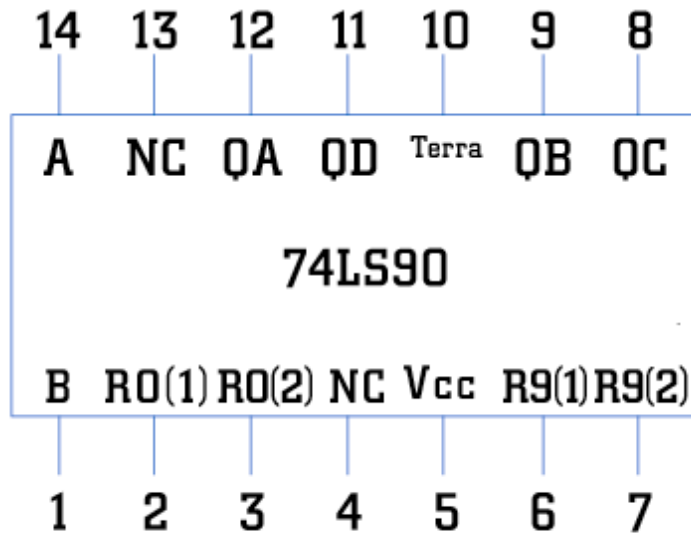
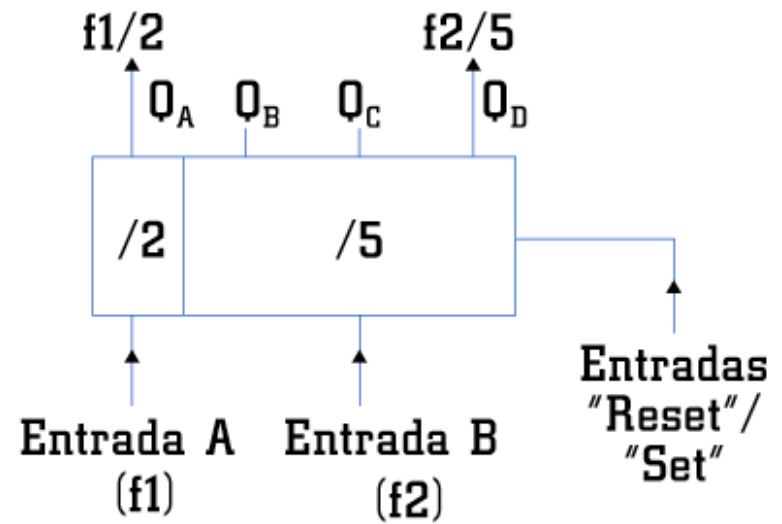


# CIRCUITOS CONTADORES “MSI”

## Circuito Integrado 74LS90 – Divisor por 2 e 5



(a)



(b)

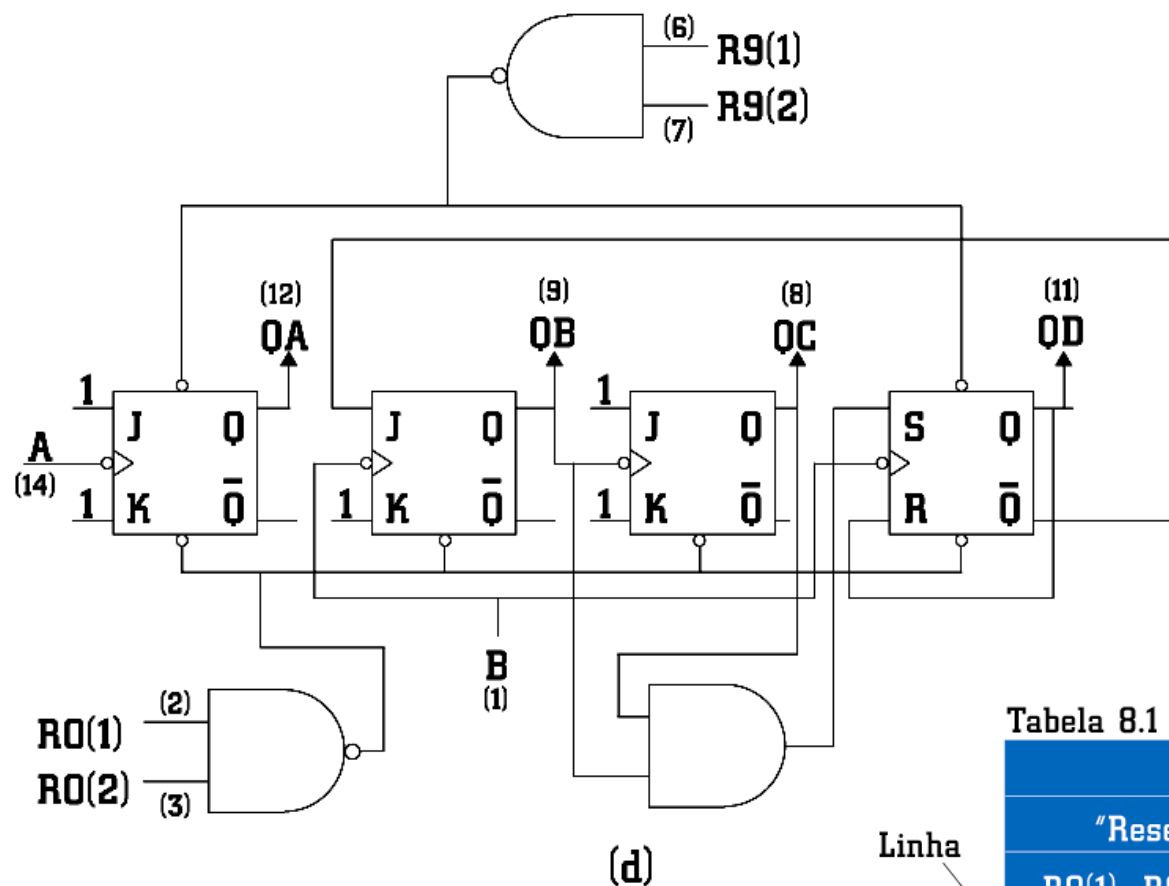
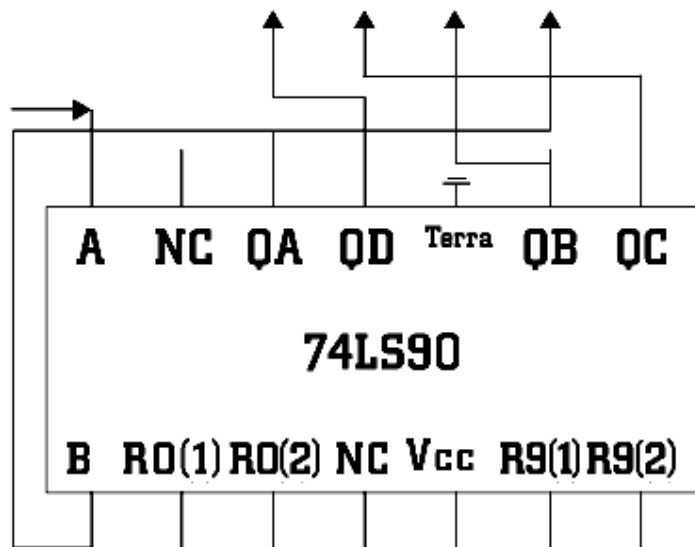


