

TD no 3

Exercice 1:

a)  $V_S [00000] = 0,2V$

$$V_S = \alpha E_{ref} N \quad \rightarrow \quad \alpha E_{ref} = 0,2V$$

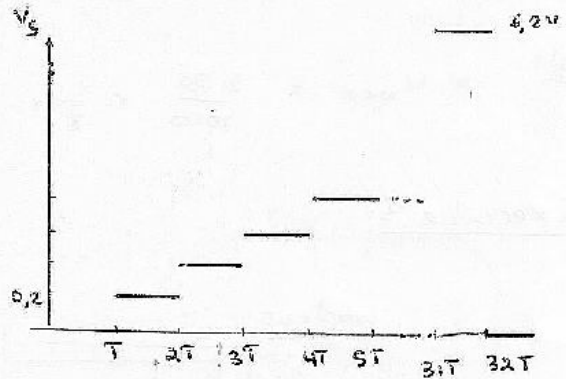
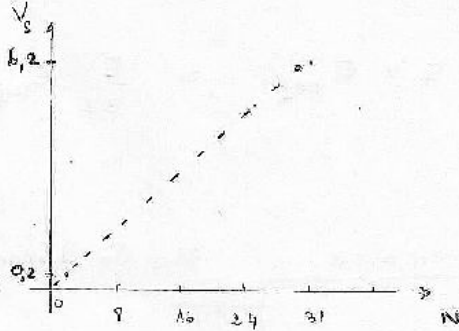
$$11111 = 31$$

$$V_S [11111] = 0,2 \times 31 = 6,2V$$

b) Le quantum  $q = \alpha E_{ref}$

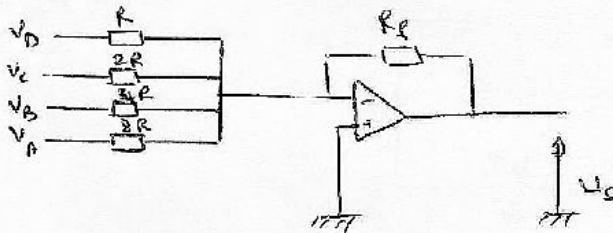
La résolution  $r = \frac{q}{V_{max}} = \frac{\alpha E_{ref}}{\alpha E_{ref} \sum_{i=0}^4 2^i} = \frac{1}{2^5 - 1} = \frac{1}{31}$

c)



$T$ : période du signal d'horloge du compteur.

Exercice 2:



$$V^- = \frac{V_A}{8R} + \frac{V_B}{4R} + \frac{V_C}{2R} + \frac{V_D}{R} + \frac{V_S}{R_F}$$

$$\frac{1}{R} + \frac{1}{2R} + \frac{1}{4R} + \frac{1}{8R} + \frac{1}{R_F}$$

$$\Rightarrow \frac{V_A}{8R} + \frac{V_B}{4R} + \frac{V_C}{2R} + \frac{V_D}{R} = - \frac{V_S}{R_F}$$

$$V^- = 0$$

$$V_s = -\frac{R_f}{R} \times \frac{1}{8} (V_A + 2V_B + 4V_C + 8V_D)$$

$$V_A = A E_{ref} \quad V_B = B E_{ref} \quad V_C = C E_{ref} \quad V_D = D E_{ref}$$

$$V_s = -\frac{R_f}{R} \times \frac{E_{ref}}{8} (A + 2B + 4C + 8D) \quad A, B, C, D \text{ des variables binaires}$$

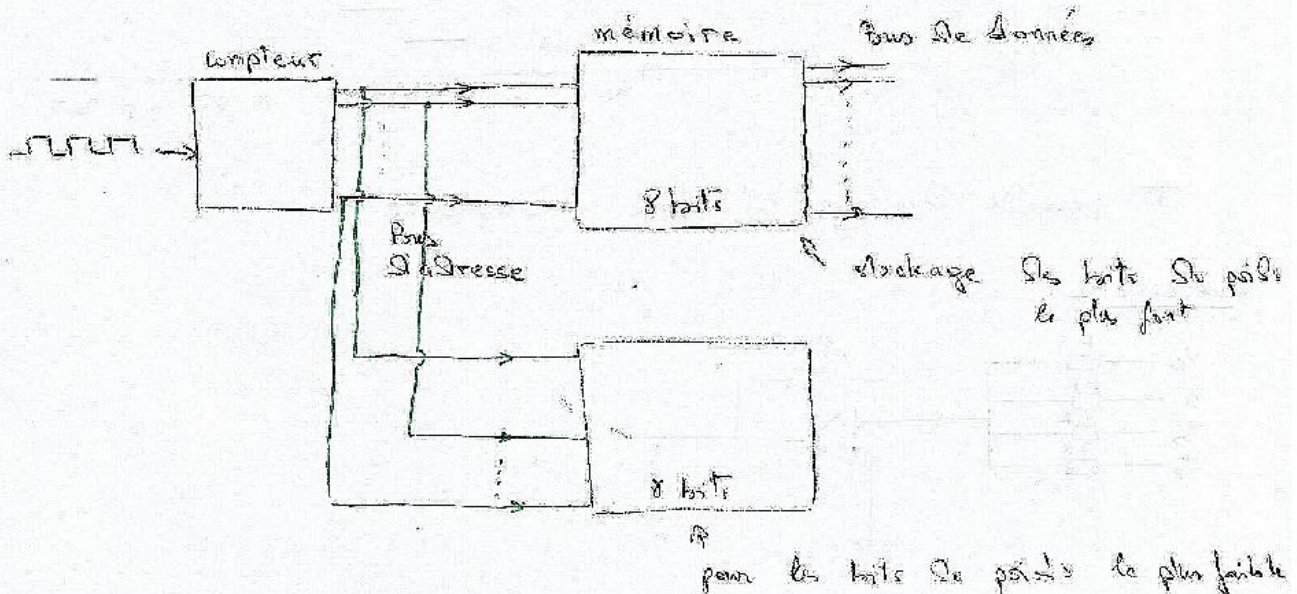
$$\text{Résolution} = \frac{1}{2^4 - 1} = \frac{1}{15} \quad (A \text{ le poids le plus faible} \rightarrow \text{le poids le plus fort})$$

- 10
- A de poids 0
  - B de poids 1
  - C de poids 2
  - D de poids 3

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$$V_{max} = \frac{2.50}{1000} \times \frac{1}{8} \times 15 \times E_{ref} = \frac{15}{32} E_{ref}$$

### Exercice 3:



$$\begin{aligned} V_{s1} &= 0,02 \times 127 = 2,54 \text{ V} \\ V_{s2} &= 0,02 \times 153 = 3,18 \text{ V} \\ V_{s3} &= 3,82 \text{ V} \\ V_{s4} &= 4,46 \text{ V} \\ V_{s5} &= 5,1 \text{ V} \end{aligned}$$

$$\begin{aligned} V_{s6} &= 4,46 \text{ V} \\ V_{s7} &= 3,18 \text{ V} \\ V_{s8} &= 2,54 \text{ V} \\ V_{s9} &= 1,92 \text{ V} \end{aligned}$$

$$\begin{aligned} V_{s10} &= 1,28 \text{ V} \\ V_{s11} &= 0,54 \text{ V} \\ V_{s12} &= 0 \text{ V} \\ V_{s13} &= 0,54 \text{ V} \\ V_{s14} &= 1,28 \text{ V} \end{aligned}$$

$$V_{s15} = 1,92 \text{ V}$$