

Laboratory 3

(解)編碼器與(解)多工器



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實驗目的

- 瞭解編碼器的邏輯電路
- 瞭解解碼器的邏輯電路
- 瞭解多工器的邏輯電路
- 瞭解解多工器的邏輯電路

使用儀器與器材

儀器

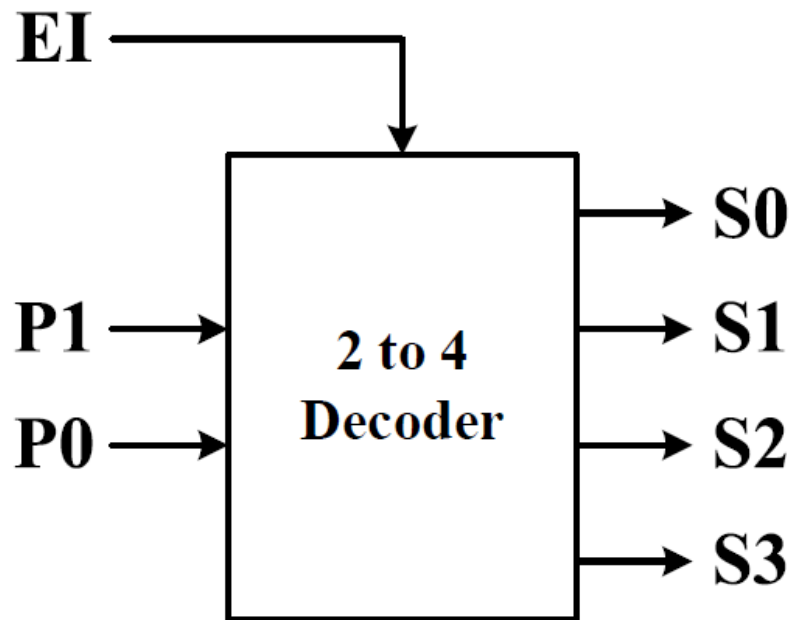
- 電源供應器
- 麵包板(自備)
- 三用電錶(自備)

材料

IC 7404	3	顆
IC 7408	6	顆
IC 7432	3	顆
300 Ω	6	顆
LED 燈	12	顆
指撥開關	3	顆

解碼器 (Decoder)

解碼器 Decoder (1/4)



Input			Output			
EI	P1	P0	S0	S1	S2	S3
0	x	x	0	0	0	0
1	0	0	1	0	0	0
1	0	1	0	1	0	0
1	1	0	0	0	1	0
1	1	1	0	0	0	1

解碼器 Decoder (2/4)

Input			Output			
EI	P1	P0	S0	S1	S2	S3
0	0	0	0	0	0	0
0	0	1	0	0	0	0
0	1	0	0	0	0	0
0	1	1	0	0	0	0
1	0	0	1	0	0	0
1	0	1	0	1	0	0
1	1	0	0	0	1	0
1	1	1	0	0	0	1

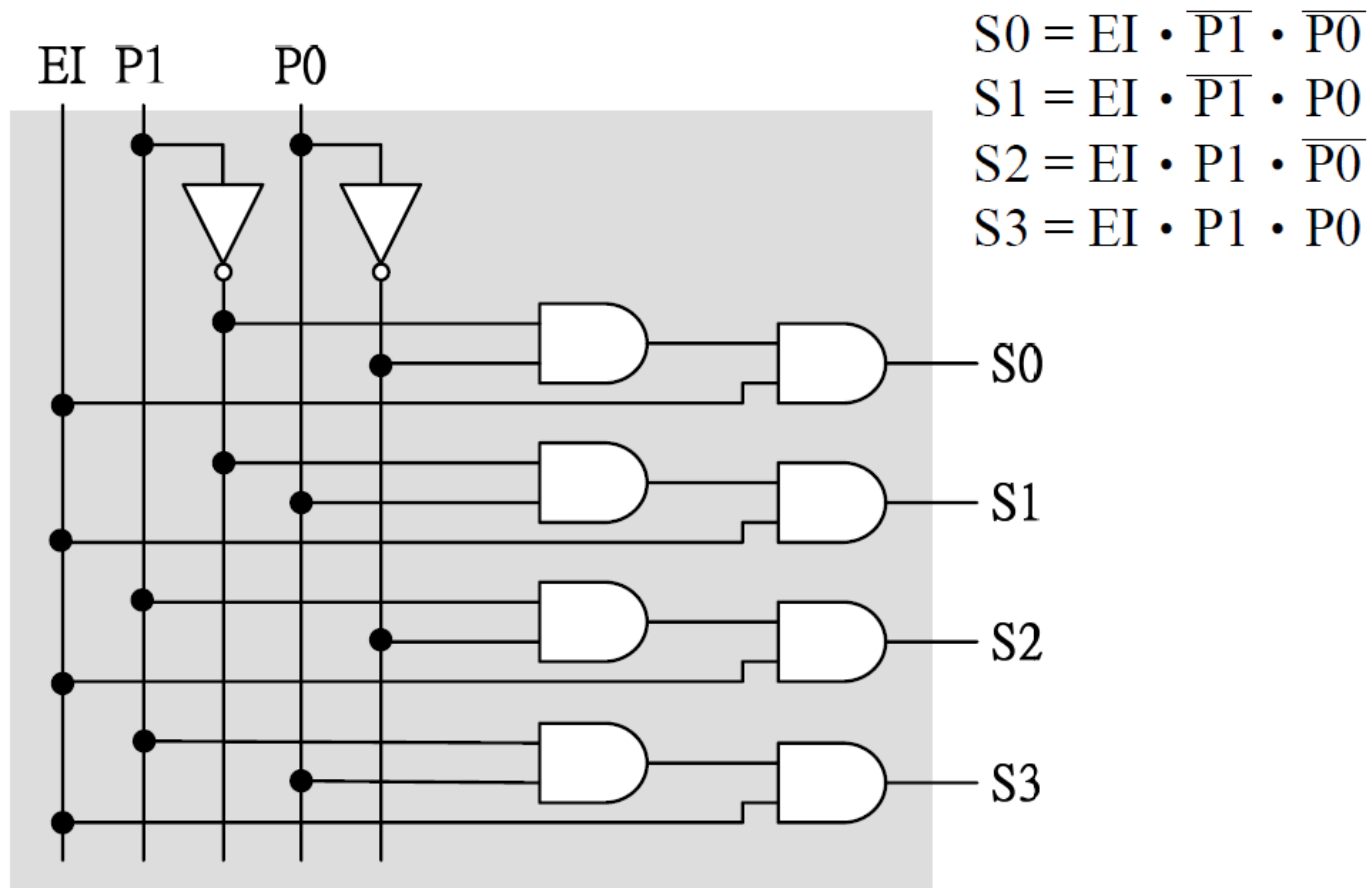
$$S0 = EI \cdot \overline{P1} \cdot \overline{P0}$$

