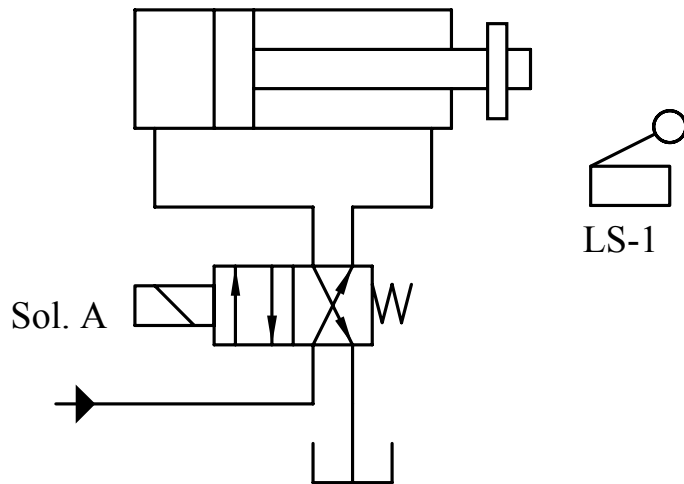


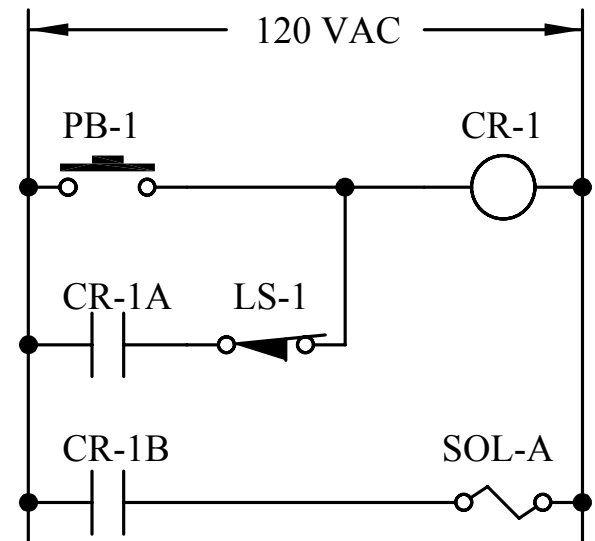
# Relay Ladder Logic Control Systems

# Ladder Logic Control

- ▶ Logic control is used with relatively simple ON/OFF systems - like pneumatics

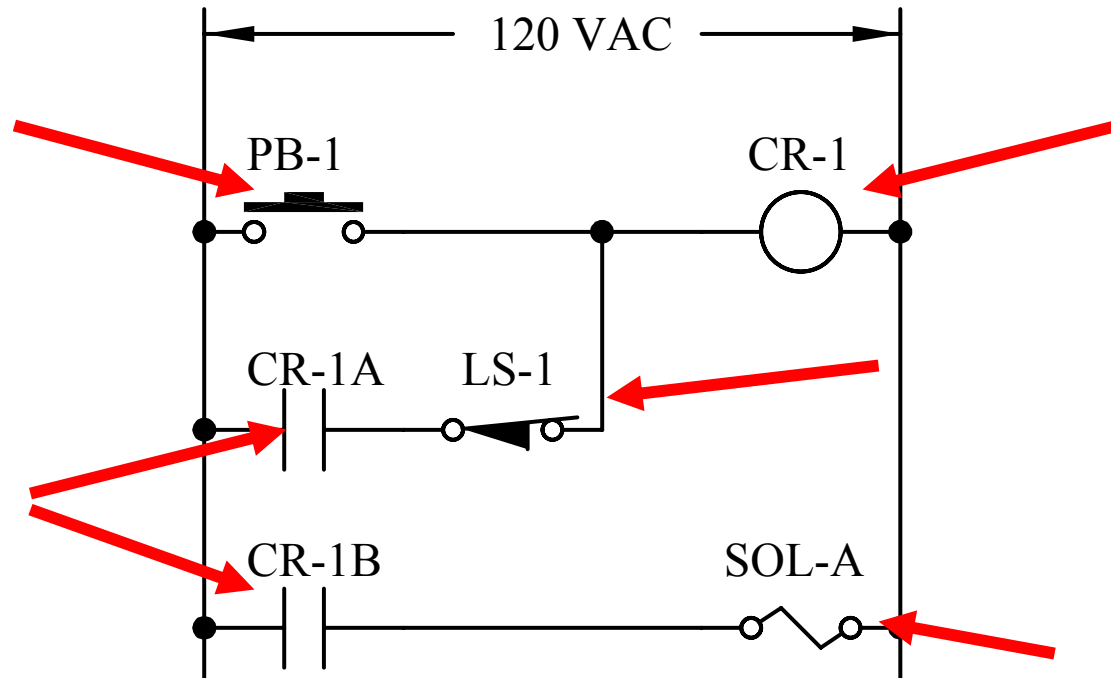


**Pneumatic System**

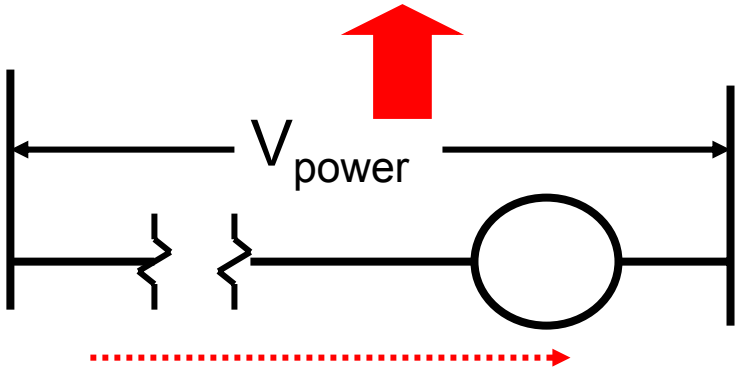
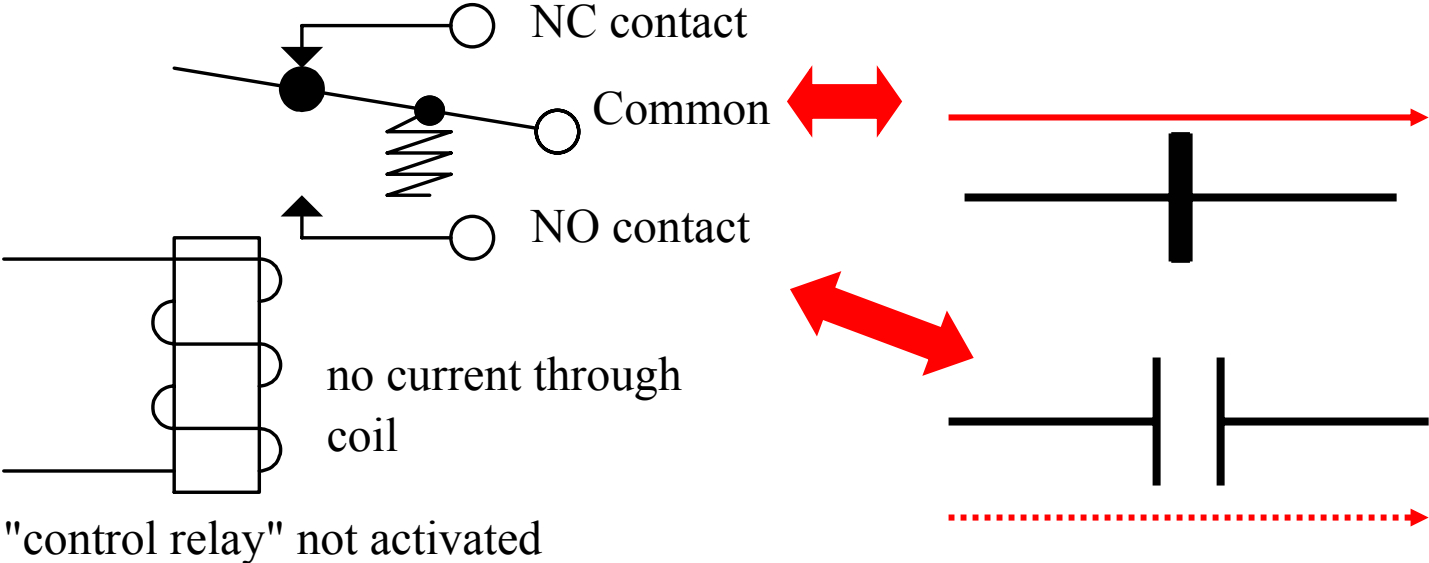


