

SEVEN SEGMENT DISPLAY



Presented by:

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BCD to 7-Segment Display

Introduction: -

A digital or binary decoder is a digital combinational logic circuit which can convert one form of digital code into another form. BCD to 7-segment display decoder is a special decoder which can convert binary coded decimals into another form which can be easily displayed through a 7-segment display.

Components required: -

Followings components are required for the formation of our project:

- 7447 IC
- 7-Segment display
- Jumper wires
- Resistors(1k-ohms, 470ohms)
- Breadboard
- Battery(9V)

1. 7447 IC: -

A Digital Decoder IC, is a device which converts one digital format into another and one of the most commonly used devices for doing this is called the Binary Coded Decimal (BCD) to 7-Segment Display Decoder.

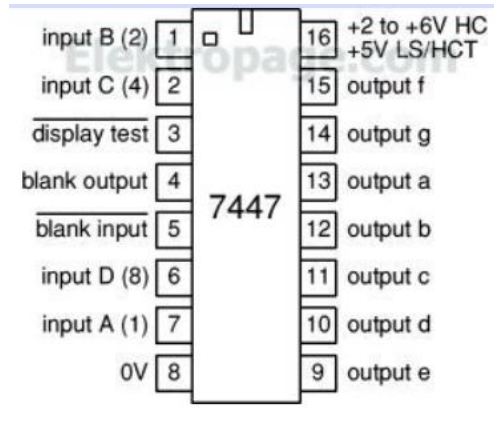
7-segment LED (Light Emitting Diode) or LCD (Liquid Crystal Display) type displays, provide a very convenient way of displaying information or digital data in the form of numbers, letters or even alpha-numerical characters.

Typically 7-segment displays consist of seven individual coloured 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 eight (8) input connections, one for each LED segment and one that acts as a common terminal or connection for all

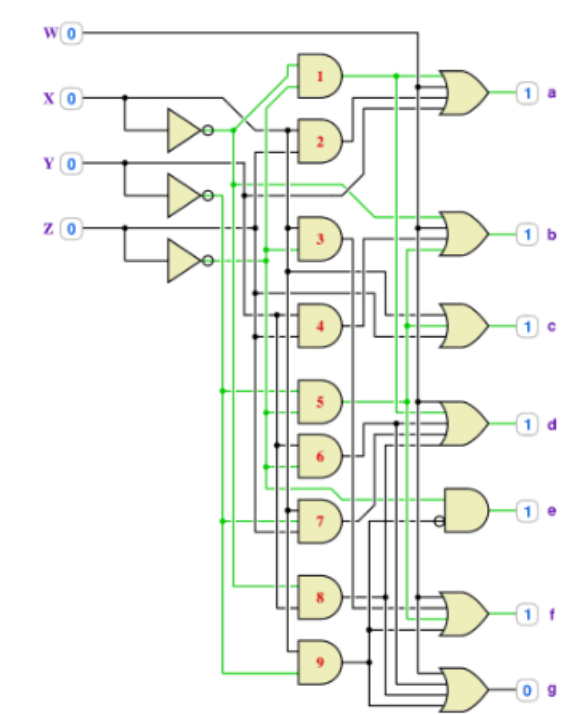
the internal display segments. Some single displays have also have an additional input pin to display a decimal point in their lower right or left hand corner.

IC-7447 Pin Diagram: -



The IC7447 IC pin configuration diagram indicates:

- A0, A1, A2, A3 as the BCD input pins.
- Lamp Test (LT) represents display test.
- RBO: Ripple blanking output pin.
- RBI: Ripple blanking Input pin.
- a, b, c, d, e, f, g indicate outputs for the seven-segment display.

