Final Project Part 1 – Logbook

By submitting this log, I acknowledge that all work is my own and I have not received any assistance other than what is noted below.

Date	Acknowledgement
Wednesday, July 24th, 2024	We acknowledge that all the work below is ours, and only ours.

List all group members

Name 1: Shaan Banday

Student ID 1: 20993610

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Student ID 2: 21011845

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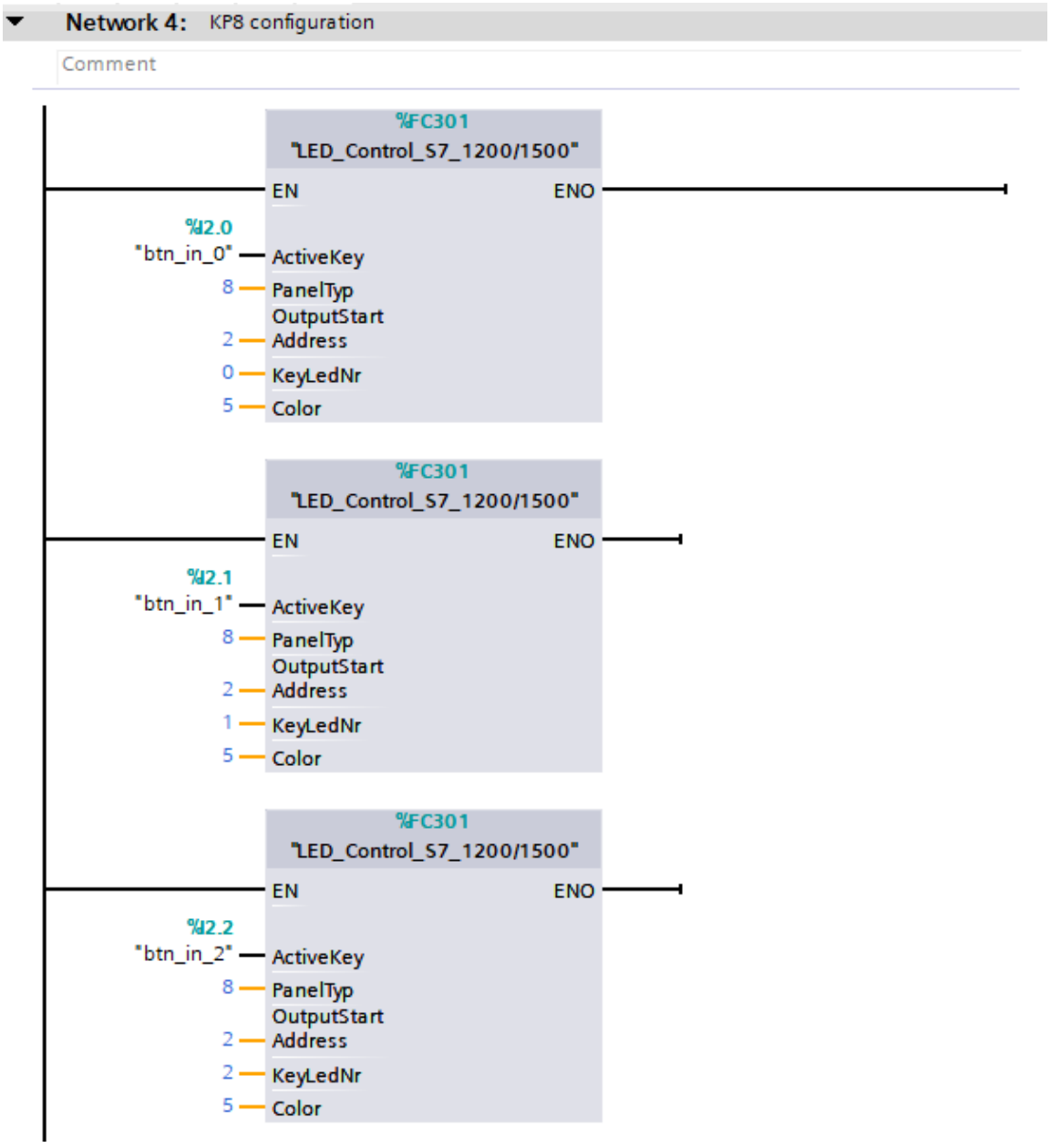
Student ID 3: 21016163