**Relay Ladder Logic (RLL) Control**

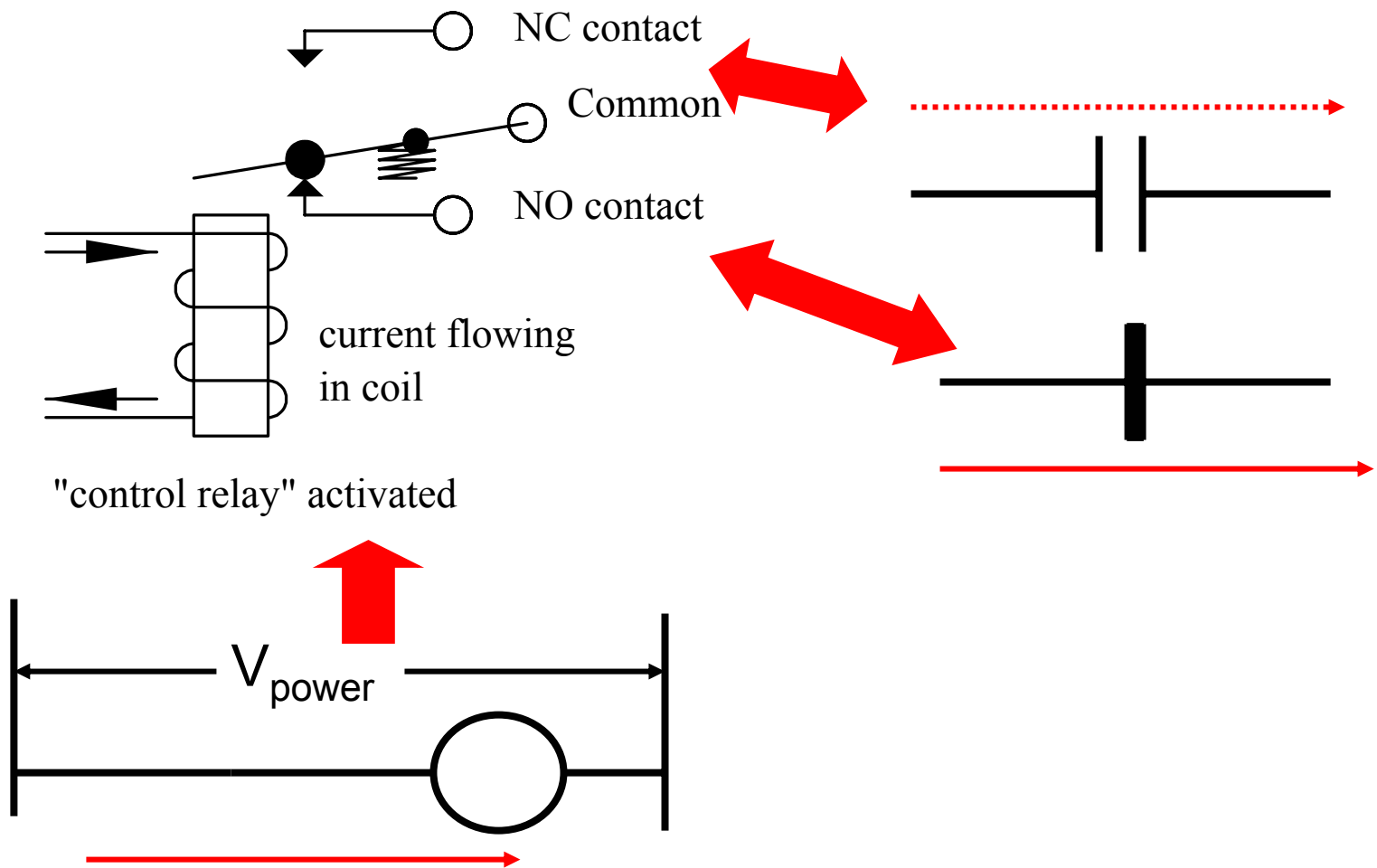
# Logic Control Components



# Control Relay - Not Activated



# Control Relay - Activated



# Normally Open Schematics



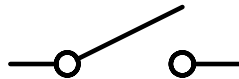
**Limit  
Switch**



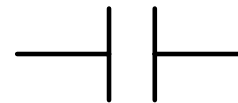
**Momentary  
Contact  
Pushbutton**



**Pressure  
Switch**



**Manual  
Switch**



**Contacts**

# Normally Closed Schematics



**Limit  
Switch**



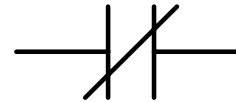
**Momentary  
Contact  
Pushbutton**



**Pressure  
Switch**

