



Sintetizzatori a conversione diretta D/A (DDS)

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Sintetizzatore DDS:

hopping time breve

(ns)

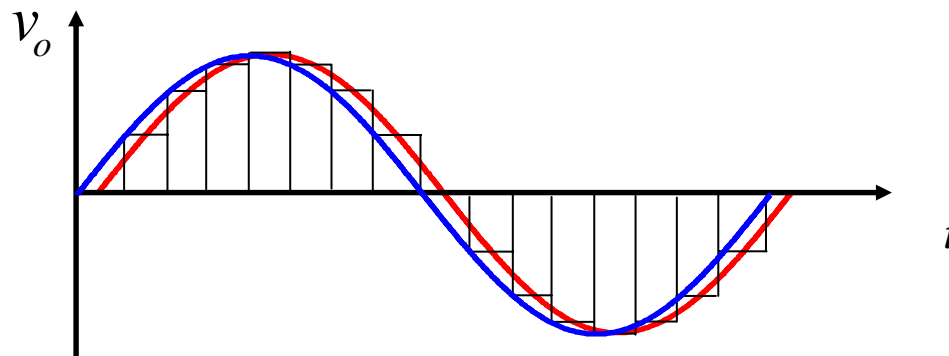
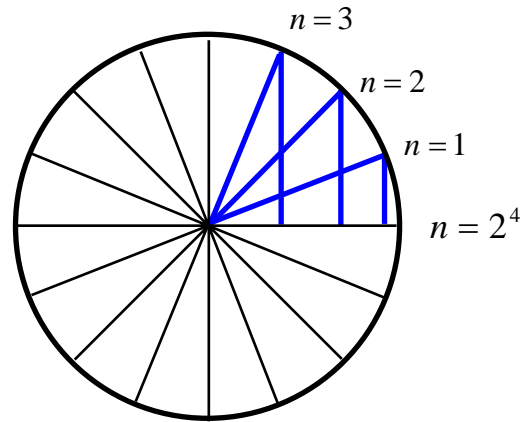
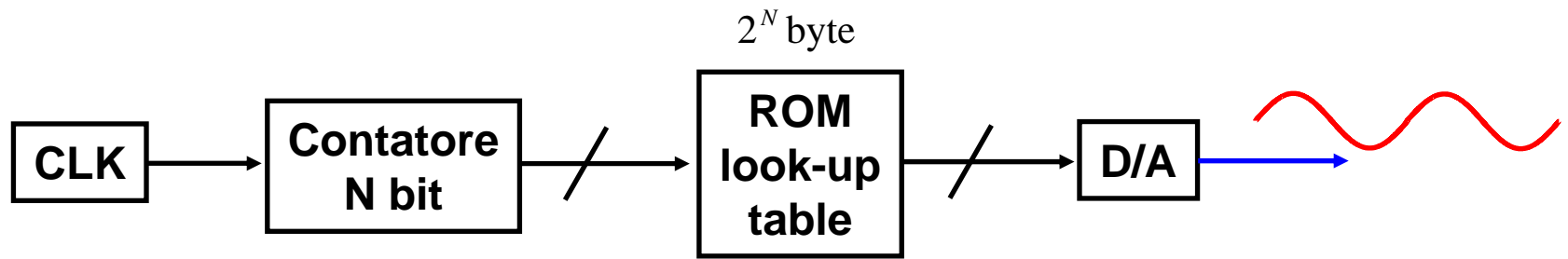
risoluzione elevata

