Hydraulics & Pneumatics

Chapter 4: Programmable Logic Controller
(PLC for Repeated Sequence)

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Lesson Outcome

• By the end of this lecture, student should be able to:
  - Design and analyze the pneumatics and hydraulics components with PLC to perform repeated sequence.
Content

• Definition of Repeated Sequence
• Approach to Solve Repeated Sequence
• Example of Problem
• Example: Design a hydraulic system with the following sequence using double solenoid valves.

A+  B+  A-  B-  A+  A-
Solution

• Identify sequence
• Group – one group will have one relay
• Identify limit switch status
• Start operation with turn ON relay group 1
• Turn ON every subsequent relay group
• Turn OFF all relay group
• Finish by turn OFF last relay group
Example

A+   B+   A-   B-    A+    A-
k1           k2       k3     k4

Group 1

Start with turn ON k1
k1 → Start.a0
A+ → k1 k3.b0
B+ → k1.a1

Group 2

Start with turn ON k2
k2 → b1.k1
A- → k2.b1 k4.
a1
B- → k2.a0
Group 3

Start with turn ON k3

\[ k3 \rightarrow k2.b0 \]

A+: Was set in Group 1

Group 4

Start with turn ON k4

\[ k4 \rightarrow k3.a1 \]

A-: Was set in Group 2

Using the last sensor

turn OFF k4 \[ k4.a0 \]
Summary

k1 → Start.a0
A (+) → k1 (+) k3.b0
B (+) → k1.A1
k2 → b1.k1
A- → k2.b1 (+) k4.
a1
B- → k2.a0
k3 → k2.b0
k4 → k3.a1
Remember!
Dots are SERIES
Pluses are PARALLEL
Example

• Similar Example: Design a hydraulic system with the following sequence using SINGLE solenoid valves.

A+  B+  A-  B-  A+  A-
In this lesson, we have learned how to design PLC ladder diagram for repeated sequence.