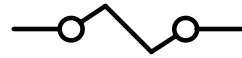


**Manual  
Switch**

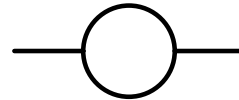


**Contacts**

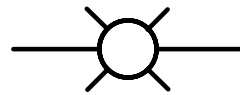
# Output Schematics



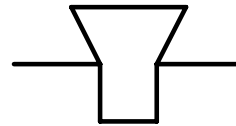
**Solenoid  
Coil**



**Control  
Relay Coil**



**Lamp**

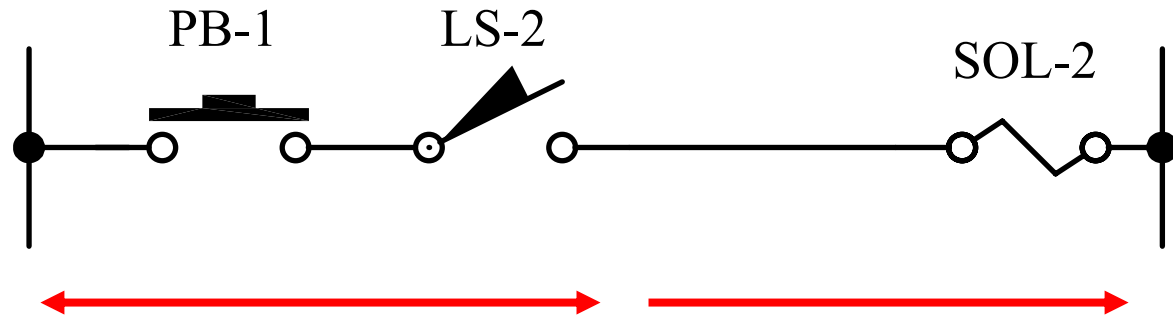


**Annunciator  
(Horn)**



# Why is it called "Logic Control?"

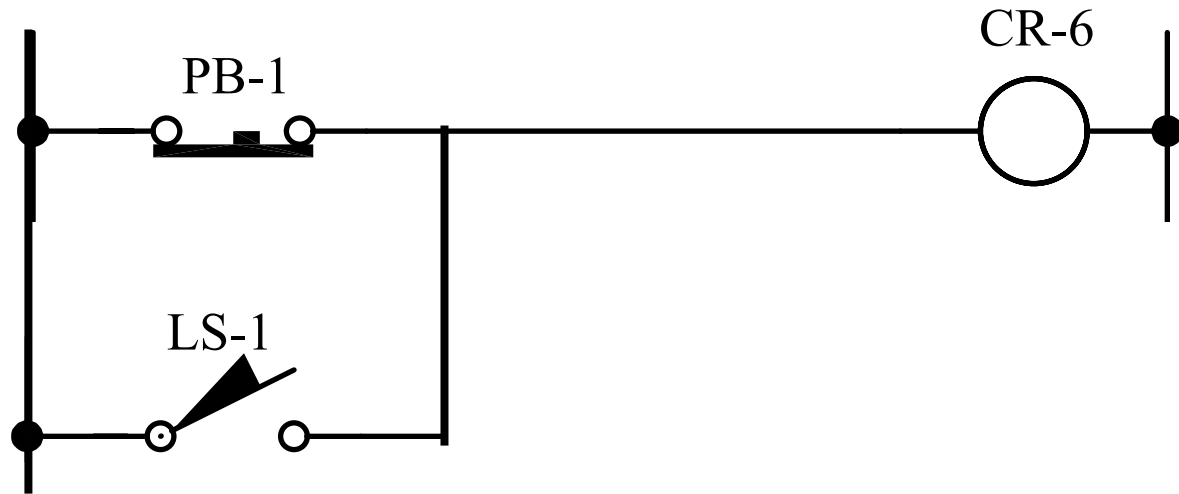
**IF** \_\_\_\_\_ **AND** \_\_\_\_\_  
**THEN** \_\_\_\_\_



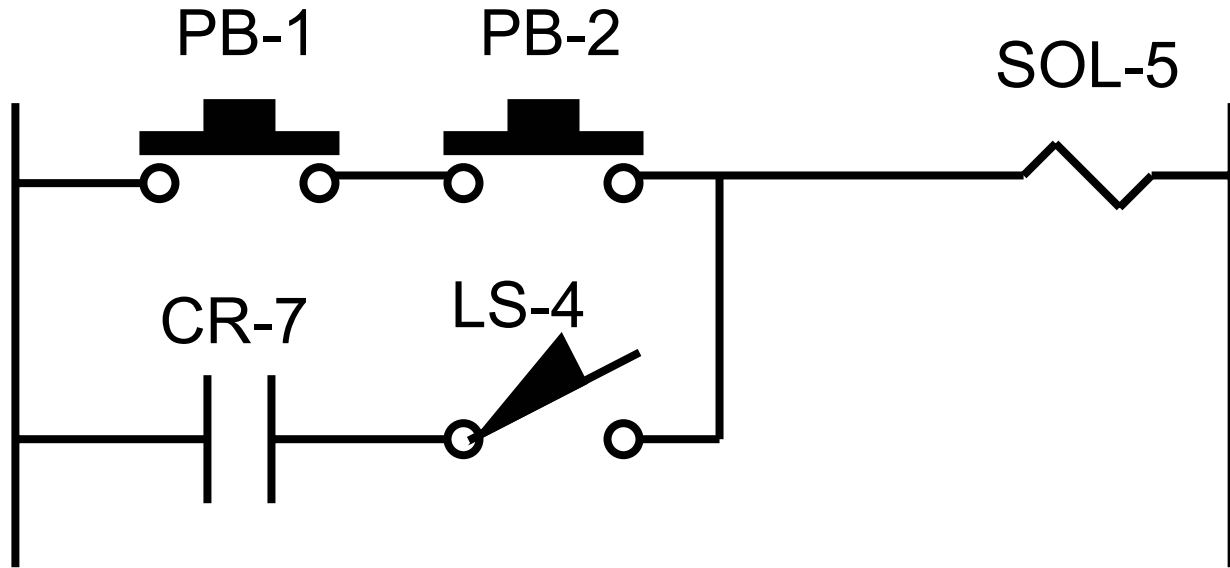
**IF there is  
continuity across  
the inputs**

