

Can I have three light switches controlling one light?

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Chris from Toronto, Ontario writes: "In my new house, the light for the hallway has a switch at the bottom of the stairs and again at the top. The stairs are located at the front of the house and the bedroom is at the back. When we go to bed we have to turn on our bedroom light and then walk back to the hall switch to turn it off, or walk the 17 feet from the hall switch to the bedroom in the dark. How can I add a switch to the 3-way set-up already there?"

Probably the easiest solution to this problem is not dealing with the switches at all, but simply installing a motion sensor light at the other end of the hallway so that there would be light in the hallway whenever anyone walks down the hallway from either end.

However, wiring three switches to control one light is possible. First let's take a look at the back of several different light switches. A simple ordinary on-off light switch as in the first photo has two screws on it. The electrical line passes through and flipping the switch either connects or disconnects the flow of current.

A "three way switch" is not really three ways at all, but it does have three screws on the back side. One of the screws is the "common" and when you flip the switch, it either connects this wire to one or the other of the two remaining screws. So the electrical path is always through the switch, it just changes it from one line to the other.

A "four way switch", like a three way switch does not have four choices but only two. It does have four screws however. Here there are always two electrical paths through this switch. But as you can see in the schematic, flipping the switch changes tracks, or switches the two input wires to the two opposite output wires.

THE WIRING

If you look at the schematic, and imagine the three switches in any given position, the light will either be on or off. Change any one of the switches, and the light moves to the opposite condition. This is pretty easy to understand in a schematic, but be careful to keep the wires straight in your mind when working with real wires. It doesn't matter where in the house you put any one of these switches, but you must respect the circuit diagram. One working tip is to print out this circuit diagram. Put numbers on every switch screw. Then as you figure out the real wiring, put those numbers on the proper wires. It will all make much more sense and you won't end up crossing some wires.

Lutron makes a really useful "Wiring Wizard" to walk you through light switch wiring.

MORE SWITCHES

You can extend the logic of this wiring with any number of 4-way switches in-between two 3-way switches -- flip any switch and it changes the electrical flow from ON to OFF or the opposite. The 3-way switches are needed on the ends of the string because they each have just one wire out to the light. Think of the wiring as a rat maze -- if you follow the labyrinth from the circuit breaker -- through all the switches -- to the light -- there will either be a complete path, or a dead-end someplace -- ON / OFF.

DIMMER SWITCHES

Dimmer switches get complicated. One dimmer and one on/off switch in a 3-wire system works. Even with more switches as mentioned above it will work with one of the 3-wire switches being a dimmer - that one dimmer sets the intensity of the electrical flow for the whole circuit and the rest of the switches just determine if it is ON or OFF. But when you want two, or three dimmers -- they can

interferer with each other, we are no longer just switching ON or OFF. Add the complexity of dimming LED lights and you now need speciality switches. For dimmer details check out this article.

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