D)(7)), AFCI (210.12(B)(1))	Dishwasher
4	Per disposal instructions	Per breaker size	GFCI (receptacle under sink is within 6 ft of the bowl, 210.8(A)(9)), AFCI	Disposal
5	Per microwave instructions	Per breaker size	GFCI (210.8(D)(12)), AFCI	Over-range microwave
6	40 A 2-pole	8 AWG copper, 3 conductors plus ground	GFCI (210.8(D)(8))	Range
7	Per refrigerator instructions	Per breaker size	GFCI (kitchen receptacle, 210.8(A)(7)), AFCI	Refrigerator
8	15 A 1-pole	14-2 and 14-3	AFCI	Recessed lights and under-cabinet driver

Countertop receptacle count on the 11-foot wall:

1. 11 ft = 132 in. The sink is 30 in. wide in the middle of the run, leaving 51 in. of counter on each side.
2. Per 210.52(C)(1), no point on the wall line may be more than 24 in. from a receptacle. The space behind the sink is exempt only where the Figure 210.52(C)(1) conditions apply (X

under 12 in. behind a straight-wall sink). Assume the sink sits so the area behind it is exempt.

3. Each 51-inch section: a receptacle covers 24 in. on each side, 48 in. total. One receptacle in the middle of a 51-inch section leaves 1½ in. at one end uncovered. Use two receptacles per section, about 12 in. from each end. Total on the wall: 4.
4. Peninsula: 4 ft. 210.52(C)(2) requires that if no receptacle is provided, provisions for a future one must be installed. Install one listed receptacle at the peninsula on circuit 1 if the customer agrees, which meets 210.52(C)(3) when placed per that section.

The range cable size: Table 310.16 gives 8 AWG copper 40 amps in the 60°C column, which applies to NM cable (334.80). 40-amp breaker on 8 AWG copper NM-B is within its ampacity. Check the range's instructions for the circuit it calls for.

4.4 Subpanel feeder for a basement finish

A customer is finishing a basement and needs 8 new 120-volt circuits. The 200-amp main panel has 2 open spaces and is not listed for tandems.

1. Two open spaces fit one 2-pole breaker.
2. Feed a 60-amp, 24-space subpanel in the basement: 2-pole 60-amp breaker, 6/3 copper NM-B with ground (55 A at 60°C, next standard size 60 A per 240.4(B)), ground at least 10 AWG copper (Table 250.122).
3. In the subpanel: bonding screw out, neutrals isolated, grounds on a bonded ground bar.
4. The 8 basement circuits go in the subpanel. Finished-basement rooms such as a bedroom, family room, or recreation room need AFCI (210.12(B)). Unfinished parts of the basement need GFCI on receptacles (210.8(A)(6)). Basement finish areas that are "similar areas" to the 210.12(B) list need AFCI; ask the inspector if a room's use is unclear.
5. Load check: the subpanel feeder is limited by its 60-amp breaker, but the main service still has to carry it. Run the load calc for the whole house (R-LOAD) with the new loads added.

4.5 Picking an old-work box

You are adding a receptacle at the end of a run. Two 12-2 NM cables (one in, one going on to another new receptacle) and one duplex receptacle. The old-work box has internal cable clamps.

1. Conductor count per 314.16(B) (see R1.3 for the full method): 2 insulated conductors per cable × 2 cables = 4.
2. Grounds: all equipment grounding conductors together count as 1.
3. Device: 1 yoke = 2.
4. Internal clamps: 1 (all clamps together count as one).
5. Total: 4 + 1 + 2 + 1 = 8 conductor volumes.
6. 12 AWG needs 2.25 cubic inches each (Table 314.16(B)). 8 × 2.25 = 18.0 cubic inches.
7. Pick an old-work single-gang box marked 18 cubic inches or more. A common 20.3-cubic-inch old-work box works. Read the cubic inches stamped inside the box you are holding.

