Title: **Forward-Reverse using 3 Position Switch for a 1P Motor** Hands On: 3

Course: Introduction to Automation Unit: Introduction of PLC CLO: 2, 4

Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Grade \_\_\_\_\_\_\_ Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Objectives**

1. Student shall demonstrate their knowledge of a forward/reverse motor control circuit.
2. Student shall convey their knowledge of how to create forward/reverse motor circuit using a three-position selector switch.
3. Student shall construct this circuit in a single-phase motor control scenario.

**Assessment**

Students shall demonstrate a comprehension of the objectives listed above by scoring a minimum of 75% on this Hands On. Grading shall be based on the Introduction to PLC rubric.

**Devices**

|  |  |  |
| --- | --- | --- |
| Inputs | | |
| *Device* | *Description* | *Symbol* |
| NC Mushroom Head PB (ESTOP) | Emergency Stop | ESTOP |
| Three-position Selector Switch | Direction: Forward-Off-Reverse | FWD, REV |
| NC Pushbutton (PB1) | Stop Motor | STOP |
| NO Pushbutton (PB2) | Start Motor | START |
| Control Relay Contacts (CR1) | Motor Control Status | MC\_STAT |
| Control Relay Contacts (CR2) | Motor Direction Status | DIR\_STAT |
| Outputs | | |
| *Device* | *Description* | *Symbol* |
| Green Pilot Light | Motor Running Forward | FORWARD |
| Yellow Pilot Light | Wait to Start Switch | WAIT |
| Red Pilot Light | Motor Stopped | STOPPED |
| Blue Pilot Light | Motor Running Reverse | REVERSE |
| 8-Pin, 24VDC Relay | Motor Control Relay | CR1 |
| 11-Pin, 24VDC Relay | Direction Control Relay | CR2 |

**Instructions**

Design a forward/reverse motor control circuit using the devices listed above. If the ESTOP is pressed, the motor shall stop and not be able to be restarted in either direction until the ESTOP is disengaged. One pushbutton shall be a stop and the other a start. When this button is pressed, the motor shall start and run in the commanded direction. even if the button is no longer pressed. The three-position selector switch shall function as a directional selector. When the switch is in the “A” position (up), the motor shall rotate counter-clockwise (CCW) when commanded. When the switch is in the “B” position (down), the motor shall rotate clockwise (CW) when commanded. If the motor is running and the selector switch is changed, the motor shall stop. Reversing a single-phase motor has an inherent issue in that it must be stopped long enough for the start switch to re-engage before a direction change will take hold. Ensure the design forces the operator to wait 8 seconds anytime the motor relay is de-energized before pressing “start” energizes the motor relay again. Indications; Green is for forward, Blue is for reverse, Red is for stopped and Yellow is to indicate that the operate has to wait to restart the motor. No two lights shall be on at the same time.

You **must** follow this sequence;

Design a hand drawing of the proposed circuit. Review with the instructor. Initials \_\_\_\_\_

After review, then you may use the computer at your station to compose your program. Wireless is to remain OFF during this hands-on test.

Compose the program & review with the instructor before connecting to the panel. \_\_\_\_\_

Download and test logic **without** motor connection. Review with instructor \_\_\_\_\_

Wire motor to panel. Have instructor review wiring **before energizing motor**. Initial \_\_\_\_\_

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Input | Description | Out | Desc | CR1 8-Pin Relay | CR2 11-Pin Relay |
| I/0 | ESTOP | O/0 | Green |  |  |
| I/1 | CR1 NO (Pins 1 & 3) | O/1 | Yellow |
| I/2 | CR2 NO (Pins 1 & 3) | O/2 | Red |
| I/3 | 3P SS, Position A (up) | O/3 | Blue |
| I/4 | 3P SS, Position B (dn) | O/4 | CR1 Coil |
| I/5 | 2P SS, Pos. A (up)=ON | O/5 | CR2 Coil |
| I/6 | PB1, NC |  |  |
| I/7 | PB2, NO |  |  |
| I/8 | PB3, NO |  |  |
| I/9 |  |  |  |



This page left intentionally almost blank