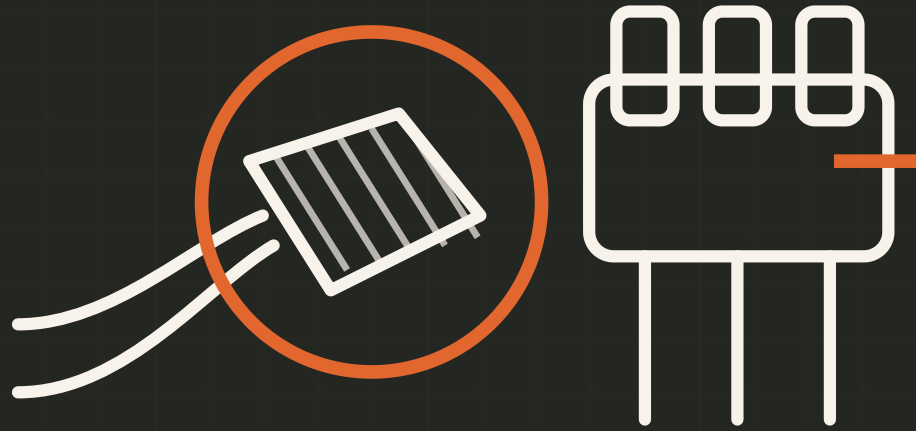




Connections That Hold

Stripping, wire nuts, lever nuts, crimps,
screw terminals and boxes, done right

ROY DALTON

From the Roy Dalton Electric videos

43 FIXES

FREE SAMPLE

The wire nut that's just sitting there, and the crimp seam

Two full fixes from Connections That Hold, Book 1 of The Homeowner's Electrical Library

These are the two fixes people ask me about most: the wire nut that looks fine and isn't holding anything, and which way a crimp terminal's seam goes into the tool. They're printed here exactly as they are in the book.

In this sample:

- **Start here:** how every fix is laid out, the four levels from "anyone" to "licensed electrician", and the rules that come before every job. These pages are at the front of all four books.
- **Fix 6:** A wire nut that's just sitting there.
- **Fix 22:** Seam up or down, which way the barrel goes in.
- **One of Roy's Bench Cards**, the free printables that come with the set.
- **Can it wait till morning?** The one-page table from The House Walk: eleven things you might find tonight, whether each can wait, and about what it costs to fix.

References to fixes that aren't in this sample point to pages in the full books.

Roy Dalton

Start here

Four pages before the first fix. They're the same in all four books, because the rules that keep you safe don't change from one book to the next.

How every fix is laid out

Every fix has a number, and the numbers run through all four books: Fixes 1 (p.10) to 43 (p.102) are in Connections That Hold, 44 to 78 in Outlets, Switches and Lights, 79 to 104 in Test Before You Touch, and 105 to 123 in Before You Call an Electrician. When a fix says "see Fix 79 (Book 3, p. 9)", the page number follows it, with the book if it's in another one.

- **Who does this** tells you, before anything else, whether the job is yours.
- **You need, Time, Parts** tell you what to have on hand and roughly what it takes.
- **Step by step** is the job itself, one action per step, with the details in the step so you don't have to look back.
- **Done right when** is what you should see, feel or measure when it's finished. If you don't see it, it isn't done.
- **Stop and call if** lists the signs that end the do-it-yourself part, and what to do instead. Read it before you start, not halfway through.
- **Where the rule comes from** names the code section, the instruction sheet or the agency behind the rule, so anyone reading over your shoulder can check it.

The four levels

LABEL	WHAT IT MEANS
Anyone · nothing gets opened	Reading a label, pressing a test button, moving a heater, measuring. No cover comes off.
Yours · breaker off, prove it dead	A careful homeowner's job inside a box or a device, with the breaker off and the circuit proven dead first.
Check it, then call	You can look and test, and you should know what you're seeing. The fix belongs to a licensed electrician.
Licensed electrician	Not a homeowner job. The fix tells you what to do right now and what to ask.