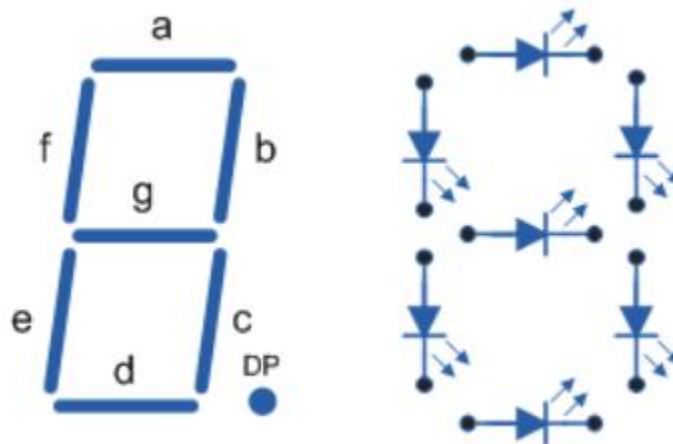


2. 7-Segment Display: -

A seven-segment display is a form of electronic display device for displaying decimal numerals that is an alternative to the more complex dot matrix displays.

Seven-segment displays are widely used in digital clocks, electronic meters, basic calculators, and other electronic devices that display numerical information.

7-Segment Display Decoder Format: -



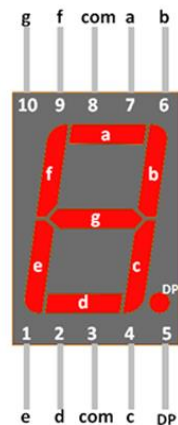
So in order to display the number “3” for example, segments a, b, c, d and g would need to be illuminated. If we wanted to display a different number or letter then a different set of segments would need to be illuminated. Then for a 7-segment display, we can produce a truth table giving the segments that need to be illuminated in order to produce the required character as shown below.



7-Segment Display Elements for all Numbers.

7 Segment Display Pinout Configuration: -

Pin Number	Pin Name	Description
1	e	Controls the left bottom LED of the 7-segment display
2	d	Controls the bottom most LED of the 7-segment display
3	Com	Connected to Ground/Vcc based on type of display
4	c	Controls the right bottom LED of the 7-segment display
5	DP	Controls the decimal point LED of the 7-segment display
6	b	Controls the top right LED of the 7-segment display
7	a	Controls the top most LED of the 7-segment display
8	Com	Connected to Ground/Vcc based on type of display
9	f	Controls the top left LED of the 7-segment display
10	g	Controls the middle LED of the 7-segment display



Working: -

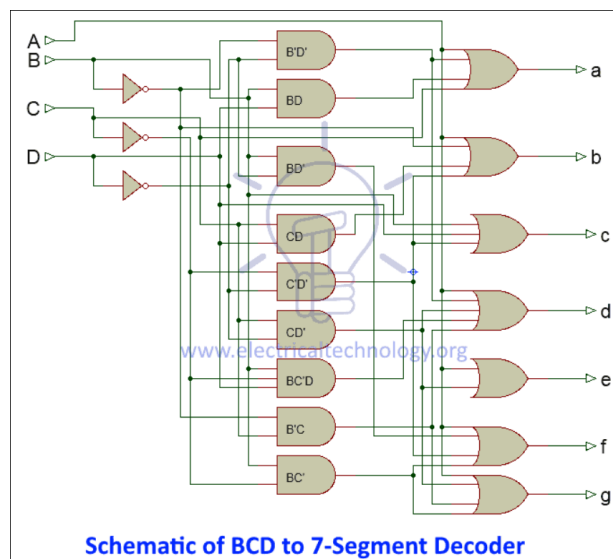
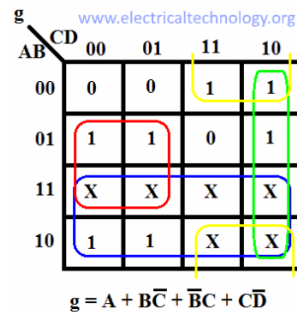
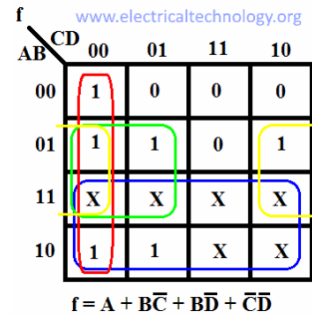
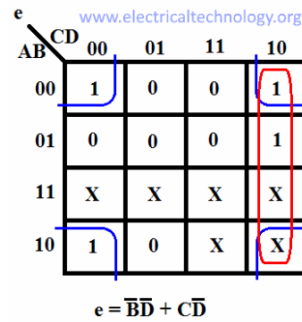
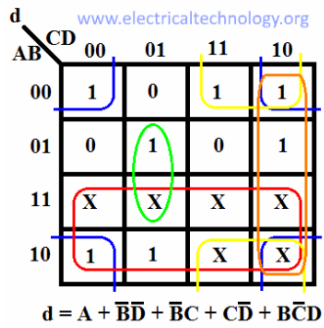
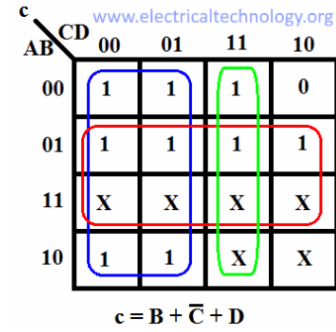
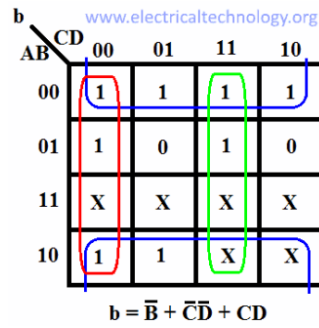
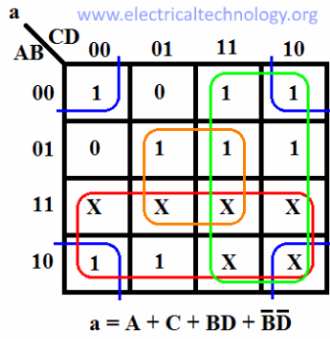
Truth Table

