



Westinghouse 3 speed fan switch wiring diagram

Dan has been a licensed drive-level electrician for about 17 years. He has extensive experience in most areas of electrical trade. The 3-way switch is really two switches that both control one light. This illustration makes it look easy, but this article explains the intricacies of engaging a 3-way switch. Plugging a 3-Way SwitchWiring 3-way light switch is not a difficult task... There are only three joints to be made, after all. Making them in the right place is a little harder, but still within the capabilities of most homeowners if someone shows them how to do it. This is where understanding the wiring diagram can help. First, what is a three-way switch? If you want to be able to control the light from two different places (for example, you want to be able to turn on the staircase lights from top to bottom), this is what electricians call a threesome switch. Is it hard to connect a 3-way switch? Replacing the switch isn't difficult at all: Simply watch you unplug the old one and then put the wires back on the new light switch in the same position. Problems can occur when you add another switch, or if you forget which wire went where. This is when you need to understand a little more about how the 3-way switch works and how to read the wiring diagram. What do I need to know before I start? If you know what is the purpose of each wire, the task will be much easier. This article will explain everything you will need to know to make a 3-way wire switch, with wiring diagrams and common wiring methods explained. What about 4-way switches? Learn how to wire a 4-way Switch for instructions and wiring diagrams to connect four-way switches. As a wire three-way switch is not all 3-way switches are the same. To look at the diagrams below, select the configuration you want to track. If you're starting from scratch, the diagram might #3 best place to run, but these methods can be confused with old work. They just suggest different ways to run the necessary cables. The #1 works when several luminaires share one common breaker, and the switches are both on the same wall. Diagram #2 works best when power is available in the ceiling, but the switch boxes are on opposite walls – the cable is often easier to run into the ceiling light box instead of between switches. Diagram #3 works best for cases with multiple switches in the same field, as other switches then have power available and can operate other lights without having to have a separate power in a row running on them. The #4 can be useful when the light is near the first switch. This results in a lot of wires, so installing a larger box may be necessary. Turn off the power on the power panel before starting work. Make sure you understand which screw terminals and which wires serve the purpose. Below you will find descriptions that will guide you. Have a lot of 14-3 type NM cable on the side that has three insulated wires-white, black and red-plus bare copper grounding wire. If you connect to a 12-gauge wire or the circuit breaker is 20 amplifier, instead you use 12-3. Most home light circuits are 15 amp, which requires only 14 gauge wire. According to the diagram, connect the wires (see instructions below) to the new three-way switch. All white wires used as passengers between 3-way switches should have their ends wrapped with black electrical tape or in a plastic wire nut. How the three-way switch works: Identification of terminal blocksOn the sides of the switch there are three screw clamps and one at the end. Each switch has the same three terminals, but older switches may miss the fourth grounded terminal. The small, green screw clamp at the end is a grounded terminal. It is usually painted green, although the image does not show that color well. It can often be recognized as a screw that is part of the metal frame of the switch and is not isolated from other metal parts. Green or non-insulated grounded wire always goes to this ground terminal. Older switches often did not have this grounded terminal block, but they are no longer legal to use. Now all light switches must have a grounded terminal block to which the grounded conductor must be attached. One of the three other terminals is a different color, usually darker, and is called a common terminal. Mechanically and electrically, this common terminal is internally connected to one of two other brass screws called passenger terminals. When the switch is flipped in a different way, this connection is broken, and the common terminal is then connected internally to the other path terminal. The common terminal is always internally connected to one (but only one) passenger terminal. Which one depends on whether the switch is up or down. It should be noted that passenger terminals are essentially interchangeable. Since each of them has to have a travel wire attached to it, and there are two travel wires and terminals, it does not matter which traveler wire goes to which terminal travelers. The identification of ground, common and travel terminals in the 3-way SwitchFlime Terminal is on top in this view, with the traveler at the lower end. The grounded terminal screw turns out to be a silver color at the very bottom. Wilderness Old Switch. This switch does not have a grounded clamp/screw and is no longer legal to use. Make sure the switch has a grounded terminal. Wilderness Which screw is the ground? Identification of screw terminals according to colorWhat is a green terminal bolt? The small, green screw clamp at the bottom is a grounded terminal. All new switches must have ground, but some older ones don't. What is a darker screw terminal? One of the three screw terminals will be different colors, usually darker. This is a common terminal. What are the brass screws? Two brass screw terminals are travel terminals. Identification of wires by colorWhat is green wire? Green or non-insulated (copper) grounded wire always goes into the grounded terminal. What is white wire? The white wire is neutral. Connect all neutrals together with a wire nut or twisted plastic wire connector. What is black wire? The black wire is always hot until the entire circuit is turned off on the circuit breaker panel. Note on wire color: The national electrical code requires that each neutral wire be colored white, and that the ground wires are colored green. Only neutral wires can have a white color, but the code makes an exception for white wires in the cable that are not used to neutral. These wires should be colored to black using a magic mark or other method. Many electricians will do this, but many will not make it difficult and in the future it may make it difficult to solve problems and may pose a security risk to anyone working on the system. I recommend you take a few seconds needed to color these non-neutral wires. The colors shown in these wiring diagrams are common only for color use. Not all electricians use the same color code (except for neutral and reasons), so the wires can be different colors. Identifying all parts of 3-Way Light Switch Traveler Terms and Common have already been explained, but there are other terms that will be used in this article that also need some explanation. Cable. The term cable refers to a combination of two or more wires, tied together, usually in the post office insulating material. Each wire is insulated separately, with the possible exception of grounded wire. Grounded wire can be insulated in green color or left naked (copper), without insulation. Take the power supply. The power cord is the cable that eventually ends up in the breaker panel or fuse box. It is a cable that provides power to the lighting system. Neutral. This is the white wire contained in the power cord. It does not stop or connect to any switch, although it may be present in the switch and ended with a wire nut connecting it to another neutral wire. Earth. Grounded wire in any switch or luminaire. This is either colored green or left bare insulation (copper). Hot wire. This is the second black wire contained in the