BCD to 7 Segment Display Worksheet

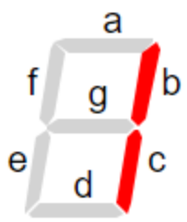
A seven-segment display is an electronic display device for displaying decimal numerals. Seven-segment displays are widely used in digital clocks, electronic meters and other electronic devices that display numerical information.

The schematic shows a BCD to 7 Segment Display for one of the digits of a digital clock. The following components are used.

- CD4511 - BCD to 7 Segment Display Decoder IC
- LSHD-A103 - 7 Segment LED Common Cathode Display

7 Segment Display

A 7 Segment LED display generally has 8 input connections, one for each LED segment and one that acts as a common terminal. There are 2 types of 7 Segment LED digital display.



- Common Cathode Display – all the cathode connections of the LEDs are connected to ground. A logic '1' applied to the anode terminal of the individual segment illuminates it.
- Common Anode Display – all the anode connections of the LEDs are connected to VCC. A logic '0' applied to the cathode terminal of the individual segment illuminates it.

BCD to 7 Segment Display Decoder

A BCD to Seven Segment decoder is a combinational logic circuit that accepts a decimal digit in BCD (input) and generates appropriate outputs for the segments to display the input decimal digit.

The truth table is extracted from the CD4511 IC datasheet.

Truth Table - Fill out the chart below. To activate a segment, simply use a '1'. If you want the segment turned off, use a '0'.

Display	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	0	1	1	1	0	1	1

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Display	D	C	B	A	a	b	c	d	e	f	g
8	1	0	0	0	1	1	1	1	1	1	1
9	1	0	0	1	1	1	1	0	0	0	0

The input bits are A (MSB) to D (LSB) and the outputs are the segments a to g. For input values A to F, the display is blanked (outputs are all 0).

The logic circuit to implement the BCD to 7 Segment Decoder can be designed using the truth table,

ACTIVITY

We will be creating a KMAP for segment letter a. Double click on the drawing below to fill in the table. Then use the scribble tool to circle the groupings of 1's.

	C'D'	C'D	CD	CD'
A'B'	1	1	X	0
A'B	1	X	X	1
AB	1	X	X	1
AB'	0	1	X	1

Answer:

$F = A'C'D' + ACD' + D + B$