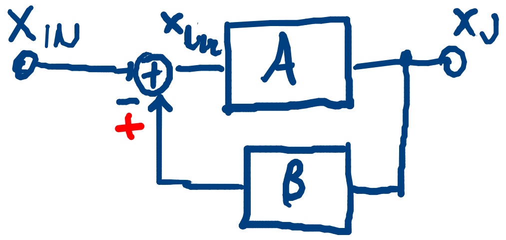



$$x_{in} = x_{in} - \beta x_v$$

$$x_v = A x_{in}$$

$$x_v = A x_{in} - \beta A x_v$$

$$x_v (1 + \beta A) = A x_{in}$$

$$A_f = \frac{x_v}{x_{in}} = \frac{A}{1 \pm \beta A} = \frac{1}{\beta}\frac{\beta A}{1+\beta A} \xrightarrow{\beta A \gg 1} \frac{1}{\beta}$$

$$S_A = \frac{1}{A_f} \cdot \frac{\partial A_f}{\partial A} \Rightarrow \frac{(\beta A + 1)}{A} \frac{(\beta A + 1) - \beta A}{(\beta A + 1)^2} = \frac{1}{A(\beta A + 1)} \xrightarrow{\beta A \gg 1} \emptyset$$

$$S_T = \frac{1}{A_f} \cdot \frac{\partial A_f}{\partial T}$$

---

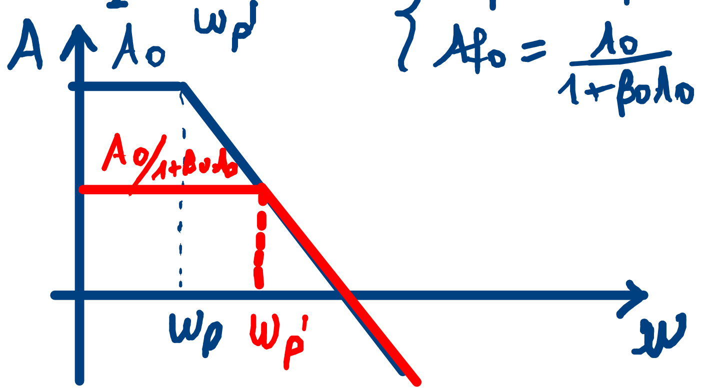
$$A = \frac{A_0}{1 + \frac{s}{\omega_p}} \qquad \beta = \underline{\underline{\beta_0}}$$

$$A_f = \frac{\frac{A_0}{1+\frac{s}{\omega_p}}}{1 + \frac{\beta_0 A_0}{1+\frac{s}{\omega_p}}} = \frac{A}{1+\beta A}$$

$$= \frac{A_0}{1 + \frac{s}{\omega_p} + \beta_0 A_0} = \frac{A_0}{1+\beta_0 A_0} \cdot \frac{1}{1 + \frac{s}{\omega_p (1+\beta_0 A_0)}} =$$

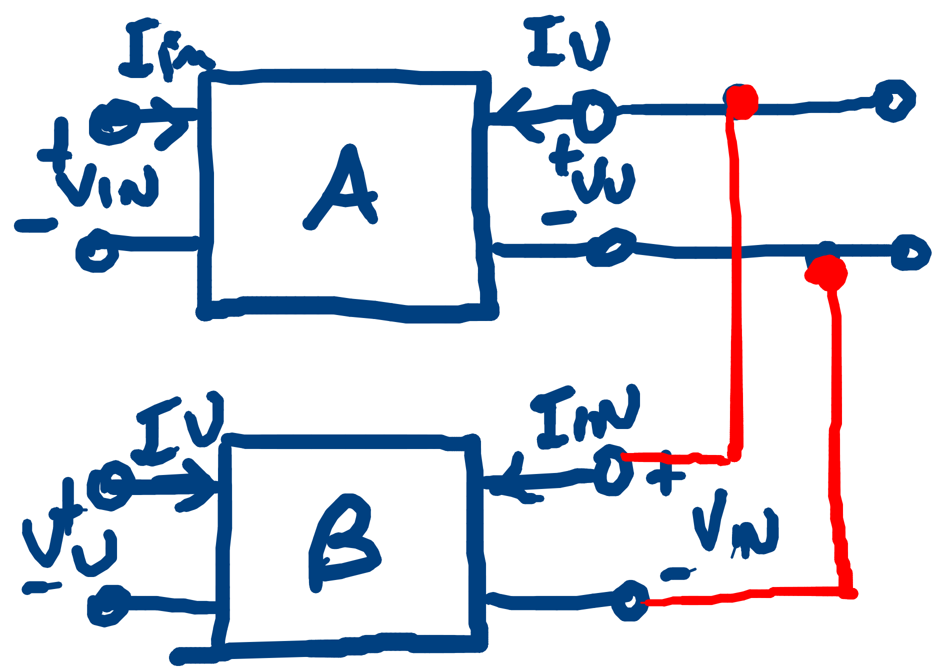
$$= \frac{A_{f0}}{1 + \frac{s}{\omega_p'}}$$

