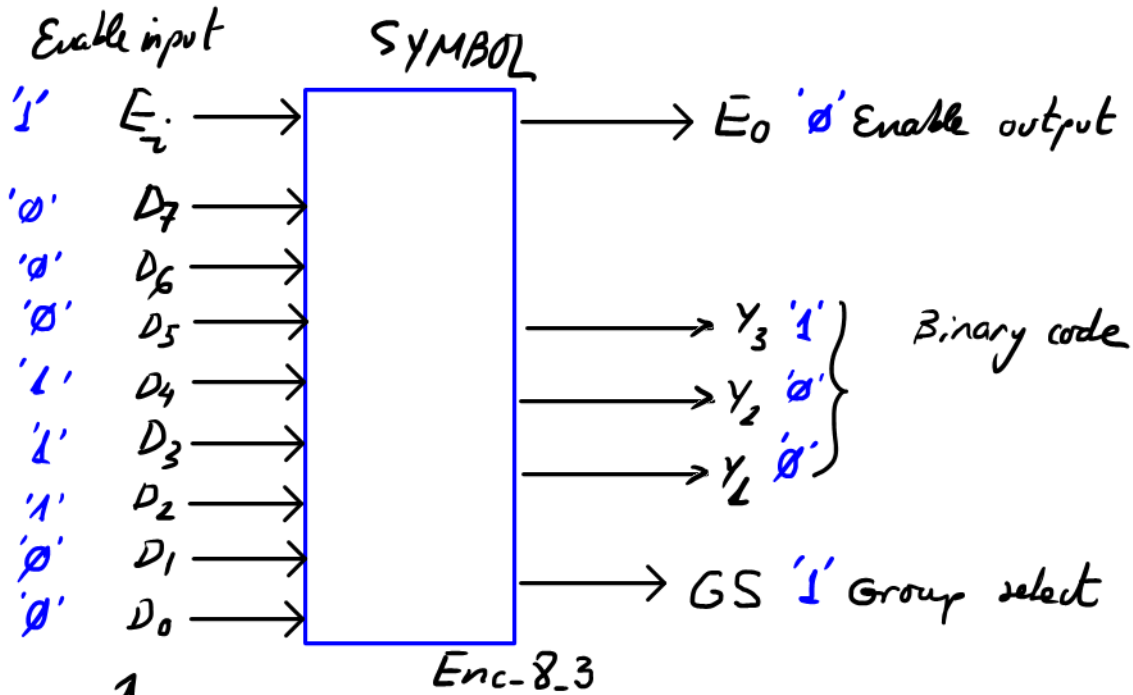


ENCODER (Priority high)



The output code is "100" because the active input with the highest priority is D4

Example chips → 74LS148, 74LS147, 4532B

Truth table example when the signals are active high: $\rightarrow 2^9 = 512$ combinations

| \bar{E}_i | D ₇ | D ₆ | D ₅ | D ₄ | D ₃ | D ₂ | D ₁ | D ₀ | GS | Y ₂ | Y ₁ | Y ₀ | \bar{E}_o | |
|-------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----|----------------|----------------|----------------|-------------|----------------------------|
| 0 | x | x | x | x | x | x | x | x | 0 | 0 | 0 | 0 | 0 | Disabled |
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | No key pressed |
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | key D ₀ pressed |
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | x | 1 | 0 | 0 | 0 | 0 | " D ₁ " |
| 1 | 0 | 0 | 0 | 0 | 1 | x | x | x | 1 | 0 | 1 | 0 | 0 | |
| 1 | 0 | 0 | 0 | 1 | x | x | x | x | 1 | 0 | 1 | 0 | 0 | |
| 1 | 0 | 0 | 1 | x | x | x | x | x | 1 | 1 | 0 | 0 | 0 | |
| 1 | 0 | 1 | x | x | x | x | x | x | 1 | 1 | 1 | 0 | 0 | |
| 1 | 1 | x | x | x | x | x | x | x | 1 | 1 | 1 | 0 | 0 | Key D ₇ pressed |

This is the input signal with highest priority
 $D_7 = 1 \rightarrow Y(2..0) = "111"$

→ Example equations

$$G_5 = f(E_i, D_7, D_6, \dots, D_0) = f(E_i, D)$$

⇒ $2^8 + 1$ maxterms, 255 minterms

$$G_5 = (E_i) \cdot (E_i' + D_7 + D_6 + D_5 + D_4 + D_3 + D_2 + D_1 + D_0)$$

POS only 2 products

$$E_0 = f(E_i, D) = m_{256} = m_{100000000} = E_i \cdot D_7' \cdot D_6' \cdot D_5' \cdot D_4' \cdot D_3' \cdot D_2' \cdot D_1' \cdot D_0'$$

⇒ only one minterm
511 maxterms

$$Y_2 = f(E_i, D) = E_i \cdot D_7 + E_i \cdot D_7' \cdot D_6 + E_i \cdot D_7' \cdot D_6' \cdot D_5 + E_i \cdot D_7' \cdot D_6' \cdot D_5' \cdot D_4$$

SOP → only 4 products

⇒ $2^7 + 2^6 + 2^5 + 2^4 \rightarrow 243$ minterms
→ 269 maxterms

The same way for Y_1, Y_0

⇒ Thus, this time it is better to use Minilog to obtain all the output equations because the canonical expressions are not practical

→ Example of a timing diagram with comments

