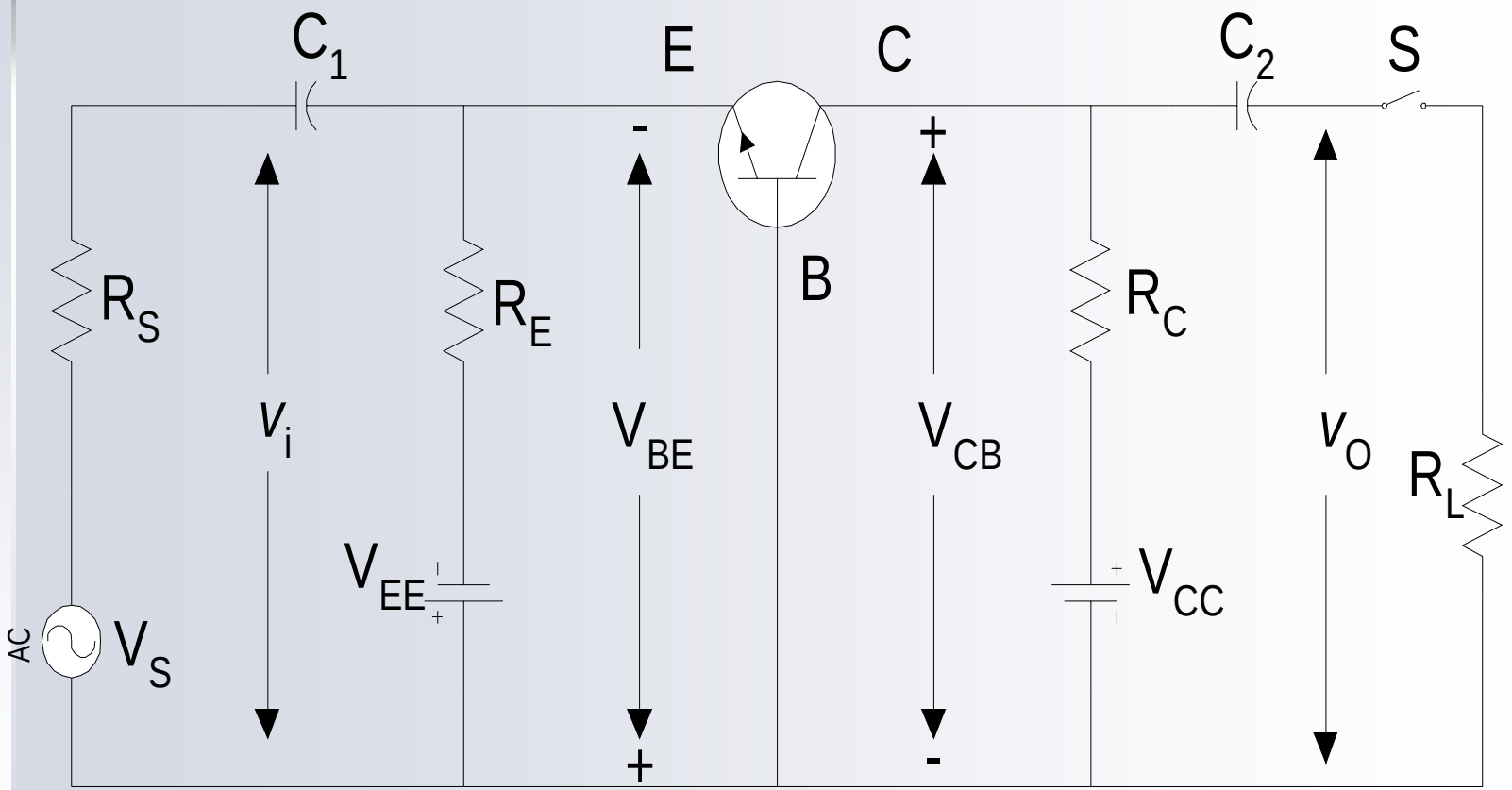
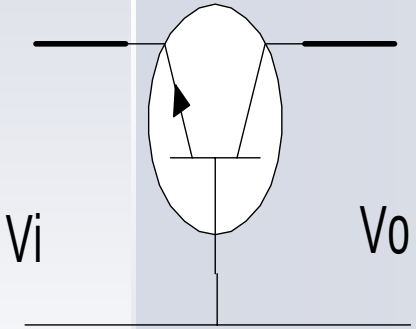
