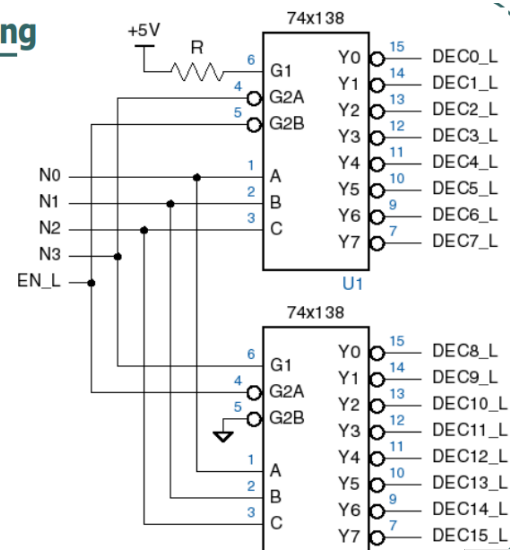
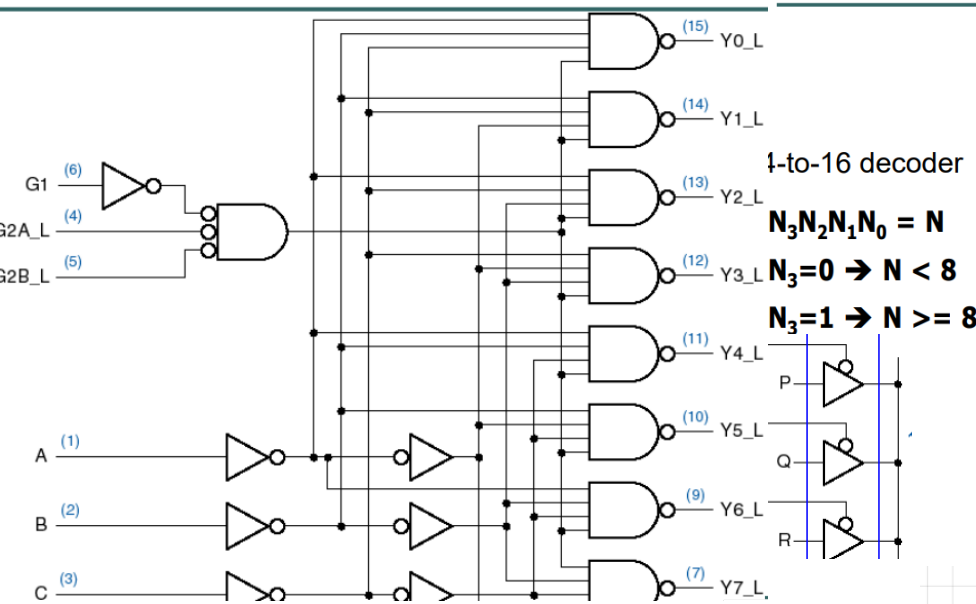
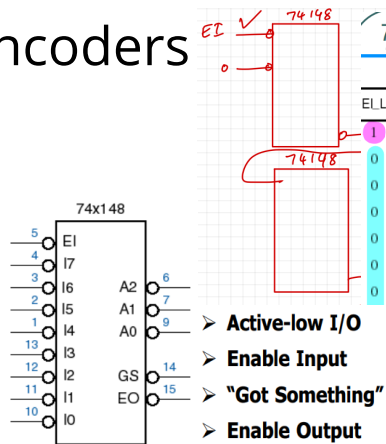


3-to-8 Decoder



Encoders



74x148 Truth Table

Inputs										Outputs				
EL_L	I0_L	I1_L	I2_L	I3_L	I4_L	I5_L	I6_L	I7_L		A2_L	A1_L	A0_L	GS_L	EO_L
1	x	x	x	x	x	x	x	x	0	0	0	0	0	1
0	x	x	x	x	x	x	x	0	1	0	0	1	0	1
0	x	x	x	x	x	x	0	1	1	0	1	0	0	1
0	x	x	x	x	0	1	1	1	1	1	0	0	0	1
0	x	x	0	1	1	1	1	1	1	1	0	1	0	1
x	0	1	1	1	1	1	1	1	1	1	1	0	0	1
0	1	1	1	1	1	1	1	1	1	1	1	1	0	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	0

I3	I2	I1	I0	Y1	Y0
0	0	0	0	0	0
0	0	1	x	0	1
0	1	x	x	1	0
1	x	x	x	1	1

Priority is given to the most significant active input.

