第五章 双稳态触发器及应用

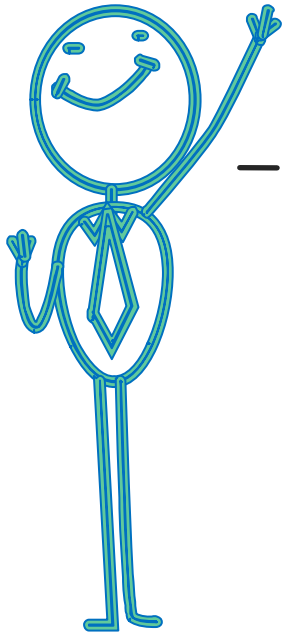
第六章 555定时器及其应用

一、基本RS触发器（ 5.1 ）

二、 边沿触发器（5.2）

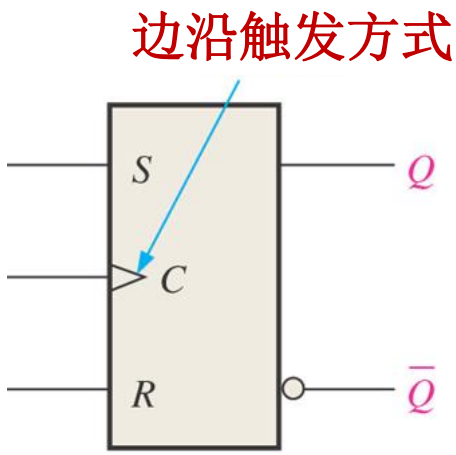
三、双稳态触发器的应用（ 5.3 ）

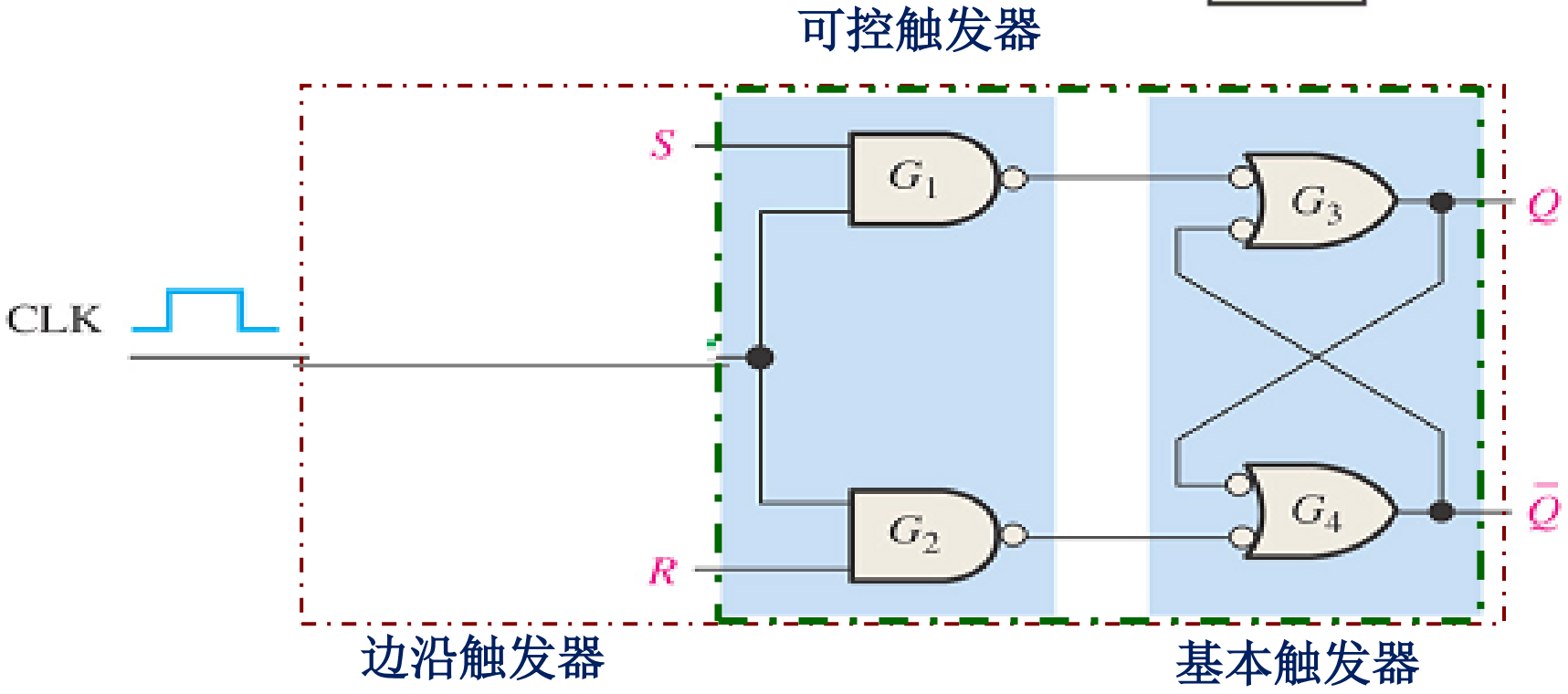
四、单稳和多谐振荡器的概念（6）



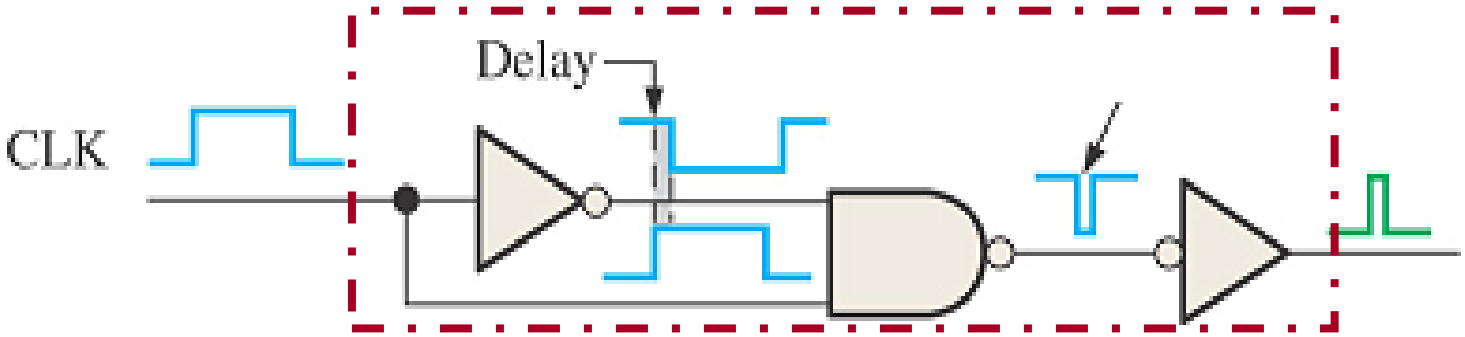
二、边沿触发器

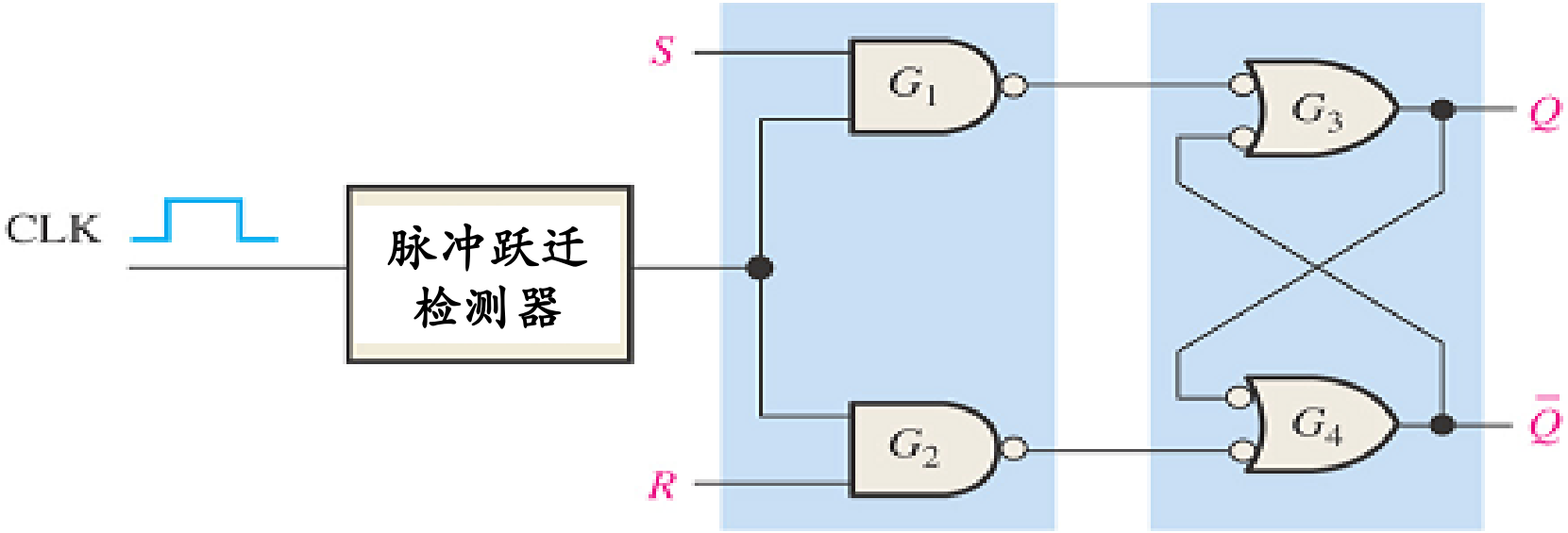
§5.2 边沿触发器


边沿触发方式
S
C
R
Q
$\overline{Q}$


可控触发器
S
R
CLK
G_1
G_2
G_3
G_4
Q
$\overline{Q}$
边沿触发器
基本触发器

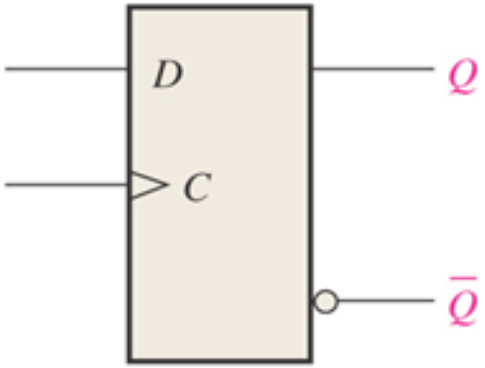
脉冲跃迁检测器

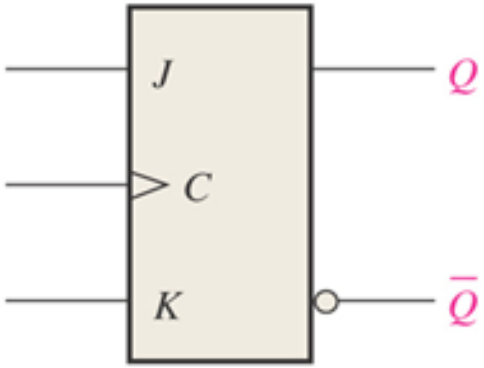




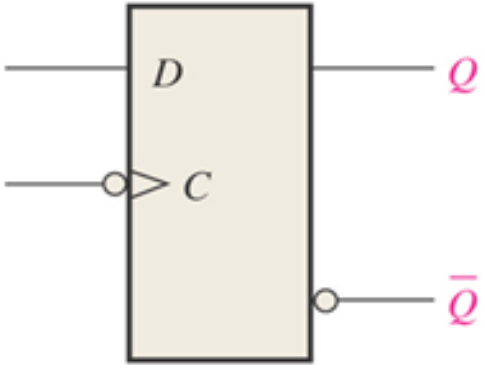
常用边沿触发器

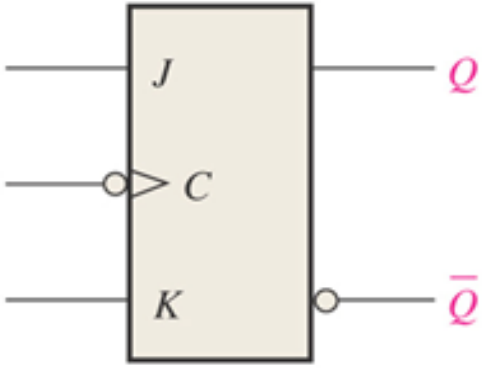
上升沿触发



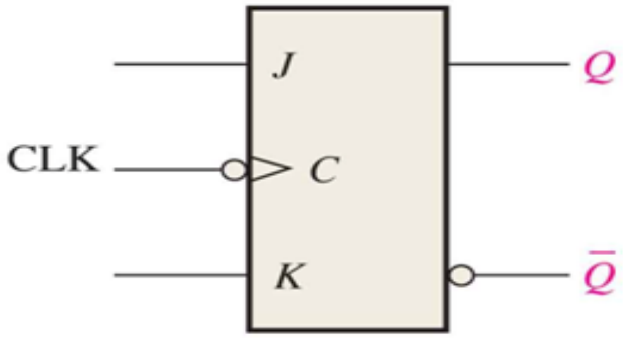


下降沿触发





JK触发器——在结构上的完善



逻辑符号

功能表

CP	*J*	*K*	Q^{n+1}	功能
↓	0	0	Q^n	保持
↓	0	1	0	置 0
↓	1	0	1	置 1
↓	1	1	$\overline{Q}^n$	翻转

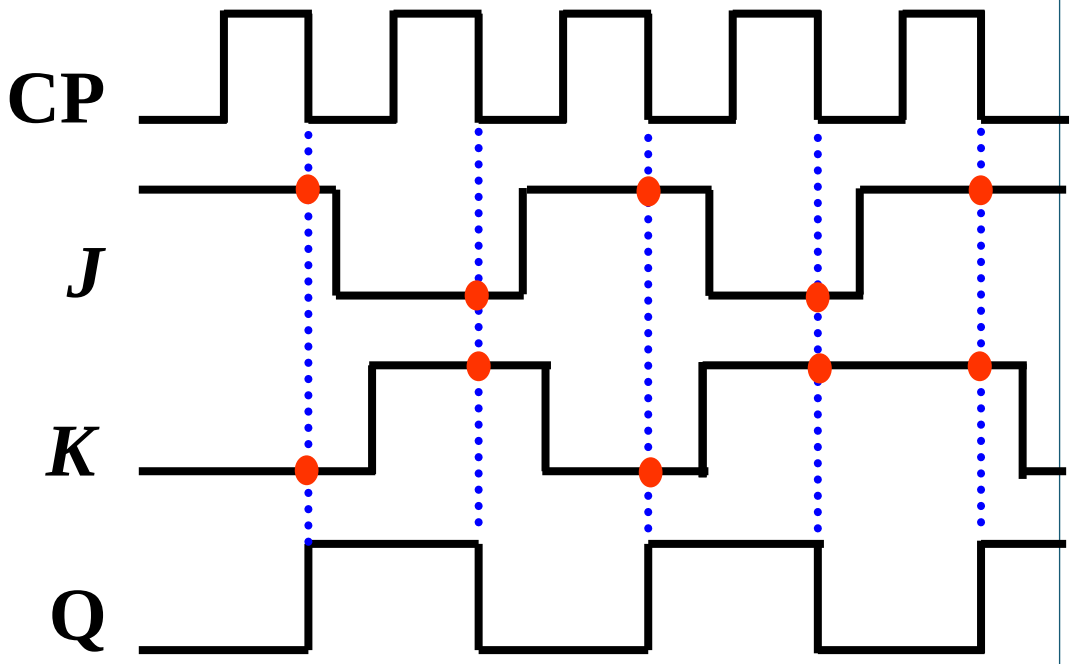
J —相当于置“1”端

K—相当于置“0”端

J、*K*—高电平有效

例:画出 *JK* 触发器在给定输入下的输出波形

CP	*J*	*K*	Q^{n+1}	功能
↓	0	0	Q^n	保持
↓	0	1	0	置 0
↓	1	0	1	置 1
↓	1	1	$\overline{Q}^n$	翻转



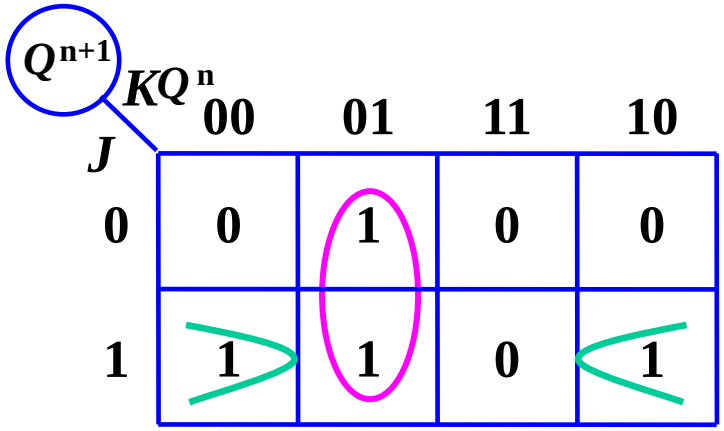
JK触发器的特性方程

功能表

J	K	Q^{n+1}
0	0	Q^n
0	1	0
1	0	1
1	1	$\overline{Q}^n$

状态表

J	K	Q^n	Q^{n+1}	功能
0	0	0	0	保持
0	0	1	1	
0	1	0	0	置 0
0	1	1	0	
1	0	0	1	置 1
1	0	1	1	
1	1	0	1	翻转
1	1	1	0	



状态表

J	K	Q^n	Q^{n+1}
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

JK触发器的特性方程

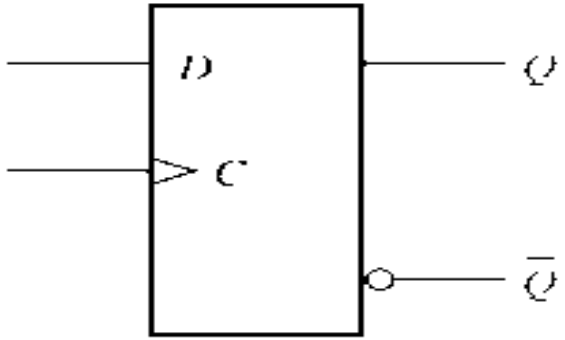
$$Q^{n+1} = J\overline{Q}^n + \overline{K}Q^n$$

D触发器

功能表

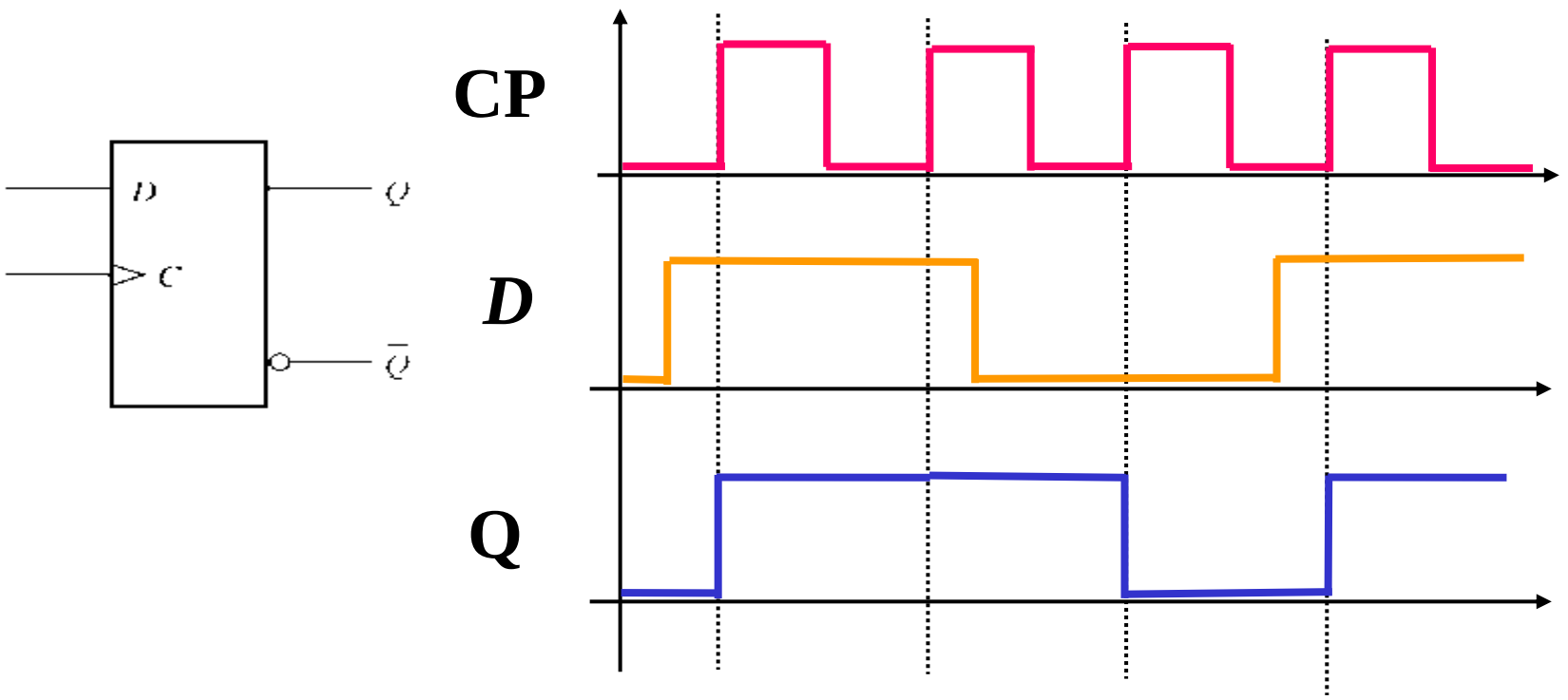
CP	D	Q^{n+1}	功能
↑	0	0	置 0
↑	1	1	置 1

逻辑符号



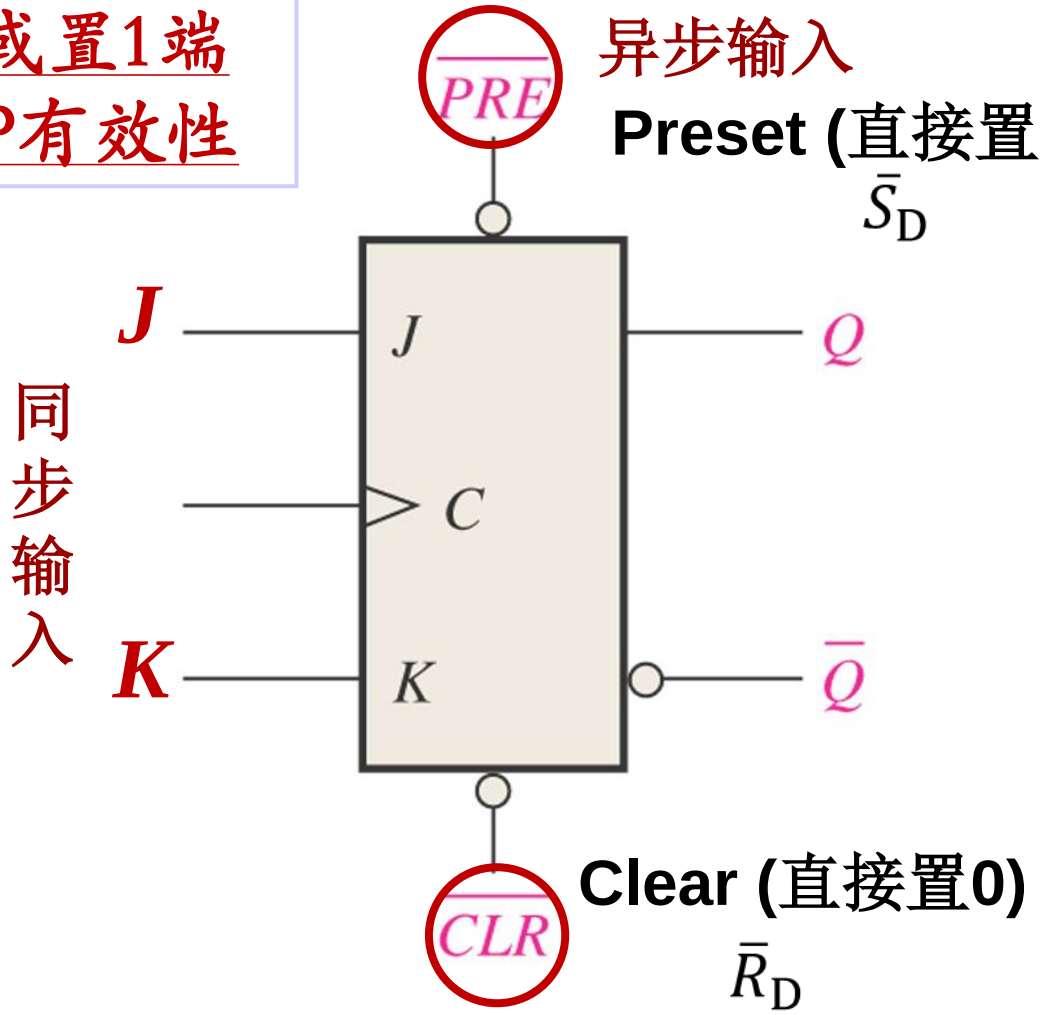
特性方程 $Q^{n+1}=D$

例:时钟CP及输入信号的波形如图所示,试画出触发器输出端Q的波形（设各触发器初始状态为0）



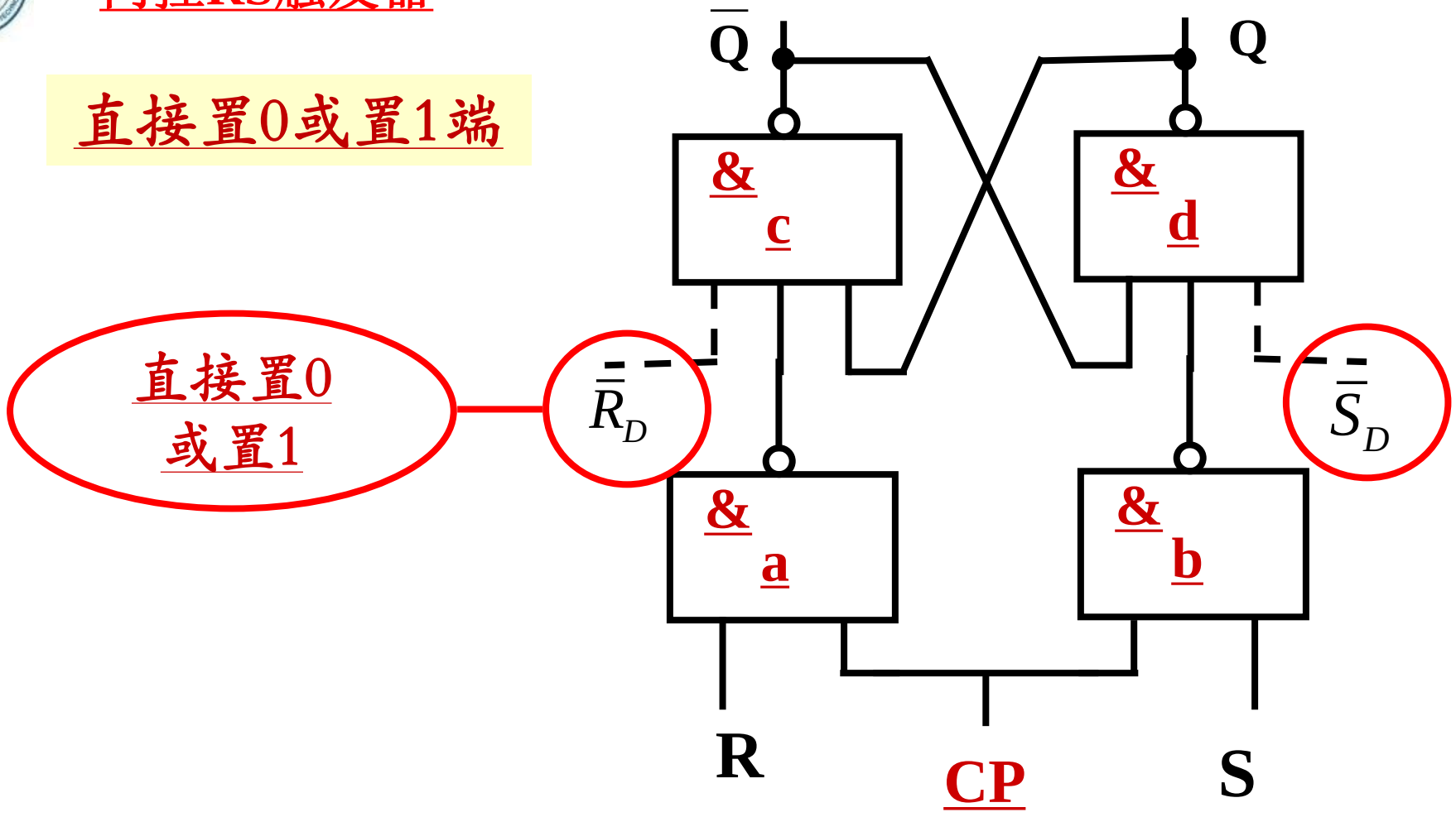
异步置数和清零端子——异步的含义（重要）

直接置0或置1端
无需看CP有效性

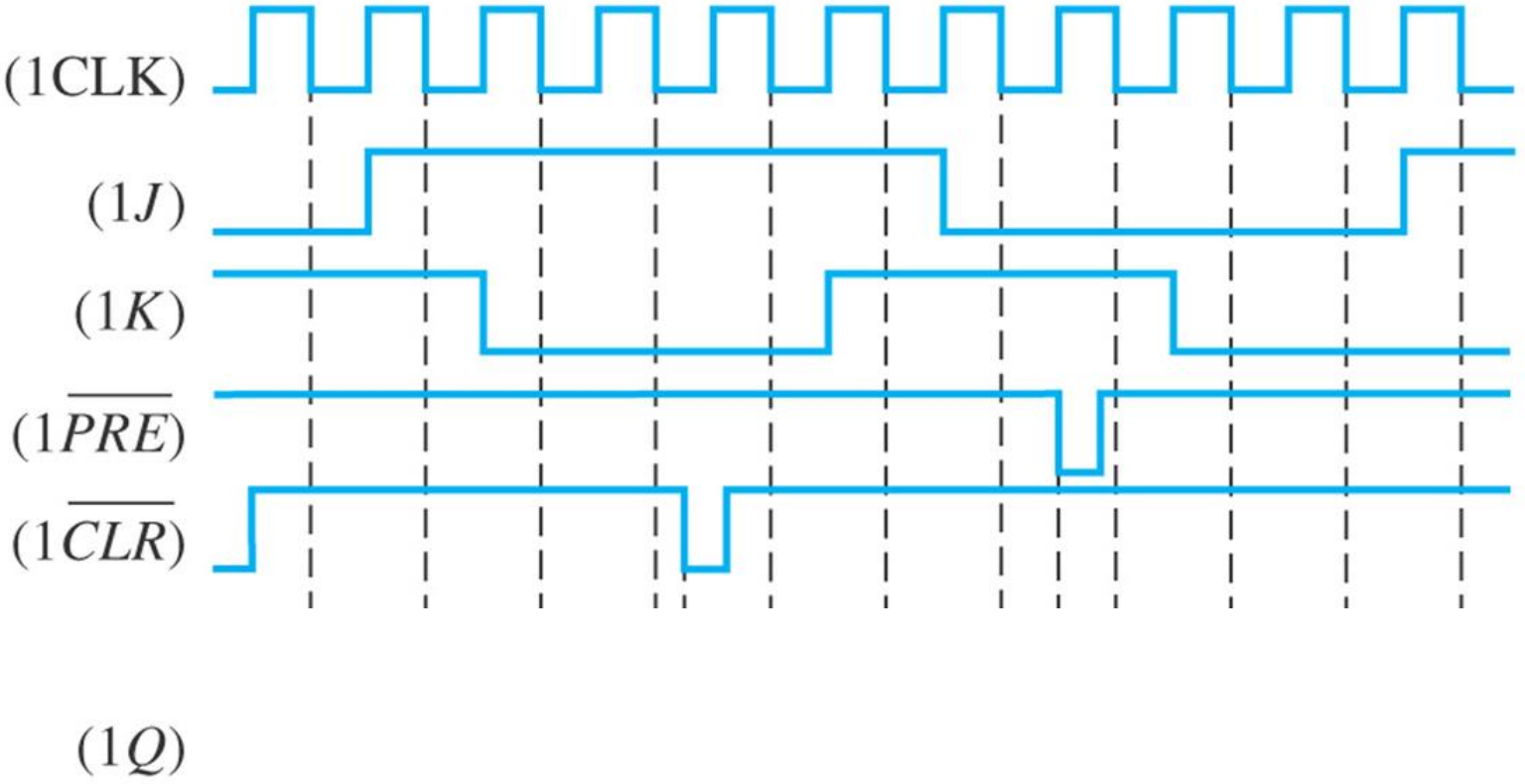


门控RS触发器

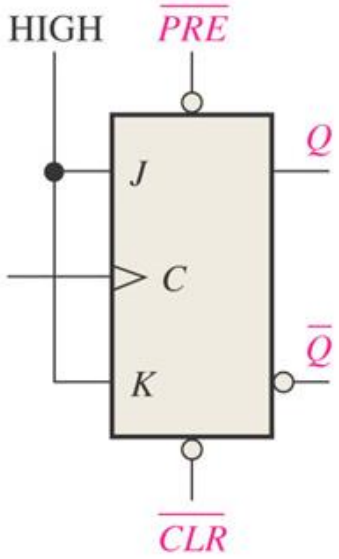
直接置0或置1端



画出电路在给定输入情况下的输出波形

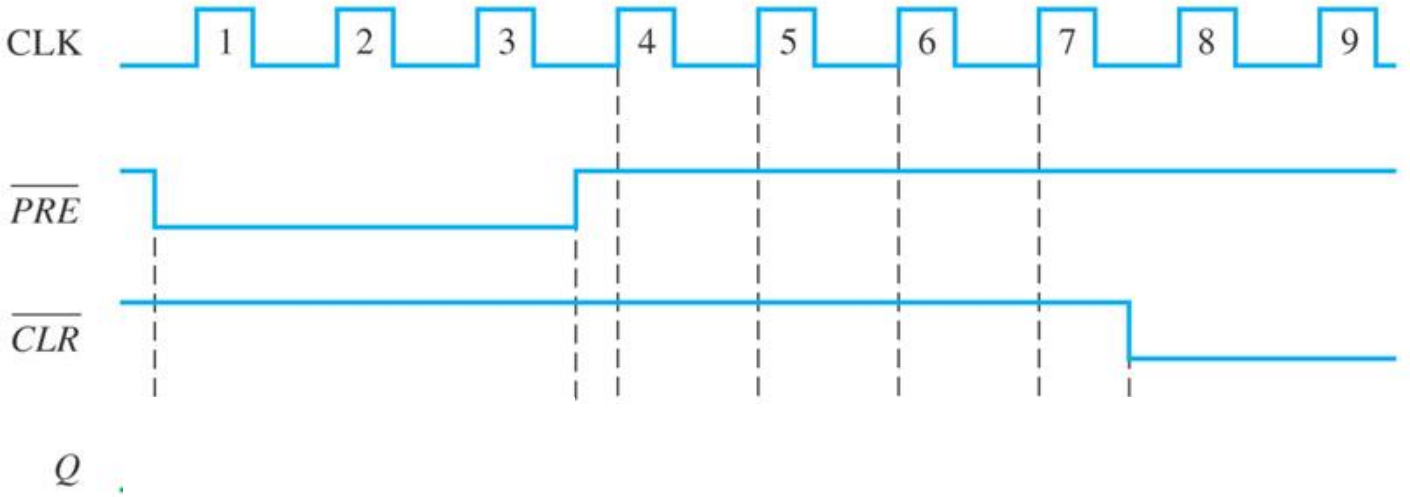


画出输出波形



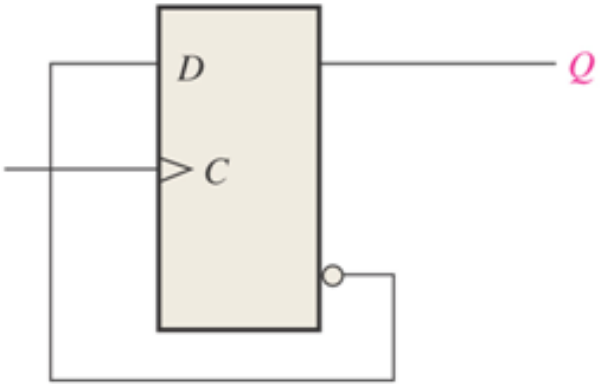
T′触发器

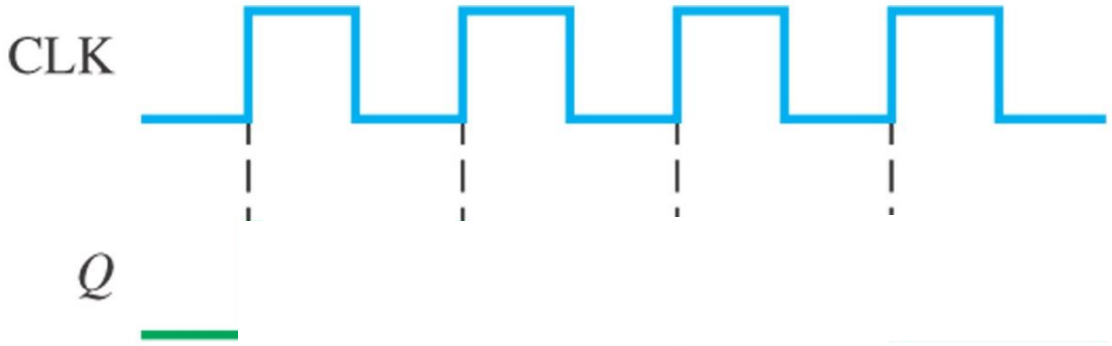
JK端都接高电平， 每来一个时钟信号有效沿触发器就翻转一次



练习：若电路输入波形如图，且Q的初态为“0”，
试画出输出波形

$D = \overline{Q}$





练习：设各触发器初态为0，画出Q_1和Q_2的波形