

Lab 7 - 4/11/22

BCD to 7-Segment Display Decoder

EGT 245 - Digital Electronics

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Introduction

The purposes of this experiment are as follows: allow students to build a physical circuit using multiple different components, build familiarity with lab equipment and the mentioned components, and utilize the learned formulae to compute theoretical circuit values, then test those values against real-world models.

Required Equipment & Components

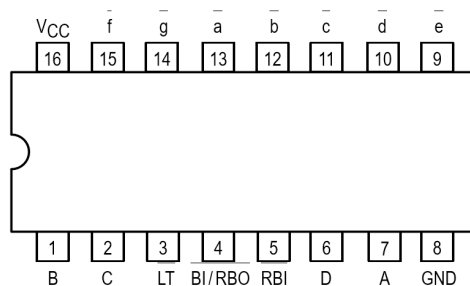
- 74LS47 (BCD to 7-Segment Decoder)
- 7-Segment Display (Common Anode)
- Breadboard with Jumper Wires
- SPST Switch (x4)
- 5V Power Supply

Theory

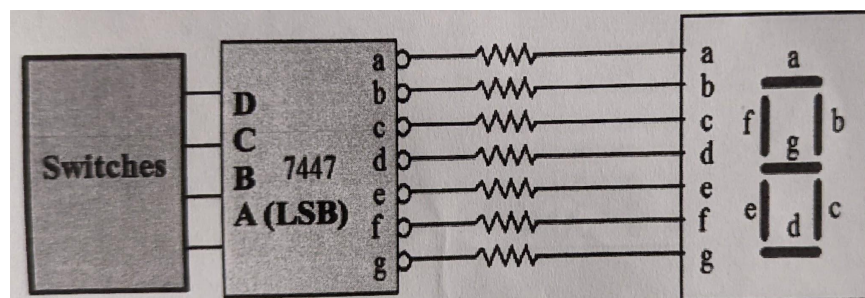
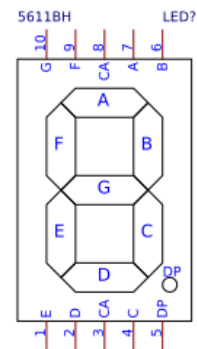
The utilized IC decodes a 4-bit BCD code into 7 active-low outputs to drive a 7-segment LED display. Switches 4-1 are connected to the A-D inputs. The four switches will act as an analog to the BCD code input. The outputs of the IC are connected to the 7-segment display, displaying the latest decoded digit. For the demonstration, the switches will be cycled from 0000 to 1001 (BCD 0 - 9). The order of switches 4-1 are LSB -> MSB.

Component Layout

74LS83A

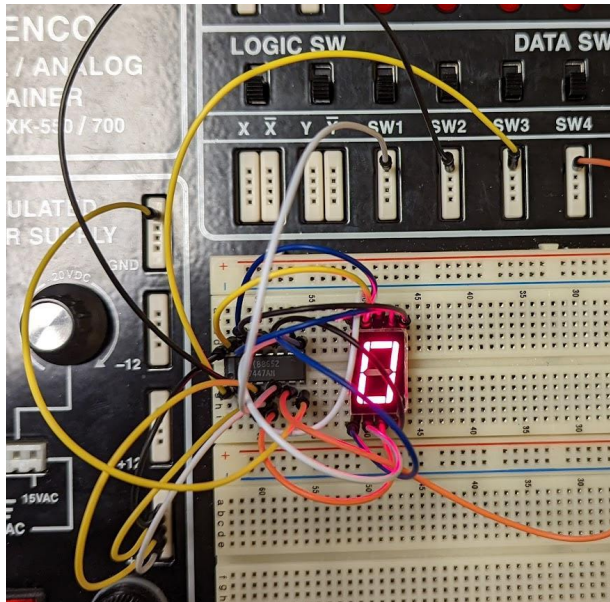


5611BH

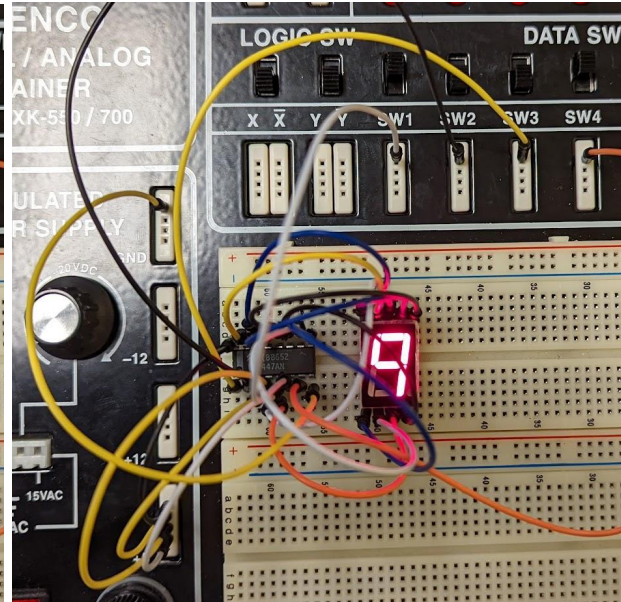


Experimental Results

BCD: 0000



BCD: 1001



Conclusion

Through the use of a 7-segment display with common anodes we were able to demonstrate the logic behind these integrated circuits(IC). The common anode IC chip received 4 inputs and sent 8 outputs that were used to determine which segments in the 7-segment display would light up. Since this was a common anode the logic would be that if a high level was inputted the output would result in a low level due to the common anode circuit, vice versa. The easiest way to understand this output was illustrated in the manual we received which showed the input as A B C D while the output being !A !B !C !D, in which “!” signifies the variable passing through a NOT gate. We used Switches to demonstrate the 4 inputs by specifying the high/low levels in their on and off physical positions. Overall, we believe that this lab allowed us to better understand common anodes and 7-segment displays.