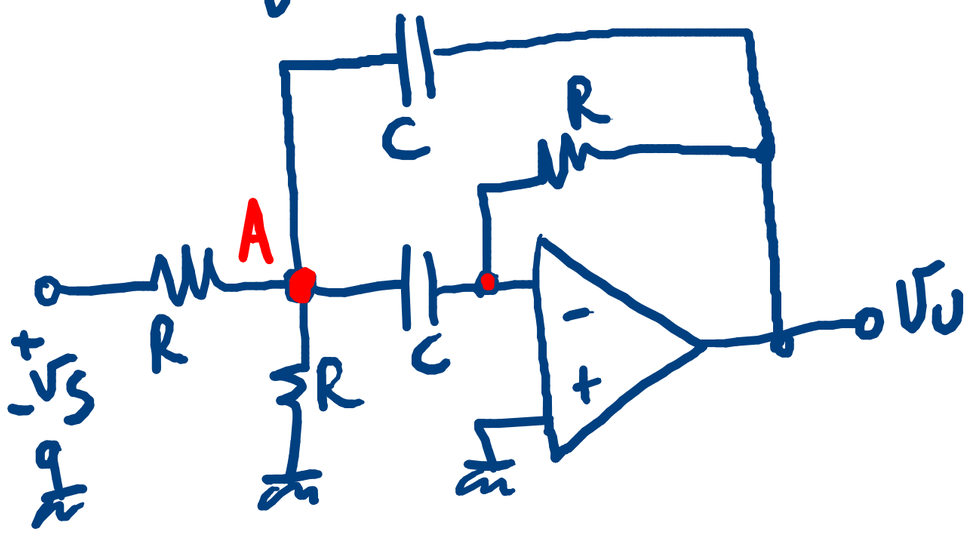
Delayjiannis



$$\begin{cases} C_S(V_U - V_A) + \dfrac{(V_S - V_A)}{R} - \dfrac{V_A}{R} - CSV_A = 0 \\ V_U = -RCS\,V_A \Rightarrow -\dfrac{V_U}{RCS} = V_A \end{cases}$$

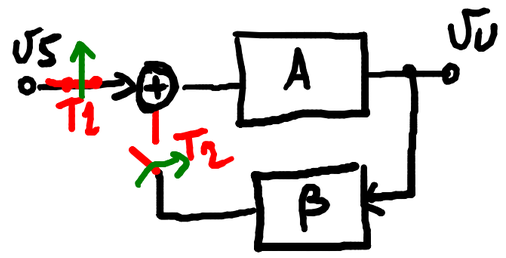
$$C_S\left(V_U + \frac{V_U}{RC_S}\right) + \left(V_S + \frac{V_U}{RCS}\right)\frac{1}{R} + \frac{V_U}{R^2CS} + \frac{V_U}{R} = 0$$

$$C_SV_U + \frac{V_U}{R} + \frac{V_S}{R} + \frac{V_U}{R^2CS} + \frac{V_U}{R^2CS} + \frac{V_U}{R} = 0$$

$$R^2C^2S^2V_U + RCSV_U + RCSV_S + V_U + V_U + RCSV_U = 0$$

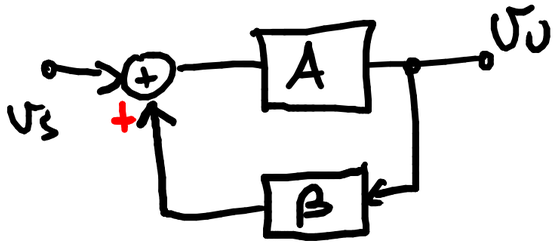
$$\left[R^2C^2S^2 + 2RCS + 2\right]V_U = -RCSV_S$$

