

# PLC125 LAB3.1: WIRING AND TROUBLESHOOTING PLC INPUTS & OUTPUTS

Student Name: \_\_\_\_\_

Student ID: \_\_\_\_\_

## LAB OUTCOMES:

Upon completion of this lab procedure, the student should be able to:

1. Identify all the sections of the MicroLogix 1200 PLC.
2. Interpret the I/O wiring diagrams from the manufacturer cut-sheets for the ML1200.
3. Wire in 4 inputs and 3 outputs into a MicroLogix 1200 PLC.
4. Interpret the overall operation of a PLC program (ladder logic)
5. Test all the discrete inputs to verify they are working properly.
6. Explain how to determine that a PLC processor is running the PLC program
7. Troubleshoot a failed output in a PLC control circuit.

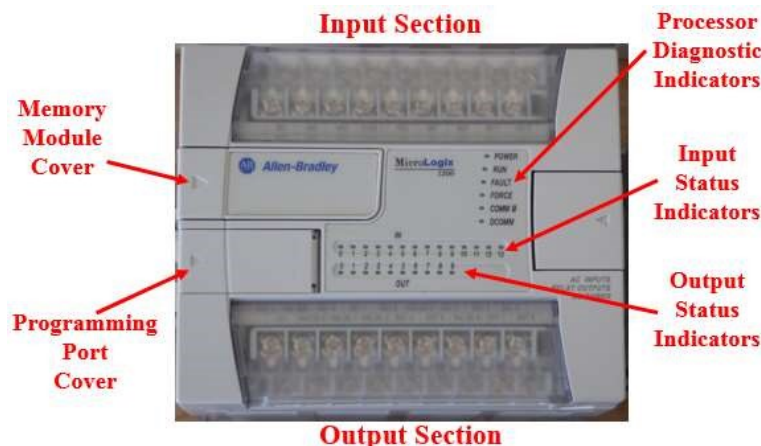
## LAB PROCESS:

Set up NSCC 120VAC wiring board. Setup the unit on its base, or lay flat on the work table.

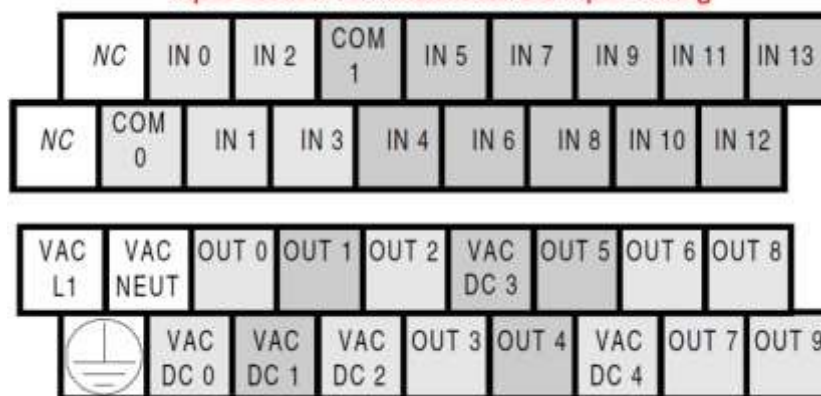
Connect the power cord and turn off the power input switch to make sure the unit is not powered.

### Part 1:

1. Open up the plastic covers over the terminals for the Input and Output sections.
2. Find the 120V control relay. Identify the coil (marked as A1 & A2). Check the continuity of the coil. Check the continuity of the relay contacts. Manually engage the relay to see the resistance measurement after the change of state (manually engaged).
3. Find the Processor Status indicators. These will be important to make sure the unit is running.

