Lab 2: 2 DC Motors

Michael McCorkell

Humber Polytechnics

Programmable Logic Controllers: MENG 3500 0NB

Savdulla Kazazi

February 3, 2025

PROGRAMMABLE LOGIC CONTROLLERS
MENG 3500

LABORATORY ASSIGNMENT SHEET

Lab Assignment	Description	Lab Attendance	Successful Run	Report Mark
1	Motor Control	✓	Jaadu Jan 16, 2025	
2	Two-DC Motors Control With The Problem Detection	✓	Jaadu Jan 23, 2025	
3	Timers and Counters	✓	Jaadu Jan 30, 2025	
4	Computations and Comparison			
5	Cascading Sequence			
6	Sequencer Output Application			
7	Stepper Motor Control			
8	Programming with ST, FBD, SFC			
9	Temperature ON-OFF control			
10	Temperature PID control			

Lab Activities and Submission													
Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12	Week 13	Week 14
Lab 1	Lab 2	Lab 3	Lab 4	Lab 5	Make up Lab	Make up Lab	Lab 6	Lab 7	Lab 8	Lab 9	Lab 10	Make up Lab	Make up Lab
	Report 1	Report 2	Report 3	Report 4	Report 5			Report 6	Report 7	Report 8	Report 9	Report 10	

Student Name: Michael McCorkell **Student No.** N01500049 **Section No.** ONB

It is the student's responsibility to keep this sheet up to date as the proof of the course work.

Notes:

- The column titled Attendance will be checked at the end of the lab activity.
- The column titled Successful Runs, will be initialed when the assignment is seen to run and satisfy the requirements.
- The column titled Report / Mark will be initialed when the report has been handed in to the professor and marked.
- The minimum passing mark will be given to the signed assignments without written report. All the labs have to be handed in satisfying the rubric below.

