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Experiment No : 12

Aim : Interfacing Seven Segment Display

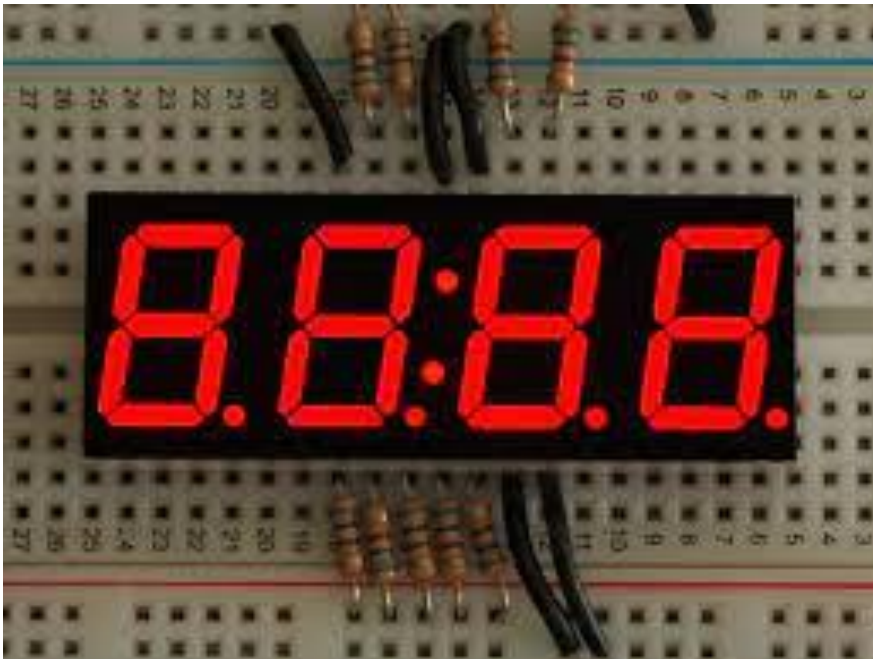
LO: Design interfacing of peripheral devices with 8086 microprocessor.

Software/Hardware Requirements: LC5051-11 7-segment displays, arduino chip, such as the UNO and AVR studio 5 to program the arduino

Theory :

Seven Segment Display :-

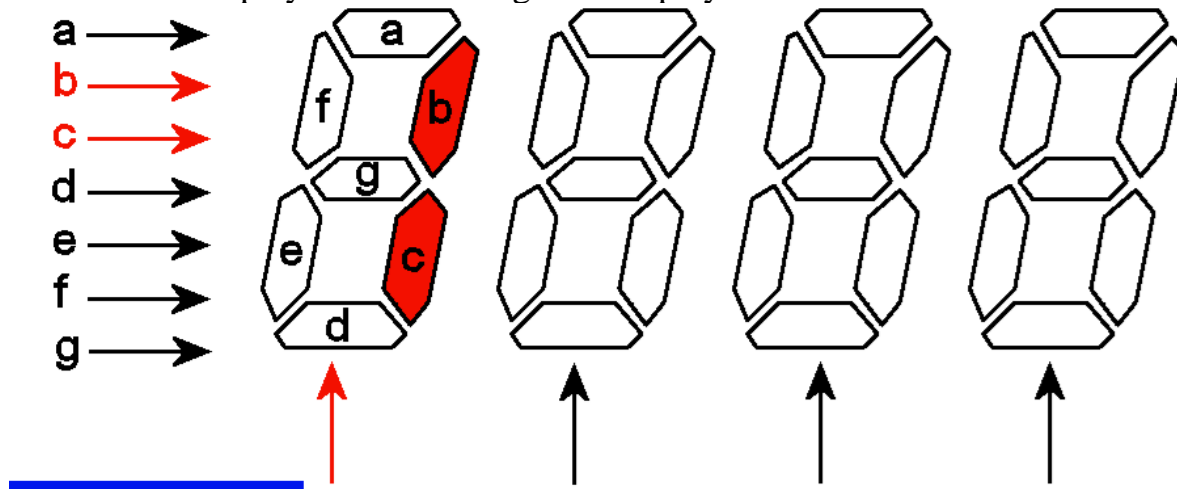
Seven segment display seven LEDs and an LED for a decimal point. Lit them in order, and you can form different letters and alphabets. Seven segment display is special for displaying numerical characters.