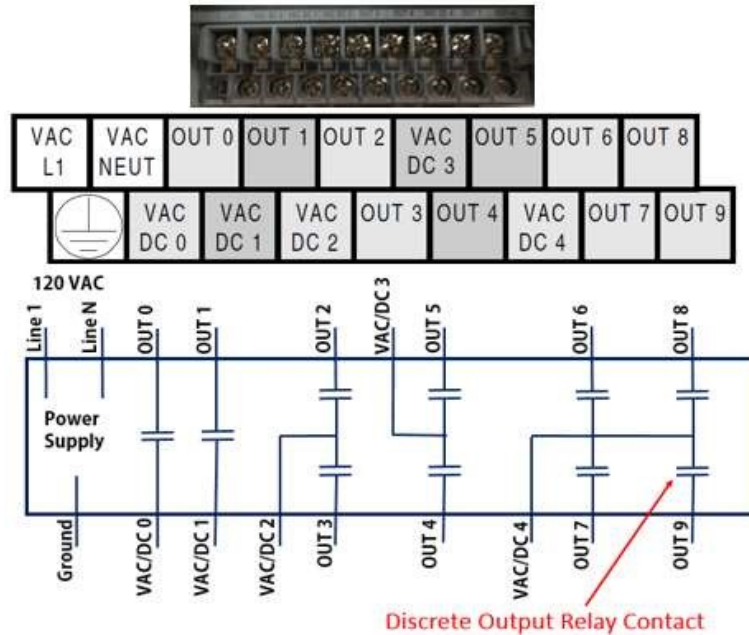


**Input Section Terminals: Discrete Input Wiring**

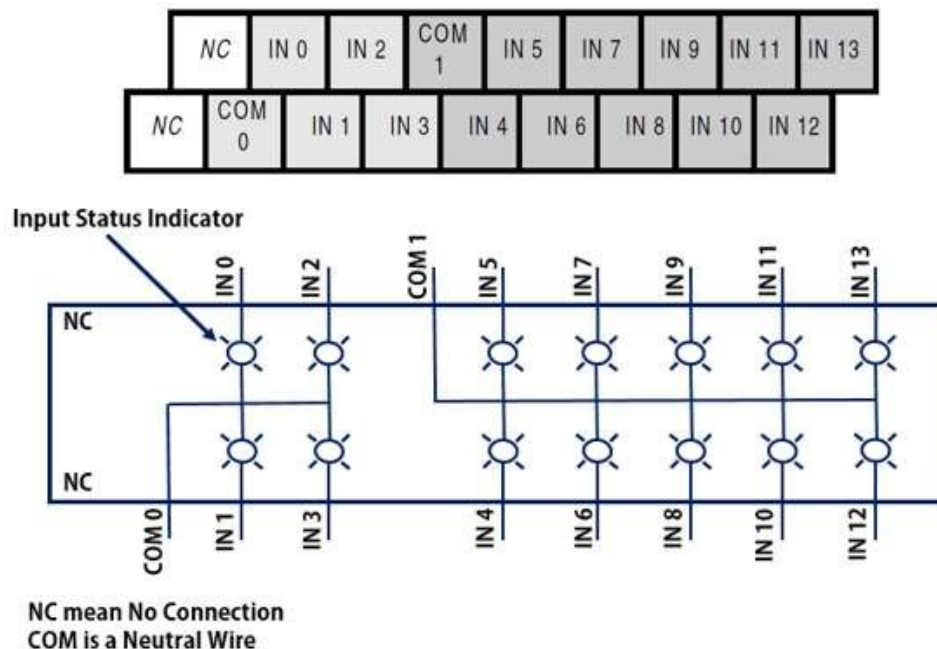


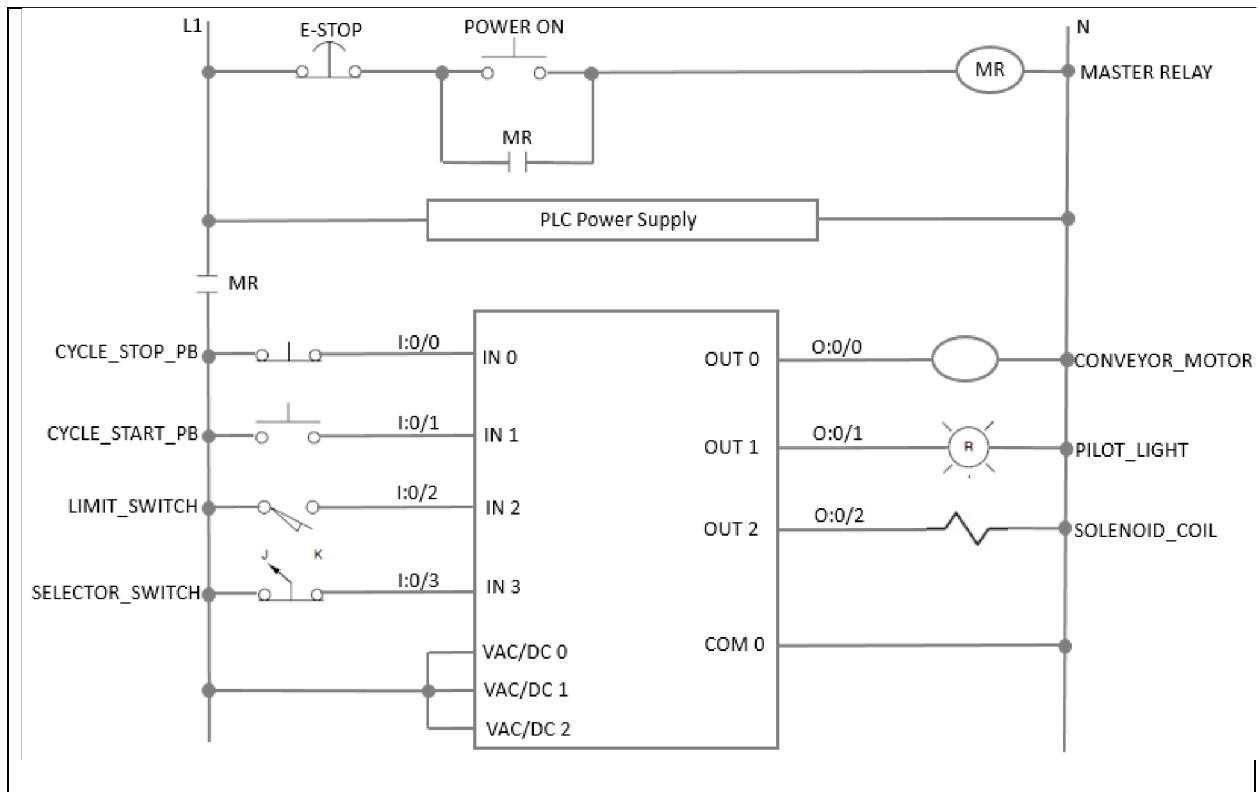
**Output Section Terminals: Power Supply & Discrete Output Wiring**

