→ 1-bit Comparator using PROM:

1-bit Comp Truth table

M	a	b	L	E	G
0	0	0	0	1	0
1	0	1	1	0	0
2	1	0	0	0	1
3	1	1	0	1	0

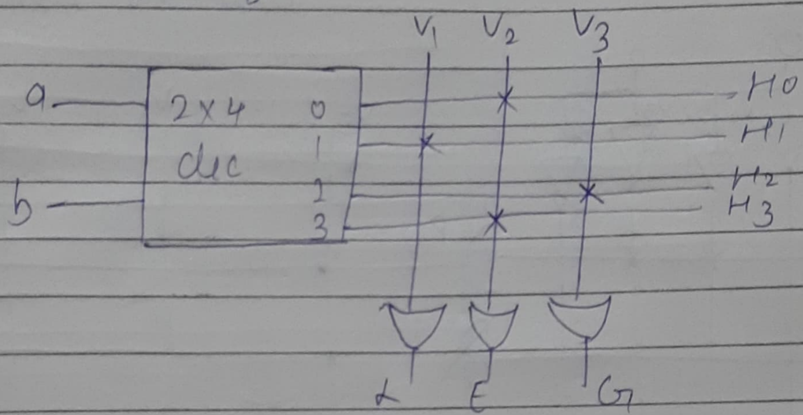
$L = \Sigma m(1)$

$G = \Sigma m(2)$

$E = \Sigma m(0,3)$

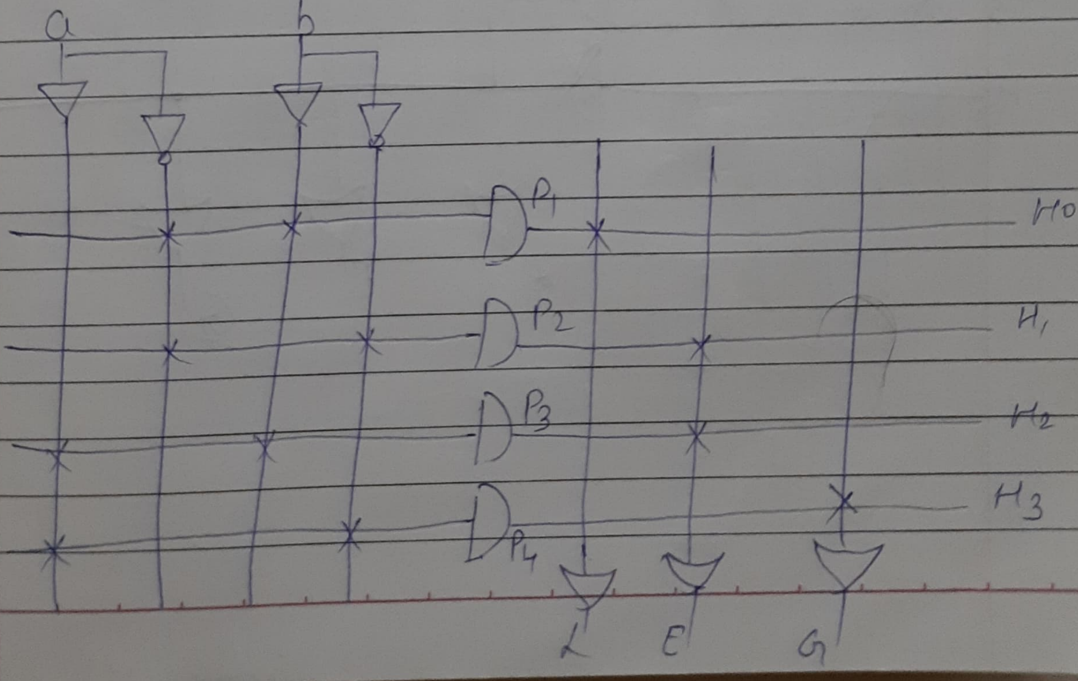
$L = a'b$, $E = a'b' + ab$, $G = ab'$

$= a \odot b$



→ 1-bit Comparator using PLA:

$\underbrace{L = a'b}_{P_1}$, $E = \underbrace{a'b'}_{P_2} + \underbrace{ab}_{P_3}$, $\underbrace{G = ab'}_{P_4}$, No. of Product Terms = 4



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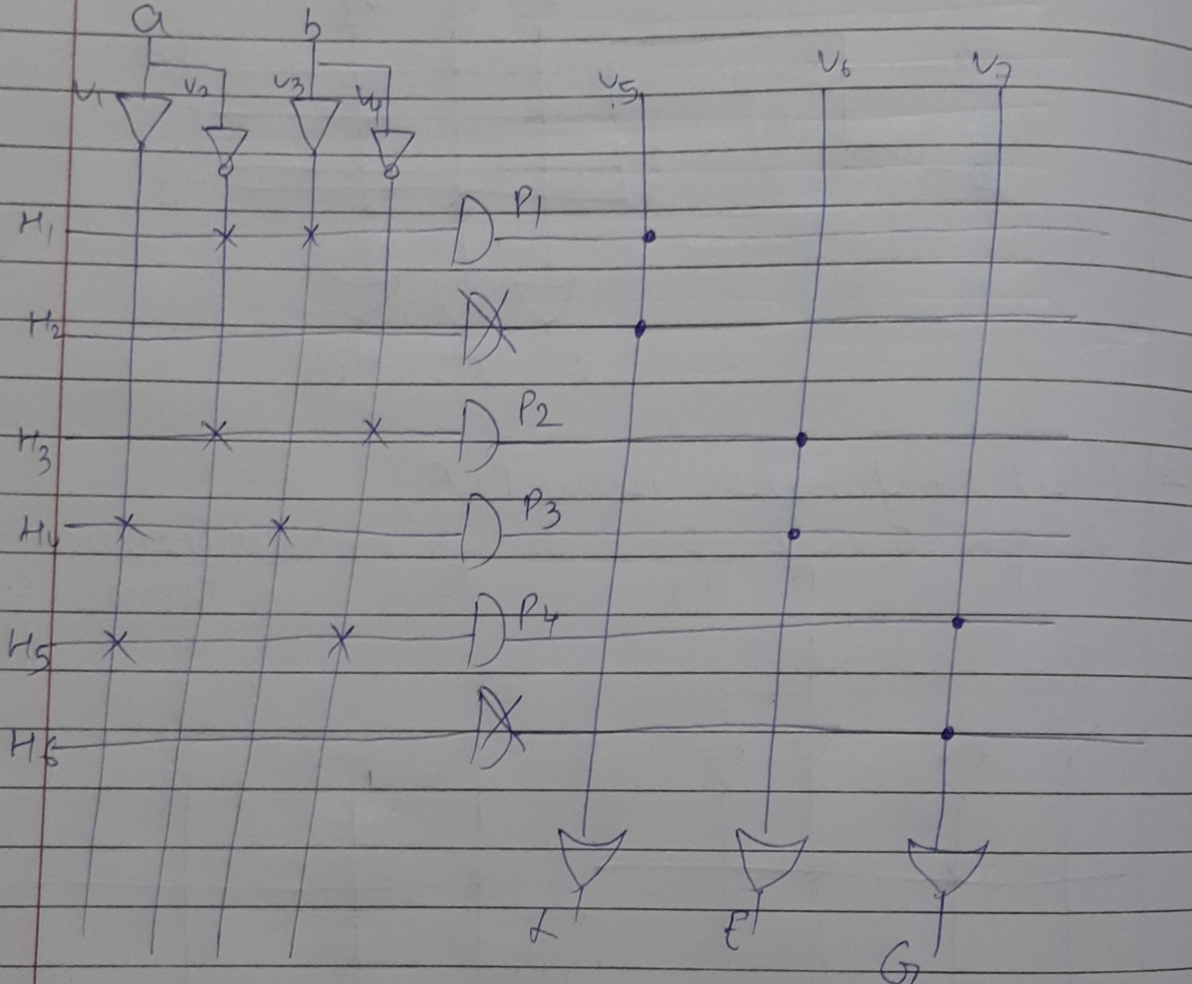
→ 1-bit comparator using PAL:

$L = \underbrace{a'b}_{\substack{P_1 \\ n_1=1}}$, $E = \underbrace{a'b' + ab}_{\substack{P_2 \quad P_3 \\ n_2 = 2}}$, $G = \underbrace{ab'}_{\substack{P_4 \\ n_3 = 1}}$

no. of product terms per each func^n in a array $= \max(n_1, n_2, n_3)$
$= \max(1, 2, 1) = 2$

Total product terms $= N$ (no. of func^n's) $\times \max(n_1, n_2, n_3) = 3 \times 2 = 6$



→ 2-bit Comparator using PROM

M	a_1	a_0	b_1	b_0	L	E	G
0	0	0	0	0	0	1	0
1	0	0	0	1	1	0	0
2	0	0	1	0	1	0	0
3	0	0	1	1	1	0	0
4	0	1	0	0	0	0	1
5	0	1	0	1	0	1	0
6	0	1	1	0	1	0	0
7	0	1	1	1	1	0	0
8	1	0	0	0	0	0	1
9	1	0	0	1	0	0	1
10	1	0	1	0	0	1	0
11	1	0	1	1	1	0	0
12	1	1	0	0	0	0	1
13	1	1	0	1	0	0	1
14	1	1	1	0	0	0	1
15	1	1	1	1	0	1	0

$L = \Sigma m(1, 2, 3, 6, 7, 11)$

$E = \Sigma m(0, 5, 10, 15)$

$G = \Sigma m(4, 8, 9, 12, 13, 14)$

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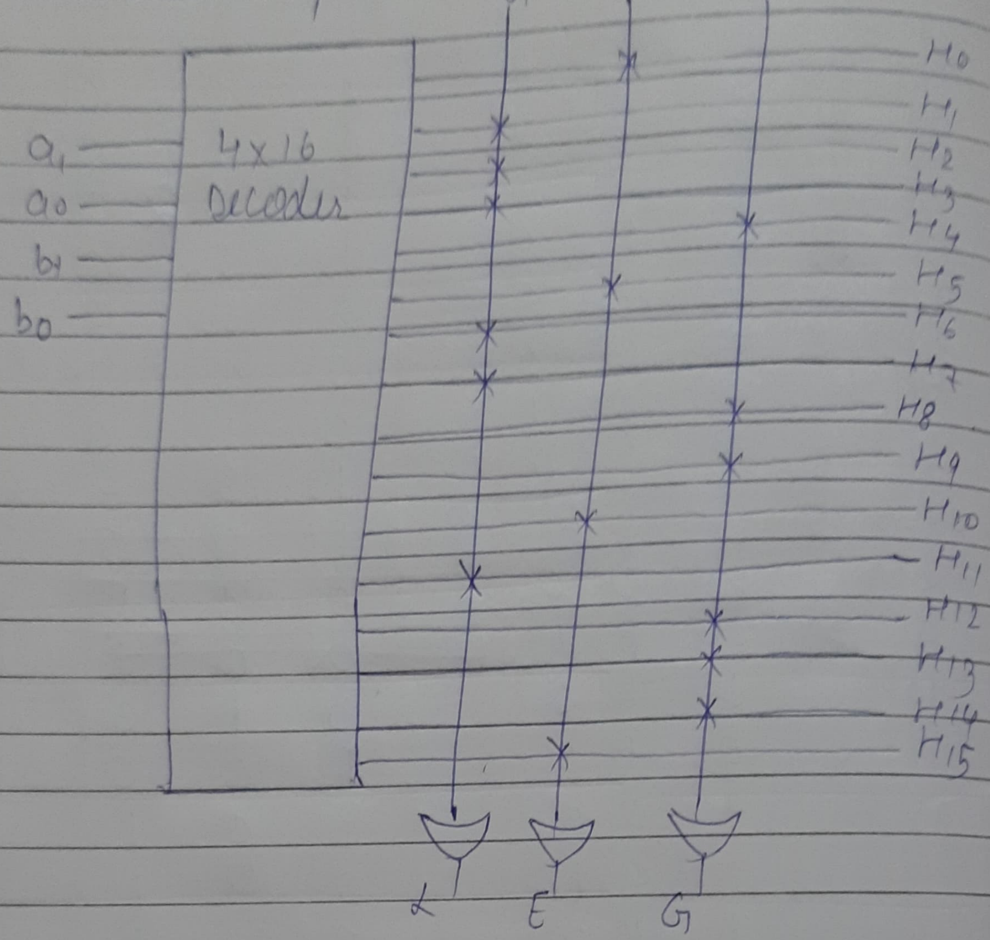
PROM 2 bit Comparator:



→ 2-bit Comparator using PLA:

for case of A < B

$\Sigma m(1,2,3,6,7,11)$

a_1a_0 \ b_1b_0	00	01	11	10
00	0	1: 1	3: 1	2: 1
01	4	5	6: 1	7: 1
11	12	13	15	14
10	8	9	11: 1	10

$L = a < b = \bar{a}_1 \bar{a}_0 b_0 + \bar{a}_1 b_1 + \bar{a}_1 b_1 b_0$

$P_1 \quad P_2 \quad P_3$

for $A = B$: $(\Sigma m = (0, 10, 5, 15))$

$a_1a_0 \backslash b_1b_0$	00	01	11	10
00	1 (0)	1	3	2
01	4	1 (5)	7	6
11	12	13	1 (15)	14
10	8	9	11	1 (10)

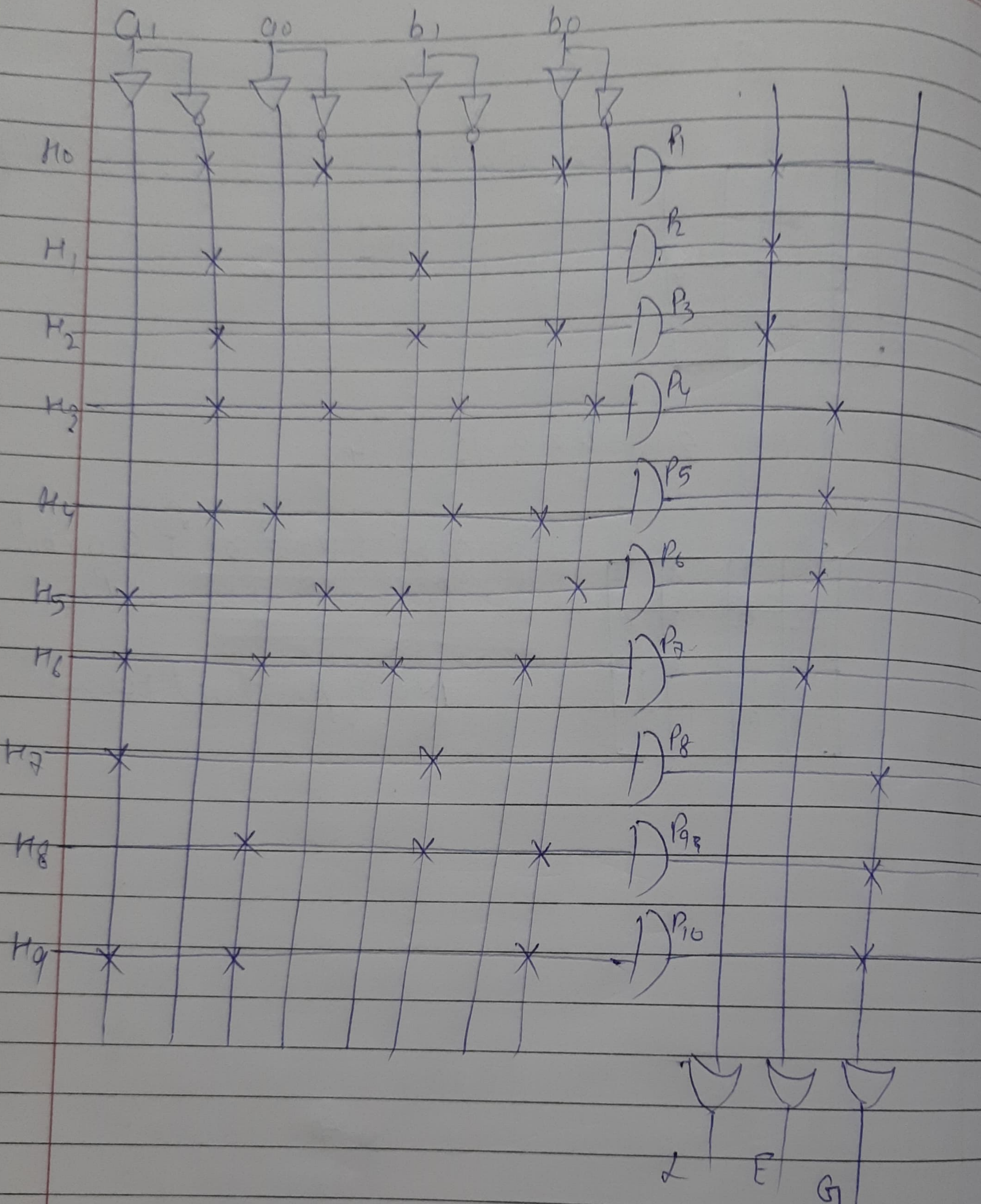
$$E = \underbrace{a_1'a_0'b_1'b_0'}_{P_4} + \underbrace{a_1'b_1'a_0b_0}_{P_5} + \underbrace{a_1b_1a_0'b_0'}_{P_6} + \underbrace{a_1b_1a_0b_0}_{P_7}$$

for $A > B$: $\Sigma m = (4, 8, 9, 12, 13, 14)$

$a_1a_0 \backslash b_1b_0$	00	01	11	10
00	0	1	3	2
01	1 (4)	5	7	6
11	1 (12)	13	15	1 (14)
10	1 (8)	9	11	10

