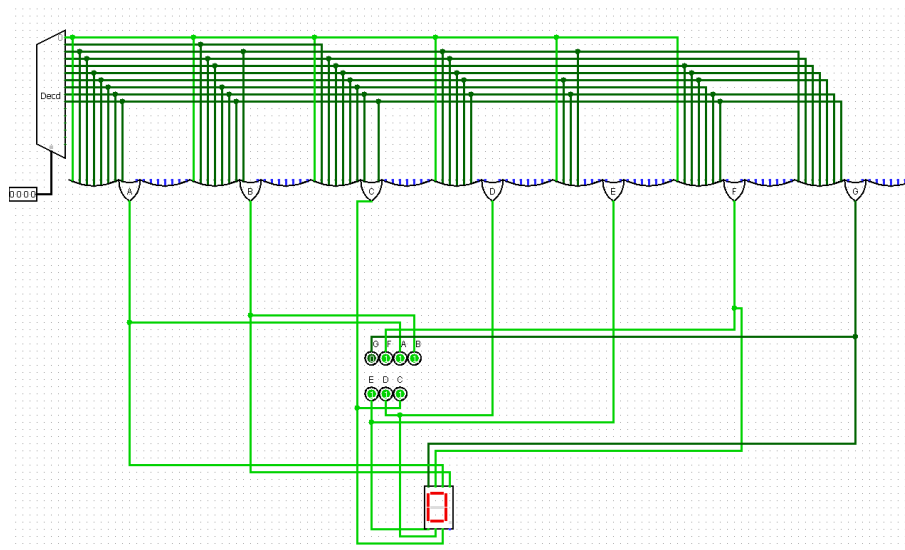
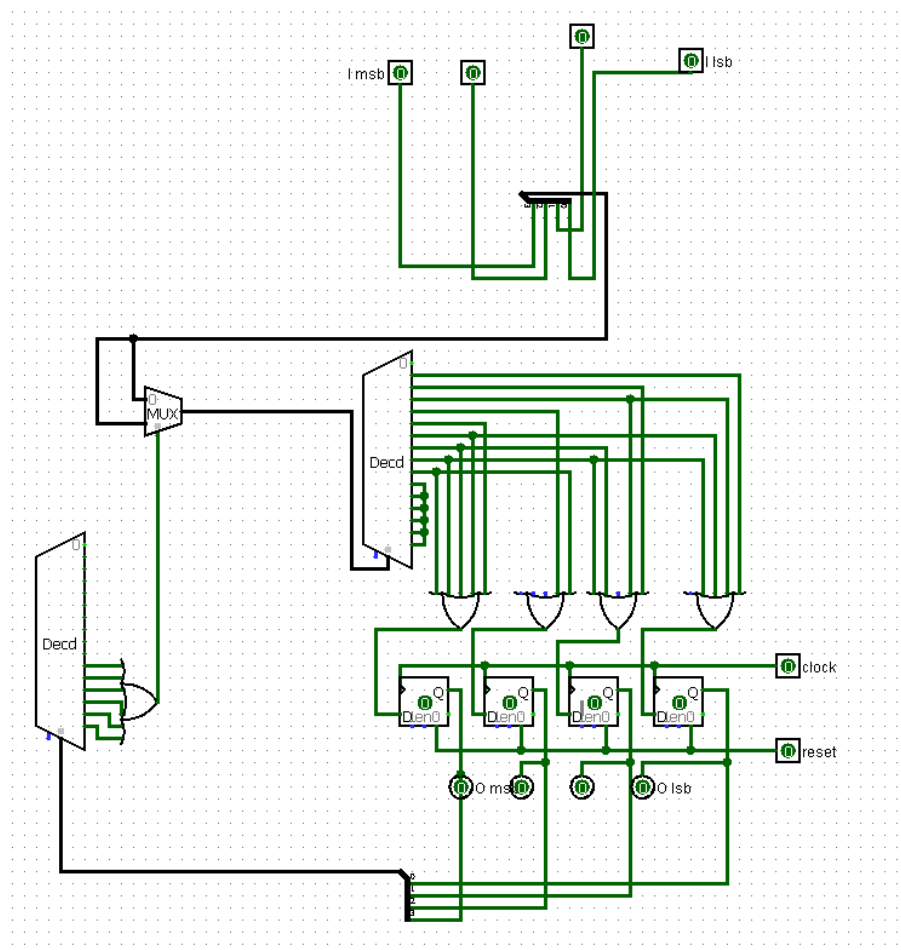


