SWITCHES IN ELECTRONICS AND CONTROL

Switches have numerous applications in electronics and control. They are used everyday in both the workplace and at home.

Switches can be used as input sensors to sense such things as pressure, proximity or orientation. They are also used to switch electrical appliances on or off and to enter information into appliances such as a microwave oven or a video recorder.

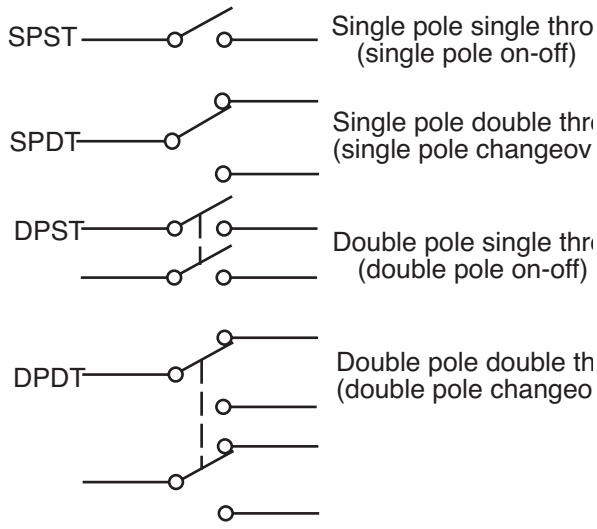
Switches vary in shape and size depending on both the intended use and current carrying capacity. They also differ in the arrangement and number of contacts.

ARRANGEMENT OF SWITCH CONTACTS

The contact arrangement of switches is classified in terms of:-

poles: the moving part of the switch which is pivoted

throws: the part of the switch which is fixed and makes contact with the moving part of the pole.

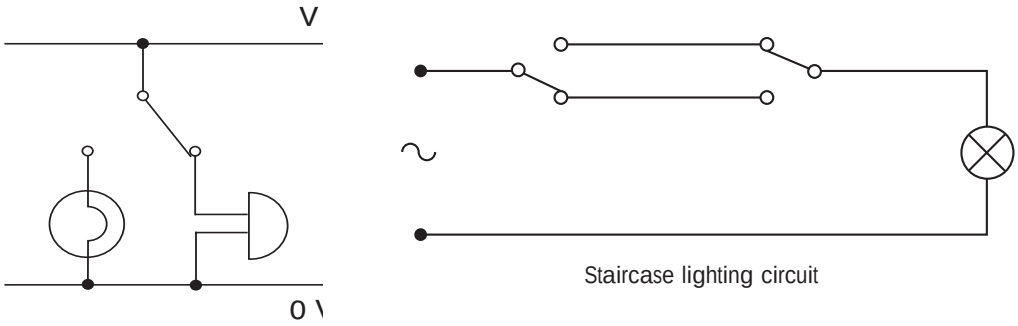


The dotted line indicates that the two poles are mechanically connected (or ganged) but are not electrically connected.

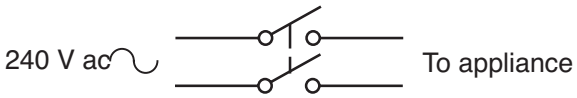
Typical uses for the different types of contact arrangement.

i) SPST switches are often used to switch on and off low voltage electronic circuits.

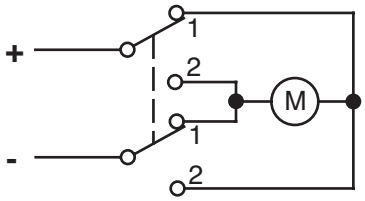
ii) A SPDT switch is useful when selecting one of two alternative circuits or to operate a device from one of two positions as in staircase lighting.



iii) A DPST switch is really two separate switches controlled by one lever. A typical use is in mains appliances to disconnect both the live and neutral wires as a safety precaution.



iv) A DPDT switch is often used to reverse the direction of a motor.



When the contacts are switched from position 1 to position 2 the current flows in the opposite direction through the motor and reverses the direction of the motor.

The contacts on switches can be NO or NC. NO means **Normally Open**. This indicates that the switch is normally not making contact; the circuit is not complete. The switch has to be operated to complete the circuit.

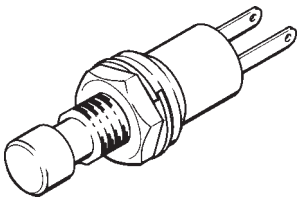
NC means **Normally Closed**. This indicates that the switch is normally making contact; the circuit is complete. When the switch is operated, the circuit is broken.

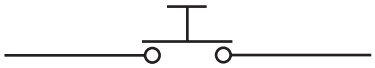
TYPES OF SWITCH

Switches are also classified in terms of the action by which the switch operates.

i) Push Switches

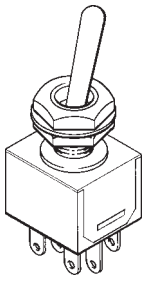
Push or press switches are used for momentary contact and are spring loaded. A common example of a push switch is a door bell switch. The press switch is a variation of the SPST switch and has the following symbol.