$$\frac{V_U}{V_S} = \frac{-RCS}{R^2C^2S^2 + 2RCS + 2}$$

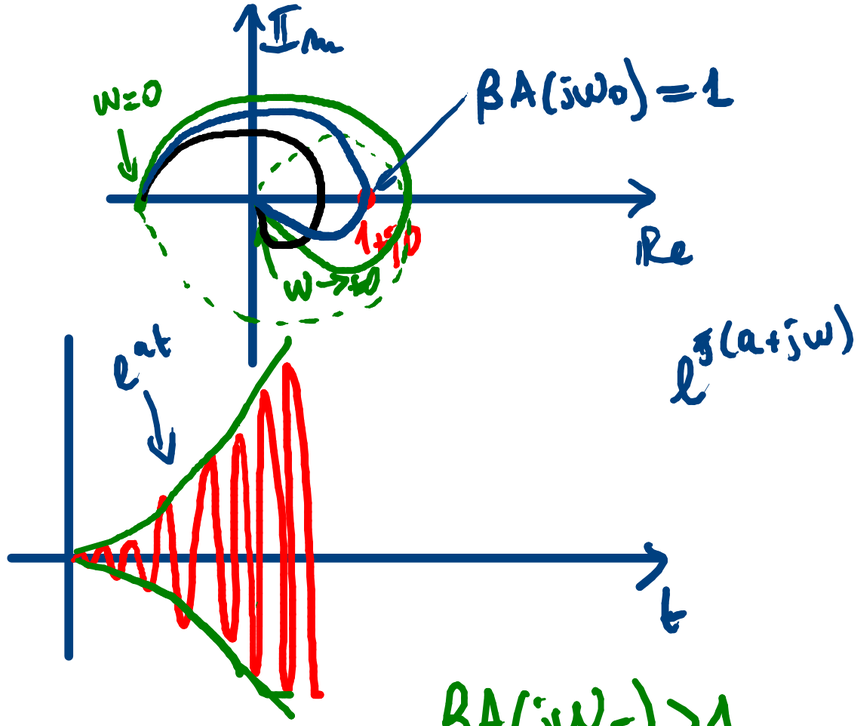


$\beta A = 1$ BARKHAUSEN

$$\begin{cases} |BA(j\omega_0)| = 1 \\ \angle BA(j\omega_0) = \phi \end{cases}$$

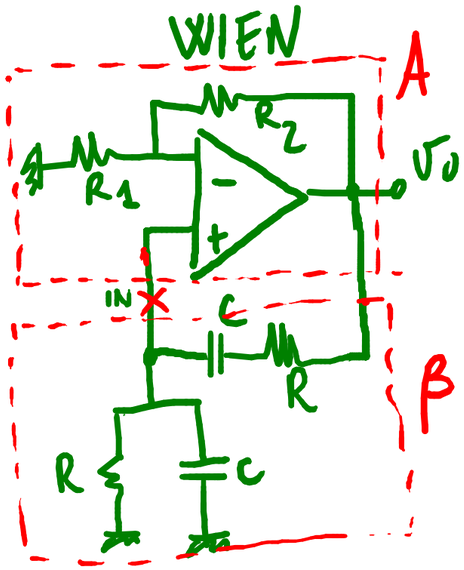


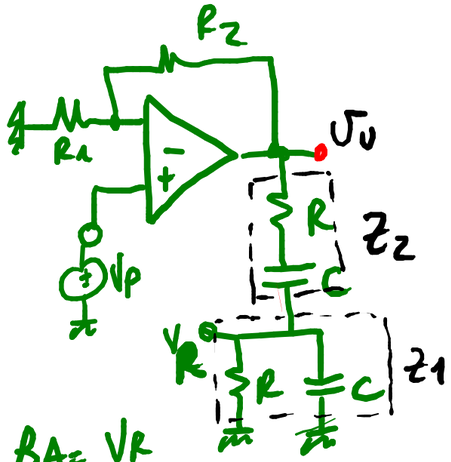
$$A_f = \frac{A}{1-\beta A}$$



$\beta A(j\omega_1) > 1$

$$\begin{cases} |\beta A(j\omega_1)| > 1 \\ \angle BA(j\omega_1) = \phi \end{cases}$$

