CPE361
Logic Circuits and Switching Theory 1

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COMPUTER HARDWARE LABORATORY SAFETY PRECAUTIONS

- Know the location of the first aid supply in your laboratory.
- Arrange the instruments/equipment to be used in an orderly manner within the vicinity of the working area and handle them with care.
- Put the measuring instruments (etc. multimeters) range at its maximum when the quantity to be measured is not known.
- Use proper tools in every work.
- Avoid loose wire connections. Always double check the wirings on the trainers before turning the trainer's power ON.
- Put off the trainers power before making changes to the connections of the circuit or instruments.
- Take great care to avoid touching the tip of the soldering iron on a power line. If a power cord is touched by a hot iron, there is a serious risk of burns and electric shock. Always return the *soldering iron* to its *stand* when not in *use*.
- Do not hold the terminals of a capacitor after it has been energized. Electrical discharge of a capacitor can be fatal. Short circuit the terminals of a capacitor before handling them.
- Always assign one of the members near the circuit breaker on standby just in case the worst case scenario happens for experiments involving high voltages.
- Do not play or make jokes with each other when performing an experiment. Horseplay takes your mind away from what you are doing.
- In case somebody is electrocuted, put him/her away from live circuit with a stick that is not a conductor of electricity. In case the person is injured, faints or is unconscious proceed immediately to the TSG office so they can contact the clinic for help.

HOUSEKEEPING

- Always return your chair at the back of the room every after class.
- Take the initiative to pick up the trash (eg. scratch papers, food wrappers, etc) within your area. Throw them on the designated trash bins are located outside the rooms after the class.
- Vandalism is strictly prohibited and anyone caught is subject to suspension or expulsion.
- Always wear your foot maps before entering the room. This is to minimize the accumulation of dirt overtime.

Name : _____ Date : _____

Course-Year : _____ Rating :_____

Subject-Section : _____ Instructor: _____

EXPERIMENT NO. 1
FAMILIARIZING LOGIC GATES & INTEGRATED CIRCUITS (ICs)

OBJECTIVES:

1. To be able to demonstrate the operation of logic gates in an IC package.
2. To familiarize the pin configuration of some common TTL ICs.
3. To be able to obtain equivalent circuits of a given logic function.

BASIC INFORMATION:

Nowadays, most logic circuits are available as Integrated Circuits (ICs). Transistor – transistor logic (TTL) became commercially available in 1964 as introduced by Texas Instruments. Since then, it has become the most popular family of digital ICs. In this experiment you will work with TTL gates.

Using advanced photographic techniques, a manufacturer can produce miniature circuits on the surface of a chip (a small piece of semiconductor material). The finished network is so small you need a microscope to see the connections. Such a circuit is called an Integrated Circuit (IC) because the components (transistors, diodes and resistors) are an integral part of the chip. This is different from a discrete circuit, in which the components are individually connected during assembly.

In this experiment, let's take a look at the logic functions available in some 7400 series IC. This will give us an idea of the variety of gates and circuits found in the TTL family. As guide, you can search and refer to some available data books that list some of the 7400-series devices. You will find it useful when connecting and evaluating logic circuits.

MATERIALS:

1 - Logic Lab/ Digital Trainer
1 - 7404 IC
1 - 7408 IC
1 - 7400 IC
1 - 7486 IC
1 - 7420 IC
1 - 7432 IC
1 - 7402 IC
20 connectors

PROCEDURE:

(This will apply to all circuit diagrams.)

1. Construct the given circuit diagram (IC format) on a digital trainer.
2. Fill in the output column of the truth table provided for each circuit.
3. Draw the logic circuit equivalent based on the actual connections. Assign as Fig. 1.1.
4. Draw the equivalent logic circuit based on its basic logic function. Assign as Fig. 1.2.

