

# Micro Electronics 120 Lab #2

## Resource Materials:

Digital Electronics Textbook Chapter 3

## Questions: (Answer on separate sheet)

1. Draw the logic symbol, the Boolean expression, and Truth Table for a two input OR gate.
2. How is the OR gate different from the AND gate?
3. Draw a schematic diagram of a 7432 TTL IC, showing the arrangement of the individual OR gates.
4. What does the + sign stand for?

## Procedure:

### MATERIALS

Qty.		Qty.	
1	7432 2-input OR gate IC	5	logic switches
1	LED indicator-light assembly	1	5- V dc regulated power supply

### SYSTEM DIAGRAMS

Figures 3-5 and 3-6 are the electronic OR gates you will wire and test in this experiment.

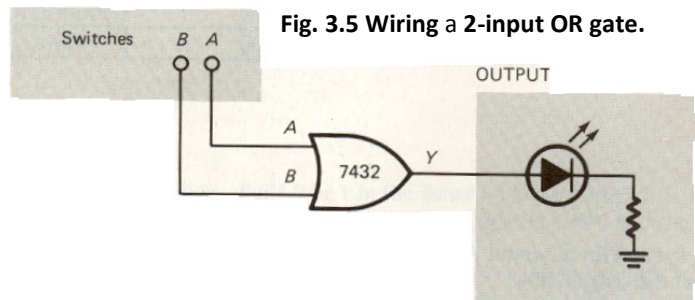


Fig. 3.5 Wiring a 2-input OR gate.

## Instructions:

1. Insert the 7432 IC into the mounting board.
2. Power OFF. Connect power to the 7432 IC: the red wire for +5 V ( $V_{CC}$ ) and the black wire for GND.
3. Refer to Fig. 3-5. Wire the 2-input OR gate (input switches, 7432 IC, LED indicator-light assembly). See pin diagrams in Appendix A.
4. Make a copy of **Tables 3-4** and **3-5** (on next page) on a separate piece of paper. Power ON. Move input switches A and B to each combination shown in the left side of the truth table in Table 3-4. Observe and record the results in the OR gate I column. Record a logical 0 if the light is OFF. Record a logical 1 if the light is ON .

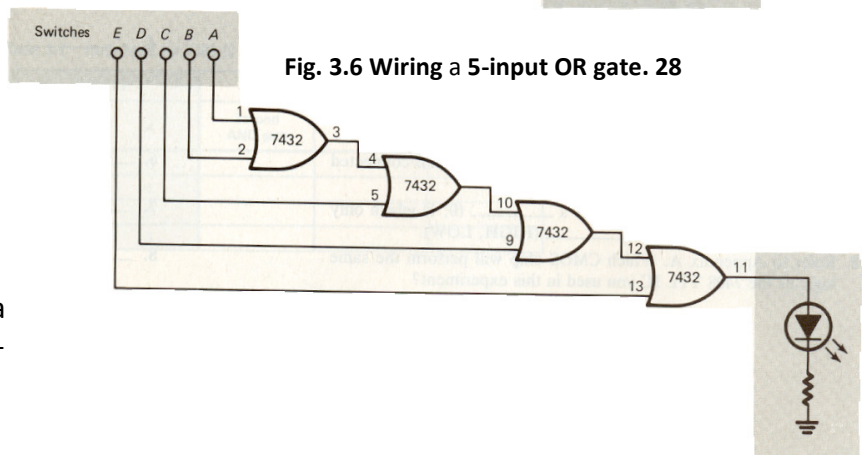


Fig. 3.6 Wiring a 5-input OR gate. 28

**Table 3-4 Truth Table for 7432 IC**

INPUTS		OUTPUTS			
B	A	OR gate 1	OR gate 2	OR gate 3	OR gate 4
0	0				
0	1				
1	0				
1	1				

**Table 3-5 5-Input OR Gate**

INPUTS					OUTPUT
E	D	C	B	A	
0	0	0	0	0	
0	0	0	0	1	
0	0	0	1	0	
0	0	0	1	1	
0	0	1	0	0	
0	0	1	0	1	
0	0	1	1	0	
0	0	1	1	1	
0	1	0	0	0	
0	1	0	0	1	
0	1	0	1	0	
0	1	0	1	1	
0	1	1	0	0	
0	1	1	0	1	
0	1	1	1	0	
0	1	1	1	1	
1	0	0	0	0	
1	0	0	0	1	
1	0	0	1	0	
1	0	0	1	1	
1	0	1	0	0	
1	0	1	0	1	
1	0	1	1	0	
1	0	1	1	1	
1	1	0	0	0	
1	1	0	0	1	
1	1	0	1	0	
1	1	0	1	1	
1	1	1	0	0	
1	1	1	0	1	
1	1	1	1	0	
1	1	1	1	1	

- Power OFF. Now wire and test each of the other three OR gates packaged inside the 7432 IC. Record their outputs in the right-hand columns of Table 3-4. Record 0s and 1s.
- Refer to Fig. 3-6. Wire the 5-input OR gate using all four 2-input OR gates in the 7432 IC. Pin numbers are shown in Fig. 3-6.
- Power ON. Operate and observe the output of the 5-input OR gate as you place the input switches (A, B, C, D, and E) in the 32 different combinations in the Inputs column, Table 3-5. Record the outputs in the Output column, Table 3-5.
- Power OFF. Take down the circuit and return all equipment to its proper place.

**Lab Questions:**

Complete questions 1 to 11 on a separate piece of paper.

- Draw a single logic symbol for the 5-input OR gate you wired in this experiment. Label the inputs A, B, C, D, and E; label the output Y.
- Draw a logic diagram of a 3-input OR gate using two 2-input OR gates. Label the inputs A, B, and C and the output Y.
- Draw and complete the truth table for a 3-input OR gate.
- When powering the IC in this experiment, the GND pin is connected to the \_\_\_\_\_ of the power supply.
- A logical 0 on the truth table in this experiment means that input or output is
  - Near GND voltage
  - Near +5 V
- A logical 1 on the truth table in this experiment means that input or output is
  - Near GND voltage
  - Near +5 V
- A truth table with two inputs has how many switch combinations?
- A truth table with three inputs has how many switch combinations?
- A truth table with five inputs has how many switch combinations?
- The OR gate's unique output is a (0, 1), \_\_\_\_ which only occurs when all inputs are \_\_\_\_ (HIGH, LOW).
- The 7432 is described by the manufacturer as a quadruple 2-input OR gate from the \_\_\_\_ (CMOS, TTL) family of digital ICs.