Title: **Pushbuttons** Job: 01

Course: Intro to Automation Unit: Manual Motor Controls CLO: 1, 2

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

**Objectives**

1. Student shall identify the function of a “momentary” pushbutton.
2. Student shall define the terms “normally-open” and “normally-closed”.
3. Student shall interpret NEMA symbols for pushbuttons and pilot lights.
4. Student shall establish the purpose and use of the training panel.
5. Student shall practice using tools to wire the training panel.

**Assessment**

Students shall demonstrate a comprehension of the objectives listed above by scoring a minimum of 75% on this Job. Grading shall be based on the Manual Motor Controls rubric.

**Devices**

|  |  |  |
| --- | --- | --- |
| Inputs | | |
| *Device* | *Description* | *Symbol* |
| Normally Closed Pushbutton | Test Button | TEST1 |
| Normally Dual Action Pushbutton | Test Button | TEST2 |
| Normally Open Pushbutton | Test Button | TEST3 |
| Outputs | | |
| *Device* | *Description* | *Symbol* |
| Green Pilot Light | Test Light | GREEN |
| Red Pilot Light | Test Light | RED |
| Yellow Pilot Light | Test Light | YELLOW |
| Blue Pilot Light | Test Light | BLUE |

**Instructions**

Wire the circuit shown below. Before powering up your circuit, get approval from your instructor. After approval, you may energize your circuit and answer the questions below the schematic*.*

**Circuit**



1. Without pressing any pushbuttons record the light sequence.

|  |  |  |  |
| --- | --- | --- | --- |
| Green | Yellow | Red | Blue |
|  |  |  |  |

1. Press and hold PB1. Record the light sequence.

|  |  |  |  |
| --- | --- | --- | --- |
| Green | Yellow | Red | Blue |
|  |  |  |  |

1. Release PB1 and press and hold PB2. Record the light sequence.

|  |  |  |  |
| --- | --- | --- | --- |
| Green | Yellow | Red | Blue |
|  |  |  |  |

1. Release PB2 and press and hold PB3. Record the light sequence.

|  |  |  |  |
| --- | --- | --- | --- |
| Green | Yellow | Red | Blue |
|  |  |  |  |

A “state” is a term used to describe the condition of a component. For instance, a simple residential light switch has two states, OFF and ON. We simplify this by saying 0 and 1, where 0 is OFF and 1 is ON. Review the data collect in question 1 through 4 and answer the following questions.

1. In this circuit, how many actions does PB1 have? \_\_\_ Can any more actions be added? \_\_\_
2. In this circuit, how many actions does PB2 have? \_\_\_ Can any more actions be added? \_\_\_
3. In this circuit, how many actions does PB3 have? \_\_\_ Can any more actions be added? \_\_\_
4. Discuss your findings with your instructor.
5. Render the schematic above using a CAD type software package on a classroom PC. Once complete, post the schematic to your student network folder using filename   
   MMC Job 01 – *name.ext* (ext would be the extension of the software you are using to render the schematic)

Title: **ESTOP and Selector Switches** Job: 02

Course: Intro to Automation Unit: Manual Motor Controls CLO: 1, 2

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

**Objectives**

1. Student shall identify the function of a “latching” switch.
2. Student shall recognize a mushroom head pushbutton and its use.
3. Student shall contrast the difference between a two-position selector switch and a three-position selector switch.
4. Student shall interpret NEMA symbols for a mushroom-head pushbutton and both selector switches.

**Assessment**

Students shall demonstrate a comprehension of the objectives listed above by scoring a minimum of 75% on this Job. Grading shall be based on the Manual Motor Controls rubric.

**Materials**

|  |  |  |
| --- | --- | --- |
| Inputs | | |
| *Device* | *Description* | *Symbol* |
| Mushroom-head Pushbutton | Test Button | ESTOP |
| Three-position Selector Switch | Test Switch | 3PSS |
| Two-position Selector Switch | Test Switch | 2PSS |
| Outputs | | |
| *Device* | *Description* | *Symbol* |
| Green Pilot Light | Test Light | GREEN |
| Red Pilot Light | Test Light | RED |
| Yellow Pilot Light | Test Light | YELLOW |

**Instructions**

Wire the circuit shown below. Before powering up your circuit, get approval from your instructor. After approval, you may energize your circuit and answer the questions below the schematic.

**Circuit**



1. Without pressing any pushbuttons record the light sequence.

|  |  |  |
| --- | --- | --- |
| Red | Green | Yellow |
|  |  |  |

1. Press ESTOP. Notice that the pushbutton stays “latched”. Record light sequence.

|  |  |  |
| --- | --- | --- |
| Red | Green | Yellow |
|  |  |  |

1. Rotate head of ESTOP to “un-latch” the pushbutton. Record light sequence.

|  |  |  |
| --- | --- | --- |
| Red | Green | Yellow |
|  |  |  |

1. Rotate the position of the selector switch to the “B” position. Record light sequence.

|  |  |  |
| --- | --- | --- |
| Red | Green | Yellow |
|  |  |  |

Wire the circuit shown below. Before powering up your circuit, get approval from your instructor. After approval you may energize your circuit and answer the questions below the schematic.



1. With the selector switch in the “Off” (or center) position, record the light sequence.

|  |  |
| --- | --- |
| Green | Yellow |
|  |  |

1. With the selector switch in the “A” position, record the light sequence.

|  |  |
| --- | --- |
| Green | Yellow |
|  |  |

1. With the selector switch in the “B” position, record the light sequence.

|  |  |
| --- | --- |
| Green | Yellow |
|  |  |

1. List three applications that is type of selector switch may be useful.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_