

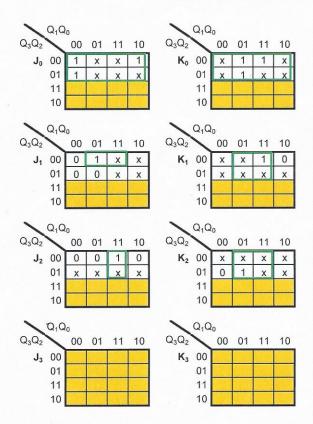
## Ontwerp van een synchrone 4-bit teller met JK-flipflops

Met deze spreadsheet kan je willekeurige 4-bits synchrone tellers ontwerpen.

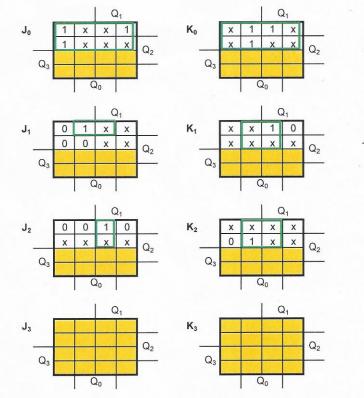
Je hoeft enkel de gewenste staten in te vullen in de grijze velden en hij berekent je automatisch de Karnaugh-kaarten Voorwaartse modulo-6 teller = 6 Natur Oplosen met 37F1.

Blanco velden zijn don't cares.

			Bir	air				Deci	imaal			ial)	4		Pu		
hı	uidig	e sta	at	VO	lgeno	de st	aat	oud	nieuw	M	SB	<	-		_	LS	SB
$Q_3$	$Q_2$	$Q_1$	$Q_0$	$Q_3$	$Q_2$	$Q_1$	$Q_0$	#	#	J <sub>3</sub>	K <sub>3</sub>	J <sub>2</sub>	K <sub>2</sub>	J <sub>1</sub>	K <sub>1</sub>	Jo	K
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	10	(	0001			(	010	1	2			0	х	1	Х	х	1
		(	010			(	0011	2	3			0	Х	х	0	1	X
		(	0011			(	0100	3	4			1	х	х	1	Х	1
		(	0100			(	0101	4	5			х	0	0	х	1	×
		(	0101			(	0000	5	0			Х	1	0	х	Х	1
								X	Y			Х	х	х	Х	Х	×
	.,,							X	×			Х	Х	х	Х	Х	×
								,									
												*					
																_	
														-		-	



$$J_0 = 1$$
  
 $J_1 = Q_0 \cdot \bar{Q}_2$   
 $J_2 = Q_0 \cdot Q_1$ 



$$K_0 = 1$$

$$K_1 = Q_0$$

$$K_2 = Q_0$$

170-21-2-3-24-57

Modulus 8 afteller
invallen tabel om automatische nummering
big Karnaugh te pebruiken.

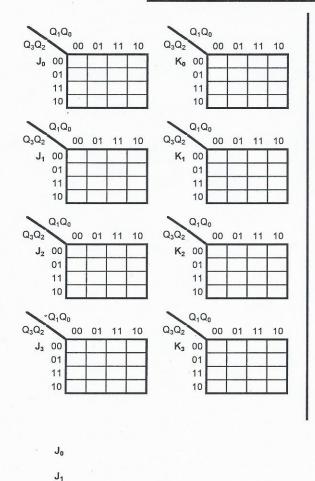
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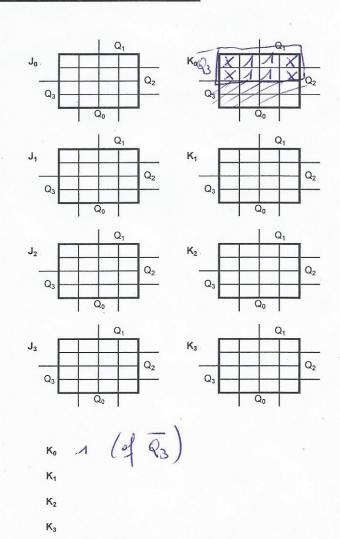
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huidige staat = oud = Q volgende staat = nieuw = Q+

	711000		Bir	nair			15	Deci	imaal								
h	uidig	e sta	at	VO	Igen	de st	aat	oud	nieuw	M	SB	+				LS	SB
$Q_3$	Q <sub>2</sub>	Q <sub>1</sub>	Q <sub>0</sub>	$Q_3$	Q <sub>2</sub>	Q <sub>1</sub>	$Q_0$	#	#	J <sub>3</sub>	K <sub>3</sub>	J <sub>2</sub>	K <sub>2</sub>	J <sub>1</sub>	K <sub>1</sub>	Jo	K <sub>0</sub>
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10	1	0	0	200	0	10	-	4	3	Market 10	ald black	×	1	A	X	1	X
3	1	0	1	1	Ł	0	0	5	4	-	1	X	0	0	X.	X	A
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/	-	and the same	and the same	1	1	10	pl.		0		e.f.	all a	19 cmm	1	Sept and the	201	and the





 $J_2$ 

 $J_3$ 

oppave (2): "manuele invalling van Karnaugh

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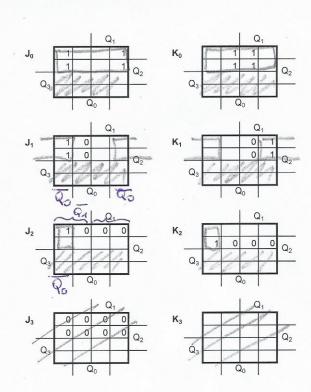
Blanco velden zijn don't cares. Modulus 8 afteller

oppelet : op dese manier iggevild kan de student de 'automatische nummerig' niet toepassen!