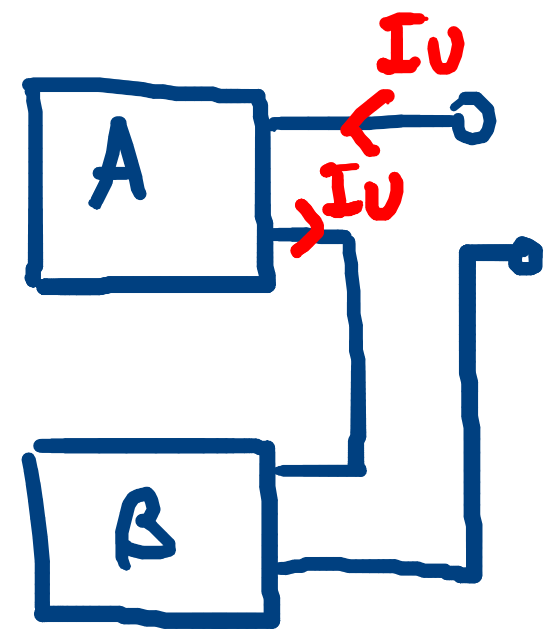
$$\begin{cases} \omega_p' = \omega_p (1 + \beta_0 A_0) \\ A_{f0} = \frac{A_0}{1+\beta_0 A_0} \end{cases}$$

