

ELC 2137 Lab #4: Subtractor

Sebastian Lopez and Megan Gordon

February 13, 2020

Summary

In this lab we described the operation of a two-bit adder/subtractor. We developed a moderately complex circuit on a breadboard using standard electrical parts, as well as our own test procedure and verification operation of the circuit. Then, we recognized that the digital circuits quickly become complex and difficult to implement in hardware.

Q&A

1. Why did we use two full adders instead of a half adder and a full adder? Using two full adders follows along with the idea that each adder has its own purpose. One adder is relative to the "adder" and the other is relative to the "subtracator". Each with its own set of switches and input, but with combined effect for output.
2. How many input combinations would it take to exhaustively test the adder/subtractor? It would take six input combinations to exhaustively test the adder/subtractor.
3. Why were the combinations given in the truth table chosen? The reason why these specific combinations were given is due to the fact that it gives the proper values to effectively run and test the adder/subtractor.
4. Do the results from your adder/subtractor match what you would expect from theory? Explain any discrepancies. The c values when calculated were incorrect in comparison to that of the expected results. The c values needed to be flipped in order to create the correct results for the adder/subtraactor.

Results

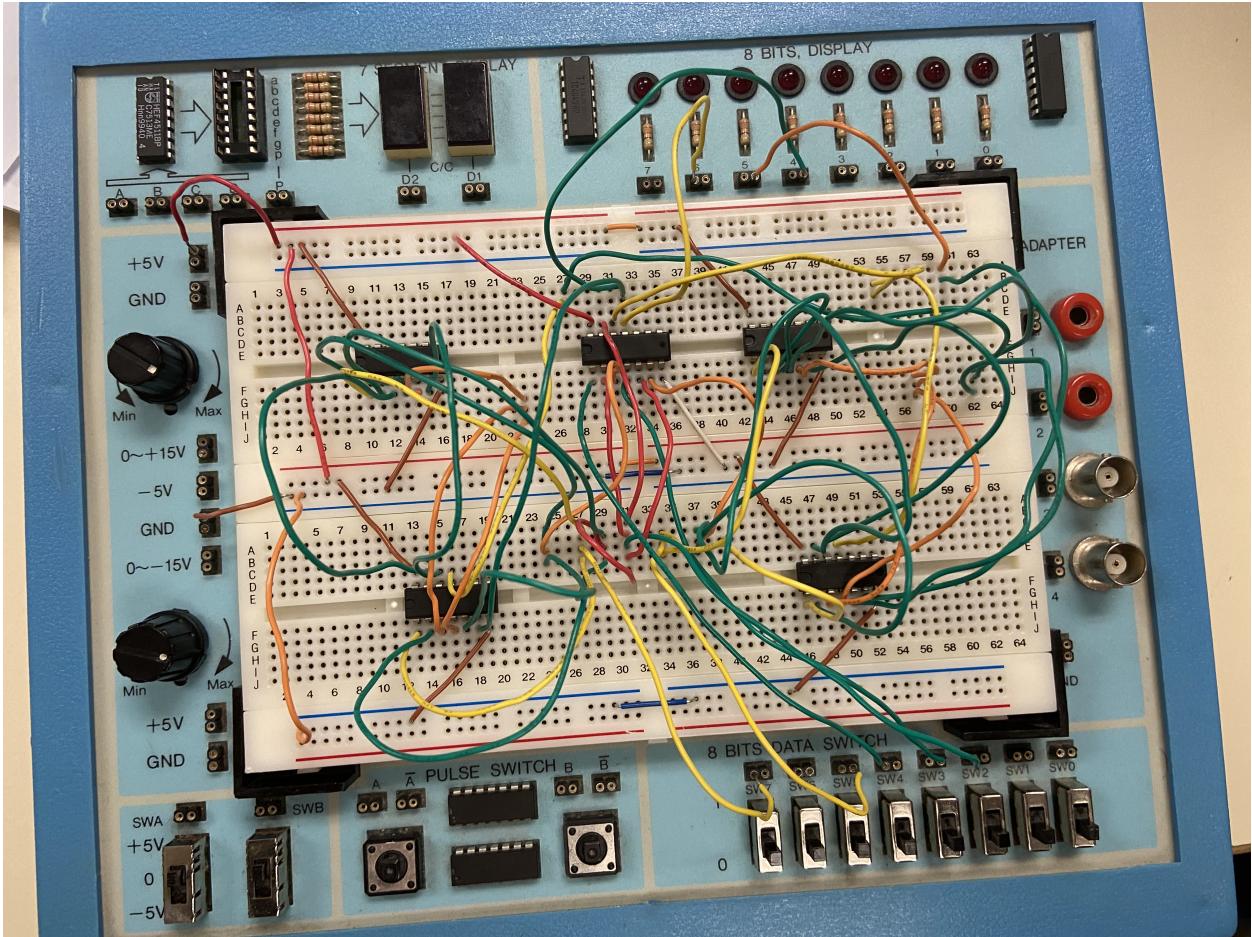


Figure 1: This is the assembled circuit.

