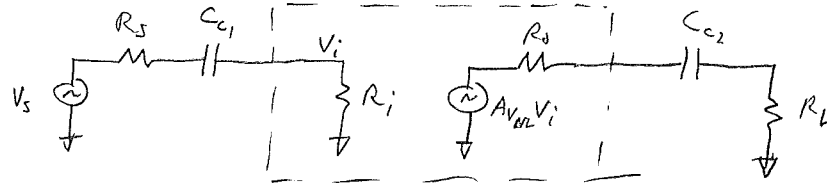


Coupling Capacitors

Consider CE Amp AC ckt (with C_b big)



"How do we select C_c ?"

"Consider V divider at input!"

$$\frac{V_i}{V_s} = \frac{R_i}{R_i + R_s - j|X_c|}$$

$$|X_c| = \frac{1}{\omega C_c} = \frac{1}{2\pi f C_c}$$

C_c acts "like a short" provided

$$|X_{c1}| \ll R_s + R_i$$

$$\Rightarrow \frac{1}{2\pi f C_{c1}} \ll R_s + R_i$$

$$\Rightarrow C_{c1} \gg \frac{1}{2\pi f (R_s + R_i)}$$

Example:

$$R_s + R_i = 50 + 1K$$

$$f = 100 \text{ MHz}$$

$$\Rightarrow C_{c1} \gg 1.5 \text{ pF}$$

Similarly at output, choose $C_{c2} \gg \frac{1}{2\pi f (R_o + R_L)}$

Conclusion:

Sufficiently

Very small C can produce low Z at RF



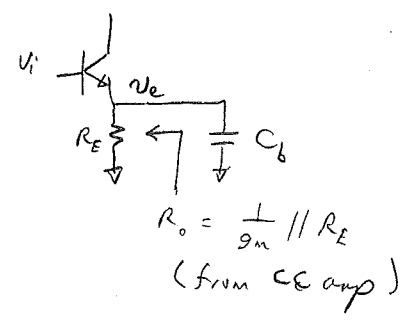
Bypass Caps

Consider Emitter Bypass:

To prevent gain reduction, we need:

$$|X_c| \ll \frac{1}{g_m} \parallel R_E$$

$$\Rightarrow C_b \gg \frac{1}{2\pi f (\frac{1}{g_m} \parallel R_E)} \approx \frac{g_m}{2\pi f}$$



Why?

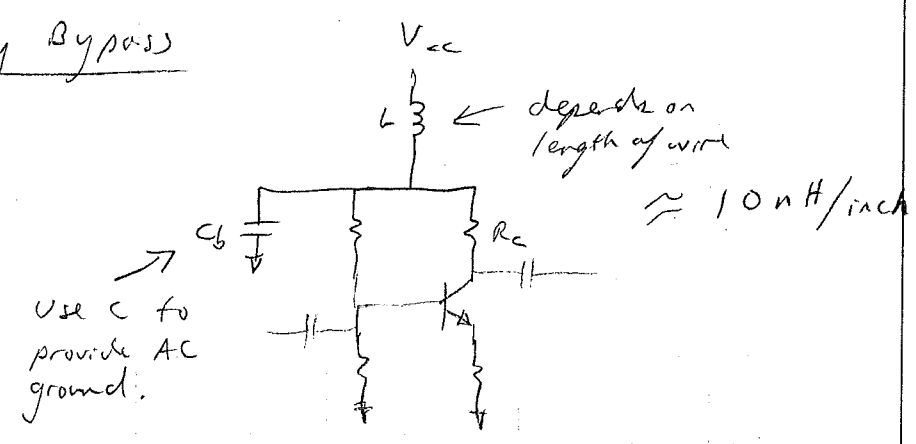
Want full v_i across bc junction

Think of ckt as CC amp.

If $X_c \nless R_o$, will have AC signal at emitter and $|V_{be}| = |v_i - v_e| < |v_i|$

Hence, full v_i not across bc junction & gain falls

Consider Supply Bypass



make ~~smaller than~~ $X_c \ll R_c$ so that output voltage drop is across R_c and not L

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