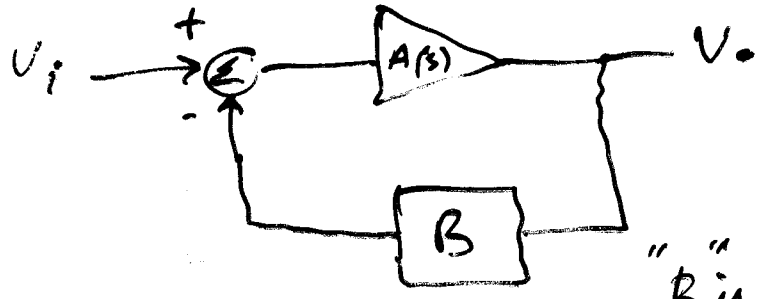
FEEDBACK APPLICATIONS

- USING FEEDBACK TO CONTROL FREQUENCY RESPONSE

Let us determine the influence of negative feedback on the Amplifier frequency response.



"B" is not a function of frequency

$$A(s) = \frac{A_0 \omega_H \cdot s}{(s+\omega_L)(s+\omega_H)} \quad \because \omega_L << \omega_H$$

① LOW FREQUENCY ($\omega << \omega_H$)

$$A(s) = \frac{s \cdot A_0}{(s+\omega_L)} \qquad A_F(s) = \frac{A}{1+AB}$$

$$\Rightarrow A_F(s) = \frac{s A_0 / s+\omega_L}{1 + s A_0 B / s+\omega_L}$$

$$A_F(s) = \left(\frac{A_0}{1+A_0B}\right)\left\{\frac{s}{s+\frac{\omega_L}{1+A_0B}}\right\}$$

$$\boxed{\omega_{LF} = \frac{\omega_L}{1+A_0B}}$$

2) HIGH FREQUENCY $(\omega \gg \omega_L)$

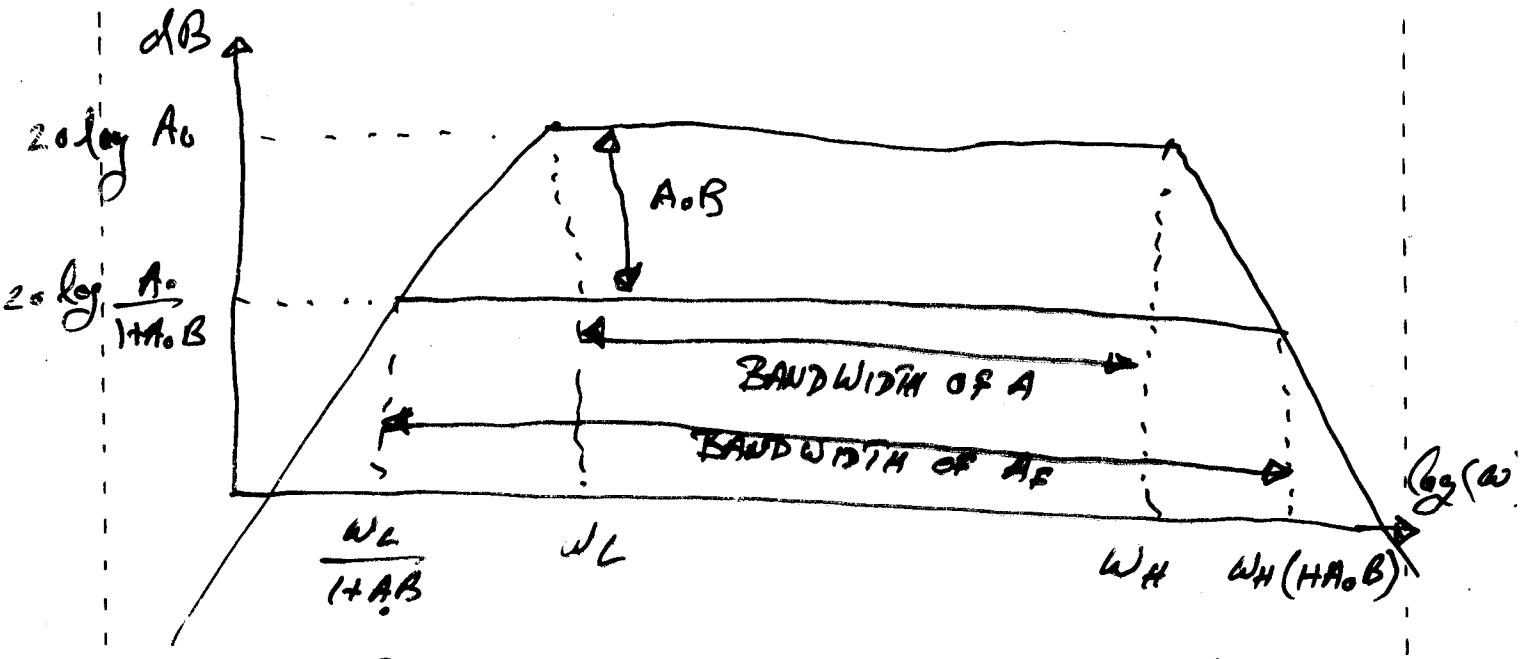
$$A(s) = \frac{A_0\,\omega_H}{s+\omega_H} \quad \therefore A_F(s) = \frac{A}{1+AB}$$

$$\Rightarrow A_F(s) = \frac{A_0\omega_H/s+\omega_H}{1+A_0B\omega_H/s+\omega_H}$$

$$A_F(s) = \left(\frac{A_0}{1+A_0B}\right)\cdot\left\{\frac{\omega_H(1+A_0B)}{s+\omega_H(1+A_0B)}\right\}$$

$$\boxed{\omega_{HF} = \omega_H(1+A_0B)}$$

FREQ. RESPONSE (APPLICATIONS) cont.



NOTE: TRADEOFF OF BANDWIDTH & GAIN

CALCULATION OF THE LOOP GAIN

Why do we need loop gain?

1) Can estimate the influence of negative feedback on R_{in} & R_{out}

Shunt: $R_{inF} = \dfrac{R_{in}}{1 + \text{Loop Gain}}$

$R_{outF} = \dfrac{R_{out}}{1 + \text{LOOP GAIN}}$

SERIES: $R_{if} = R_{in}(1 + \text{LOOP GAIN})$

$R_{of} = R_{out}(1 + \text{LOOP GAIN})$

2) To find the stability of "-ve" F.B.

There are two Methods to Calculate the LOOP GAIN:

i) DIRECT METHOD

ii) SUCCESSIVE VOLTAGE & CURRENT INJECTION METHOD