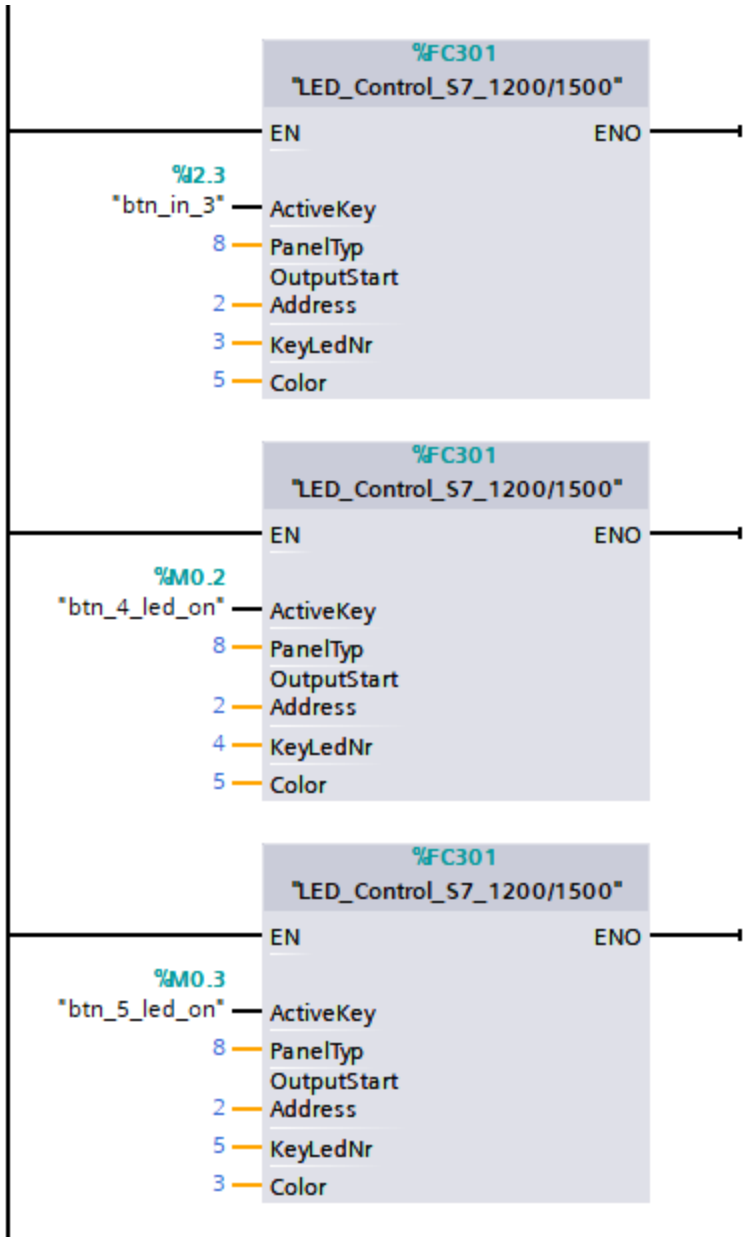
Station number: 9

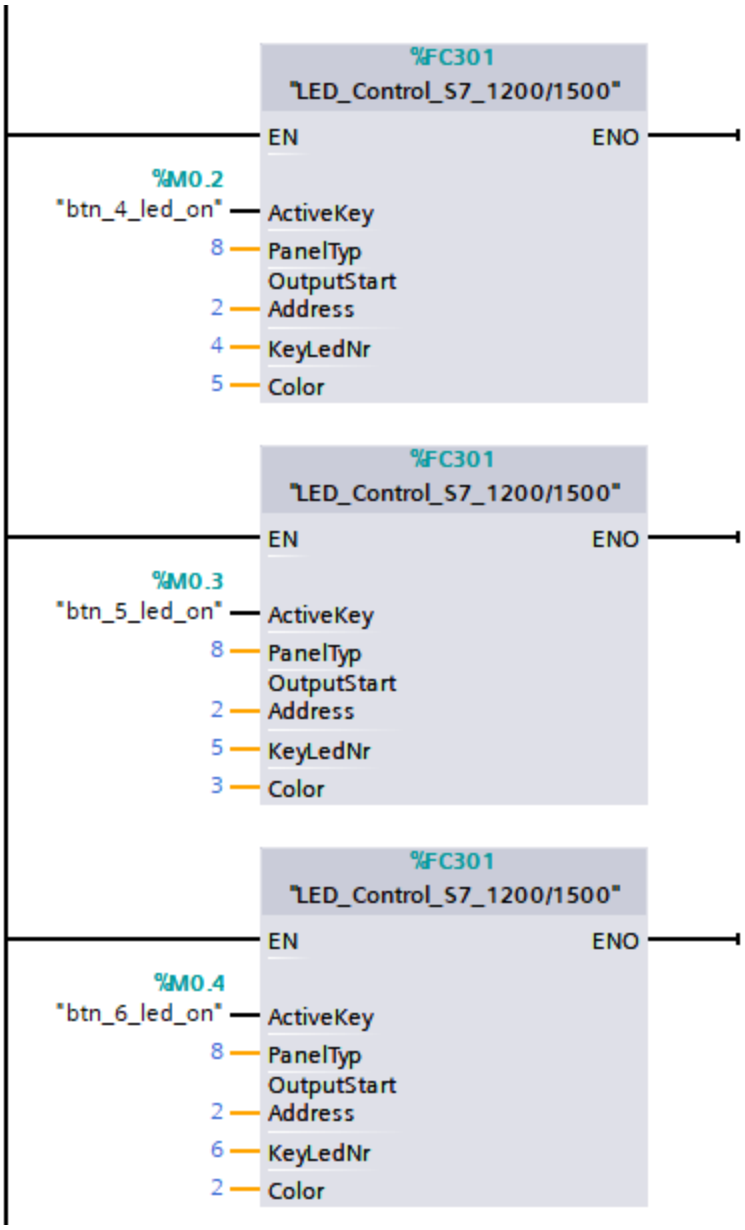
Learn Project Group Number: 37

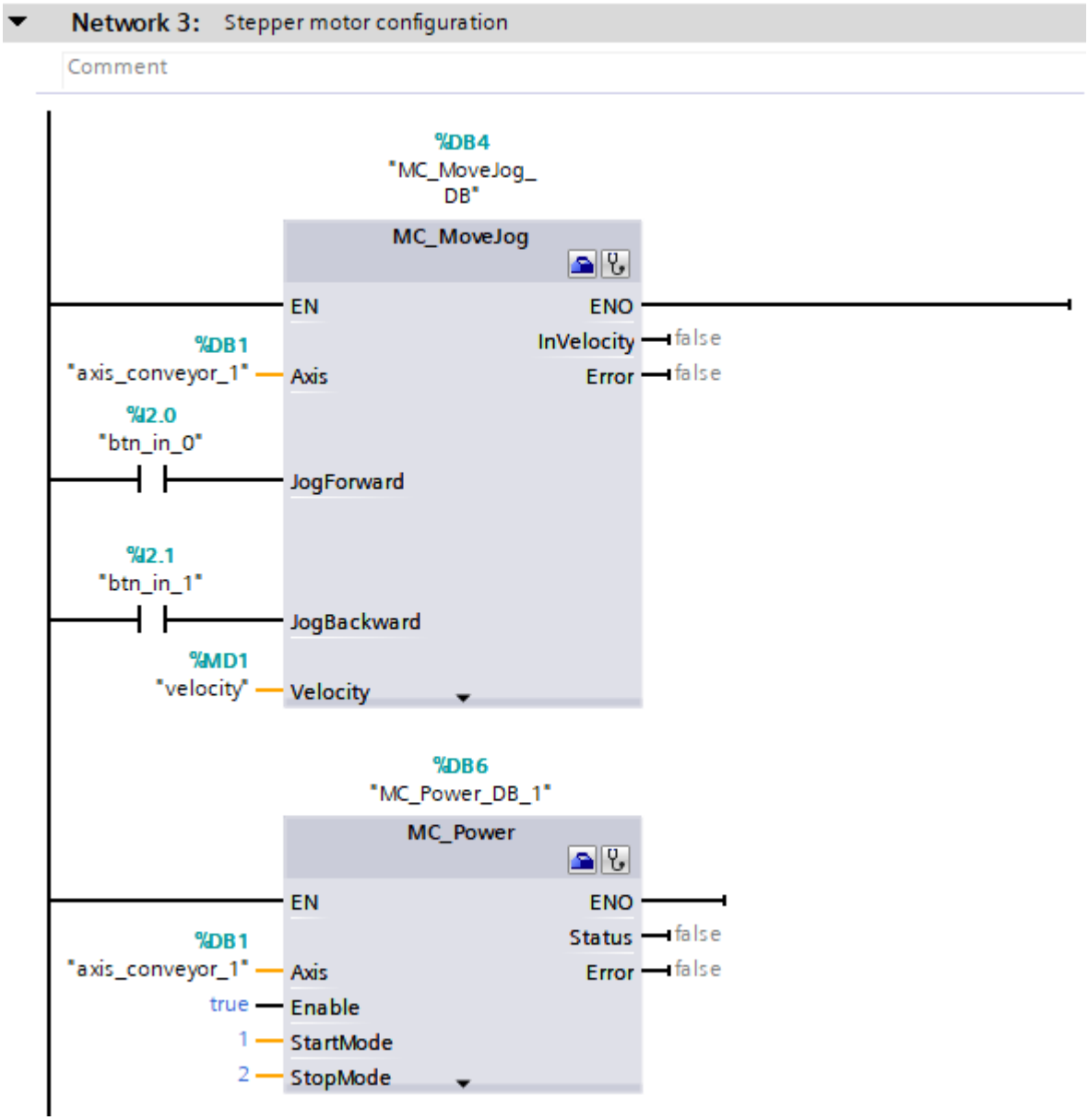
