Design Problem #1

► Press Start pushbutton (X0)
► Extend Cyl A
► After full extension of Cyl A, extend Cyl B
► After full extension of Cyl B, retract both Cyl A & Cyl B

Questions to Ask for Cyl A

► What condition(s) must be true to activate Y1 and extend Cyl A?

► What condition(s) must be true to deactivate Y1 and retract Cyl A?

Questions to Ask for Cyl B

► What condition(s) must be true to activate Y2 and extend Cyl B?

► What condition(s) must be true to deactivate Y2 and retract Cyl B?
Design Problem #2

► Press Start pushbutton
► Cylinder A fully extends,
  ▪ Delay of 5 seconds, then
► Cylinder A fully retracts

Timers (T0 - T377)

► When contacts C6 close, timer T1 will count for 2.5 seconds (K25 = 25 tenths)
► After 2.5 sec, contacts T1 will close (and stay closed until C6 opens and turns timer off)

Questions to Ask for Cyl A

► What condition(s) must be true to activate Y0 and extend Cyl A?
  •
  •
► What condition(s) must be true to deactivate Y0 and retract Cyl A?
  •
Design Problem #3

► Press Start pushbutton (X4)
► Cycle Cylinder B 3 times
  • “cycle” means cylinder fully extends, then fully retracts

Counters (CT0 - CT177)

► Each time contacts X0 close, counter increments by 1
► When counter reaches 6 (K6 = 6 counts), counter output CT2 closes
► When contacts C9 close, counter will reset to zero (and the contacts CT2 will open)

Questions to Ask for Cyl B

► What condition(s) must be true to activate Y3 and extend Cyl B?
  • 
  • 
► What condition(s) must be true to deactivate Y3 and retract Cyl B?
  • 
  • 
► What condition(s) must be true to reset the counter?
Design Problem #4

► Press Start pushbutton (X0)
► Extend Cyl A and Cyl C
► After full extension of Cyl A, extend Cyl B
► After full extension of Cyl B, retract both Cyl A & Cyl B
► After both Cyl A & Cyl B fully retract, then retract Cyl C

PLC wiring diagram #4
Design Problem #5

- Press two Start buttons
- Cyl A completely extends, waits 5 seconds, then fully retracts,
- After Cyl A is fully retracted, Cyl B then completely extends and immediately retracts 6 times in sequence,
- If the “Stop” button is pressed at any time, the cylinders both retract and the circuit returns to the start-up configuration

PLC wiring diagram #5

<table>
<thead>
<tr>
<th>Inputs</th>
<th>Outputs</th>
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</thead>
<tbody>
<tr>
<td>X0</td>
<td>Y0</td>
</tr>
<tr>
<td>X1</td>
<td></td>
</tr>
<tr>
<td>X2</td>
<td>Y1</td>
</tr>
<tr>
<td>X10</td>
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<td>X11</td>
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<tr>
<td>X20</td>
<td></td>
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<tr>
<td>X21</td>
<td></td>
</tr>
</tbody>
</table>

+24VDC

Start1
Start2
Stop
Cyl A - In
Cyl A - Out
Cyl B - In
Cyl B - Out

Sol-A
Sol-B
Design Problem #6

► Press "Coffee" and "Vend"
  • activate "Coffee" solenoid for 10 seconds

► Press "Coffee", "Cream", and "Vend"
  • activate "Coffee" solenoid for 8 seconds
  • activate "Cream" solenoid for 2 seconds

► Press "Coffee", "Sugar", and "Vend"
  • activate "Coffee" solenoid for 10 seconds
  • activate "Sugar" solenoid for 2 seconds

► Press "Coffee", "Cream", "Sugar", and "Vend"
  • activate "Coffee" solenoid for 7 seconds
  • activate "Cream" solenoid for 2 seconds
  • activate "Sugar" solenoid for 2 seconds