Switches and Relays

Daniel Kohn
University of Memphis
Department of Engineering Technology
TECH 3821 – Industrial Electronics
Fall 2023

1

Switches

- Definition - a device for making and breaking the connection in an electric circuit.
- Types (Action):

Toggle

Rocker

Pushbutton

Limit

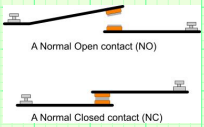
Rotary

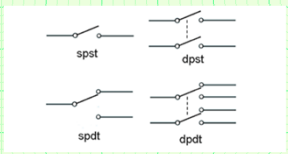
Slide

2

Switches (Cont)

- Types (Electronic Connections):





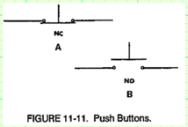


FIGURE 11-11. Push Buttons.

3

Switches (Cont)

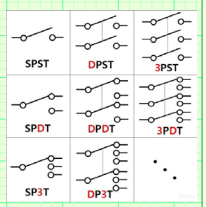
What does SPST, SPDT, DPST, and DPDT mean?

SP and DP refer to single pole and double pole; ST and DT refer to single throw and double throw.

Pole refers to the number of circuits controlled by the switch: SP switches control only one electrical circuit. DP switches control two independent circuits (and act like two identical switches that are mechanically linked). Do not confuse 'pole' with 'terminal'. The DPST switch, for example, has four terminals, but it is a DP, not a 4P switch.

Throw refers to the extreme position of the actuator: ST switches close a circuit at only one position. The other position of the handle is Off. DT switches close a circuit in the Up position, as well as the Down position (On-On). A DT switch can also have a center position (frequently On-Off-On).

Single pole/throw and double pole/throw switches are by far the most common switches, but triple and quadruple configurations are also available. They are commonly denoted 3PST, 3PDT, 4PDT, etc.

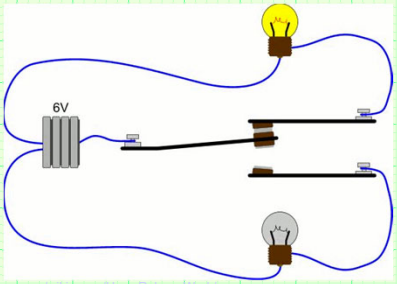


https://www.mouserglobal.com/post/what-does-spst-spdt-dpst-and-dpdt-mean

4

Switches

- SPDT

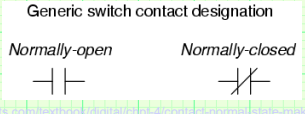


http://scitheaven.com/wiki/index/How_Relays_Work

5

Switches

- How is NORMAL determined?
  - The normal state of a switch is that where it is unactuated. For process switches, this is the condition its in when sitting on a shelf, uninstalled.
  - A switch that is open when unactuated is called normally-open. A switch that is closed when unactuated is called normally-closed. Sometimes the terms "normally-open" and "normally-closed" are abbreviated N.O. and N.C., respectively.



http://www.allaboutcircuits.com/textbook/digital/chpt-4/controlled-normally-state-make-break-sequence/

6

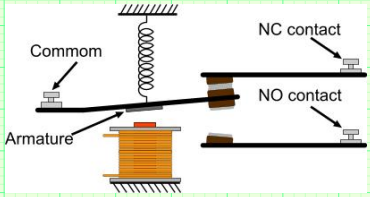
Switch Types (cont)

http://www.musicfromouterspace.com/analogsynth_new/ELECTRONICS/switches.html

7

Relay

- A Relay is an Electromechanical device that uses an electromagnet to change the status of a switch contact.

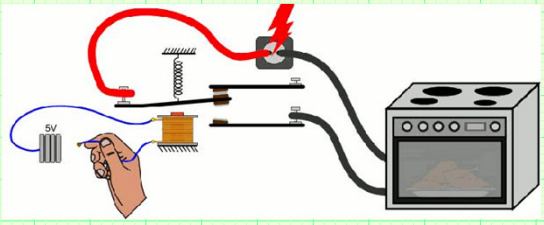


http://pcbheaven.com/wikipages/How_Relays_Work/

8

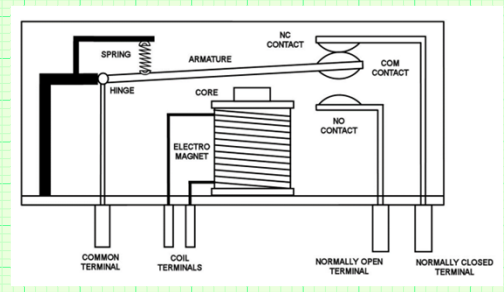
Relay

- Example



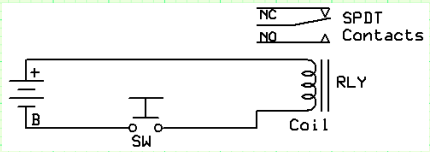
9

Relay



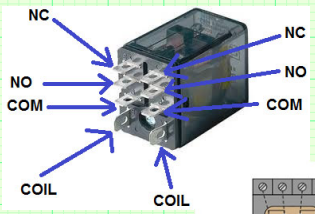
10

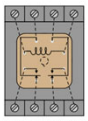
Relay



11

Relay





(Dashed lines represent connections between relay terminals and socket screw lugs, hidden from sight)