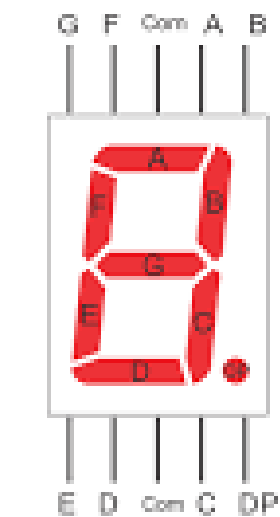
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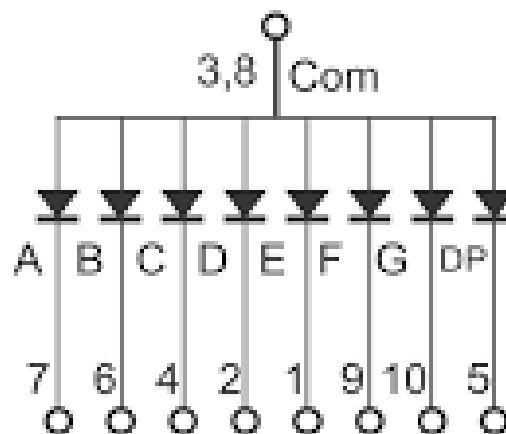
How 0-9 is displayed in seven segment display :-



Each segment is designated as a, b, c, d, e, f and g along with dp for decimal point.



7 Segment Display - Pin Out Diagram

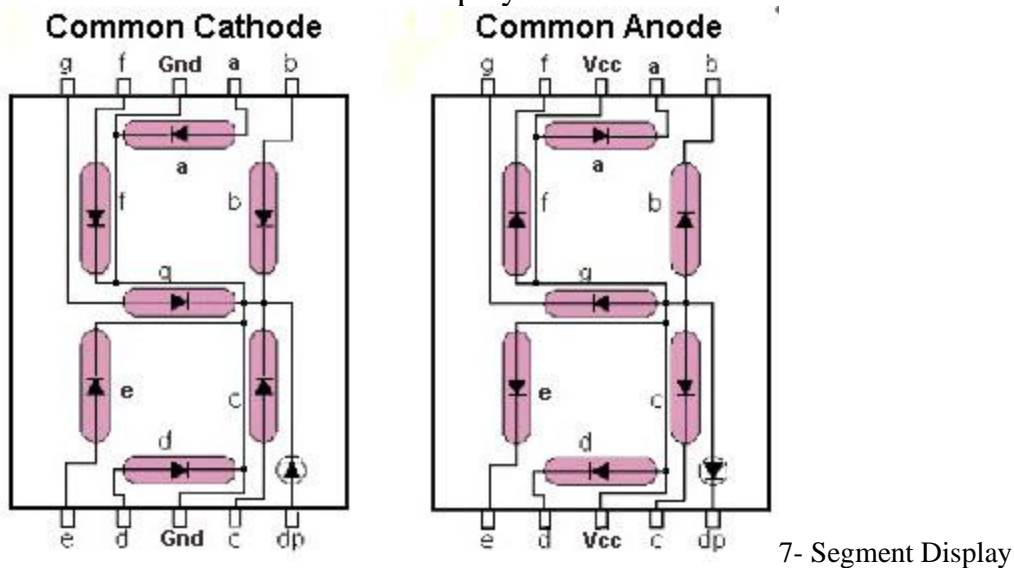


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Types of 7-Segment Displays

There are two types of seven segment displays available in the market. According to the type of application, these displays can be used. The two configurations of seven segment displays are discussed below.

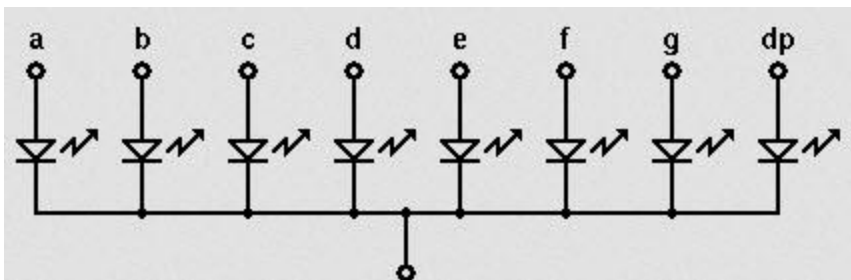
- Common Anode Display
- Common Cathode Display



Configuration

Common Cathode 7-segment Display

In this type of display, all the cathode connections of the LED segments are connected together to logic 0 or ground. The separate segments are lightened by applying the logic 1 or HIGH signal through a current limiting resistor to forward bias the individual anode terminals a to g.

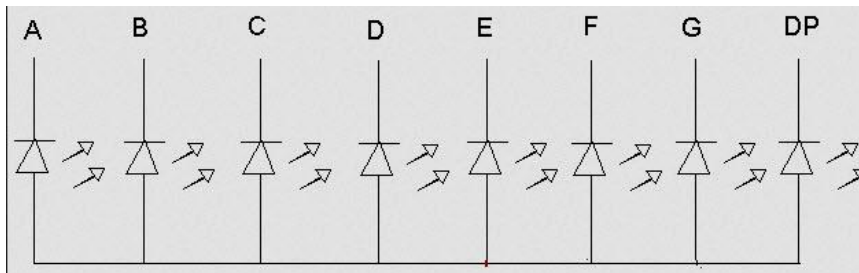


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Common Anode 7-segment Display

In this type of display, all the anode connections of the LED segments are connected together to logic 1. The separate segments are lightened by applying of the logic 0 or LOW signal through a current limiting resistor to the cathode of the particular segment a to g.