# "OR" Example

**IF** \_\_\_\_\_ **OR** \_\_\_\_\_  
**THEN** \_\_\_\_\_



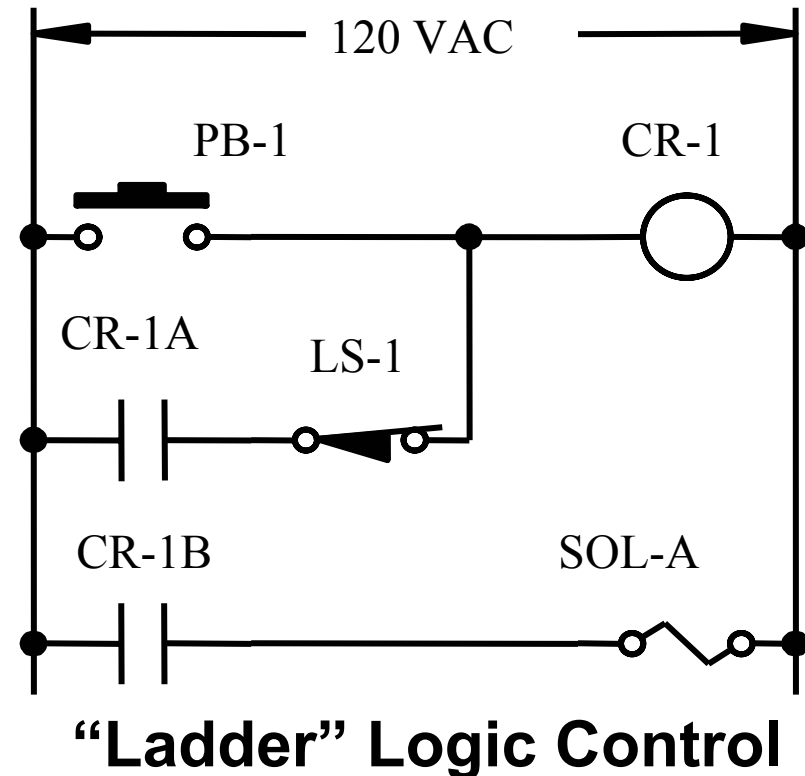
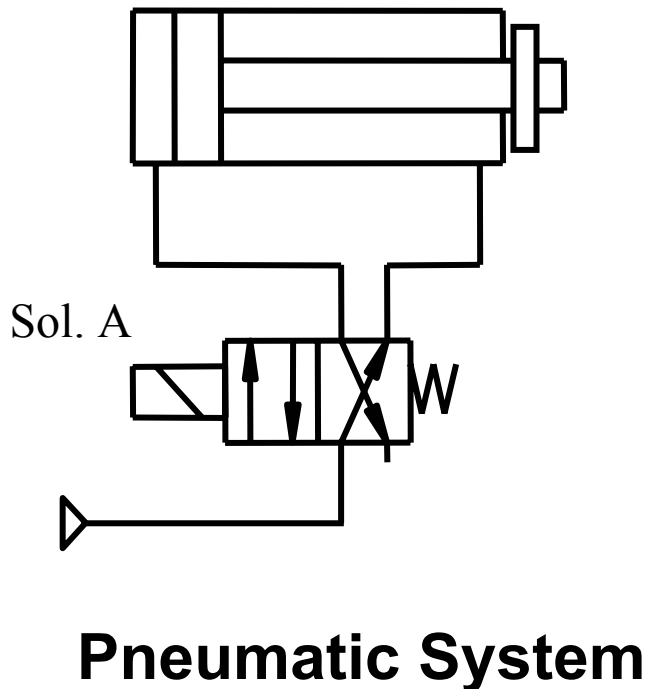
# Write the Logic for this Rung



**IF** { \_\_\_\_\_ **AND** \_\_\_\_\_ }  
**OR** { \_\_\_\_\_ **AND** \_\_\_\_\_ }  
**THEN** \_\_\_\_\_

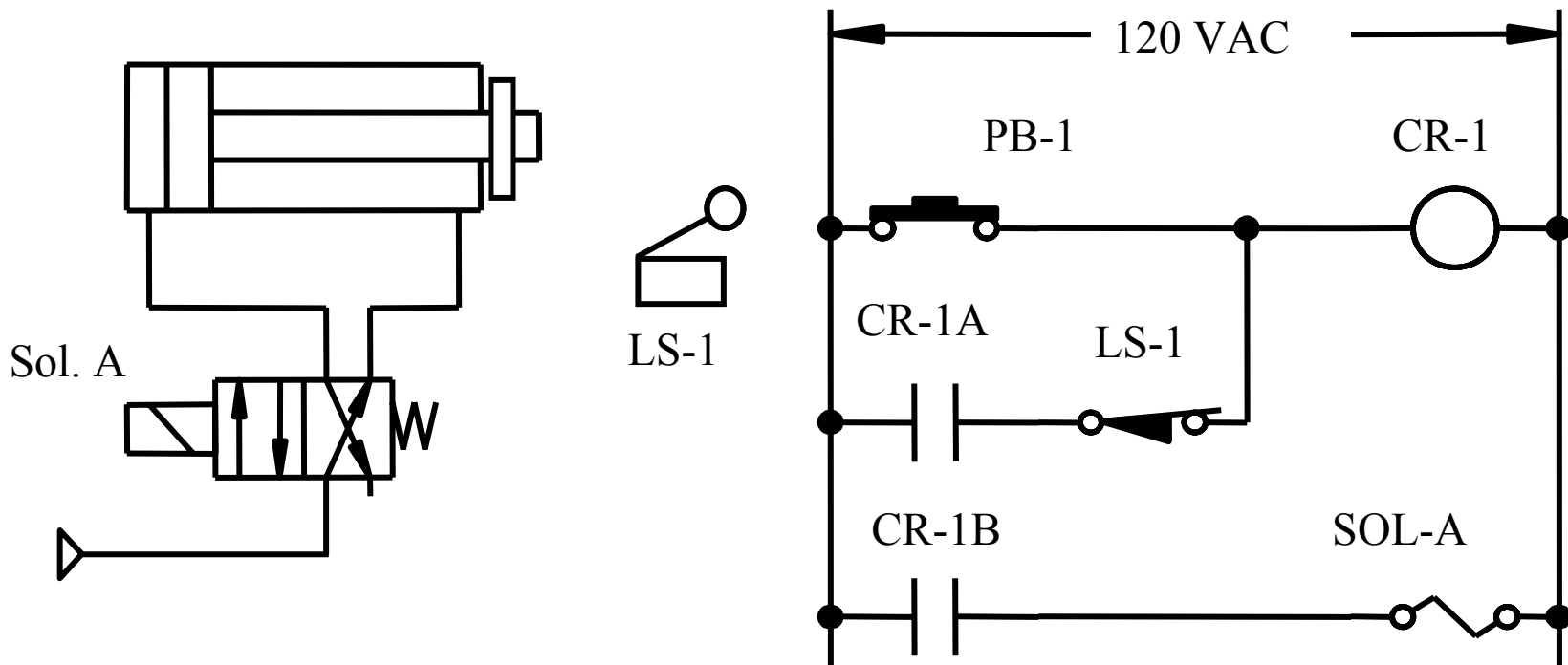
# “One Shot” - Single Stroke

- ▶ Pressing the pushbutton PB-1 will cause the cylinder to extend and retract one time



