Warm-up: Multi-way Switching

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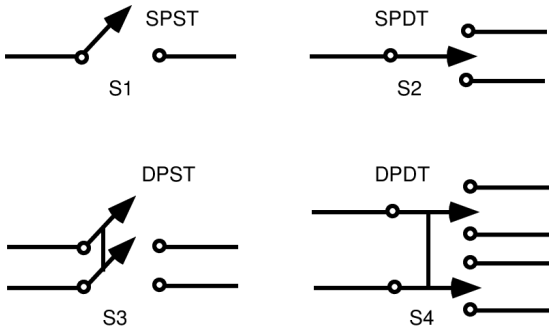
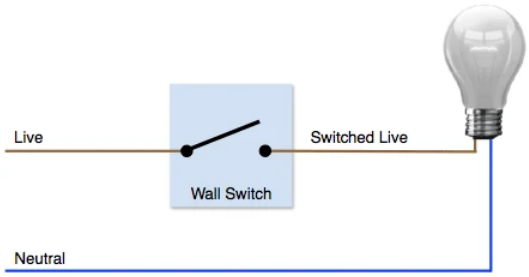
1 Pre-requisites

Electrical switches have *poles* and *throws*. The most basic switch is called *single-pole, single-throw* (SPST)[1]. Here are some basic types of switches with their corresponding abbreviations. You can probably figure out what poles and throws are from this.



All homes have separate *hot/live* and *neutral* busbars in the circuit-breaker that connect to all the electronics in your home. When a path exists between hot and neutral, current flows freely and any devices along that path turn on. Switches work by manipulating those paths. Below is an example of a simple circuit with a SPST switch that turns a lightbulb on and off.



2 Problem

Suppose I want to install a light in a long hallway with two switches at either end. This way, I can turn it on at one end and off at the other. Draw a circuit diagram to accomplish this. Compare your diagram to those around you. (Hint: you only need two switches of the same type.)

Actually, there are three solutions, can you come up with all three? One of them is prohibited in America, can you explain why?

[1] This is more commonly called a *two-way* switch because it has two terminals. British people call it a *one-way* switch because they're British. Accordingly, a SPDT is called a *three-way* switch if you're American and a *two-way* switch if you're British.