Voltage Amplifier – Series Shunt Feedback – Cont'd

$$B = h_{12F}\ ,\quad A = \frac{-h_{21A}}{(R_S + h_{11T})(h_{22T} + G_L)}\ ,\quad R_{in} = R_S + h_{11T}$$

$$R_{OUT} = \frac{1}{h_{22T} + G_L}$$

$$\boxed{A_F = \frac{A}{1+AB}\ ,\ R_{inF} = R_{in}(1+AB)\ ,\text{ and } R_{outF} = \frac{R_{OUT}}{1+AB}}$$

Summary of Series-Shunt Fb. Analysis—

1.) Find h_{11T} (h_{11F} and h_{11A}) – input resistance w. output S.C.

2.) Find h_{22T} (h_{22F} and h_{22A}) – output conductance w. input O.C.

3.) Find $h_{12F} = B$

4.) Find A $(B=0)$ includes h_{11F} & h_{22F}

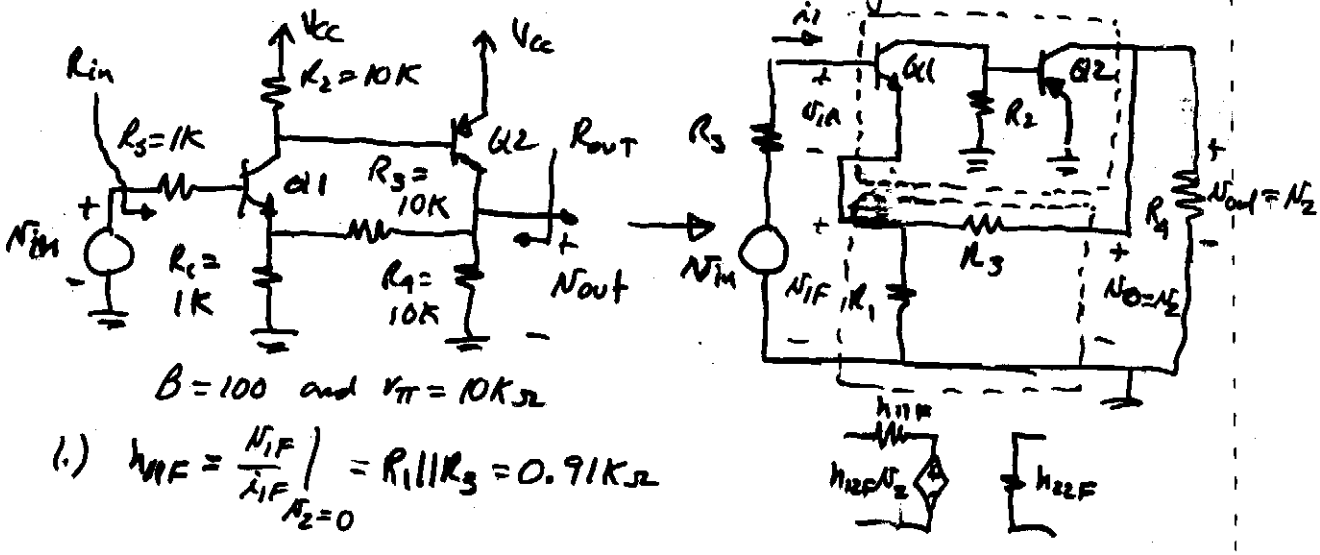
5.) $A_F = \frac{A}{1+AB}$

6.) $R_{inF} = R_{in}(B=0)\left[1+AB\right]$

7.) $R_{outF} = \frac{R_{out}(B=0)}{1+AB}$

Example of Series-Shunt Feedback

Find R_{inF}, R_{outF} and A_F for the following circuit –



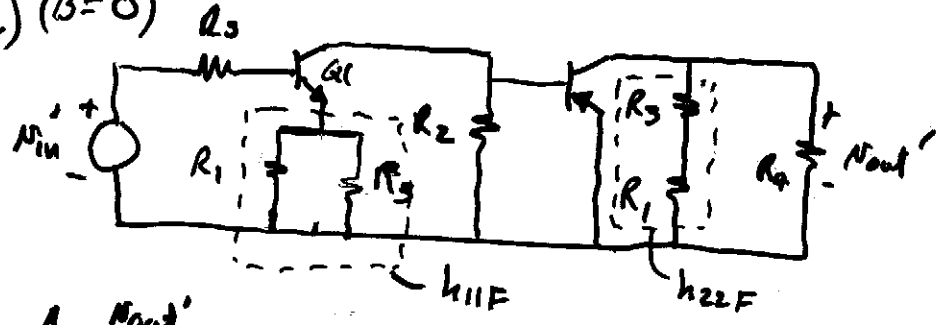
$B = 100$ and $r_\pi = 10K\Omega$

1.) $h_{11F} = \left.\frac{V_{1F}}{i_{1F}}\right|_{V_2=0} = R_1 \| R_3 = 0.91K\Omega$

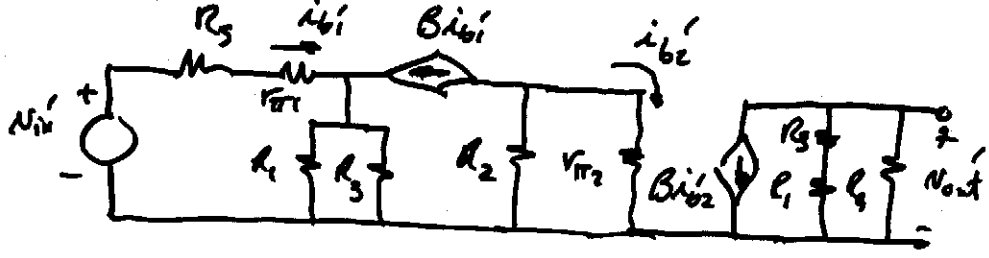
2.) $h_{22F} = \left.\frac{i_{2F}}{v_{2F}}\right|_{i_1=0} = \frac{1}{R_1+R_3} = \frac{1}{11K}$

3.) $h_{12F} = \beta = \left.\frac{v_{1F}}{v_2}\right|_{i_1=0} = \frac{R_1}{R_1+R_3} = \frac{1}{11}$

4.) ($\beta = 0$)



$A = \frac{v_{out}'}{v_{in}'}$



$\frac{v_{out}'}{v_{in}'} = \left(\frac{v_{out}'}{i_{b2}'}\right)\left(\frac{i_{b2}'}{i_{b1}'}\right)\left(\frac{i_{b1}'}{v_{in}'}\right)$

$\left(\frac{i_{b1}'}{v_{in}'}\right) = \frac{1}{R_{in}}$