$$S1 = EI \cdot \overline{P1} \cdot P0$$

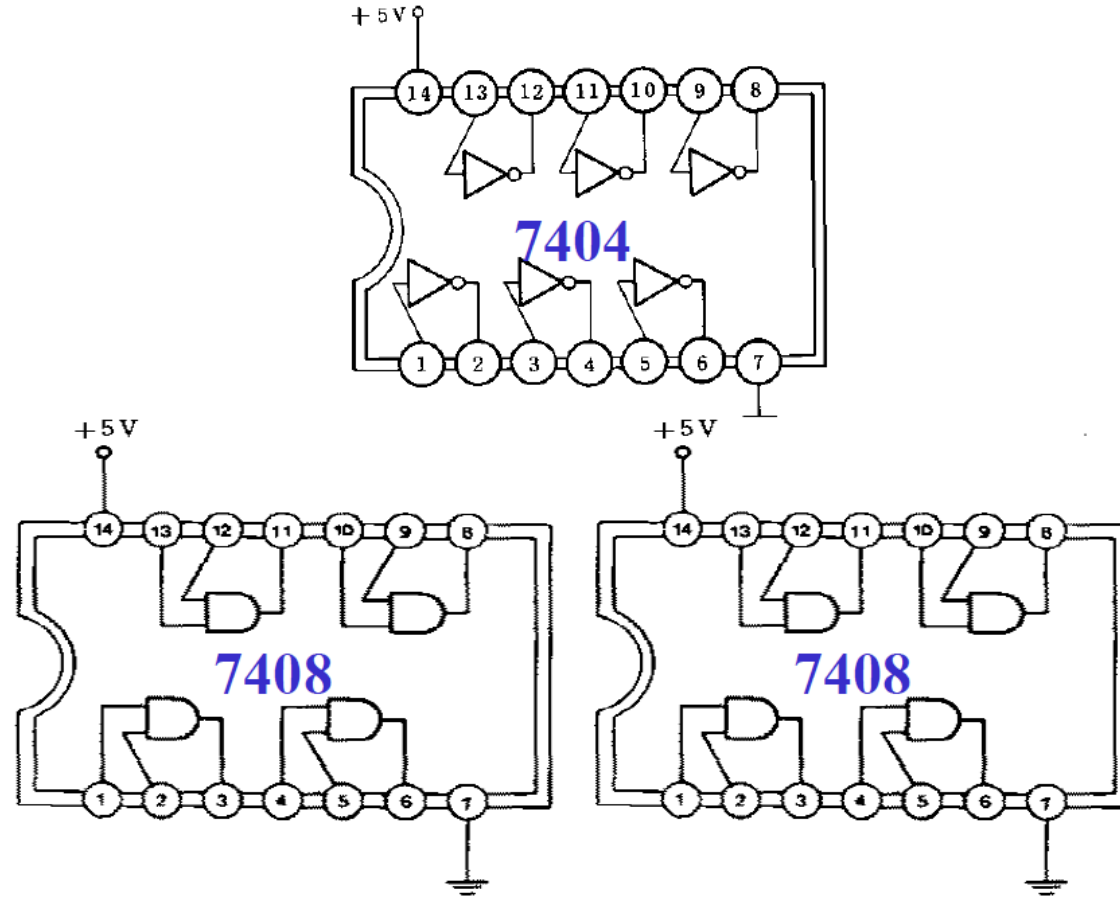
$$S2 = EI \cdot P1 \cdot \overline{P0}$$

$$S3 = EI \cdot P1 \cdot P0$$

解碼器 Decoder (3/4)

