2016
2017

Logic Circuits Lab.

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Experiment No1: 'NOT', 'AND', 'OR', 'NAND', 'NOR' GATES

1.0. Objectives

1. Information about lab. equipments and integrated circuits.
2. Creating truth table for NOT, AND, OR, NAND, NOR gates.

1.1. Introductory Theory

GATES

NOT: the output is 0 when the input is 1, and the output is 1 when the input is 0. (7404)

AND: a multi- input circuit in which the output is a 1 only if all inputs are 1. (7408)

OR: a multi-input circuit in which the output is a 1 when any input is a 1. (7432)

NAND: AND followed by INVERTER. (7400)

NOR: OR followed by INVERTER. (7400)

Each of the Integrated Circuits (ICs) used in this experiment is a 14-pin dual-in-line IC case. The base pins progress in a counterclockwise direction as seen from the top view of the IC (the side away from the pins), as shown in Figure 1.1 below. Pin 1 is represented by a dimple, or you can identify the location of pin 1 by the index notch at the end of the IC case where Pins 1 and 14 are located.

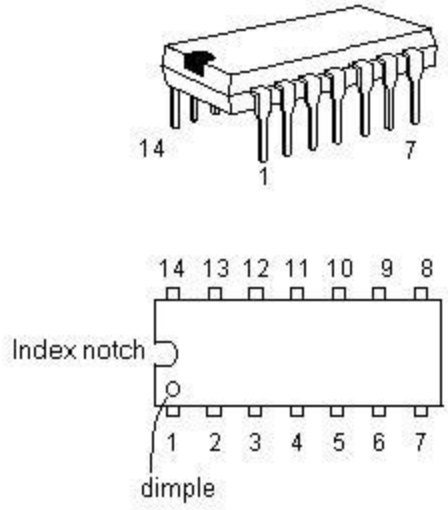


Figure 1.1 IC Pin locations

The breadboard of digital circuits has standard internal connections. The internal connections help to build the digital circuits easily. For example, for the Breadboard shown below in Figure 1.2, the internal connections would be as in Figure 1.3.

