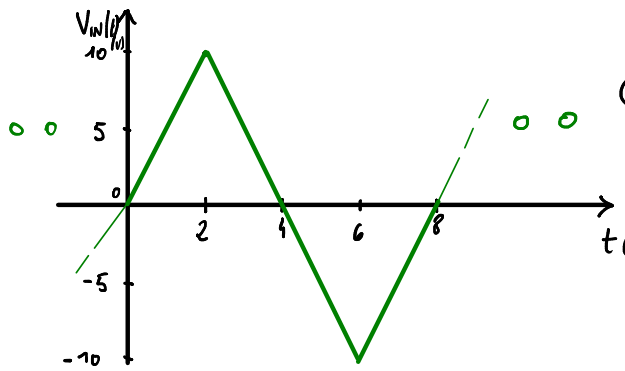
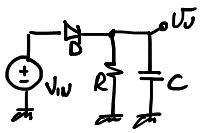




$$A = \left(\frac{R_B}{R_A} + 1\right) \qquad \beta = \frac{Z_2}{Z_2 + Z_1} \qquad Z_1 = R_1 + \frac{1}{C_1 S} = \frac{R_1 C_1 S + 1}{C_1 S}$$

$$Z_2 = R_2 // \frac{1}{C_2 S} = \frac{R_2}{R_2 C_2 S + 1}$$

$$\beta A = \frac{\frac{R_2}{R_2 C_2 S + 1}}{\frac{R_2}{R_2 C_2 S + 1} + \frac{R_1 C_1 S + 1}{C_1 S}} \cdot \left(1 + \frac{R_B}{R_A}\right) = \left(1 + \frac{R_B}{R_A}\right) \frac{R_2 C_1 S}{R_1 R_2 C_1 C_2 S^2 + (R_1 C_1 S + R_2 C_2 S + R_2 C_1) + 1}$$

$$\begin{aligned} &|\beta A(j\omega_1)| > 1 \\ &|\beta A(j\omega_0)| = 1 \end{aligned} \Rightarrow \begin{aligned} &|\beta A(j\omega_3)| > 1 \wedge \angle \beta A(j\omega_3) = 0 \\ &|\beta A(j\omega_0)| = 1 \wedge \angle \beta A(j\omega_0) = 0 \end{aligned}$$

$$\beta A(j\omega) = \left(1 + \frac{R_B}{R_A}\right) \frac{j\omega R_2 C_1}{\underbrace{1 - R_1 R_2 C_1 C_2 \omega^2}_{=0} + j\omega (R_1 C_1 + R_2 C_2 + R_2 C_1)}$$

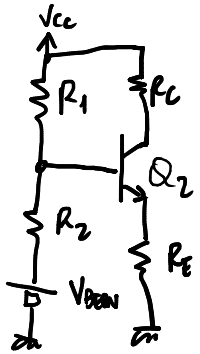
$$\omega_0 = \omega_2 = \frac{1}{\sqrt{R_1 R_2 C_1 C_2}} = 500 \text{ rad/sec}$$

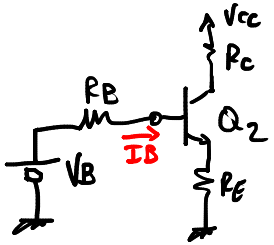
$$\beta A(j\omega_0) = \left(1 + \frac{R_B}{R_A}\right) \frac{R_2 C_1}{R_1 C_1 + R_2 C_2 + R_2 C_1}$$

Se $R_B = R_0 \Rightarrow |\beta A(j\omega_2)| = 2 > 1$

$$\left[1 + \frac{1}{R_A} R_0 \left(1 - \frac{V_{UMAX}}{V_0}\right)\right] \frac{R_2 C_1}{R_1 C_1 + R_2 C_2 + R_2 C_1} = 1$$

$$V_{UMAX} = 2{,}92 \text{ V}$$





$R_B = ? = R_1 // R_2 = 4,5 k\Omega$

$V_B = V_{cc}\frac{R_2}{R_1+R_2} + V_{BEON}\frac{R_1}{R_1+R_2} =$

$= 2,63V$

$V_B = R_B I_B + V_{BEON} + R_E(h_{FE}+1) I_B$

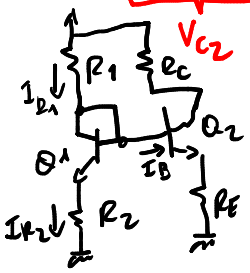
$I_B = \frac{V_B - V_{BEON}}{R_B + R_E(h_{FE}+1)} = 18,43 \mu A$

$I_B = I_{B2}$

$I_{C2} = h_{FE} I_{B2} = 9,217 mA$

$V_{CE2} = V_{C2} - V_{E2}$ $\quad V_{C2} = V_{cc} - R_c I_{C2} =$

$V_{CE2} = \underbrace{V_{cc} - R_c I_{C2}}_{V_{C2}} - \underbrace{R_E\left(\frac{h_{FE}+1}{h_{FE}}\right) I_{C2}}_{V_{E2}} = 8,936V$

