

Computer Circuit Fundamentals (Lab 8)

Comparator

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OBJECTIVES

- Learn about comparator logic.
- Test comparator logic.

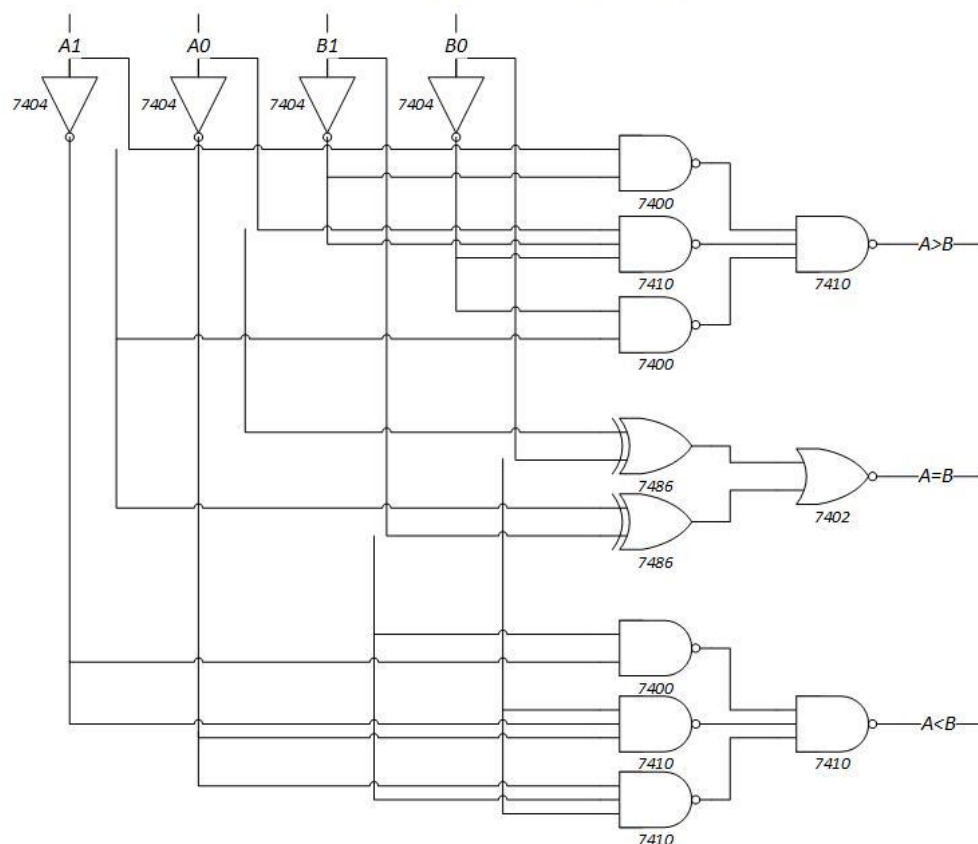
DESIGN

Experiment

- This experiment consisted of testing the logic of a 1-bit comparator and 2-bit comparator. Based on our understanding of comparator logic, we applied that knowledge to test two separate logic circuits. The first one was a 1-bit comparator and the second was a 2-bit comparator. We used the 2-bit comparator logic diagram under “Schematics” to wire our circuit. Using the 2-bit comparator truth table under “Questions”, we compared our results with the truth table.

SCHEMATICS

2-bit comparator logic diagram



QUESTIONS

Questions from the Experiment

1) 1-bit comparator truth table:

a)

INPUTS		OUTPUTS		
A	B	A>B	A=B	A<B
0	0	0	1	0
0	1	1	0	0
1	0	0	0	1
1	1	0	1	0

b)

$$A > B = A \cdot B'$$

$$A < B = A' \cdot B$$

$$A = B = (A \cdot B' + A' \cdot B)'$$

2) 2-bit comparator truth table:

INPUTS				OUTPUTS		
A1	A0	B1	B0	A>B	A=B	A<B
0	0	0	0	0	1	0
0	0	0	1	0	0	1
0	0	1	0	0	0	1
0	0	1	1	0	0	1
0	1	0	0	1	0	0
0	1	0	1	0	1	0
0	1	1	0	0	0	1
0	1	1	1	0	0	1
1	0	0	0	1	0	0
1	0	0	1	1	0	0
1	0	1	0	0	1	0
1	0	1	1	0	0	1
1	1	0	0	1	0	0
1	1	0	1	1	0	0
1	1	1	0	1	0	0
1	1	1	1	0	1	0

$$A > B = A0.B1'.B0' + A1.B1' + A1.A0.B0'$$

$$A = B = A1'.A0'.B1'.B0' + A1'.A0.B1'.B0 + A1.A0.B1.B0 + A1.A0'.B1.B0'$$

$$A < B = A1'.B1 + A0'.B1.B0 + A1'.A0'.B0$$

3) Bonus Questions:

Q: What is a comparator?

A: *A digital comparator is a combinational circuit that compares two digit or binary numbers.*

Q: What are the applications of a comparator?

A: *-Operational amplifiers*

-Process controllers

-Servo-motor control