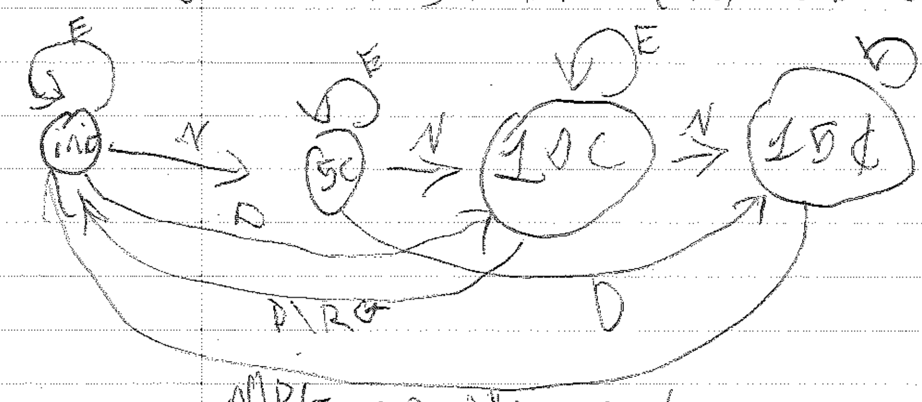
inputs, outputs, and states
and encoding scheme

inputs		output	
coin x_1x_0	reset r	RG z_1	RN z_0
Empty 00	false 0	false 0	false 0
Nickel 01	true 1	true 1	true 1
Dime 11			

States

init	00
5¢	01
10¢	11
15¢	10
	S_1S_0

State diagram and table



MRG or D|RG, RN

input

PS	E	N	D
init	init	5¢	10¢
5¢	5¢	10¢	15¢
10¢	10¢	15¢	init
15¢	15¢	init	init

NS

input

PS	E	N	D
init	0	0	0
5¢	0	0	0
10¢	0	0	1
15¢	0	1	1

RG

input

PS	E	N	D
init	0	0	0
5¢	0	0	0
10¢	0	0	0
15¢	0	0	1

RN

State table in binary

PS	input 00	01	11	PS	input 00	01	11	PS	input 00	01	11
00	00	01	11	00	0	0	0	00	0	0	0
01	01	11	10	01	0	0	0	01	0	0	0
11	11	10	00	11	0	0	1	11	0	0	0
10	10	00	00	10	0	1	1	10	0	0	1
	NS				RG				RN		

Minimization for flip flop inputs

PS	input	J_1	K_1	J_0	K_0
00	00	0	-	0	-
00	01	0	-	1	-
00	10	-	-	-	-
00	11	1	-	1	-
01	00	0	-	-	0
01	01	1	-	-	0
01	10	-	-	-	-
01	11	1	-	-	1
10	00	-	0	0	-
10	01	-	1	0	-
10	10	-	-	-	-
10	11	-	1	0	-
11	00	-	0	-	0
11	01	-	0	-	1
11	10	-	-	-	-
11	10	-	1	-	1

J_1

$S_1S_0 \backslash X_1X_0$	00	01	11	10
00	0	0	1	-
01	0	1	1	-
11	-	-	-	-
10	-	-	-	-

$J_1 = X_1 + S_0 X_0$

K_1

$S_1S_0 \backslash X_1X_0$	00	01	11	10
00	-	-	-	-
01	-	-	-	-
11	0	0	1	-
10	0	1	1	-

$K_1 = X_1 + S_0' X_0$

$Q \backslash JK$	00	01	11	10
0	0	0	1	1
1	1	0	0	1

$Q = Q'J + K'Q$

kmap's for the outputs :

RG :

		x_0	x_0		
	0	0	0	–	
	0	0	0	–	s_0
s_1	0	0	1	–	s_0
s_1	0	1	1	–	
			x_1	x_1	

$RG = s_1 s_0' x_0 + s_1 x_1$

RN

		x_0	x_0		
	0	0	0	–	
	0	0	0	–	s_0
s_1	0	0	0	–	s_0
s_1	0	0	1	–	
			x_1	x_1	

$RN = s_1 s_0' x_1$

kmap's for the flip-flop inputs.

J_0 :

		x_0	x_0		
	0	1	1	–	
	–	–	–	–	s_0
s_1	–	–	–	–	s_0
s_1	0	0	0	–	
			x_1	x_1	

$J_0 = s_1' x_0$

k_0 :

		x_0	x_0		
	–	–	–	–	
	0	0	1	–	s_0
s_1	0	1	1	–	s_0
s_1	–	–	–	–	
			x_1	x_1	

$k_0 = s_1 x_0 + x_1$

final minimal expressions

$Z_1 = S_1 S_0' X_0 + S_1 X_1$

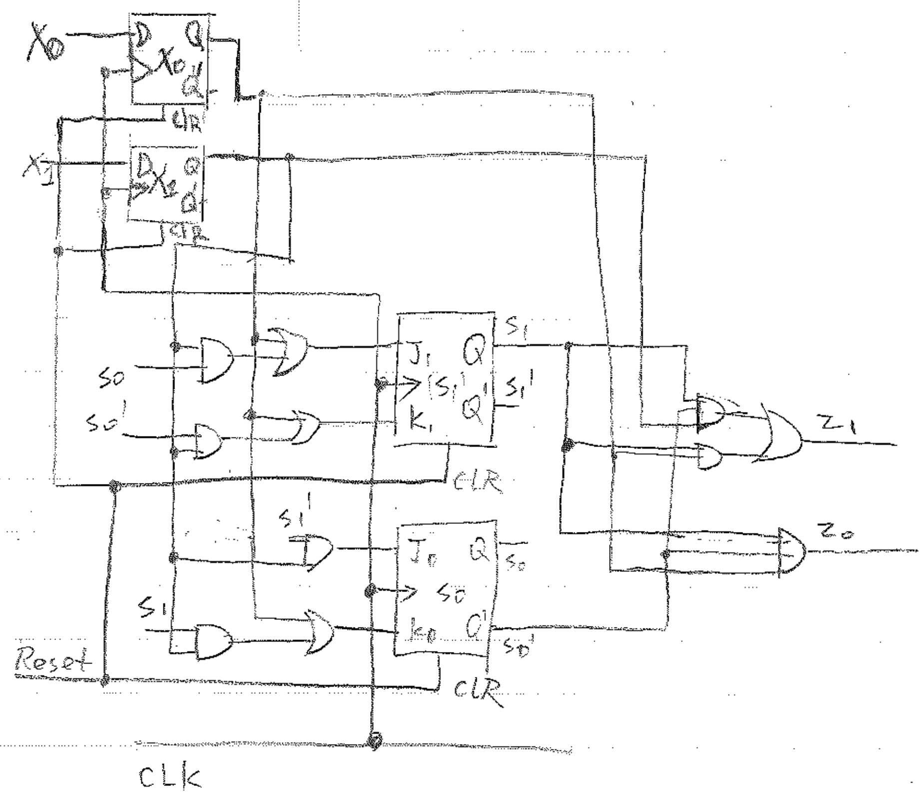
$Z_0 = S_1 S_0' X_1$

$J_1 = X_1 + S_0 X_0$

$K_1 = X_1 + S_0' X_0$

$J_0 = S_1' X_0$

$K_0 = X_1 + S_1 X_0$



We use d flip flops to synchronize the inputs