Exercises

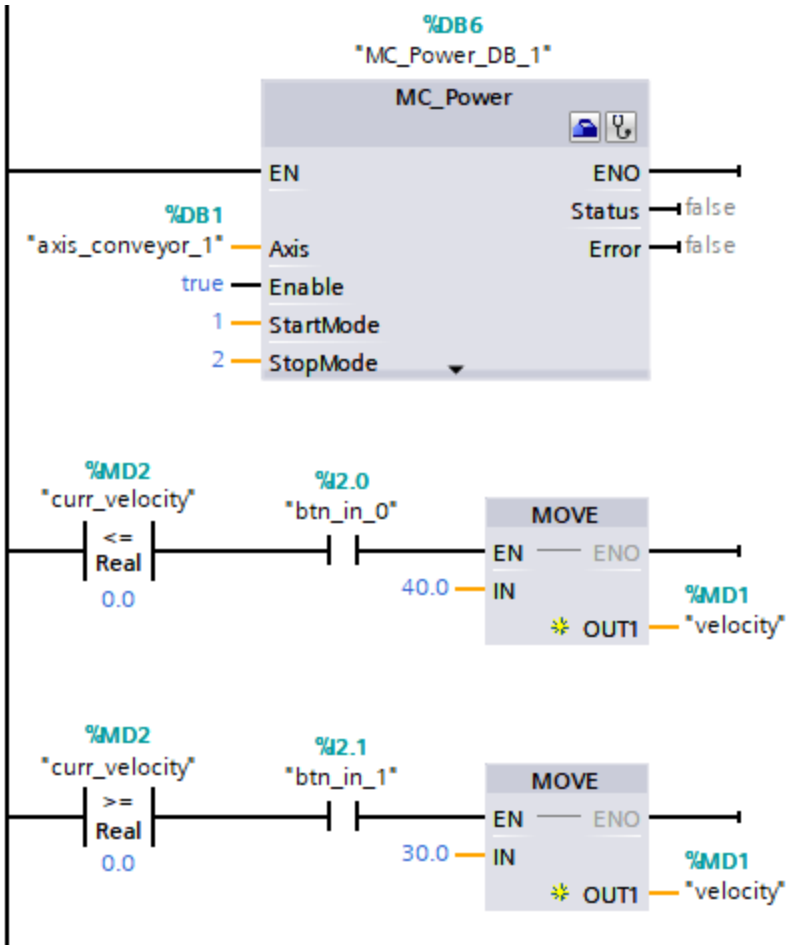
1. **Paste here the screenshot of your ladder program from the TIA Portal for Exercise 2.2.**