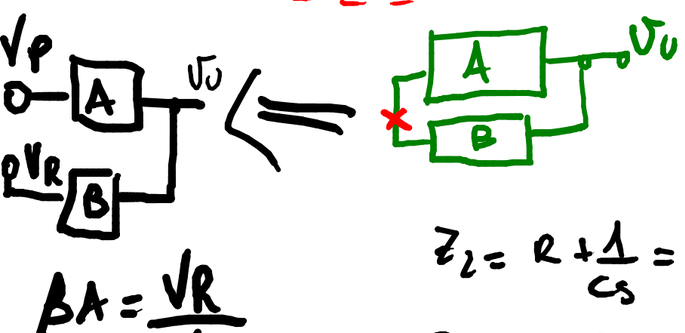




$$BA = \frac{V_R}{V_P}$$

$$V_U = \left(1 + \frac{R_2}{R_1}\right) V_P \qquad A_N$$

$$V_R = V_U \cdot \frac{Z_1}{Z_1 + Z_2}$$



$$BA = \frac{V_R}{V_P}$$

$$Z_2 = R + \frac{1}{Cs} = \frac{RCs+1}{Cs}$$

$$Z_1 = \frac{\frac{R}{Cs}}{R + \frac{1}{Cs}} = \frac{R}{RCs+1}$$

$$BA(s) = \frac{V_R}{V_P} = \frac{\frac{R}{RCs+1}}{\frac{R}{RCs+1} + \frac{RCs+1}{Cs}} A_N = \frac{A_N RCs}{RCs + (RCs+1)^2} =$$

$$\boxed{BA(s) = \frac{RCs\,A_N}{R^2C^2s^2 + 3RCs + 1}}$$

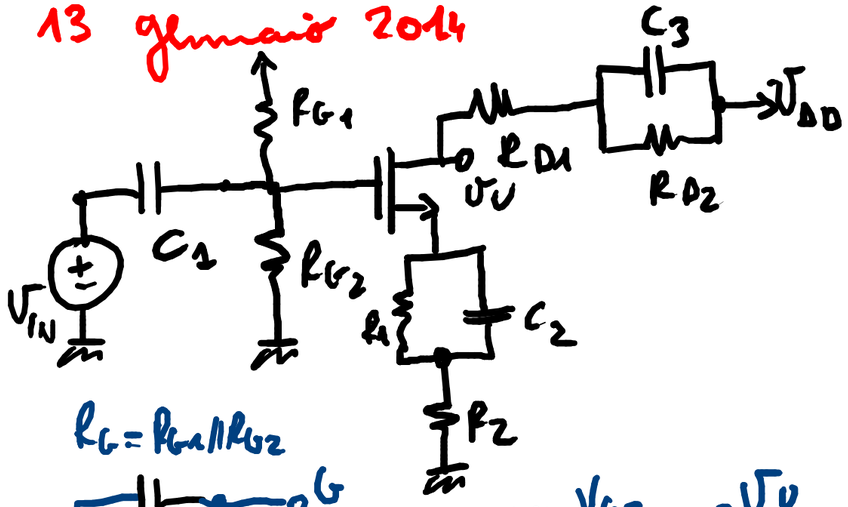
$$BA(j\omega) = \frac{A_N RC(j\omega)}{1 - \omega^2 R^2C^2 + j\omega \cdot (3RC)}$$

$$\begin{cases} |BA(j\omega_0)| = 1 \\ \angle BA(j\omega_0) = 0 \end{cases} \qquad 1 - \omega_0^2 R^2C^2 = 0$$

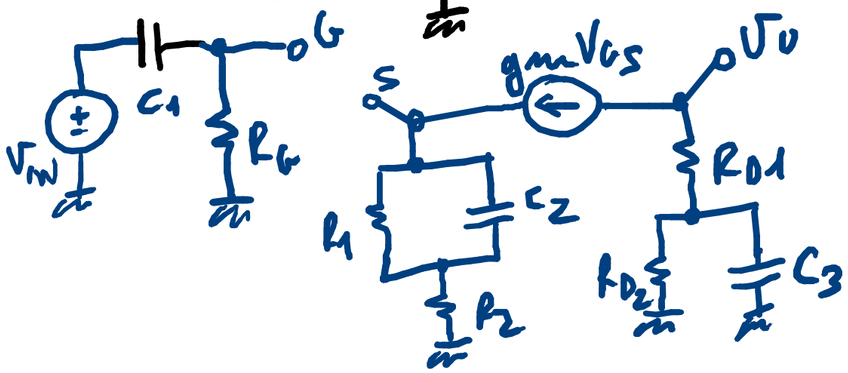
$$\omega_0 = \frac{1}{RC}$$

$$BA(j\omega_0) = \frac{A_N}{3} = \left(1 + \frac{R_2}{R_1}\right) \cdot \frac{1}{3}$$

