

Chapter 7

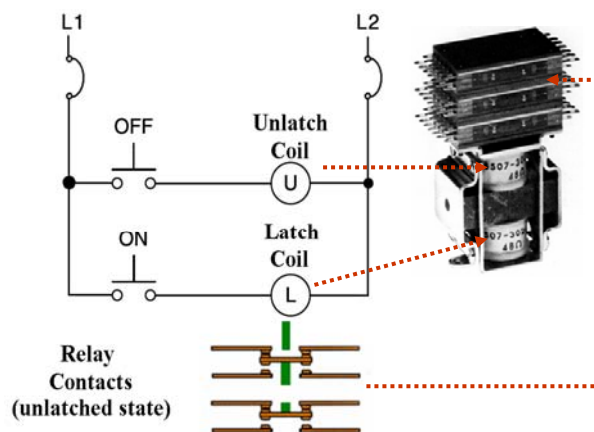
Relays

PART 4 Latching Relays

© 2010, The McGraw-Hill Companies, Inc.

Latching relays typically use a *mechanical catch* or *permanent magnet* to hold the contacts in their last energized position without the need for *continued application of coil power*.

They are used in application where it is desirable to have a relay **stay in one position** if power is interrupted.

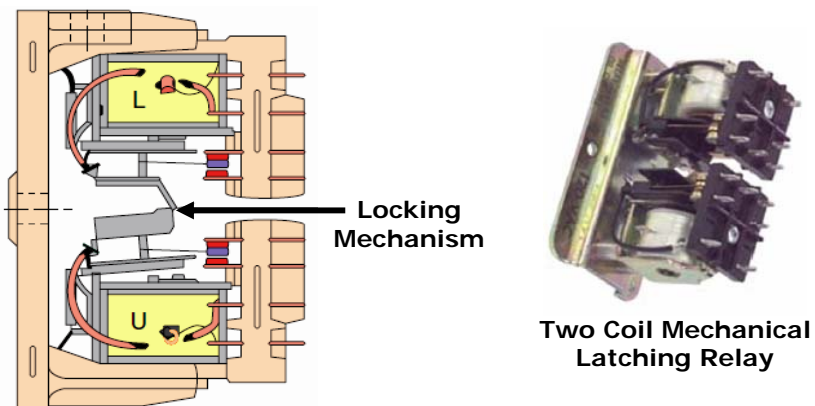


© 2010, The McGraw-Hill Companies, Inc.

MECHANICAL LATCHING RELAYS

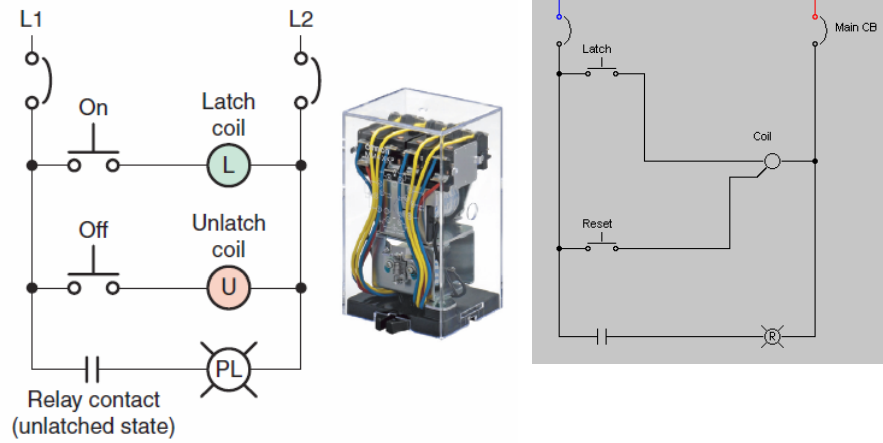
© 2010, The McGraw-Hill Companies, Inc.

Mechanical latching relays use a locking mechanism to hold their contacts in their last set position until commanded to change state, usually by energizing a second coil.



