

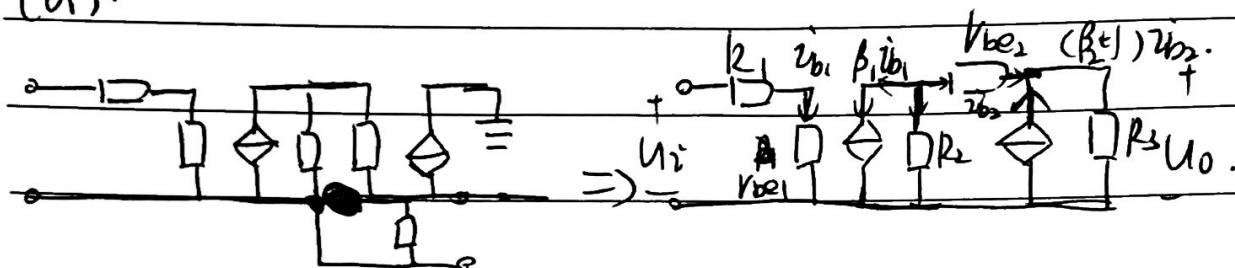
P178.31

(a) T_1 共射 T_2 共基 (b) T_1 共射 T_2 共射 (c) T_1 共射 T_2 共射

(d) T_1 共集 T_2 共基 (e) 共源 T_2 共集 (f) T_1 共基 T_2 共集

P178. 3.2 \dot{A}_u, R_i, R_o .

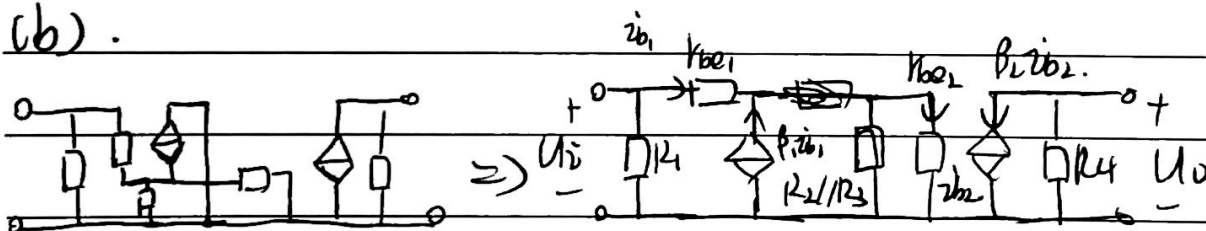
(a).



$$\begin{aligned} \dot{A}_u &= \frac{(\beta_2 + 1) \dot{U}_{be2} \cdot R_3}{\dot{U}_{be1} (R_1 + R_{be1})} \\ &= -\beta_1 (\beta_2 + 1) \frac{R_2 R_3}{(R_{be2} + (\beta_2 + 1) R_3 + R_2) (R_1 + R_{be1})} \end{aligned} \quad \left. \begin{aligned} \dot{U}_{be2} R_{be2} + (\beta_2 + 1) \dot{U}_{be2} R_3 &= \dot{U}_{be2} R_2 \\ \beta_1 \dot{U}_{be1} &= -\dot{U}_{be2} + \dot{U}_{be1} \end{aligned} \right\}$$

$$R_i = R_1 + R_{be1}, \quad R_o = \frac{R_3 + R_{be2}}{\beta_2 + 1} \parallel R_3$$

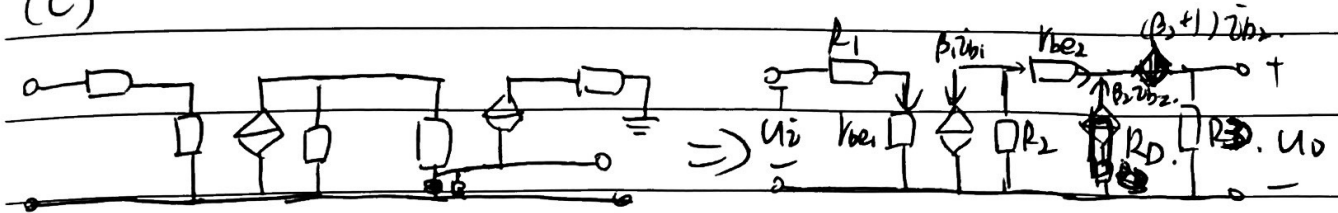
(b).