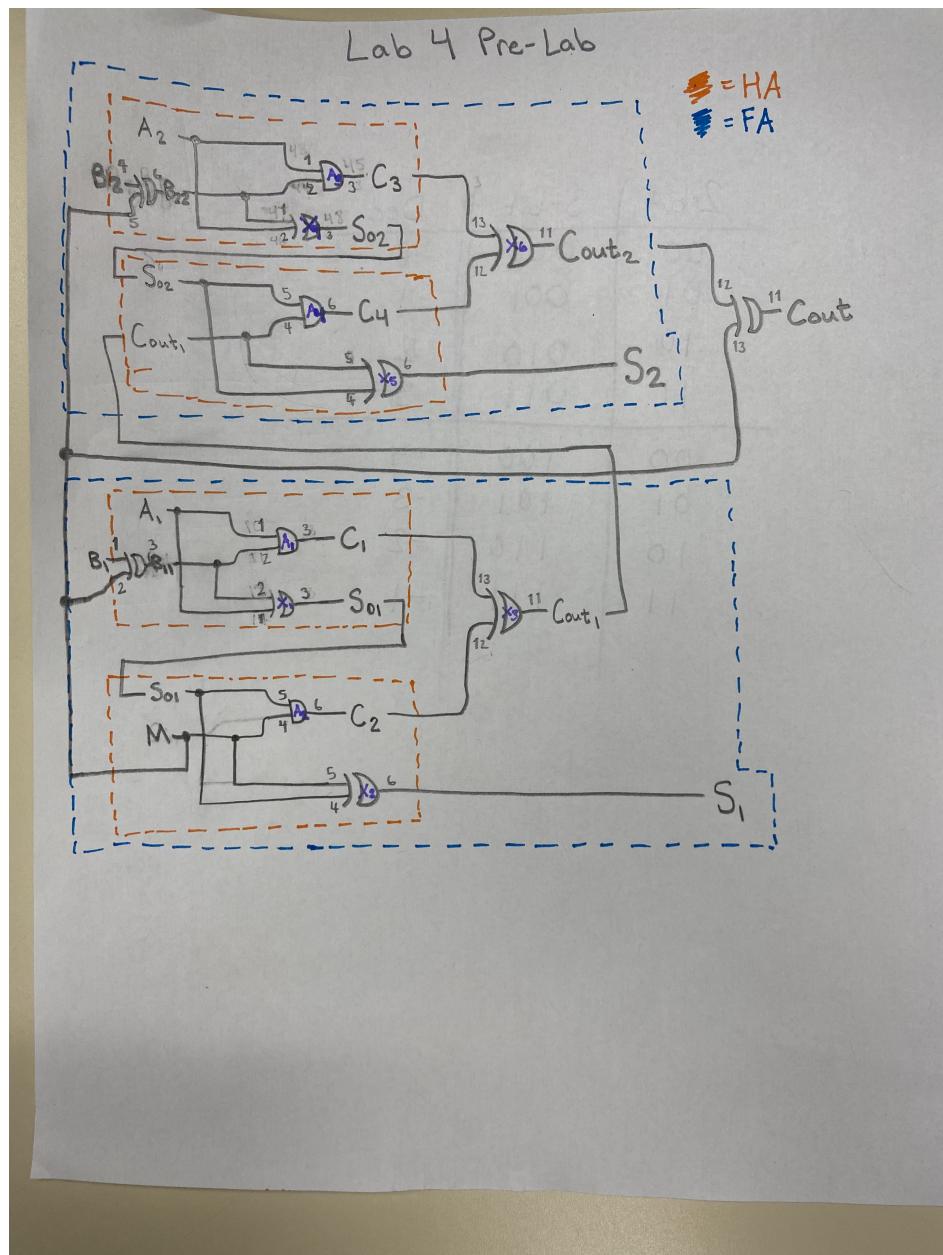


Figure 2: This is the two bit adder/subtractor schematic.

ELC 2137

Lab 4. Subtractor

Circuit Demonstration Page

Student names:

Sebastian Lopez

Megan Gordon

Instructor Signatures

Separate Full Adders

Gil Blahm

Two-Bit Adder

Gil Blahm

Adder/Subtractor

Gil Blahm

Inputs		Expected Results			Actual Results	
A	B	B 2's comp	Sub	Dec	Sub	
00	01	11	011	3	111	
00	10	10	010	2	110	
00	11	01	001	1	101	
01	01	11	100	-4	000	
10	01	11	101	-3	001	
10	00	100	110	-2	010	

Figure 3: This is the circuit demonstration page.