© 2010, The McGraw-Hill Companies, Inc.

Operation of a two-coil mechanical latching relay circuit.

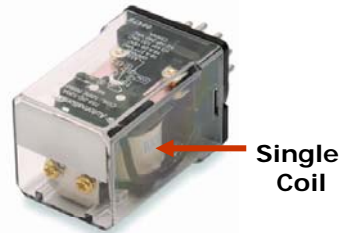


© 2010, The McGraw-Hill Companies, Inc.

MAGNETIC LATCHING RELAYS

© 2010, The McGraw-Hill Companies, Inc.

Magnetic latching relays
are typically single coil
relays designed to be
polarity sensitive.

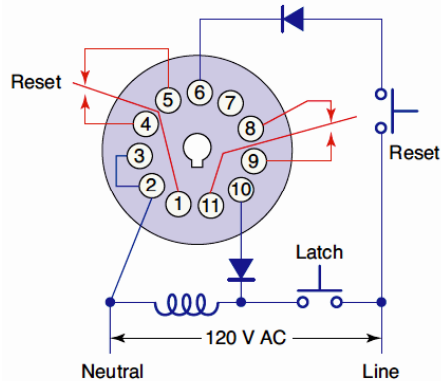


➤ When voltage is applied to the coil with a predetermined polarity, the relay will latch.

➤ A permanent magnet then holds the contacts in the latch position.

➤ When the polarity is reversed, and current is momentarily applied to the coil, the armature will push away from the coil overcoming the holding affect of the permanent magnet, causing the contacts to unlatch or reset.

© 2010, The McGraw-Hill Companies, Inc.



LATCHING RELAY APPLICATIONS

© 2010, The McGraw-Hill Companies, Inc.

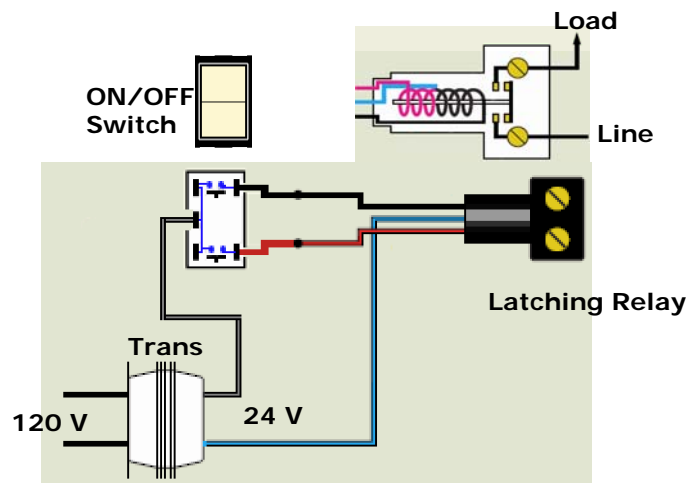
It is common in a control circuit to have to remember when a particular event takes place and not permit certain functions once this event occurs.



Running out of a part on an assembly line may signal the shutdown of the process by momentarily energizing the unlatch coil. The latch coil would then have to be momentarily energized before further operations could occur

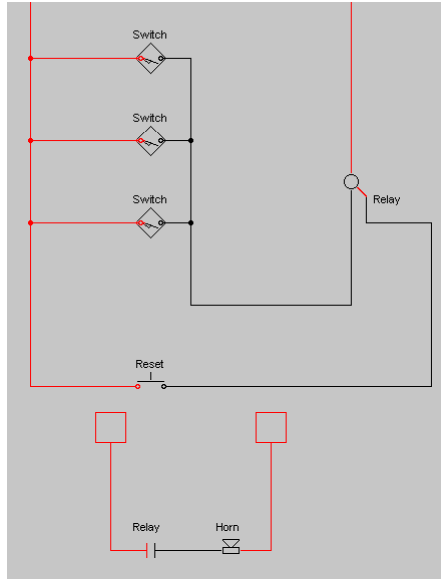
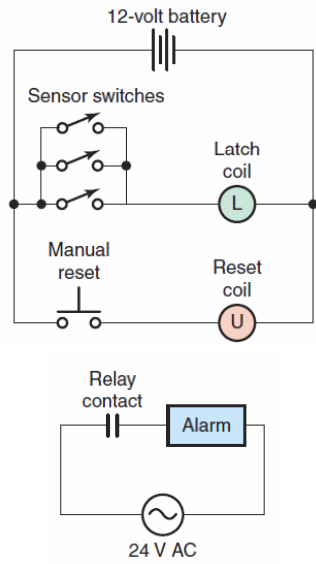
© 2010, The McGraw-Hill Companies, Inc.