μHz

bassa frequenza **<200MHz**

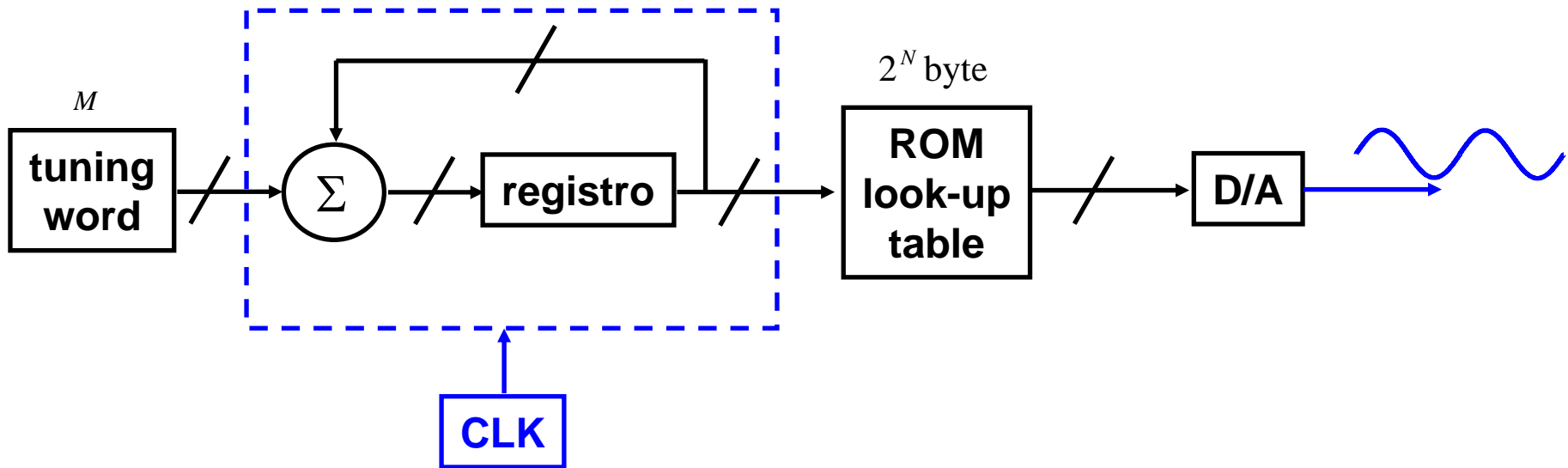
spurie, repliche, jitter

DDS

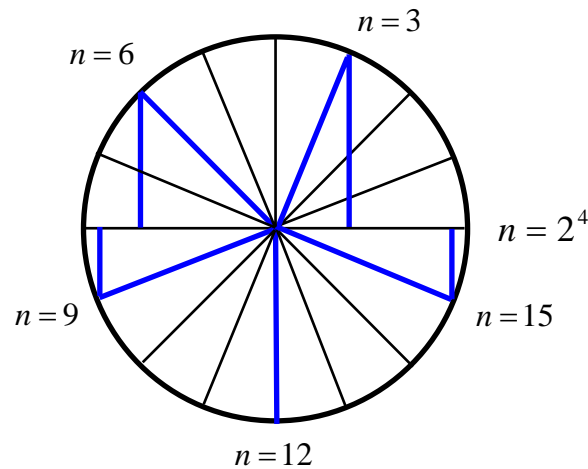


$$f_o = \frac{f_{CLK}}{2^N}$$

DDS



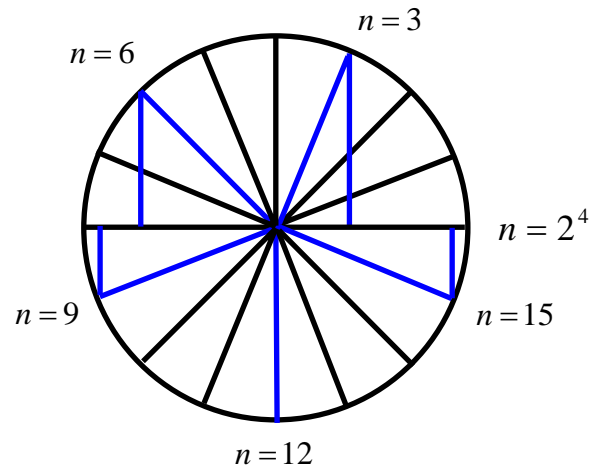
$$M = 3$$



