

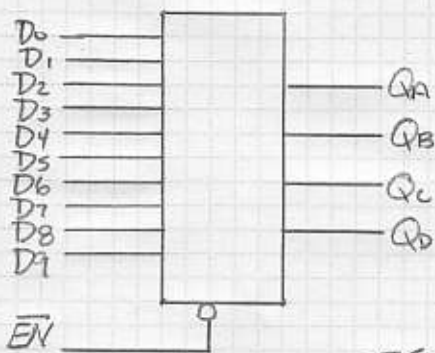
Encoders and Decoders

Encoders - human to code

Decoders - code to human

Computers work in binary, humans work in Base 10, and Base 16 is a shorthand humans use to keep track of all the ones and zeros in a binary number (as is Octal).

Encoder example:

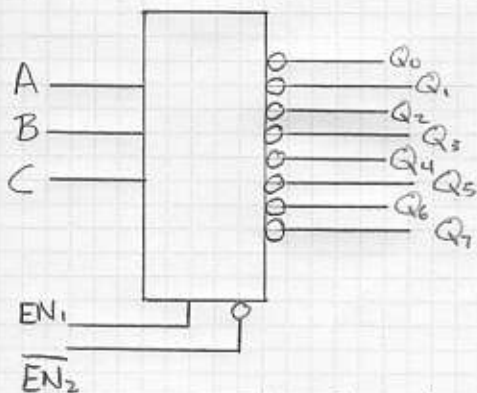


This is a decimal to BCD converter. When an input becomes active (in this case a one) the BCD value appears at the output. If input D_2 is high, for example, 0010_2 will be output.

This, of course, is assuming the \overline{EN} pin is low (active).

If more than one input is high, the BCD output will represent the highest active input. This is called priority encoding.

Decoder Example



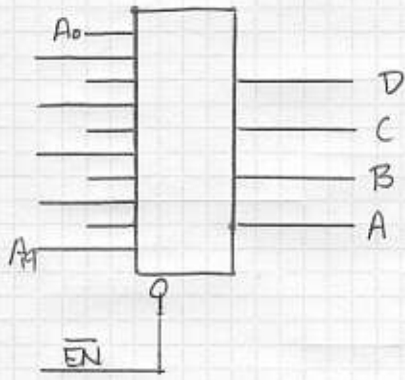
This is a binary to octal decoder. When a three bit binary code appears at the input the corresponding output becomes active (in this case a zero).

If 101_2 appears at A, B, and C, output Q_5 will become low.

This is assuming $EN_1 = 1$ and $\overline{EN}_2 = 0$.

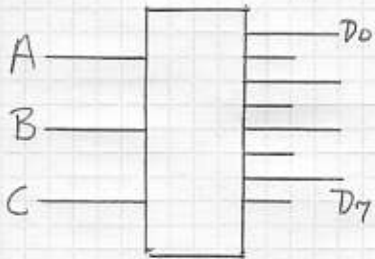
The key to identifying these devices lies in the number of inputs and outputs. For encoder inputs and decoder outputs, seven = 7 segment (used only with BCD input) eight = octal, ten = decimal, sixteen = hexadecimal.

Examples



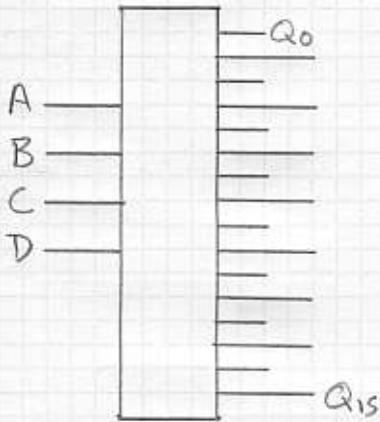
10 inputs. DECIMAL
4 outputs

DECIMAL TO BCD ENCODER (OUTPUT IS BINARY)



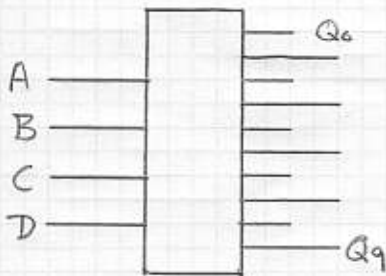
3 INPUTS
8 OUTPUTS OCTAL

BINARY TO OCTAL DECODER (INPUT IS BINARY)



16 OUTPUTS HEXADECIMAL
4 INPUTS

BINARY TO HEX DECODER

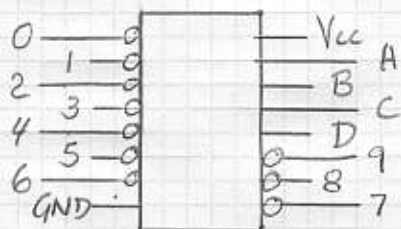


10 OUTPUTS - DECIMAL
4 INPUTS - BCD

BCD TO DECIMAL DECODER

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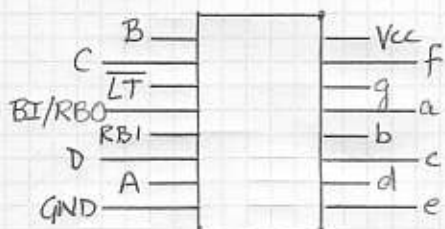
4-line BCD to 10-line decimal decoder



A, B, C, D are BCD inputs, active high
 0-9 are decimal outputs, active low
 Invalid input causes all outputs to be high.

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BCD to 7-segment decoder/driver



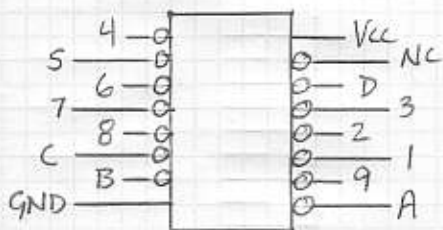
A, B, C, D are BCD inputs
 a-g are segment outputs

\overline{LT} turns on all LEDs to test them

BI, RBI, RBO are used to blank leading zeros left of the decimal point and trailing zeros to the right.

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DECIMAL TO BCD CONVERTER/ENCODER



A, B, C, D are BCD outputs (active low)

1-9 are decimal inputs (active low)

(note that there is no "zero" input - this device outputs BCD zero (1111) when no inputs are active (in other words, zero).