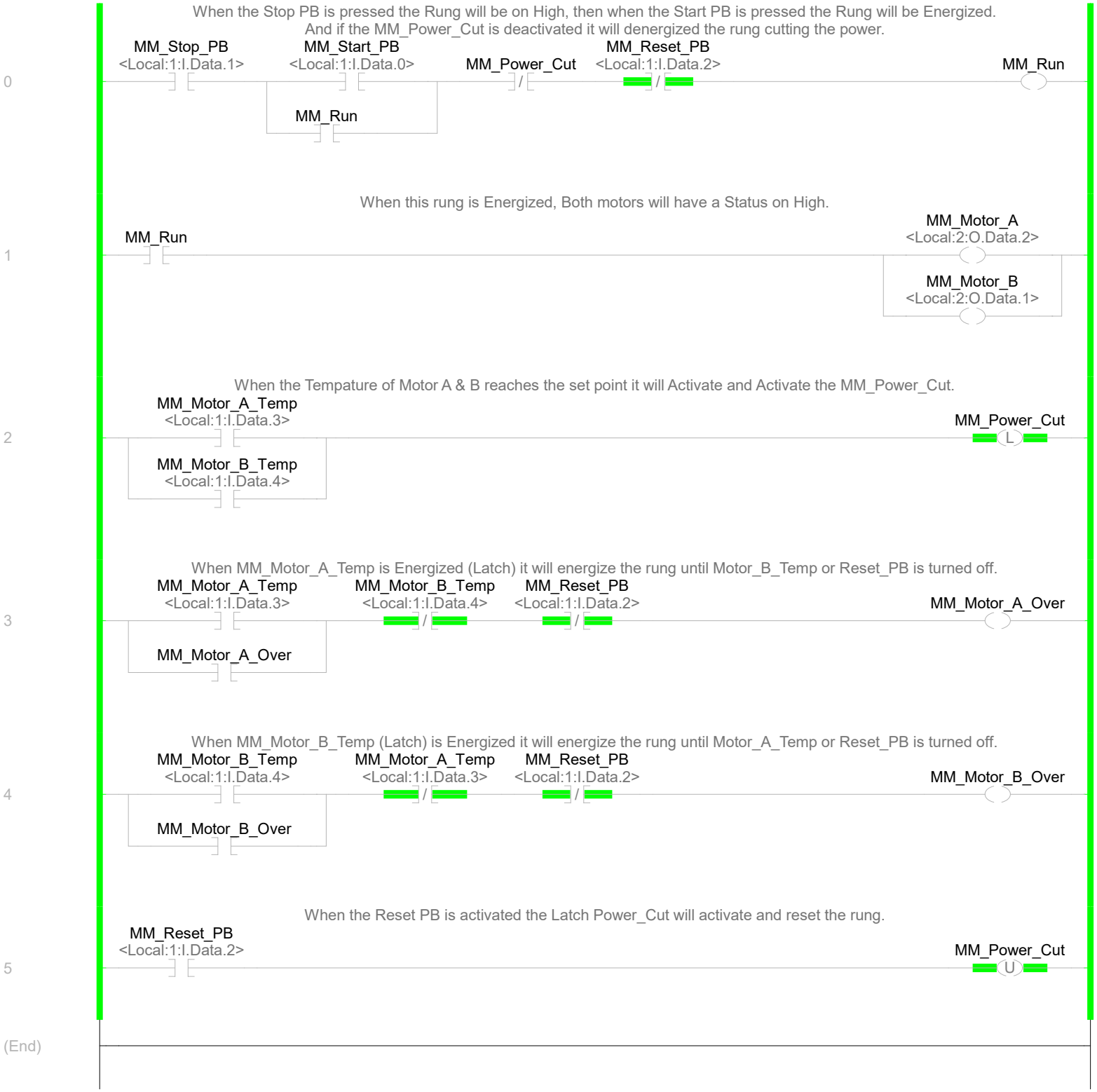
Objectives

The primary objectives of this lab were:

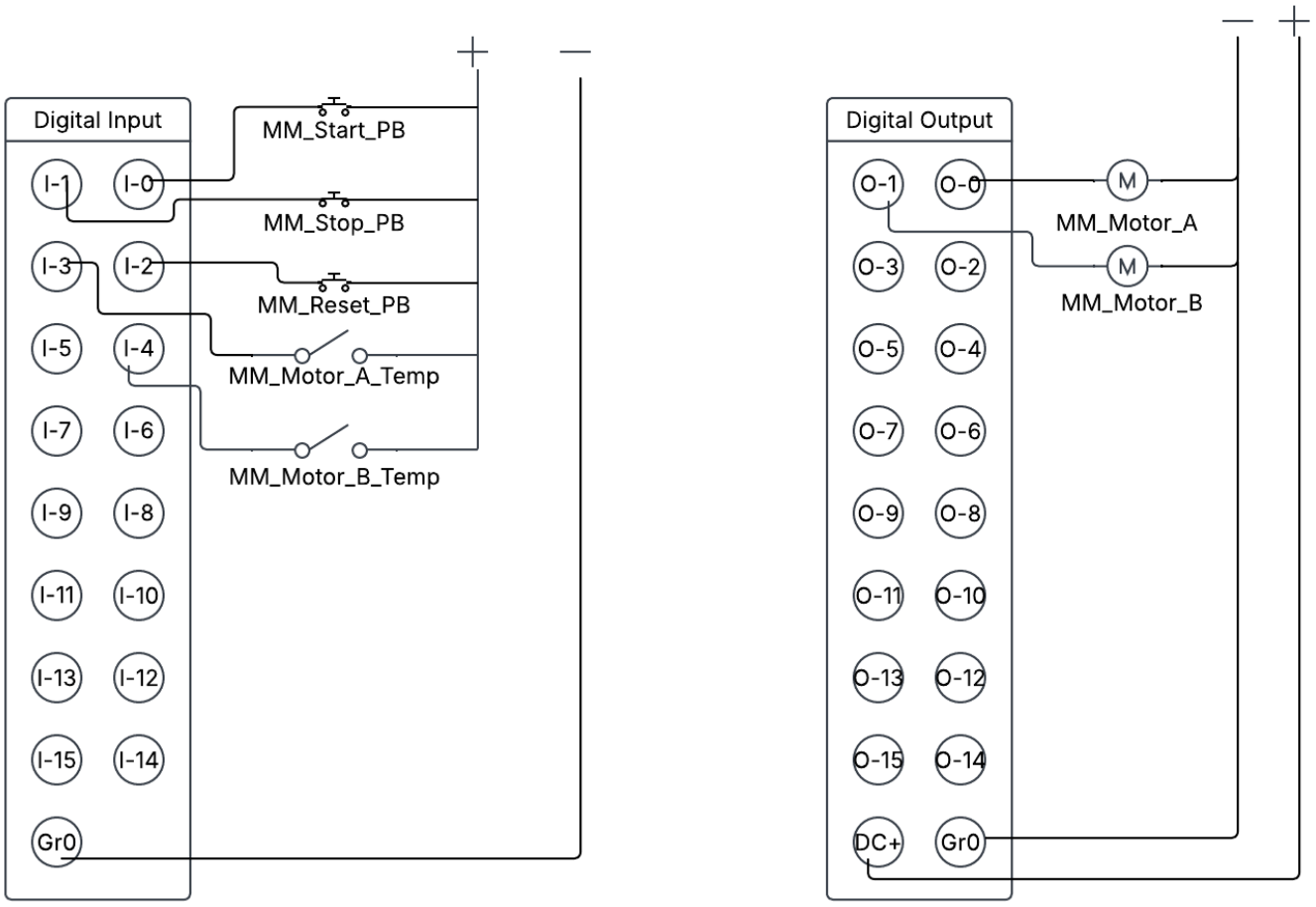
1. Establishing communication between the PLC and the computer.
2. Utilizing base and alias tags for efficient programming.
3. Implementing signal interlocks to prevent conflicts in motor operation.
4. Designing and developing PLC logic to control two DC motors.
5. Wiring input and output field devices, including sensors and actuators.
6. Downloading the developed program to the PLC and verifying its functionality.
7. Running and monitoring the program to ensure proper operation.
8. Detecting and troubleshooting problems such as motor overheating.