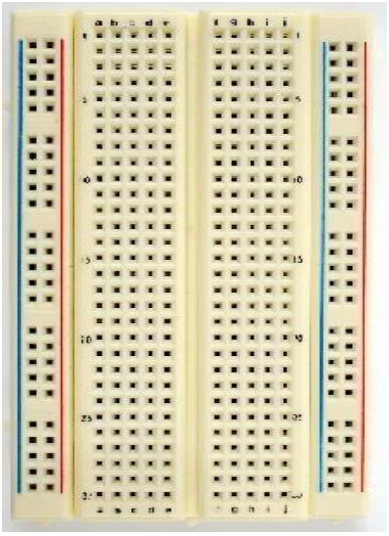


Figure 1.2 Sample Breadboard

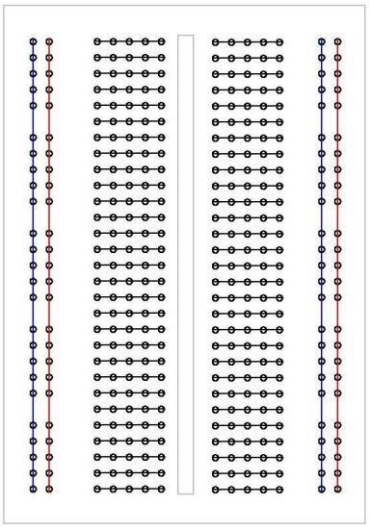


Figure 1.3 Internal connections of the sample Breadboard

Integrated Circuits

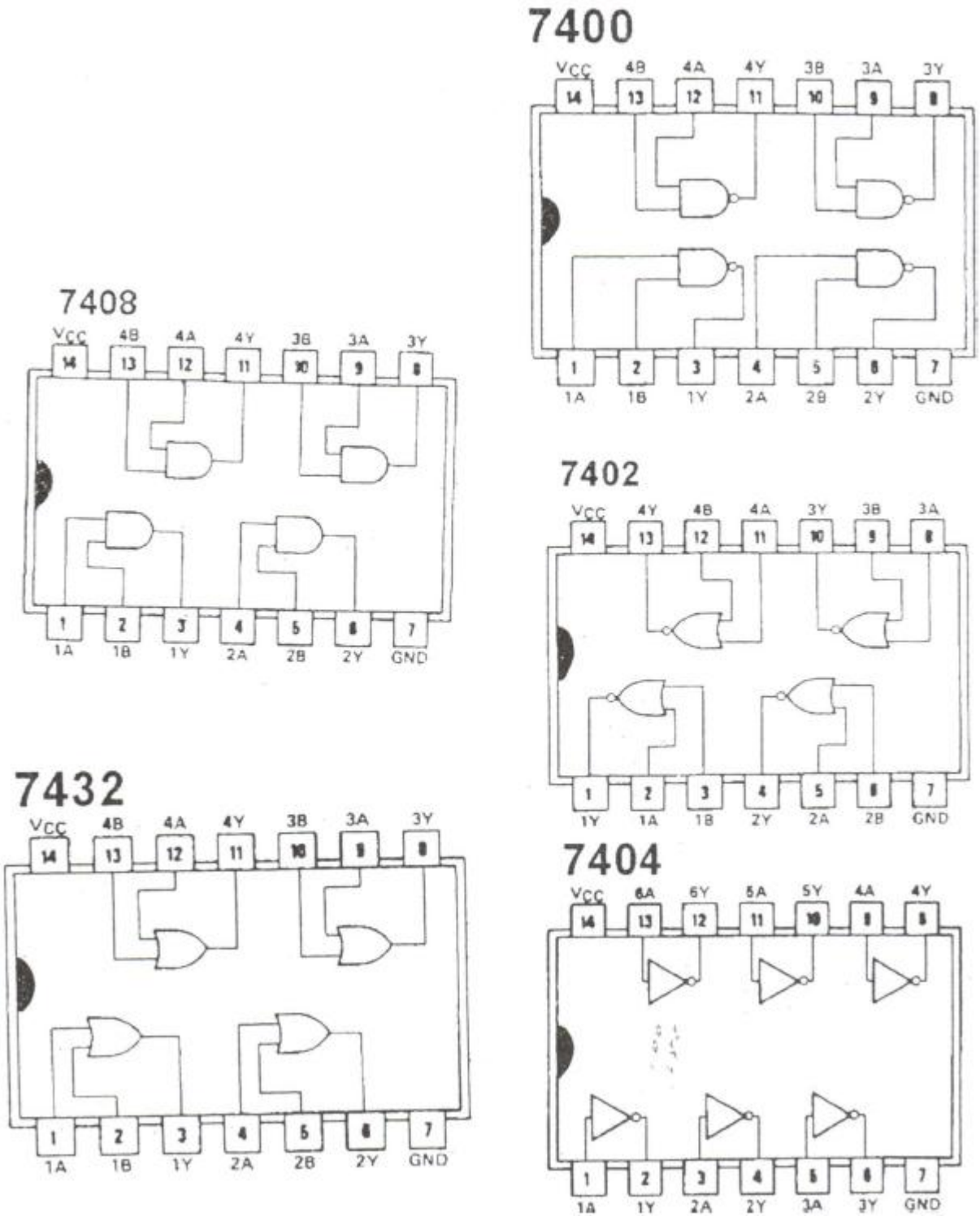


Figure 1.4 ICs

1.2. Implementation of the Experiment

Equipment Required

7404 - NOT Gate

7408 - 2-input AND gate

7400 - 2-input NAND gate

7432 - 2-input OR gate

7402 - 2-input NOR gate

Experimental Guidelines:

In part A, B, C do the following:

1- Make sure the digital trainer is switched off.

2- Insert the required IC into the breadboard.

3- Connect the Vcc pin to +5V and the GND pin to ground (Refer to the IC pin connections diagram attached).

4- According to each part's circuit diagram, connect the inputs to switches (e.g. SW1) on the digital trainer. Connect the outputs to LEDs (e.g L1) on the digital trainer.

5- Power on the digital trainer.

6- Start taking measurements by changing switches ON and OFF and observing the LEDs.

7- Fill in the tables.

A: OR Gate.

Using IC type 7432 connect one OR gate from its package using pin 1,2,3 as shown in Figure 1.4 and fill in Table 1.1.