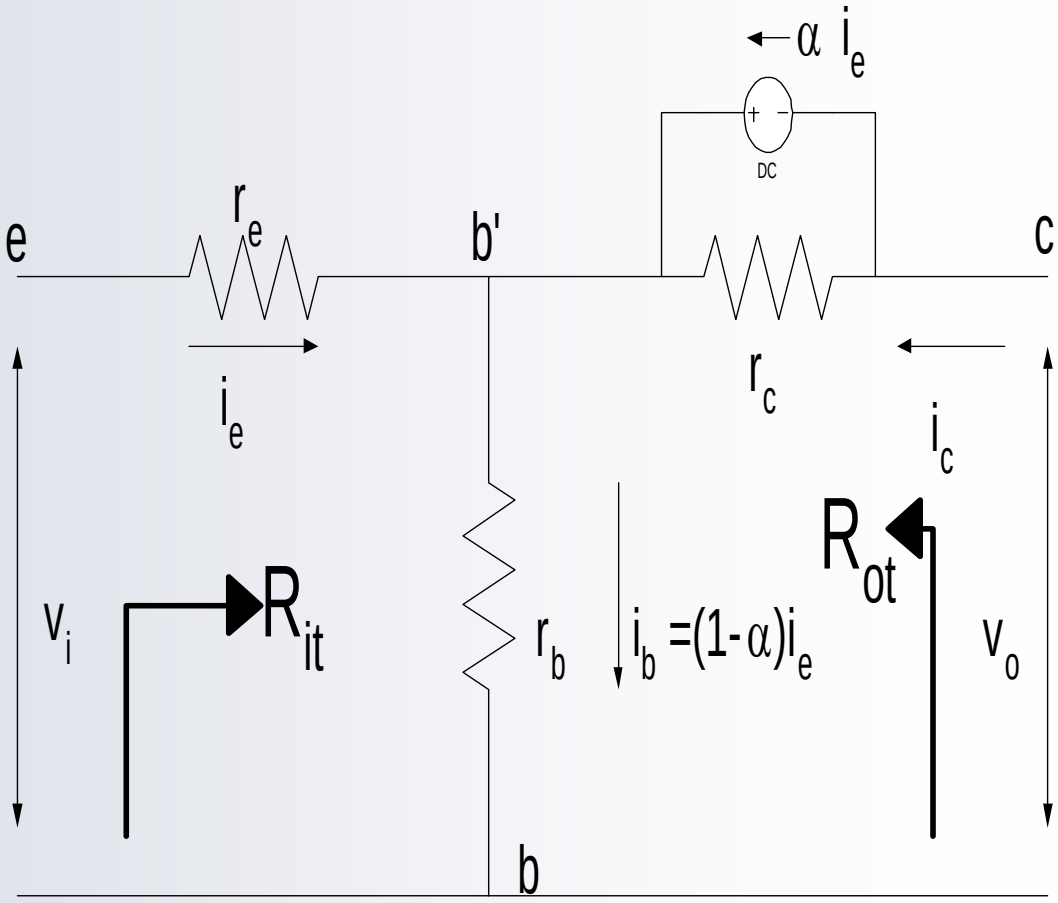
T-Configuration of Amplifier Voltage