$$\begin{aligned} \dot{A}_u &= \frac{-\beta_2 \dot{U}_{be2} R_4}{(\beta_1 + 1) \dot{U}_{be1} (R_2 \parallel R_3 \parallel R_{be2}) + \dot{U}_{be1} R_{be1}} \\ &= \frac{-\beta_2 (\beta_1 + 1) \frac{R_2 \parallel R_3}{R_2 \parallel R_3 + R_{be2}} \cdot R_4}{(\beta_1 + 1) (R_2 \parallel R_3 \parallel R_{be2}) + R_{be1}} \end{aligned} \quad \left. \begin{aligned} \dot{U}_{be2} R_{be2} &= (\beta_1 + 1) \dot{U}_{be1} - \dot{U}_{be1} \\ \dot{U}_{be2} R_{be2} &= (\beta_1 + 1) \dot{U}_{be1} - \dot{U}_{be1} \end{aligned} \right\}$$

$$R_i = R_1 \parallel (R_{be1} + (\beta_1 + 1) (R_2 \parallel R_3 \parallel R_{be2})), \quad R_o = R_4$$

(C)



R_D 为 Q 点处二极管等效电阻

$$\dot{A}_u = \frac{(\beta_2 + 1) \dot{u}_{b2} R_3}{\dot{u}_{b1} (R_1 + r_{be1})}$$

$$\begin{cases} \dot{u}_{b2} r_{be2} + (\beta_2 + 1) \dot{u}_{b2} R_D = \beta_1 \dot{u}_{b1} R_2 \\ \dot{u}_R + \dot{u}_{b2} = -\beta_1 \dot{u}_{b1} \end{cases}$$

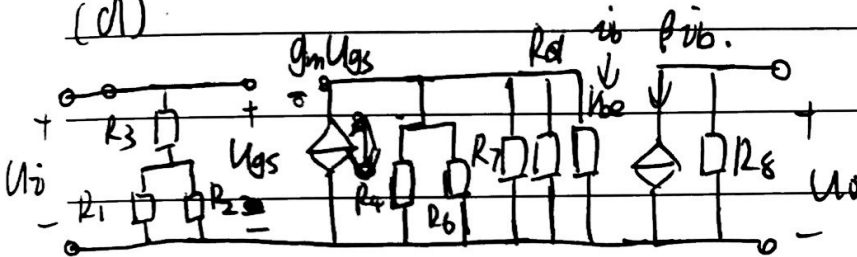
\dot{A}_u

$$\dot{A}_u = \frac{-\beta_1 (\beta_2 + 1) R_2 R_3}{(R_2 + r_{be2} + (\beta_2 + 1) R_D) (R_1 + r_{be1})}$$

$$R_i = R_1 + r_{be1}$$

$$R_o = R_D \parallel \frac{R_2 + r_{be2}}{\beta_2 + 1} \cdot R_3$$

(D)



$$\dot{A}_u = \frac{-\beta \dot{u}_b R_8}{\dot{u}_{gs} + \dot{u}_b} \quad \dot{u}_b = \frac{R_4 \parallel R_6 \parallel R_7 \parallel R_8}{r_{be} + R_4 \parallel R_6 \parallel R_7 \parallel R_8} g_m \dot{u}_{gs}$$

$$\dot{A}_u = \frac{-\beta R_8 R' g_m}{r_{be} + R' + r_{be} R' g_m} \quad R' = R_4 \parallel R_6 \parallel R_7 \parallel R_8$$

$$R_i = R_3 + (R_1 \parallel R_2) \quad R_o = R_8$$

$$\dot{A}_u = \frac{-g_m (R_4 \parallel R_6 \parallel R_7 \parallel r_{be1} \parallel R_d) \beta R_8}{r_{be2}}$$