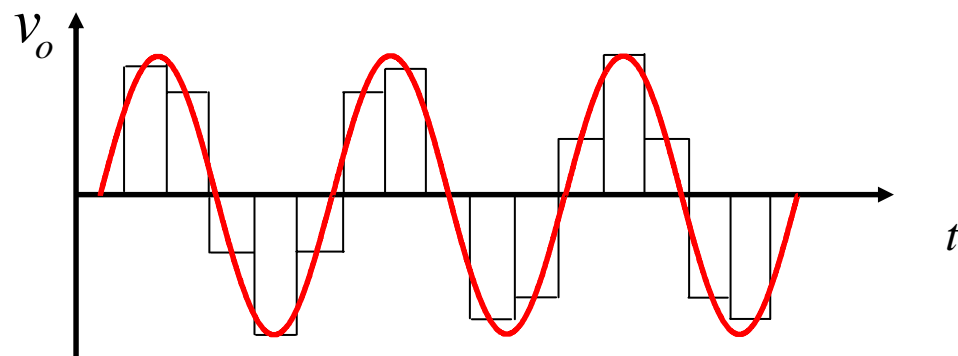
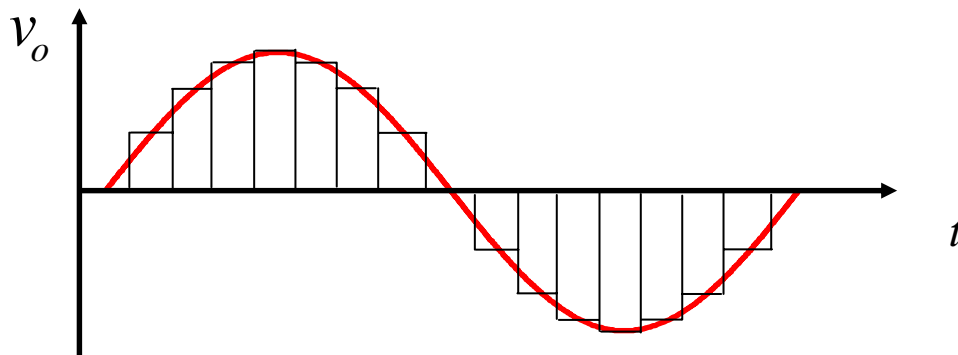
$$f_o = M \frac{f_{CLK}}{2^N}$$

DDS

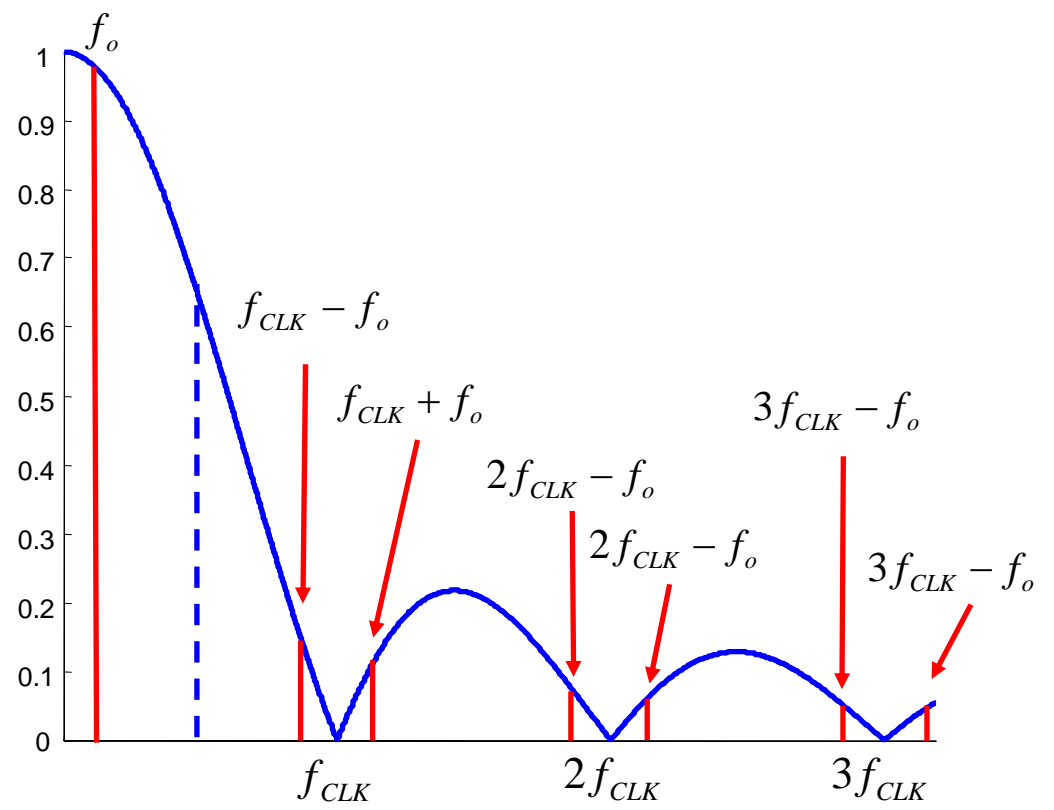
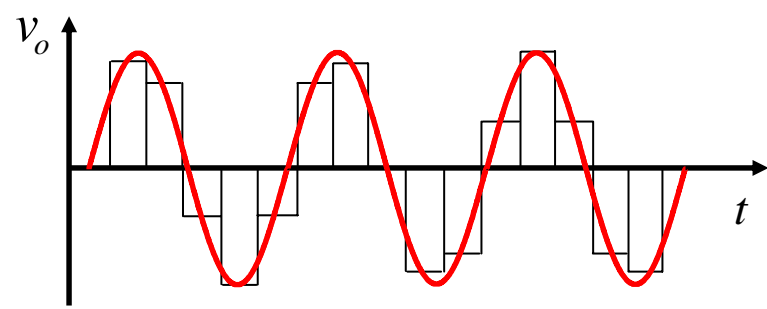
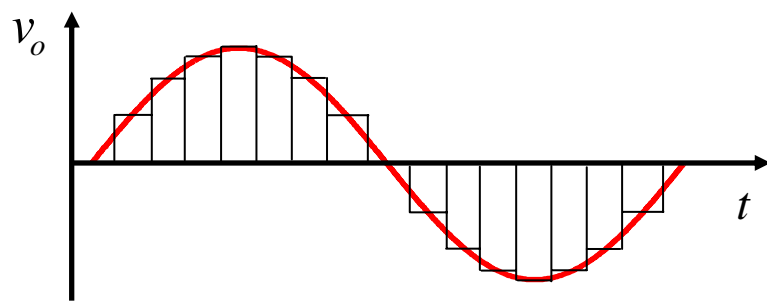
$$M = 3$$