power cord. It is hot all the time if the entire circuit is turned off on the circuit breaker panel. Panel breaker. Commonly called a fuse box, it can contain either breakers or fuses. This panel controls all the energy in the building and there can be this power turned off. Two rope is the marking of a cable that has two separate wires, plus a grounding wire. These wires will be white and black, with green or bare (copper) ground. Three ropes. Three rope is a cable with three wires, plus ground. Normal colors are white, black and red with additional green or bare (copper) landscapes. Understanding the wiring diagram Each diagram will show two 3-way switches (but not the wall box that they are contained in), the different cables and wires used in the configuration being discussed, and the light box and luminaires. How is electricity flowing through the switch? To understand the wiring diagram, you need to know that the electric current enters the system on a black wire in the power cord, passes through the switches, through the luminaire, and returns to the white wire in the cable. If the circuit is broken anywhere (the switch is turned in the wrong direction, the wire is broken or the bulb is broken), the current will not flow and the bulb will not be lit. For discussion purposes, each 3-pass switch shall be considered as having a common terminal connected to the right passenger terminal when in the up position and connected to the left terminal when in the down position. This isn't necessarily true, however, it's simply useful for discussion purposes. Read the descriptions carefully and compare them with diagrams. Each diagrams. Each diagram will have a description of how the current travels to make light lamps. Voltage testerContact voltage is an invaluable tool for working on electrical circuits. Both Fluke and Klein make professional-guality testers, and cheaper ones are commonly available as well. As a professional electrician for about 20 years, there is always one in your pocket, and anyone who works around electricity should carry one as well. Turn off the power before starting work! Installation of the light switchOn the correct positioning of each wire is determined by the wiring diagrams below, the switch is connected to the correct wires and installed in the light switch box. Before connecting, make sure the power is turned off! Older switches vs. newer: Many residential light switches have a small hole in the back of the switch that the wires can be pushed into, and all switches have screws on the side. The image of the older switch above has both insertion holes and screws; the second is an expensive switch, which has holes for inserting wire, but the screws must also be tightened. Many switches have only screws, no holes. There is a belt gage on the back of the switch; shows how much insulation should be cut off if the push-in connection method is to be used. If the screws are to be used, a little more insulation needs to be removed. How to connect the wires to the screw terminals: If the screws are to be used for connection, bend the end of the stripped wire into the semicint with needle and nose pliers and wrap the wire around clockwise. Tighten each screw firmly. Fold the wires neatly back into the wall cabinet and push the switch into the box. Normally the ground bolt drops towards the floor, but can be inserted into the upward position with 3-way and 4-way switches. 3 Way Wiring Diagram #13-way switch wiring diagram with power-in cable entering the light box. Wiring diagram #1, Power In the light boxIn this example, the power cord is entered into the light field. This method of running the wire is common when several luminaires share one common breaker, and the switches are both on the same wall. Cables need to be edging into the light box, between two switches, and from the light box only one of the switches. Allows you to watch the current as the lamp shines in the luminaire: The current enters the light box on the black wire, as it always does. This wire is connected to a white wire in a two-rope cable that goes into the first switch box (not the switch), where it is connected to a white wire in three cables and continues on the second switch, at the common terminal. If the switch is up, it will leave the switch on the right side of the travel terminal and continue on the red wire back to the fare terminal on the first switch. If this switch is also up, it will exit from this switch from the common terminal on the black wire in two cables from the light switch. Continuing down that black wire, electricity enters the light box where it goes into the luminaire. The current passes through the light, rises on a white, neutral wire and returns to the power cord. Note on the color of the wires: In this example, the only neutral wires are the white wire in the power-in cable (which is always white wire) and one of the two wires connected to the light (also always white). All other white wires should be colored.3-Way Wiring Diagram #23-way switch wiring: Power supply in a light box with 3 cable cables on each switch box. Wiring diagram #2, Power supply in the light boxIn this 3-way switch wiring diagram, the power-in line enters the light box, but 3 cable cables are then installed between the light box and each switch box. This method can be used when power is available in the ceiling, but the switch boxes are on opposite walls – the cable is often easier to launch into the ceiling light box instead of between switches. If the current is being tracked... It comes into the light box on the black wire then flows into the common terminal on one switch using the (colored) white wire leaves the switch from the passenger terminal then returns to the light box where it is only plugged into another wire that goes into the fare terminal on the other switch it goes through this switch, again leaving from the common terminal, and again enters the light box where it goes to light itself. Neutral goes from the power cord directly to the light 3-way Wiring Diagram #33-way wiring diagram with power input switch #1. Wiring Diagram #3This time electrician brought energy to the first switch, via the second switch, and to the luminaire. This is a reasonable method for cases with multiple switches in the same field as other switches then have power available and can operate other lights without having to have a separate power in a row

running towards them. The main difference is that the neutral of the power-in wiring needs to be taken to the luminaire over 3 rope. White wire must be used here, as the code requires that all neutral wires are white. After the current... enters the first switch box on a black wire and is connected to a common terminal. If the switch is in the down position, the switch on the red wire leaves and enters the second switch is also down, it exits that switch to black, common, wire and continues to light. After passing the luminaire, the current returns to the second switch box on the white wire, is plugged into another white wire in the 3 rope used between the switching boxes, and continues to the first switch box, where it is plugged into the white force in the wire and back into the fuse box. The circuit is complete and the indicator light lights up. 3-way Wiring Diagram #43-way wiring: Power-in enters the switch #1 with the cable into the light box. For example, #4This, the wiring diagram shows the power cord entering the first switch together with the cable into the luminaire. This can result in a lot of wires in this box, but can be useful when the light is near the first switch box. A larger box may need to contain all the wires. After the current... turn on the black wire cabinet at the common terminal. If the switch is up, it leaves the box on the red wire of the travel device and switches to the passenger terminal on the second switch. If this switch is also up, it leaves the switch on the common terminal on a white (colored) wire and returns to the first switch box, where it is plugged into the black wire in 2 rope