5. Common Mistakes

Mistake	What happens	How to avoid it
Cutting a box hole into a stud or a live cable	Hole in the wrong place, or a cut cable	Stud finder plus a $\frac{1}{8}$ in. test hole plus a look from above or below
Promising a new circuit before checking panel space and label	Job grows into a panel change after the price was set	Check space, label, and load during the survey (Procedure 3.1)
Tandem breaker in a slot the label does not allow	Overheating, failed inspection	Read the label; 408.54, 110.3(B)
Using the wrong brand of breaker	Poor bus contact, overheating	Use only breakers listed on the panel label
Splicing copper to aluminum branch wiring with standard wire nuts	Loose, hot connection	Stop; see R-OLDHOUSE
Tapping a circuit without knowing what is on it	Overloaded circuit, nuisance trips	Map it with a tracer first
Forgetting AFCI on an extended bedroom or living room circuit	Failed inspection	Apply 210.12(E) every time (Procedure 3.10)
Swapping an AFCI breaker back to a standard breaker because it trips	Hides a real fault that can start a fire	Find the neutral-to-ground contact or arcing splice (R2.4)
Cable within $1\frac{1}{4}$ in. of the face of a stud with no plate	Drywall screw or nail goes through it later	Steel plate at least $\frac{1}{16}$ in. thick (300.6(A))
Old-work box set back from a wood surface	Code violation, arc path to wood	Box flush or projecting in combustible surfaces (314.20(B))
Gaps over $\frac{1}{8}$ in. around a box	Fails inspection	Mud and patch (314.21)
Cable left loose in a reachable attic or basement	The fishing exception does not apply where you can reach	Secure per 334.30 wherever accessible
Kitchen lights put on a small-appliance circuit	Code violation; small-appliance circuits may have no other outlets	Separate lighting circuit (210.11(C)(1))
Neutral and ground tied together in a subpanel	Neutral current on ground paths and metal	Bonding screw out; separate bars (250.24(B))
Opening walls before the permit is pulled	Inspector can require walls to be opened again	Confirm the permit first (Procedure 3.12)
Not photographing fished runs before patching	Inspector cannot see the work	Photos of every route and plate

6. Field Exercise

Do this with a journeyman watching, in a training house or on a real job. It comes from the course outline.

Part A: Fish from below into a finished wall

1. In a finished first-floor wall over a basement or crawl space, mark a new receptacle location.
2. Cut in an old-work box hole (Procedure 3.3).
3. From the basement or crawl space, find the bottom plate, drill up, and fish a 12-2 NM cable to the hole without opening the wall anywhere else, using a fish tape, glow rods, and, if blocked, a flex bit (Procedure 3.4, 3.7).
4. Set the old-work box, flush, with the sheath $\frac{1}{4}$ in. into the box.
5. Secure the cable in the basement per 334.30.
6. Your journeyman checks: no extra holes, box tight and flush, gap $\frac{1}{8}$ in. or less, cable secured where reachable, box fill within limits.

Part B: Fish across a finished ceiling to a new fan box

1. In a finished ceiling under an attic, mark a fan location.
2. Cut the hole and install a fan-rated brace box from below (R1.7, Procedure 3.8).
3. From the attic, fish cable across the ceiling to the new fan box from the nearest wall switch location (Procedures 3.5 and 3.6).
4. Protect and secure the cable in the attic.
5. Your journeyman checks: attic run secured and protected near the scuttle, fan box marked for fan support, cable connector at the box.

Part C: Tandem breaker or subpanel

1. On a training panel, read the label. Write down: spaces, circuits, listed breaker types, and which slots accept tandems.
2. Add a tandem breaker in a slot the label allows. Show your journeyman the label line that permits it.
3. On a second training panel whose label does not allow tandems in the slot you need (or allows none), lay out and install a 60-amp subpanel feed: 2-pole 60 A breaker, 6/3 copper NM-B with ground, subpanel with the bonding screw removed and a separate ground bar.
4. Your journeyman checks: tandem only in an allowed slot, breakers listed for the panel, subpanel neutrals isolated, grounds bonded to the can, directories updated.

Part D: Kitchen remodel plan

1. On a printed kitchen plan, lay out every circuit for the remodel: two small-appliance circuits, appliance circuits, and lighting.

2. Place every countertop receptacle with dimensions showing the 24-inch rule.
3. Mark every outlet that needs GFCI and every circuit that needs AFCI, with the NEC section next to each.
4. Your journeyman checks the plan against Procedure 3.11.

Sign-off

The journeyman signs when all four parts pass with no safety misses.