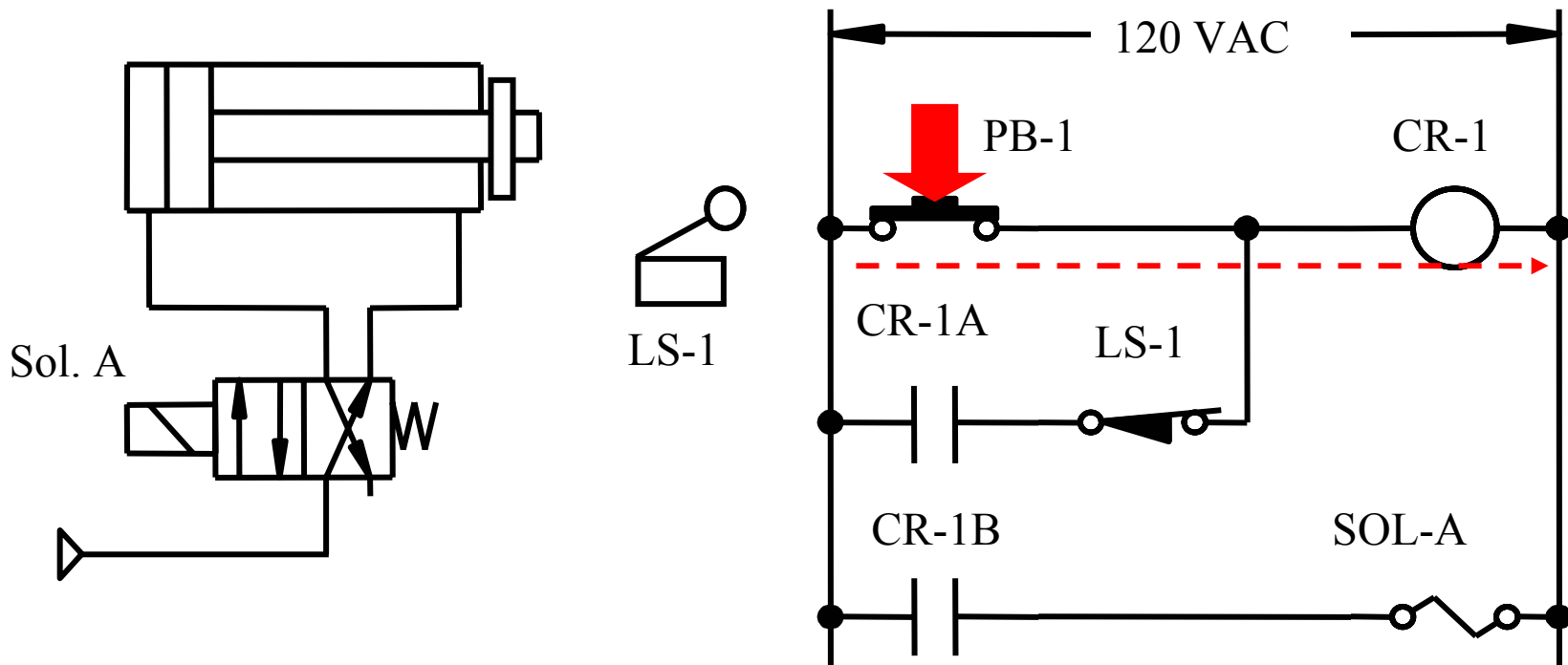
# "One Shot" - Step #1

- ▶ Pressing the momentary contact pushbutton PB-1 energizes the control relay CR-1



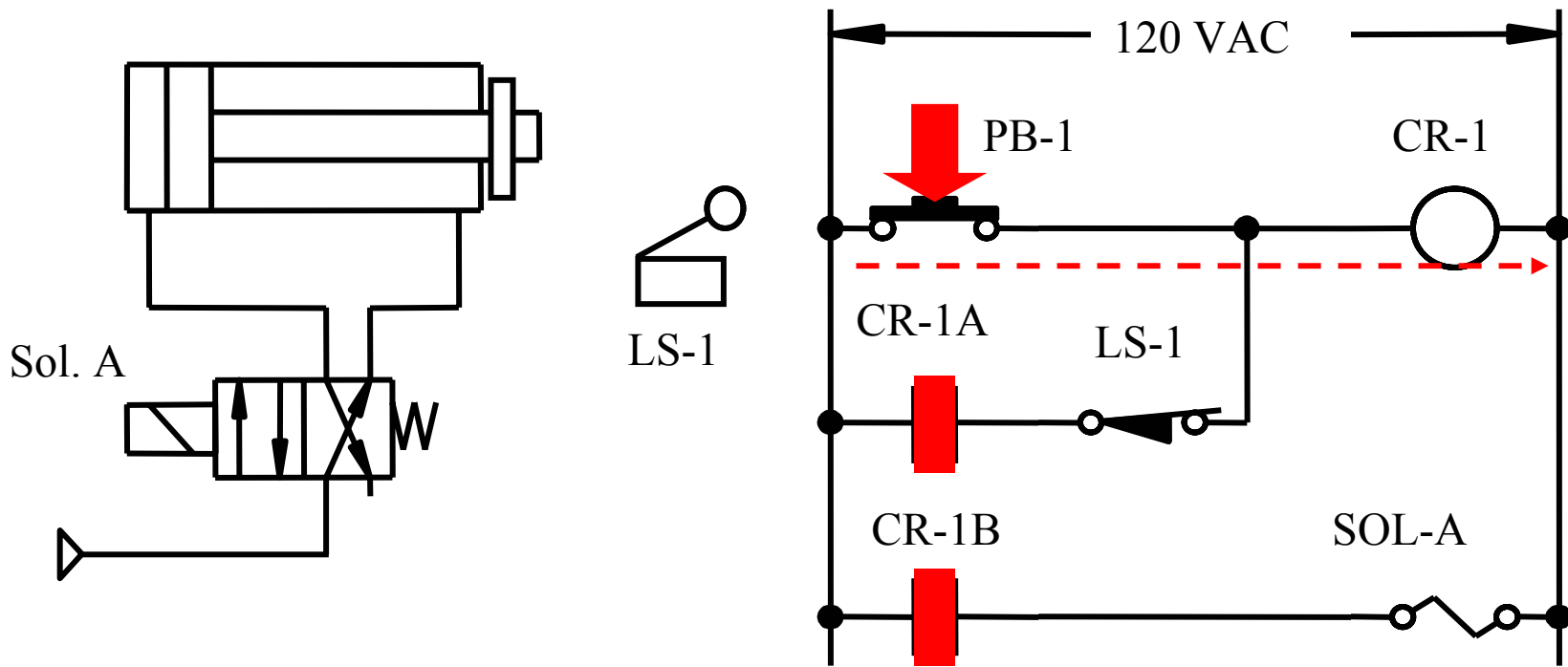
# "One Shot" - Step #2

- ▶ After control relay CR-1 energizes, normally open contacts CR-1A and CR-1B activate