to go to light. By passing through the lamp, it returns to the white (neutral) wire in the first switch box, where it is connected to a white (neutral) wire that returns to the fuse box. The circuit is complete and the lamp lights up. Commonality In All Wiring DiagramsCommon to all of these wiring diagrams is that the neutral, white wire from the lamp connects directly to the white, neutral wire from the power-in cable without ever terminating on a switch. It may or may not be plugged into another white wire in the box, but it never ends on the switch – only on the lights. Black power-in wire always goes into common on the switch, often changing colors through the need for connecting to different cables. Regardless of color, one switch will have a common terminal on the second switch always goes directly (although possibly connected again) to the lamp. It doesn't end on the second switch. There are two travel wires; always go directly from one switch to another. Even the travel terminal, although it can connect with another cable somewhere. Neutral wires are always white and white wires, which are not attached to the white force in the wire, should have a different color. Grounded wires are always green or bare insulation (copper). Each switch, like a lamp, must have a grounded wire terminated to it. The only exceptions are older houses that do not have ground wires in boxes: if the driver is grounded in the box, it must be finished on the switch and light. Final note on building regulations: Recent code changes require that each switch box has a neutral wire in it. This means not only white wire, but white wire, which is connected to the white wire to power the cable. This rule is intended to provide future capability for the use of a dimmer or other device that may need neutral wire and stop homeowners disconnecting or using grounded wire for other purposes. New work (for example, adding a new three-way switch) will need to comply with this code. Which method or diagram is best to follow? The only wiring diagram mentioned here that is legal to use is #3, although #1 it could be modified by adding a 2-wire cable from the bottom box to the light. Any neutrals in the switch that are not used are either plaited or, in the case of a single neutral, simply closed with a wire nut and tucked back into the box. Do I need to replace all electrical installations that do not meet the current code? Simply replacing the switch does not mean that the room must be re-wired, because the existing wiring is grandfather in and is acceptable. Old work does not need to be re-done to comply with the code, and that is why unacceptable (according to the current code) wiring diagrams are described here in this article. Other articles and links that could help youIn general, switches are not difficult to replace or install, and most homeowners are guite able to do this. For more help and guidance, read installing or replacing the light switch. If you are adding a new luminaire to work with new 3-way switches and want some help, read Installing and Plugging Luminaires. Regardless of whether you are replacing the switch or installing new switches in the main conversion, probably the most useful tool on your own is a contactless voltage detector. Make sure that whenever you do any kind of electrical work you first test with a good voltage detector. This article is accurate and true to the best of the author's knowledge. The content is for or for entertainment purposes only and does not replace personal advisors or expert advice on commercial, financial, legal or technical matters. Questions & amp; AnswersQuestion: Can the dimmer switch be installed in the three-way switch? A: Yes, but a 3-way dimmer must be used. Most dimmer switches won't work. Q: Is there a three-way switch with three lights in circumference? A: If you want to add more fixtures simply use the same wires to existing accessories and extend them further than many other luminaires you want. Simply connect the new wire to the wire to go into the existing light. They'll all come and go at the same time. Q. On a three-way switch, can it just be grounded in a box, or do you need to go to the box and then to the switch? Can it go into a box? My house is only plugged into a box, but I was told it should also go to the switch. A: The current electrical code requires grounding of all switches. It's easy enough to add a short braid from the box to the switch, if the box is metal and already grounded. Q: My three-way switch is over fifty years old. There is a white wire on one side of the box (at the bottom), and a red wire on the same side (top). On the other side is a black wire (above). The new three-way switch has a green screw at the bottom on one side and a black screw on the other at the bottom, with two gold screws at the top. Can I connect the wires to a new box in the same place as the old one, regardless of color? A: Yes, but you didn't mention the green screw) for the old switch. It is very doubtful that he has one. If not, the new switch should get the grounded wire on the green screw, which will mean finding the source for the grounded wire and starting it to the switch. The electrical code requires that each switch now has grounded wire, although the reasons have not been used for many years. Other than that, connect the wires in the same way. The worst case scenario is that the switch won't work properly, then you'll swap a few wires and try again until it works properly. It's always fun trying to decipher what an electrician or homeowner did fifty years ago! Q. I have a setting that looks like a 3 Way Diagram #1, based on the configuration of two switches (I haven't located the lightbox yet), but when I separated both switches from the wires, all the travel lines went hot. The white wire power-in cable stayed hot as well. How can this happen? Is it possible that this is actually a 4 way, and I just failed to identify the next switch? A: As the travel wires go from one passenger terminal to one switch to the travel terminal on the other switch, it is not possible to remove both ends from the switches and the wire is hot. It is not connected to anything at all, and be hot. What tester do you use to determine if the wire is hot? The contactless testers referred to in the article may be sensitive enough to pick up static electricity transmitted from one wire is dead, and I've never had one put a fake negative (showing dead wire), but the price is that sometimes they can turn hot when the wire isn't. If the wires are hot when disconnected, then there's another power source that you haven't yet identified, and the wires go somewhere you're not aware of. It's doubtful that this is a 4-way switch - you have four terminals on them (plus the country), and they're all passengers. No power line should ever end up on a 4-state switch. Q: Can I be directed to a 3-way switch configuration diagram? A: There is a link at the beginning of the article about 3-way switches. Here it is again: If I understand it correctly, one - and only one - of the wires of travelers is always hot. If true, could one put a drawer in the middle of each travel wire with the result of one drawer or another - but not both - being 'ON'? Answer: You could do this, but only one switch - the one with the power from the fuse box - will operate. You could even set it so that the top or bottom of one socket, but not both, is on, depending on how the switch is flipped. You will need to ensure that there is a neutral wire to run with others and are available in each socket. Q. I have a scenario in the picture in Diagram 1 of this article and I've gone through my wiring countless times and it still doesn't work. I'd love to get it right, but it doesn't work. How do I further diagnose my connection problem? Answer: Is the breaker on and bulb good? Is the makeup in the lightbox correct? If you put the incoming black wire in the light bulb, will it light up? If all the good ones, the best guess is that either black or white of the lightbox is not connected