			Bin	nair				Deci	maal								
h	uidig	e sta	at	VO	lgend	de st	aat	oud	nieuw	M	SB	4				LS	SB
Q <sub>3</sub>				$Q_3$	$Q_2$	Q <sub>1</sub>	$Q_0$	#	#	J <sub>3</sub>	K <sub>3</sub>	J <sub>2</sub>	K <sub>2</sub>	$J_1$	K <sub>1</sub>	Jo	K
)		0	111			C	110	7	6	0	11		0		0		1
		0	110			C	101	6	5	0	1		0		1	1	
		0	101			C	100	5	4	0	11		0	0			1
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7	1	0	011			C	010	3	2	0	1300	0			0		1
year.		0	010			C	001	2	1	0	7	0			1	1	
io.		C	001			C	000	1	0	0	-	0		0			1
		C	000			C	111	0	7	0	THE PARTY	1		1		1	
										-							
							-				-						

3FF/s voldende =>Q3 schappen

$Q_3Q_2$	00 5°	01	11	10	$\phi_3Q_2$	Q <sub>1</sub> Q	00	01	11	10
<b>J</b> <sub>0</sub> 00	1			1	K <sub>0</sub>	00	X	1	1	X
01	1			1		01	x	1	1	X
11						11	magazine.	endered at	NEWSON .	TOWN SALES
10						10	1/	1/0	40	/
Q10	$Q_0$				1	Q <sub>1</sub> Q	0			
$Q_3Q_2$	00	01	11	10	$Q_3Q_2$	/	00	01	11	10
J <sub>1</sub> 00	1	0			K <sub>1</sub>	00			0	1
01	1	0				01			0	1
11						11				
10						10				
Q1C	1				\	Q <sub>1</sub> Q				
		01	11	10		\		01	11	10
$Q_3Q_2$	00	01	11	10	$Q_3Q_2$	/	00	01	11	10
Q <sub>3</sub> Q <sub>2</sub> J <sub>2</sub> 00		01	11	10		00	00			
Q <sub>3</sub> Q <sub>2</sub> J <sub>2</sub> 00 01	00		_		$Q_3Q_2$	00 01		01	0	10
Q <sub>3</sub> Q <sub>2</sub> J <sub>2</sub> 00 01 11	00		_		$Q_3Q_2$	00	00			
Q <sub>3</sub> Q <sub>2</sub> J <sub>2</sub> 00 01	00		_		Q <sub>3</sub> Q <sub>2</sub> <b>K<sub>2</sub></b>	00 01 11 10	1			
Q <sub>3</sub> Q <sub>2</sub> J <sub>2</sub> 00 01 11	1		_		Q <sub>3</sub> Q <sub>2</sub> <b>K<sub>2</sub></b>	00 01 11	1			
Q <sub>3</sub> Q <sub>2</sub> J <sub>2</sub> 00 01 11 10	1		_		Q <sub>3</sub> Q <sub>2</sub> <b>K<sub>2</sub></b>	00 01 11 10	1			
Q <sub>3</sub> Q <sub>2</sub> J <sub>2</sub> 00 01 11 10	00	0	0	0	Q <sub>3</sub> Q <sub>2</sub> K <sub>2</sub>	00 01 11 10	00	0	0	C
Q <sub>3</sub> Q <sub>2</sub> J <sub>2</sub> 00 01 11 10 Q <sub>3</sub> Q <sub>2</sub>	00	0	11	10	Q <sub>3</sub> Q <sub>2</sub> K <sub>2</sub>	00 01 11 10 Q <sub>1</sub> Q	00	0	0	C
Q <sub>3</sub> Q <sub>2</sub> J <sub>2</sub> 00 01 11 10 Q <sub>3</sub> Q <sub>2</sub> J <sub>3</sub> 00	00	01 0	11 0	10	Q <sub>3</sub> Q <sub>2</sub> K <sub>2</sub>	00 01 11 10 Q <sub>1</sub> Q	00	0	0	C



$$J_0 = 1$$
 =  $K_0 = 1$   
 $J_1 = \bar{Q}_0$  =  $K_1 = \bar{Q}_0$   
 $J_2 = \bar{Q}_0 \cdot \bar{Q}_1$  =  $K_2 = \bar{Q}_0 \cdot \bar{Q}_1$ 

Je hebt dus 3 FF's en 1 AND poort nodig om deze teller te maken.