Fig. 1.0

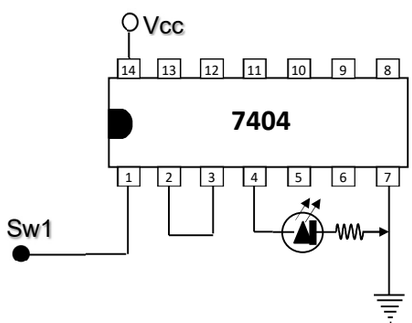


Fig. 1.1

Table 1.0

Input	Output
SW1	Y0
0	
1	

Fig. 1.2

Fig. 2.0

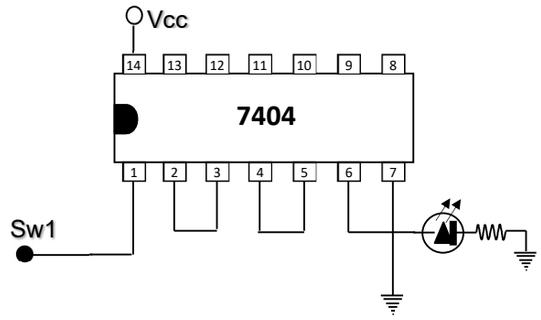


Fig. 2.1

Table 2.0

Input	Output
SW1	Y0
0	
1	

Fig. 2.2

Fig. 3.0

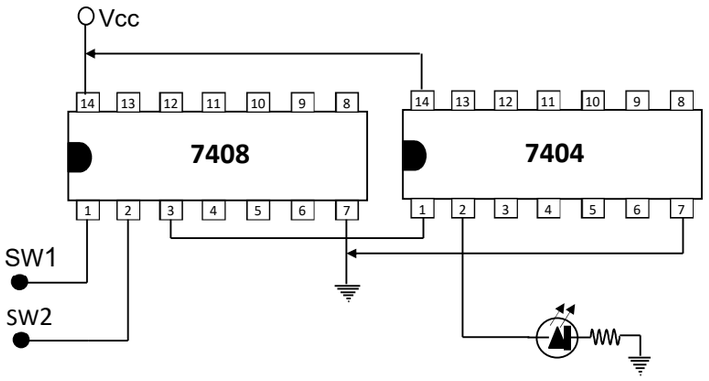


Fig. 3.1

Table 3.0

Input		Output
SW2	SW1	Y0
0	0	
0	1	
1	0	
1	1	

Fig. 3.2

Fig. 4.0

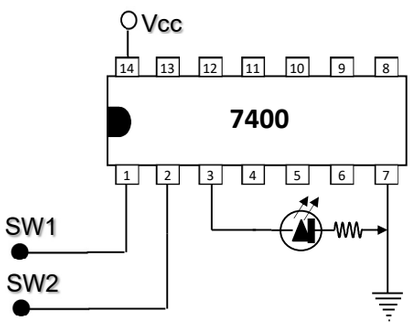


Table 4.0

Input		Output
SW2	SW1	Y0
0	0	
0	1	
1	0	
1	1	

Fig. 4.1

Fig. 4.2

Fig. 5.0

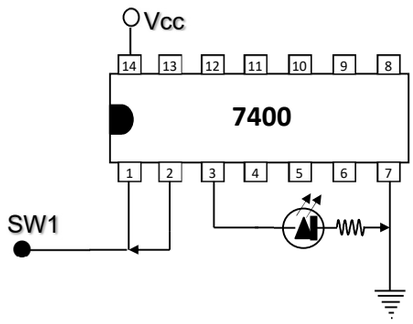


Fig. 5.1

Table 5.0

Input	Output
SW1	Y0
0	
1	

Fig. 5.2

Fig. 6.0

