

Accelerator A0
 Gear G1 G0
 Speed S2 S1 S0

(c)

S2	S1	S0	A0	G1	G0
0	0	0	0	0	0
0	0	1	0	0	0
0	1	0	0	0	0
0	1	1	0	0	1
1	0	0	0	0	1
1	0	1	0	1	0
1	1	0	0	1	0
1	1	1	0	1	0
0	0	0	1	0	0
0	0	1	1	0	0
0	1	0	1	0	1
0	1	1	1	0	1
1	0	0	1	1	0
1	0	1	1	1	0
1	1	0	1	1	0
1	1	1	1	1	0

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$$G_0 = \bar{S}_2 S_1 S_0 + \bar{S}_2 S_1 A_0 + S_2 \bar{S}_1 \bar{S}_0 \bar{A}_0$$

G0	S0 A0			
S2 S1	00	01	11	10
00				
01		1	1	1
11				
10	1			

G1	S0 A0			
S2 S1	00	01	11	10
00				
01				
11	1	1	1	1
10		1	1	1

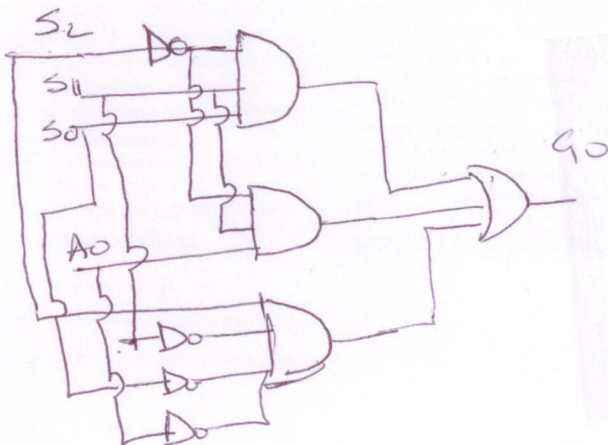
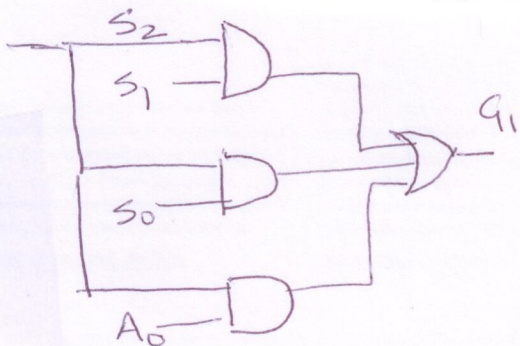
$$G_1 = S_2 S_1 + S_2 S_0 + S_2 A_0$$

(b)

$$G_0 = \bar{S}_2 S_1 S_0 \bar{A}_0 + S_2 \bar{S}_1 \bar{S}_0 \bar{A}_0 + \bar{S}_2 S_1 \bar{S}_0 A_0 + \bar{S}_2 S_1 S_0 A_0$$

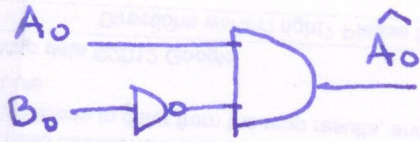
$$G_1 = S_2 \bar{S}_1 S_0 \bar{A}_0 + S_2 S_1 \bar{S}_0 \bar{A}_0 + S_2 S_1 S_0 \bar{A}_0 + S_2 \bar{S}_1 \bar{S}_0 A_0 + S_2 \bar{S}_1 S_0 A_0 + S_2 S_1 \bar{S}_0 A_0 + S_2 S_1 S_0 A_0$$

(d)



e

Replace all A_0 inputs for $Q_0 \neq Q_1$ by \hat{A}_0



F

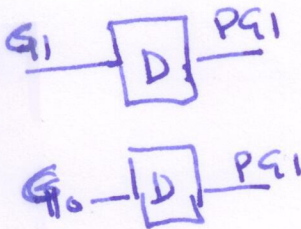
Previous Gear		Current Gear		Up/Dn Up/Dn	
PG1	PG0	G1	G0		
0	0	0	0		X
0	0	0	1		1
0	0	1	0		1
0	1	0	0		0
0	1	0	1		X
0	1	1	0		1
1	0	0	0		0
1	0	0	1		0
1	0	1	0		X

g

PG1	PG2	G1	G0			
	00	00	01	11	10	
00		X	1		1	
01			X		1	
11						
10						X

$$L_0 = \overline{P_{G1}} \overline{a_1} q_0 + \overline{P_{G1}} a_1 \overline{q_0}$$

g cont.



2 D-Flip Flop

