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
Control Relay - Not Activated

- NC contact
- NO contact
- Common
- "control relay" not activated
- no current through coil
- V_{\text{power}}
Control Relay - Activated

current flowing in coil

"control relay" activated

V power

NC contact
Common
NO contact
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 _____________________________________

PB-1

LS-1

CR-6
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.

Pneumatic System

“Ladder” Logic Control
“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
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