The label is a ceiling, not a dare. If a "Yours" job doesn't match what you find behind the plate, it stops being yours.

Before every job

1. Turn the power off at the breaker, not at the wall switch. A switch opens one wire, and some boxes hold more than one circuit.
2. Prove it dead: test your tester on a known live outlet, test every wire in the box, then test the tester on the live outlet again. That's the whole routine in Fix 79 (Book 3, p. 9), and every "Yours" fix starts with it.
3. Take a photo of the wires before you disconnect anything. It's the best wiring diagram you'll ever have.
4. Read the instruction sheet that came with the part in your hand. Where it disagrees with this book, the sheet wins: it's what the part was tested and listed to.

Where you stop, every time

- **The panel cover.** The small hinged door is fine for reading labels and resetting a breaker. The screwed-on cover behind it stays on. Parts in there stay live even with the main breaker off (Fix 99, Book 3, p. 52).
- **Silver wire.** Aluminum branch wiring needs its own repair methods and an electrician who knows them (Fix 31 (p. 75) to Fix 33, p. 79).
- **Brown, black, melted or crumbling.** Scorch marks, soft plastic or insulation that cracks when it moves mean heat has been there. Power off, leave it off, call.
- **More than two cables in the box** when you're swapping a device, or wiring that doesn't match your photo or the page. Close it up and call.
- **Anything you don't understand.** That's not a failure. That's the system working.

Permits, code editions and renters

The rules in these books come from the 2023 edition of the National Electrical Code. Not every state and town is on that edition: some are still on the 2020 or 2017, and local amendments add their own changes. Permit rules differ too. Some places let a homeowner work on a home he lives in with a permit, some don't. Check with your local building department before you start anything beyond a like-for-like swap. If you rent, the wiring belongs to the landlord: report it and let him fix it.

About Roy and these books

Roy Dalton is a narrator character created with AI for the Roy Dalton Electric channel. He isn't an electrician. These books collect what his videos teach, and every rule in them was checked against the 2023 National Electrical Code, the manufacturers' instruction sheets, and the U.S. Consumer Product Safety Commission, NFPA and the other agencies named in the text, as of October 2026. Where a video got something wrong, the book has the corrected version.

Prices for hired work are typical U.S. ranges from the cost guides named next to them, checked in 2026. Quotes run higher in big coastal metros and lower in much of the Midwest and South. A quote outside the range isn't proof of anything; it's a reason to ask what's different about your job.

A wire nut that's just sitting there

Two solid wires, a wire nut, a few turns until it feels snug: it's the most common splice in a house, and nobody told you there was more to it. If the wires only lie side by side under the nut, the light still comes on and a voltage pen still beeps, because neither one tests whether the joint can carry a real load. The fix is to keep turning until the copper twists together inside the nut, then prove it with a firm pull on each wire.

TIME	PARTS	WHO DOES THIS
about 5 minutes per splice, once the box is open	pennies per nut	Yours · breaker off, prove it dead

Redoing a wire-nut splice in a box is yours once the breaker is off and the circuit is proven dead. Silver wire, scorched or brittle insulation, or a stub too short for a pigtail ends your part.

YOU NEED wire nuts sized from the chart on the bag · wire stripper · diagonal cutters · voltage tester (Fix 79, Book 3, p. 9) · flashlight and screwdriver