Description of Work Completed

- **PLC Communication:** Established a stable communication link between the PLC and the computer.
- **Tag Configuration:** Defined base tags and used alias tags for better program structure.
- **Control Logic Development:**
    - Created a ladder logic program to control two motors based on start/stop conditions.
    - Implemented interlock mechanisms to ensure safe operation.
- **Problem Detection & Safety Features:**
    - Integrated temperature sensors (TSA for Motor A and TSB for Motor B) to detect overheating.
    - Configured an automatic shutdown of both motors if overheating occurs.
    - Enabled manual motor restart only after overheating is resolved and the reset pushbutton is pressed.
    - Added fault diagnostics to identify which motor caused the shutdown.
- **Field Wiring & Testing:** Connected input devices (pushbuttons, temperature sensors) and output devices (motors) per the provided schematic.
- **Troubleshooting:** Verified program execution, monitored live data, and resolved any logic errors.


When the Stop PB is pressed the Rung will be on High, then when the Start PB is pressed the Rung will be Energized.
And if the MM_Power_Cut is deactivated it will denergized the rung cutting the power.
MM_Stop_PB
<Local:1:I.Data.1>
MM_Start_PB
<Local:1:I.Data.0>
MM_Power_Cut
MM_Reset_PB
<Local:1:I.Data.2>
MM_Run
MM_Run
0
When this rung is Energized, Both motors will have a Status on High.
MM_Run
MM_Motor_A
<Local:2:O.Data.2>
MM_Motor_B
<Local:2:O.Data.1>
1
When the Tempature of Motor A & B reaches the set point it will Activate and Activate the MM_Power_Cut.
MM_Motor_A_Temp
<Local:1:I.Data.3>
MM_Motor_B_Temp
<Local:1:I.Data.4>
MM_Power_Cut
L
2
When MM_Motor_A_Temp is Energized (Latch) it will energize the rung until Motor_B_Temp or Reset_PB is turned off.
MM_Motor_A_Temp
<Local:1:I.Data.3>
MM_Motor_B_Temp
<Local:1:I.Data.4>
MM_Reset_PB
<Local:1:I.Data.2>
MM_Motor_A_Over
MM_Motor_A_Over
3
When MM_Motor_B_Temp (Latch) is Energized it will energize the rung until Motor_A_Temp or Reset_PB is turned off.
MM_Motor_B_Temp
<Local:1:I.Data.4>
MM_Motor_A_Temp
<Local:1:I.Data.3>
MM_Reset_PB
<Local:1:I.Data.2>
MM_Motor_B_Over
MM_Motor_B_Over
4
When the Reset PB is activated the Latch Power_Cut will activate and reset the rung.
MM_Reset_PB
<Local:1:I.Data.2>
MM_Power_Cut
U
5
(End)

Wiring Diagram



Conclusions

The lab was successfully completed, meeting all functional requirements. The control logic effectively managed motor operations while ensuring safety through interlocks and fault detection. The troubleshooting process reinforced the importance of monitoring live data for debugging. This exercise enhanced understanding of PLC programming, motor control, and fault diagnosis in automation systems.