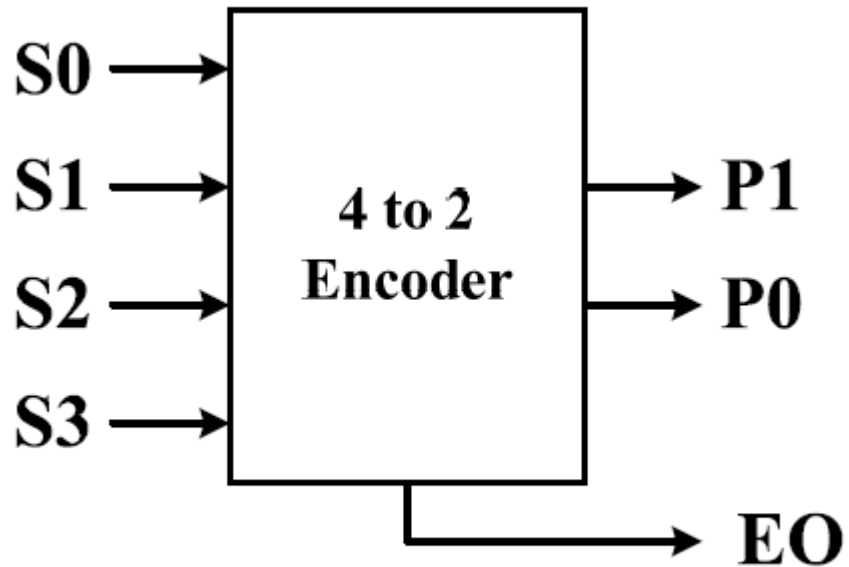


解碼器 Decoder (4/4)



編碼器 (Encoder)

編碼器 Encoder (1/)



Input				Output		
S_0	S_1	S_2	S_3	P_1	P_0	EO
1	x	x	x	0	0	1
0	1	x	x	0	1	1
0	0	1	x	1	0	1
0	0	0	1	1	1	1
0	0	0	0	x	x	0

編碼器 Encoder (2/)

Input				Output		
S0	S1	S2	S3	P1	P0	EO
0	0	0	0	x	x	0
0	0	0	1	1	1	1
0	0	1	0	1	0	1
0	0	1	1	1	0	1
0	1	0	0	0	1	1
0	1	0	1	0	1	1
0	1	1	0	0	1	1
0	1	1	1	0	1	1
1	0	0	0	0	0	1
1	0	0	1	0	0	1
1	0	1	0	0	0	1
1	0	1	1	0	0	1
1	1	0	0	0	0	1
1	1	0	1	0	0	1
1	1	1	0	0	0	1
1	1	1	1	0	0	1

$$P1 = \overline{S0} \cdot \overline{S1}$$

$$P0 = \overline{S0} \cdot S1 + \overline{S0} \cdot \overline{S2}$$

$$EO = S0 + S1 + S2 + S3$$

P1

S0 S1 \ S2 S3	00	01	11	10
00	x	1	1	1
01	0	0	0	0
11	0	0	0	0
10	0	0	0	0

P0

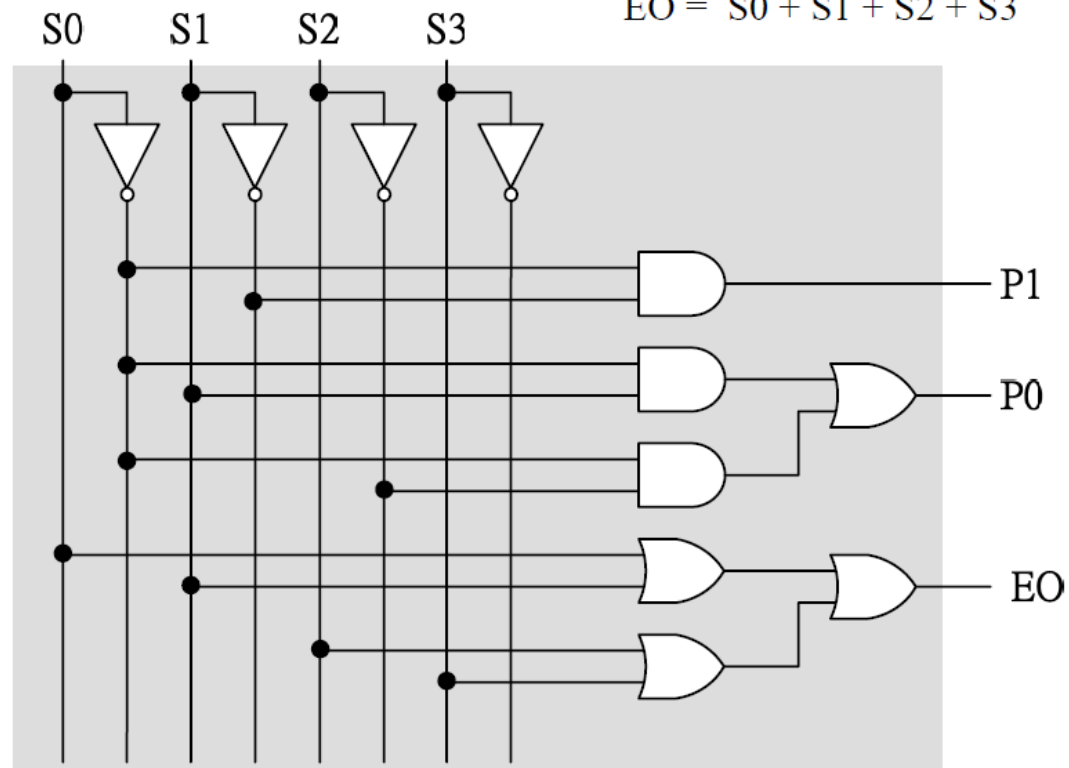
S0 S1 \ S2 S3	00	01	11	10
00	x	1	0	0
01	1	1	1	1
11	0	0	0	0
10	0	0	0	0