STEP BY STEP

- 1 Breaker off, prove it dead.** Turn off the breaker for this circuit; the wall switch is not enough. Prove every wire in the box dead with the live, dead, live routine in Fix 79 (Book 3, p. 9). If any wire still reads live, stop and follow Fix 79 (Book 3, p. 9) to find the second source before you go on.
- 2 Open the box.** Take off the plate or fixture, photograph the box, and ease the splice out. Silver wire, or brown or melted plastic: stop and read the stop list.
- 3 Pull the nut, look.** Turn the nut counterclockwise and look at the bare wires. If they fall apart, the nut was the connection: that is the parallel lay, so go to step 4. If they hold a twist on their own, the copper is the connection: cap them with a new nut whose chart lists your wires (Fix 9, p. 27), turn it firm, and go to step 6.
- 4 Cut back, pick the nut.** Cut off the old bare ends and strip fresh copper to the length on the bag's chart. Count the wires, read the gauge printed on each, and use the nut the chart names for that exact mix (Fix 9, p. 27); colors differ by brand. A stranded wire in the mix: read Fix 8 (p. 25) first. A wire now too short: add a pigtail (Fix 5, p. 18).
- 5 Keep turning.** Hold the stripped wires side by side, tips even and insulation ends level. Push the nut on and turn it clockwise. The first resistance you feel is where most people stop. Keep going: the nut gets harder to turn as the wires twist together inside it. Stop when it is firm; don't crank it. Pre-twisting first is fine too (Fix 7, p. 23).
- 6 Pull each wire.** Hold the nut and pull each wire, one at a time: a firm pull, not a yank. Nothing should move. If a wire slides, take the nut off and start over; tape won't fix it (Fix 10, p. 29).

- 7 Check and close up.** The insulation should reach the skirt with no bare copper showing. If copper shows, cut the ends back and strip again to the chart's length. Fold the splice into the box, put the plate or fixture back, and switch the breaker on.

Done right when every wire holds when you pull it alone, no bare copper shows outside the skirt, and the nut feels firm and will not turn further without real effort.

STOP AND CALL IF

- Silver wire, or a cable marked aluminum: a wire nut is not a repair for aluminum. Close the box, leave the breaker off, and read Fix 31 (p. 75).
- Brown, black, blistered or melted plastic, or insulation that cracks when touched: that joint has been hot. Close the box, leave the breaker off, and call an electrician.
- A wire is too short to work with and there is no room for a pigtail: stop and call. Don't splice a stub.
- What you find points back at the panel, or a wire stays live with the breaker off: close the box and call. The panel's screwed-on cover stays on.

WHY IT WORKS

A twist-on is a listed splicing connector: its spring twists the wires together as you turn it, and the twisted copper is where current crosses from one wire to the other. Laid side by side and turned only to the first resistance, the wires merely touch, held by a plastic cap and a barely caught spring. Wires move, and a half-made joint is how copper gets hot. A voltage pen can't see that (Fix 80, Book 3, p. 11); a space heater or a hair dryer is where a loose splice gives itself away.

FROM MY HOUSE

I did it that way for years in my first house: two wires side by side and a nut spun on until it felt tight. Just about everybody starts there.

Tip. Practice once at the bench: cap two scraps of wire, pull the nut off and look. The wires should hold a twist on their own, and your hand now knows what firm feels like.

WHERE THE RULE COMES FROM Ideal wire-connector sheet 30-841 (the connector twists the wires together; choose it from the package chart); NEC 2023, 110.3(B); the pull test is shop practice, not in the sheet

► From the videos: "Avoid Disaster! 7 FATAL Wire Nut Mistakes Most DIYers Make (You've Done 3)" · "Wago vs Wire Nut: 6 Mistakes That Make Either One Fail"

Seam up or down: which way the barrel goes in

A crimp terminal can click shut, look perfect, and still slide off the wire with two fingers. On a lot of them the reason is a line along the metal barrel, thinner than a hair: the seam. Which way it faces the jaws of your tool decides whether the barrel closes around the copper or splits open.

TIME	PARTS	WHO DOES THIS
about a minute per terminal, plus a minute once to learn your kit	a few cents per terminal	Yours · breaker off, prove it dead

Doorbell and thermostat wiring runs on low voltage and is fair game for most homeowners. A terminal on a dryer cord, a range cord or anything on a full house circuit is yours only with the breaker off and the circuit proven dead; anything behind the panel cover is a licensed electrician's job.

