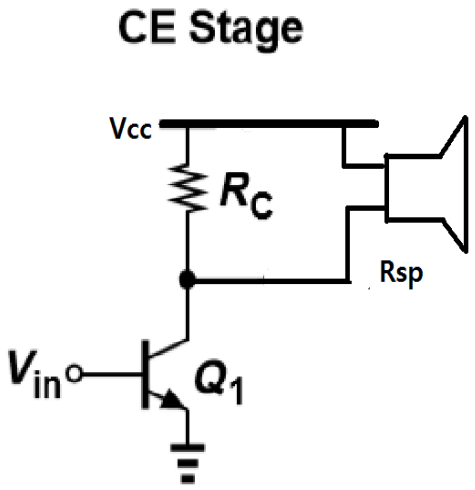
Lesson 24 :
Emitter Follower as a Buffer & Review of BJT Circuit

2012142230 Won Hyo Kyeong

Lesson 24 : Emitter Follower as a Buffer & Review of BJT Circuit

- - Youtube : Lec 28.
- - Textbook : Chapter 5.3.3

- **1. How does Emitter Follower role as a buffer?**



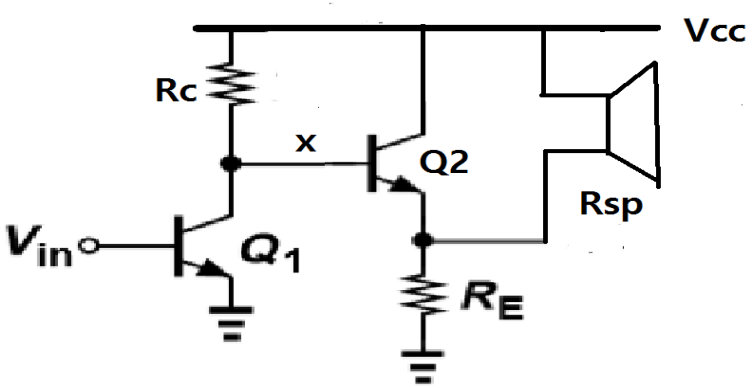
: Av = - $g_m(R_c ll R_{sp})$

: Non-Spearker voltage gain = - $g_m R_c$

In general case, $(R_c ll R_{sp})$ << R_c

So CE stage with speaker's gain decrease.

Emitter Follower connected between CE stage and speaker!



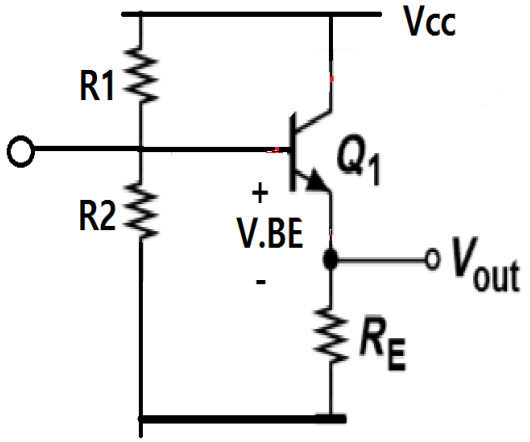
$$\frac{V_x}{V_\in} = -g_{m1}[R_c ll(r_{\pi 2} + (\beta+1)(R_E ll R_{sp})]$$

$$\frac{V_{out}}{V_x} = \frac{R_E ll R_{sp}}{R_E ll R_{sp} + \frac{1}{g_{m2}}}$$

$$\frac{V_{out}}{V_\in} \gg -g_m(R_c ll R_{sp})$$

(This fact can know that subsitute general value)

2. Bias design in Emitter Follower

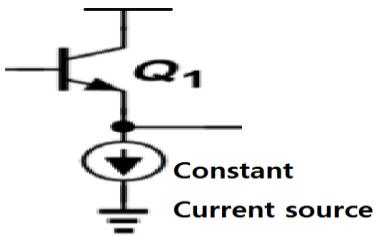


Vcc > V.BE : Not saturation

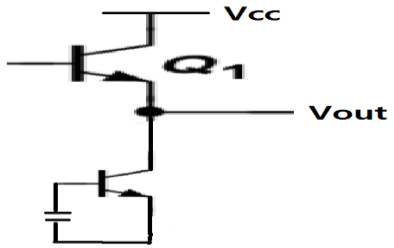
$$\approx \frac{V_{cc} - V_{BE}}{2}$$

(Maximum value Vout = Vcc - V.BE)

