Gulf Coast Community College
EST 2542C Programmable Logic Controllers

Lab 5-1: PLC Logic Gates

OBJECTIVES:

Upon completion of this lab you should be able to:

- compare digital logic gates to PLC logic
- write a boolean expression for a logic gate
- program the PLC for an OR and AND gate.
- program the PLC for an INVERTER.
- Program thje PLC for an EXCLUSIVE-OR.
- modfify a logic gate circuit to a PLC circuit.

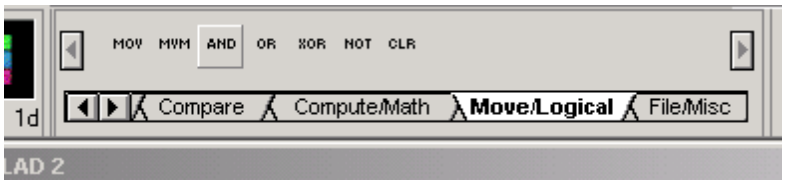
READING AND STUDY ASSIGNMENTS:

Programmable Logic Controllers Hardwareand Programming by Max Rabiee 2nd ed.
Chapter 7 Pages 137-149 & 158-161 ONLY (1st ed. pages 111-121 & 127-131 ONLY)
Chapter 11 Pages 223-227

View the powerpoint by Rabiee: **CH07.ppt**
View the powerpoint **Lab 5 PLC Logic, Encoder and Decoders.ppt**

INTRODUCTION:

In this lab you will program the PLC for logic functions. Most logic circuits that can be built in digital logic gates can be programmed in the PLC. Of course the PLC is not suitable to become a cell phone, however its power is in control circuits based on logic. Looking at the tool bar in RSLOGIX500 you will see some of the gate functions under the **Move/Logical** function. Most of these function are to work at the word level but can be used to look at a bit.



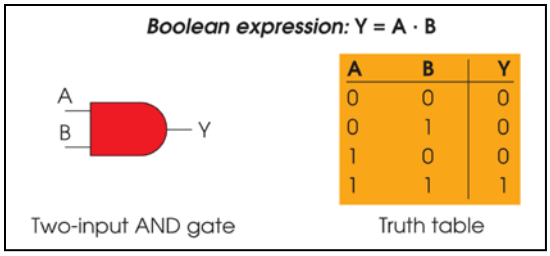
Some of the **Compare** functions such as = or > can perform logic functions as well. Using the **Compute/Math** tab you will also find some more logic functions.

LAB PROCEDURE:

> **NOTE: THE ADDRESSES SHOWN IN THIS LAB ARE FOR ILLUSTRATION ONLY. THE PLC BENCH TRAINER AND PLC CASE TRAINER MAY HAVE DIFFERENT ADDRESS. SEE LAB 1-2 FOR THE CHART THAT SHOWS TO ACTUAL ADDRESS USED IN THE PLC CASE TRAINER.**

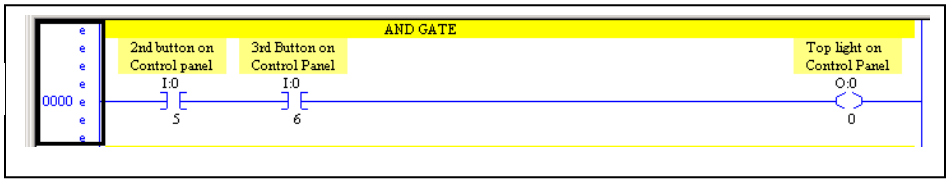
1. Program the PLC for an **AND** gate and test it against the truth table.

Digital Logic **AND** Gate



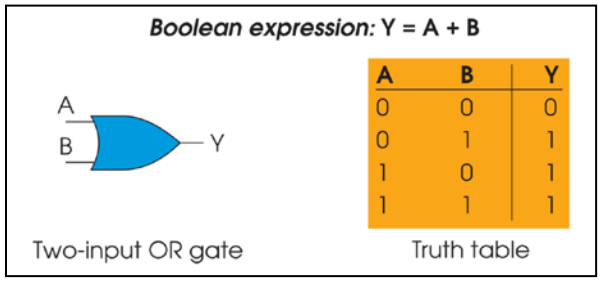
A	B	Y
0	0	0
0	1	0
1	0	0
1	1	1

PLC **AND** Gate



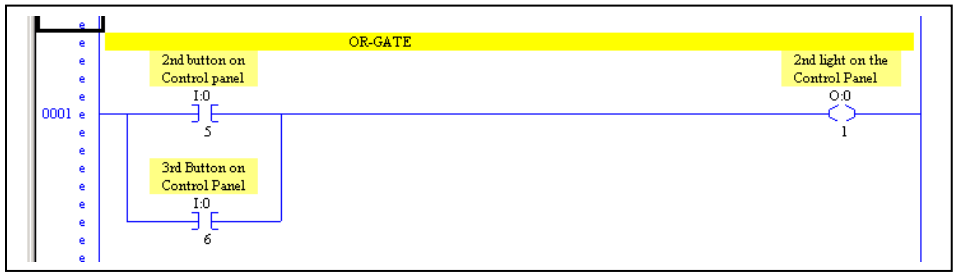
2. Add to your program a PLC **OR** gate and test it against the truth table.