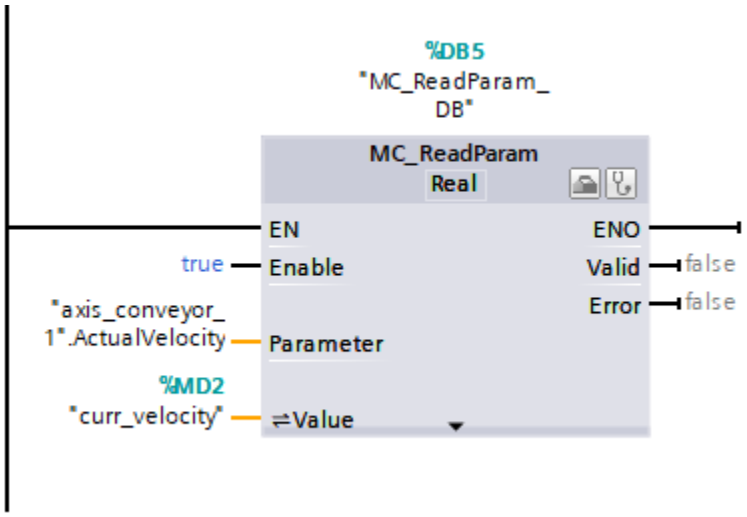


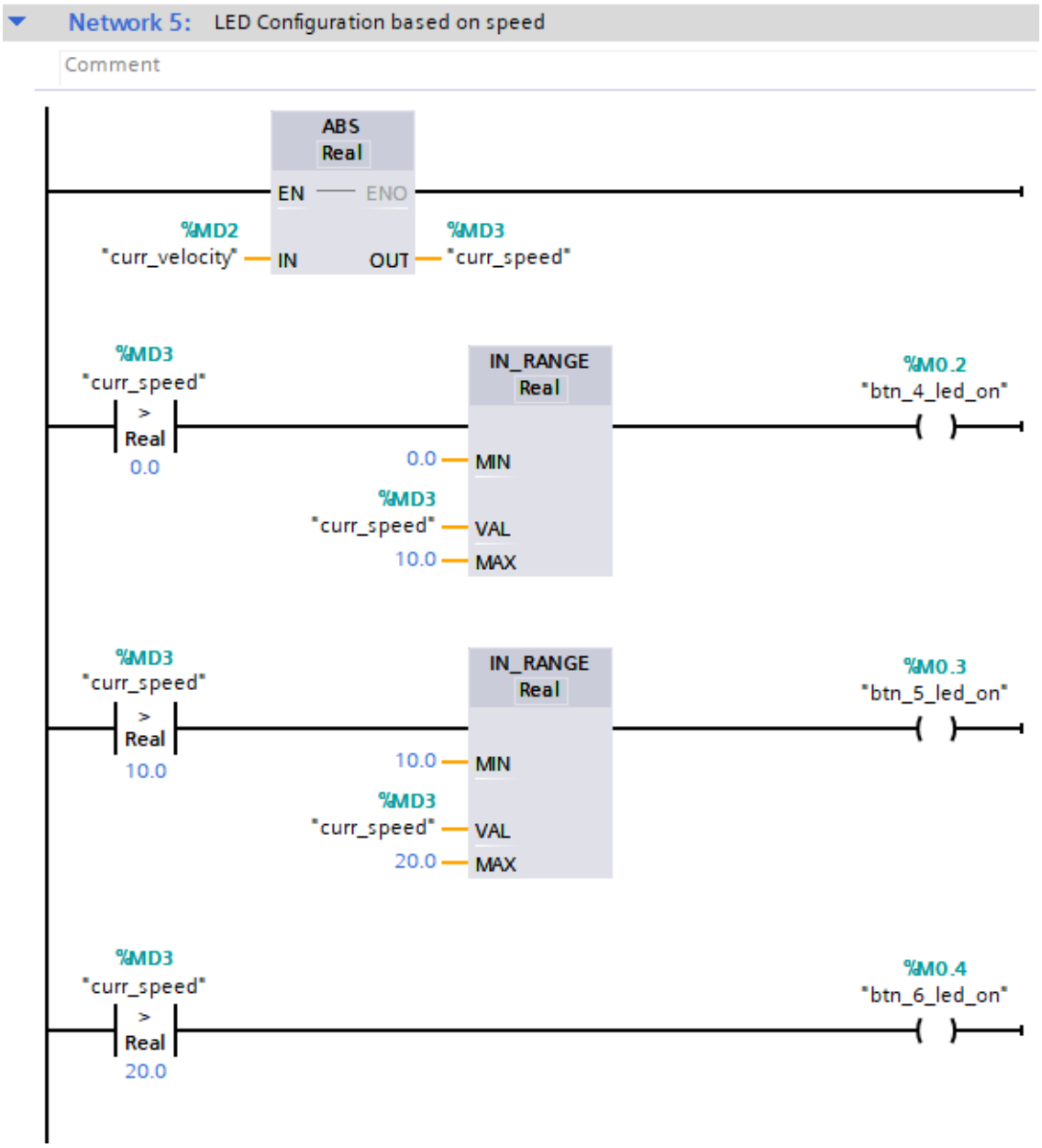

%FC301
"LED_Control_S7_1200/1500"
EN
ENO
%I2.3
"btn_in_3"
ActiveKey
8
PanelTyp
OutputStart
2
Address
3
KeyLedNr
5
Color
%FC301
"LED_Control_S7_1200/1500"
EN
ENO
%M0.2
"btn_4_led_on"
ActiveKey
8
PanelTyp
OutputStart
2
Address
4
KeyLedNr
5
Color
%FC301
"LED_Control_S7_1200/1500"
EN
ENO
%M0.3
"btn_5_led_on"
ActiveKey
8
PanelTyp
OutputStart
2
Address
5
KeyLedNr
3
Color


%FC301
"LED_Control_S7_1200/1500"
EN
ENO
%M0.2
"btn_4_led_on"
ActiveKey
8
PanelTyp
OutputStart
2
Address
4
KeyLedNr
5
Color
%FC301
"LED_Control_S7_1200/1500"
EN
ENO
%M0.3
"btn_5_led_on"
ActiveKey
8
PanelTyp
OutputStart
2
Address
5
KeyLedNr
3
Color
%FC301
"LED_Control_S7_1200/1500"
EN
ENO
%M0.4
"btn_6_led_on"
ActiveKey
8
PanelTyp
OutputStart
2
Address
6
KeyLedNr
2
Color
%FC301
"LED_Control_S7_1200/1500"
EN
ENO
%I2.7
"btn_in_7"
ActiveKey
8
PanelTyp
OutputStart
2
Address
7
KeyLedNr
5
Color


Network 3: Stepper motor configuration
Comment
%DB4
"MC_MoveJog_
DB"
MC_MoveJog
EN
ENO