編碼器 Encoder (3/)

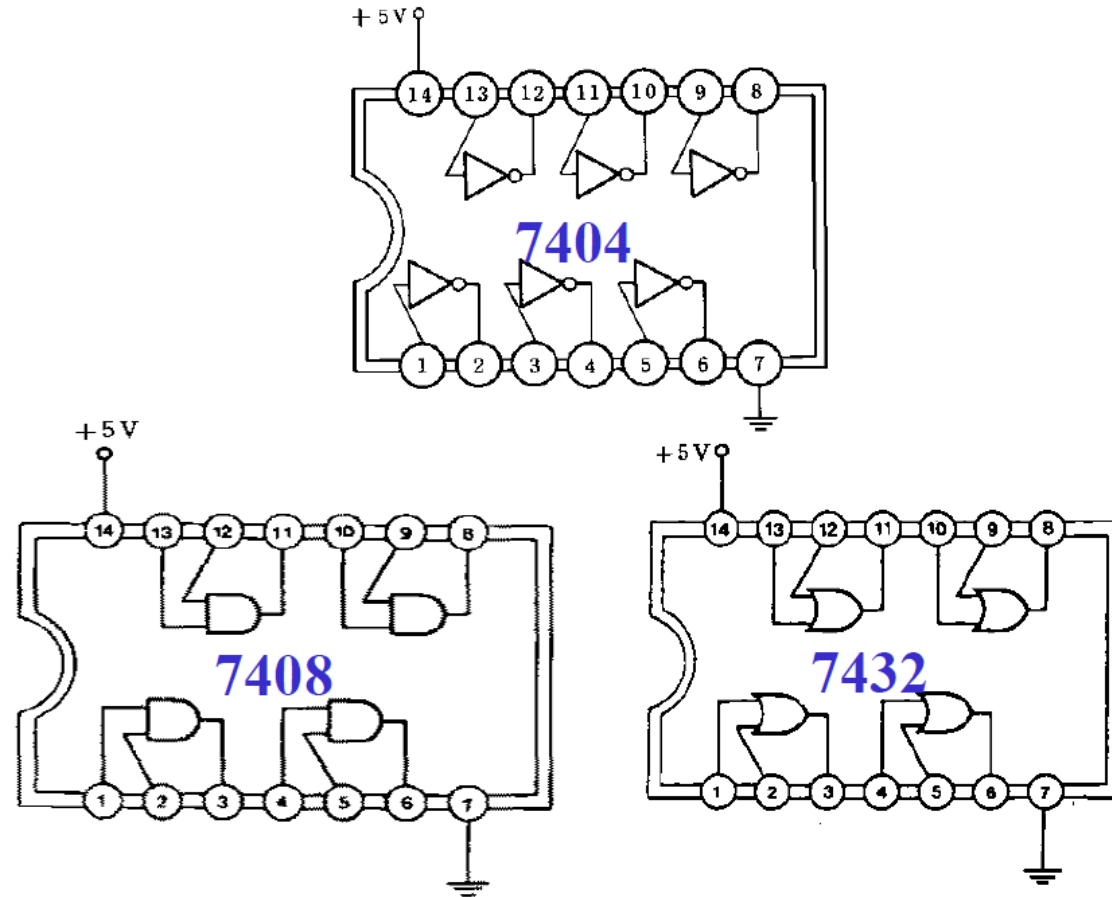
$$P1 = \overline{S0} \cdot \overline{S1}$$