YOU NEED crimp tool (bare-terminal jaws with a tooth, or a ratcheting crimper with dies for insulated terminals) · flashlight · wire stripper · side cutters, for opening a spare terminal · two spare terminals of the size you're using

STEP BY STEP

- 1 Power off first.** Turn off the breaker for whatever the wire feeds: the doorbell transformer, the furnace for a thermostat, or the dryer or range for an appliance lead. On a full house circuit, prove it dead with a tester before you touch a screw (Fix 79, Book 3, p. 9).
- 2 Match terminal and wire.** Pick the sleeve color for your wire: red for the smallest wire, blue for 16 and 14 gauge, yellow for 12 and 10. Makers differ on where red stops (some print 22 to 18, some 22 to 16), so read the gauge stamped on the tongue, and strip to the length printed on the terminal package (Fix 19 (p. 49) and Fix 21, p. 53).
- 3 Find the seam.** Hold a bare terminal up to the light and look along the barrel. A thin line running its length is an open seam: the barrel was rolled from a flat strip and the two edges only touch. A seam fused shut is brazed; the package may say so. On an insulated terminal, shine the flashlight straight into the end of the barrel to see the line from the inside.
- 4 Find the tooth.** On jaws for bare terminals, one side is a smooth, rounded cradle and the other has a tooth. Ratcheting dies for insulated terminals are shaped differently: use the die that matches the sleeve color, per the tool's sheet.
- 5 Set the barrel.** Open seam: seam down into the smooth cradle, so the tooth bites the solid metal opposite it. Brazed seam: makers disagree, even within one brand (one Panduit sheet puts the indenter on the seam, another puts the seam opposite it), so follow the sheet for your tool and terminals; with no sheet, seam opposite the tooth. Push the stripped wire in until the strand ends sit flush with the front of the barrel or a hair past it.

- 6 Squeeze all the way.** Close the tool fully; a ratcheting crimper won't release until the squeeze is finished. Don't squeeze twice in different spots.
- 7 Pull and look.** Hold the terminal in one hand and the wire in the other and pull firmly, about like pulling a stuck plug from the wall, not a yank (Fix 23, p.57). Then look at the barrel: closed evenly, no split along the line, insulation right up to the back, strand ends at the front.
- 8 Unsure? Test a spare.** If you can't tell which kind of seam you have, crimp a spare terminal each way, cut the plastic off both with the side cutters, and look at the barrels. A minute and two terminals, and you know your kit for good.

Done right when the barrel is closed tight and even all the way around with no split along the seam, the strand ends sit flush or a hair past the front, and the terminal doesn't move when you give it a firm pull, not a yank.

STOP AND CALL IF

- The barrel splits, gapes along the line or folds open: cut it off, strip fresh, and use a new terminal with the seam turned the other way. Never crimp the same barrel twice.
- The terminal block behind a dryer or range is brown or melted: leave the breaker off and call an electrician. That's heat damage, not a crimp problem.
- You can't tell an open seam from a brazed one and have no spare to test: don't guess. Use terminals whose package says brazed seam, and follow the sheet that came with them or with your crimper.
- The wire leads behind the panel cover: that's a licensed electrician's job, every time.

WHY IT WORKS

The tooth is a wedge. Aimed at solid metal, it pushes the barrel down into the strands and locks them together. Aimed at an open seam, it drives into the gap between two edges that were only touching and pries them apart, so the barrel opens instead of closing. A brazed seam is fused shut, so there's no open edge for the tooth to find, which is why some makers allow crimping right on it.

FROM MY HOUSE

In every bad crimp I've cut open in my own houses, the wire was fine. So I tried it on my own bench: same terminal, same wire, same tool, and I changed one thing. Seam up into the tooth, the barrel split and half of it folded down; seam down in the smooth cradle, the same tool made a crimp that was tight and even all the way around.

Tip. Keep a couple of spares of each color in the kit for the seam test, and once you know your terminals, write which way the seam goes on the lid.