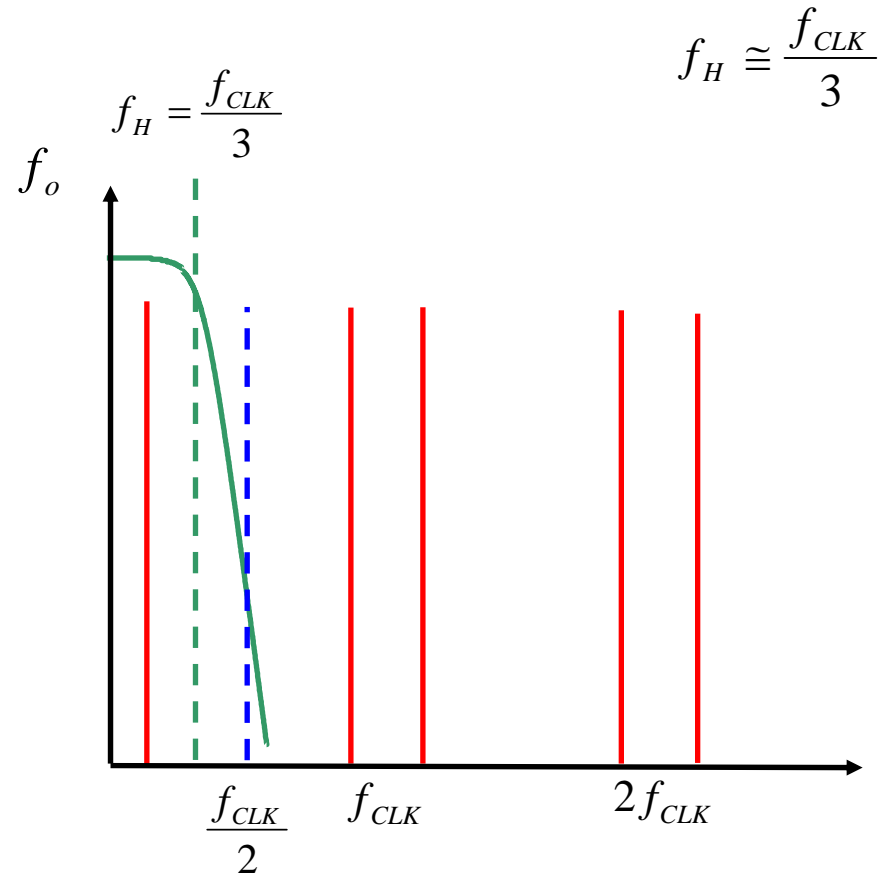
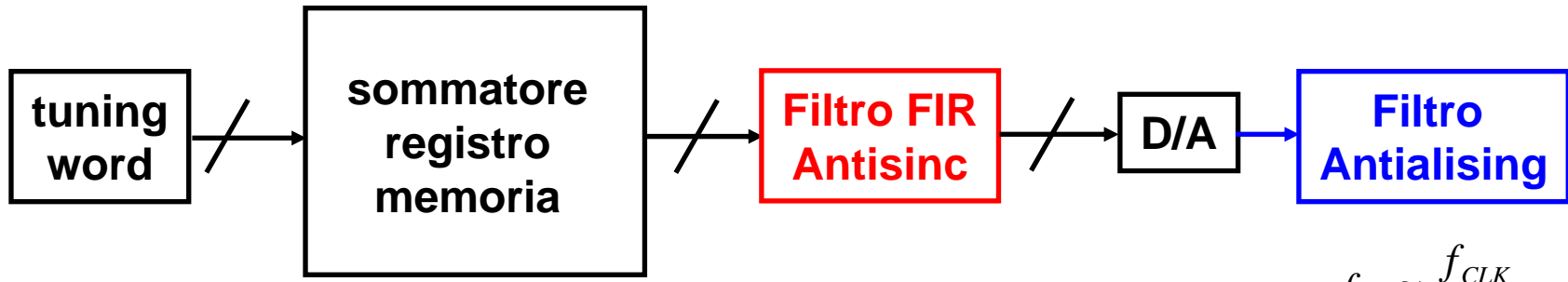
$$f_o = M \frac{f_{CLK}}{2^N}$$