Low voltage latching relay lighting control circuit continues its operation from the point of interruption after power interruption.



© 2010, The McGraw-Hill Companies, Inc.

Latching Relay Alarm Circuit



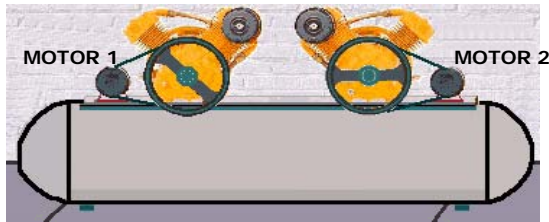
© 2010, The McGraw-Hill Companies, Inc.

ALTERNATING RELAYS

© 2010, The McGraw-Hill Companies, Inc.

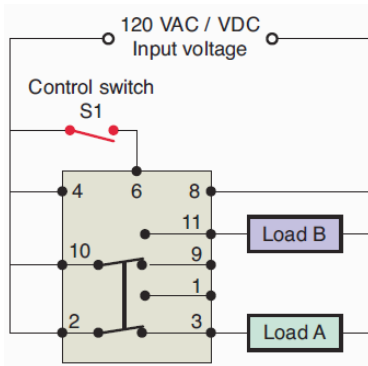
Alternating relays are a form of latching relay that transfers the contacts with each pulse.

Dual Motor Compressor System



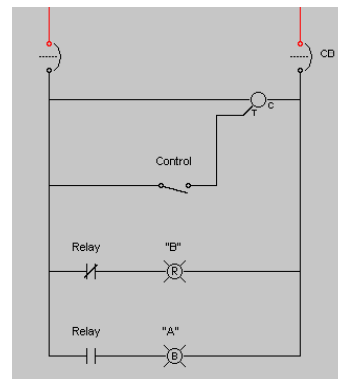
They are used in special applications where the optimization of load usage is required by equalizing the run time of two loads.

© 2010, The McGraw-Hill Companies, Inc.

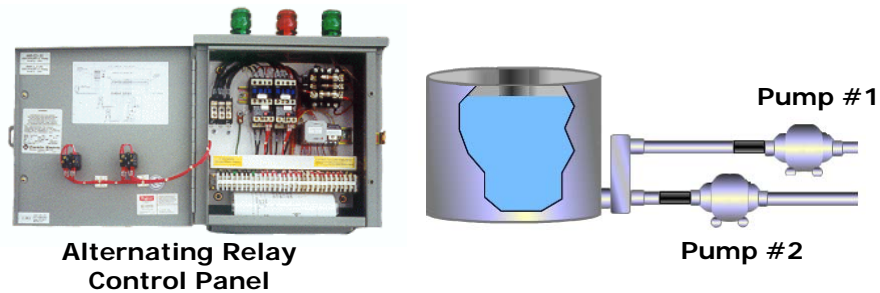


© 2010, The McGraw-Hill Companies, Inc.