%DB1
"axis_conveyor_1"
Axis
InVelocity
false
Error
false
%I2.0
"btn_in_0"
JogForward
%I2.1
"btn_in_1"
JogBackward
%MD1
"velocity"
Velocity
%DB6
"MC_Power_DB_1"
MC_Power
EN
ENO
%DB1
"axis_conveyor_1"
Axis
Status
false
Error
false
true
Enable
1
StartMode
2
StopMode


%DB6
"MC_Power_DB_1"
MC_Power
EN
ENO
%DB1
"axis_conveyor_1"
Axis
Status
false
Error
false
true
Enable
1
StartMode
2
StopMode
%MD2
"curr_velocity"
<=
Real
0.0
%I2.0
"btn_in_0"
MOVE
EN
ENO
40.0
IN
%MD1
OUT1
"velocity"
%MD2
"curr_velocity"
>=
Real
0.0
%I2.1
"btn_in_1"
MOVE
EN
ENO
30.0
IN
%MD1
OUT1
"velocity"


%DB5
"MC_ReadParam_
DB"
MC_ReadParam
Real
EN
ENO
true
Enable
Valid
false
Error
false
"axis_conveyor_
1".ActualVelocity
Parameter
%MD2
"curr_velocity"
⇌Value



2. Paste here a screenshot/picture of your state diagram for exercise 2.3.

2.3 State Diagram:

Let RED_TE (trailing edge) be the transition from 1 to 0 for the red color sensor input, and pulses 1.

Let RED_LE (leading edge) be the transition from 0 to 1 for the red color sensor input, and pulses 1.

