Title: **Fwd-Rev-Jog using 3 PBs and 3 position SS for a 1P Mtr** Hands-On: 4

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

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

**Objectives**

1. Student shall repeat the design and construction of a reversing single-phase motor.
2. Student shall apply “jogging” functionality to a reversible, single-phase motor.
3. Student shall contrast different “jogging” methods for a reversing single-phase circuit.

**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**

|  |  |  |
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| Inputs | | |
| *Device* | *Description* | *Symbol* |
| NC Mushroom Head PB | 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 |
| NO Pushbutton (PB3) | Jog Motor | JOG |
| Outputs | | |
| *Device* | *Description* | *Symbol* |
| Green Pilot Light | Motor Running Forward | FORWARD |
| Red Pilot Light | Motor Stopped | STOPPED |
| Yellow Pilot Light | Motor Direction Change | CHANGING |
| 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/jog motor control circuit using the devices listed above. One pushbutton shall be a “stop” button. When this button is pressed, the motor shall stop running regardless of direction. Another pushbutton shall be a traditional “start” button. When the start button is pressed, the motor shall start and continue to run even if the “start” button is no longer pressed. The third pushbutton shall be a “jog” pushbutton. When this button is pressed, the motor shall start and run in the commanded direction if the button is held down. When the “jog” button is released, the motor shall stop. A three-position selector switch shall be used to determine rotational direction. If the selector switch is in the “forward” position, the motor shall rotate counter-clockwise (CCW). If the selector switch is in the “reverse” position, the motor shall rotate clockwise (CW). If the motor is running and the three-position selector switch is changed, the motor shall stop. The program logic should ensure that in the event of a direction change the motor has had enough time to slow down and re-engage the motor’s internal start switch before the operator pressing the start button performs any function. While the motor is running in the forward direction, the green light shall illuminate. While the motor is running in the reverse direction, the blue light shall illuminate. The yellow light shall indicate to the operator that the motor has been commanded to stop and a direction change has occurred. When the “stopping” period has expired, the yellow light shall go off and red light shall illuminate. No two lights shall be on at any one 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 \_\_\_\_\_

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| 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 |  |  |  |