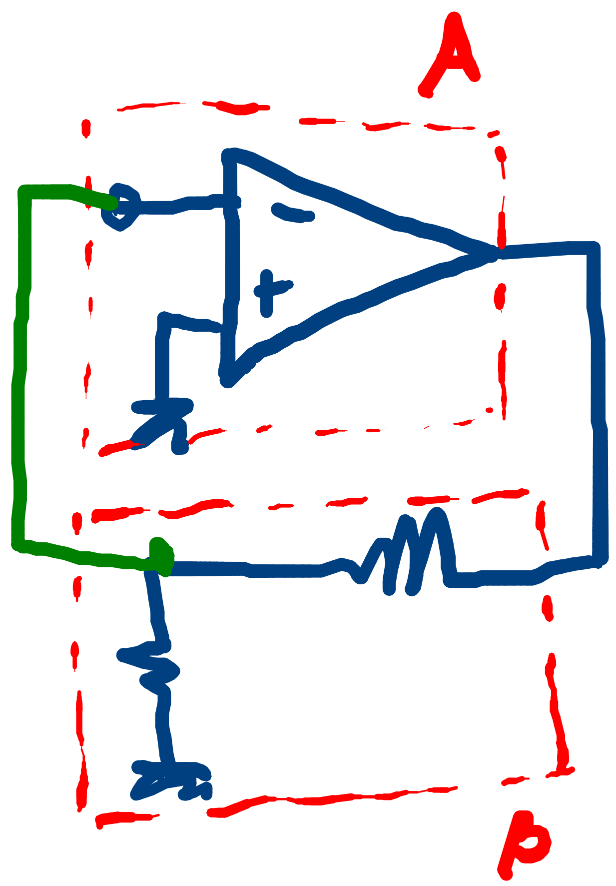


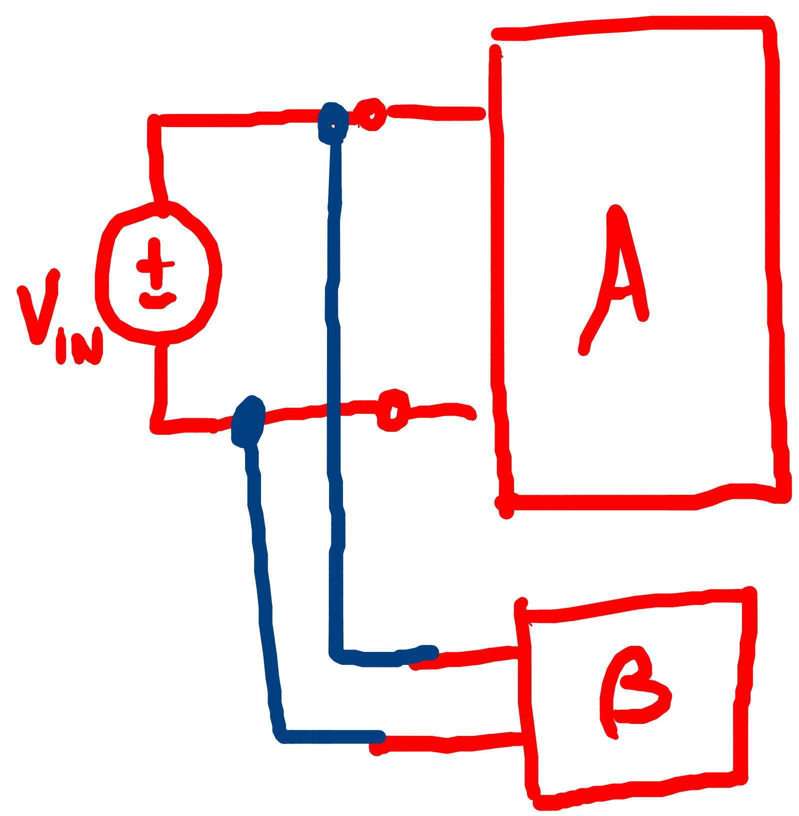

$$(PGB)_R = A_{f0} \cdot \omega_p' = \frac{A_0}{\cancel{1+\beta_0 A_0}} \cdot \omega_p \cancel{(1+\beta_0 A_0)} =$$