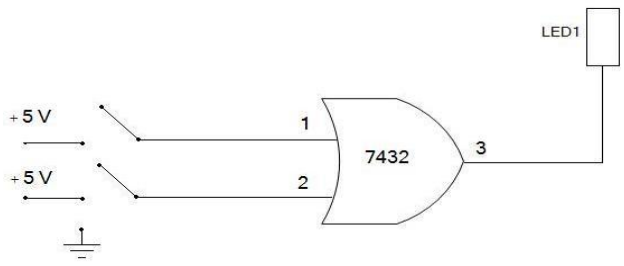


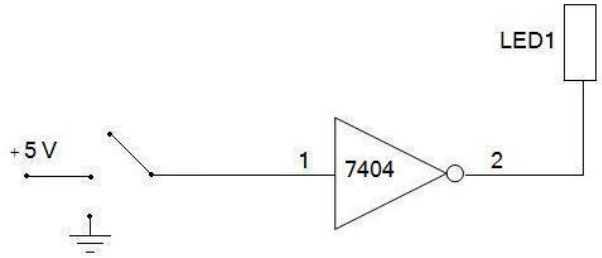
Figure 1.5

Pin1	Pin 2	Pin 3
0	0	
0	1	
1	0	
1	1	

Table 1.1

B: NOT Gate.

Using 7404 IC connect the circuit shown in Figure 1.6 and fill in the Table 1.2.



Pin1	Pin 2
0	
1	

Figure 1.6 **Tablo 1.2**

C: AND+NAND GATES

Using 7408 and 7400 ICs connect the circuit as shown in Figure 1.7 and fill in Table 1.3.

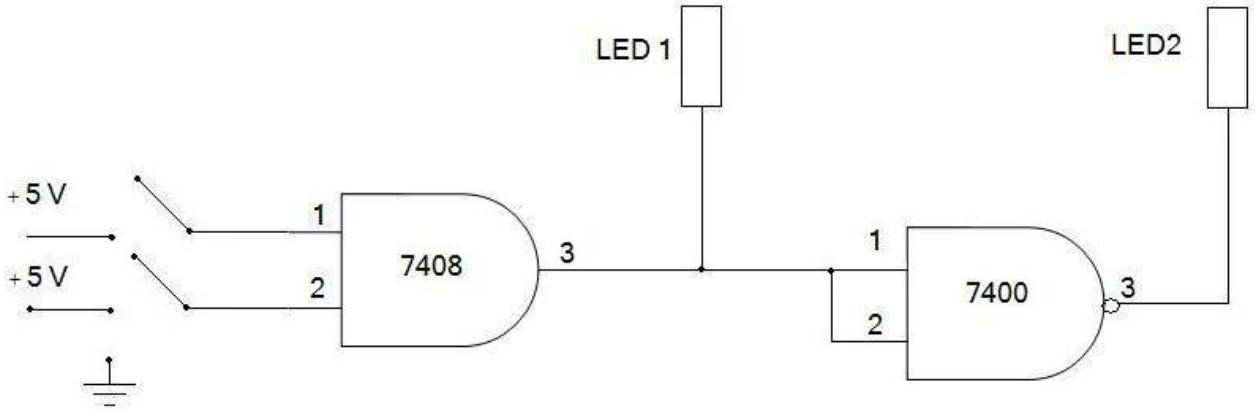


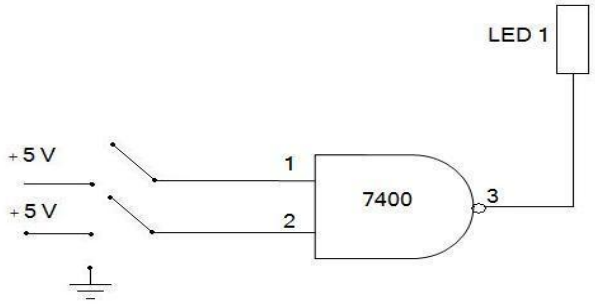
Figure 1.7

7408			7400	
Pin 1	Pin 2	Pin 3	Pin 1,2	Pin 3
0	0			
0	1			
1	0			
1	1			

Table 1.3

1.3. Questions and Results

1. Redraw the following circuit using AND and NOT only.



2. Using 7432 IC Draw the logic circuit that will implement the following Boolean function.

   F = A+B+C+D.

3. Write a report for your experiments and results at the end of construction.