WHERE THE RULE COMES FROM Panduit CT-1570 tool sheet (butted or brazed seam opposite the indenter); Panduit CT-200 sheet (indenter on the seam; at least 1/32 inch of conductor past the barrel); Thomas & Betts nest sheet for terminal colors. Makers differ, so the sheet for your tool wins

► From the video: "Why Most DIY Crimp Connections Fail – Up or Down?"

Twist-on, lever, push-in, crimp or solder: which one?

Pick by the softest wire in the joint and the place it lives. Whatever you pick, read the range on its package.

CONNECTOR	WHEN IT FITS	WIRE LIMITS	WHAT IT NEVER DOES
Wire nut (twist-on)	Copper splices in a box, in a dry spot. Solid wire, or stranded led a hair ahead of solid.	The chart on the bag, for your exact sizes and count. Colors are not a size code. Ideal's sheet: copper only, dry locations, 105 °C maximum.	Never on aluminum (Fix 31, Book1, p. 75). A nut that holds needs no tape (Fix 10, Book1, p. 29). A bag with no chart: don't use it (Fix 9, Book1, p. 27). Damp or wet spots: only one whose package says so (Fix 12, Book1, p. 33).
Lever nut , Wago 221	Solid, stranded and fine stranded copper in one joint: fixture leads, dimmers, mixed wire. Inside a box.	Read the range on your model. Common ones are 24 to 12 AWG; the larger 221-6 series is 20 to 10 AWG.	One wire per port. Never a lever left half-up: down and flat (Fix 14, Book1, p. 38). Never a look-alike with no maker's name or range (Fix 17, Book1, p. 44).
Push-in connector , Wago 2773 or Ideal In-Sure	Copper in a box, in a dry spot.	Wago 2773: solid 20 to 12 AWG, stranded 18 to 12, fine stranded not listed. In-Sure: solid 20 to 12; stranded 16 to 12 with 19 strands or fewer; 18 AWG only with 7 strands. Neither takes 10 AWG.	One wire per port. A wire that has come out gets a fresh cut and strip before it goes back; a stranded one goes into a new connector (Fix 18, Book1, p. 46). Not aluminum.
Crimp terminal or butt splice	Doorbell and thermostat wire, appliance and trailer leads, a terminal on the end of a lead.	Sleeve color to wire size, from the maker's sheet. The stamp on the terminal wins.	Never squeezed with pliers (Fix 20, Book1, p. 51). Never a splice in house cable inside a wall; that goes in a box you can reach (Fix 23, Book1, p. 57). Never a joint in a power cord (Fix 110, Book4, p. 20).
Solder	Only as an extra on a splice that already holds without it, covered with insulation as good as the wire's.	No size limit. The joint must hold before any solder goes on (NEC 110.14(B)).	Never the grip. Never melted into a stranded end to go under a screw, and never run up the wire behind a crimp (Fix 24, Book1, p. 59).

- Every splice goes in a box with a cover you can reach (Fix 40, Book1, p. 95). Lever and push-in connectors are for the joint inside the box. They don't replace it.
- A 10 AWG wire: only a connector whose own package says 10 (Fix 17, Book1, p. 44). Tape is insulation, not a connector (Fix 25, Book1, p. 61).
- Silver (aluminum) wire: none of these is a repair. Stop (Fix 31, Book1, p. 75).

Source: Ideal 30-841 and In-Sure sheets; Wago 221 and 2773 sheets; NEC 110.14(B). Read the sheet that came with your own connector.

Can it wait till morning?

Eleven things you might find tonight. Find yours and read across. Nothing here asks you to open anything. Breaker off means at the panel's small door, only if you know which one and the panel is quiet.

