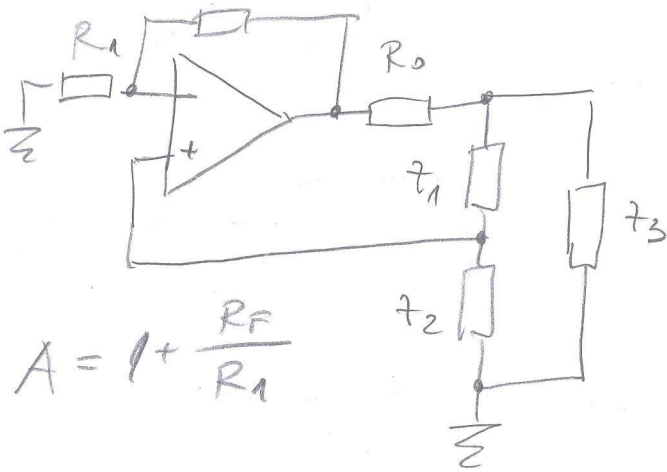


## LC Oscillatorji

$R_F$



$$A = 1 + \frac{R_F}{R_1}$$

$$F(j\omega) = \frac{(z_1 + z_2) \parallel z_3}{R_0 + (z_1 + z_2) \parallel z_3} \cdot \frac{z_2}{z_1 + z_2} =$$

$$= \frac{(z_1 + z_2) z_3}{z_1 + z_2 + z_3} \cdot \frac{z_2}{z_1 + z_2} =$$

$$= \frac{z_2 z_3}{R_0 (z_1 + z_2 + z_3) + (z_1 + z_2) z_3}$$

$$AF(j\omega) = 1$$

$$R_0 / (z_1 + z_2 + z_3) + (z_1 + z_2) z_3 = A z_2 z_3$$

$$R_0 (z_1 + z_2 + z_3) + z_1 z_3 + (1 - A) z_2 z_3 = 0$$

$$z_i = j X_i$$

$$j R_0 (X_1 + X_2 + X_3) - X_1 X_3 - (1 - A) X_2 X_3 = 0 \quad R_0 \neq 0$$

$$\text{Re}(\dots) = 0$$

$$\text{Im}(\dots) = 0$$

$$X_1 X_3 + (1 - A) X_2 X_3 = 0$$

$$X_1 + X_2 + X_3 = 0$$

$$X_1 + (1 - A) X_2 = 0$$

$$A = 1 + \frac{X_1}{X_2}$$

pri  $\omega = \omega_0 : z_1 + z_2 + z_3 = 0$

$$F(j\omega) = \frac{z_2 z_3}{(z_1 + z_2) z_3} = \frac{z_2}{z_1 + z_2}$$

## Colpitts

$$X_1 = -\frac{1}{\omega C_1} \quad X_2 = -\frac{1}{\omega C_2} \quad X_3 = \omega L$$

$$f = 117 \text{ kHz}$$

$$C_1 = C_2 = C = 1 \text{ nF}$$

$$L = \frac{2}{\omega^2 C} = 5 \text{ } \mu\text{H}$$

$$\omega L - \frac{1}{\omega C_1} - \frac{1}{\omega C_2} = 0$$

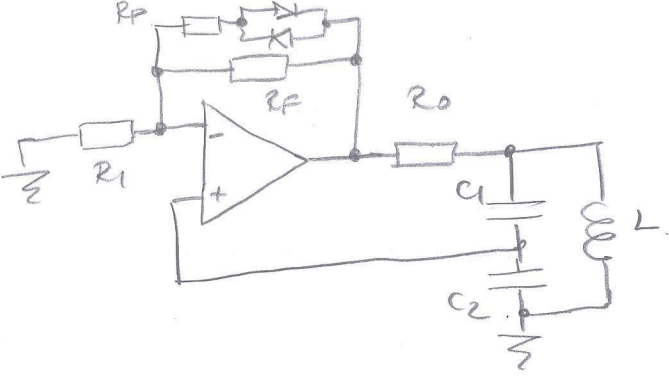
$$\omega^2 L \frac{C_1 C_2}{C_1 + C_2} = 1$$