7. NEC 2026 Cross-References

Section	What it covers	Why it exists
110.3(B)	Install per listing and labeling	The panel label decides breaker types and tandem slots
210.8(A), 210.8(D), and the replacement paragraph after 210.8(F)	GFCI locations, specific appliances, and replacement equipment	Shock protection where water and grounded surfaces are
210.11(C)(1)–(4)	Required kitchen small-appliance, laundry, bathroom, and garage circuits	Keep high-use areas on their own circuits
210.12(A), (B), (E)	AFCI methods, dwelling areas, extensions and modifications	Arcing in old and damaged wiring starts fires
210.52(A), (C), (D), (F)	Receptacle spacing; countertops; bathrooms; laundry	Fewer extension cords
210.70(A)	Required lighting outlets	Light at every room entry
240.4(B)	Next size up OCPD	Used for the 60 A subpanel on 6 AWG NM
Table 250.122	Equipment grounding conductor size	Fault current path big enough to trip the breaker
250.24(B) (2023: 250.24(A)(5))	No neutral-to-ground connection on the load side of the service	Keeps neutral current off metal and grounds
250.32	Feeder to a separate building	Grounding electrode and EGC at the remote building
300.6(A), (D) (2023: 300.4(A), (D))	Bored holes, notches, steel plates, fishing exception	Nails and screws through cables
314.16	Box fill	Overfilled boxes damage insulation
314.17(B)(2)	Cable sheath $\frac{1}{4}$ in. inside the box	Protects conductors at the entry
314.20, 314.21	Box flush or set back $\frac{1}{4}$ in. max; gaps $\frac{1}{8}$ in. max	Contains arcs and heat inside the box
314.23(C)	Boxes mounted in finished surfaces	Old-work box support
320.23 (via 334.23)	Cables in accessible attics, guard strips	Keep people from stepping on cables
334.15(C)	NM in unfinished basements and crawl spaces	Protection from damage
334.30	Securing NM; 334.30(B)(1) fished cable	Support, with relief for finished walls

Section	What it covers	Why it exists
334.80	NM ampacity at 60°C	NM's insulation and jacket limit
406.12(D) (2023: 406.4(D))	Replacement receptacles: grounding, GFCI, AFCI, TR	Old houses gain protection over time
408.36	Panelboard overcurrent protection	Panel bus not overloaded
408.40	Panelboard grounding and ground bar	Separate ground bar where EGCs land
408.54	Maximum number of overcurrent devices	Panel not overfilled
Table 310.16	Conductor ampacity	Wire size for the breaker

8. End-of-Chapter Checklist

- ☐ I surveyed above and below before cutting, and showed the customer each planned hole.
- ☐ The permit is pulled before walls were opened.
- ☐ I checked panel space, the panel label, and the load before promising circuits.
- ☐ Any tandem is in a slot the label allows, and every breaker is listed for the panel.
- ☐ Any subpanel has neutrals isolated, grounds on a bonded bar, and a correctly sized feeder and EGC.
- ☐ Every old-work box is tight, flush or within the ¼ in. setback, and has gaps of ⅛ in. or less.
- ☐ Box fill is within limits for every box I touched.
- ☐ Cable sheath is at least ¼ in. inside each box.
- ☐ Cable is secured and protected anywhere it can be reached (attic, basement, crawl space).
- ☐ Steel plates cover every crossing within 1¼ in. of a framing face.
- ☐ I did not splice copper to aluminum branch wiring.
- ☐ AFCI protection is in place wherever 210.12(E) or 406.12(D)(4) requires it.
- ☐ GFCI protection is in place for every location in 210.8(A) and every appliance in 210.8(D) that I touched.
- ☐ Tamper-resistant receptacles are used for replacements where required.
- ☐ Kitchen, bath, and laundry circuits meet 210.11(C) and 210.52.
- ☐ Every receptacle, GFCI, AFCI, and switch tested.
- ☐ Panel directory updated for every new and moved circuit.
- ☐ Photos taken of every fished route, plate, and box before patching.
- ☐ Alarm upgrade question raised with the office (R1.8).
- ☐ Dust cleaned up and drop cloths removed.