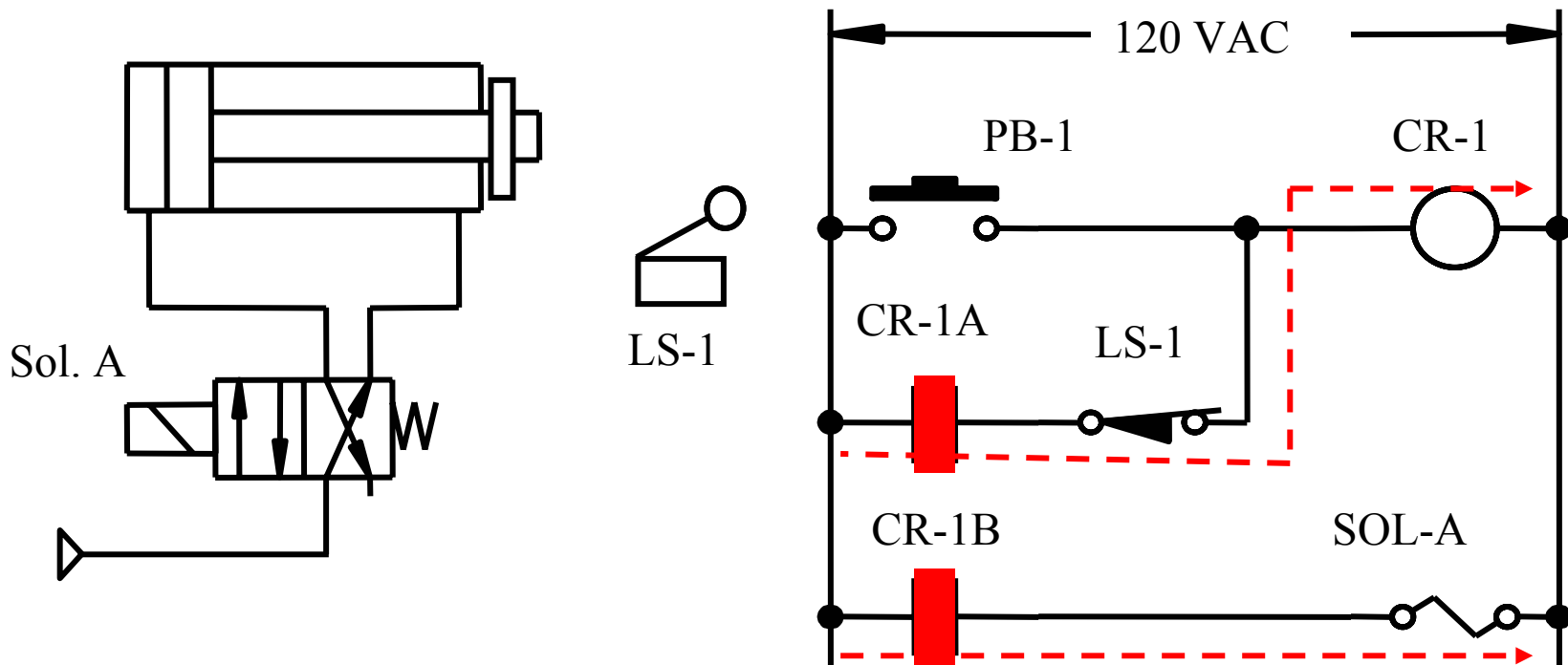
# "One Shot" - Step #3

- ▶ Control relay CR-1 is now energized by a 2nd path, solenoid SOL-A also activates



# "One Shot" - Step #4

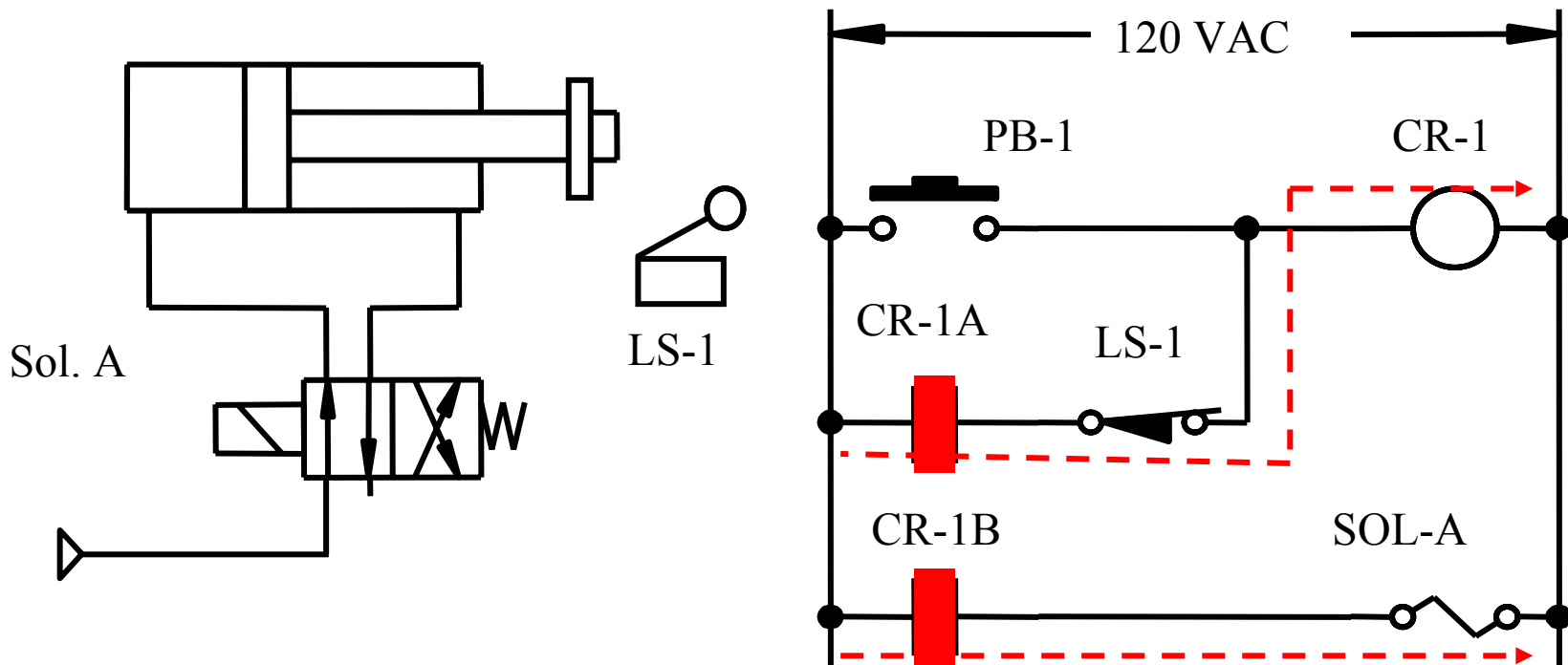
- ▶ PB-1 is released, but control relay CR-1 is still energized by the 2nd path ("hold" circuit)