P179. 3.5

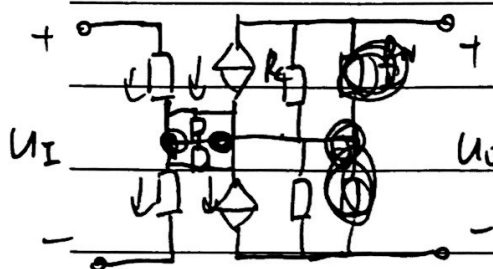
$$r_{be} = r_{bb'} + \beta \frac{26\text{mV}}{I_{CQ}}$$

$$I_{CQ} \cdot R_c + U_{CEQ} + I_{EQ} \cdot \frac{R_w}{2} + 2I_{EQ} \cdot R_e = V_{CC} + V_{EE}$$

$$I_{EQ} \cdot \frac{R_w}{2} + 2I_{EQ} \cdot R_e + U_{BEQ} = V_{EE} \Rightarrow I_{EQ} = 0.517\text{mA}$$

$$\therefore I_{CQ} \approx I_{EQ} = 0.517\text{mA} = 517\mu\text{A}, r_{be} = 5.13\text{k}\Omega$$

交流通路



$$A_d = \frac{-\beta i_b \cdot R_c \times 2}{2(i_b r_{be} + (\beta+1) \frac{R_w}{2})} = \frac{-\beta R_c}{r_{be} + (\beta+1) \frac{R_w}{2}}$$

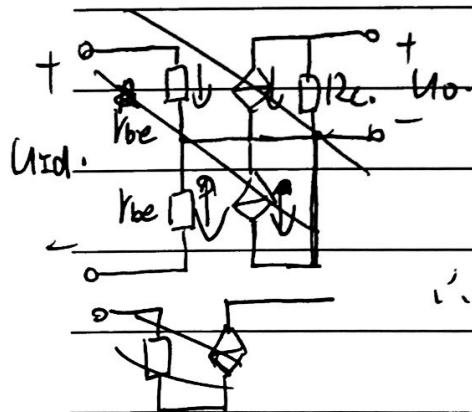
$$= -98.23$$

$$R_i = 2r_{be} + 2(\beta+1) \frac{R_w}{2} = 20.36\text{k}\Omega$$

P179. 3.6

$$\begin{cases} \frac{U_{Id}}{2} + U_{IC} = U_1 \\ U_{IC} - \frac{U_{Id}}{2} = U_2 \end{cases} \Rightarrow \begin{cases} U_{Id} = 10\text{mV} \\ U_{IC} = 15\text{mV} \end{cases}$$

交流通路:



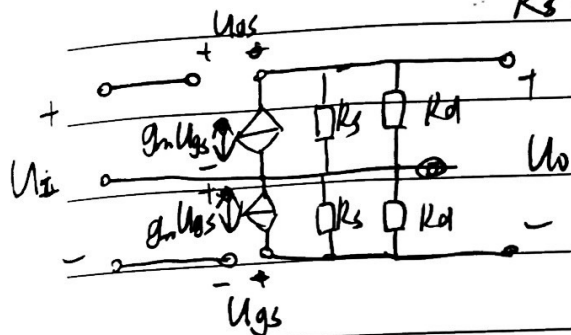
$$A_{ec} = 0$$

$$A_{id} = \frac{-\beta i_b R_c}{i_b 2r_{be}} = \frac{1}{2} \frac{-\beta R_c}{r_{be}} = -175$$