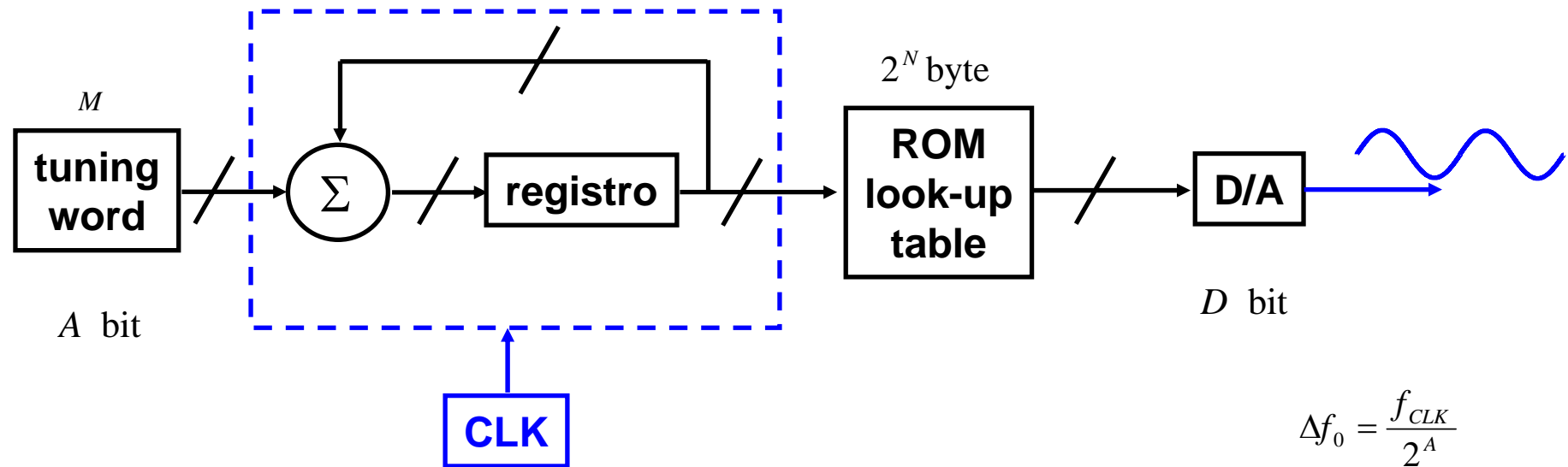
Frequenze immagine



Filtri



DDS



$$\Delta f_0 = \frac{f_{CLK}}{2^A}$$

Esempio:

$$f_{CLK} = 300\text{MHz}$$

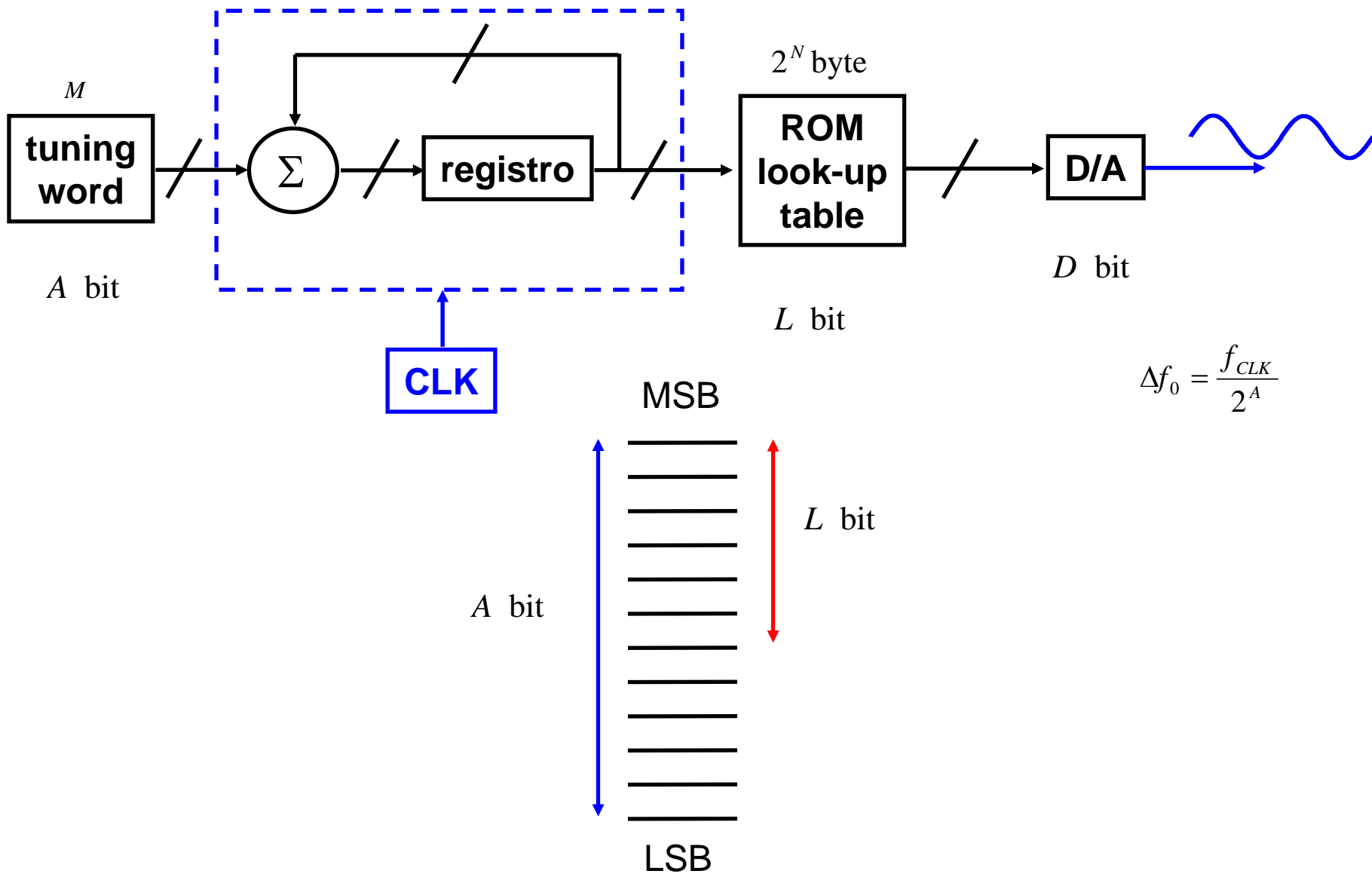
$$D = 12\text{bit}$$

$$A = 48\text{bit}$$

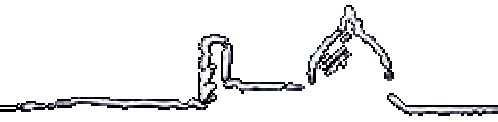
$$\Delta f_o = 1\mu\text{Hz}$$

$$ROM = 2^{48} \times 12 = 4000\text{Tbit} \quad !!!$$