## Diseño del Decoder BCD 7 segmentos (con compuertas)

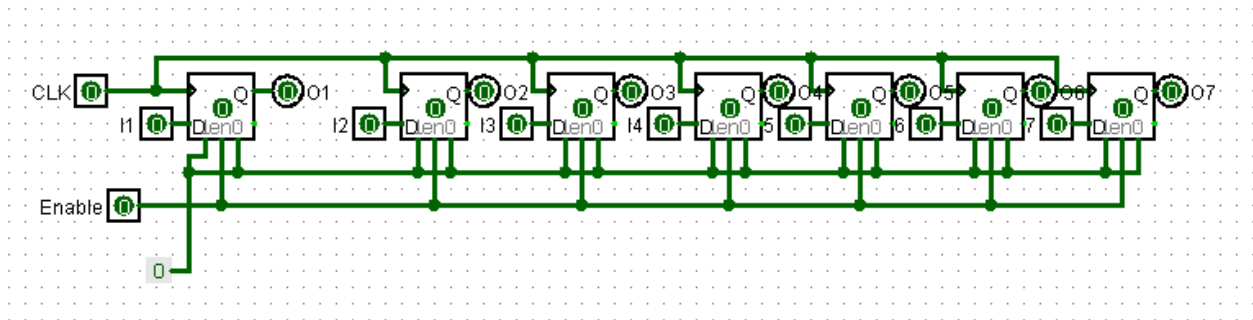


## Binario serial a BCD secuencial



## Flip-Flops para almacenar la información

Un componente formado por 7 flip flops (uno por cada señal que necesita la pantalla), los cuales guardarán su valor anterior cuando el enable esté en LOW. Esto permite que se pueda quedar en un estado



mientras se manipulan los demás.

## Tablas de verdad, Mapas de karnaugh, algebra booleana

### BCD to 7 Segment Display Decoder

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

Output e

D	C	B	A	e
0	0	0	0	1
0	0	0	1	0
0	0	1	0	1
0	0	1	1	0
0	1	0	0	0
0	1	0	1	0
0	1	1	0	1
0	1	1	1	0
1	0	0	0	1
1	0	0	1	0
1	0	1	0	0
1	0	1	1	0
1	1	0	0	0
1	1	0	1	0
1	1	1	0	0
1	1	1	1	0

		D C			
		00	01	11	10
B A	00	1	0	0	1
	01	0	0	0	0
	11	0	0	0	0
	10	1	1	0	0

Boolean Expression

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

Sum of Products

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

Output c

D	C	B	A	c
0	0	0	0	1
0	0	0	1	1
0	0	1	0	0
0	0	1	1	1
0	1	0	0	1
0	1	0	1	1
0	1	1	0	1
0	1	1	1	1
1	0	0	0	1
1	0	0	1	1
1	0	1	0	0
1	0	1	1	0
1	1	0	0	0
1	1	0	1	0
1	1	1	0	0
1	1	1	1	0

		D C			
		00	01	11	10
B A	00	1	1	0	1
	01	1	1	0	1
	11	1	1	0	0
	10	0	1	0	0

Boolean Expression

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

Sum of Products

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

Output B

D	C	B	A	b
0	0	0	0	1
0	0	0	1	1
0	0	1	0	1
0	0	1	1	1
0	1	0	0	1
0	1	0	1	0
0	1	1	0	0
0	1	1	1	1
1	0	0	0	1
1	0	0	1	1
1	0	1	0	0
1	0	1	1	0
1	1	0	0	0
1	1	0	1	0
1	1	1	0	0
1	1	1	1	0

		D C			
		00	01	11	10
B A	00	1	1	0	1
	01	1	0	0	1
	11	1	1	0	0
	10	1	0	0	0

Boolean Expression

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

Sum of Products

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

Output a

D	C	B	A	a
0	0	0	0	1
0	0	0	1	0
0	0	1	0	1
0	0	1	1	1
0	1	0	0	0
0	1	0	1	1
0	1	1	0	1
0	1	1	1	1
1	0	0	0	1
1	0	0	1	1
1	0	1	0	0
1	0	1	1	0
1	1	0	0	0
1	1	0	1	0
1	1	1	0	0
1	1	1	1	0

		D C			
		00	01	11	10
B A	00	1	0	0	1
	01	0	1	0	1
	11	1	1	0	0
	10	1	1	0	0

Boolean Expression

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

Sum of Products

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