Assume common cathode 7-Segment display. Suppose the binary input **ABCD** to the decoder and output a, b, c, d, e, f, & g for the display.

Digits	INPUT				OUTPUT						
	A	B	C	D	a	b	c	d	e	f	g
0	0	0	0	0	1	1	1	1	1	1	0
1	0	0	0	1	0	1	1	0	0	0	0
2	0	0	1	0	1	1	0	1	1	0	1
3	0	0	1	1	1	1	1	1	0	0	1
4	0	1	0	0	0	1	1	0	0	1	1
5	0	1	0	1	1	0	1	1	0	1	1
6	0	1	1	0	1	0	1	1	1	1	1
7	0	1	1	1	1	1	1	0	0	0	0
8	1	0	0	0	1	1	1	1	1	1	1
9	1	0	0	1	1	1	1	1	0	1	1

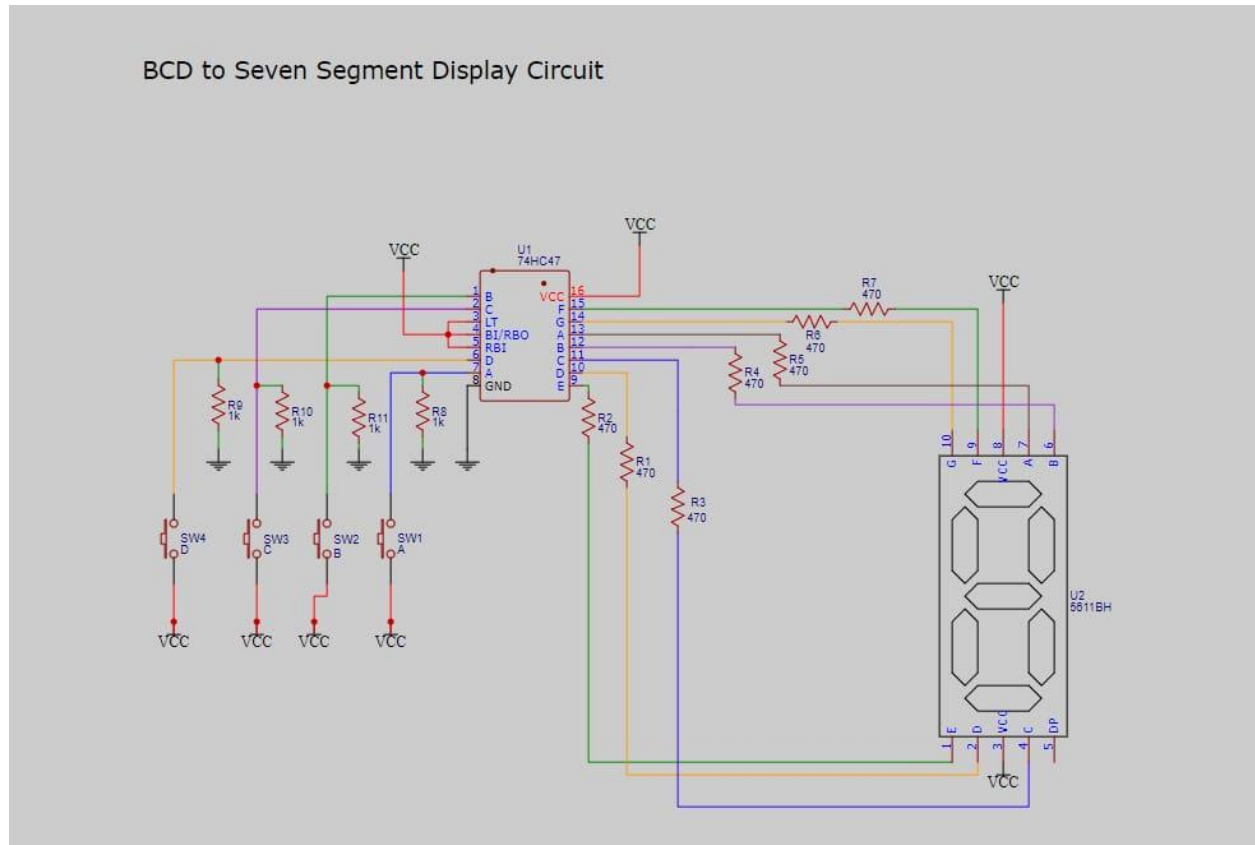
Karnaugh Maps Simplification

For other combinations of input, the output is “don’t care X” as there are no more digits to display. We will derive the expression for each output using Karnaugh map (K-MAP).