to the common terminal, but one of the travel terminals. It's always possible that one of the switches is also bad - even brand new switches can be faulty. If you have a voltmeter, preferably a contactless tester, you can deal with it as well. Using wire paint in the diagram, the white wire on the switch should be hot, changing when the switch overturns. If everything works, and passengers on the second switch go hot or cold as the first switch is flipped, the black wire on the second switch should be hot or not because this switch is flipped. Checking these would tell you where the problem is, O: Can I use a 3-way switch with only two wires? A: No. There must be three conductors between the two drivers. You can only use the switch with two wires, but it will function as a regular switch, not a three-way switch. Q: I want to switch to a rocking switch. I have 2 black wires and one red wire - where should they go? Answer: If you only replace a regular light switch with one of the decora style (a square switch that only rocks up and down), then the wires go to the same place that made the wall switch. Q: How do I take off some insulation from the wire? Answer: Preferably with wire stripping tool. If one is not available knife can also be used sharp cooking knife. Cut around the insulation, it is very careful not to touch the copper wire, and then strip the line down on one side. Wire cutters can also be used by rotating around the top end of the cut and then using them to push off the insulation you want to remove. Again, it is necessary to provide considerable attention. so that you do not damage the wire inside. Either way, if the wire is scratched, it must be cut off and the process started over. 2010 By Dan Harmon (author) of Boise, Idaho on August 30, 2019: You are welcome, Marius. And thanks for the comment – it's always nice to hear I was helping someone. Marius Tudor, August 30, 2019: Mr Dan thank you for taking the time to be on this blog and for the thorough answers and diagrams you are presenting. It helped me think deeper into what was going on at one of the posts. The answers are always ahead of us.... sometimes we just need quidance. This is where I will definitely check regularly in the future. Dan Harmon (author) of Boise, Idaho, May 12, 2019: @Pierre:Use one of the diagrams above to easily start wires with each other. Black to black, white to white and ground to the ground for as many lights as you'd like. Dan Harmon (author) of Boise, Idaho, January 21, 2019:@George: You have one four-way switches with three wires each on the circuit. If more than 2 switches are needed, it requires 2 three-way switches and all others are 4-way switches. Instructions on how to wire 4-way switches can be found at: January 21, 2019: I have 3-way light switches one switch has 4 wires attached to the four screws on the switch.,, the other has 3 wires to connect. Why Dan Harmon (author) of Boise. Idaho on December 05, 2018:@Bill:You can't do this using just 2 cable drivers (12-2) if you run two rather than one cable. As shown in the diagrams and as described, you must have 3 wires between the switches, and that is, 12-3. Bill on December 5, 2018: I wanted to put 2 3way switch es in my garage using 12 2 wire i only have to run the wire between twosimon switches on September 14, 2017: I like this site, it was very informative marshall on 04, 2017: Thank you Dan for your reply again. This is a cheap metal ceiling mounted one bulb type of preparation, which is closed with a round globe. Now it has an LED light in it and I'm not using the light until it's fixed. The switch is disconnected. Today I left a message for the electrician to call me that a friend recommended. I expect to be called back on Monday. The reason I left all my DIY work is I'm hoping the electrician will alert our homeowners board if they agree that the building was illegally wrong (with no grounds for switches and accessories) when built. In 1977, all new buildings were to have grounded all electrical accessories, sockets and switches. I therefore believe that this entire apartment complex was built on the cheap (for other reasons as well). What I want is for homeowners associations to send letters to other apartment owners that they should have all their units electrically inspected and grounded (if necessary). I don't believe the homeowners association will act if they don't receive a letter from an electrician with the company's head on it. Frankly, I doubt whether they will act anyway, even if they have received such a letter. It made me wonder if I should go to town about it if necessary. Am I doing great doing nothing? The way I see it, there are almost 400 apartments and housing units in our complex that have non-earth lights and light switches. You could get electrocuted when he or she changes the bulb or touches the metal screws on the cover of the light switch, if the accessory or switch had a short in it. Dan Harmon (author) of Boise, Idaho on August 04, 2017: Probably not. I do not know what kind of preparation it is, but the lamps are designed to get rid of heat from the bulb in mind. You've just closed down any way to get air to it and it could overheat. If you really want to do this, I suggest an LED bulb because it doesn't extinguish anywhere near the heat of the bulb. Of course, if you mean you removed the accessory and left the box open behind it, then yes, it is ok to cover it with plastic. Marshall August 03, 2017: Hi Dan, today I opened my 8ft high ceiling fixture with a three-way problem. I found out it wasn't grounded. Having found so many light switches in my apartment that we are not grounded, I have come to the probable conclusion that the original supplier never connected the grounds! I believe this ceiling fixture has never been opened beforelong story short, so I stopped my own DIY iob and will call an electrician tomorrow. My question is: because this lamp is so close to the bathroom, and since it would be difficult for me to close it back up. I put a plastic cover over it to prevent the bathroom moisture from short circuiting from this unobtained accessory, the electrician comes to fix it. IS THAT THE RIGHT THING TO DO? Dan Harmon (author) of Boise, Idaho on July 30, 2017; Okay, Sounds to me like your switch two contains a hot wire from the panel and switch one contains a foot switch to light. It doesn't agree with the hot wire label or with statement 2 however – I don't guite understand what you're seeing for a reason. At this point I would disconnect all wires (non-terrestrial wires) from the switches (marking them somehow where they went, just in case) and check only what is hot with the breaker on. At the point, the hot switch in it can be wired with a hot go into common and both passengers hooked up. Then check on the second switch is up or down, you should find two wires that will become hot, one at a time. These are passengers and the only one left is a foot switch that goes into common on this switch. I'm pretty sure the hot spur is the hot wire from the panel, which one has a switch leg to light, but maybe I'm missing something. Marshall on July 28, 2017: Thank you for your reply once again Dan. I solved it a little bit. Here are my observations.1... The light is lit only when both switch (corridor at the front door) and switch two (bedroom) are in the upward position.2... But when switch one is up, and switch two is down, the light is off.3 ... Also when switch one is down, and switch two is either up or down, the light is off. That's why I identified the hall switch as switch one, and the bedroom switch as switch two. BUT THE STRANGE THING IS THAT SWITCH TWO (BEDROOM) IS PRACTICALLY RIGHT NEXT TO THE PANEL BOX. Switch one (hall) is farther from the panel box. Is the switch closest to the panel box on a three-way connection always identified as switching one? Here are some AC tester observations on the switch two wire connections. (Switch one was closed while only switch two was open). But first, a few notes: NOTE: switch one is a three-way switch