- Notice that the 120V input for the power supply is on the Output Terminal strip. VAC/L1 is for the hotline, and VAC/NEUT is for the neutral wire (white wire). Also notice the color coding of the terminal diagram. This is I/O group.
- Notice the wiring layout of the output terminals. The terminals marked as VAC/DC means it is the hot wire, whether it is 120VAC or 24VDC. In this case, these are 120VAC. Notice that VAC/DC 0 & 1, each feeds an individual output. VAC/DC 2 feeds two output, VAC/DC 3 feeds two outputs, and VAC/DC 4 feeds four outputs. This diagram shows the outputs with a relay contact, for this model of PLC. It specifies right on the front of the processor that these are relay outputs.

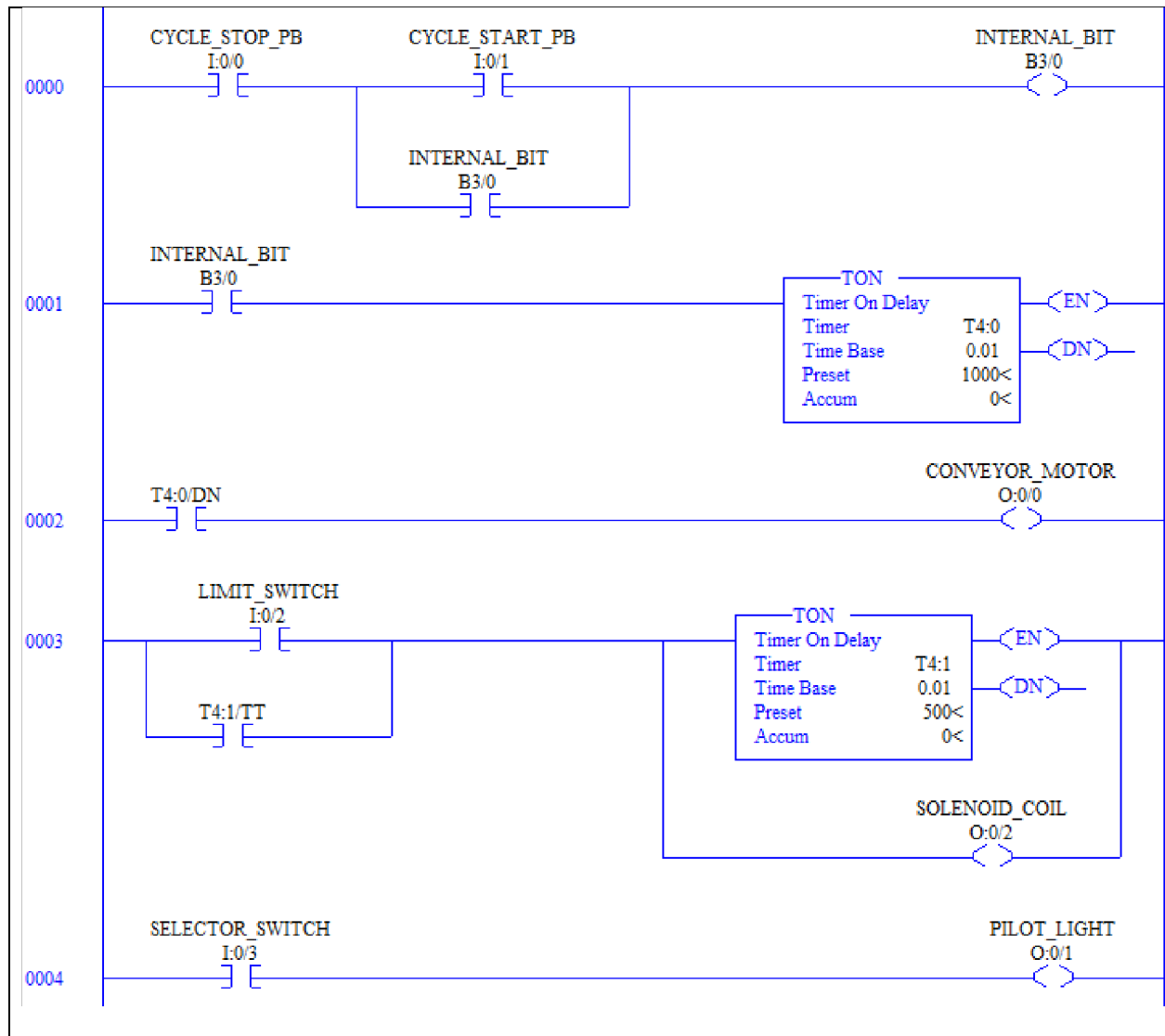


6. The diagram below shows the input section terminal layout. The lower diagram is a redraw by the author to show how the unit is actually wired. Notice that the pilot light symbols are used to represent the input status indicators. When 120VAC comes into one of the input terminals, that input indicator light will turn on, writing a "1" into the processor. Also notice the COM 0 & 1 terminals. The user should run a neutral wire to each of these. Notice that COM 0 connects to the first 4 inputs. COM 1 connects to the other 10 inputs. Also notice the shaded grey colors on the terminal sections in the top diagram.





7. Wire the NSCC wiring board according to the hardware diagram above. Notice the Master Relay, which is the safety relay. When the E-Stop is pushed, all the power going to the PLC I/O should be shut off. Realize that the PLC power supply (located on the output terminal section) will keep power, so the PLC program is not interrupted. If you do not have a solenoid for output 2, use a contactor coil on the reversing starter instead.
8. After the unit is wired, power it up. Notice that the Power light should come on in the Processor Diagnostic Indicators section.
9. Press the Power On pushbutton to enable the control circuit. You should notice that the Input 0 status light is on (due to the N.C. pushbutton wired to it). Now actuate the other inputs to verify that all the inputs are wired correctly.
10. Have your Instructor load the PLC Program into the PLC, and put the processor into the RUN mode. Notice the RUN light in the Processor Diagnostic Indicators section will turn on.