$$P0 = \overline{S0} \cdot S1 + \overline{S0} \cdot \overline{S2}$$

$$EO = S0 + S1 + S2 + S3$$



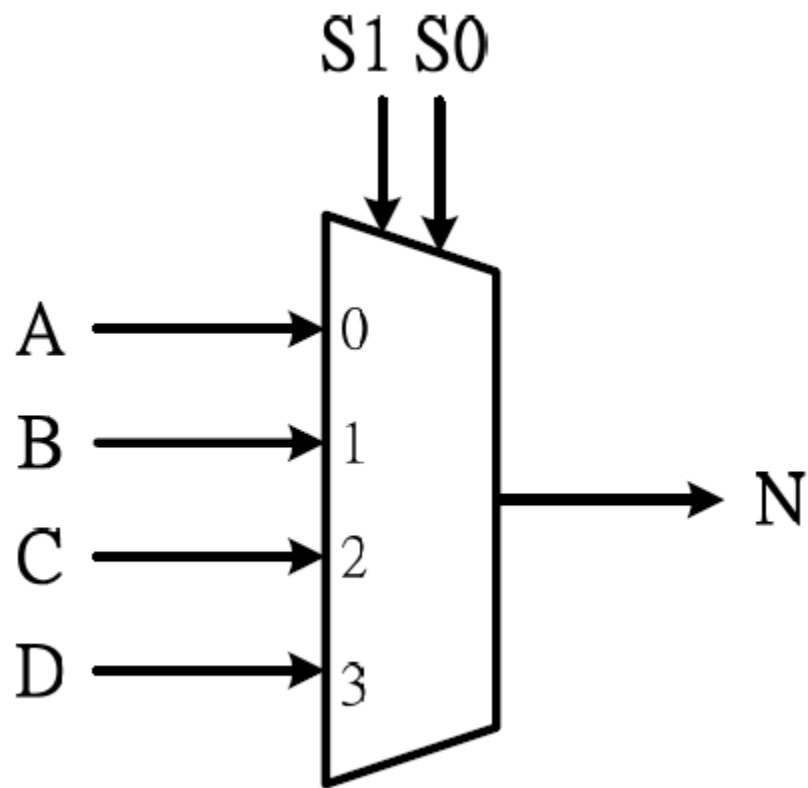
編碼器 Encoder (1/)



多工器 (MUX)

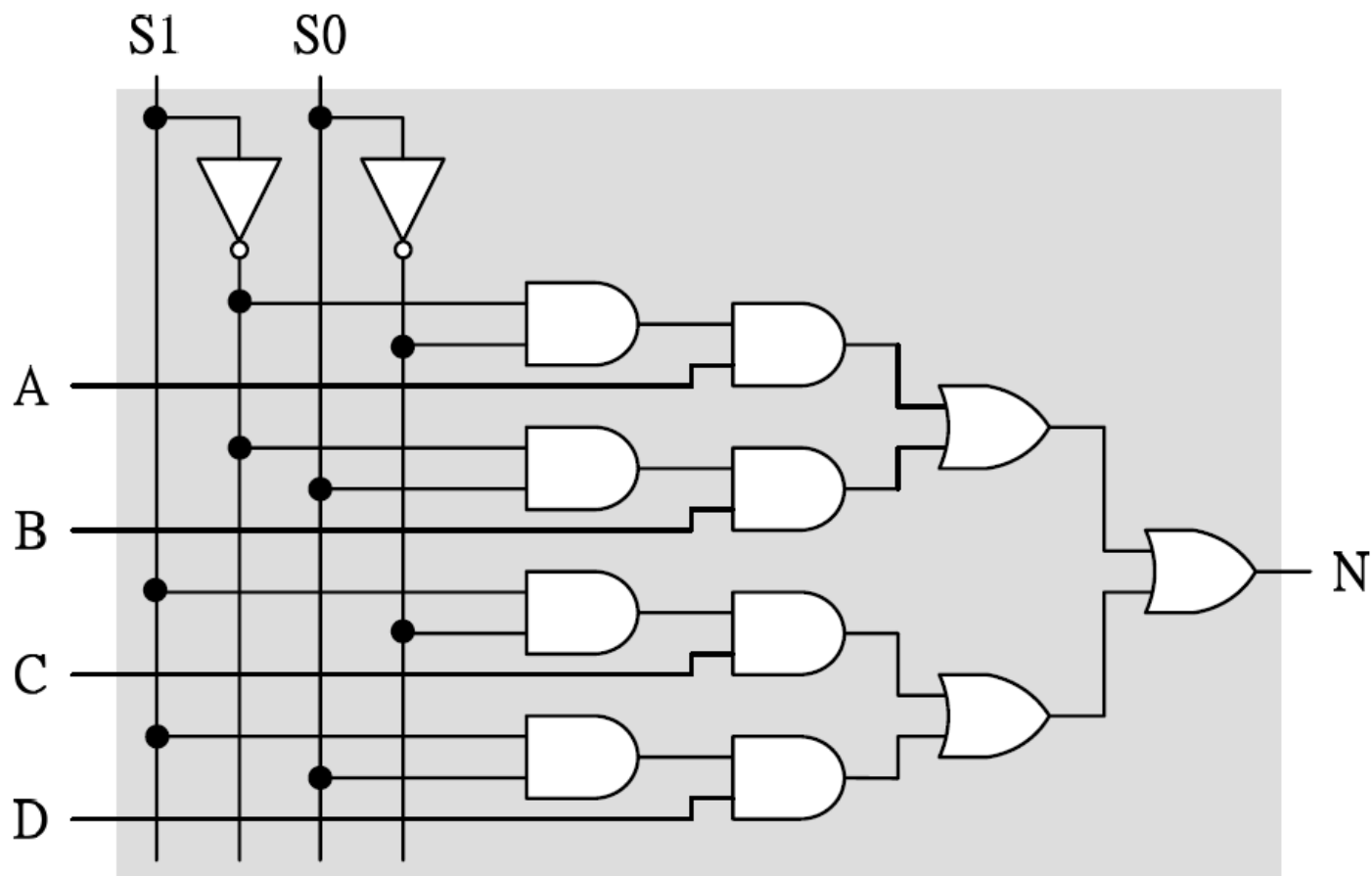
MUX (Multiplexer)

多工器 (MUX) (1/3)