Digital Logic **OR** Gate



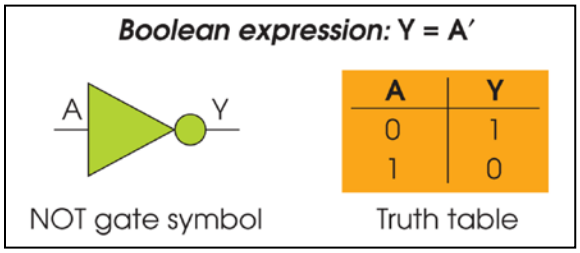
A	B	Y
0	0	0
0	1	1
1	0	1
1	1	1

PLC **OR** Gate

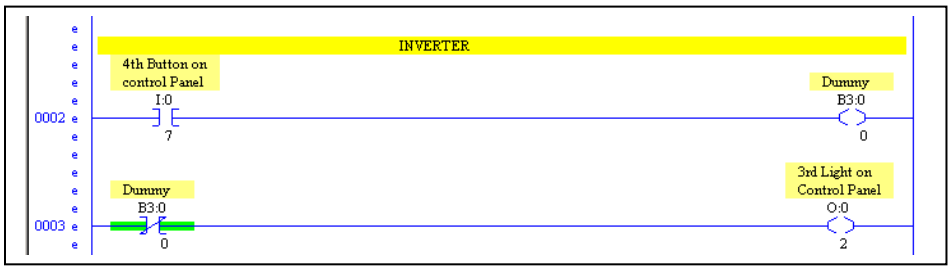


3. Add to your program a PLC **INVERTER** and test it against the truth table.

Digital Logic **INVERTER** Gate

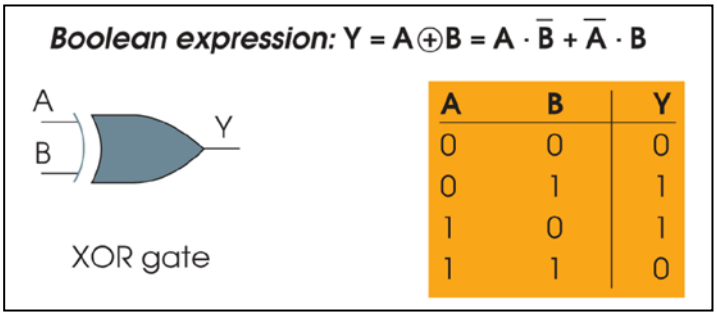


PLC **INVERTER** Gate

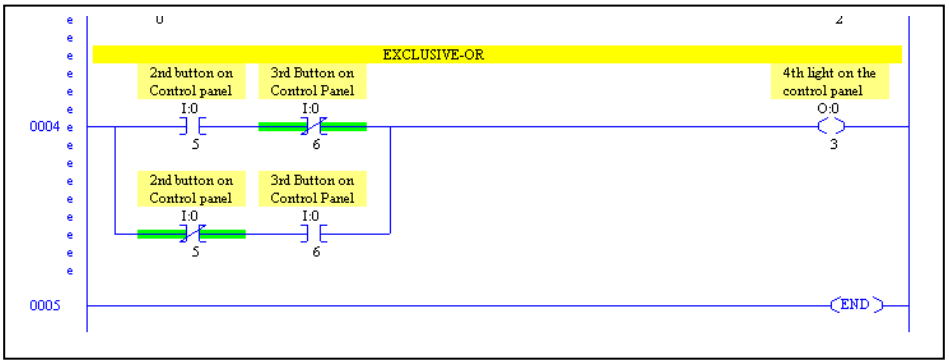


4. Add to your program a PLC **INVERTER** and test it against the truth table.

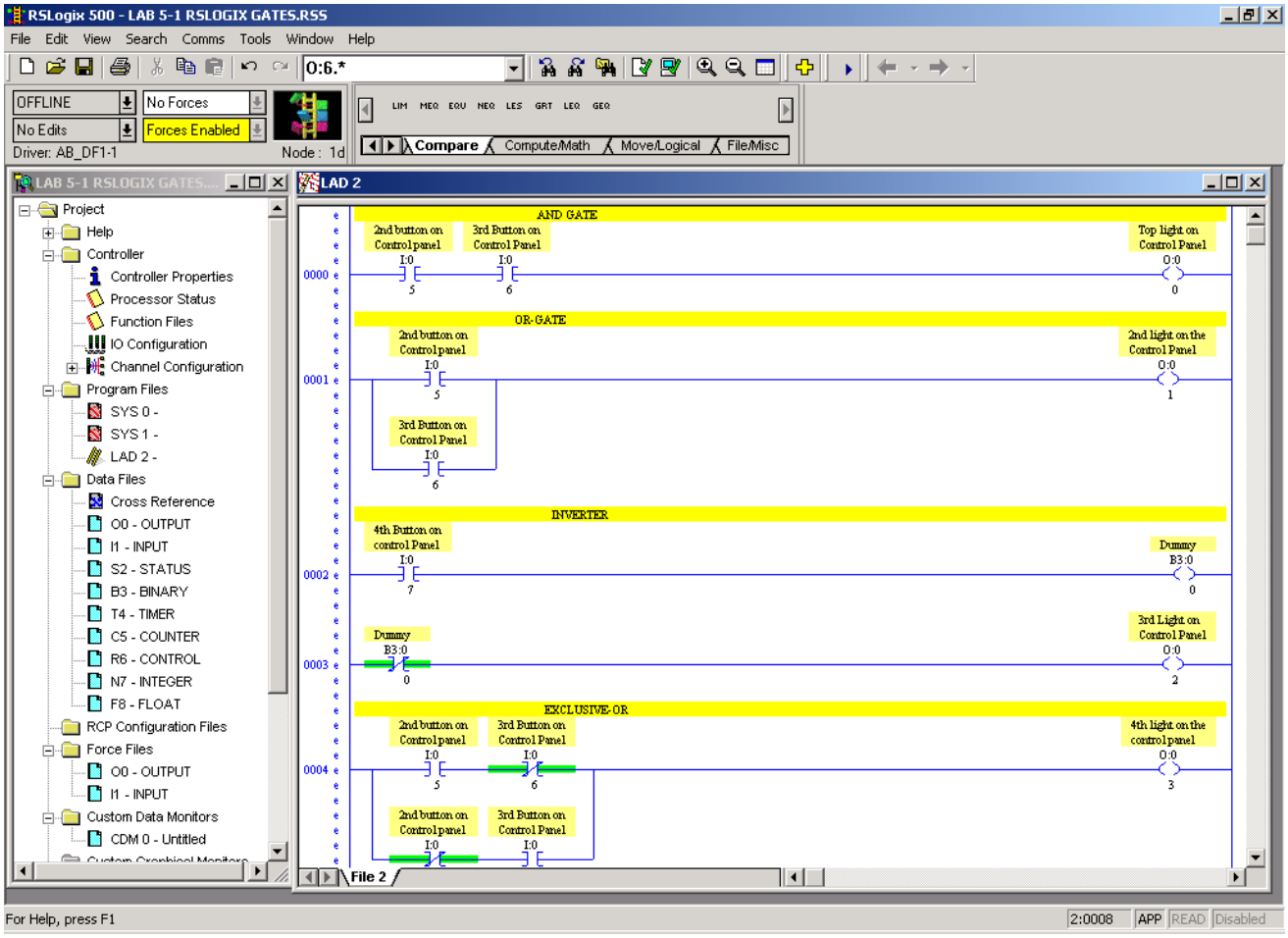
Digital Logic **EXCLUSIVE-OR** Gate



PLC **EXCLUSIVE-OR** Gate



5. Your program should look like this. Verify your project, if no errors then download, run and test you logic gates..



6. Save your program. File name example: NAMELAB5-1

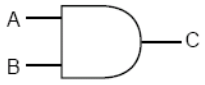
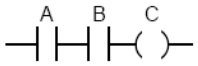
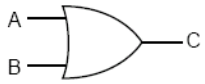
