

Exemplo

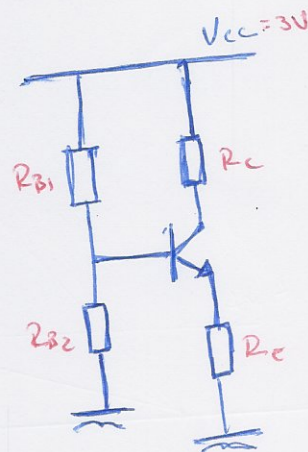
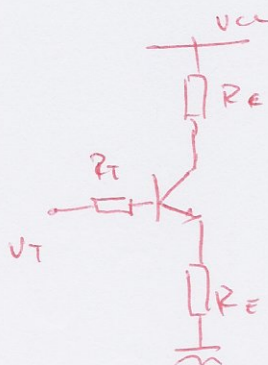
Analisando o circuito ao lado,

calcule:

(1) I_{B0} .

(2) I_{C0} .

(3) V_{BE0} .



$\beta = 500$

$I_S = 10^{-15} \text{ A}$

$R_E = 300 \Omega$

$R_{B1} = 1950 \Omega$

$R_{B2} = 1000 \Omega$

$$R_T = \frac{R_{B1} R_{B2}}{R_{B1} + R_{B2}}$$

$$R_T = 661.016 \Omega$$

$$R_C = ?$$

$$V_T = V_{CC} \frac{R_{B2}}{R_{B1} + R_{B2}}$$

$$V_T = 1.983 \text{ V}$$

$$I_{B0} = \frac{V_T - V_{BE0}}{R_T + R_E(\beta + 1)}$$

$$V_{BE0} = V_T \ln\left(\frac{\beta I_{B0}}{I_S}\right)$$

Iterando:

0: $V_{BE0} = 0.0 \text{ V}$

$I_{B0} = 6.736 \mu\text{A}$

1: $V_{BE0} = 0.746 \text{ V}$

$I_{B0} = 1.794 \mu\text{A}$

2: $V_{BE0} = 0.711 \text{ V}$

$I_{B0} = 2.020 \mu\text{A}$

3: $V_{BE0} = 0.714 \text{ V}$

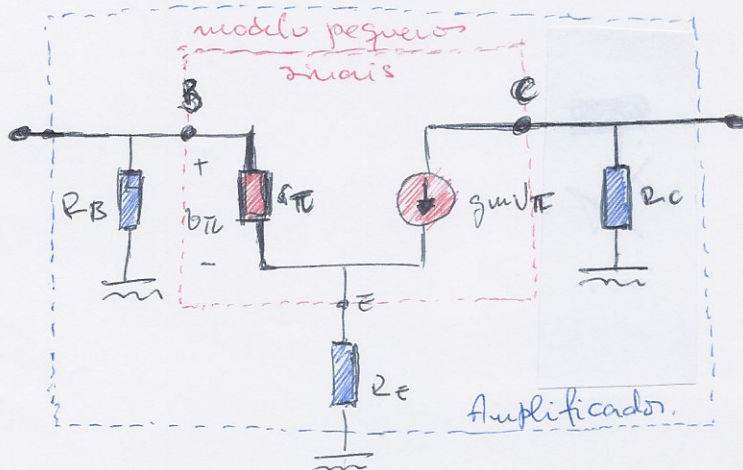
$I_{B0} = 2.000 \mu\text{A}$

$I_C = \beta I_B$

$I_C = 1 \text{ mA}$

→ Em pequenos sinais: (sem incluir o efeito early!)

Para formar o amplificador



Observe que temos a mesma corrente I_C do exemplo anterior. Podemos comparar o comportamento!!

$$R_B = R_{B1} \parallel R_{B2} = \frac{(1 \times 1.95) 10^6}{(1 + 1.95) 10^3}$$

$$R_B = 661.01 \Omega$$

$$r_{\pi} = \frac{V_T}{I_{B0}} = 12.918 \text{ k}\Omega$$

$$g_m = \frac{I_{C0}}{V_T} = 38.705 \text{ mS} \quad (3)$$