13 gennaio 2014



$R_G = R_{G1} \| R_{G2}$



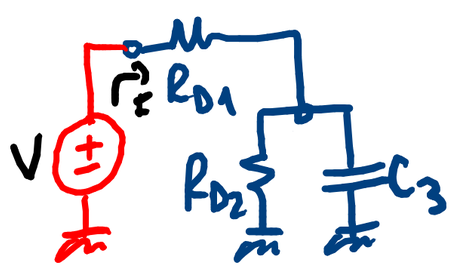
$$A_V(s) = \frac{V_U}{V_{IN}} = \frac{A_{V\infty}\, s(s+\omega_{Z2})(s+\omega_{Z3})}{(s+\omega_{P1})(s+\omega_{P2})(s+\omega_{P3})}$$

$$A_{V\infty} = -\frac{g_m R_{D1}}{1+g_m R_2} \qquad \omega_{P1} = \frac{1}{C_1 R_G} = 40\,\text{rad/s}$$

$$\omega_{P2} = \frac{1}{C_2 R_{VC2}} \qquad R_{VC2} = R_1 \| \left[R_2 + 1/g_m\right]$$

$$\omega_{P3} = 1/C_3 \cdot R_{VC3} \qquad R_{VC3} = R_{D2}$$

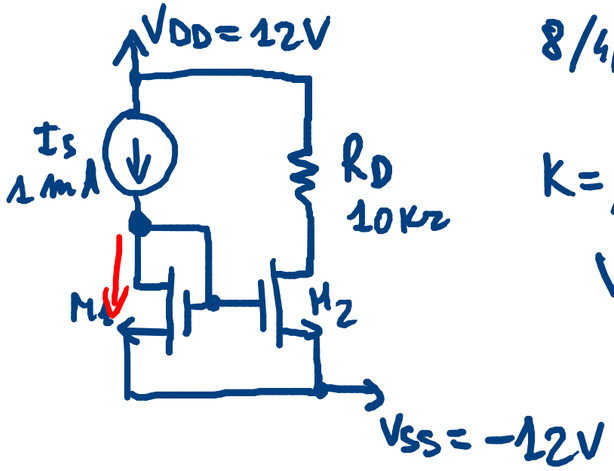
$$\omega_{O2} = \frac{1}{\sqrt{2}\, C_2}$$



$$Z = \frac{V}{I} \qquad Z = \frac{1}{Y}$$

$$Y = \frac{I}{V}$$

$$\omega_{PY} = \omega_{OZ} = \frac{1}{C_3 \cdot R_{D1} \| R_{D2}} = \omega_{O3}$$



8/4/2013

$K = \mu_n C_{ox} \frac{W}{L} = 1\,mA/V^2$

$V_T = 1V$

$I_{DS1} = I_S$ $\quad I_{DS1} = \frac{K}{2}(V_{GS} - V_T)^2 = I_S$

$V_{GS} = \pm\sqrt{\frac{2I_S}{K}} + V_T = \begin{cases} 2{,}414 \geq V_T \\ -414\,mV \end{cases}$

$V_{DS1} = V_{GS1} \geq V_{GS1} - V_T = 1{,}414\,V$

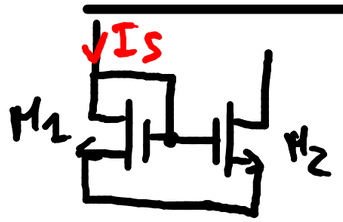
$V_{GS1} = V_{GS2} \Rightarrow I_{DS1} = I_{DS2} = 1\,mA$

$V_{DS2} = V_{D2} - V_{S2} = V_{DD} - R_D I_{DS2} - V_{SS} =$

$V_{DS2} = 1V \geq V_{GS2} - V_T = 1{,}414V$

$V_{DD} - R_D I_S - V_{SS} \geq V_{GS2} - V_T$

$\frac{V_{DD} - V_{SS} + V_T - V_{GS}}{I_S} \geq R_D$



$I_{DS1} = \frac{K_1}{2}(V_{GS} - V_T)^2$

$I_{DS2} = \frac{K_2}{2}(V_{GS2} - V_T)^2$

$V_{GS1} = V_{GS2}$

$\frac{I_{DS1}}{I_{DS2}} = \frac{\frac{K_1}{2}(V_{GS1} - V_T)^2}{\frac{K_2}{2}(V_{GS2} - V_T)^2} = \frac{K_1}{K_2}$