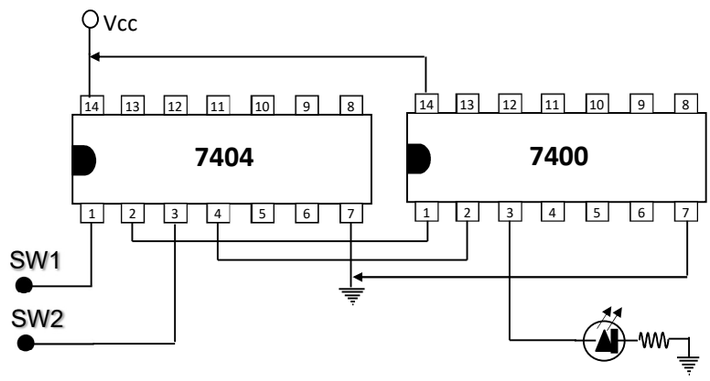


Fig. 6.1

Table 6.0

Input		Output
SW2	SW1	Y0
0	0	
0	1	
1	0	
1	1	

Fig. 6.2

Fig. 7.0

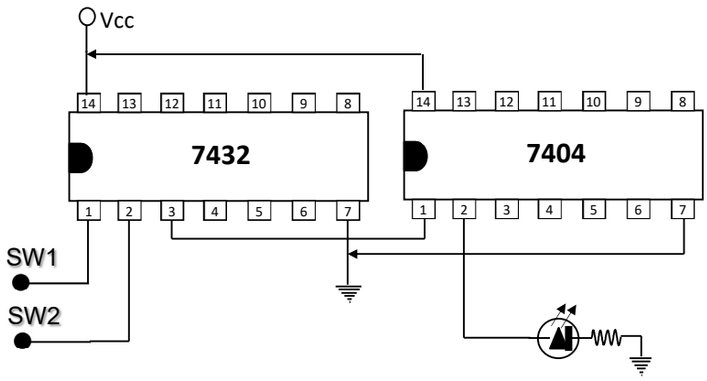


Fig. 7.1

Table 7.0

Input		Output
SW2	SW1	Y0
0	0	
0	1	
1	0	
1	1	

Fig. 7.2

Fig. 8.0

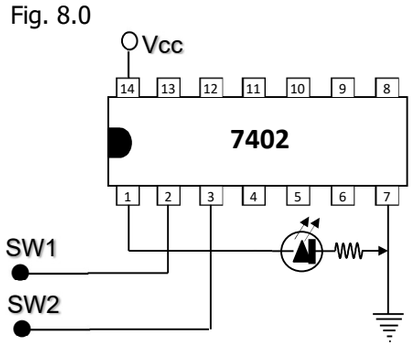


Fig. 8.1

Table 8.0

Input		Output
SW2	SW1	Y0
0	0	
0	1	
1	0	
1	1	

Fig. 8.2

Fig. 9.0

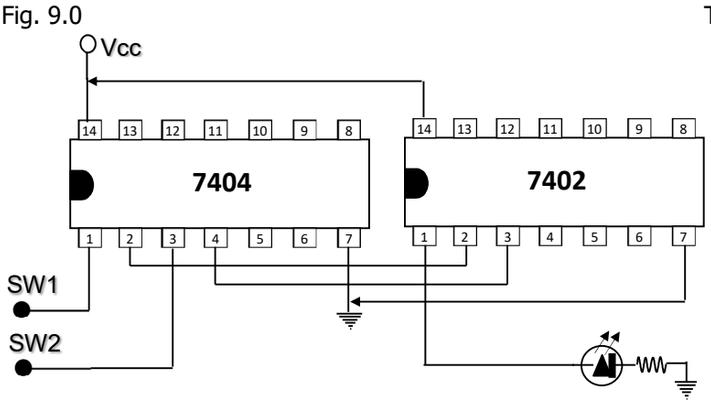


Table 9.0

Input		Output
SW2	SW1	Y0
0	0	
0	1	
1	0	
1	1	

Fig. 9.1

Fig. 9.2

Fig. 10.0

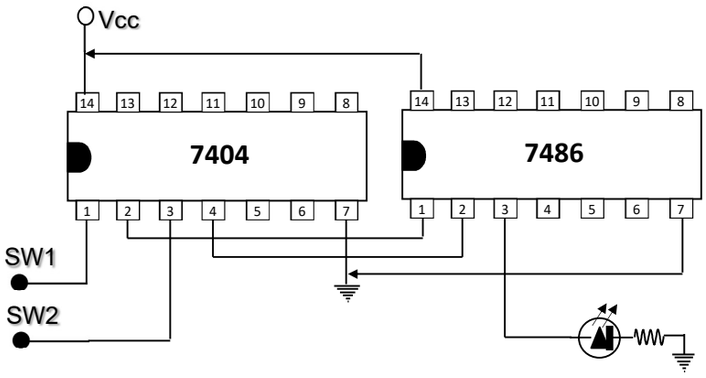


Fig. 10.1

Table 10.0

Input		Output