$$\therefore U_O = A_{id} \cdot U_{Id} = -1.75\text{V}$$

P179. 3.7

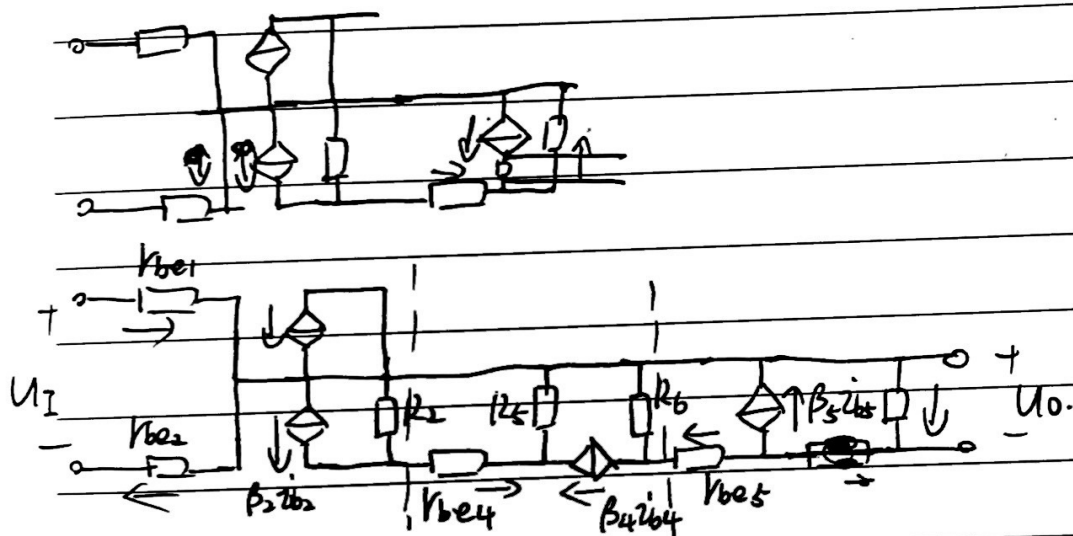
$R_s \gg R_d$. 7.69.



$$R_s = \infty$$

$$\begin{aligned} \therefore \dot{A}_d &= \frac{-2g_m U_{gs} R_d}{2U_{gs}} \\ &= \frac{g_m R_d}{1 + g_m R_d} = 0.995. \\ &= -g_m R_d = -200 \end{aligned}$$

P179. 3.8



$$\therefore R_{i1} = R_{be1} + R_{be2}, \quad \dot{A}_u = \frac{(1 + \beta_1) U_{be1} R_7}{U_{be1} + U_{be2}} = \dot{A}_{u1} \cdot \dot{A}_{u2} \cdot \dot{A}_{u3}.$$

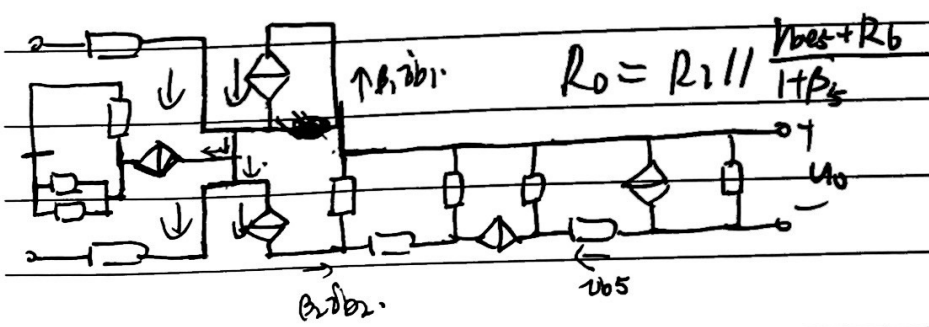
$$\dot{A}_{u1} = \frac{\beta_2 (R_2 // R_{i2})}{R_{be1} + R_{be2}}.$$

$$R_{i2} = R_{be4} + (1 + \beta_2) R_5.$$

$$\dot{A}_{u2} = \frac{\beta_4 (R_6 // R_{i3})}{(R_{be4} + (1 + \beta_2) R_5)}.$$

$$R_{i3} = R_{be6} + (1 + \beta_4) R_7.$$

$$\dot{A}_{u3} = \frac{(1 + \beta_5) R_7}{R_{be5} + (1 + \beta_4) R_7}.$$



P181.3.9

(1) $U_{CE2} = 12V$, $U_{CE3} = U_{CE2} - U_{CE2} = 11V \approx U_{OQ}$

$U_{om} \approx \frac{U_{CE3}}{5} = 7.78V = |A_u| \cdot U_{immax}$

$\therefore U_{immax} = 77.8mV$

(2) $U_o = |A_u| U_i = 1V$ 有效值

R_3 开路, T_2 ~~截止~~ 击穿, T_1, T_3 复合, $\beta_{eq} = \beta_1 \cdot \beta_3$

T_3 饱和, $U_o = U_{CE3} - U_{CES} = -11V$

R_3 短路, $U_o = V_{CC} - U_{BEQ} = 11.3V$

P181.3.10

(1) ① (2) ③ (3) ⑤ ⑦ (4) ② (5) ⑥

(6) ⑧ ⑤ (7) ④