$$\omega = \sqrt{\frac{C_1 + C_2}{L C_1 C_2}}$$

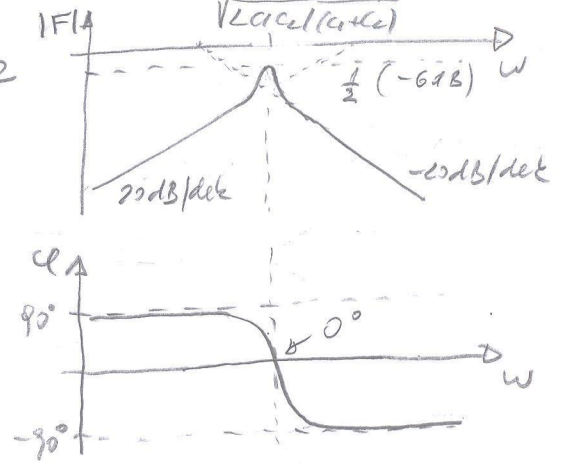
$$A = 2 \quad \frac{R_F}{R_1} = \frac{C_2}{C_1} = 1$$

$$R_F = R_1 = 20 \text{ k}\Omega$$

$$A = 1 + \frac{C_2}{C_1} = 1 + \frac{R_F}{R_1} \quad \frac{R_F}{R_1} = \frac{C_2}{C_1}$$



$R_F = 21k\Omega$   
 $R_F = 200k\Omega$   
 $R_1 = 20k\Omega$   
 $R_0 = 1k\Omega$



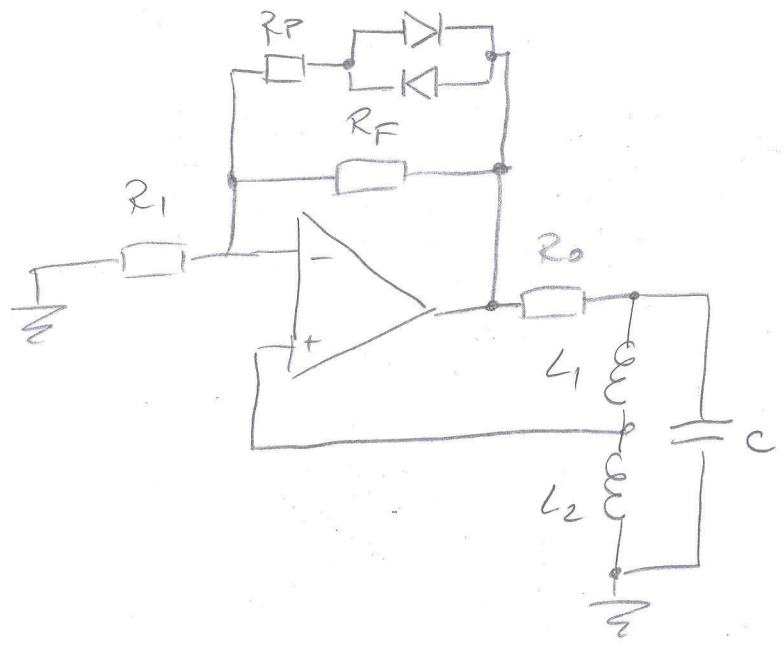
Hortley

$X_1 = \omega L_1$     $X_2 = \omega L_2$     $X_3 = -\frac{1}{\omega C}$   
 $\omega L_1 + \omega L_2 - \frac{1}{\omega C} = 0$   
 $\omega = \frac{1}{\sqrt{(L_1 + L_2)C}}$     $f = 117\text{Hz}$

$F(j\omega_0) = \frac{Z_2}{Z_1 + Z_2} = \frac{C_1}{C_1 + C_2}$   
 Quality factor resonance  $\propto \frac{1}{R_0}$

$A = 1 + \frac{X_1}{X_2} = 1 + \frac{L_1}{L_2} = 1 + \frac{R_F}{R_1}$

$L_1 = L_2 = L = 10\text{mH}$   
 $C = \frac{1}{2\omega^2 L} = 1.27\text{nF}$



$R_1 = 20k\Omega$   
 $R_F = 21k\Omega$   
 $R_F = 200k\Omega$   
 $R_0 = 1k\Omega$