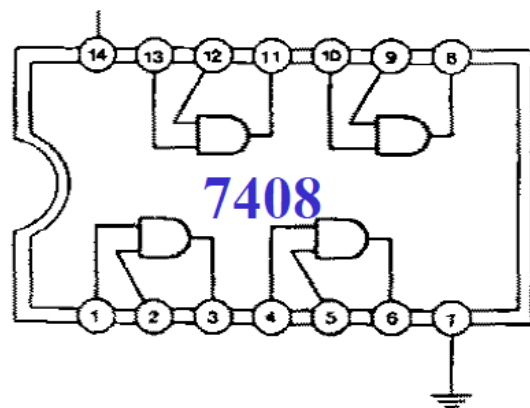
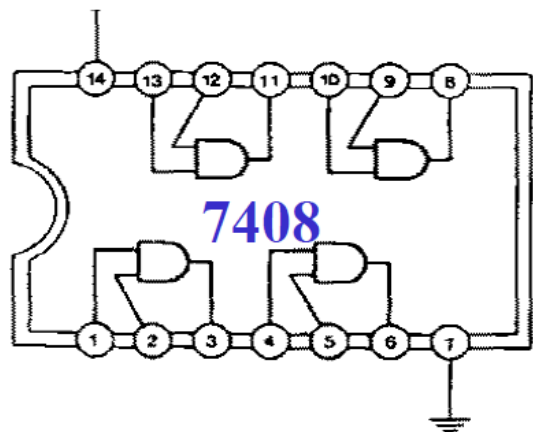
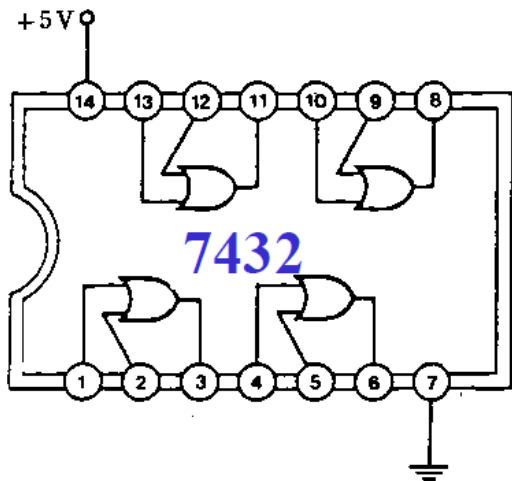
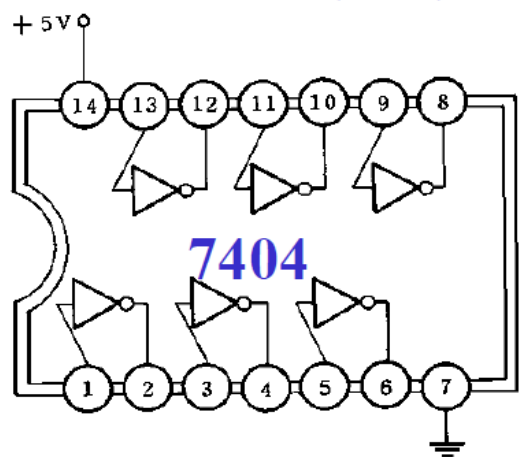


S1	S0	Output
0	0	N=A
0	1	N=B
1	0	N=C
1	1	N=D

多工器 (MUX) (2/3)



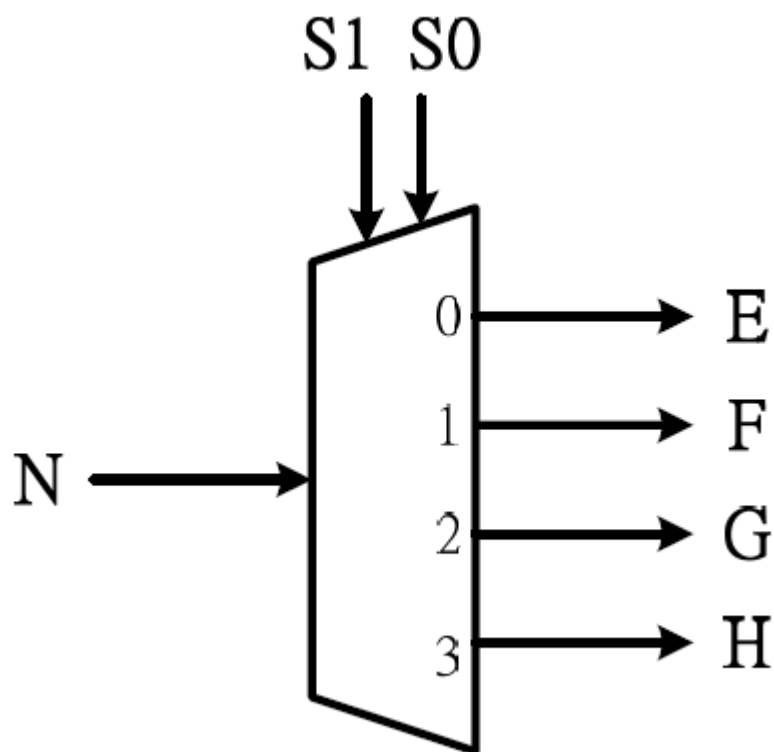
多工器 (MUX) (3/3)



解多工器 (DEMUX)

