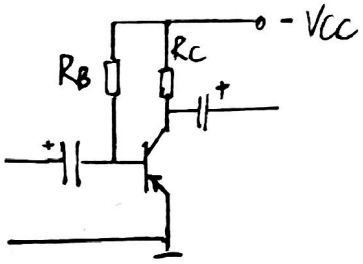
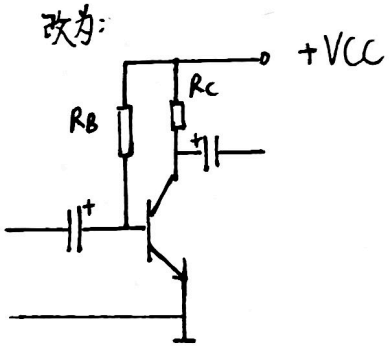
2-1

1. a b a a
2. b
3. a b
4. a a b
5. b



b) $U_{be}=0$ 晶体管截止

改为：



2-16

1. 增大　基本不变　增大
2. 增大　基本不变

2-4

A管　PNP型

X为发射极，Y为基极，Z为集电极

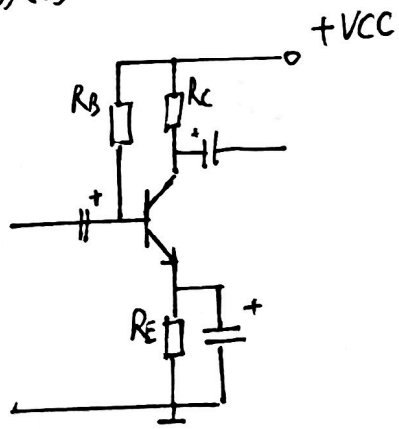
B管　NPN型

X为基极　Y为集电极　Z为发射极

c)　$U_b > U_c$　$U_b > U_e$　饱和状态

输入信号接 VCC，不能输入

改为：



2-7.

a)

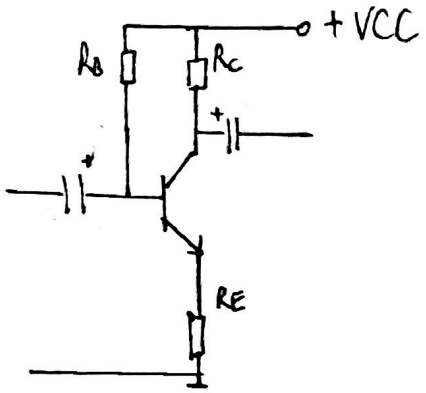
PNP型晶体管要满足 $U_e > U_b > U_c$ 才能工作在放大状态

应改为：

联系方式：_____

d) be之间无电流，不能工作

改为：

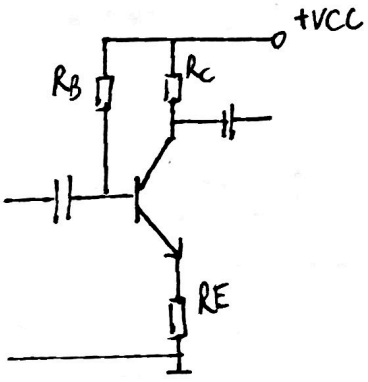


e) 可以放大

f) 可以放大

g) 输出端接VCC不能输出

改为：

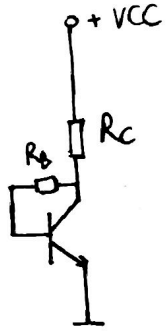


h) 输入信号被短路 不能输入

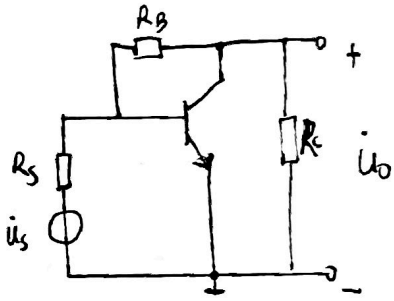
应去掉 C_B

2-8

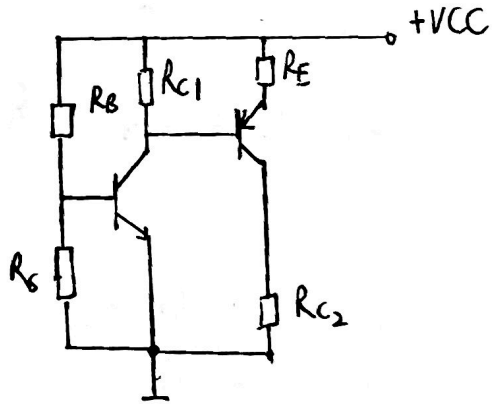
a) 直流通路



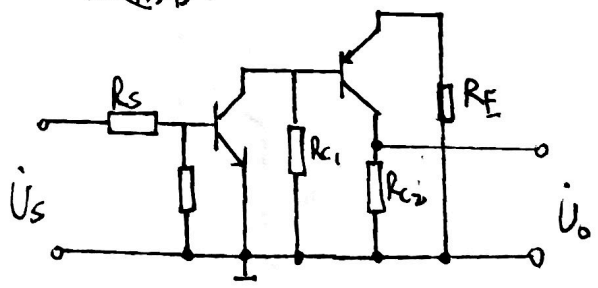
交流通路



b) 直流通路，



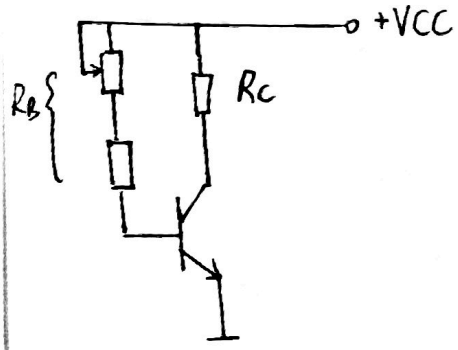
交流通路：



联系方式:_____

2-14　1.

