**Experiment # 08**

***OBJECTIVE:***

To investigate the operation of seven segment, display and practically observe the working of 7447 BCD to seven segment Decoder.

***BACKGROUND THEORY:***

Typically 7-segment displays consist of seven individual colored LED’s (called the segments), within one single display package. In order to produce the required numbers or HEX characters from 0 to 9 and A to F respectively, on the display the correct combination of LED segments need to be illuminated and BCD to 7-segment Display Decoders such as the 74LS47 do just that.

A standard 7-segment LED display generally has 8 input connections, one for each LED segment and one that acts as a common terminal or connection for all the internal display segments. Some single displays have also have an additional input pin to display a decimal point in their lower right or left hand corner.

In electronics there are two important types of 7-segment LED digital display:

**The Common Cathode Display (CCD) –** In the common cathode display, all the cathode connections of the LED’s are joined together to logic “0” or ground. The individual segments are illuminated by application of a “HIGH”, logic “1” signal to the individual Anode terminals.

**The Common Anode Display (CAD) –** In the common anode display, all the anode connections of the LED’s are joined together to logic “1” and the individual segments are illuminated by connecting the individual Cathode terminals to a “LOW”, logic “0” signal.







***BCD to 7-Segment Display Decoders:***

A binary coded decimal (BCD) to 7-segment display decoder such as the TTL 74LS47 or 74LS48, have 4 BCD inputs and 7 output lines, one for each LED segment. This allows a smaller 4-bit binary number (half a byte) to be used to display all the denary numbers from 0 to 9.



***HARDWARE REQUIRED:***

* Power supply with cables
* Breadboard
* 7447 (BCD to 7 Segment Decoder)
* LEDs / Seven Segment Display
* Logic Probe (optional)

***PROCEDURE:***

* The connection diagram of 7447 IC (BCD to 7-segment decoder) is shown below:



A, B, C, D : BCD inputs.

a – g : Decoded outputs.

Lamp Test : If grounded, turns all the outputs high, regardless of input applied. RBI & RBO : Blanking Input & Blanking Output respectively

Vcc , GND : Supply Pins for the IC.

* Make supply connections to the IC.
* Now apply the inputs to the Decoder on specified pins (A to D),
* Connect a common anode 7 segment display on the outputs (a to g).
* Observe the output on 7 Segment display

***REVIEW QUESTIONS:***

* What will be displayed on 7-segment when the BCD inputs are 1111?   
  ANSWER:
* When the BCD inputs are 1111, the 7-segment display will show "F". This is because the BCD code 1111 corresponds to the hexadecimal digit F, and in a 7-segment display, F is represented by lighting up specific segments (a, b, c, e, f).
* Which outputs will be high in the case of 13?   
  ANSWER:
* For the input BCD value 13, which is 0001 0011 in binary, the corresponding segments lit on a 7-segment display will represent the number 3. Therefore, the segments a, b, c, d, and g will be high to form the number "3."
* What is the function of LAMP TEST input?  
  ANSWER:
* The LAMP TEST input, when grounded, turns all the output segments of the 7-segment display high, causing all segments (a through g) to light up simultaneously. This is useful for checking if the display is functioning correctly.
* What have you learnt from this experiment?  
  ANSWER:
* From this experiment, I learned how a BCD to 7-segment display decoder works, specifically the 7447 IC. I observed how the BCD inputs correspond to the activation of segments on a 7-segment display and how the different codes can display numerical values. I also gained an understanding of the functions of the LAMP TEST, RBI, and RBO inputs, and how to connect and use 7-segment displays in digital circuits.

***LEARNING OUTCOMES:***

Upon successful completion of the lab, students will be able to:

LO1: Understand the working of 7 Segment displays.

LO2: Experimentally verify the behavior of BCD to 7 Segment Decoders

To be filled by Demonstrator/Lab Instructor

Date of Conduct

Last Date of Submission Signature