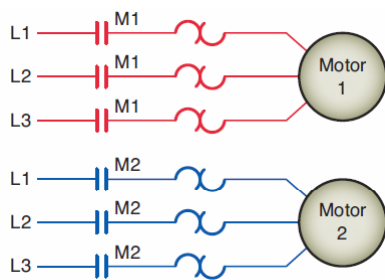
Alternating Relay Simulated Circuit



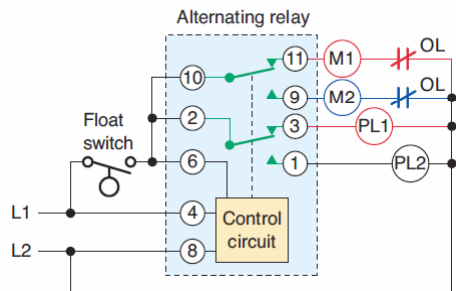
- In certain pumping applications, two identical pumps are used for the same job.
- A standby unit is made available in case the first pump fails.
- However, a completely idle pump might deteriorate and provide no safety margin.
- Alternating relays prevent this by assuring that both pumps get equal run time.



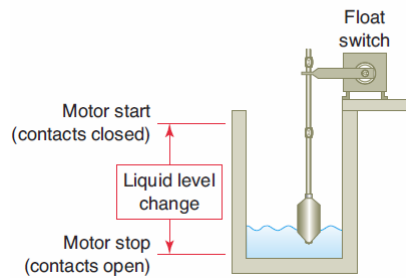
© 2010, The McGraw-Hill Companies, Inc.



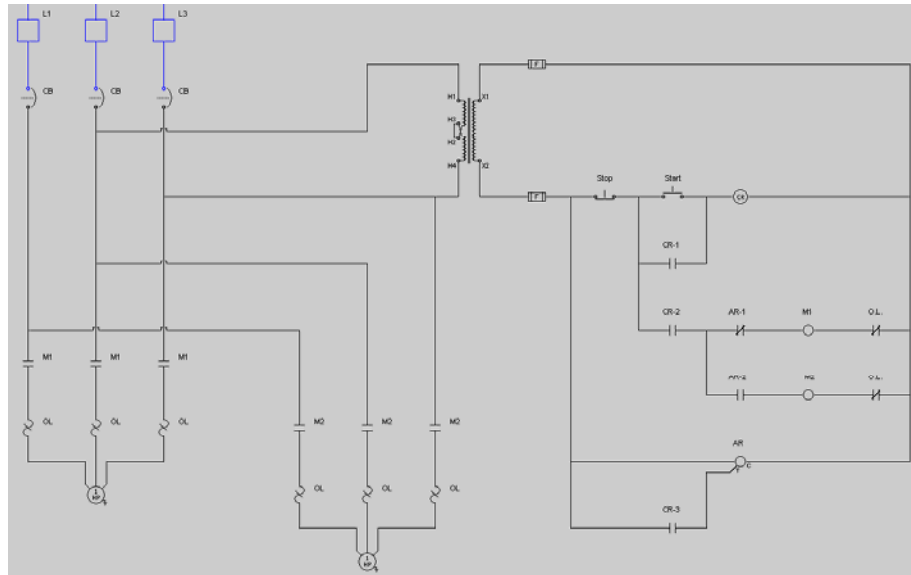
Alternating relay circuit used with a duplex pumping system where it is desirable to equalize pump run time.



© 2010, The McGraw-Hill Companies, Inc.



Simulated Alternating Relay Pumping System

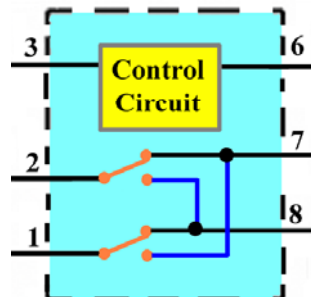


© 2010, The McGraw-Hill Companies, Inc.

DPDT *crossed-wired* alternating relays are used in applications where additional capacity may be required in addition to normal alternating operation.



