



# TOOLBOX TALK

## Reverse Polarity: When the Wires Get Crossed

TOPIC NO.	DURATION	AUDIENCE
TBT 13	10 to 15 min	All Crew

**OSHA REFERENCE** 29 CFR 1910 Subpart S · 29 CFR 1926 Subpart K · Electrical Safety

PROJECT / JOBSITE	DATE	PRESENTED BY

### 01 THE HOOK

#### START HERE

*Look at any standard 2-prong plug. One blade is wider than the other. Look at the receptacle. One slot is wider than the other. That's not a manufacturing quirk. It's a safety feature you don't notice until it's missing. The wide and narrow blades make the plug "polarized" so it can only go in one way: hot to hot, neutral to neutral. When somebody crosses those wires (usually trying to repair something they shouldn't have touched), the tool runs like normal but it's now a trap. That's reverse polarity, and the next person to use that tool or fixture is the one who finds out.*

### 02 HOW POLARIZATION IS SUPPOSED TO WORK

Power flows in a loop. It enters the tool through the **hot wire**, goes through the on-off switch, through the motor or heating element or bulb, then leaves through the **neutral wire** and returns to ground. The polarized plug exists for one reason: to make sure those two wires connect to the right side of the receptacle every single time.

THE NARROW BLADE / SLOT	THE WIDE BLADE / SLOT
WIRED TO	WIRED TO
<b>HOT</b>	<b>NEUTRAL</b>
Power flows IN through this side, into your tool or fixture.	Power flows OUT through this side, back to the system and to ground.

Two prongs of different sizes. Two slots of different sizes. They only fit together one way. That's how the system *guarantees* the on-off switch sits between the source of power and the working parts of the tool. As long as the wires are correct, flipping the switch off cuts power before it reaches anything dangerous.

## 03 WHAT HAPPENS WHEN THE WIRES GET CROSSED

If the hot and neutral wires are switched (almost always during an unauthorized repair), the device usually runs like normal. That's the dangerous part. Nothing looks wrong. But the safety logic is broken: the on-off switch and the parts you can touch are now on the wrong side of the circuit. Two real-world failures show why this matters:

### CASE 01 PORTABLE GRINDER

*What happens when the switch is on the wrong side of the motor*

#### ✓ WIRED CORRECTLY

The switch sits between the hot wire and the motor. Switch off cuts power to the motor. Switch on lets current flow through the motor and the grinder spins. When you flip the switch, you control whether the load is energized.

#### ✗ WIRED IN REVERSE

The switch now sits on the neutral side, after the motor. The **motor stays connected to hot all the time**, even with the switch off. The grinder usually still runs and stops normally because flipping the switch still completes or breaks the loop. But if anything inside the tool faults to the housing, **the housing can become energized while the tool appears off**. You pick it up to put it away and you're the new path to ground.

### CASE 02 LAMP SOCKET

*What happens when the part you touch becomes the live part*

#### ✓ WIRED CORRECTLY

Only the small button at the bottom of the socket is hot. The threaded metal collar (the part you grip when changing a bulb) is connected to neutral. Even with the lamp switched on, you can change a bulb without getting shocked.

#### ✗ WIRED IN REVERSE

The whole **threaded collar is now energized** any time the switch is on. The next person to change a bulb wraps their hand around live metal. Even with the bulb in, brushing the collar with a finger or a wedding ring becomes a shock path.

## 04 WHY IT HAPPENS

### ⚠ IT'S ALMOST ALWAYS AN UNAUTHORIZED REPAIR

Reverse polarity rarely shows up out of nowhere. It happens because someone who isn't a qualified electrician opens up a switch, receptacle, fixture, or tool and swaps wires while putting it back together. The device works again, so they assume they got it right. Nobody knows it's wired backwards until somebody gets shocked. This is the entire reason OSHA reserves electrical work for qualified people.

## 05 WHAT YOU SHOULD DO

If you find a tool, fixture, receptacle, or piece of equipment that isn't working right, the answer is the same every time:

- Don't open it up. Don't "just have a look". Don't do a quick fix.

- Don't swap wires, splice anything, or jumper around a problem.
- Tag it out and pull it from service so nobody else uses it.
- Report it to your supervisor or safety rep so a qualified electrician can handle the repair.
- After any electrical repair, the work needs to be tested for correct polarity before the device goes back in service.

## 06 WHY IT MATTERS

[ JOBSITE ]	[ INDIVIDUAL ]	[ HOME ]
<p><b>FOR THE CREW</b></p> <p>A reverse-polarity device runs fine until it kills somebody. The whole crew benefits from a culture where the answer to "it's broken" is always "tag it out, get an electrician."</p>	<p><b>FOR YOU</b></p> <p>If a metal tool casing or fixture shocks you when it shouldn't, that's a polarity or grounding fault. Don't troubleshoot. Get away from it, kill the breaker feeding it, and get a qualified person to look at it.</p>	<p><b>FOR LIFE OFF-SITE</b></p> <p>Older houses, DIY rewires, and basement-finished receptacles are reverse polarity hotspots. A \$10 outlet tester from any hardware store will tell you within seconds. Worth checking.</p>

## 07 TODAY'S DRILL

### TODAY'S DRILL    THREE-PRONG AWARENESS CHECK

Look at the next plug you handle today. Find the wide blade and the narrow blade. Now think: if those got crossed somewhere upstream, would I know? The honest answer is no. Which is exactly why nobody on this crew opens up tools, fixtures, or receptacles. We tag, we report, we let the electrician test the polarity before it goes back in service.

## 08 CREW DISCUSSION

*Take 2 minutes. Pick one.*

1. Has anyone ever had a tool keep running after they flipped the switch off? What did you do?
2. How does our process work for tagging out a broken tool? Does everyone here know who picks it up from there?
3. Have you ever been tempted to fix something electrical yourself rather than wait? What changed your mind, or what should have?