WHAT YOU FOUND	RIGHT NOW	CAN IT WAIT?	COSTS ABOUT
Smoke, flames or sparks	Everyone out. Call 911 from outside.	No. Now.	Not a price question yet. Later, a service call is about \$100–\$200 for the first hour.
A burning smell you can't trace , or a plate, plug or switch too hot to hold or buzzing	Stop using it. Breaker off. Unplug only if that means touching nothing hot.	No. Call now.	Outlet about \$100–\$250. Switch about \$85–\$200. More if the box is scorched.
A breaker or panel that buzzes , smells hot or shows brown plastic	Touch and reset nothing. Close the small door.	No. Call now.	Service call about \$100–\$200. Breaker about \$100–\$260. Panel swap about \$1,000–\$1,600 (100 A) or \$1,300–\$3,000 (200 A).
Brown or melted plastic at an outlet , darkened blades, nothing hot right now	Breaker off, nothing plugged in. Don't tighten the screw or take the plate off.	Till morning , if the breaker is off and the smell is gone. Call first thing.	Outlet about \$100–\$250. A scorched box can cost more.
A breaker that trips at once , trips with everything off, or won't stay on	Leave it off. Don't hold the handle or tape it.	Till morning , if it stays off and nothing smells or buzzes. Call in the morning.	Service call about \$100–\$200. New breaker about \$100–\$260 (1-pole \$100–\$180).
A smoke alarm that is missing, past ten years, or chirps with a fresh battery	Fresh battery tonight. A bedroom with no working alarm gets one tonight. Never take the battery out to stop it.	Tonight for a bedroom. Replace an old alarm this week.	Alarm about \$25–\$60. Hardwired swap, wiring in place, about \$90–\$200.
A GFCI that won't reset, or trips the moment you plug in	Unplug what's on it. Keep it away from water.	A day or two.	Part about \$12–\$40. Hired swap about \$120–\$250.
Silver-colored (aluminum) wire , or AL printed on a cable, no warm plates or smell	Leave it as it is. Tighten nothing. Keep heaters off those outlets.	Weeks , not years. Get two written quotes.	Whole-house connector repair about \$2,000–\$8,000 (one contractor). Price follows the connection count.
A three-prong outlet that reads open ground, or a two-slot outlet	Keep metal-cased appliances and surge strips off it. Skip the gray adapter.	Weeks.	GFCI swap, labeled, about \$90–\$200 per outlet. A true ground wire is a bigger job: get a quote.
An outlet that drops plugs , or a switch that feels loose	Use another outlet. Brown marks mean the row above.	This week or next.	Part about \$1–\$7 (outlet), \$1–\$20 (switch). Hired: outlet \$100–\$250, switch \$85–\$200.
A junction box with no cover , or a splice in the open	Keep things off it. Don't tape it or open it.	Weeks , if nothing is warm, brown or smells.	No cost guide prices this one. Get a written quote. A first hour is about \$100–\$200.

US national ranges from consumer cost guides: one visit, wiring you can reach, labor plus ordinary parts. Local quotes can sit outside them. A permit typically adds about \$50–\$350. When in doubt, call.

THE HOMEOWNER'S ELECTRICAL LIBRARY

That was 2 of 123 fixes.

Every fix in the four books is laid out like these: what you need, step by step, how you know it's done right, exactly when to stop, and where the rule comes from.

- **Book 1: Connections That Hold.** Stripping, splicing, crimping and boxing every wire the right way. 43 fixes.
- **Book 2: Outlets, Switches and Lights.** Replacing, testing and fixing the devices you touch every day. 35 fixes.
- **Book 3: Test Before You Touch.** Testers, meters, troubleshooting and the panel you leave closed. 26 fixes.
- **Book 4: Before You Call an Electrician.** Heaters, cords, generators, old houses, and what the work should cost. 19 fixes.
- Free with the set: **Roy's Bench Cards** for the workbench and **The House Walk**, a room-by-room checklist with the fair-price table.

All four books: \$27

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Roy Dalton is a narrator character created with AI for the Roy Dalton Electric channel. Every rule was checked against the 2023 National Electrical Code, manufacturer instruction sheets and the safety agencies named in the text, as of October 2026. Not a substitute for a licensed electrician or your local code. Handful of Life LLC, Winchester, Massachusetts.