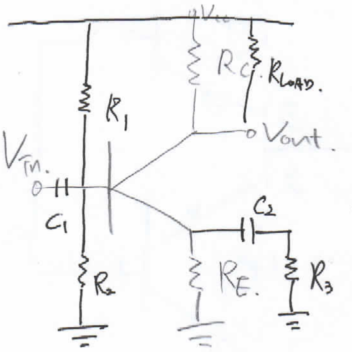
11/6. ①.

AC-Coupled

Common emitter follower.



$\Delta V_{out} = \frac{R_C}{R_E} \Delta V_{in}$

if V_{in} = 

ex) $V_{cc} = 20V$, Gain = -100, $I_c = 0.5mA$ (given)

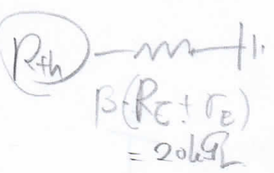
$f_{3dB} = 100Hz$ for biasing

1. DC component (Quiescent Case)

$V_E = 1V$ (given for temp stability)

$R_E = \frac{1V}{0.5mA} = 2k\Omega$.

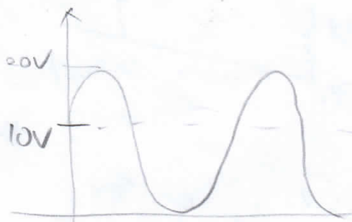
$\frac{R_2}{R_1+R_2} = \frac{1.6}{20}$ ... ①.



$= \frac{R_1 R_2}{R_1+R_2} = 20k$ ... ②.

$R_1 = 220k$, $R_2 = 20k$.

From R_C, Centering at V_{out}.



$V_{out} = 10^V = V_{cc} - I_c R_c = 20 - (0.5) R_C$
$= 10V$

$\therefore R_C = 20k$.

2. AC component (signal) $R_{LOAD} \gg R_C$

Gain $= -100 = -\frac{R_C (// R_{LOAD})}{R_E // R_3 + r_e}$

$r_e = \frac{25.4}{I_E} = 50\Omega$ (very small)

$= -\frac{20k}{R_E // R_3 + r_e}$

So, 150. $= 50$

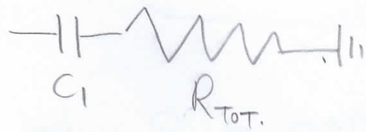
$= 200$

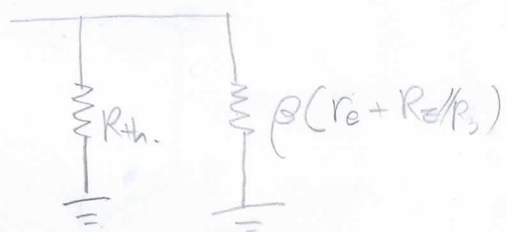
$\therefore R_E // R_3 = 150\Omega$

$\therefore \frac{R_E \cdot R_3}{R_E + R_3} = 150$.

$R_3 \cong 150\Omega$

C_1 ⓐ $\omega_{3dB} = 100Hz$



$R_{TOT} =$ 

$R_{th} = 20k$

$\beta(r_e + R_E // R_3) = 100 (50 + 2 // 150)$

$= 20k$.

$R_{TOT} = 10k$

$f'_{3dB} = 50Hz \longleftarrow 100Hz$. $C_1 = 0.33\mu F$

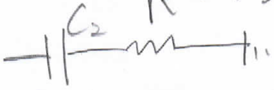
($\because$ Cascaded HPF)

to avoid excessive attenuation

②

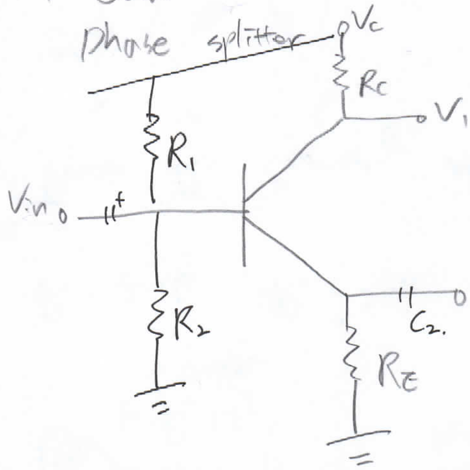
C_2

$R = R_3 + r_e = 200\Omega$



$f'_{3dB} = 50Hz$, $C_2 \cong 16\mu F$

Unit Gain phase splitter



$\Delta V_1 = -\frac{R_C}{R_E // r_e} \Delta V_{in}$ (r_e ignore)