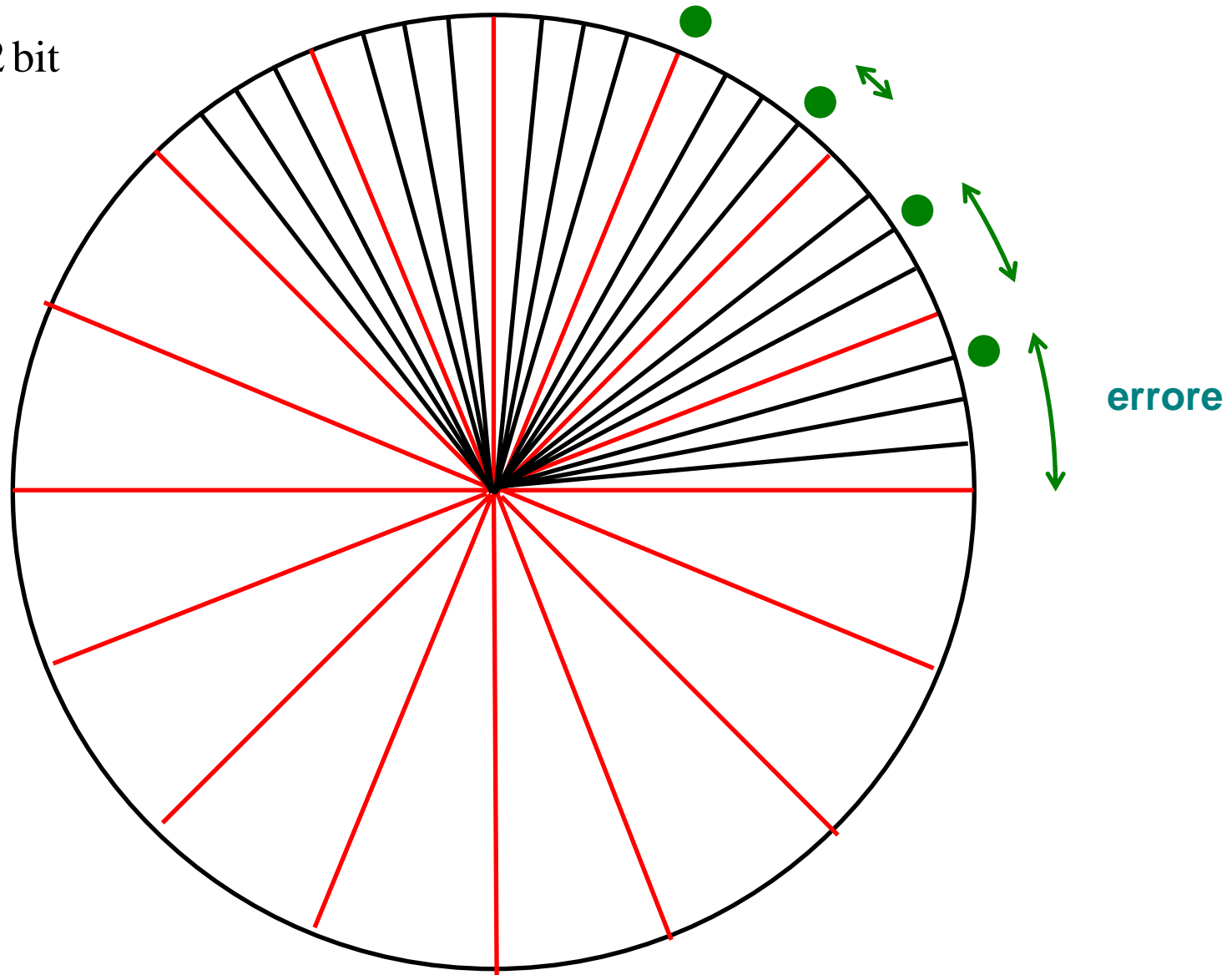
Troncamento



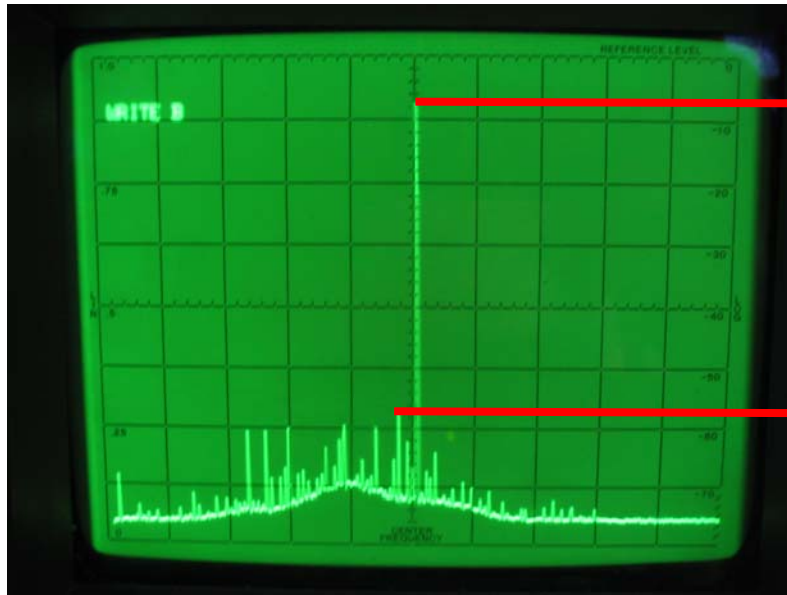
$$\Delta f_0 = \frac{f_{CLK}}{2^A}$$



$A - L = 2 \text{ bit}$



L'errore di quantizzazione è periodico e produce spurie



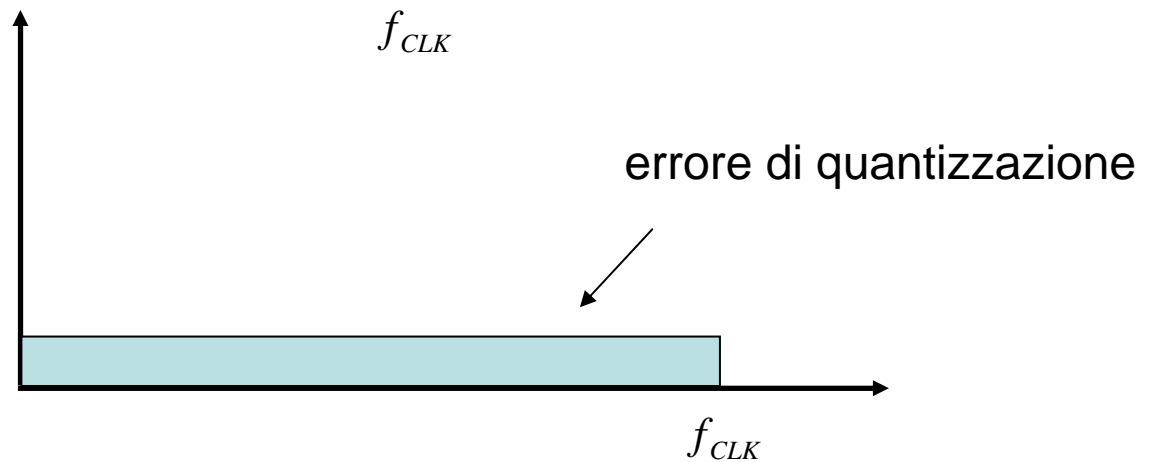
