WIDE BAND VIDEO AMP

Recall $f_{3dB}$ of OP AMP = 20 Hz

VIDEO $\Rightarrow$ flat response out into MHz

* Trade off gain for bandwidth
* Use feedback
**Wideband Video Amps**

- **Use negative feedback**
- **Op Amps** → high open loop gain $10^5 (100 \text{dB}) - 10^6 (120 \text{dB})$ at low $f$
- **Sacrifice $f$ response**, $f_{3dB} = 5 \text{Hz}$
- **Video amps** - flat, wideband gain up to 4-6 MHz TV, some apps. 50 MHz
- **Gain - Bandwidth trade-off**
  - Reduced load resistance for stage of amp
  - Negative feedback

\[
A_v = G_m R_0
\]

\[
A(s) = \frac{a_0}{1 - \frac{a_0}{f_l}}
\]

**Overall gain:**

\[
A(s) = \frac{v_o}{v_i} = \frac{a(s)}{1 + fa(s)}
\]
\[ A(s) = \frac{a_0}{1 - \frac{s}{p_1}} \cdot \frac{1}{1 - \frac{s}{a_0 f}} = \frac{a_0}{1 - \frac{s}{p_1} + a_0 f} \]

\[ = \frac{a_0}{1 + a_0 f} \cdot \frac{A_0}{1 - \frac{s}{p_1 (1 + a_0 f)}} \]

**Low freq. gain** \( A_0 = \frac{a_0}{1 + a_0 f} \)

**New pole** \( p_1 = p_i (1 + a_0 f) \)

**\( f_{-3dB} \) increased by** \((1 + a_0 f)\)

\((\text{Gain} \cdot \text{Bandwidth})(w=0) = \text{const.}\)

Feedback is internal, reducing \( A_o \) of diff. amp.