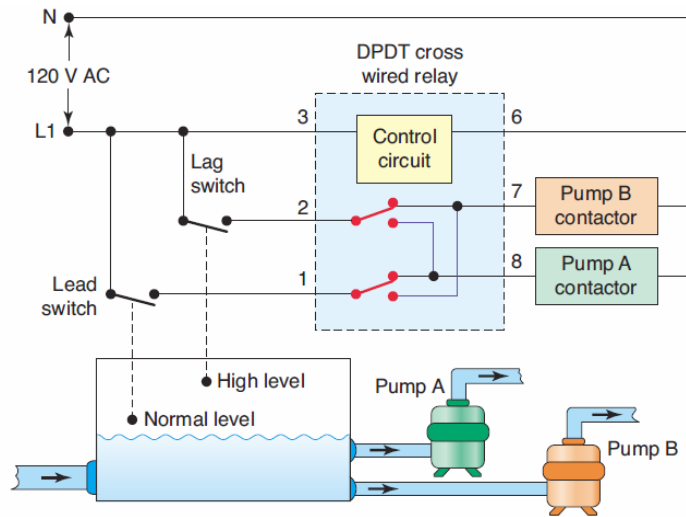
DPDT Crossed Wired Relay



These relays have the ability to alternate the loads of a dual system during normal operation or operate both when demand is high.

© 2010, The McGraw-Hill Companies, Inc.

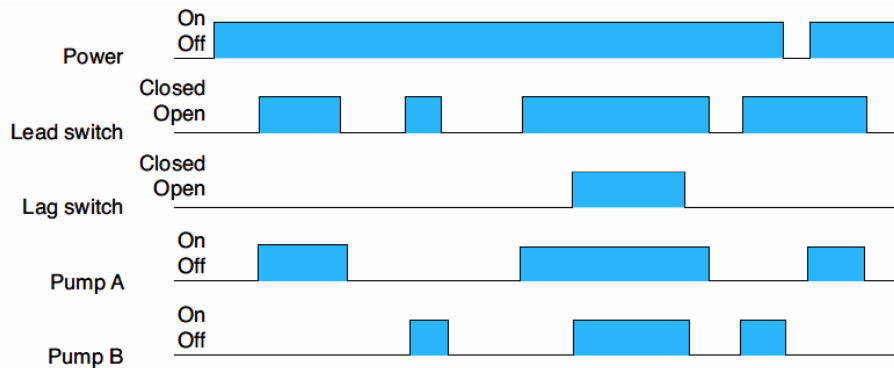
Cross-wired contact version of an alternating relay used in a dual pumping circuit.



© 2010, The McGraw-Hill Companies, Inc.

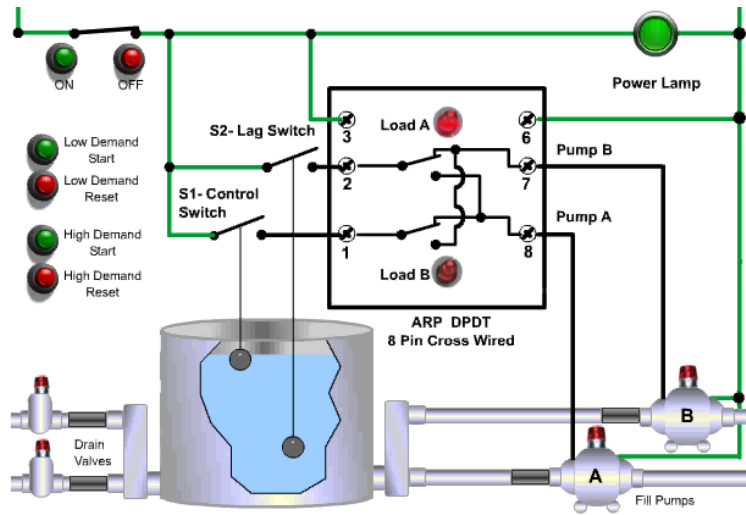
This system saves on energy because only one smaller pump is operating most of the time; yet the system has the capacity to handle twice the load.

Timing Diagram



© 2010, The McGraw-Hill Companies, Inc.

Crossed-Wired Alternating Relay Simulation



© 2010, The McGraw-Hill Companies, Inc.