10. Sources

- Jesse Kuhlman, Residential Electrical Troubleshooting (2019)., page = book page. Cited: "Twin / Tandem circuit breakers," pp. 34–35; mid-pointing and circuit routing in old homes, pp. 77–78; "Receptacle not working within home (finished area)," pp. 80–81. Paraphrased.
 - Arc Workforce, Residential Electrical Field Guide, Part 4 Job 7 (running a new circuit from panel to outlet) and Part 8 (brand notes, older home quirks). Its code cites are NEC 2020; the NEC numbers here are from NEC 2026. Its aluminum fix (purple wire nuts and CO/ALR devices) was not used.
 - Terrell Croft, Wiring of Finished Buildings (1915),, Chapter IX "Tools and Manipulation": removal of floor boards and making of pockets, pp. 159–168; fishing and fishing devices, pp. 183–191.
 - NFPA 70, National Electrical Code, 2026 edition.
 - Commercial course module 3.3 (productivity in finished spaces).
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Videos to watch

These videos are made by other electricians and companies, not YES Electric. Watch each one after you read the section it goes with. Where a video does something differently from this module, the caution line says so. Follow this module and your journeyman, not the video. Click a title to open it on YouTube.

Section	Video
Procedure 3.3: Cut in an old-work box (metal box with Madison clips)	Installation of Metal Oldwork Box using Madison Clips Craig Michaud- Electrical Instructor • 17:16 An electrical instructor gangs two metal old-work boxes, traces and cuts the drywall opening (horizontal cuts first so a stud can be found early), fishes MC cable down, installs the MC connector with a red-head bushing, and sets Madison straps the right way. Caution: He uses MC cable; most YES old work is NM in plastic old-work boxes. His 20 in to the top of the box is his own standard; use the height YES specifies.
Procedures 3.4 and 3.5: Fish down from an attic (and up from below)	Uncommon Tricks to Fish Wire Through Walls and Ceilings Quickly How To How To Home • 10:58 On a cut-away mock wall you can see what happens inside: a 1/8 in locator hole and wire through the ceiling, a 3/4 in hole down through the top plate, a weighted chain dropped to the box opening, and the cable taped to it and pulled. Caution: DIY channel, not an electrician. The chain trick works only in an empty interior wall; in an insulated exterior wall use a fish tape or glow rod (he says this). Turn off and verify dead before cutting into a wall that may hold live cable.
Procedure 3.2: The old-work tool kit (fish rods and tips)	How To Use Fish Rods for Pulling Cables Klein Tools • 4:35 Klein explains low-, mid-, and high-flex fiberglass fish rods and when to use each, and shows the hook, bullet-nose, whisk, and lighted tips. Caution: Product video aimed at low-voltage cabling; the same rods and tips are used for NM in old work.
Procedure 3.7: Going sideways through studs	How To Fish Electrical Wires. "SECRET OF THE PROS!" Tricks that Make Wire Fishing Easy! Starving Electrician • 8:12 He drills through the center of studs (keeping 1-1/4 in from the face), bores two holes that meet at a corner, and makes a hook-and-pole from scrap NM to pull cable around the turn without stripping the jacket. Caution: Shown on open framing; in a finished wall you would be drilling through small openings with a flex bit. Keep the 1-1/4 in setback or add nail plates (R1.3).
Procedure 3.9 Step 1 and Step 2: Read the panel label before adding a tandem	How to Install an EV Charger Ask This Old House This Old House • 8:27 Heath Eastman locks out the remote main, verifies dead with a non-contact tester and then a meter, finds the 30/40 label inside a full panel, and explains that it allows tandems so a circuit can be added without a subpanel. Caution: The job is an EV receptacle with a load-management kit; watch the first half for the panel-label lesson. GFCI on the receptacle and EV-specific rules are in R1.11, not shown here.

Procedure 3.10: AFCI
when you extend or
modify a circuit

[Modifications or extension to an existing branch circuit NEC 210.12\(B\)](#)

NEMA Webmaster • 2:00

NEMA explains that an extension over 6 ft, or any added outlet, needs AFCI protection, and that an outlet branch-circuit AFCI receptacle at the first outlet of the circuit is an option when the panel cannot take an AFCI breaker.

Caution: Based on the 2014 NEC, where this rule was 210.12(B); in NEC 2026 it is 210.12(E). The rule itself has not changed in the way the module uses it.