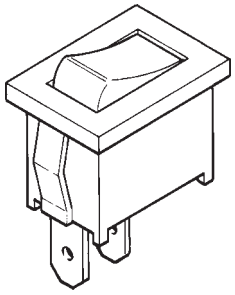


ii) Toggle and Rocker Switches

These are used as on/off switches for mains operated equipment or appliances.



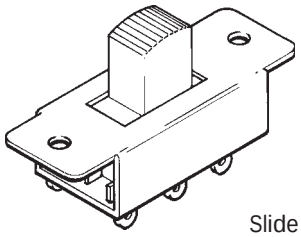
Toggle



Rocker

iii) Slide Switches

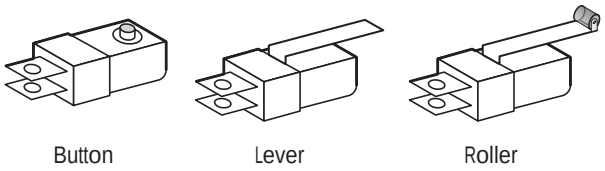
Slide switches are inexpensive and are found mainly in low voltage circuits. They are useful for setting the inputs of logic gates high or low and as on/off switches for battery powered projects.



Slide

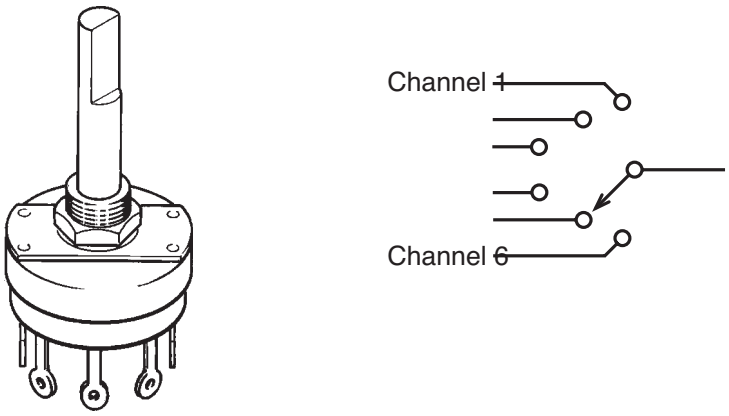
iv) Microswitches

Microswitches are very sensitive push switches which require a very low operating force over a small distance. They are ideal for sensing small movements.



v) Rotary Switches

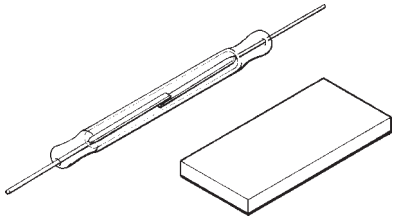
Rotary switches are multiway switches. Each of several channels may be selected by turning a spindle. The symbol for a 1 pole 6 way rotary switch is also shown.

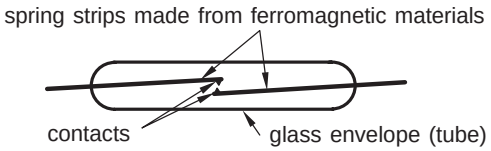


vi) Tilt Switches

Tilt switches contain a small quantity of a liquid conductor such as mercury. When the switch is tilted in the right direction, this conductor bridges across two 'contacts' to turn the switch on.

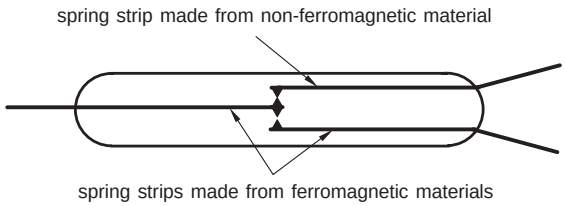
vii) Reed Switches
When a magnet is close to the switch, the spring strips become magnetised and attract each other. The contacts are then closed to complete the circuit.





The reed switch can be used in automatic systems to detect anything which has a magnet attached to it. An everyday example is the use of reed switches to detect the opening of a door or window covered by a burglar alarm system. The magnet is hidden inside the edge of the door or window next to the reed switch which is hidden inside the frame.

Some reed switches have three contacts inside them and can be used as changeover switches.



INVESTIGATING SWITCHES

Use an electronics catalogue to find out the following about switches.
Make a table or chart to display your findings.

- How can it be operated?
- What current can it take?
- What versions are available?
- What is the cost?
- What sizes are available?

SELECTING A SWITCH

When you are selecting a switch, you need to consider:

- What does the switch have to do?
- How will it be operated?
- What current will it take?
- What size do you need?

Type of Switch	Ways of operating	Max. current	Version available	Typical cost	Sizes	Special function