Row Expressions

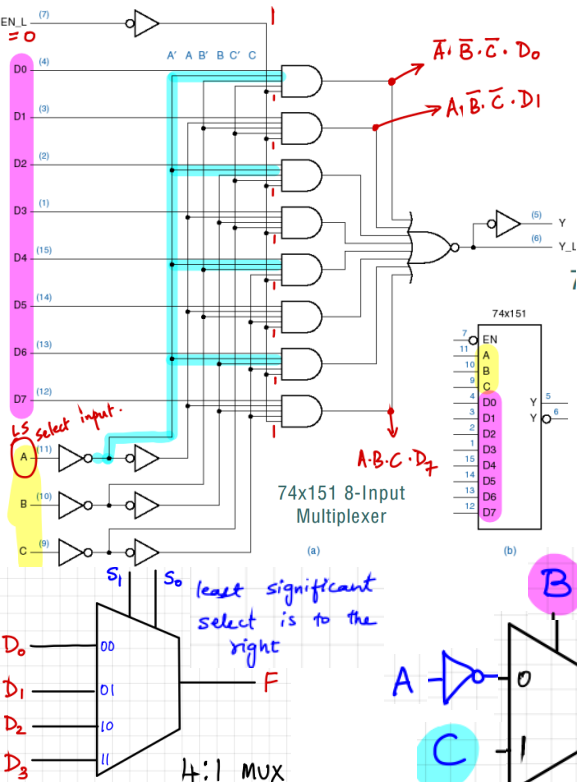
$$H_0 = \overline{I_3} \cdot \overline{I_2} \cdot \overline{I_1} \cdot I_0$$

$$H_1 = \overline{I_3} \cdot \overline{I_2} \cdot I_1$$

$$H_2 = \overline{I_3} \cdot I_2$$

$$H_3 = I_3$$

MUX



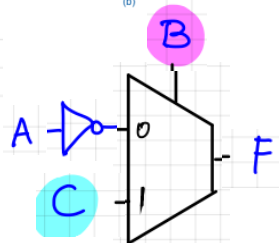
$$F = \sum_{(A,B,C)} (0, 1, 3, 7)$$

$$= \overline{A} \cdot \overline{B} \cdot \overline{C} + \overline{A} \cdot \overline{B} \cdot C + \overline{A} \cdot B \cdot C + A \cdot B \cdot C$$

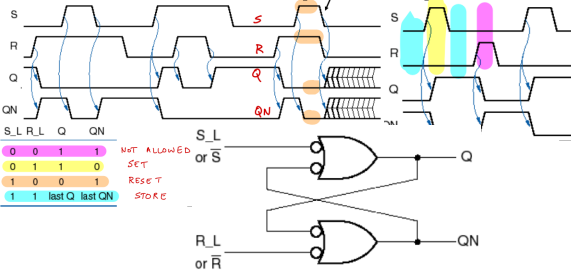
$$F = \overline{A} (\overline{B} \cdot \overline{C} + \overline{B} \cdot C) + B (\overline{A} \cdot C + A \cdot C)$$

$$= \overline{A} (C + \overline{C}) + B (C (\overline{A} + A))$$

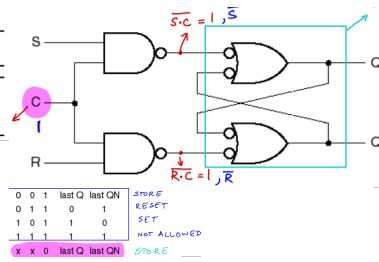
$$= \overline{A} + B \cdot C$$



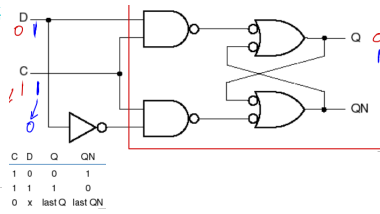
SR Latches(level)



