Laboratory Report

Experiment 7: PLC Control

Programme: Mechatronics Engineering
Mechatronics Control and Automation Lab (MCTA 3104)
Section 2
Semester 1 2024/2025
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Table of Contents

Objectives

- To understand the concept of PLC programming and PLC integration with various sensors, switches and actuators.

Material and Equipment

- Connecting wires
- Computer with MicroLogix500 PLC software
- PLCSiemens Hardware
- Pneumatics Hardware
- Rubber tubes

Experiment Setup

Typical PLC hardware connection is shown in Fig. 1 and Fig.2

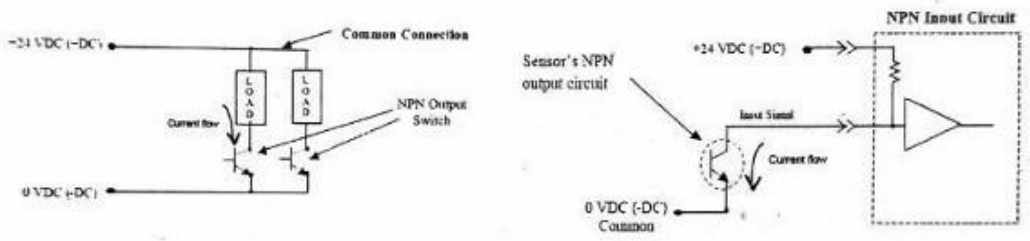


Fig.1: NPN connection to PLC for input and output.

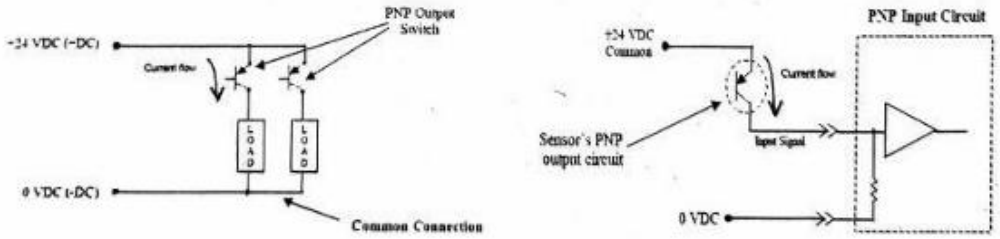


Fig.2: NPN connection to PLC for input and output.

Program 1:

1. A ladder logic program is developed where both inputs must be activated simultaneously to turn on an output.
2. Another ladder logic program is created where activating either one of the two inputs is sufficient to turn on an output.

Program 2:

1. A ladder program is written to turn on an output after 10 second, a Normally Open (NO) and a Normally Closed (NC) connection are triggered.
2. The output remains ON for 10 seconds once both the NO and NC connections are executed.

Program 3:

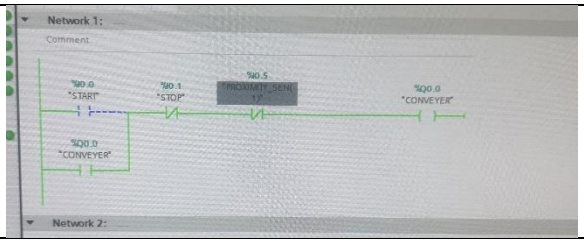
1. A ladder program is configured with two inputs required to enable a TON (On Delay) timer. Once the timer completes its countdown, a double-acting cylinder is activated to move forward. A separate push button is used to reverse the movement of the double-acting cylinder.
2. The program includes a counter to track the number of cycles performed by the double-acting cylinder. After five cycles, a single-acting cylinder is programmed to move forward.

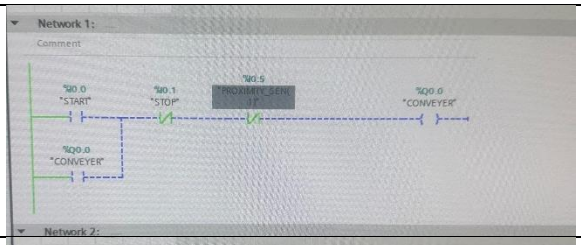
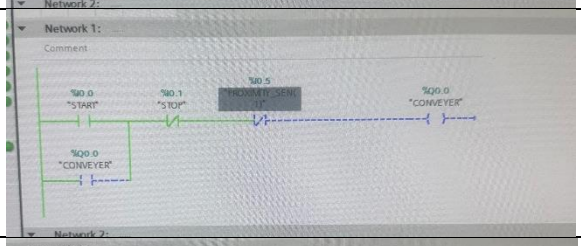
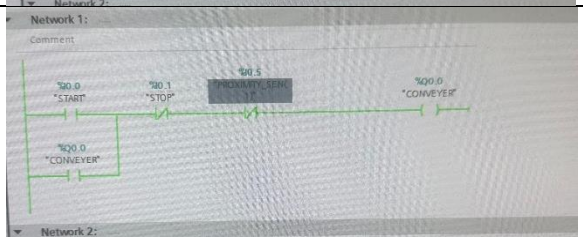
Program 4:

1. A ladder program is designed to start with a single push button. When pressed, it activates a TON timer for 2 seconds. After the timer finishes, a double-acting cylinder moves forward.
2. Once the first TON timer completes its operation, a second TON timer is triggered for another 2 seconds. After this, the double-acting cylinder retracts to its original position.
3. This sequence continues to repeat until a reset button is pressed, which interrupts the power supply and stops the ladder program.

