

# ELC 2137 Lab 03: Adders

Yiting Wang

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## Summary

Logic circuits began as discrete components, which were then packaged into integrated circuits(ICs or chips) that might contain several individual gates or more complicated circuits. The goals of this Lab are to be able to design logical circuits that implement a desired function, and introduces a family of logic chips (integrated circuits or ICs) that can be used to design simple logic circuits.

## Q&A

1. Which gates could we use for combining the carry bits? Which one should we use and why?  
We should use XOR gate. When there are two 1s as inputs, we need to cut off 1 bit; and when there are 0's and 1s as inputs, we need to keep that. An XOR gate will give you a 0 with two 1s as inputs, and a 1 with one 1's as input.

## Results

Table 1: FA expanded truth table

Cin	A	B	c1	s1	c2	s2	Cout	S
0	0	0	0	0	0	0	0	0
0	0	1	0	1	0	1	0	1
0	1	0	0	1	0	1	0	1
0	1	1	1	0	0	0	1	0
1	0	0	0	0	0	1	0	1
1	0	1	0	1	1	0	1	0
1	1	0	0	1	1	0	1	0
1	1	1	1	0	0	1	1	1

## Code

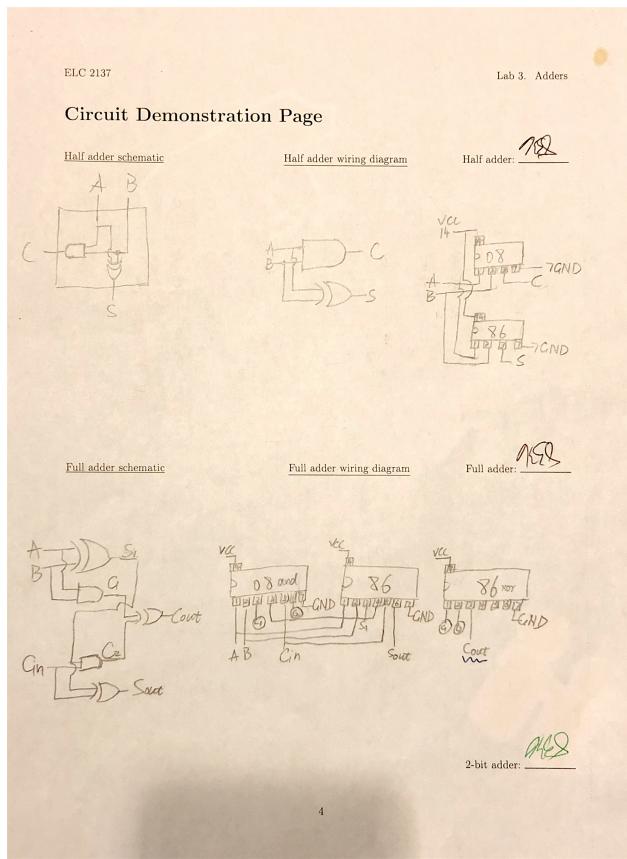


Figure 1: The Circuit Demonstration Page

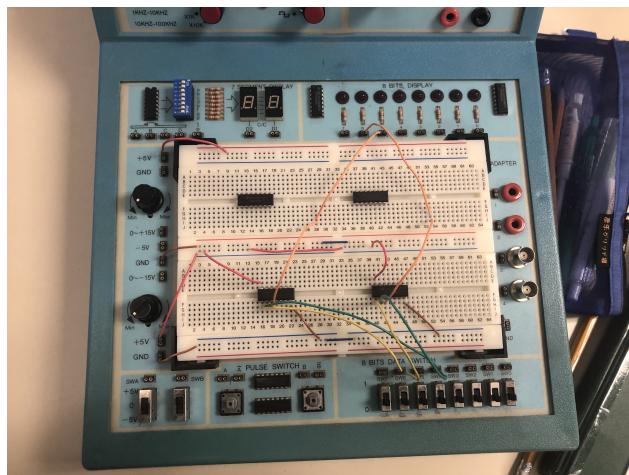


Figure 2: The Half Adder Circuit

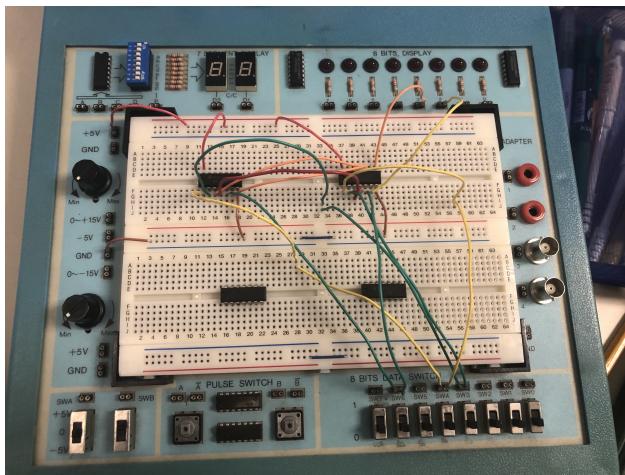


Figure 3: The Full Adder Circuit

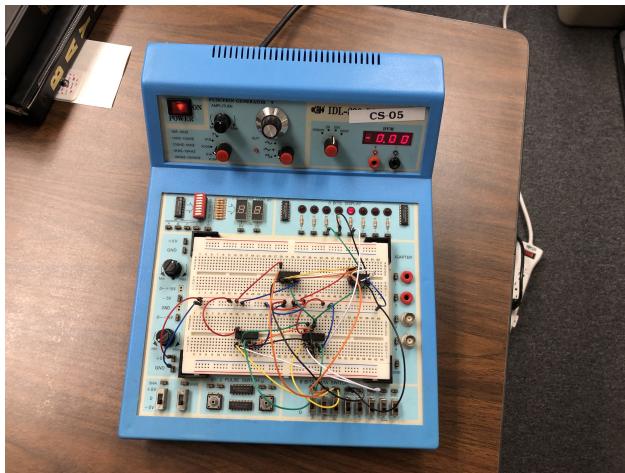


Figure 4: The 2-bit Adder Circuit

Table 2: FA expanded truth table

Cin	A	B	c1	s1	c2	s2	Cout	S
0	0	0	0	0	0	0	0	0
0	0	1	0	1	0	1	0	1
0	1	0	0	1	0	1	0	1
0	1	1	1	0	0	0	1	0
1	0	0	0	0	0	1	0	1
1	0	1	0	1	1	0	1	0
1	1	0	0	1	1	0	1	0
1	1	1	1	0	0	1	1	1

