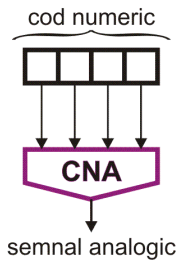


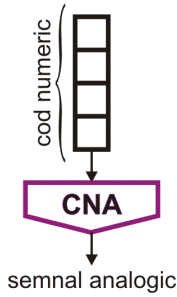
Convertoare Numeric-Analogice

- Circuite de interfață între sisteme de măsurare numerice și procese fizice

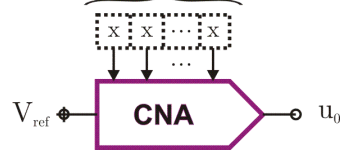
CNA paralel



CNA serie



Cod numeric → N bit



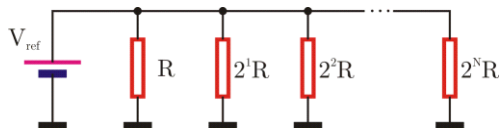
Simbol al convertoarelor numeric-analogice

$$u_o = C_N \cdot V_{ref}$$

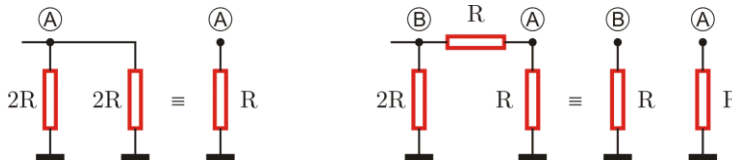
Principii ale conversiei numeric-analogice

- Rezoluția (ex.: N = 8 bit): $res = \frac{1}{2^N} = \frac{1}{2^8} \cong 0.39\%$

CNA cu sumă de curenți ponderați



Rețea de rezistoare ponderate

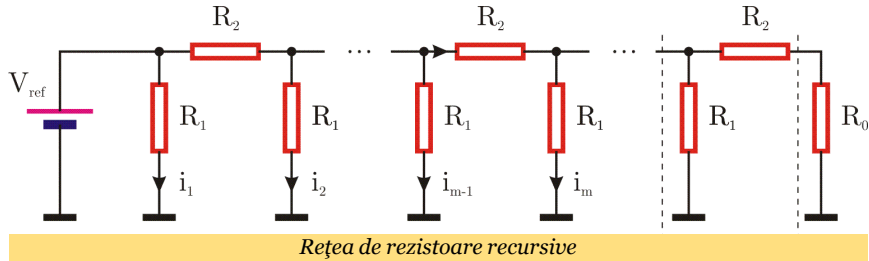


Echivalențe ale rezistoarelor

$$R_A = \frac{2R \cdot 2R}{2R + 2R} = R$$

$$R_A = R_B = R$$

CNA cu sumă de curenți ponderați



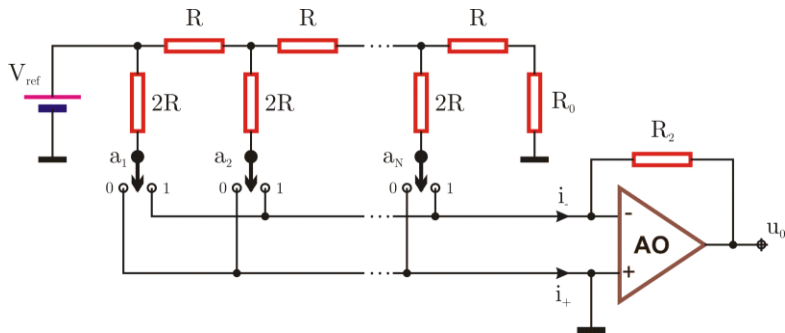
$$\frac{i_{n-1}}{i_n} = k > 1$$

$$R_1 = \frac{k}{k-1} R_0; \quad R_2 = (k-1) R_0$$

$$R_0 = \frac{R_1 (R_2 + R_0)}{R_1 + R_2 + R_0}$$

$$k = 2 \Rightarrow \begin{cases} R_1 = 2R_0 \\ R_2 = R_0 \end{cases}$$

CNA R-2R



CNA cu divizor recursiv R-2R

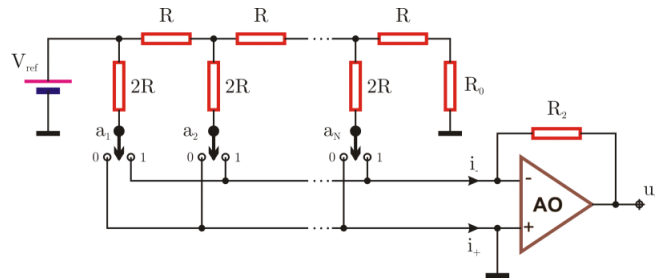
- Codul numeric de intrare:

$$A = a_1 2^{-1} + a_2 2^{-2} + \dots + a_N 2^{-N}$$

$$0 \leq A \leq 1 - 2^{-N}$$

$$a_i = \begin{cases} "0" \\ "1" \end{cases}$$

CNA R-2R



CNA cu divizor recursiv R-2R

- Curenți de intrare:

$$i_- = \frac{V_{ref}}{R} \cdot A$$

$$i_+ = \frac{V_{ref}}{R} \cdot (1 - A)$$

- Tensiune de ieșire:

$$u_o = -\frac{R_2}{R} V_{ref} \cdot A$$