Tabela 8.1

Linha	Entradas				Saídas			
	"Reset"		"Set"					
	R0(1)	R0(2)	R9(1)	R9(2)	Q <sub>D</sub>	Q <sub>C</sub>	Q <sub>B</sub>	Q <sub>A</sub>
1	1	1	0	X	0	0	0	0
2	1	1	X	0	0	0	0	0
3	X	X	1	1	1	0	0	1
4	X	0	X	0	CONTA			
5	0	X	0	X				
6	0	X	X	0				
7	X	0	0	X				

"Reset"



(a)

Número de transições ocorridas no "clock"	Saídas				
	Q <sub>D</sub>	Q <sub>C</sub>	Q <sub>B</sub>	Q <sub>A</sub>	
0	0	0	0	0	Estado inicial
1	0	0	0	1	
2	0	0	1	0	
3	0	0	1	1	
4	0	1	0	0	
5	0	1	0	1	
6	0	1	1	0	
7	0	1	1	1	
8	1	0	0	0	
9	1	0	0	1	

Pino 12 ligado ao pino 1

(b)

Figura 8.16 Circuito 74LS90 como contador BCD.  
 (a) Ligações no diagrama de pinos; (b) Tabela de combinações no modo BCD.

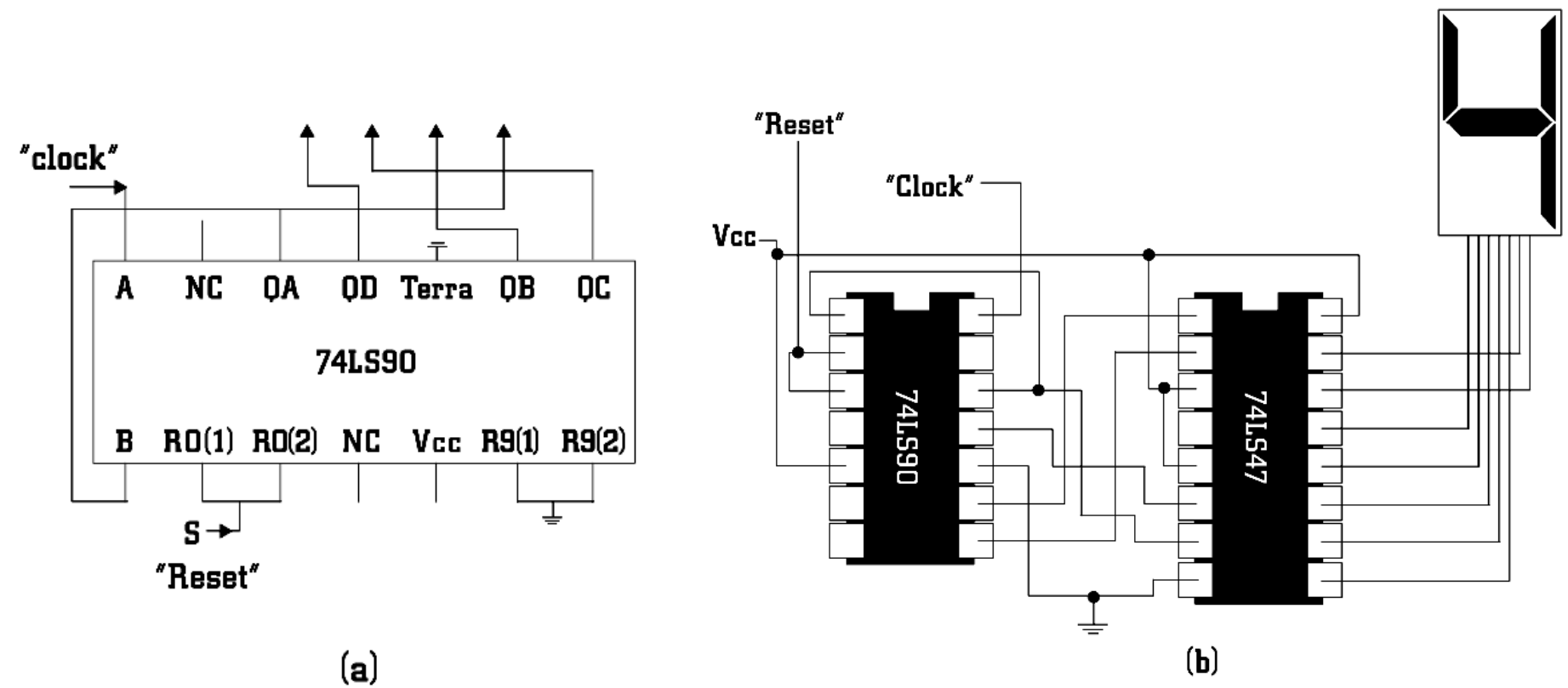
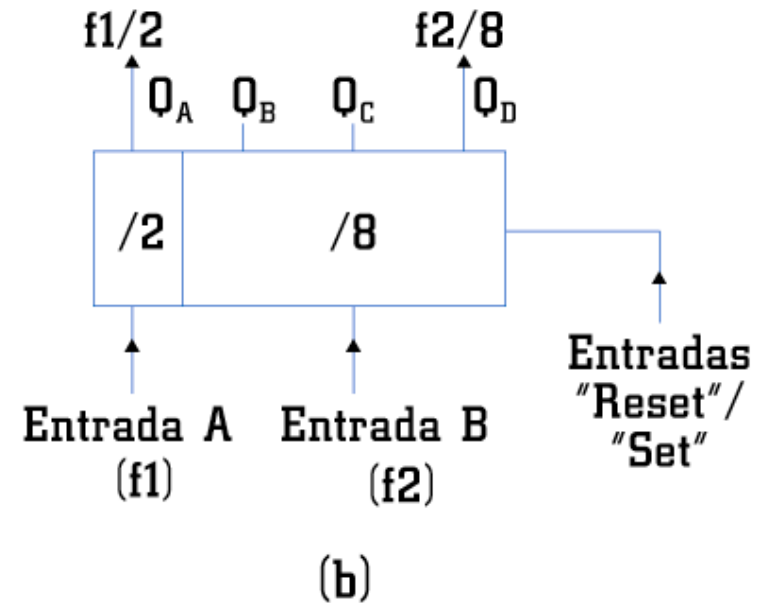
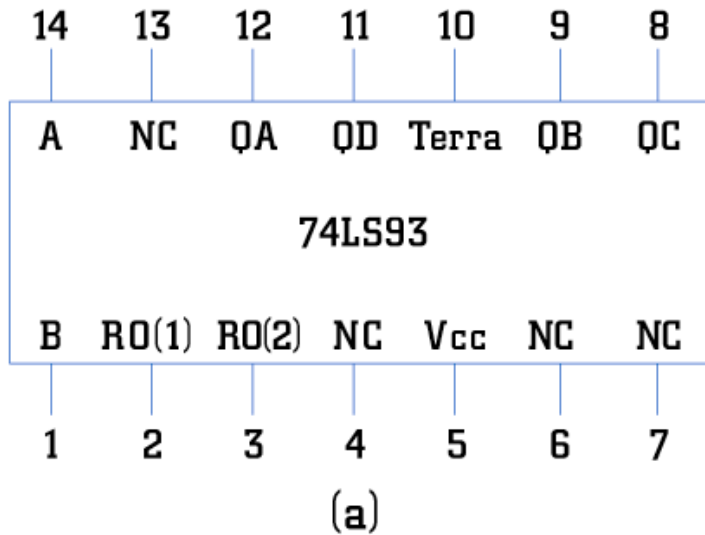
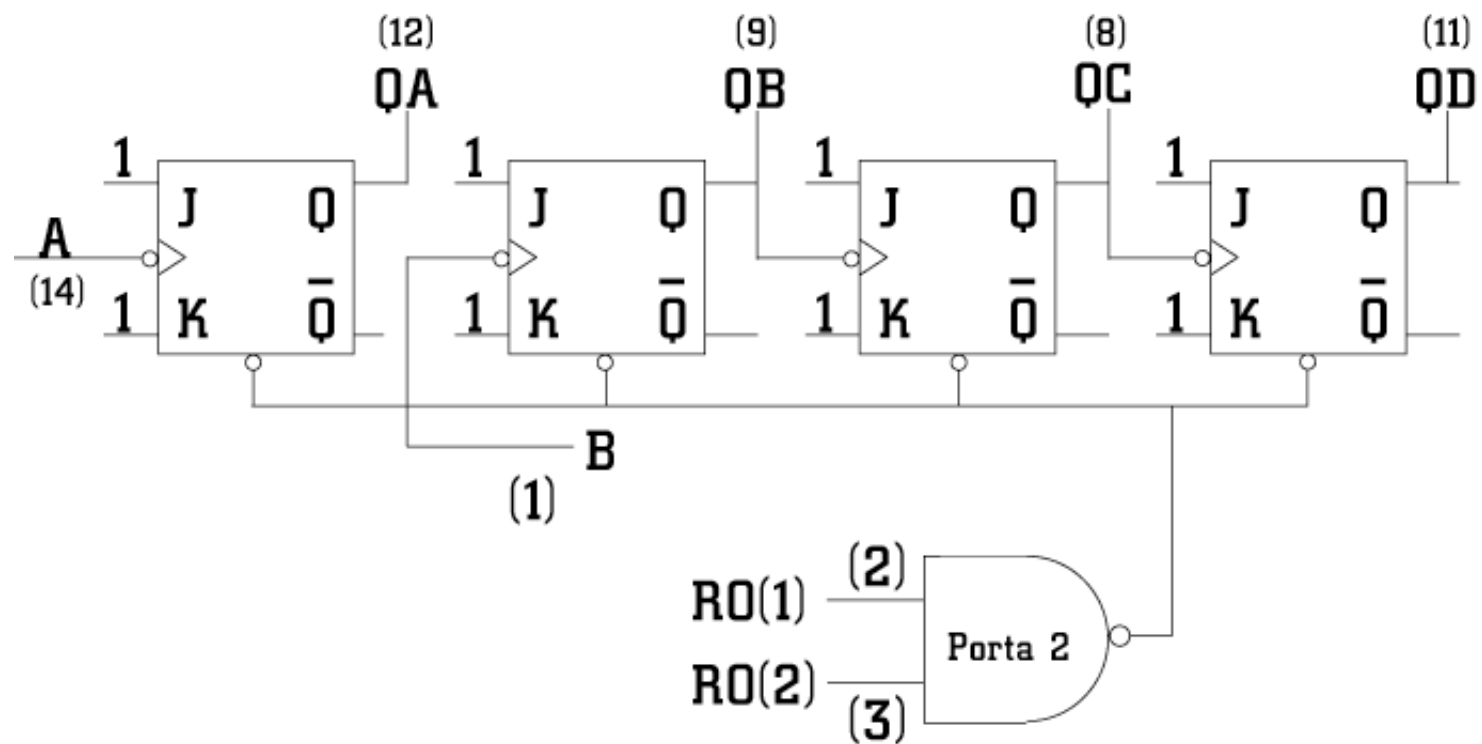


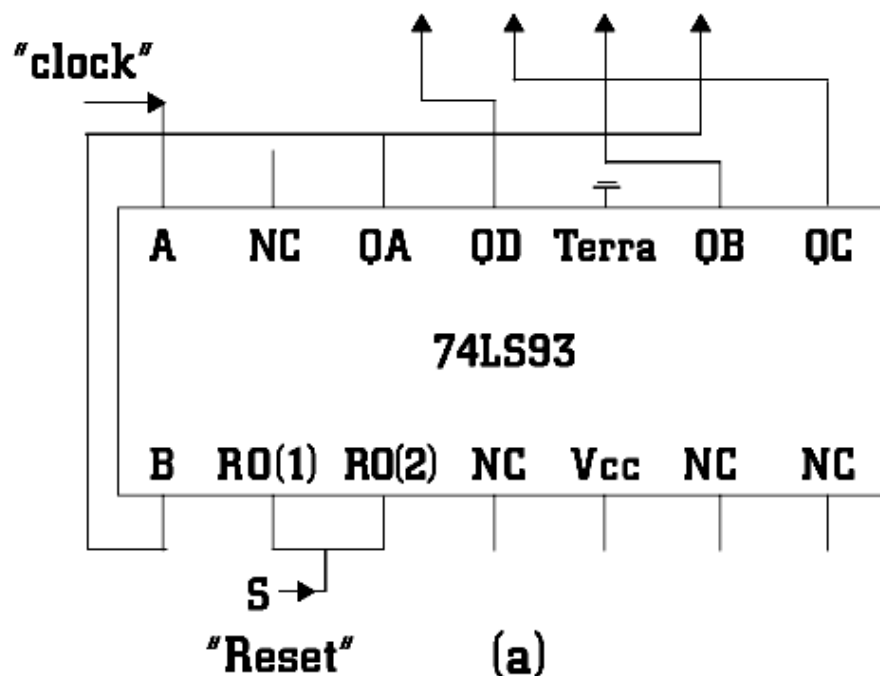
Figura 8.17 (a) 7490 como contador BCD e com entrada "reset"; (b) Saída para "display".

# Circuito Integrado 74LS93 – Divisor por 2 e 8





(d)



Estradas		Saídas			
"Reset"					
RO(1)	RO(2)	Q <sub>D</sub>	Q <sub>C</sub>	Q <sub>B</sub>	Q <sub>A</sub>
1	1	0	0	0	0
X	0	CONTA			
0	X				

**"Reset"**

Número de transições ocorridas no "clock"	Saídas			
	Q <sub>D</sub>	Q <sub>C</sub>	Q <sub>B</sub>	Q <sub>A</sub>
0	0	0	0	0
1	0	0	0	1
2	0	0	1	0
3	0	0	1	1
4	0	1	0	0
5	0	1	0	1
6	0	1	1	0
7	0	1	1	1
8	1	0	0	0
9	1	0	0	1
10	1	0	1	0
11	1	0	1	1
12	1	1	0	0
13	1	1	0	1
14	1	1	1	0
15	1	1	1	1

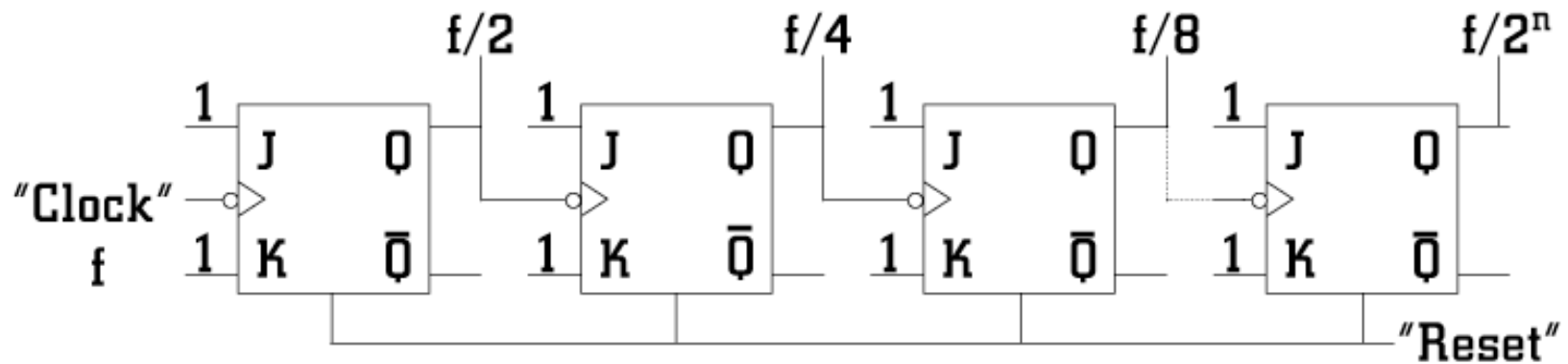
**Estado inicial**

**Pino 12 ligado ao pino 1**

**(b)**

# DIVISOR DE FREQUÊNCIA COM “FLIP-FLOPS” JK

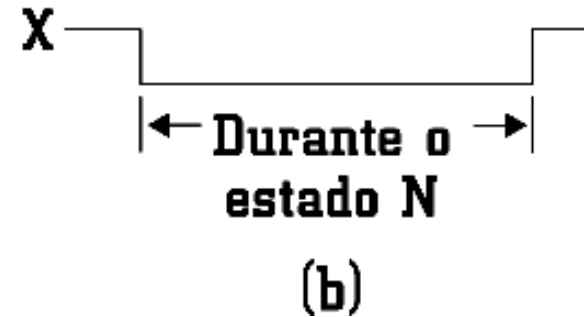
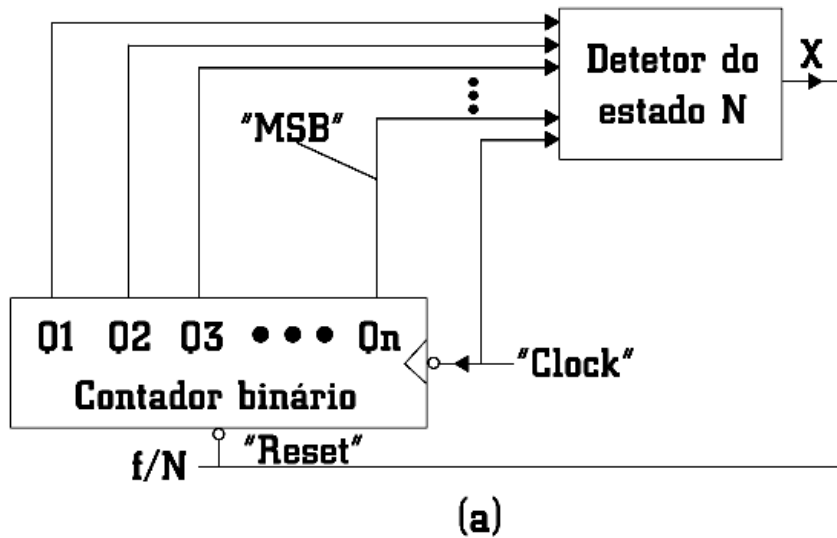
Para N igual a uma potência de 2





# DIVISOR DE FREQUÊNCIA COM “FLIP-FLOPS” JK

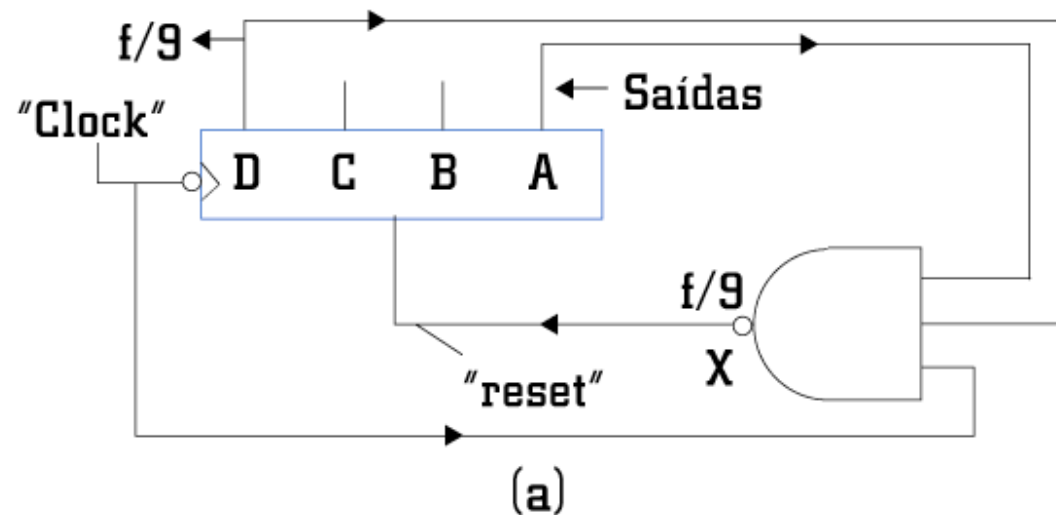
Para  $N > 0$  e diferente de uma potência de 2

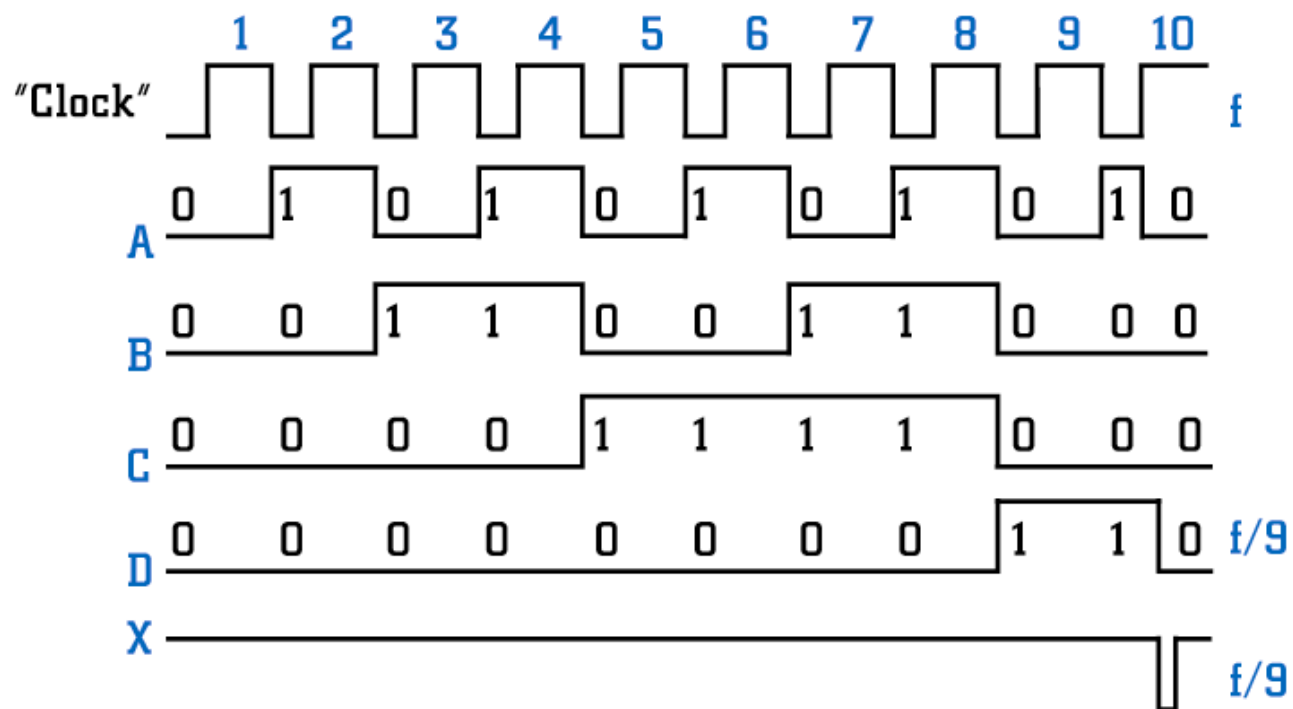
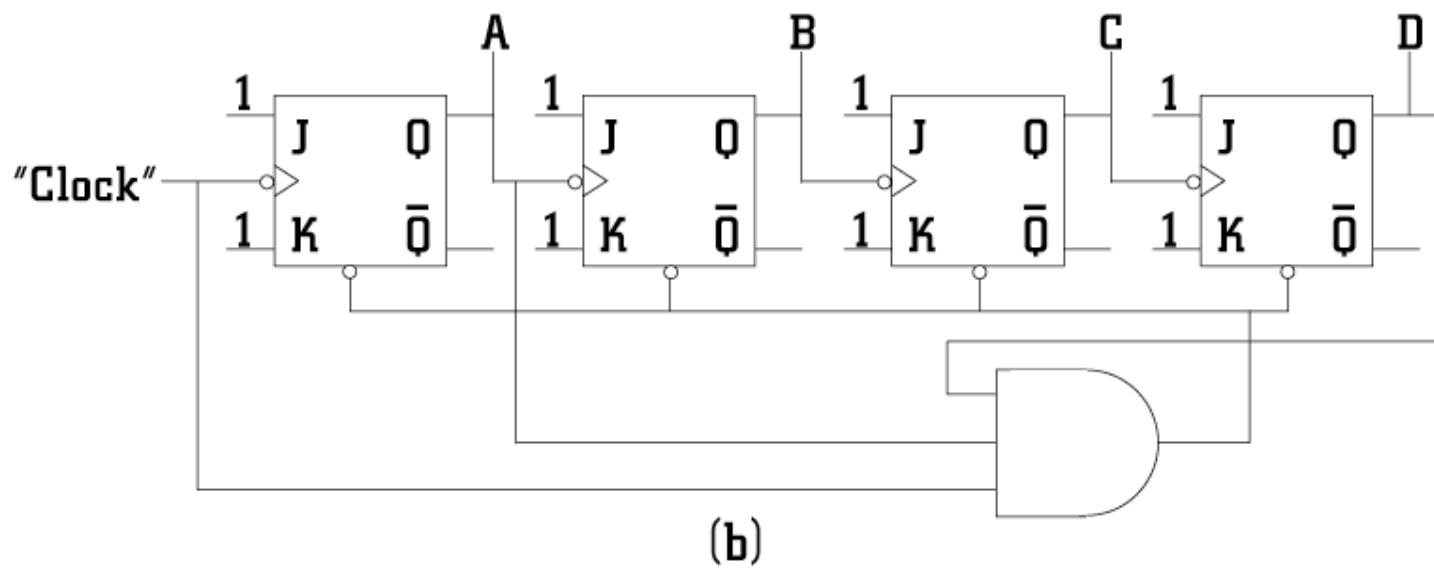


# Projeto de um circuito divisor por 9 usando JK's.

No caso  $N = 9$ . A expressão algébrica de  $N$  é:

$$D \quad \overline{C} \quad \overline{B} \quad A$$





## DIVISORES DE FREQUÊNCIA COM MSI

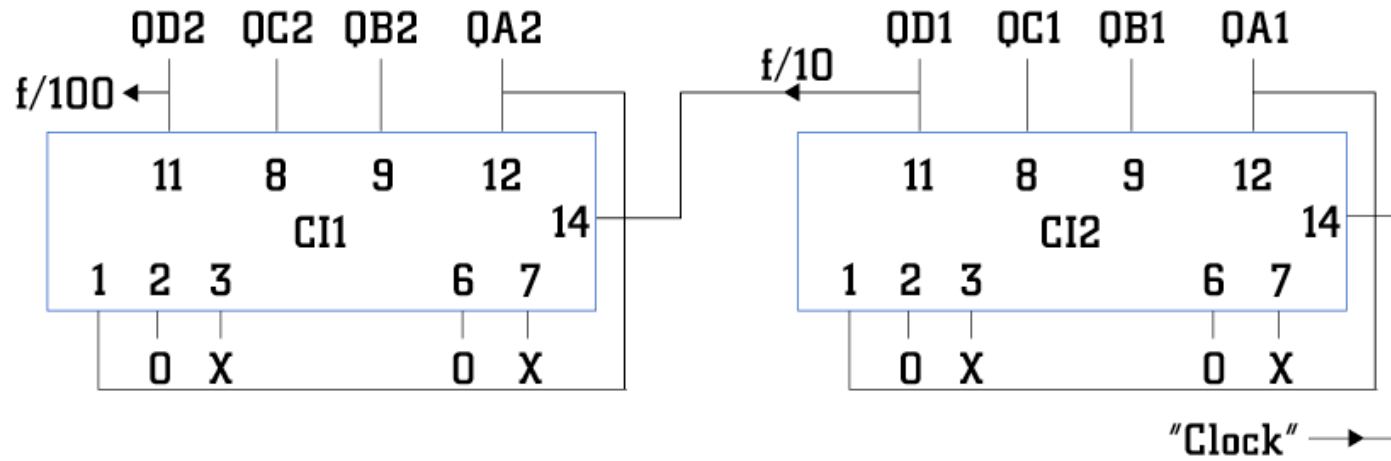
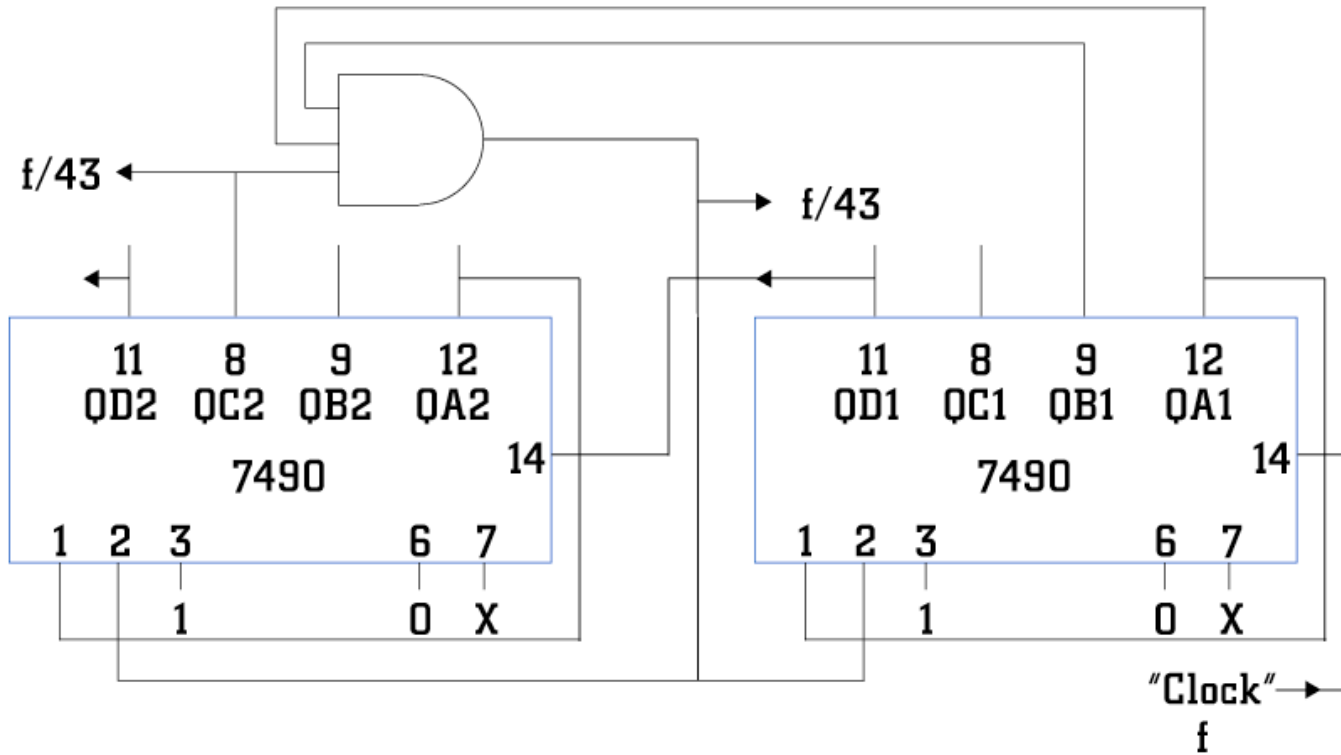
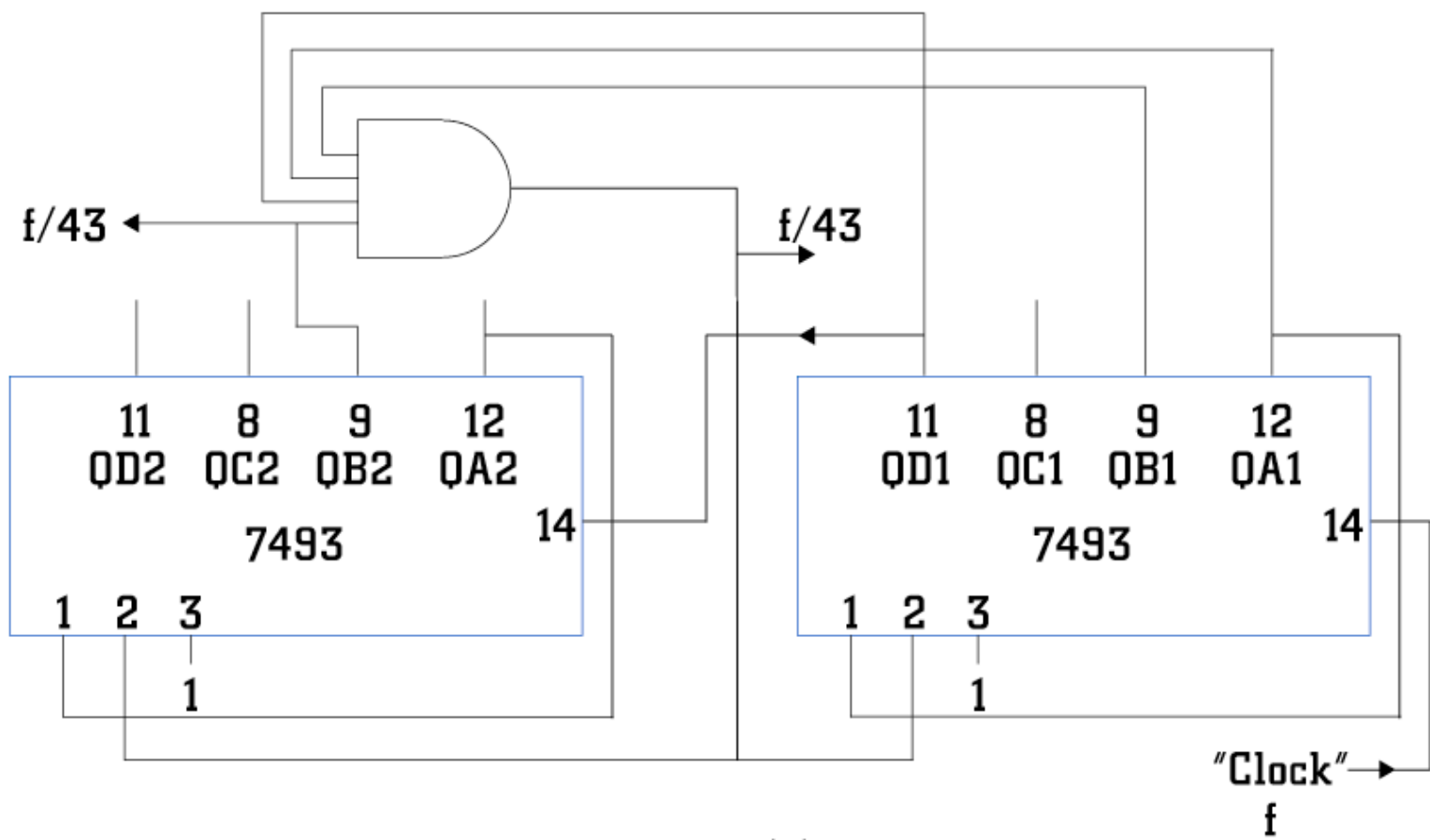


Figura 8.25 Divisor por 100 usando 74LS90.

# Obtenção de um divisor por 43.



(a)



(b)