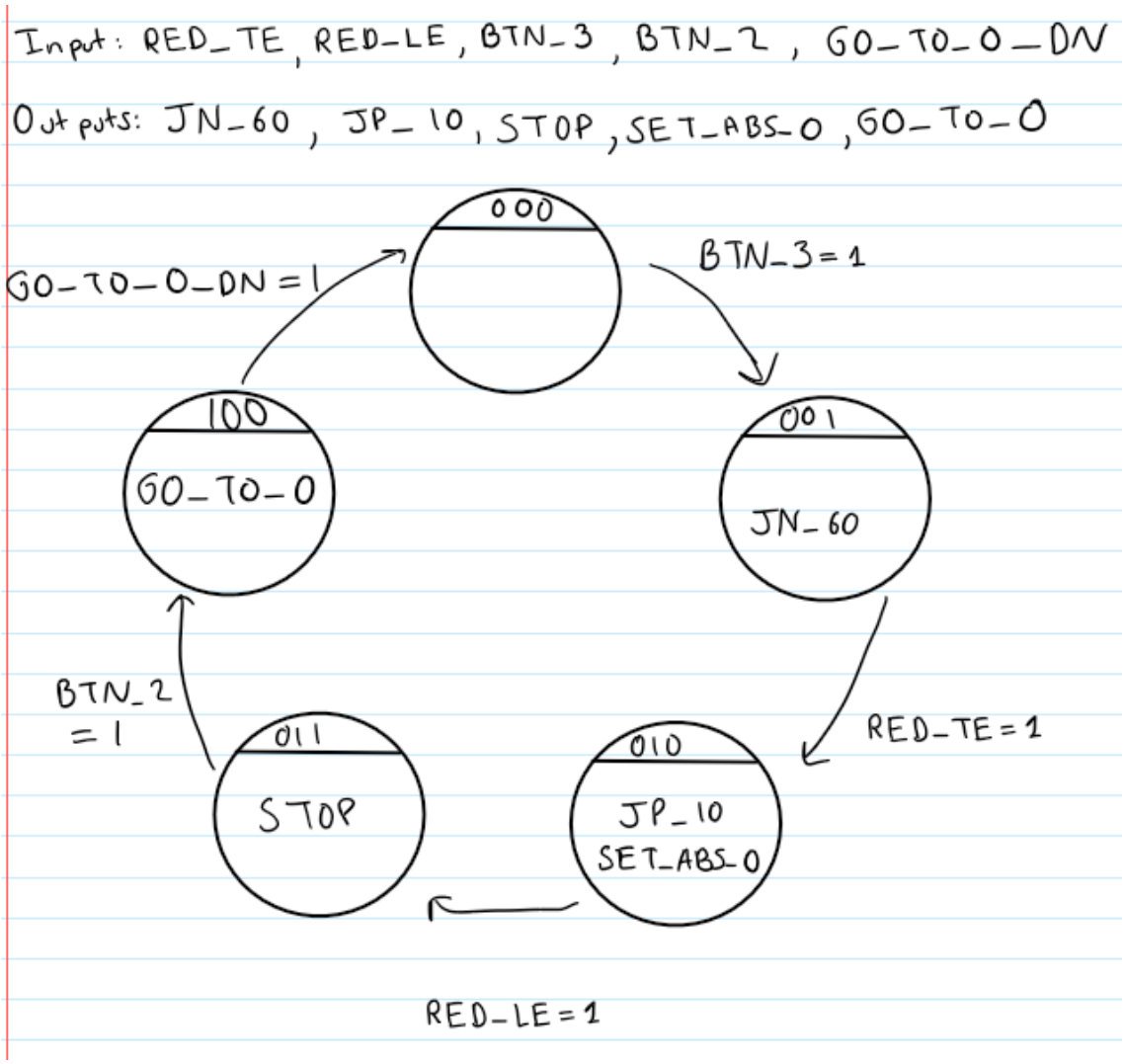
Let JN_60 be motor jog in negative direction at $60 \frac{mm}{s}$

Let JN_10 be motor jog in negative direction at $10 \frac{mm}{s}$

Let JP_10 be motor jog in positive direction at $10 \frac{mm}{s}$

Let SET_ABS_0 define the current position as absolute 0

Let GO_TO_0 jog towards absolute 0 at $10 \frac{mm}{s}$



3. Provide a short description of how the state diagram above was conceived, and of its working principles.

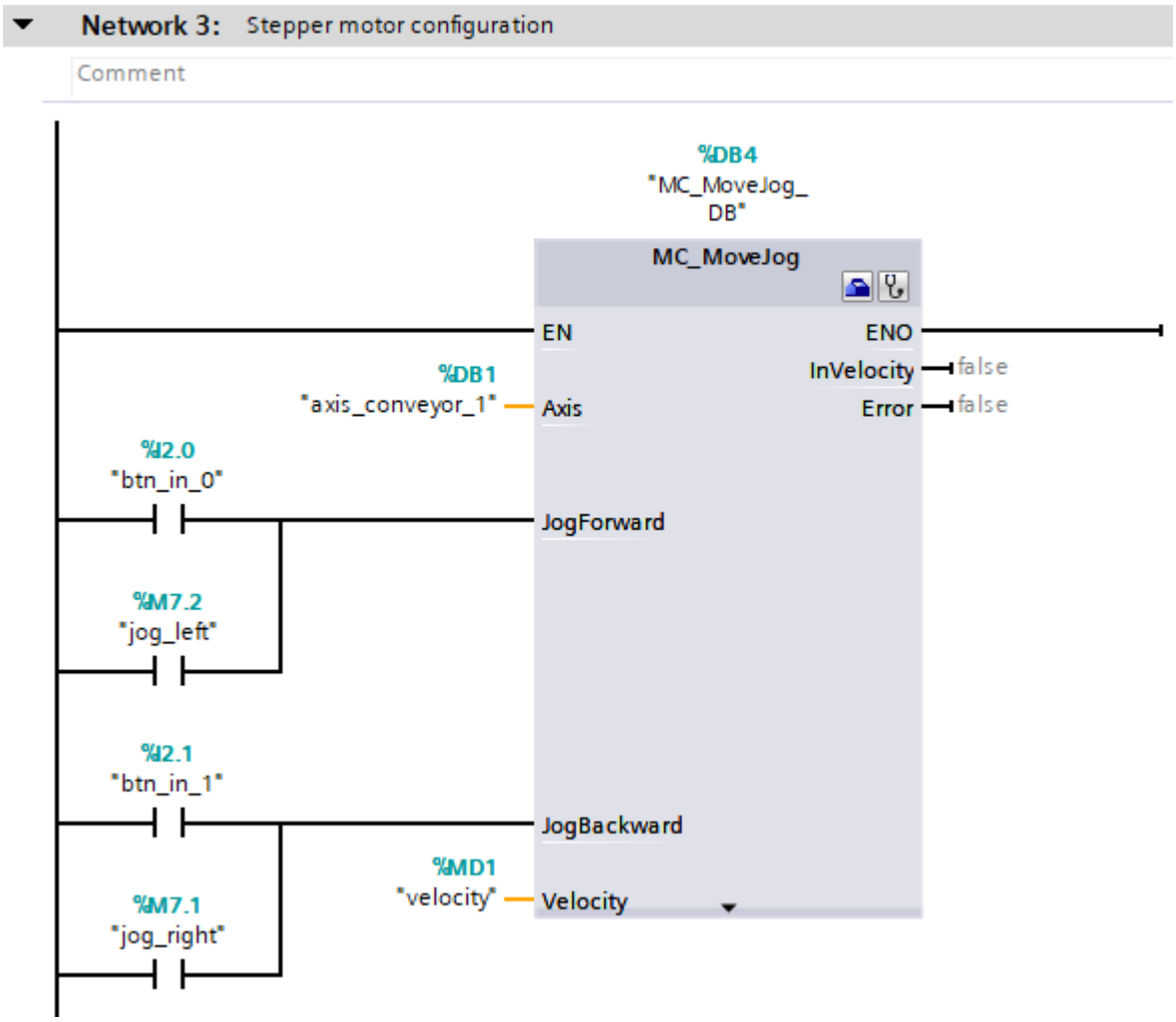
There are 5 states:

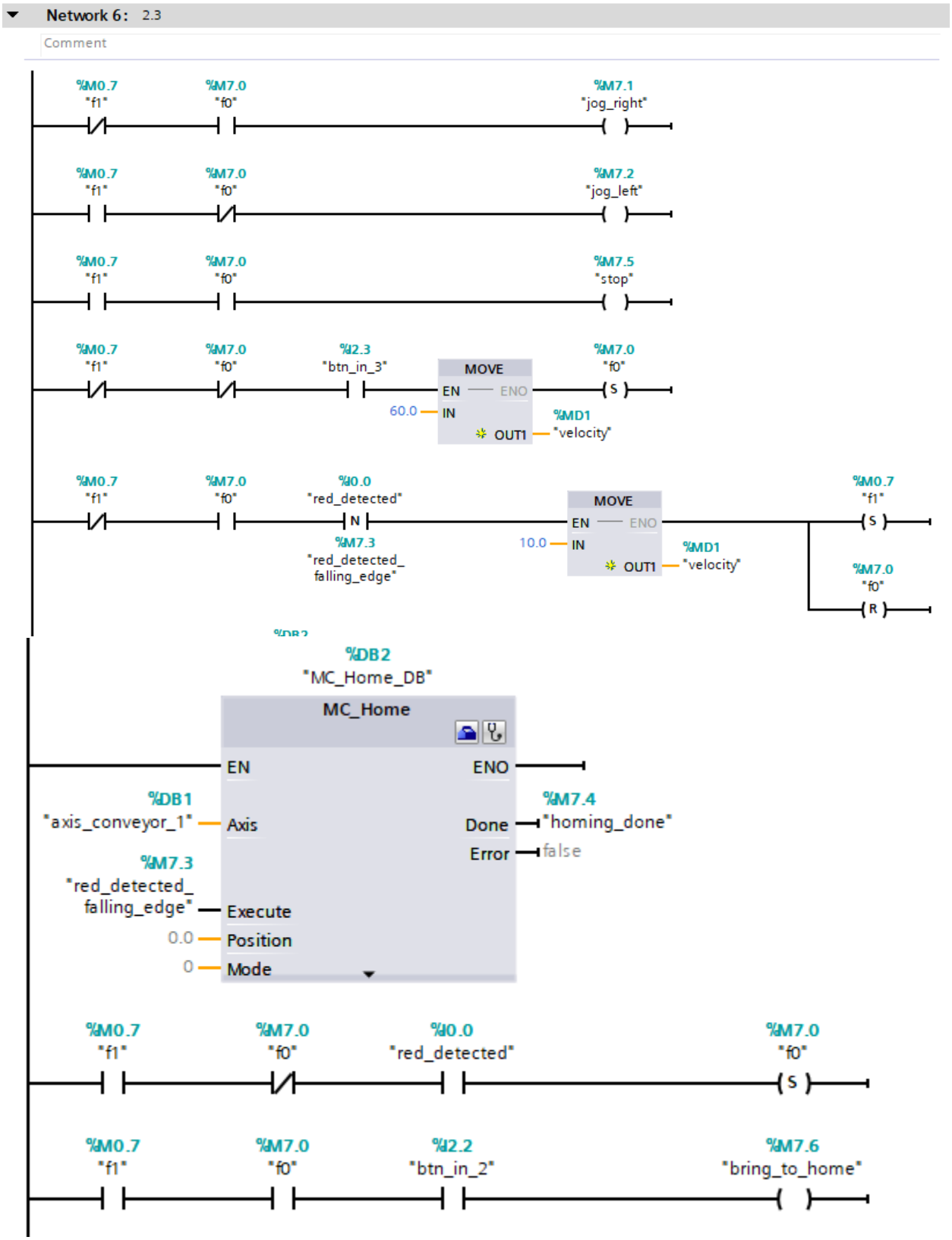
- The motor is not in the homing sequence (000) - it is doing nothing
- The homing sequence has been activated and the motor is jogging right at 60mm/s (001)
- Home is set (absolute 0 has been set) and the motor is moving left at 10mm/s
- The motor is stopped and waiting for button 2 to be pressed
- The motor is jogging at 10 mm/s until it reaches home position