with a hot connected to a common terminal, and a non-missing traveler connected to one of the passengers. NOTE 2: Switch two is an old one pole switch (that I'll replace with a three poles switch) with a piece of black electrical tape on the hot wire. and no tape on a non-missing traveler.1... When both switch one and switch two are up (light on), Then as a hot wire and a non-missing traveler on switch two are hot.2 ... when both switch one and switch two are down (light off), then only the hotwire is hot, and the non-missing traveler is cold = dead.3 ... when switch one is up, and switch two is down (light off), again only hot is hot, and the non-missing traveler is cold/dead.4... but when switch one is down, and switch two is up then the hot wire and the missing traver are hot.5... Missing traveler (on switch two) goes up the same romex (2-rope) cable as the same white neutral wire that I found disconnected from the other three neutral wires in this double gang (both switches are on double gangs) switch (which I suspect is the missing traveler) 6... but the hot wire (on switch two) is a hot pulse that is pigtailed with four other black hot wires. (But that you say is to be directly connected to the light, and never associated with multiple/plural other wires). That's why I have MISCONNECTION! Could I possibly have incorrectly identified switch one and switch two? MarshallDan Harmon (author) of Boise, Idaho on July 28, 2017: You're right - in a properly wired set both wires can't be hot. One will be, but the other is going to light and therefore can't be hot all the time, or the light would be on all the time. It sounds as if it is seriously mixed, perhaps with one of the passengers going to light instead of the other switch. You have some work ahead of you to figure out where the wires are going. Marshall on July 23, 2017: I have another question about my 3 way switches. Re: black wires that connect to the common terminal on both switches, should only one, or should both wires be hot when disconnected from the common screw? The hot wire, as I understand it, is a wire that is sengergized even when disconnected if the circuit breaker is turned off. What I'm getting at is if the two black wires that connect to the common screw on both 3 directional switches are hot (even if disconnected, this would mean that the energy coming from both the power in the cable and from the luminaire, that is, the power coming from both directions at once. (Note: I have not yet installed both switches partially for this reason). Is there something I'm missing here? Or is it a dangerous bad connection? Remember, I said that both original 3 way switches were replaced by 1 way switches for some mysterious reason years ago. (And I know it has to be 3 way to connect) And I wonder if that might be why. Could any handyman not familiar with 3 way of keeping installed 1 way switches after experiencing problems? Dan Harmon (author) of Boise, Idaho on July 21, 2017: I hope it all helps. No, I'm not going to ban any press. But the hosting company, HubPages dot com may decide that it's not something they want to see. Not sure – I've never tried to print comments and haven't heard any more complaints about it. Could it be something about avatar pictures? Marshall on July 21, 2017: Thank-you Dan for your second reply! I believe this will be very useful. I was able to print your article re: 3-way switches, but I can't print any of the comments (either all of them or just my own, as well as your replies selected). You have disabled printing Comments? Dan Harmon (author) of Boise, Idaho on July 21, 2017:It's okay to combine 4 hots along with a braid (your stimulus) to switch. But that braid should go to the common screw on the switch, not the traveler. Travel wires go only to the second switch. I think you have an idea: use one black traveler (already in place) and a white wire that is not included with other whites as neutral as the other traveler after making sure that the other end is where you think it is and that it's not doing anything else between boxes. I'm assuming the second switch has a switch leg to go to light, along with neutral – if so using extra white as a traveler (after uploading it is black at both ends) is fine. Just don't connect any more wires to that traveler (or any other traveler). No wire nut per traveler should ever have more than 2 wires in it, simply continue with the same wire without adding more to it. All reasons should always be nutty along with braids on any switch, outlet or other device. (Just a matter of terminology, but the 3-WAY switch is not a 2 or 3 FIELD switch. Technically, it's a DOUBLE THROW switch that connects one or two additional wires, not just one at a time. It has two positions enabled, which the double-button FIELD is not.) Marshall on July 21, 2017: Thank-you for your response Dan, you asked: But are you sure that someone in the past didn't use what used to be a traveler to power something else? Drawer or what? I don't believe it. Here's what I'm sure... 1...I have wooden nails and plastic boxes. 2... In the bedroom 2 gang switch box, one of the romex neutrals was disconnected from the other three romex neutrals, with a piece of electrical tape covering the bare end.3... In the hallway of the 2 gang switch box, two of the neutrals had white camouflage tape on them to mark (I have since replaced them with white electrical tape). The other two neutrals had no marker tape.4 ... I know these two switches are three pole connections, but both switches as I found out there were one pole switches for a reason. WHY WOULD SOMEONE REPLACE 3 POLE SWITCHES WITH ONE POLE? Since then I have replaced the hallway one pole with a new 3 pole, and intend to do the same in the bedroom.5 ... An inherited tenant who said he was an electrician lived in the unit in 2000 (I bought the apartment in 2000 and rented it until 2014 when I moved in). He said he installed track lighting in the living room (another circuit) that was different from the luminaire that was installed when I lived in this unit from 1985 to 1987. I believe he'll play with three poles for some reason. Anyway, that track lighting erupted in 2013 when my sister was renting a unit from me, according to my sister (now I live in the unit as an owner-occupier).6... Two stores in the living room are part of the same circuit as all the drawers in the bedroom. Is it unusual?7...One of the bedrooms 2 gang box romexes is 14-3, but used to power the switch controlled socket in the bedroom, which is the original design.8 ... When I lived there before, I didn't have any electrical problems. Since I moved to the unit in 2014, not only does the 3 pole connection not work properly, but the 2 gang box in the living room has a bad on/off switch and/or a bad dimmer switch that is used to control the track lighting that blew up (since replaced by a pull chain ceiling fan two years ago, which always worked fine), I replaced all the drawers (some were loose), and I had misdeed the PFE stab-lok (which I still have and would like to get tested, but where? Certainly not UL!) in 2015. I also connected the grounds in 2 gang boxes in the bathroom and in the hallway (the bedroom is next).9 ... All four black hot wires are pigtailed together in the Bedroom 2 gang box, with black wire spurs attached to the switches. Is it kosher?10 ... All four ground wires in corridor 2 gang box are now joined together. But initially I found with one connected only one another (times 2). All four ground wires in the bedroom 2 gang box are properly connected together, but wit, ches are not grounded (which I intend to fix shortly) 11 ... One traveler who is hooked up to a bedroom 2 gang box is a black pulse that is attached up to all four romex black wires (see #9). Therefore, if I attach one of the 4 romex neutrals to it, I'll have to remark it with black electrical tape to mean it's hot now. But first, I need to do a continuity test to determine the other end of the same wire on the other side of the (at least) 2 gang switch. For you said