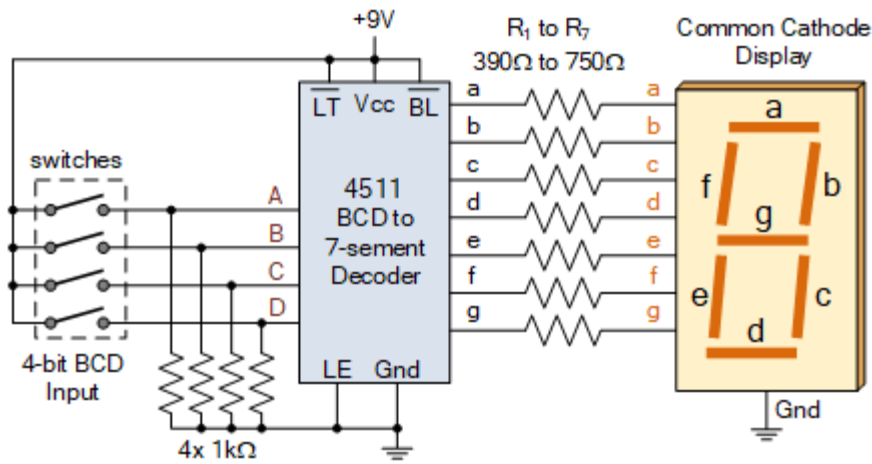
Common Anode 7-segment Display

Therefore, common anode seven segment displays are very popular as many logic circuits can sink more current than they can source. These displays are not a direct replacement in a circuit for a common anode display, as it is the same as connecting the LEDs in reverse, and hence the light emission will not take place. Depending upon the decimal number displayed, the particular set of LEDs is forward biased. For instance, to display the numerical number 0, we need to light up remaining segments corresponding to a, b, c, d, e and f. Then the digits from 0 through 9 can be displayed using a seven segment display.

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Seven Segment Display Diagram :-



Example Code :-

```
Mov Ax, 500004
MOV DS, AX
MOV AL, 80H
OUT FFH, AL
MOV AH, 60
REPEAT : MOV AL, 00
UP :     MOV SI, SX
        MOV AL, [SI]
        OUT FC, AL
        CALL DELAY
        INC AL
        CMP AL, 0AH
        JNE UP
        JMP REPEAT
```

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Why is still used :-

- Require small space and hardware.
- It is simple to interface.
- Can be seen from long distance.
- Versatile to display alphabets to some alphabets.

Advantages

Cost

Light emitting diodes (LEDs) are extremely cheap. Diodes are one of the most simple electrical components, and they are extremely easy to make. A trip to your local electronics store will reveal packages of hundreds of LEDs for only a few dollars.

Simplicity

Seven-segment displays are extremely simple electronic circuits. A simple seven-segment display circuit consists of four input leads; a BCD chip, which contains logic gates to translate the four leads into seven binary signals, or integrated circuit chip; and the seven-segment display itself. Most seven-segment displays are capable of displaying all 16 hexadecimal values (1 through 9 and A through F).

Reliability

Since the seven-segment circuit is so simple, there is a decreased risk of circuit malfunction due to component failure. Seven-segment LED displays are used in a wide range of environments from very hot to well below freezing. As there is no liquid inside the unit to freeze, as there is in LCD displays, an LED display can operate at very low temperatures.

Efficiency

LED displays in general are extremely efficient. Diodes dissipate very little energy. Light-emitting diodes emit slightly more energy than a standard diode in order to produce the photons (light) that you see, but the voltage drop across a typical LED is so small that it is negligible. Because of this high efficiency, many electronics makers favor LED technology over LCD technology because it lowers power supply requirements and reduces the cost of using devices.

Limitations

Most seven-segment displays are limited to displaying the 16 hexadecimal characters. Some can display only the numbers 0 through 9. Although LED technology exists to display more than this, seven-segment displays are limited to possible binary combinations of the four input leads, for a total of 16. Integrated circuit technology can increase this somewhat, but there are still a limited number of combinations for the seven segments on the display.

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Production

Because LEDs are so cheap to produce and so easy to make, many manufacturers have sprung up over the past several decades. There is very little regulation in terms of making LEDs, excluding the environmental regulations regarding pollution, and it is therefore easy to find a manufacturer that produces substandard LEDs. The only way to know for sure if a manufacturer produces quality LEDs is by recommendation or buying and testing the product yourself.

Disadvantages

limited characters:

Seven-segment displays are capable to display only numbers from 0-9 and few alphabets.

Type of display:

The appearance of the two types of display are very similar and that causes difficulty interfacing it with controllers

Conclusion :

Hence, we can conclude that seven segment display is still used widely and its replacement has not been found. Also it is easy to interface it to 8086 processor. So we can say, that we successfully interfaced a seven segment display using 8086.