Gulf Coast Community College
EST 2542C Programmable Logic Controllers

Lab 5-4: DECIMAL TO BINARY ENCODER (BCD)

OBJECTIVES:

Upon completion of this lab you should be able to:
- identify the difference between encoder and decoders
- determine if the circuit is built from AND gates or OR gates.
- Program the PLC for a Decimal to BCD encoder

READING AND STUDY ASSIGNMENTS: (same as Lab 5-1)

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:

What is the difference between an Encoder and a Decoders? Ttypically Decoders change a code into a more familiar code. In the last lab (5-3) you programmed a decoder. Decoders have fewer inputs than outputs and the PLC program uses AND gate logic (contacts in series) to decode each possible output. Encoders have more inputs than outputs and the PLC program uses OR gate logic (contacts in parallel) to encode the input into a code. In this lab you will program the PLC for a decimal to binary encoder. Since the inputs are 0-9, the output will be binary coded decimal (BCD). A truth table helps to see how the encoder outputs must be programmed. When programming this encoder, there a 4 outputs. Each output should be treated separate. Looking at the 1 output and the truth table, it can be seen by reading down the 1 column that the decimal number 1 or 3 or 5 or 7 or 9. The significance of "or" tells us that these contacts must be ORed or in parallel. Look at each collumn for 2, 4, and 8 to find what decimal inputs are needed.
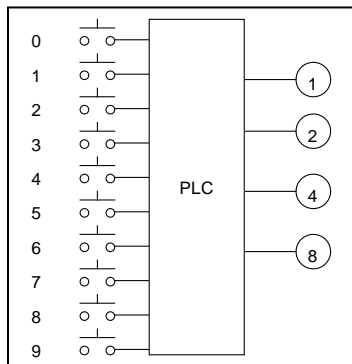
Dec	8	4	2	1
0	0	0	0	0
1	0	0	0	1
2	0	0	1	0
3	0	0	1	1
4	0	1	0	0
5	0	1	0	1
6	0	1	1	0
7	0	1	1	1
8	1	0	0	0
9	1	0	0	1

LAB PROCEDURE:

1. The Encoder will have 4 rungs each with several branches used to OR each input needed to Activate the output. Looking at the truth table for this circuit, identify each input needed for each output. This can be done by reading down the collums under the 8 then the 4, then the 2, then the 1.
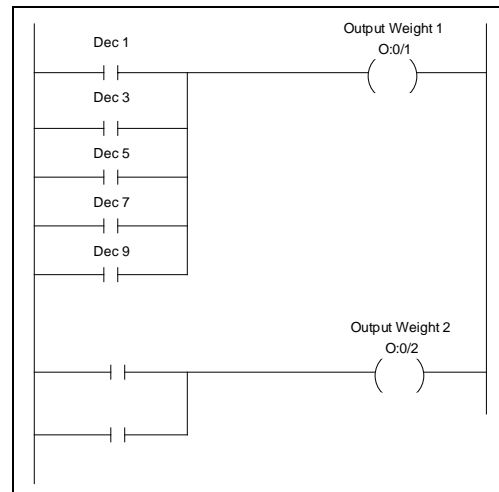
List each:

Output 1   <u>1,   3,   5,   7,   9</u>

Output 2   _____

Output 4   _____

Output 8   _____

2. Create a rung for each output with the inputs in parallel (OR Logic) Do not program a switch for the 0 since if all switches are off the 4 outputs will also be off indicating no input.

3. Dowload and test the program by activating one of 1-9 switches at a time.

4. Save your program in your folder as NAMELAB5_3

5. Print out you program if you like.

6. Demonstrate this program to your instructor for lab credit.

SUMMARY:

1. Decoders have fewer inputs than outputs

2. Decoders use AND gate logic (contacts in series) to decode each possible output.

3. Encoders have more inputs than outputs

4. Encoders use OR gate logic (contacts in parallel) to encode the input into a code.

5. Since the inputs are 0-9, the output will be binary coded decimal (BCD).

6. A truth table helps to see how the encoder outputs must be programmed.