ELEC 2210 LABORATORY REPORT COVER PAGE
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Meeting # 002 EXPERIMENT 3: Medium Scale Integrated (MSI) Circuits
Title of Lab Experiment

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GTA: Jonathan
Name of your GTA

The section you are enrolled in: (Circle One): 1 2 3 4 5 6 7 8

Date experiment performed (dd / mm / yy): 2/9/20

Date report submitted: (dd / mm / yy): 8/9/20

If you performed this experiment at a time other than your regularly scheduled section meeting:

Section # of the section you sat in on (Circle One): 1 2 3 4 5 6 7 8 Makeup

Name of the GTA who supervised your work: None

I hereby certify that the contents of this report are true and complete to the best of my ability. The lab work was performed by me exclusively, and this report was written by me exclusively.

Jacob Howard 9/8/20
Student signature Date signed

ELEC-2210

Digital Electronics

FROM: Jacob Howard
TO: Jonathan
DATE: 9/8/20
LAB SECTION: 001 (Tuesday, 1:00pm-2:50 pm)

EXPERIMENT 3:
Medium Scale Integrated (MSI) Circuits

Introduction

The objectives of this lab experiment were mainly focused on performing simple problems with equipment that we will be using relatively frequently. This helped us gain experience with equipment for future labs. We were introduced to multiplexers and demultiplexers and some of the things they can do. This lab required us to use the ELVIS board and some PC software later in the lab.

Step 1

The lab consisted of 3 steps. The fourth step was just to clean up our station. For the first step, we had to make the necessary connections provided from a table from *Table1* below. We used the 74LS161 chip. This setup was just the first part of the full circuit design from our prelab. We were able to check if everything was wired up correctly by checking LEDs 2-0.

Pin	Label	Function	Connect to	Notes
16	VCC	Power	+5 V	
8	GND	Ground	Ground	
1	CLEAR*	Asynchronous clear	+5V	Disable clear function
2	CLOCK	Clock	Digital I/O DIO7	Use Digital Writer to produce clock pulses
3-6	A-B-C-D	Data inputs	Ground	
7	ENABLE P	Enable	+5V	Enable counting
9	LOAD*	Asynchronous load	+5V	Disable load function
10	ENABLE T	Enable	+5V	Enable counting
11	QD	Count output (bit 3)	Not connected	
12	QC	Count output (bit 2)	LED2	Select channel 0-7
13	QB	Count output (bit 1)	LED1	
14	QA	Count output (bit 0)	LED0	
15	RIPPLE	Ripple carry out	Not connected	

Table 1

Step 2

For step 2 of the lab, we wired up the 74LS151 chip. This chip is an 8-input multiplexer. A table was also given in this step for how to correctly wire up the chip. The table is shown in *Table 2*. In this step, only one output is connected to an LED and we were able to use the Digital Writer to verify the correct functioning of the circuit. By changing the input in the Digital Writer we were able to verify that we had the wiring correct.

Pin	Label	Function	Connect to	Notes
16	VCC	Power	+5 V	
8	GND	Ground	Ground	
4-1, 15-13	D0-D3, D4-D6	Data inputs 0-6	Digital I/O DIO0-DIO3, DIO4-DIO6	Data to be transmitted from Digital Writer
12	D7	Data input 7	Ground	Constant 0 data
11	A	Data select (LSB)	Counter output QA	These three inputs select the data input to be transmitted.
10	B	Data select	Counter output QB	
9	C	Data select (MSB)	Counter output QC	
7	STROBE*	Enable signal	Ground	
5	Y	Multiplexer output	LED7	Transmitted signal
6	W	Multiplexer output (inverted)	No connection	

Figure 1

Step 3

In step 3, we connected the 74LS138 chip, which is the last chip we need to be wired up for the circuit design. This chip is a decoder or demultiplexer. A wiring table was also provided for this chip. We just needed to follow the table in *Table 3* to wire up the demultiplexer correctly. We used the Digital Writer to provide inputs to the circuit. The final result was a circuit that would light the LED 0-7 depending on what the input was. The correct results are shown in *Table 4*.

INPUT	OUTPUT
1	LED 0 turns on
2	LED 1 turns on
3	LED 2 turns on
4	LED 3 turns on
5	LED 4 turns on
6	LED 5 turns on
7	LED 6 turns on
8	LED 7 turns on

Conclusion

This experiment was a good hands-on way of showing the multiplexer and demultiplexer works. I think the lab was simple and very interesting, though I did burn up a demultiplexer chip by wiring it in upside down. I would say this is one of my favorite circuits I have wired on a breadboard and was a great intro to the chips and the software