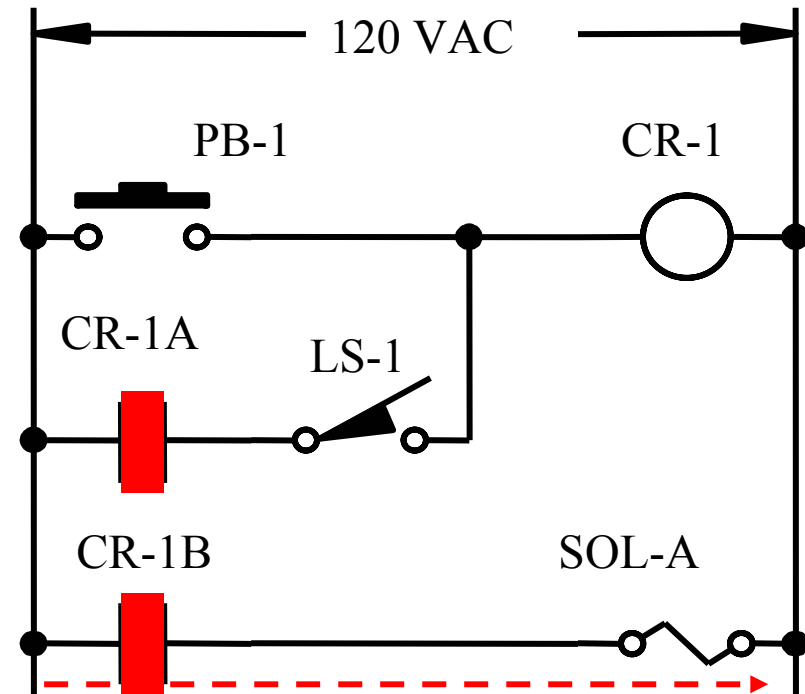
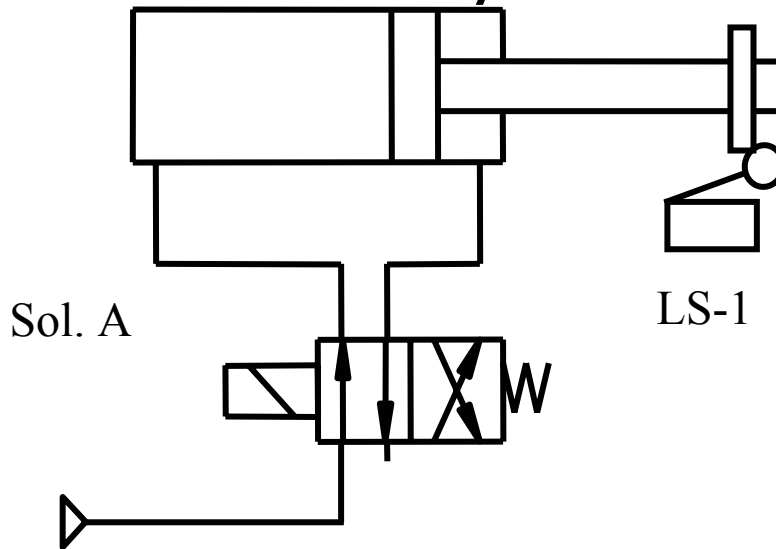
# "One Shot" - Step #5

- ▶ Solenoid A shifts the valve spool to the right, and the cylinder begins to extend



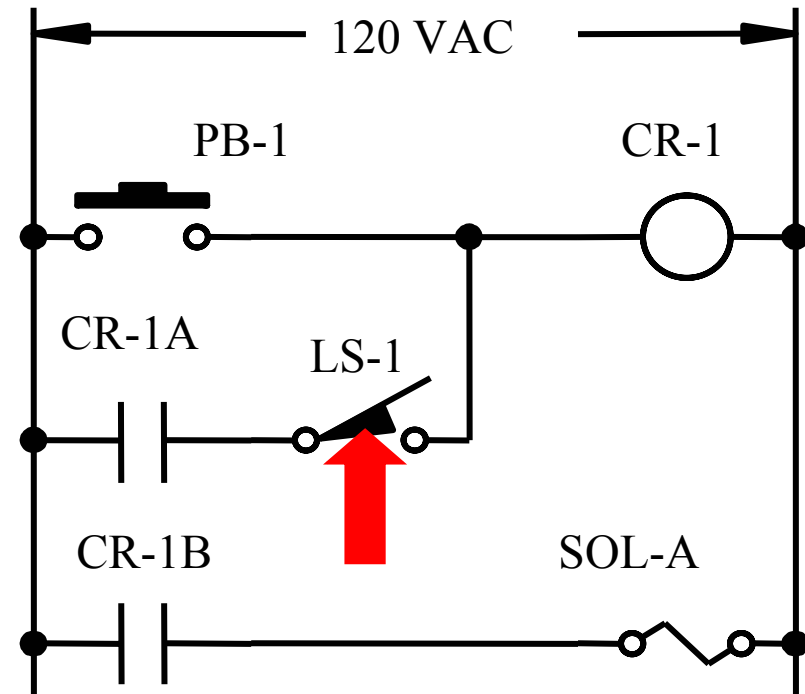
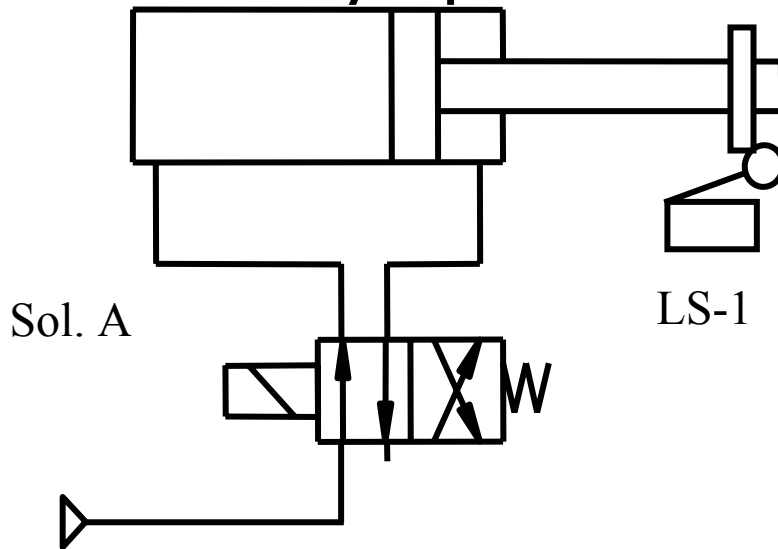
# "One Shot" - Step #6

- ▶ Cylinder activates the normally closed limit switch LS-1, which "kills" the hold circuit for control relay CR-1