that the travel wire must connect directly from one 3 pole switch to the next 3 pole switch (but connecting the broken connection between OK). But I believe you've said that under no circumstances do you attach traveler spurs indirectly to all four white neutrals, or black heat, that are pigtailed together inside the box when I understand you correctly. Anyway, I hope this helps you with my situation. Thank you very much for what you have said to me so far. Dan Harmon (author) of Boise, Idaho on July 20, 2017: I'm sorry, but I can't answer a question about the 1977 code - that was before my time. If you have 2 14-2 wires running between the switches, and have wooden nails (almost certainly) and plastic boxes (probably), then you can make it work with what you have. You will need to find out which cable is which in each switch box and then the color of both ends of one of the white wires Whatever color it is, but white or green. At this point you have all the wires you need to make 3-way switches and light work. But you are sure that someone in the past what used to be to power something else? Drawer or what? Marshall on July 20, 2017: I live in a 1977 vintage apartment building in the USA. My bedroom entrance light is controlled by two threesome switches that are seated inside two separate double gang light switch boxes. As it is now, one switch must be left in the up position at all times to allow the other switch to turn the light on or off. But two switches should be able to operate completely independently if one another. The 14-3 cable is not used for three-way connection. There are only 14-2 cables for this connection. Black wires are used for ordinary and one of the passengers on three pole switches, but the other passenger is missing But I suspect that initially the white neutral stimulus had to connect from the second terminal of the traveler on each switch up to four neutral wires all pooled in both double gang boxes. I know it doesn't meet the current code, but does it meet the latest code back in 1977? My real question is, do I need to have a brand new 14-3 wire added to the circuit to have a secure 3 pole switch connection? Dan Harmon (author) of Boise, Idaho on March 22, 2017: Hi Angela: Sounds like you have a very old home, and it can be a problem. If the wires are Romex (two or three insulated wires encapsulated in the outer post office), you can replace the box with an old piece or cut in a plastic box - it's not a difficult thing and it's very cheap. If the wires are not Romex, but the old knob and tube, this is not something you really want to deal with, so if you don't see that these wires are all matched together in the outer post office, or each wire enters the box separately, don't force it. Besides that, the only thing left is to protect those screws on the side – I'm not aware of any switches available for the day with screws on the back. One option would be to use electrical tape and wrap the entire switch, go up to the side, over the top and completely around, finishing the circle several times, covering those screws with several layers of tape. Many electricians take this for granted. But if the screws are already touching, this probably isn't really a good solution, as movement over the years could carry a hole in the tape. Better to cut a piece of solid plastic (not a piece of plastic bag) as thick as possible, and slide it next to the switch, keeping the screw away from the wall of the box. Make both sides of the switch. There is also an insulating material, similar to what a printed circuit board is made of, it will work as well and is guite thin. Angela Schmitt on March 21, 2017: We have a 3-way switch in our bathroom for light, fan, and night light. We decided to put in a new one before we re-made our bathroom and wanted the colors to match. The old switch had screws on the back, but the new one has metal screws on the and touch the metal box. This causes a spark when it turns on the power supply. What can we do? (Hopefully it made sense -- I don't know much about wiring.) Thanks! Dan Harmon (author) of Boise. Idaho on January 11, 2017: You can't do it with three-way switches. Consider that if they are both down, and the light is turned off, you will need to rotate both into up turn position on, beating the purpose of the threesome switches. What you can do, though, is set so that they must either be up or both down to be on - when the light is turned off against each other. Wire them, try it and see what happens. If that's not what you want, either turn one over or reverse the travel wires on just one of the them.ddevol47@gmail.com january 01, 2017: It doesn't really comment more question. I think I had a few years ago a collaborator show me a way to wire a threesome switch so that you always have two three way switches in a down position when off and two in the up position when switched on. If he did that at the time it seemed like he did, I would like to know how I think it's not possible. I'm right, I just never had anyone even try. Your article was and thank you for all your understanding and knowledge. Dan Harmon (author) of Boise, Idaho on November 10, 2016: The best thing you'll be able to do is wire drawer into a common terminal switch rather than travel terminals. If it's the power supply coming into the socket will be all the time, if the light outlet goes on and off. But there's another problem. If you can completely guarantee that the white wire is neutral (and it may not be), you may be plugging the socket in the series with light and will not function properly. If I understand correctly that the white wire is finished on the switch: if it is so, it is not neutral and what you are trying to do will not work as you are plugging in sockets and lights in the series. It is a danger in this way and it must not be done. If there are no more wires than the three you mentioned, all in one cable, you can't do the socket work. There must be another cable with white and black wire in the box for the drawer to work at all. Rick on November 10, 2016: Hi Dan, I have a light switch on the wall of my stairs at the top (2nd level of the house) and at the bottom (1st level of the house). It acts as a two-way switch. Turn go up, turn off once up or turn up to go down and turn off once down. Just... I put the duplex socket on the opposite side of the wall away from the light switch at the bottom of the stairs and designed to turn off the light switch. The light switch has 3 wires and a grounded connection. One red, one hot black, one white neutral (all wired from the back of the switch) and grounded wire into the screw box. I wired duplex expected it to work, but have some When I turn on the switch, the duplex power goes out. When I turn off the light, the duplex power is turned on. I have passed the wires around but still haven't had success. However, I noticed that when I touch the neutral switch on the ground bolt it all works as I expected. Can you help me sming on it? Dan Harmon (author) of Boise, Idaho on March 27, 2016:Piet, you have to have power lines in this box, plus at least 3 wires to go out; one to each light. It would be possible to put two of them on one 3 wire romex, although using black and red as switching legs (one for each light) and neutral. Is that the answer to your question?piet on March 27, 2016: I have 3 light switches in the 2x4 box and I want every light to have switchmoses on October 11, 2015: good jobDan Harmon (author) from Boise, Idaho on March 29, 2014: Article 404.2 (C) is what you're looking for. In the case of switches, a controlled lighting load supplied by a grounded branch for general purposes, a grounded circuit conductor for the controlled lighting circuit, shall be provided at the switch position. And thanks for patting; 3 way switches really aren't that hard, just a little different than most people are used to thinking about switches.donald on March 29, 2014: I just searched to see if the code called for colored specific wires for travelers and happened on your site. I'm glad