Common Base Amplifier



It can be converted into:





r_b is about 300Ω and
r_c is about 1MΩ

$$R_{it} = \frac{v_i}{i_i} = \frac{v_i}{i_e} = \frac{i_e r_e + i_b r_b}{i_e}$$

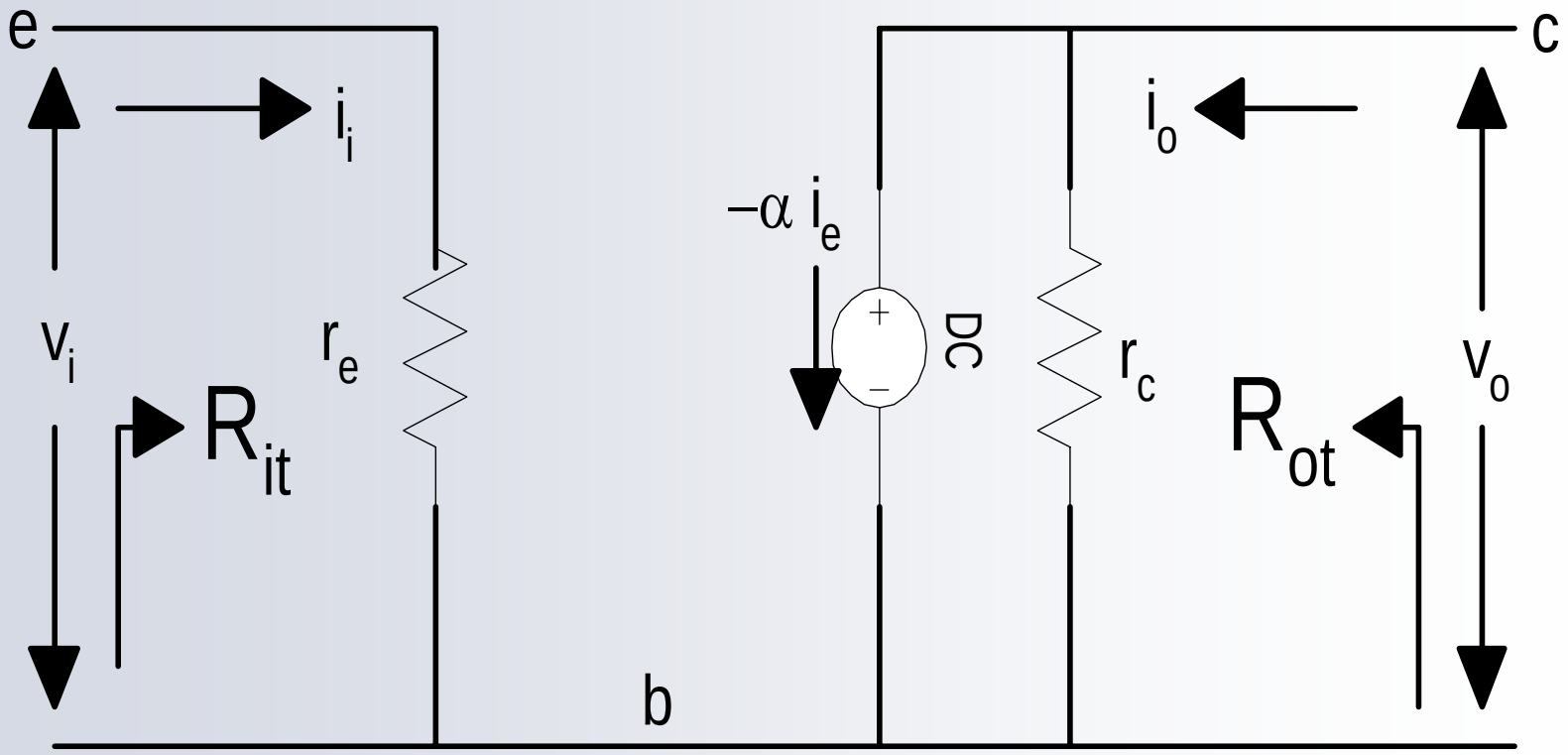
$$= \frac{i_e r_e + i_e (1-\alpha) r_b}{i_e}$$