SW2	SW1	Y0
0	0	
0	1	
1	0	
1	1	

Fig. 10.2

Fig. 11.0

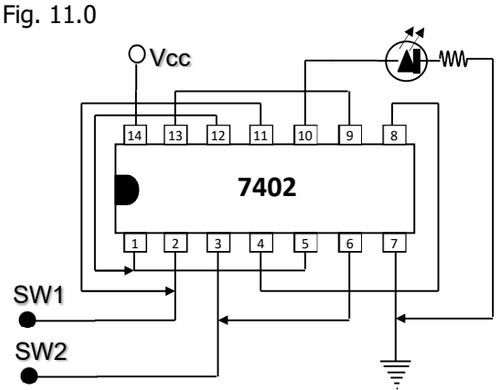


Fig. 11.1

Table 11.0

Input		Output
SW2	SW1	Y0
0	0	
0	1	
1	0	
1	1	

Fig. 11.2

Fig. 12.0

Table 12.0

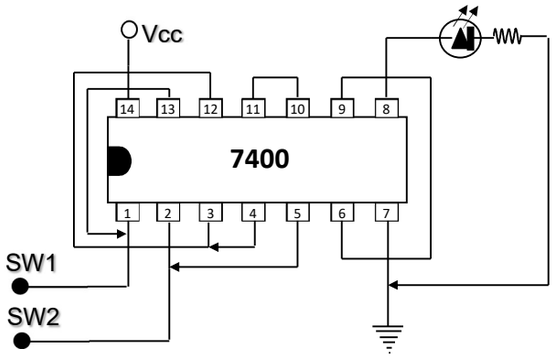


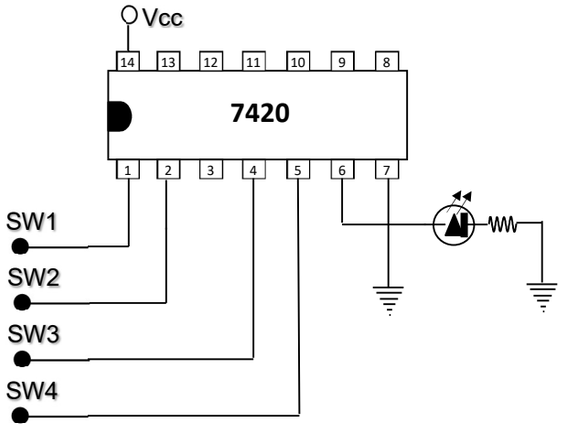
Fig. 12.1

Input		Output
SW2	SW1	Y0
0	0	
0	1	
1	0	
1	1	

Fig. 12.2

Fig. 13.0

Table 13.0



Input				Output
SW4	SW3	SW2	SW1	Y0
0	0	0	0	
0	0	0	1	
0	0	1	0	
0	0	1	1	
0	1	0	0	
0	1	0	1	
0	1	1	0	
0	1	1	1	
1	0	0	0	
1	0	0	1	
1	0	1	0	
1	0	1	1	
1	1	0	0	
1	1	0	1	
1	1	1	0	
1	1	1	1	

Fig. 13.1

Fig. 13.2

OBSERVATION/CONCLUSION: