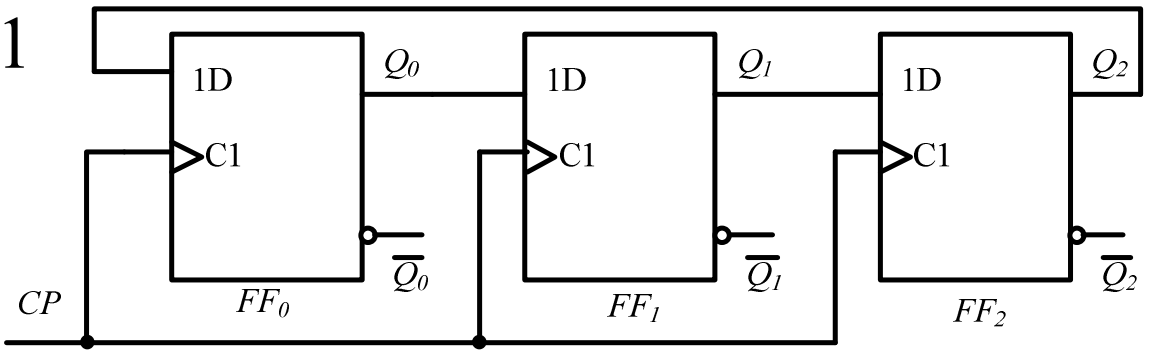
5.1



时钟方程

$$CP_0 = CP_1 = CP_2 = CP$$

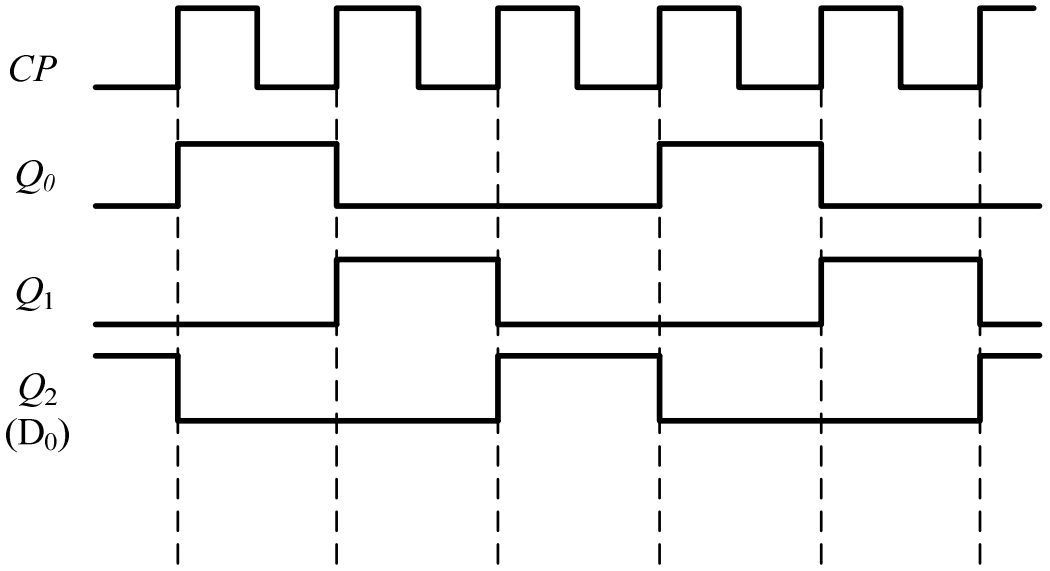
驱动方程

$$\begin{cases} D_0 = Q_2^n \\ D_1 = Q_0^n \\ D_2 = Q_1^n \end{cases}$$

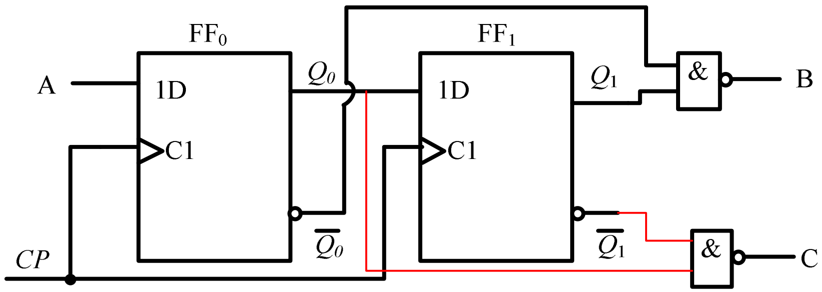
状态方程

$$\begin{cases} Q_0^{n+1} = D_0 = Q_2^n \\ Q_1^{n+1} = D_1 = Q_0^n \\ Q_2^{n+1} = D_2 = Q_1^n \end{cases}$$

触发器的初始状态$Q_0Q_1Q_2$=001



5.4



时钟方程

$$CP_0 = CP_1 = CP_2 = CP$$

触发器的初始状态Q_0Q_1=00

驱动方程

$$D_0 = A$$

$$D_1 = Q_0^n$$

状态方程

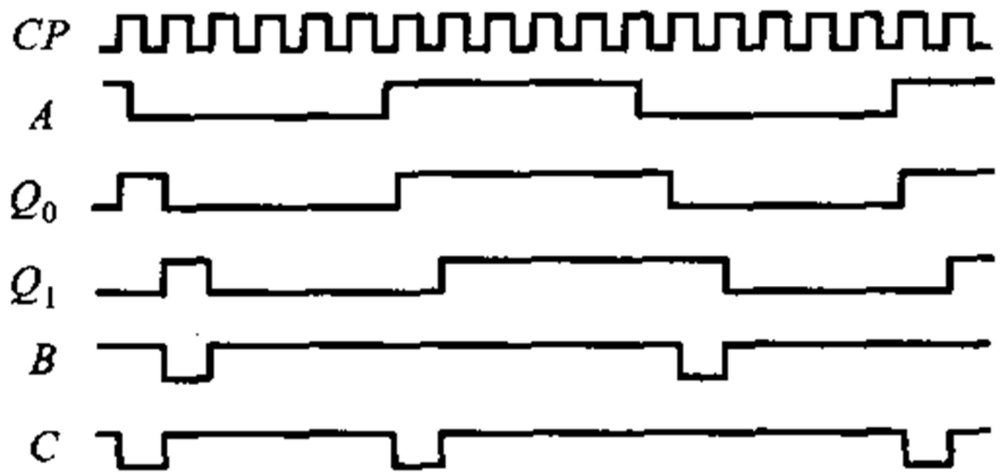
$$Q_0^{n+1} = D_0 = A$$

$$Q_1^{n+1} = D_1 = Q_0^n$$

输出方程

$$B = \overline{\overline{Q_0^n} Q_1^n}$$

$$C = \overline{Q_0^n \overline{Q_1^n}}$$



C

图 5－31

（1）状态方程如图 5－37 所示。

Q_2^n \ $Q_1^n Q_0^n$	00	01	11	10	
0	001	011	111	×××	$Q_2^{n+1}=Q_1^n$
1	000	×××	110	100	$Q_1^{n+1}=Q_0^n$
					$Q_0^{n+1}=\overline{Q}_2^n$

图 5－37

（2）驱动方程

$Q_2^{n+1}=Q_1^n(\overline{Q}_2^n+Q_2^n)=Q_1^n\overline{Q}_2^n+Q_1^nQ_2^n$

$J_2=Q_1^n$、 $K_2=\overline{Q}_1^n$

$Q_1^{n+1}=Q_0^n(\overline{Q}_1^n+Q_1^n)=Q_0^n\overline{Q}_1^n+Q_0^nQ_1^n$

$J_1=Q_0^n$、 $K_1=\overline{Q}_0^n$

$Q_0^{n+1}=\overline{Q}_2^n(\overline{Q}_0^n+Q_0^n)=\overline{Q}_2^n\overline{Q}_0^n+\overline{Q}_2^nQ_0^n$

$J_0=\overline{Q}_2^n$、 $K_0=Q_2^n$

（3）逻辑图如图 5－38 所示。

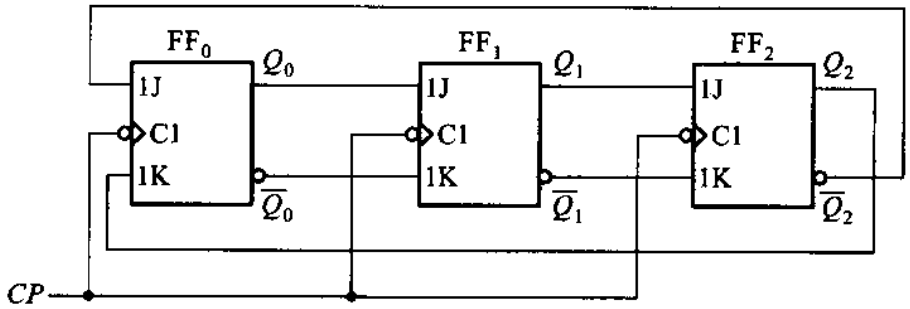


图 5－38

74161的状态表

输入									输出					注
$\overline{CR}$	$\overline{LD}$	CT_P	CT_T	CP	D_3	D_2	D_1	D_0	Q_3^{n+1}	Q_2^{n+1}	Q_1^{n+1}	Q_0^{n+1}	CO	
0	×	×	×	×	×	×	×	×	0	0	0	0	0	清零
1	0	×	×	↑	d_3	d_2	d_1	d_0	d_3	d_2	d_1	d_0		置数
1	1	1	1	↑	×	×	×	×	计数					
1	1	0	×	×	×	×	×	×	保持					
1	1	×	0	×	×	×	×	×	保持				0	

$\overline{CR}=1$, $\overline{LD}=1$, CP↑, $CT_P=CT_T=1$ 二进制同步加法计数

$\overline{CR}=1$, $\overline{LD}=1$, $CT_PCT_T=0$ 保持

若 $CT_T=0$ $CO=0$

若 $CT_T=1$ $CO=Q_3^nQ_2^nQ_1^nQ_0^n$

【题 5－16】　解：

（1）$S_N = \mathbf{1010}$、$\overline{CR} = \overline{Q_3 Q_1}$　　$S_{N-1} = \mathbf{1001}$、$\overline{LD} = \overline{Q_3 Q_0}$

连线如图 5－55 所示。

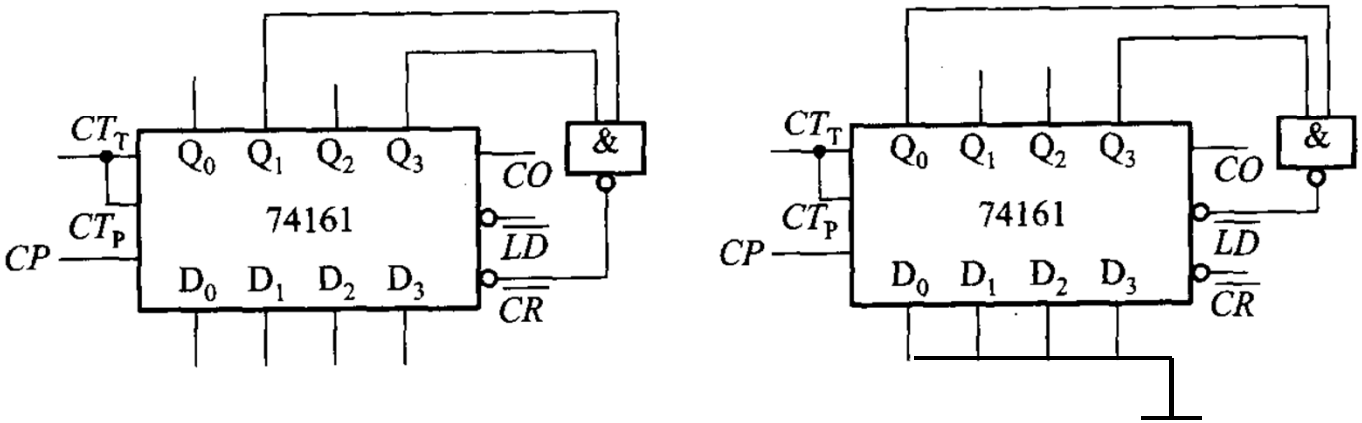


图 5－55

(2) $S_N = \mathbf{00111100}$，$\overline{CR} = \overline{Q_5 Q_4 Q_3 Q_2}$

连线如图 5 - 56 所示。

$S_{N-1} = \mathbf{00111011}$、$\overline{LD} = \overline{Q_5 Q_4 Q_3 Q_1 Q_0}$

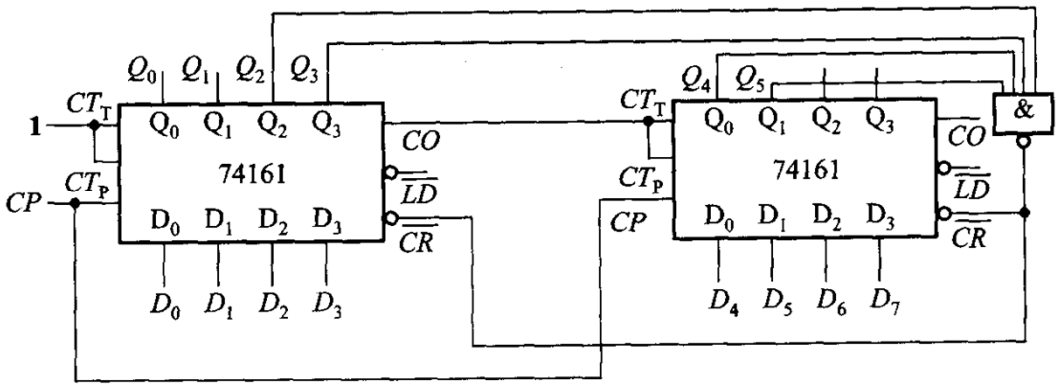


图 5 - 56

连线如图 5 - 57 所示。

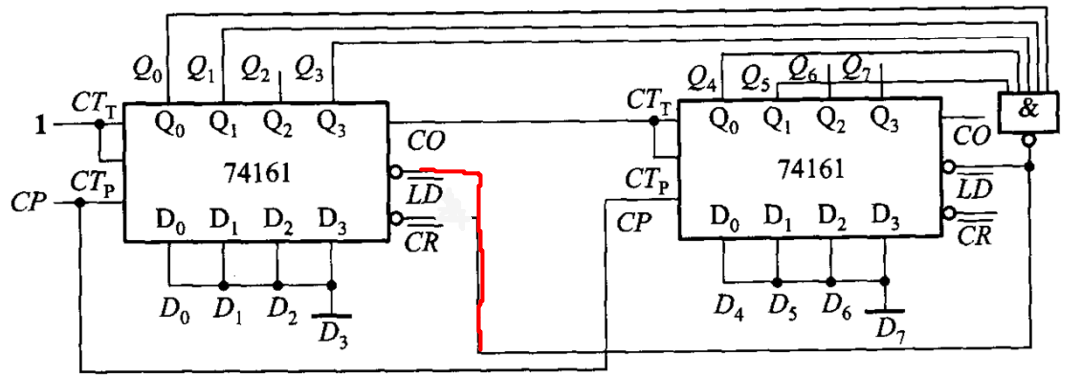


图 5 - 57

（3）S_N = **01100100**、 $\overline{CR} = \overline{Q_6 Q_5 Q_2}$

连线如图 5 - 58 所示。

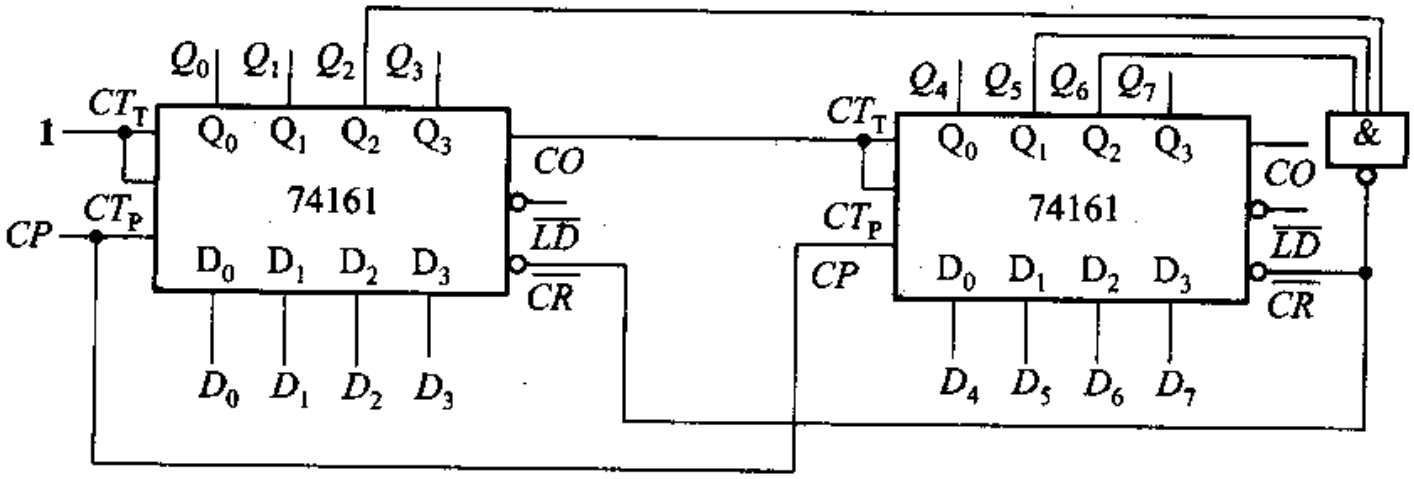


图 5 - 58

S_{N-1} = **01100011**、 $\overline{CR} = \overline{Q_6 Q_5 Q_1 Q_0}$

连线如图 5 - 59 所示。

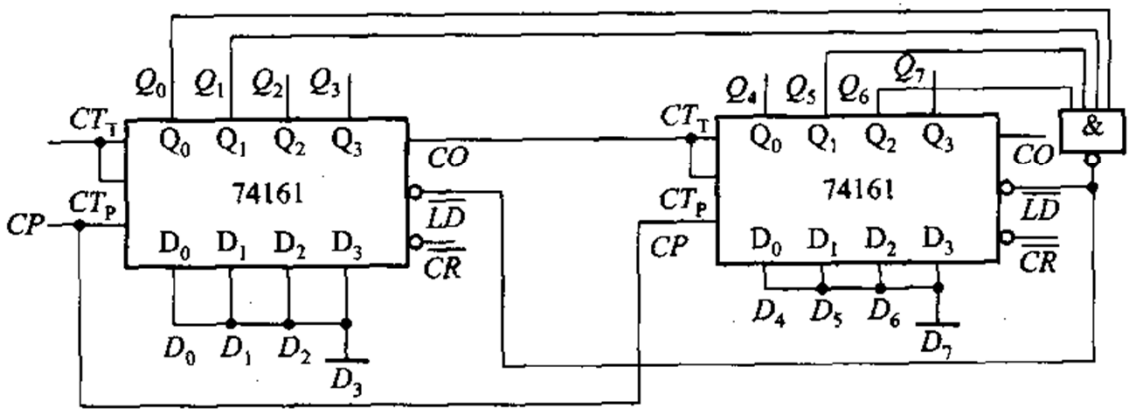
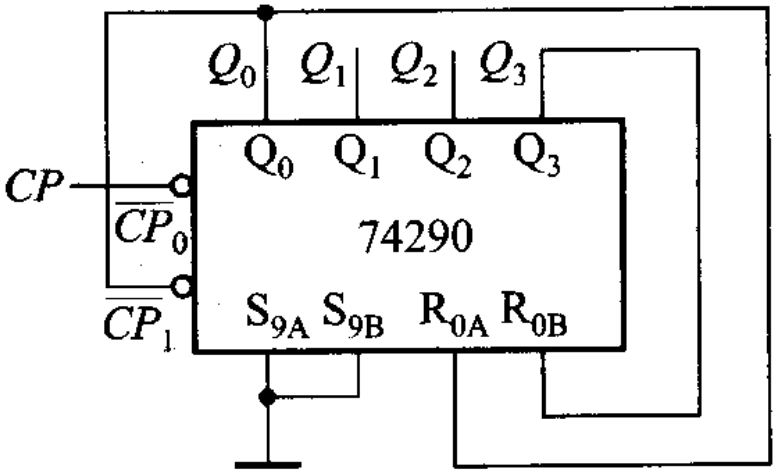


图 5 - 59

【题 5－17】 解：

（1）$S_N = S_9 = \mathbf{1001}$、 $R_{0A}R_{0B} = Q_3Q_0$

连线如图 5－62 所示。



输入			输出				注
$R_{0A}\cdot R_{0B}$	$S_{9A}\cdot S_{9B}$	CP	Q_3	Q_2	Q_1	Q_0	
1	0	×	0	0	0	0	清零
×	1	×	1	0	0	1	置9
0	0	↓	计数				CP_0=CP CP_1=Q_0

（3）$S_N = S_{88} = \mathbf{10001000}$、 $R_{0A}R_{0B} = Q_7Q_3$

连线如图 5－64 所示。