Actual implematation in integrated circuit

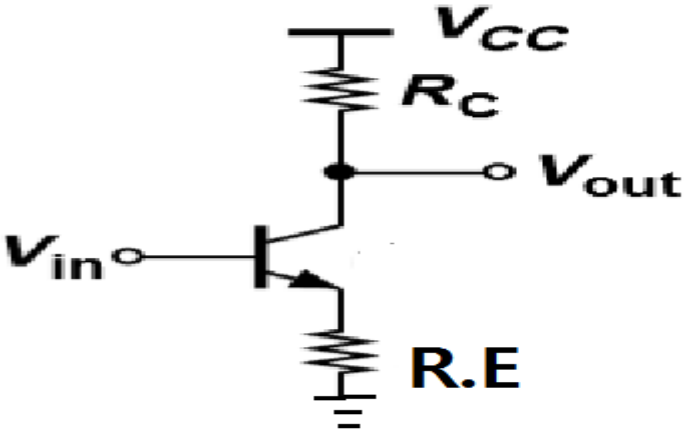


=>



Review of BJT circuit

1. CE stage

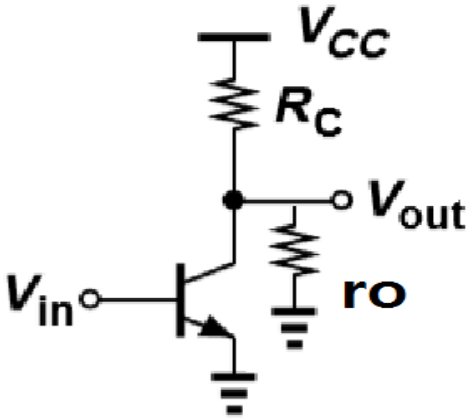


$$V_A = \infty$$

$$A_v = -\frac{R_c}{\frac{1}{g_m} + R_E}$$

$$R_{\in} = r_\pi + (\beta + 1) R_E$$

$$R_{out} = R_C$$

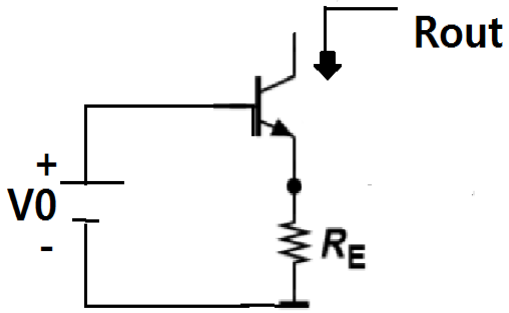


$$V_A < \infty$$

$$A_V = -g_m (R_C llr_o)$$

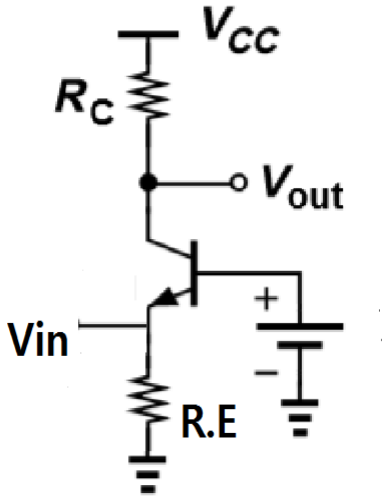
$$R_{\in} = r_\pi$$

$$R_{out} = R_c llr_o$$



$$R_{out} = (1 + g_m r_o)(R_E \| r_\pi) + r_o$$

2. CB stage



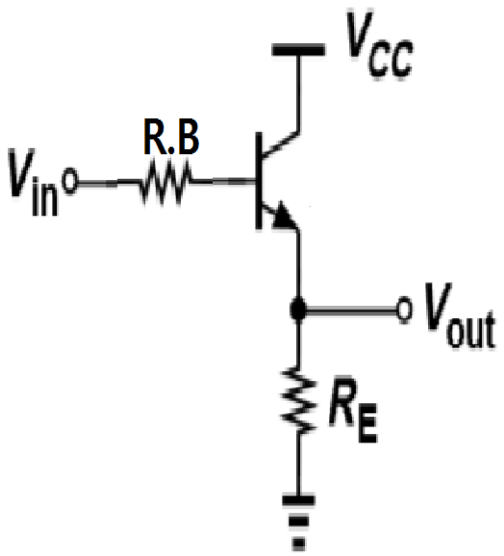
$$V_A = \infty$$

$$A_V = g_m R_C$$

$$R_{\in} = \frac{1}{g_m} \| R_E$$

$$R_{out} = R_C$$

3. Emitter Follower



$$V_A = \infty$$

$$A_V = \frac{R_E}{R_E + \frac{1}{g_m} + \frac{R_B}{\beta+1}}$$

$$R_{\in} = R_B + r_\pi + (\beta+1)R_E$$

$$R_{out} = (\frac{R_B}{\beta+1} + \frac{1}{g_m}) ll R_E$$