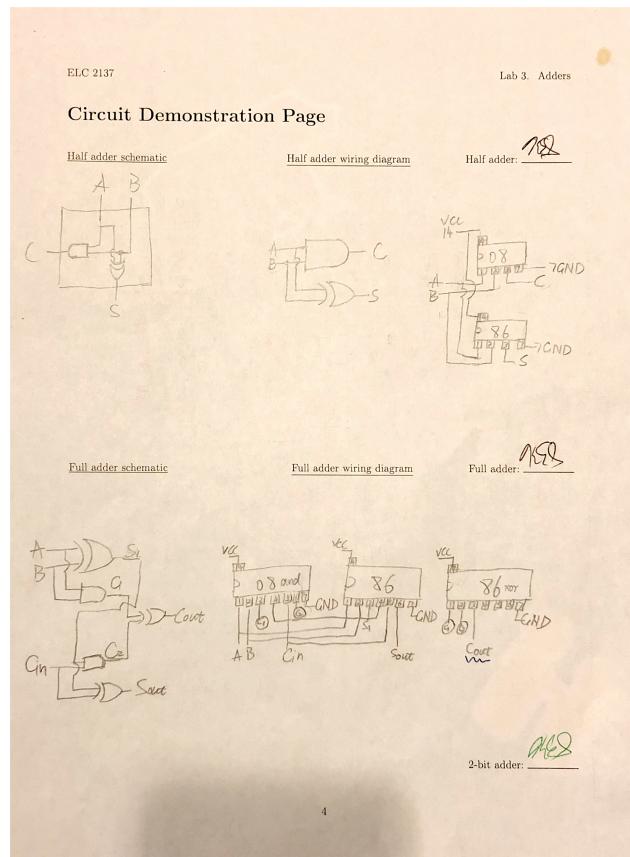


Figure 5: The Circuit Demonstration Page

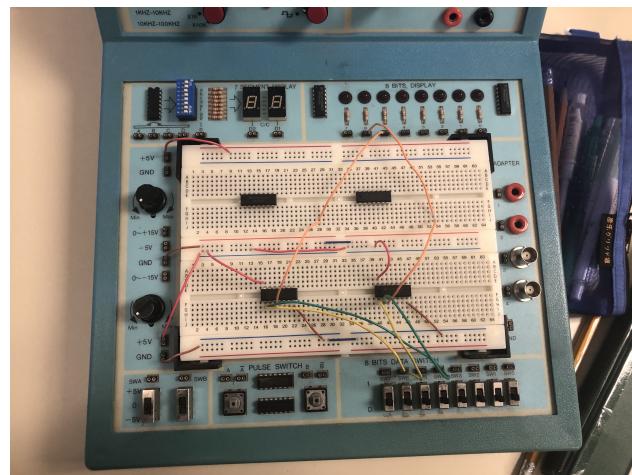


Figure 6: The Half Adder Circuit

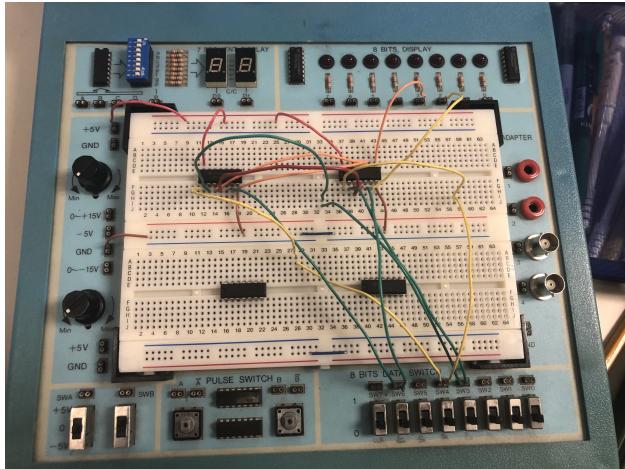


Figure 7: The Full Adder Circuit

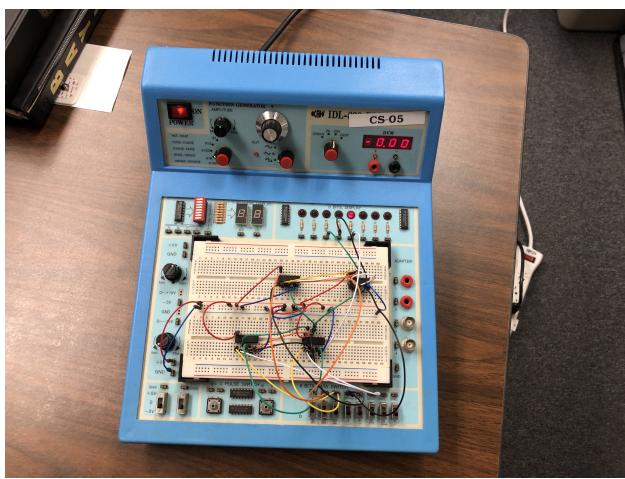


Figure 8: The 2-bit Adder Circuit