

DIG125

8-bit Adder/Subtractor

Name: _____
Last First

Class: _____

Objectives

- To build an 8-bit adder/subtractor and investigate its operation
OR
- To realize an 8-bit adder/subtractor using simulation software.

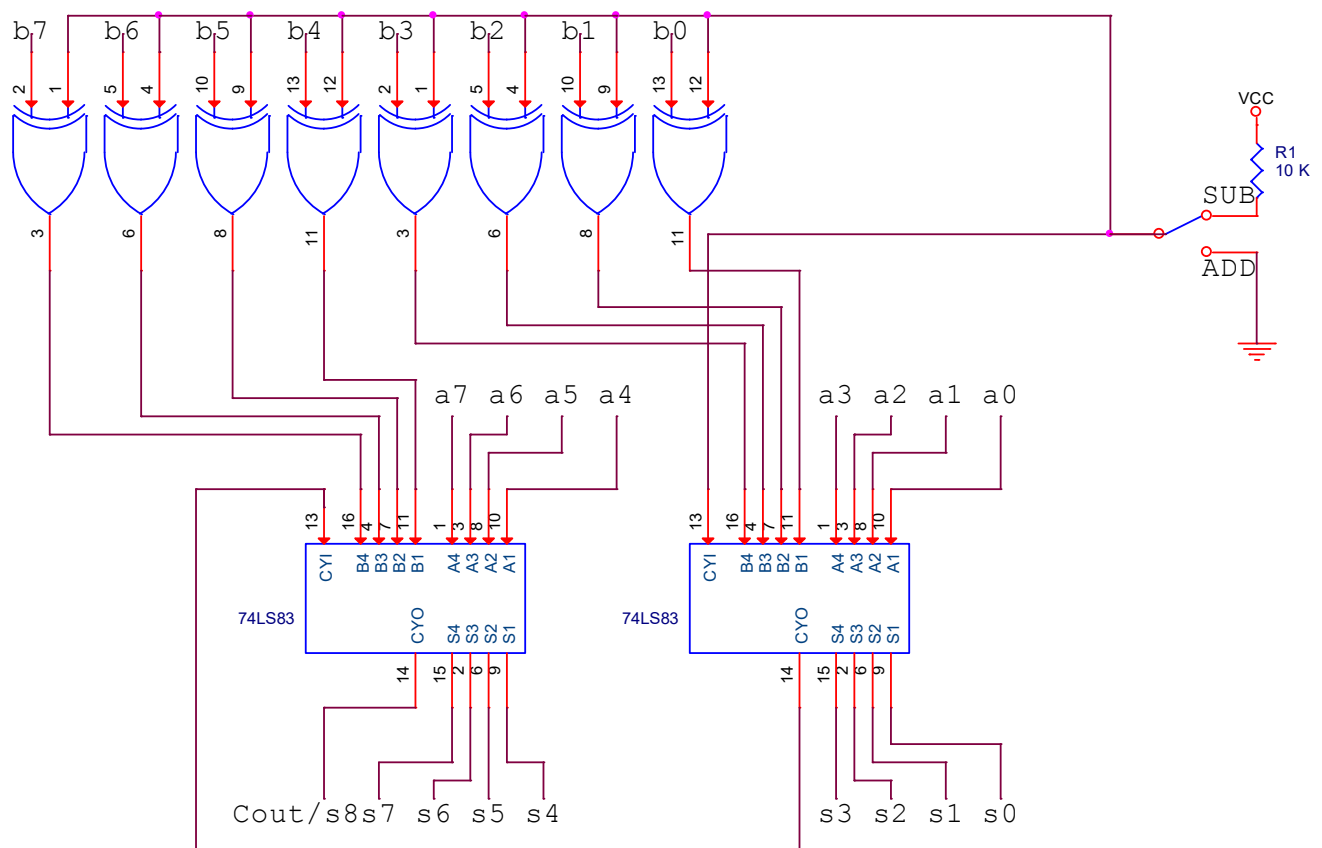
Equipment Required

QTY	DESIGNATION	DESCRIPTION
2	74LS83	4-bit adder
2	74LS86	TTL Quad 2-input EXCLUSIVE OR Gate IC
2	8-DIP switch	SMD switch board or other
1	8-LED	SMD LED BOARD or other

Procedure

Use hardware or simulation software as the Professor shall instruct.

1. Construct the circuit shown below.



2. Connect word A (a7a6a5a4a3a2a1a0) to 8 input switches.
3. Connect word B (b7b6b5b4b3b2b1b0) to 8 input switches. Note that word B will be the subtrahend for subtraction.

4. Connect the sum outputs to LEDs.
5. If you are working with hardware, determine the pin numbers for V_{CC} and GND and connect appropriately.
6. Apply power to (or simulate) the circuit.
7. Calculate and record the following arithmetic operations in the table.

	Addition	Addition	Subtraction	Subtraction
Problem	1100101_2 $+ 10010001_2$	10101101_2 $+ 1101110_2$	11100101_2 $- 10010001_2$	10101101_2 $- 11011100_2$
Answer				

8. Now use your circuit to verify your answers:

A. $1100101_2 + 10010001_2$ **Ans =** _____

B. $10101101_2 + 1101110_2$ **Ans =** _____

C. $11100101_2 - 10010001_2$ **Ans =** _____

D. $10101101_2 - 11011100_2$ **Ans =** _____

9. Demonstrate your working circuit to the instructor.

Instructor Check _____

10. Modify your circuit to automatically discard any carry when you perform a subtraction while showing the carry when you perform an addition.

11. Demonstrate your working circuit to the instructor.

Instructor Check _____