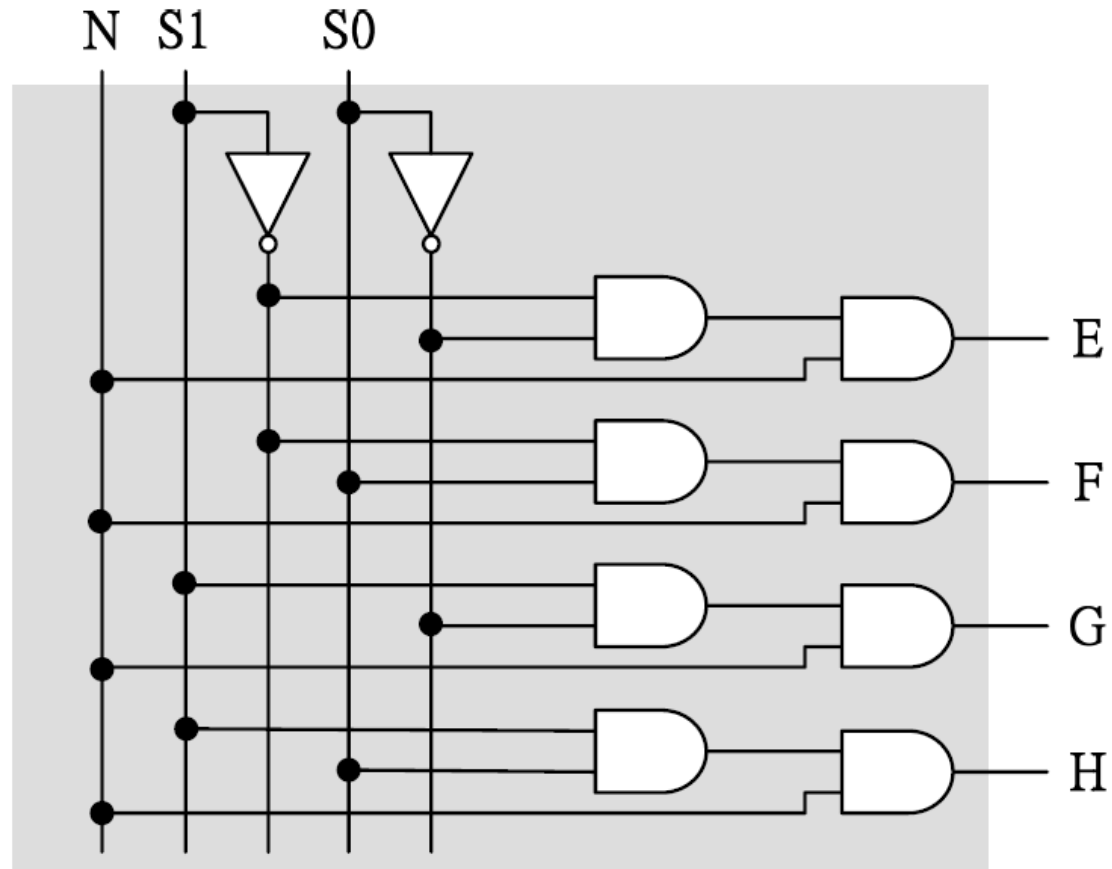
DEMUX(demultiplexer)

解多工器 (DEMUX) (1/)

