HOMEOWNER REPAIR GUIDE

THREE-WAY SWITCHES

It would be mighty inconvenient to have to cross a darkened room in order to turn on the wall switch at the opposite entrance. There is also the likelihood that you would walk into or trip over something and sustain an injury. Three-way switches allow you to control lights from two locations – from two doorways to a room, from the top and bottom of a stair, from house and garage, etc.

Despite the name, three-way switches are actually two-position switches. Each switch has three terminal screws: two terminals of the same color (silver or brass), and one terminal colored bronze or black. The black terminal screw is called the **"common" terminal**, and the other two terminals are called the **"travelers."** You will note that there is no ON-OFF marking on the toggle, nor indication of top or bottom on the switches.

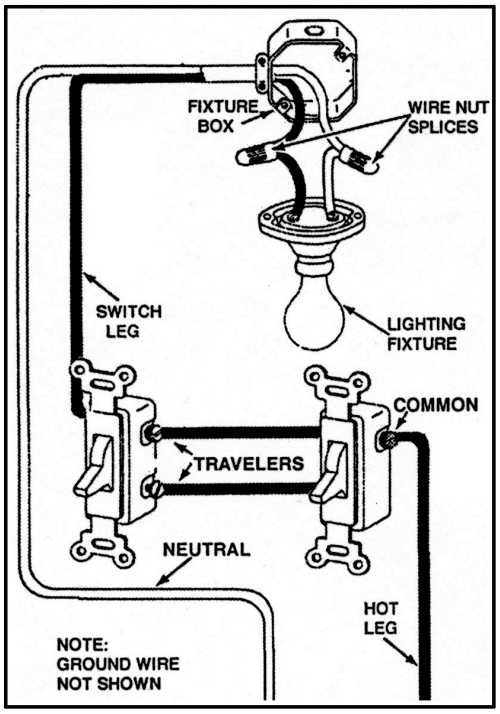


Illustration 1: Three-way switch wiring (ground wire not shown)

HOW THEY WORK

The hot (black) wire is connected to the common terminal on the first switch in the sequence. The continuation of the hot wire that runs to the light fixture is attached to the common terminal of the second switch. Two wires pass between the switches and connect to the traveler terminals *(see Illustration 1)*. Changing the position of the toggle connects the common terminal to one or the other of the traveler terminals. It is the position of the connection in one switch in relation to the connection in the other switch that determines whether the fixture is on or not *(see the schematic in Illustration 2)*.

TROUBLESHOOTING

Although it's possible that a problem with a three-way switch system is due to the switch having been installed incorrectly in the first place, a more common cause is a bad contact in one of the switches. As the switch is used, these contacts become pitted, dirty and corroded. So, it's a good idea to change both switches at the same time.

SHOPPING LIST

While you are at the supply store purchasing the new switches, be sure to buy a neon tester if you do not own one already, plus a small roll of blue plastic tape.

One big problem with most of the old switches is that the common terminal was not marked or indicated. In these switches, you will have to test the wiring to find which wires are hot and which are the travelers. Old knob-and-tube

wiring is often all black, giving no visual clue as to which wire is hot. (The neutral wire usually isn't in the switch box.)

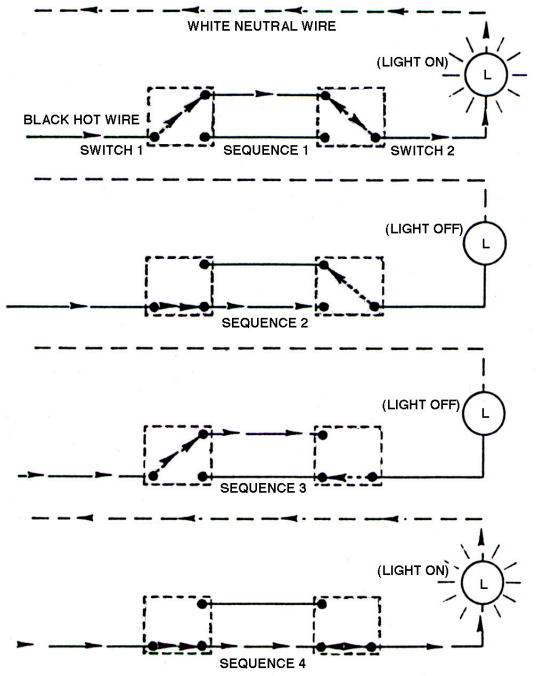


Illustration 2: Three-way switch schematic — whether the light is on or off depends on how the two switches' contacts line up

TESTING SEQUENCE

1. Turn off the power to the circuit, disconnect the switches from the wires, and take the light bulbs out of the fixture (to minimize the chance of a "false positive" reading). Pull the wires out of the switch wallboxes, making sure that they do not touch the box or contact the other wires.
2. Hold the neon tester in your hand as shown in Illustration 3, with one probe contacting your skin. (Do not use any other type of tester than a neon one.)
3. Turn on the power, and touch the other probe against each wire until you get a dim glow on the tester. The glow indicates the hot wire, so you've found the first switch in the sequence. (Note that it may not be the switch that is physically closest to the service panel.) Use your blue tape to tag the other two wires in the box, to indicate that they are the travelers.
4. Shut off the power at the service panel; connect the hot wire to the common terminal of your replacement switch, and the blue-tagged wires to the traveler terminals.
5. Turn on the power, and go to the second switch box. Test each wire until your tester glows, and tag that wire with blue tape, again indicating a traveler.
6. Change the first switch toggle position, and then test the remaining wires in the second box until you get a glow (positive test); tag this wire blue, as well.

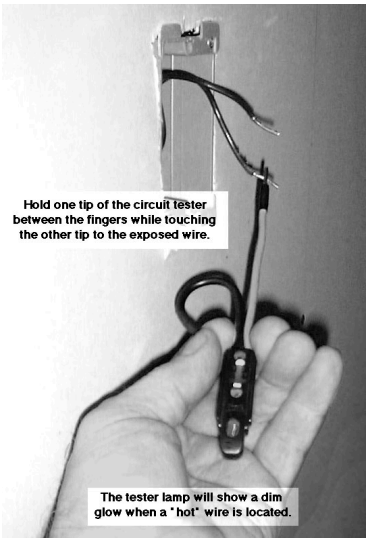


Illustration 3: Hold one tip of the circuit tester between the fingers while touching the other tip to the exposed wire. The tester lamp will show a dim glow when a "hot" wire is located.

7. Shut off the power, connect the blue-tagged wires to the traveler terminals of your second replacement switch, and the remaining wire to the common terminal.

TIP

Tagging the traveler wires will make it easier for you or someone else to locate them at a later date. Use better grade switches for a longer-lasting repair. You'll enjoy the convenience of walking into a lighted room for years to come.

Home Repair Resource Center empowers homeowners to maintain their homes for sustainable and diverse communities.

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