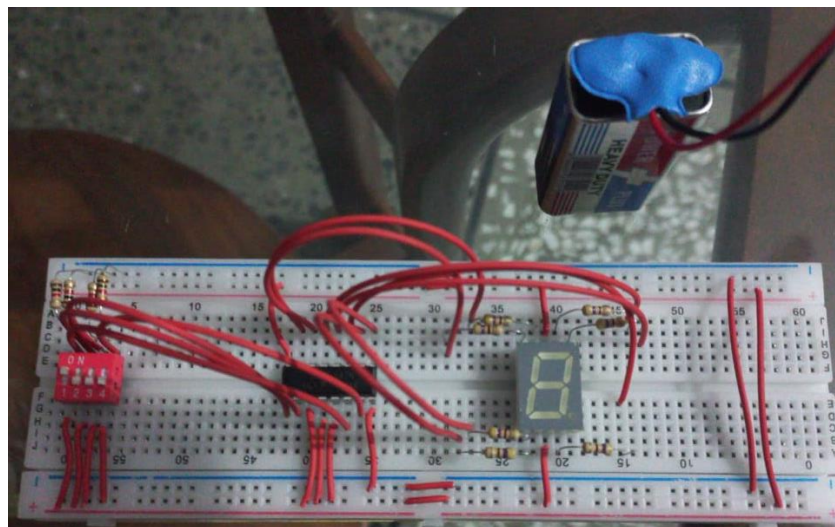


Implementation: -

Circuit diagram



Hardware Display: -



Application of BCD to Display Decoder: -

This circuit can be used as a timer circuit.

- With little modification, it can be also used to display the number clock pulses.
- It can also be used with modification to display alphabet display system instead of decimal display system.
- 7-Segment display are mostly used in digital clocks, electronic meters, odometers as well as LCD application due to low current consumption.
- They are also used in various measuring instruments, digital watches and digital counters.