Title: **Forward-Reverse using 3 Pushbuttons for a 1P Motor** Job: 13

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

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

**Objectives**

1. Student shall reinforce their knowledge of a forward/reverse motor control circuit.
2. Student shall develop a knowledge of how to create forward/reverse motor circuit using three pushbuttons.
3. Student shall apply 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 shop job. Grading shall be based on the Introduction to PLC rubric.

**Devices**

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| Inputs | | |
| *Device* | *Description* | *Symbol* |
| NC Mushroom Head Pushbutton (ESTOP) | Emergency Stop | ESTOP |
| NC Pushbutton (PB1) | Stop Motor | STOP |
| NO Pushbutton (PB2) | Start Motor | START |
| NO Pushbutton (PB3) | Jog Motor | JOG |
| Outputs | | |
| *Device* | *Description* | *Symbol* |
| Green Pilot Light | Motor Running | FORWARD |
| Red Pilot Light | Motor Stopped | STOPPED |
| Blue Pilot Light | Motor Jogging | REVERSE |
| 8-Pin, 24VDC Relay | Motor Control Relay | CR1 |
| 11-Pin, 24VDC Relay | Direction Control Relay | CR2 |
| Reversible, 120VAC Motor | Reversible Motor | M1 |

**Instructions**

Design a forward/reverse motor control circuit using three momentary. The circuit will also utilize a latching mushroom head pushbutton to act as an “ESTOP” as well. 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 traditional stop. When this button is pressed, the motor shall stop running regardless of direction. The second pushbutton shall function as a “forward” button. When this button is pressed, the motor shall start and run counter-clockwise (CCW) even if the button is no longer pressed. The third pushbutton shall function as a “reverse” button. When this button is pressed, the motor shall start and run clockwise (CW) even if the button is no longer pressed. This first solution should not be concerned with limiting direction change while the motor is running. (Part II focusses on this issue) Whenever the motor is running in the forward direction, the green light shall illuminate. Whenever the motor is running in the reverse direction, the blue light shall illuminate. Whenever the motor is not running, the red light shall illuminate. No two lights shall be on at the same time. Use the space on the opposite side of this page to design the circuit. Once complete, review the design with the instructor. After obtaining approval, configure the program in RSLogix 500. Have the instructor review the program before downloading. Once the program has been reviewed, verify and download.

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Discussed design \_\_\_\_\_\_\_, Test logic without motor \_\_\_\_\_\_\_, With motor \_\_\_\_\_\_\_

**Part II** - As discussed previously, reversing a single-phase motor has one inherent issue in that it must be stopped long enough for the start switch to re-engage before a direction change will take hold. Design a circuit on the next page that shall force the operator to press “stop” and wait for the start switch to re-engage **only if the direction has been changed**. A yellow light shall indicate to the operator that the motor has been commanded to stop **and a direction change has occurred** and the motor is within the “stopping” time-delay sequence. Again, no two lights shall be on at the same time.

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1. Discuss the design with the instructor. Instructor Initials \_\_\_\_\_\_\_