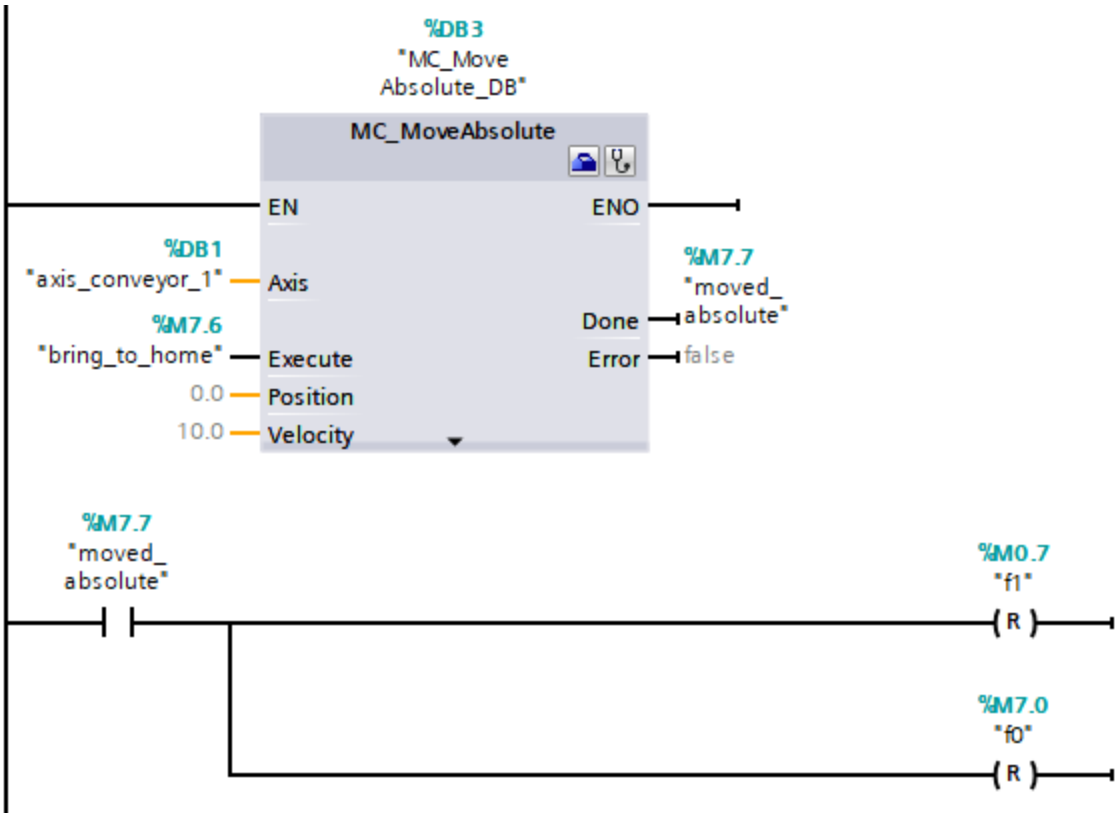
Starting at 000, the program allows the user to do anything until button 3 is pressed, after which the homing sequence is activated. When the homing sequence is activated, the state is set to 001, the motor starts jogging right until the red sensor outputs a falling edge,

which means that the red block has completely passed the sensor. This sets the state to 010, which sets the absolute position of the motor, and changes the velocity to 10, while jogging left until home position is reached (the red block is detected). Once a red block is detected the state is set to 011, where the motor stops moving. At this state, the program awaits button 2 press, which changes the state to 100. The motor then jogs right or left at a speed of 10mm/s, until home position is reached. This finishes the homing sequence, and sets the state to 000.

4. **Paste here the screenshot of your ladder program from the TIA Portal for exercise 2.3.**




Network 6: 2.3
Comment
%M0.7
"f1"
%M7.0
"f0"
%M7.1
"jog_right"
%M7.2
"jog_left"
%M7.5
"stop"
%I2.3
"btn_in_3"
MOVE
EN
ENO
60.0
IN
OUT1
%MD1
"velocity"
%I0.0
"red_detected"
N
%M7.3
"red_detected_
falling_edge"
10.0
S
R
%DB2
"MC_Home_DB"
MC_Home
%DB1
"axis_conveyor_1"
Axis
Done
%M7.4
"homing_done"
Error
false
Execute
0.0
Position
0
Mode
%I2.2
"btn_in_2"
%M7.6
"bring_to_home"


%DB3
"MC_Move
Absolute_DB"
MC_MoveAbsolute
EN
ENO
%DB1
"axis_conveyor_1"
Axis
%M7.7
"moved_
absolute"
Done
%M7.6
"bring_to_home"
Execute
Error
false
0.0
Position
10.0
Velocity
%M7.7
"moved_
absolute"
%M0.7
"f1"
R
%M7.0
"f0"
R