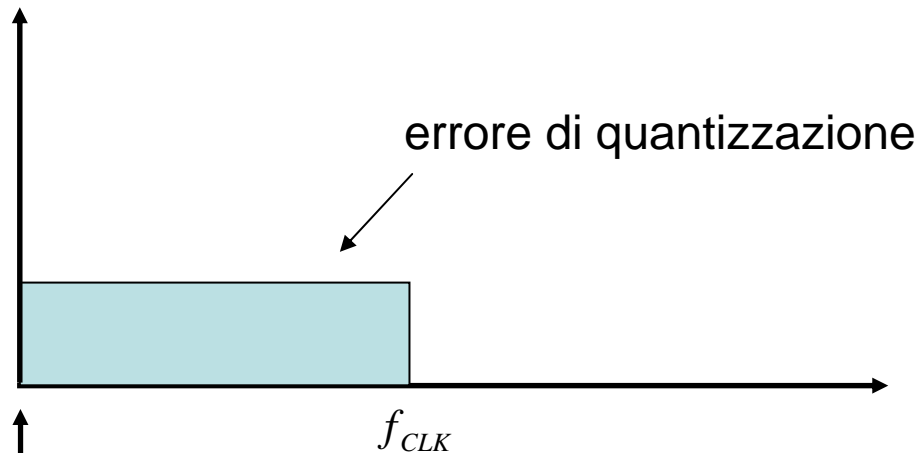
$$A - L > 4$$

$$\approx 6L \text{ dBc}$$

L = numero di bit della look up table

Errore di quantizzazione

$$\frac{S}{N} \approx 6D \text{ dB}$$



frazione di fondo scala (<1)

$$\frac{S}{N} \approx 6D \text{ dB} + 20\log_{10}(FFS)$$