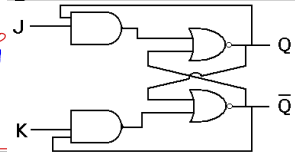
SR Enable



D

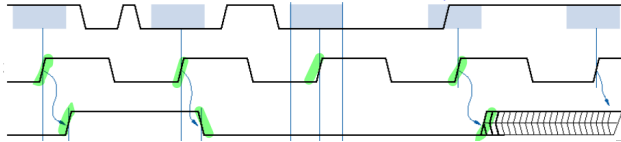


JK

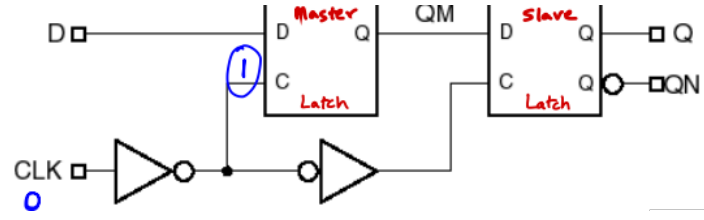


D for registers

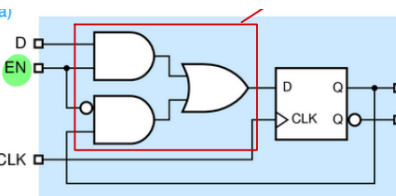
D FlipFlops(edge)



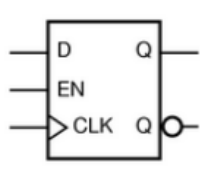
D	CLK	Q	QN
0	1	0	1
1	1	1	0
x	0	last Q	last QN
x	1	last Q	last QN



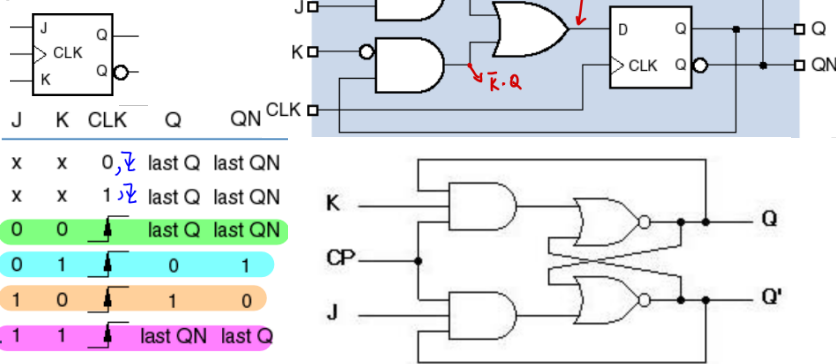
ClockEnable



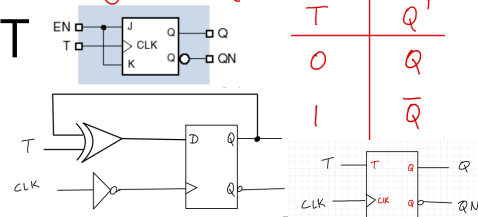
D	EN	CLK	Q	QN
0	1	1	0	1
1	1	1	1	0
x	0	1	last Q	last QN
x	x	0	last Q	last QN
x	x	1	last Q	last QN



JK



T for counters



S	R	Q	Q*	J	K	Q	Q*	D	Q	Q*
0	0	0	0	0	0	0	0	0	0	0
0	0	1	1	0	0	1	1	0	1	0
0	1	0	0	0	1	0	0	1	0	1
0	1	1	0	0	1	1	0	1	1	0
1	0	0	1	1	0	0	1	0	0	1
1	0	1	1	1	0	1	1	0	1	1
1	1	0	0	1	1	0	0	1	0	1
1	1	1	0	1	1	1	0	1	1	0

Q	Q*	R	S	J	K	T	D
0	0	x	0	0	x	0	0
0	1	0	1	1	x	1	1
1	0	1	0	x	1	1	0
1	1	0	x	x	0	0	1

RS L Q+=S+R'Q
D FF Q+=D
JK FF Q+=JQ'+K'Q
T FF Q+=TQ'+T'Q

Converting

Write the next state table of desired D to JK

J	k	Q	Q*
0	0	0	0
0	0	1	1
0	1	0	0
0	1	1	0
1	0	0	1
1	0	1	1
1	1	0	1
1	1	1	0

Excitation table of given

Q	Q*	D
0	0	0
0	1	1
1	0	0
1	1	1

Q and Q+ of desired to given input

J	k	Q	Q*	D
0	0	0	0	0
0	0	1	1	1
0	1	0	0	0
0	1	1	0	0
1	0	0	1	1
1	0	1	1	1
1	1	0	1	1
1	1	1	0	0

derive expression for given input in terms of wanted input and Q

Jk	Q	Q*	D
00	0	0	0
01	0	1	1
10	1	0	0
11	1	1	1

$$D = J \cdot \bar{Q} + \bar{K} \cdot Q$$