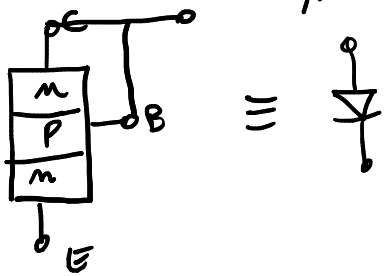


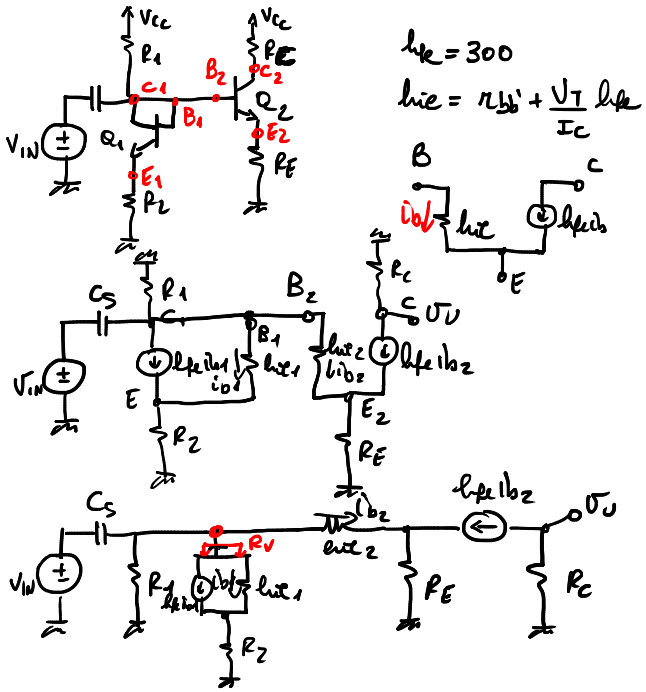
$I_{R2} = \frac{\cancel{V_{BEON}} + R_E I_{C2} - \cancel{V_{BEON}}}{R_2} = I_{E1} = \frac{R_E I_{C2}}{R_2}$

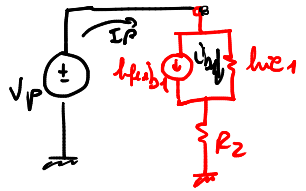
$I_{B1} = \frac{I_{E1}}{h_{FE}+1} = 737,3 \mu A$

$I_{C1} = 0,3687 mA$

$V_{CE1} = V_{BEON} = 0,7V$





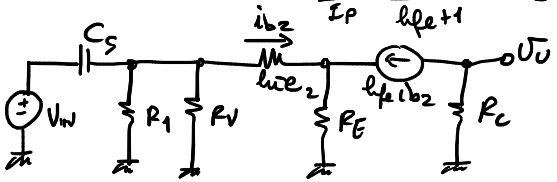


$$R_V = \frac{V_p}{I_p}$$

$$I_p = (h_{fe}+1)\, i_{b1}$$

$$V_p = h_{ie}\, i_{b1} + R_2 (h_{fe}+1)\, i_{b1}$$

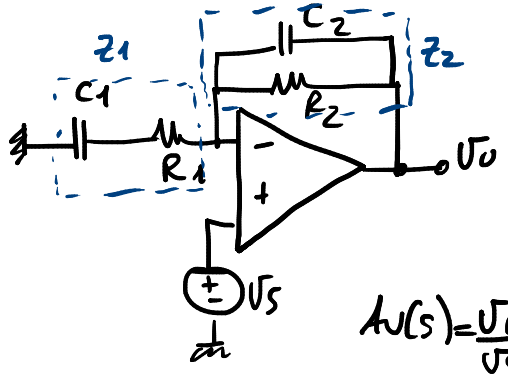
$$\frac{V_p}{I_p} = \frac{h_{ie}}{h_{fe}+1} + R_2$$



$$A_V(s) = \frac{V_U}{V_S} = \frac{A_{V\infty}\, s}{(s + \omega_P)}$$

$$\omega_P = \frac{1}{C_S \cdot R_1 \| R_V \| \left[h_{ie2} + R_E (h_{fe}+1)\right]}$$

$$A_{V\infty} = -\frac{R_C\, h_{fe}}{h_{ie} + R_E (h_{fe}+1)}$$



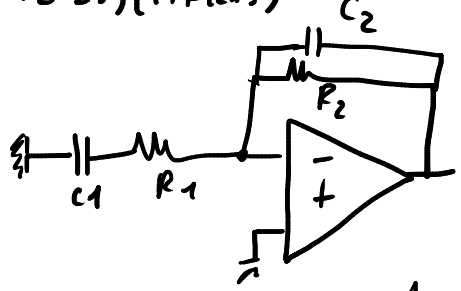
$$z_1 = R_1 + \frac{1}{C_1 s} = \frac{R_1 C_1 s + 1}{C_1 s}$$

$$z_2 = R_2 // \frac{1}{C_2 s} = \frac{R_2}{1 + R_2 C_2 s}$$

$$A_V(s) = \frac{V_U}{V_S} = \left(1 + \frac{z_2}{z_1}\right) =$$

$$= \left[1 + \frac{R_2}{(1+R_2C_2s)} \cdot \frac{C_1 s}{(R_1 C_1 s + 1)}\right] =$$

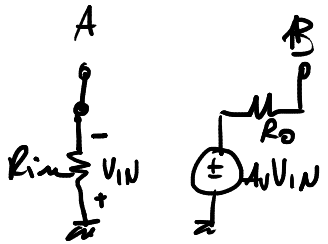
$$= \frac{(R_1C_1s+1)(R_2C_2s+1) + R_2C_1s}{(1+R_2C_2s)(1+R_1C_1s)} = \frac{R_1R_2C_1C_2s^2 + (R_1C_1 + R_2C_2 + R_2C_1)s + 1}{(1+R_2C_2s)(1+R_1C_1s)}$$



$R_{VC1} = ? = R_1$

$$\omega_{p1} = \frac{1}{R_1 C_1}$$

$$R_{VC2} = R_2 // R_V'$$



$$R_{AB} = R_{in}(1 + A_V) + R_O$$

$$R_{in} = R_{in\,op} // z_1 \qquad R_V' = (R_{in\,op} // z_1)(1 + A_V) \longrightarrow +\infty$$

$$R_{VC2} = R_2$$