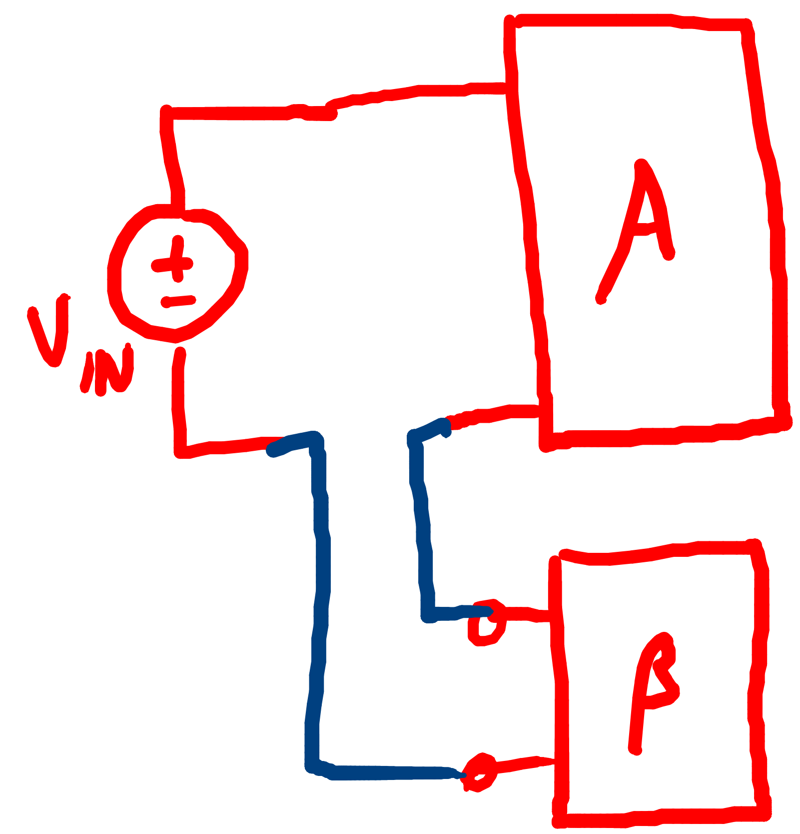
$$= A_0 \omega_p = (PGB)_A$$

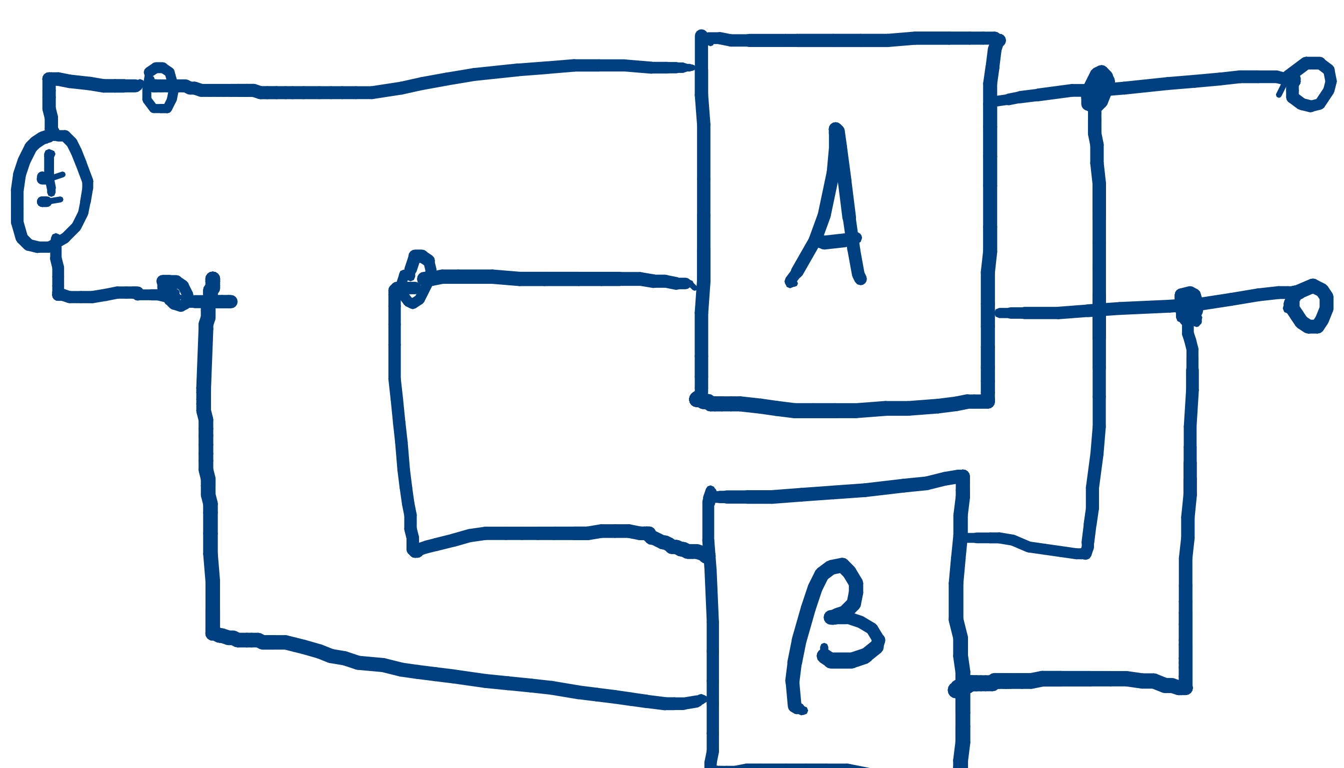

IIN
+
VIN
-
A
IU
+
VU
-
IU
+
VU
-
β
IIN
+
VIN
-

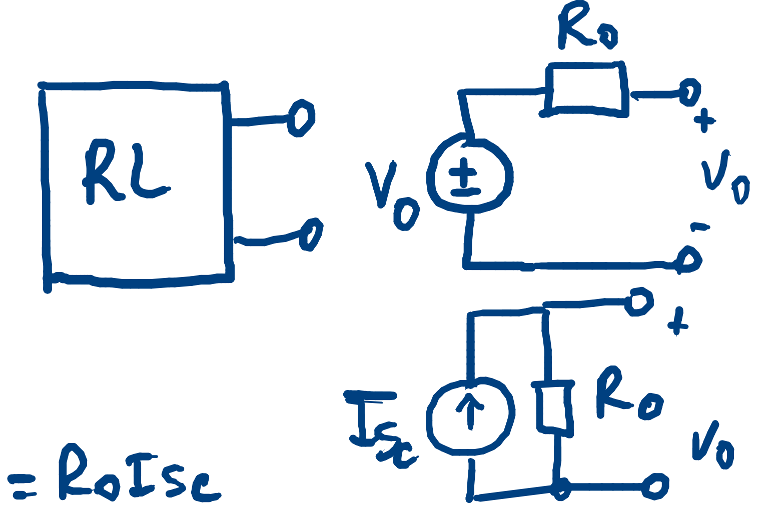

A
IU
IU
β


A
-
+
β


VIN
±
A
β


VIN
±
A
β


±
A
β




$V_o = R_o I_{sc}$

$R_o = \dfrac{V_o}{I_{sc}}$

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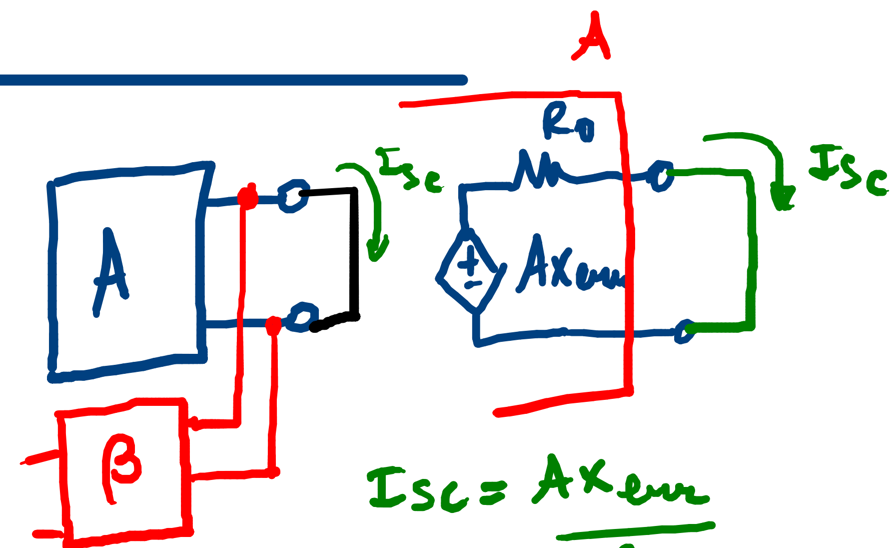


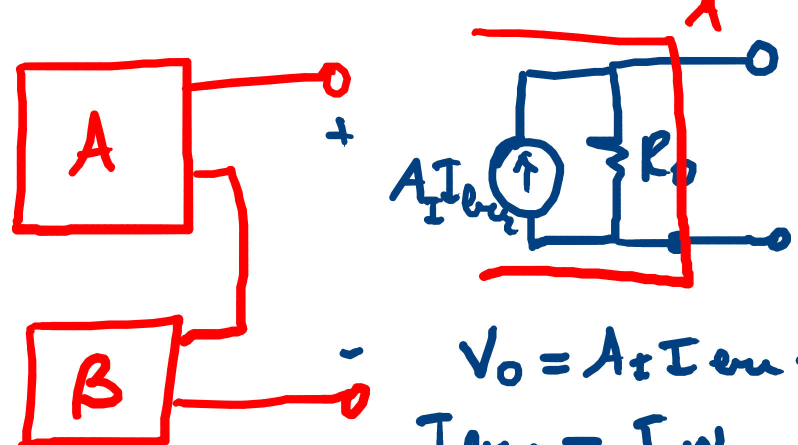

$I_{sc} = \dfrac{A x_{err}}{R_o}$

$x_{err} = x_{IN} - x_\beta = x_{IN}$

$I_{sc} = \dfrac{A x_{IN}}{R_o}$

$V_o = x_o = \dfrac{A}{1+\beta A} \underline{\underline{x_{IN}}}$

$R'_o = \dfrac{V_o}{I_{sc}} = \dfrac{\cancel{A}}{1+\beta A} \dfrac{\cancel{x_{IN}}}{\cancel{A x_{IN}}} \cdot R_o = \dfrac{R_o}{1+\beta A}$




$V_o = A_I I_{err} \cdot R_o$

$I_{err} = I_{IN}$

$V_o = A_I I_{IN} \cdot R_o$

$I_{sc} = \dfrac{A_I I_{IN}}{1+\beta A_I}$

$R'_o = \dfrac{\cancel{A_I} R_o \cancel{I_{IN}}}{\cancel{A_I} \cancel{I_{IN}}} \cdot (1+\beta A_I)$

$R'_o = R_o(1+\beta A_I)$