there are individuals out there who choose the time to describe the operation of the 3-way circuit in intelligible detail as you should. Pat on the back. I have a guestion. What article requires that there be neutral in each switch box? They haven't been to The Book ever, and it makes sense to me. However it would be benificial to be able to show the customer that they have to pay more for the work! Thanks. Dan Harmon (author) of Boise, Idaho on March 05, 2014: You will need to install a new 4 way to switch between two 3 method switches. Among the meanings electrically, not necessarily physically. You will need 12-3 from 3 way, on 4 way and on the other 3 way. Instructions and diagrams are available here: on March 05, 2014: I have 3 way to switch that works properly in my basement. I want to add another switch to make it 4 way between the existing two switches. I have a 12-3 run from switch to switch. The power supply of the lights comes from switch one with 12-2. Is this possible without taking drywall? Dan Harmon (author) of Boise, Idaho on March 02, 2014: It doesn't look as if your motion sensors are 3 way. Are you absolutely positive that they are? In addition, the old switches, if 3 way, had three terminals on them, plus the ground that all had to have wire. Two black wires is not enough - what other wires / colors are in the boxes? Jacob on March 02, 2014: have 3 way in my so my 2 new motion sensors have 3 red black and ground but the old switches have 2 black wires I know the witch one is common but only with 3 wires as I can mount 4. Check the switch where the power comes from and verify that the first and then other traveler is powered when the switch is inverted. If not, one of the passengers is replaced with power here. Then, with the second switch, verify that the switch can transfer power or not, regardless of which traveler is hot, to a common wire. If not, one of the wires is replaced with a normal go to the luminaire. From your description, the problem lies in the switch should always produce energy for one of the two passengers. Jerry Leviner on December 27, 2013: My problem after plugging in for a new light with two 3 ways swithes is that if both switches are down then the light won't come on both switches. Loses power on non switch! What did I do wrong? Dan Harmon (author) of Boise, Idaho on June 26, 2013: If you put both black accessories and ground wires on black wire from a breaker the best thing that happens is that it will blow a breaker. More likely, in residential construction, it causes all metals of the luminaire to become hot whenever the light is turned on. Touch both the light and the ground source, such as sink feces, and you'll be shocked. So, it is absolutely not ok to put grounded wire on black wire. If the house does not have ground wires, simply tuck the ground light back into the box. The main purpose of the grounded wire is to blow the breaker, if the lamp is somehow defective and the black wire touches the metal parts of the lamp somewhere inside the lamp. As long as the match is in good condition (probably the new match is) there will be no problem.phillip on June 26, 2013:1 have a friend doing a job in my bathroom that has old wiring coming from a breaker. The new light we add has a grounded wire. He said it would be okay to turn the grounded wire into black wire. It's right; Dan Harmon (author) of Boise, Idaho on April 20, 2013: Yes, it will work well. See the article about four-way switches for wiring diagrams. Just add more 4-way switches to the diagram, always between two 3-way switches. There will be 2 three-way switches, one at each end of the switch line. One 3 way will have an incoming power supply and the other will have a cable feeding the light itself.14 guage wire is fine if it is powered from a 15 amp fuse. Do not use 14 gauge wire on a circuit with a 20 amp circuit breaker. ... article on 4 way switches.bob April 20, 2013: I need to power one light from seven or eight different locations using 3 way and 4 way switches using 14/3 wire I can do that manyDan Harmon (author) from Boise, Idaho on November 29, 2012: Amshas, I'm not sure what you mean. If you can be more specific in your needs and what you are trying to achieve, maybe I could help you out.amshad on November 27, 2012: this is helpful, but I need 3 way 3 switchDan Harmon (author) from Boise, Idaho on September 13, 2012: What you are missing is that it is not on or off with a three way switch. When the switch is up, the common terminal is connected to one of the passengers when the switch is down the common terminal is connected to the other traveler. There is no off position. One or the other of the travel terminals is always connected to the common terminal. Wiring diagrams basically only show different methods of physical operation of cables; in any case, one joint is connected to the incoming power supply and the other is connected to the light. Travel terminals are always connected to the fare terminal on the second switch - never to light or to the incoming power supply. Robert on September 13, 2012: I'm sorry, but these four wiring digram seems to me the same. It's not an independent connection. If the first switch is on, the second switch works correctly, if the first switch is turned off, the second switch does not work. I'm not looking for a solution like this. Dan Harmon (author) of Boise, Idaho on July 11, 2012: Thank you for the compliment. These switches may seem complicated at first, but they are actually quite simple at heart. The best thing about them is that they are always hooked up electrically the same regardless of the physical reality of running the wire. Dan Harmon (author) of Boise, Idaho on February 23, 2012: If you have three white wires on one side then there are all either neutral wires or grounds. Any hot put on the same side as either neutral or ground will immediately blow the fuse or breaker. With more information I could offer more specific advice. Is it an old (for 1950s) knob and tube wiring? Are there cables in the box that contain (or more) cables in each cable? Are there any wires in the box that are connected together? Should it be a switched socket, with half hot all the time and one half switch? Are the wires old enough to suffer a change in color, at least to the extent that black has become gray or dirty white? So far, I see a box with three neutrals and only one hot wire. I can't imagine any application where it would be convenient except perhaps a knob and tube wiring where there was no cabling. All normal house wiring has at least black and white in each cable. Or is it different than a house with wires entering a box through a pipe (pipe)?charge on February 23, 2012: rewiring the old 3 white wires per side socket 1 black to hot side-I can only assume that 1 of the white wires should be hot as well,?because the socket wont work?thanksDan Harmon (author) from Boise, Idaho on January 03, 2012:@Stefan – if you spliced the white wire into hot, it is then hot, not neutral, and should be colored at both ends so that no one will mistake it for real neutral. Black tape is fine for this purpose. Understand that it is not the color that makes neutral; this is where it eventually ends up in the breaker panel. The wires or electrons that flow in them don't know what color the insulation is. People do, however, and that's why the NEC has ordered that every neutral be white - when you're spliced that white wire on black hot it's no longer neutral and shouldn't be white. Interestingly, this rule is so important that the NEC will not allow you to color the wire white. You can change the color from white to anything else (except green), but never from, say, black, to white. The only exception is for #4 and larger wire, which is so large that the only use in most houses is from the street to your home. Stefan on January 03, 2012: Thanks for the diagram 4. No other book I looked at in Home Depot or online showed diagram 4. As soon as I hooked everything up, I color coded neutral, which was associated with