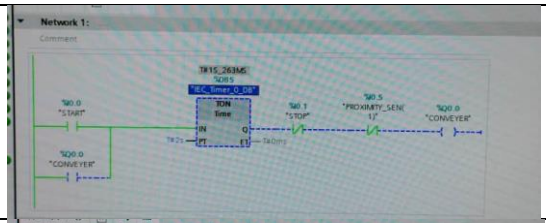
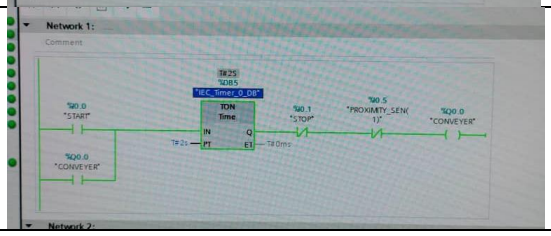
Results

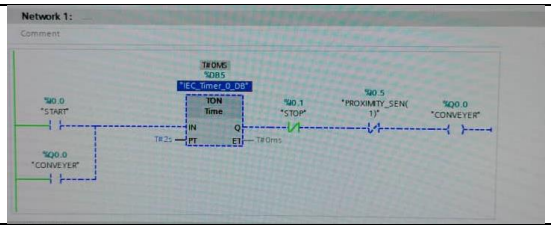
Program 1:

Num	Result
1	

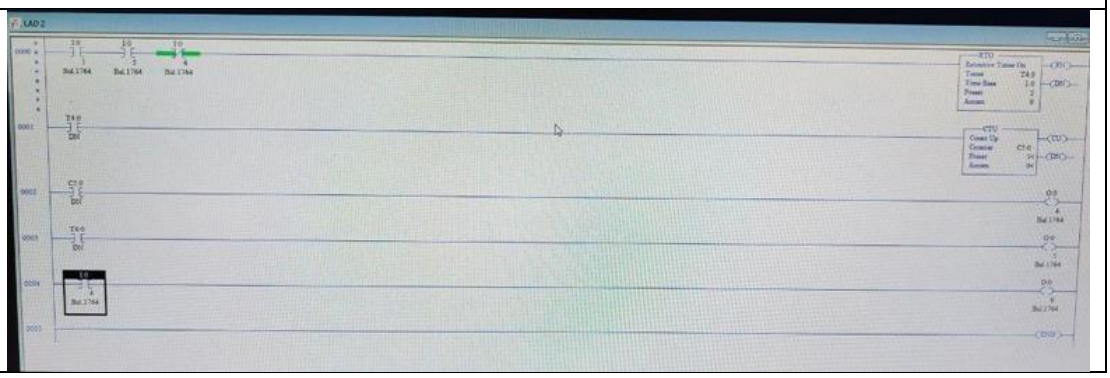
2	
3	
4	

Program 2:

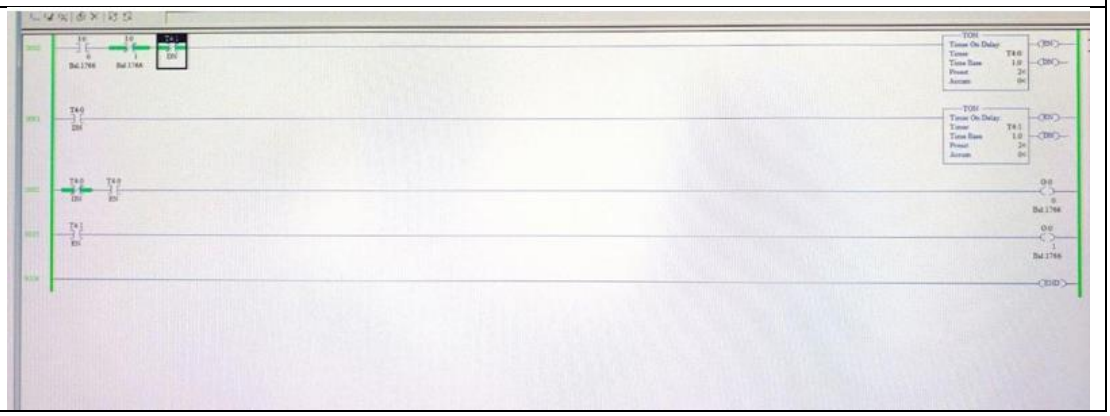
Num	Result
1	
2	

3	

Program 3:

Num	Result
1	

Program 4:

Num	Result
1	

Conclusion

In conclusion, from the result carried out during the lab session, we gained an understanding that PLCs function as the central controllers of automated systems, ensuring precise and reliable operation of machinery and processes. By connecting with sensors, switches, and actuators, PLCs can observe real-world conditions, implement programmed logic, and adjust the performance of industrial systems to adapt to varying environments or production demands. Each program we completed enhanced our knowledge of integrating PLC software with PLC hardware and pneumatic systems.