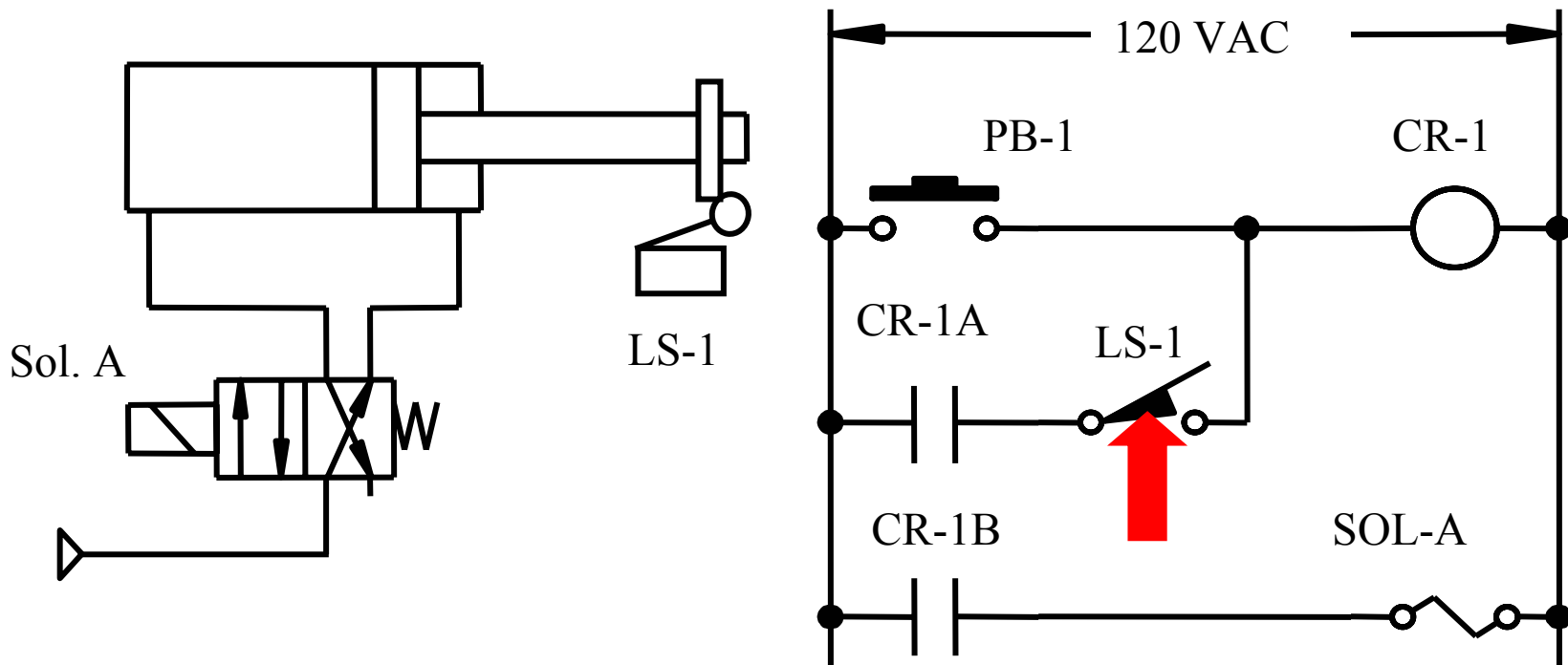
# "One Shot" - Step #7

- ▶ With control relay CR-1 de-activated, the contacts CR-1A and CR-1B return to their normally open state



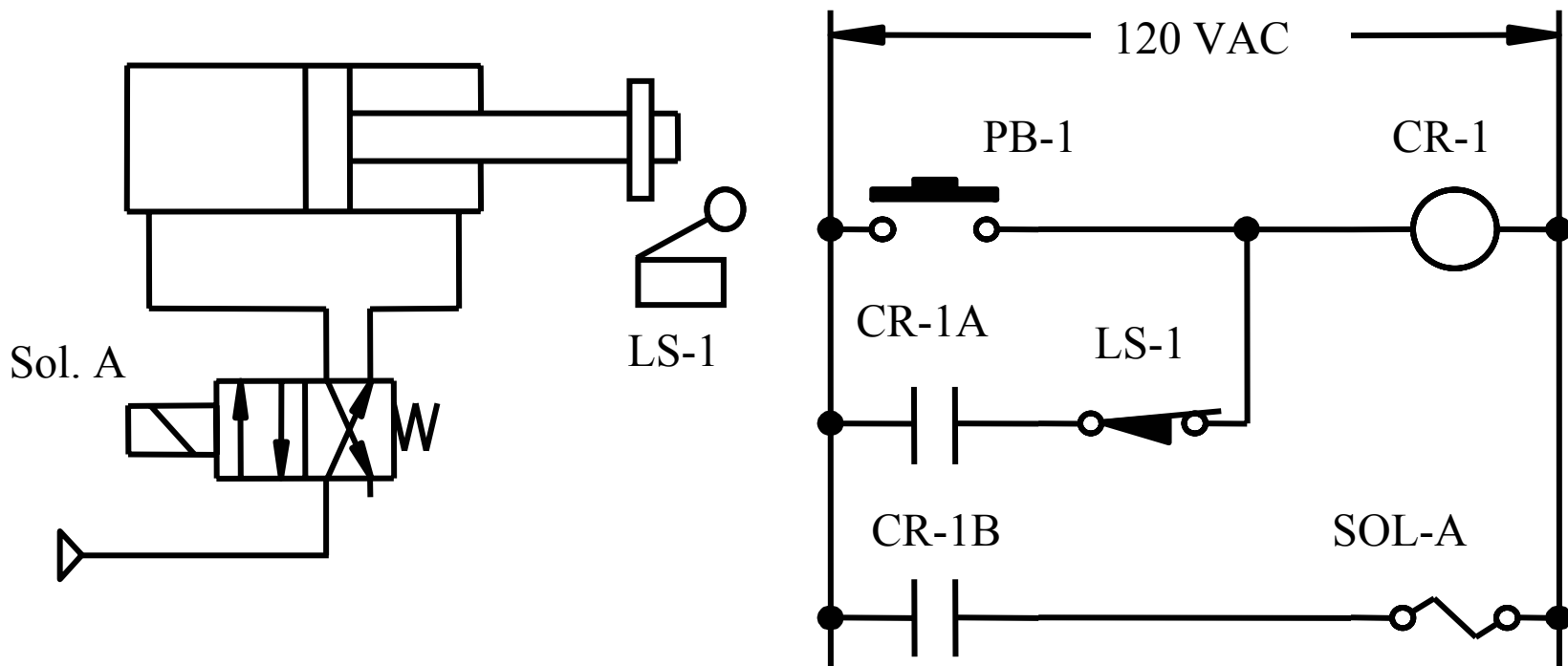
# "One Shot" - Step #8

- ▶ CR-1B is now open, SOL-A is de-activated, spring returns valve to default state



# "One Shot" - Step #9

- ▶ Cylinder begins to retract, and "rolls off" of LS-1, which returns to its N.C. state



# "One Shot" - Step #10

- ▶ Cylinder fully retracts and system has returned to the start-up configuration