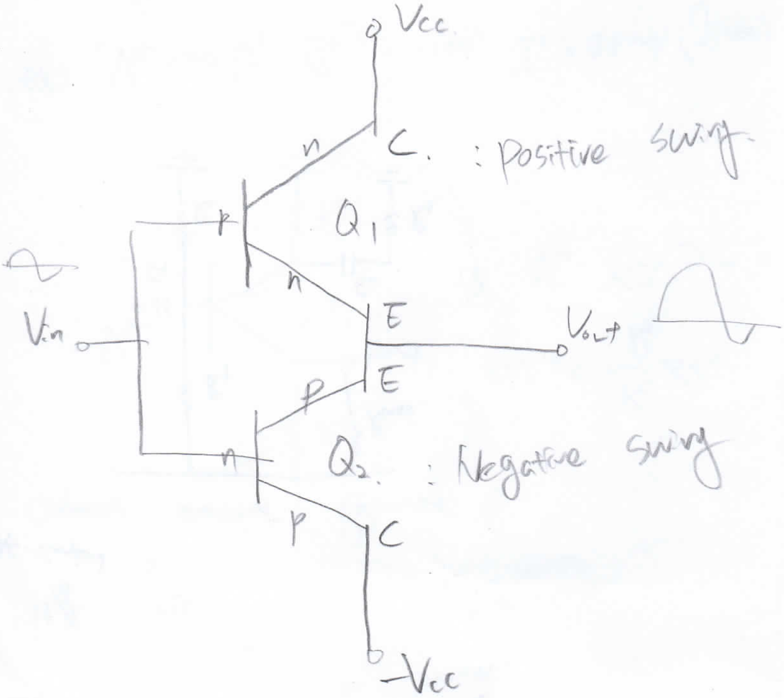
$= -\Delta V_{in}$ (if $R_C = R_E$) → 180° phase change of ΔV_{in}.

$\Delta V_2 = \Delta V_{in}$.

application example.

180° difference in phase.

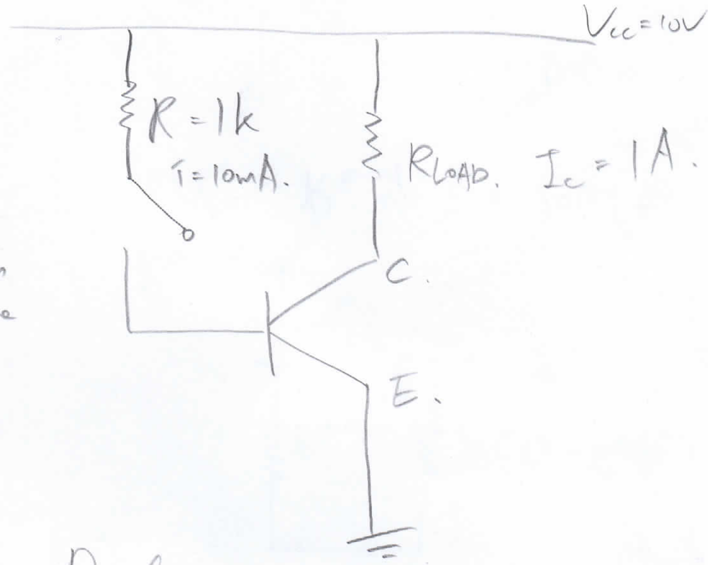
Push Pull Amplifier.



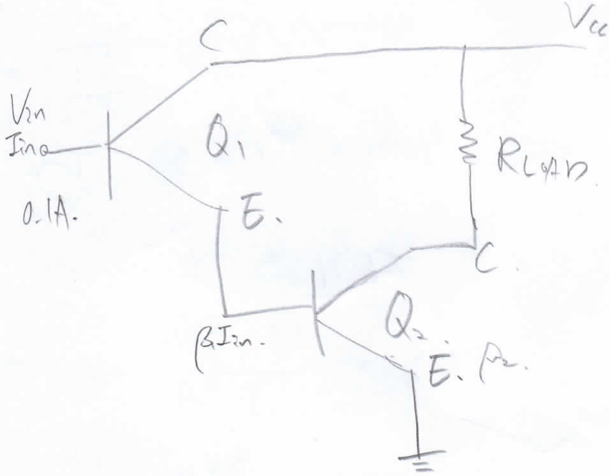
: positive swing.

: Negative swing

TR switch.



Darlington Circuit



$\beta_2 \beta_1 I_{in} = I_c = 1kA$ (100, 100)

$d_1 = \sqrt{x^2 + (y-h)^2}$

$d_2 = \sqrt{x^2 + y^2}$

$d_3 = \sqrt{\quad}$