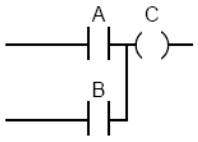
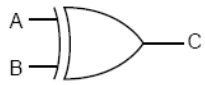
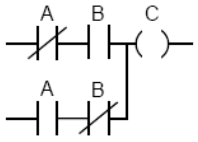
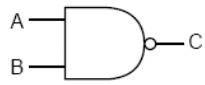
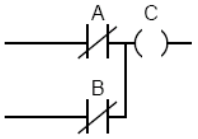
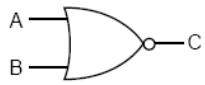
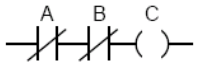
7. Print your program.

8. Demo this for a sign off

SUMMARY:

The chart below shows the equivalent ladder logic for a digital logic gate.

EQUIVALENT LADDER/LOGIC DIAGRAMS

Logic Diagram	Truth Table	Ladder Diagram
 AND Gate	A B C 0 0 0 0 1 0 1 0 0 1 1 1	 AND Equivalent Circuit
 OR Gate	A B C 0 0 0 0 1 1 1 0 1 1 1 1	 OR Equivalent Circuit
 Exclusive-OR Gate	A B C 0 0 0 0 1 1 1 0 1 1 1 0	 Exclusive-OR Equivalent Circuit
 NAND Gate	A B C 0 0 1 0 1 1 1 0 1 1 1 0	 NAND Equivalent Circuit
 NOR Gate	A B C 0 0 1 0 1 0 1 0 0 1 1 0	 NOR Equivalent Circuit

http://www.industrialtext.com/Support/Logic_Symbols.PDF