1 Objective

The objective of this experiment is to demonstrate the concept of using memory bits in the output latching technique within a Programmable Logic Controller (PLC). The experiment involves implementing a ladder logic diagram that utilizes memory bits to maintain the state of outputs, specifically controlling a main contactor and two pumps.

2 Equipment

The following equipment is required for this experiment:

1. Siemens S7 1200 PLC Module or LOGO PLC.
2. PC with TIA PORTAL or LOGO SOFT Comfort installed.

3 Lab Work

In this section, develop the provided ladder diagram using the appropriate software (TIA PORTAL for Siemens S7 1200 or LOGO SOFT Comfort for LOGO PLC). After creating the ladder logic, upload it to the PLC module and execute the program to observe the behavior.

3.1 Ladder Diagram

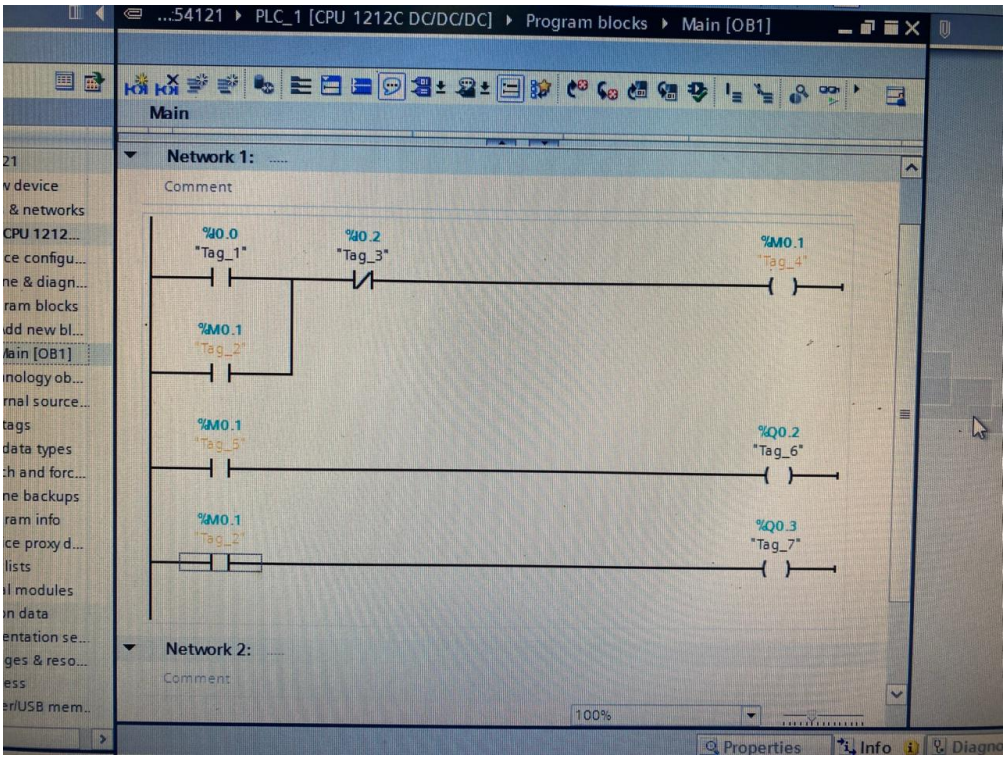

Figure 1: Simple Demonstration of Using Memory Bits

Additional details: Ensure the ladder logic incorporates memory bits to latch the outputs for the main contactor and pumps. Test the system by simulating the start and stop button presses to verify the latching and unlatching functionality.

4 Experimental Work

The experiment focuses on controlling a main contactor and two pumps (Pump A and Pump B) using a PLC with a ladder diagram that employs memory bits for output latching. The setup includes:

- A start button that, when pressed, activates the main contactor, Pump A, and Pump B. Memory bits ensure these outputs remain on even after the start button is released.
- A stop button that deactivates all outputs (main contactor, Pump A, and Pump B), resetting the system.

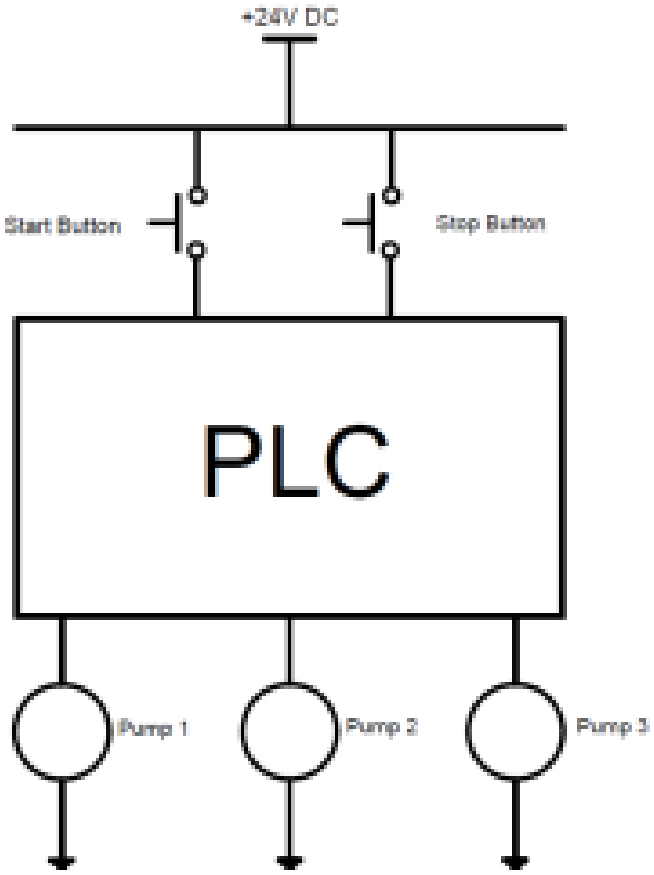

Figure 2: Pump Operation Using Memory Bits

Additional details: The use of memory bits ensures continuous operation of the pumps until the stop button is pressed, demonstrating a practical application of latching in industrial control systems. Monitor the PLC's input/output status to confirm proper latching behavior.

5 Discussion

The experiment, titled "Demonstrating the Concept of Using Memory Bits in Output Latching Technique," successfully utilized a Siemens S7-1200 PLC Module or LOGO PLC, programmed via TIA Portal or LOGO Soft Comfort, to design a ladder logic circuit. The circuit latched a main contactor and two pumps (Pump A and Pump B) using a start button, maintaining their state through memory bits until the stop button was pressed. This demonstrated reliable latching and unlatching, mirroring real-world pump control systems, such as those in water treatment or industrial automation, where continuous operation is required until an explicit stop command is issued.