$$G = \underbrace{a_1b_1'}_{P_8} + \underbrace{a_0b_1'b_0'}_{P_9} + \underbrace{a_1a_0b_0'}_{P_{10}}$$

No of product terms = 10


a1
a0
b1
b0
H0
H1
H2
H3
H4
H5
H6
H7
H8
H9
P1
P2
P3
P4
P5
P6
P7
P8
P9
P10
L
E
G

→ 2 bit Comparator using PAL

$n_1 = 3$, $L = \underbrace{a_1' a_0' b_0}_{P_1} + \underbrace{a_1' b_1}_{P_2} + \underbrace{a_1' b_1 b_0}_{P_3}$

$n_2 = 4$, $E = \underbrace{a_1' a_0' b_1' b_0'}_{P_4} + \underbrace{a_1' b_1' a_0 b_0}_{P_5} + \underbrace{a_1 b_1 a_0' b_0'}_{P_6} + \underbrace{a_1 b_1 a_0 b_0}_{P_7}$

$n_3 = 3$, $G = \underbrace{a_1 b_1'}_{P_8} + \underbrace{a_0 b_1' b_0'}_{P_9} + \underbrace{a_1 a_0 b_0'}_{P_{10}}$

'N' = 3.

no. of product terms for each func^n in a array = $\max(n_1, n_2, n_3) = \max(3, 4, 3) = 4$

Total Product terms = N (no. of func^{n}s) × $\max(n_1, n_2, n_3)$

$= 3 \times 4 = 12$