

Add Electrical Outlet Testing to Your Spring Cleaning Projects

How-To Test it Yourself

Problem:

Have you ever plugged a radio or lamp into the wall only to find it didn't work? Your natural reaction may be to assume the radio is broken, but it could also be a faulty outlet, a tripped circuit breaker, broken wiring or some other failure.

There are also times when you have wiring problems that aren't so readily apparent—problems that can cause damage to appliances and fixtures or create a fire risk.

So checking the health of your wiring is a good addition to your other spring cleaning projects to ensure your house is safe, and fortunately, it's easy to do.

Task summary:

This application note will lead you through the steps to safely test for power at a wall outlet then troubleshoot and fix the common causes if there isn't. To properly repair or replace an electrical outlet, first check the outlet

for power, then for proper grounding and polarity (making sure the wires are connected to the proper terminals). If the outlet checks out OK, the next step is to check the wiring. Note: These same basic procedures can be used to test ceiling fixtures and wall switches.

Recommended tools:

For this project you will need a basic digital multimeter (DMM), like the Amprobe DM-60, that measures a range of electrical parameters, including voltage, current, resistance, frequency and capacitance. The DM-60 also has a safety feature called "Volt Sense" that detects whether voltage is present or not without contacting the outlet. This application note assumes you already know how to use a DMM to make basic voltage and resistance measurements. If not, read your DMM owner's manual before you start this project.

Step by step troubleshooting:

1. Check the device:

Before you spend a lot of time troubleshooting the outlet, make sure the device you are plugging into the outlet is working. Try plugging the device into an outlet that you know is working. If it still doesn't work, the problem is most likely with the device. (See the Amprobe application note ["How to Troubleshoot Common Household Appliances"](#) for more information.)

2. Check for damage:

Inspect the outlet for signs of damage, such as burn marks, soot, melted plastic, or cracked or broken plastic. These are indications there may be a short inside the outlet or that the receptacle is broken. It is best to replace any outlet that shows visible signs of damage. Turn the power OFF at the breaker panel before attempting to replace an outlet.

3. Check for power:

To check an electrical outlet for power, first make sure the breaker is not tripped. (If the breaker is tripped, or trips again when you reset it, read ["How to Troubleshoot Circuit Breakers"](#) for more information.) If the outlet is controlled by a wall switch, make sure the switch is in the ON position.

Set the DMM to the AC voltage function, 200-volt range (ranges may vary on different meters; check your meter manual if you are unsure of settings) and connect the test leads to the COM and V inputs. Insert the probes, one at a time, into the long and short slots of the outlet. Make sure the probes make contact with the metal conductors inside the outlet slots. Check both the top and bottom receptacle. With some outlets, the top and bottom receptacles are wired separately from each other—one may work while the other does not.

The voltage on an electrical outlet is usually 100 V to 120 V. If the circuit is disconnected or turned off at the electrical panel or wall switch then the voltage should be less than 1 volt.

4. Testing for grounding and polarity on a 3-slot outlet:

A 3-slot outlet has a "hot" slot, a neutral slot and a grounding slot (see figure 1). The short slot should be the hot, the long slot should be the neutral and the U-shaped slot should be the ground. Incorrect wiring on an electrical out-

let not only leads to problems with electronic equipment and appliances, it can also present a safety hazard.

With the meter set to the 200-volt AC range, place one probe in the U-shaped slot and the other in the long slot. The meter should read less than 1 volt. Move the probe from the long slot to the short one (see figure 2). The meter should now show about 120 volts. If your readings are the opposite, the hot and neutral wires are reversed. Turn OFF the power at the panel and re-wire the outlet.

5. Testing for grounding and polarity on a 2-slot outlet:

While most homes are equipped with 3-slot electrical outlets, some older homes still have 2-slot outlets. In these homes the outlet box should be grounded. In order to test for grounding and polarity you'll have to make sure that there is no paint on the cover plate screw (if the screw has paint on it, temporarily replace it with an unpainted screw to conduct this test).

With the meter set to the 200-volt AC range, place one probe in the long slot. Hold the other probe on the screw head. You should read less than 1 volt. Move the probe from the long slot to the short one. You should now read about 120 volts on the meter (see figure 3). If your readings are the opposite, the hot and neutral wires are reversed. Turn OFF the power at the panel and re-wire the outlet.

6. Check the wiring:

If your readings so far still show no voltage, it is safe to assume the outlet is damaged and should be replaced. Turn OFF the power at the panel before replacing the outlet. However, if you still do not get a reading after replacing the outlet, it could point to a more complex problem.

7. Where to go from here:

Hopefully by now you have found and fixed the problem. However, if you still do not measure any voltage, the problem is likely either in the wiring or the circuit breaker. You should contact a licensed electrician to troubleshoot and repair the wiring. You can also read **"How to Troubleshoot Circuit Breakers"** for information on things you can do to check the circuit breaker.

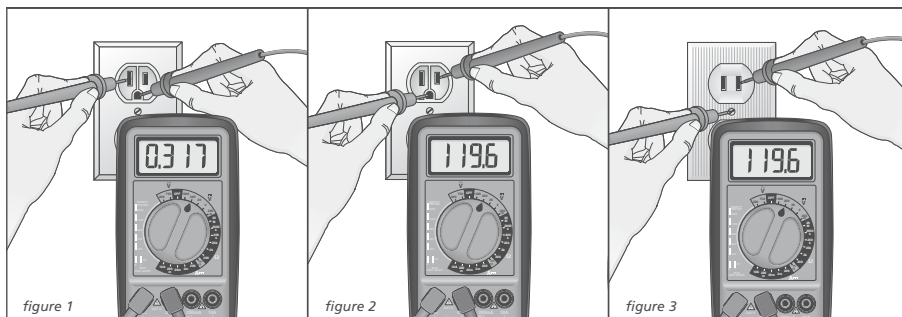
Amprobe

The AM-60 Digital Multimeter, which is available exclusively at **Lowe's**, is one of the many tools built by Amprobe to give professionals and do-it-yourselfers more quality for their hard-earned dollar. Since 1948, Amprobe has designed test tools that are built tough and priced right. No other tools deliver more quality for the money than Amprobe.

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For more information, visit www.amprobe.com.

How to safely test electrical outlets



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Work Safely!

- Electricity can be dangerous. Protect yourself and your home by remembering to follow a few simple rules when working with electrical circuits:
 - Always turn the power off at the electrical panel before handling wires or terminals. Don't assume that you know which wire is hot. Use your meter to verify the power is off before handling any wires or terminals.
 - Make sure your meter is working with a 3-point check: Measure a known live circuit, next measure the circuit you're working on and finally re-check the known live circuit.
- Use caution when measuring live circuits. Don't stand in water. Use one hand to probe whenever possible, and don't wear metal jewelry.
- Only use a meter that has the proper voltage ranges for the job at hand and make sure the meter has the proper safety ratings and protection.

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