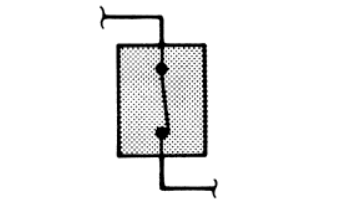
Switches

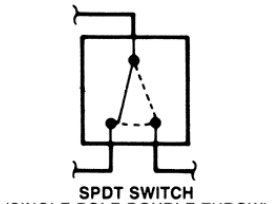
Switches interrupt, connect, or route the flow of electricity. In your home, closing the switch on the wall allows electrical current to flow to the light. Opening the switch interrupts the flow of current.

Switches come in different physical packaging, such as pushbutton, slide, rocker, and toggle. More importantly, they come in different electrical configurations, referred to by the number of possible internal connections.



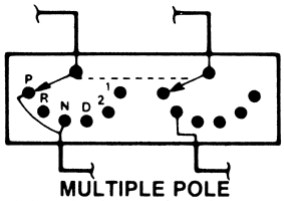
SPST SWITCH
(SINGLE POLE SINGLE THROW)

The SPST, or Single Pole, Single Throw is the simplest sort of switch. The switch is either opened or closed.



SPDT SWITCH
(SINGLE POLE DOUBLE THROW)

The SPDT, or Single Pole Double Throw, allows the input to be connected to one of two outputs. This allows you to select which load to power from a single source. Note that current will flow either way through the switch. The SPDT could be used to select which source of data flows, for example, to a dimmer rack.



MULTIPLE POLE
MULTIPLE THROW SWITCH

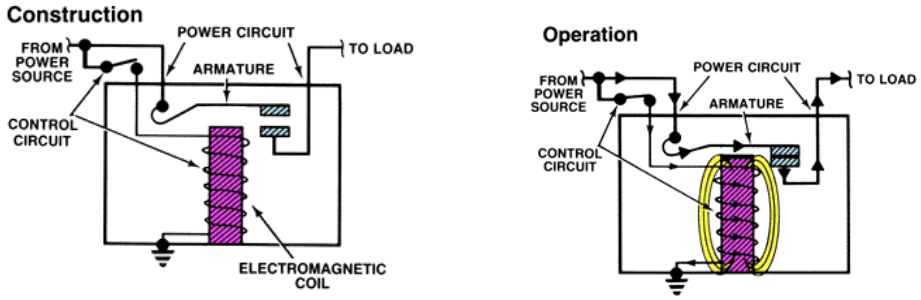
Multiple-Pole input, Multiple-Throw output switches, which are also known as "gang" switches, have movable contacts in wired in parallel. These switches move together to supply different sets of output contacts with current. An ignition switch is a good example of a multiple-pole multiple-throw switch. Each switch sends current from different source to different output circuits at the same time depending on position. The dotted line between the switches indicates they move together; one will not move without the other moving as well. The most common variety of this switch is the DPDT, or Double Pole Double Throw. Above this, numbers are used: 3P6T would have three circuits with six outputs each.

Relays

A relay is simply a remote-control switch, which uses a small amount of current to control a large amount of current. A typical relay has both a **control circuit** and a **power circuit**. Relay construction contains an iron core, electromagnetic coil, and an armature (moveable contact set). There are two types of relays: **normally open** (shown below) and **normally closed** (NOT shown). A Normally open (N.O.) relay has contacts that are "open" until the relay is energized while a normally closed (N.C.) relay has contacts that are "closed" until the relay is energized.

Current flows through the control coil, which is wrapped around an iron core. The iron core intensifies the magnetic field. The magnetic field attracts the upper contact arm and pulls it down, closing the contacts and allowing power from the power source to go to the load. When the coil is

not energized, the contacts are open, and no power goes to the load. When the control circuit switch is closed, however, current flows to the relay and energizes the coil. The resulting magnetic field pulls the armature down, closing the contacts and allowing power to the load. Many relays are used for controlling high current in one circuit with low current in another circuit. An example would be a computer, which controls a relay, and the relay controls a higher current circuit. In the illustrations below, the power and control circuits are tied together. This is not often the case. For example, a 12v relay could be used, allowing a 12v signal to close the relay, connecting a 120v device.



Note that relays come in the same varieties as switches: SPST, SPDT, DPDT, etc.

Considerations

When selecting switches and relays, you must consider the number of parallel connections to be made (do you need to switch two devices simultaneously, or just one?) and how many connection combinations you need. (Do you need to power a single lamp, or do you need to be able to select between three operating modes?)

You also must consider the electrical requirements. The switch or relay must be able to handle the amount of current you intend to run through it. Also, in the case of relays, the control voltage of the relay (the power used to close the switch) must be compatible with whatever you are using to trigger it.

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http://www.autoshop101.com/trainmodules/switches/101.html