hot with black tape. I hope it was the right action because neutral spliced on hot acts like hot when done by the appropriate switching combo. Did I do it right by marking neutral hot in the second switch box? Thanks. Dan Harmon (author) of Boise, Idaho on January 02, 2012: First, the reasons should not be separated. All the reasons in the same box must always be tied (exceptions may be made for special reasons of the computer circuit). I'll see if I understand what you're trying to do. You have four three-way switches and two lights. Two switches are supposed to run light (A) and two switches have to run light (B). The power supply comes from the fuse panel to the box with the first switch (let's call it 1A). The same power will then go to the switch (1B). From this point on, the wiring is the same for each control circuit. I assume that one light should be connected as in the #3. The other light, with its own two switches is also wired as in the diagram #3. If this is the case, then the power in the wire (black), the power in neutral (white) and the ground (bare or green) must go to both the first two switches, one for each light. Just run two ropes between the two switches, plait the power supply in the cable, and treat each set of switches as independent. Please let me know if it answers your question. If not, let me know either with another comment here or with an email (contact information in the upper right corner, below my profile information). These things are difficult to answer with limited information and only with a written word, We can work this out. BradG on January 02, 2012: Do you have any suggestions for plugging 2 separate 3-way switch-switch-light settings (switch-switch-light) from the same power supply? I have wired, and even separated neutral on the second switch, but still can't get much off. Do I also have to separate the reasons? Dan Harmon (author) of Boise, Idaho on December 07, 2011: It's really hard to diagnose from afar, but the power supply coming into the second switch will always come (when the first switch has the first power cord) to the traveler. You should have two wires marked as passengers and one as ordinary (which will never be hot without the other switch plugged in). If the marked T never burns, I would suspect it's normal, not a traveler. You can use a volt meter, or contactless voltage detector to monitor the wires. Make sure the wires are closed and safe in

the second box and turn on the power supply. Flipping the first switch would give you two wires that go hot, then cold when the switch is flipped - these are the passengers on the second switch. From your description, which leaves two wires; hook one of them to either traveler and turn that traveler hot; if the light works, that wire is then it's common and the fourth wire should simply be limited by a wire nut. However, it is possible that the older owners wired in a second switch that never worked properly. If you're using a #3 above and use only two ropes, the switches may work, but not correctly. Is this maybe what happened?dr on December 6, 2011: We have an older home and had 3 ways to switch between connected fan/lights. Power comes into switch #1 and if we only use #1 on the fan/lights that work. . . . but we try to add the Switch #2 back inches We had the wire marked as T - traveler, but we can't get switch #2 to work again – we can't seem to get much on it. Not modern 3 wire used, these were two separate double wires originally used. Can I switch from the power #1 switch #2? Would it be better to run the new 3 wires on the Switch #2 or can we try to get it to work again than it is? Dan Harmon (author) of Boise, Idaho on November 14, 2011: It's actually pretty simple, isn't it? All those wires and often paint on 3 way to make the light switch look confusing, but once you understand what's actually going on it's not that bad. Glad you found it helpful, and thanks for the comment. It's always good to hear that I was able to help out.rocco on November 14, 2011: thank you so much, for the more ways I now have a better understanding of the terminology and wiring method of Dan Harmon (author) of Boise, Idaho on September 11, 2011:Good. It's certainly tempting to save some time and effort by cutting corners, but that's not the point. It's too dangerous, now and in the future.wade on September 11, 2011: Thanks for I wouldn't feel good doing that. But he had run the wire and had the walls down on his extra room. I thought I could save him time from failure. Again, thanks, I see it's not worth the risk. Dan Harmon (author) of Boise, Idaho on September 9, 2011: Yes, in more ways than one. For no reason, there is a potential risk of shock. You will be able to use the legally required grounded screw on the switch. It's not legal to do what you're proposing, and any future problems (house burns perhaps) that can be traced back to that leadership will result in accountability of who did it. In many states, it is illegal to sell a house with known defects like this without informing the buyer why the sale probably did not pass. In short, don't do it. As an electrician, I wouldn't have done it, and if the boss had ordered it, I would have refused. It's not worth it. These codes are introduced for a very good reason and need to be followed. Good luck with your project wade on September 7th, 2011: Im helping a friend with wiring 3 ways, he already runs 2 wire/with ground switches, I ask for trouble if we skip to the ground? (use the land for the traveler) Dan Harmon (author) of Boise, Idaho on September 07, 2011: Thanks to you both for the comment; helps to know that you will find information useful.imamsaheb september 07, 2011: when I look connectipons learn to simplify, so thanks uManna in the wild from Australia on March 06, 2011: This is useful. Thanks.Dan Harmon (author) of Boise, Idaho on January 25, 2011: Thanks for the comment -I hope you will find a use for the information.whitton on January 25, 2011: Thank you for this very informative Hub.Dan Harmon (author) from Boise, Idaho on November 29, 2010: Thank you, both for the ping and the compliment.tamron on November 29, 2010: I pinged ya! well done and well written electric article! Dan Harmon (author) of Boise, Idaho on November 17, 2010: That's good to hear. Thanks for the comment – I appreciate it when someone lets me know that I helped them out. Dan Harmon (author) of Boise, Idaho on October 27, 2010: Thank you. I can only hope that someone will find it useful in wiring 3 way switch.stars439 from Louisiana, Magnolia and Pelican State. October 27, 2010: Great information. GBYDan Harmon (author) of Boise, Idaho on October 18, 2010: You are absolutely right in that it can be very frustrating. Once I tried problems to shoot a friend's work and he had installed 4 way to place 3 way (which is possible and will work) but had it wired wrong. It looked good if you didn't notice 4. Almost 2 hours tearing all the switches and 4 little can light apart as I noticed his error! Extremely frustrating!dgicre from usa on October 18, 2010: That's great! Very common problem and hooking 3/way switches the journey leads to some interesting and often frustrating experiences. Dan Harmon (author) of Boise, Idaho on October 18, 2010: Thank you for the compliment. Engaging 3 way to switch is just guite different that a lot of people have problems with it. I hope the diagrams and explanations will make it understandable for those who also have a modicum of experience there. At least you found your problem; many end up hiring an electrician for 5 minutes of work! Dallas W Thompson of Bakersfield, CA on October 18, 2010: As a licensed California supplier, I thought I knew basic leadership. I bought what I thought was a threesome switch. Imagine my frustration after checking my lead three times, I checked the three-way switch to determine that it was a normal one pole, on-off two-way switch... Great information for those who understand the concept of wiring ... Leadership...

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