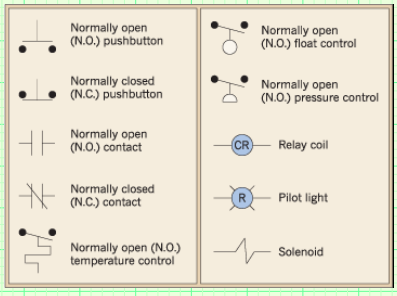
12

Relay

13

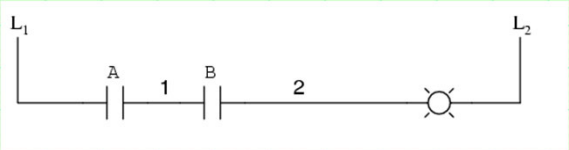
Relay Ladder Logic

- Symbols

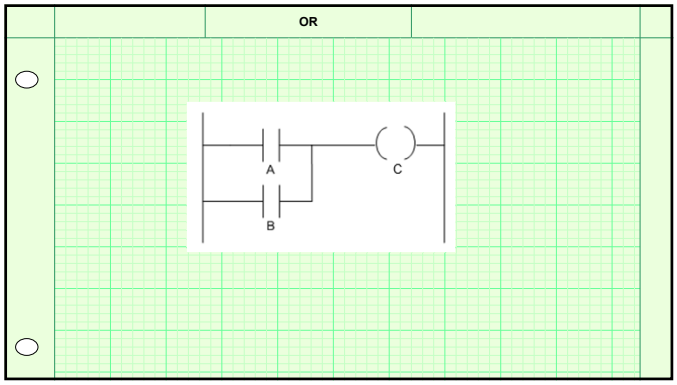


14

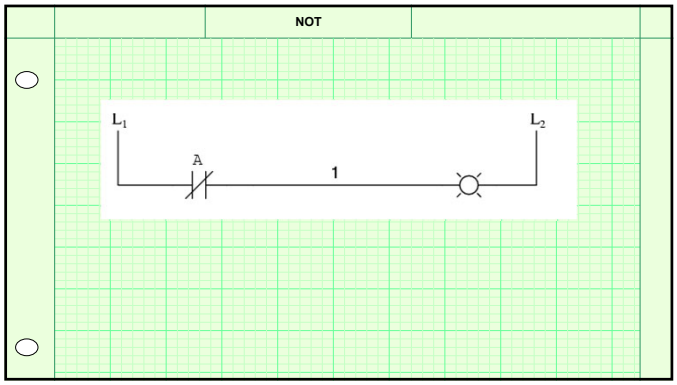
AND



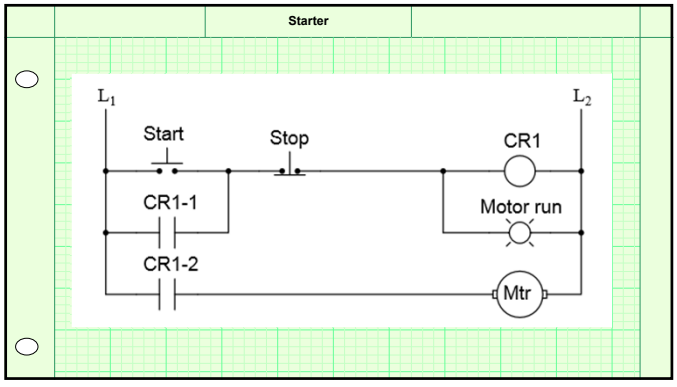
15


OR
A
B
C

16


NOT
L1
L2
A
1

17

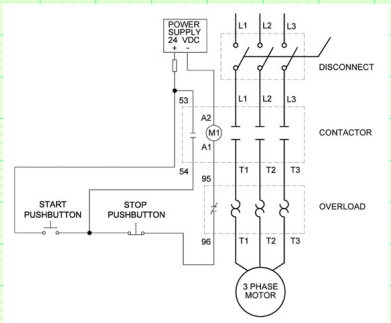

Starter
L1
L2
Start
Stop
CR1
CR1-1
Motor run
CR1-2
Mtr

18

Motor Starter (3 phase)

19

Motor Starter



20