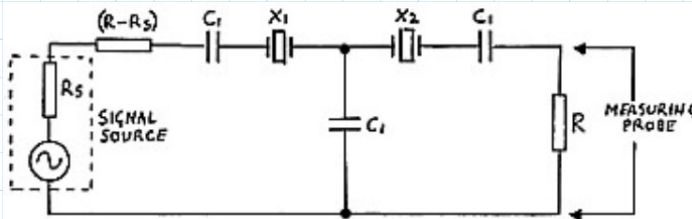**1.) Calculate source and load resistance for two crystals (test circuit):**

$C_1 := 0.0000000001$ F = 100pF $f := 9000000$ Hz = 9MHz

$$R := \frac{0.613}{2 \cdot \pi \cdot f \cdot C_1} = 108.402 \quad \text{Ohm}$$

2.) Set up test circuit and measure the bandwidth:

$BW_1 := 1030$ Hz   ... measured bandwidth

3.) Calculate C2 with required bandwidth

$BW_2 := 2700$ Hz = 2.7kHz   ... required bandwidth

$$C_2 := C_1 \cdot \left(\frac{BW_1}{BW_2}\right)^2 = 0.0000000000146 \quad \text{F = 14.6pF}$$

4.) Calculate final source and load resistance

$$R := \frac{0.613}{2 \cdot \pi \cdot f \cdot C_2} = 744.888 \quad \text{Ohm} \quad \text{--> Transformer needed!}$$

5.) Calculate transformer:

$Z_P := 50$ Ohm $R = 744.888$ Ohm

$$\ddot{u} := \sqrt{\frac{R}{Z_P}} = 3.86$$ --> Guideline: 6T:23T @ FT37-43 Toroid Core
                                    --> $L := 12.6 \cdot 10^{-6}$ H @ FT37-43 Toroid Core

$$Z_S := Z_P \cdot \left(\frac{23}{6}\right)^2 = 734.722 \quad \text{Ohm}$$

Requirement: $X_L > 5 \cdot 50$ Ohm --> $X_L > 250$ Ohm

$X_L := 2 \cdot \pi \cdot f \cdot L = 712.513$ Ohm > 250 Ohm --> correct!
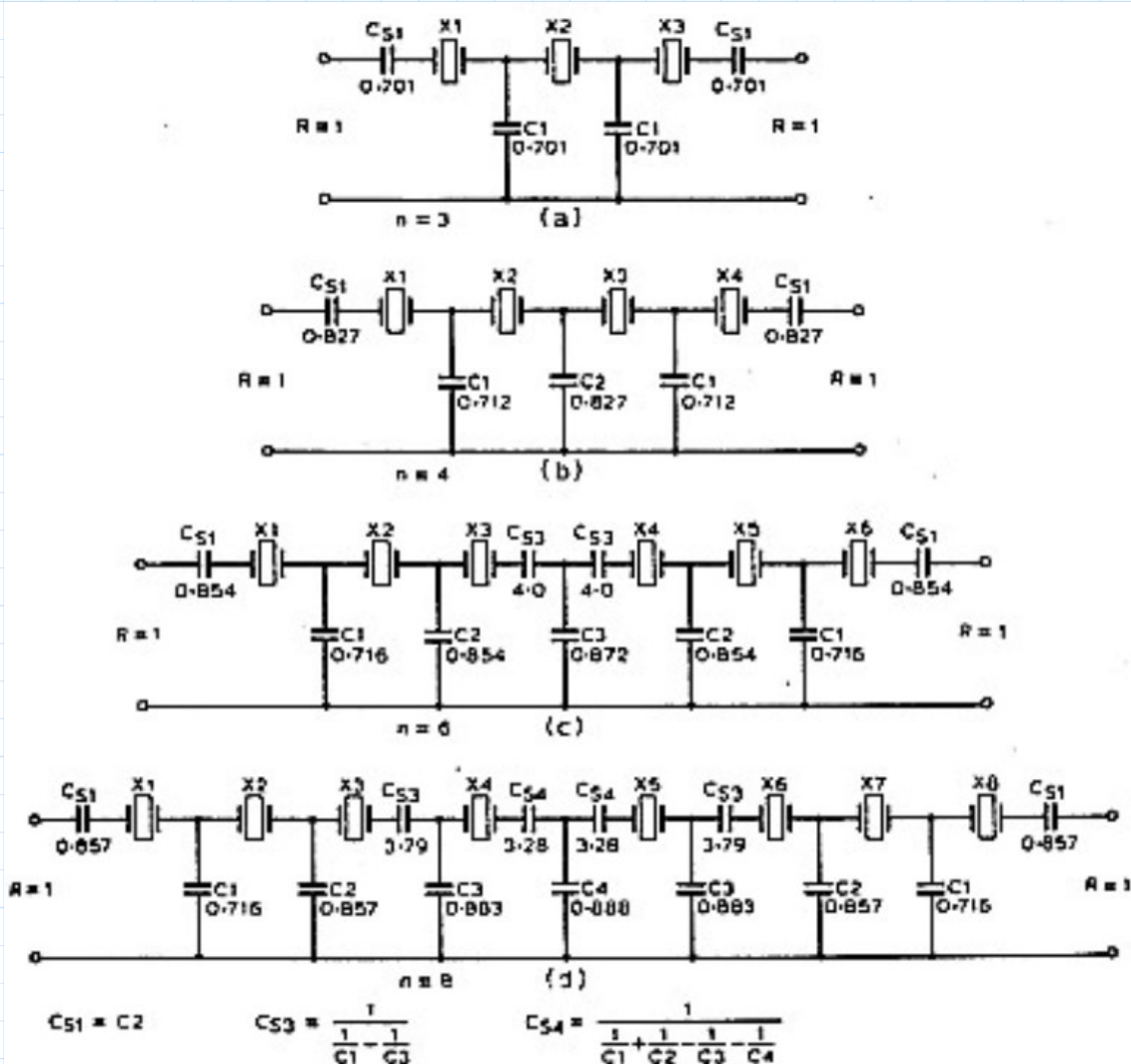
6.) Calculate capacitors for final ladder topology:

Ladder topology b) is used here:

$$C(K) := \frac{K}{2 \cdot \pi \cdot f \cdot R}$$

$C_{S1} := C(0.827) = 0.0000000000196$ F = 19.6pF = 20pF

$C_1 := C(0.712) = 0.0000000000169$ F = 16.9pF = 2x 33pF in series = 16.5pF

$C_2 := C(0.827) = 0.0000000000196$ F = 19.6pF = 20pF

Formulas: http://www.i1wqrlinkradio.com/antype/ch97/chiave40.htm