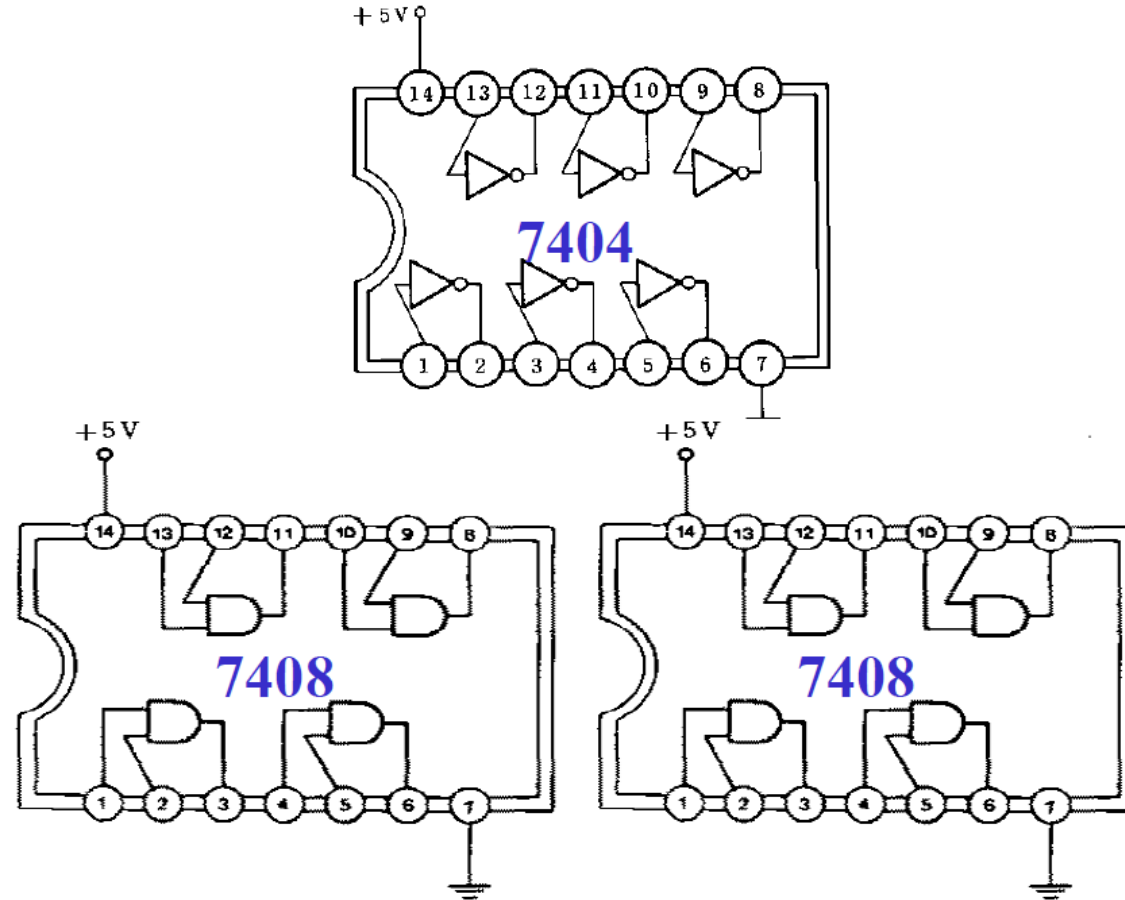


S1	S0	E	F	G	H
0	0	N	X	X	X
0	1	X	N	X	X
1	0	X	X	N	X
1	1	X	X	X	N

解多工器 (DEMUX) (2/3)



解多工器 (DEMUX) (3/3)

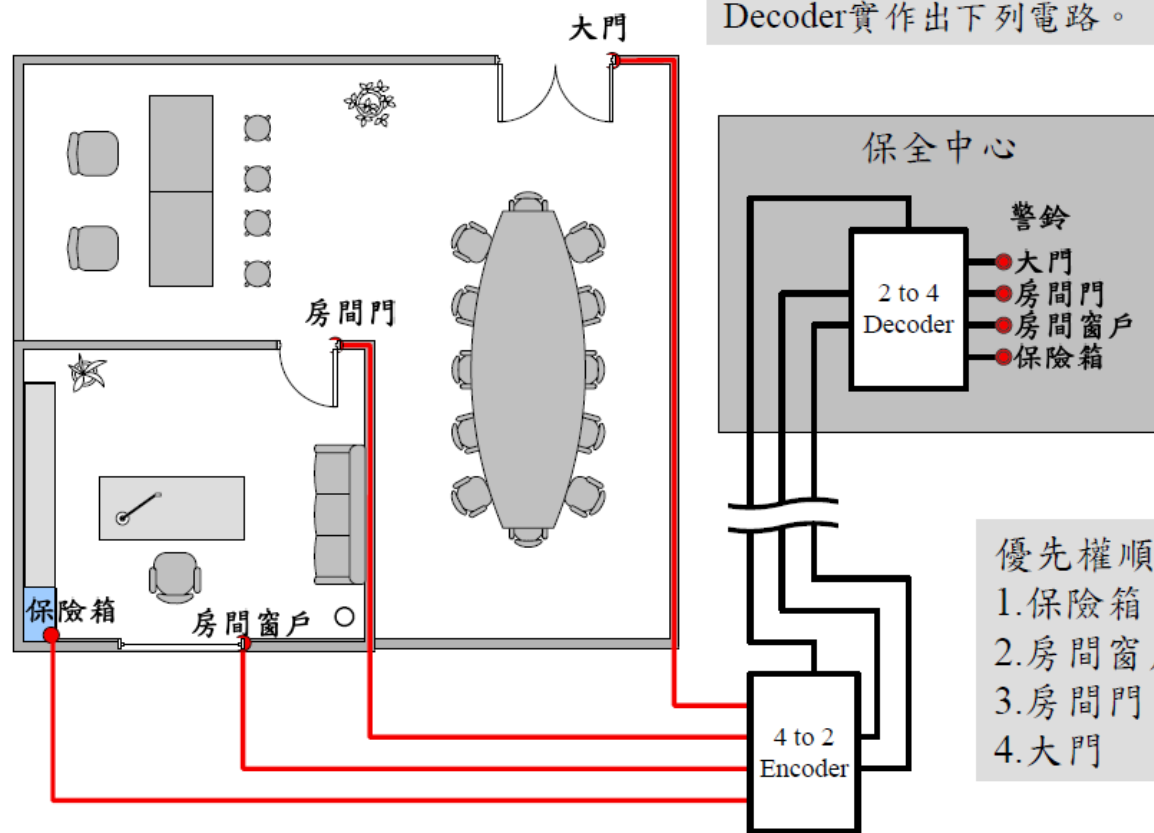


實作題

本次實作分為兩個基本實作

實作題(一)

請利用指撥開關、LED燈、Encoder及Decoder實作出下列電路。



優先權順序：

1. 保險箱
2. 房間窗戶
3. 房間門
4. 大門

實作題(二)

請利用MUX、DEMUX實作出下列電路，
A ~ D 請使用”指撥開關”代替，
E ~ H 請使用”LED燈”代替。