$$= r_e + (1-\alpha) r_b \approx r_e$$

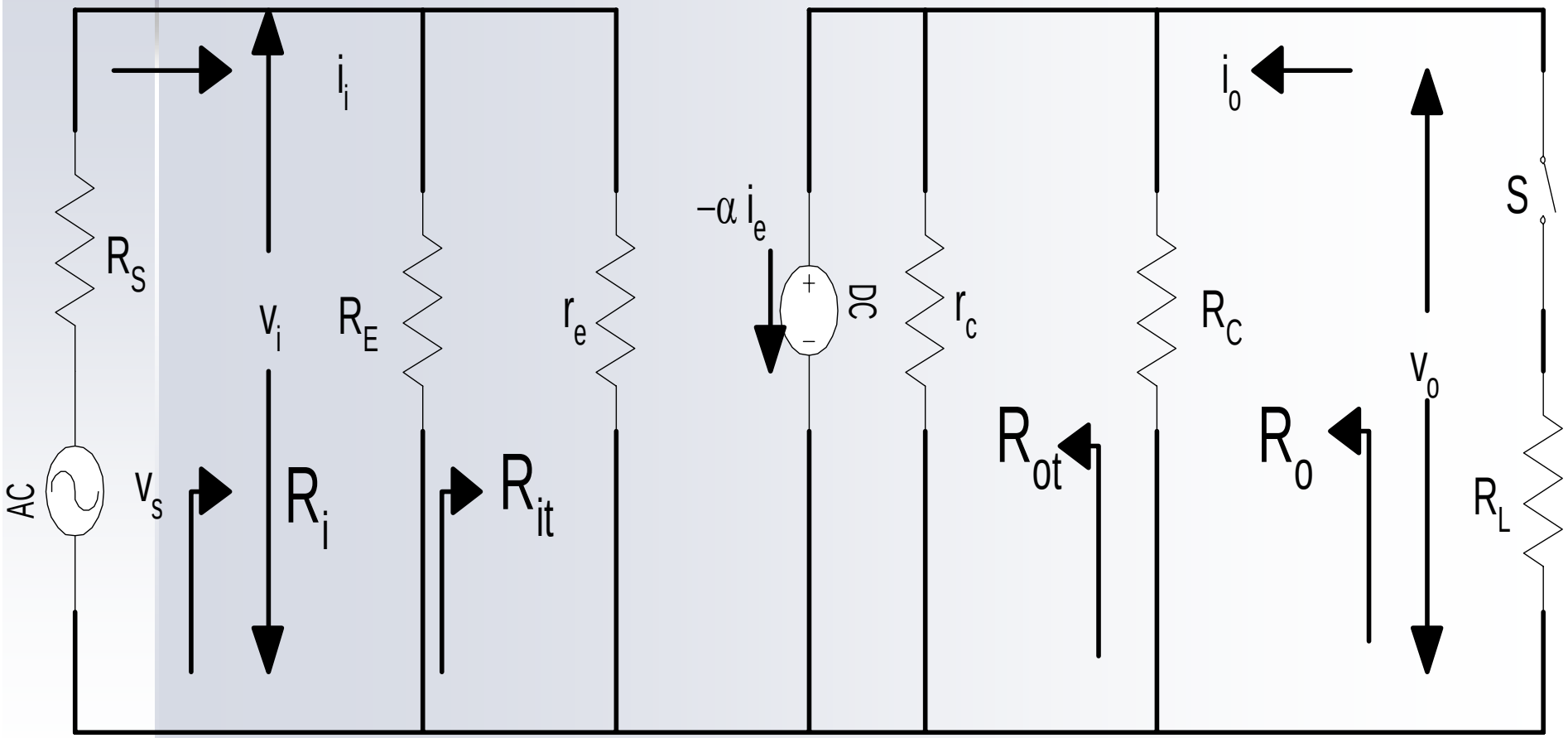
$$r_e = \frac{25}{I_E(mA)}\Omega$$

$$R_{ot} = r_b + r_c \approx r_c \approx 1M\Omega$$

It can be simplified as:



Then it will be:



Parameters of T-configuration are

$$R_i = R_E \,//\, r_e = \frac{R_E \cdot re}{R_E + r_e}$$

$$R_o = r_c \,//\, R_C = \frac{r_c \cdot R_C}{r_c + R_C}$$

$$v_i = \frac{R_i}{R_i + R_S} v_s$$

$$v_o = -(\alpha i_e)(r_c // R_C)$$

$$A_v = \frac{v_o}{v_i} = \frac{-\alpha \; i_i \, (r_c \,//\, R_C)}{R_i \, i_i} \approx -\frac{\alpha \, (R_o)}{r_e}$$

$$v_o' = \frac{R_L}{R_o + R_L} v_o \qquad A_v' = \frac{v_o'}{v_i}$$