11. The figure below will show the PLC program that was designed for this lab. This program will be downloaded into the PLC processor, and will control the outputs based on the status of the inputs.



12. The following is the basic operation of the program that controls 3 outputs:

- CONVEYOR\_MOTOR (Address O:0/0)
- PILOT\_LIGHT (Address O:0/1)
- SOLENOID\_COIL (Address O:0/2)

13. Rung 0000: The N.O. contact referenced from the CYCLE\_STOP\_PB should have highlight (continuity). When the CYCLE\_START\_PB is pressed, it sends power flow to the INTERNAL\_BIT coil and latches up, so it remains on when the start button is released.

14. Rung 0001: The N.O. INTERNAL\_BIT contact has highlight so it powers the timer. This is a 10 second timer with an address of T4:0.
15. Rung 0002: When the timer is done timing, it turns on the “Done” bit of the timer, which highlights the N.O. contact in this rung, powering the output instruction for the CONVEYOR\_MOTOR. This will turn on the output at output 0 (due to the address of O:0/0).
16. Rung 0003: When the limit switch wired to input 2 is actuated momentarily, it highlights the N.O. instruction in this rung, which powers timer T4:1. This is a 5 second timer. The timer latches up through the N.O. timer timing bit, which is in parallel with the N.O. limit switch instruction. The output instruction for the SOLENOID\_COIL is energized during the time when the timer is timing, then it shuts off.
17. Rung 0004: This is real simple rung. When the selector switch wired to input 3 is turned on, the N.O. instruction highlights, sending logic power flow to the output instruction which will turn on the pilot light that is wired to output 1.
18. Have the Instructor put a hardware problem into your circuit after you leave the lab for a short break. Troubleshoot the problem with your meter, once you know the operation of the circuit and program.

*The outcomes of this exercise (listed on page 1) specifies the skills that the Student must demonstrate to the Instructor. Once the Instructor is satisfied with the demonstration of Knowledge & Skills by the individual student, they will sign this document (for the student), then enter a 100% into the Hands-On Lab grade in Sakai.*

I verify that this student has completed all of the requirements of this Hands-On Assessment:

Student Name: \_\_\_\_\_

Faculty Signature: \_\_\_\_\_ Date: \_\_\_\_\_

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