直流通路



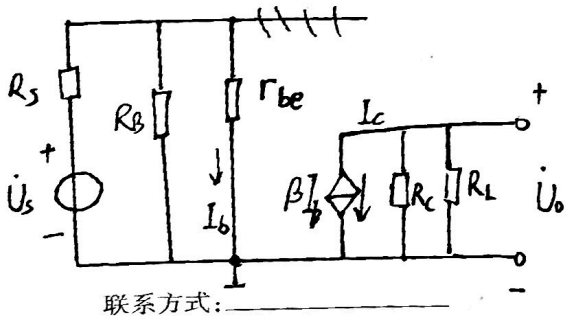
$$I_{BQ} = \frac{V_{CC} - U_{ON}}{R_B}$$

$$I_{CQ} = \bar{\beta} I_{BQ}$$

$\therefore I_{BQ} = 10\,\mu A$

$R_B \approx 1.2\,M\Omega$

2. 微变等效电路：



$$r_{be} = r_{bb'} + (1+\beta)\frac{U_T}{I_{EQ}}$$

$= 2700\,\Omega$

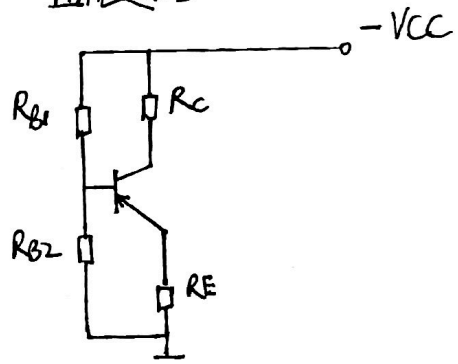
$$A_u = \frac{\dot{U}_o}{\dot{U}_i} = \frac{-\dot{I}_c R_L'}{\dot{I}_b r_{be}} = \frac{-\beta R_L'}{r_{be}} = -112$$

$$A_{us} = \frac{\dot{U}_o}{\dot{U}_s} = \frac{R_B // r_{be}}{R_S + R_B // r_{be}} \quad A_u = -83$$

3. $R_i = \frac{\dot{U}_o}{\dot{I}_i} = R_B // r_{be} = 2.7\,k\Omega$

$R_o = R_C = 10\,k\Omega$

2-15　直流通路：



联系方式：_____

$$U_B \approx \frac{R_{B2}(-VCC)}{R_{B1}+R_{B2}} = -4V$$

$$I_{CQ} \approx \frac{U_B}{R_E} = -2\ mA$$

$$I_{BQ} = \frac{I_{CQ}}{\beta} = -0.033mA = -33\ \mu A$$

$$U_{CEQ} \approx -VCC + I_C(R_C+R_E) = -6\ V$$

2. $U_{CEQ} = -4V$

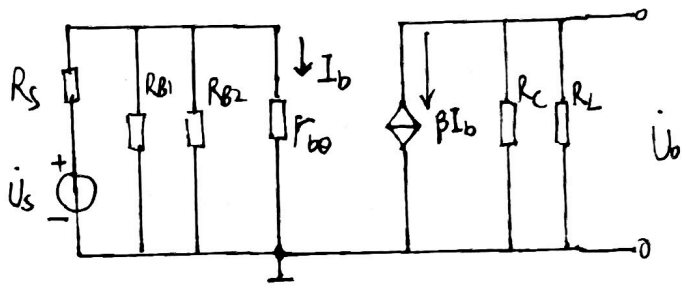
$\therefore I_C \approx -2.4\ mA$

$\therefore U_B \approx I_C R_E = -4.8\ V$

$\therefore -4.8 = \frac{20}{R_{B1}+20}(-12)$

$\therefore R_{B1} = 47\ k\Omega$

3. 微变等效电路：



$$r_{be} = (1+\beta)\frac{U_T}{I_{EQ}} = 793\ \Omega$$

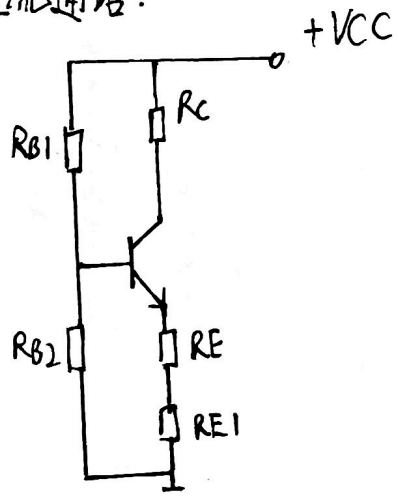
$$R_i = R_{B1}//R_{B2}//r_{be} = 753\ \Omega$$

$$R_o = R_c = 3\ k\Omega$$

$$A_{us} = \frac{\dot{U}_o}{\dot{U}_s} = -\frac{R_i}{R_i+R_s}\frac{\beta R_L'}{r_{be}} = -65$$

2-17

直流通路：



$$U_B = \frac{R_{B2} V_{CC}}{R_{B1}+R_{B2}} = 2.12V$$

$R_E = 0$ 时

$$I_{EQ} = \frac{U_B - 0.7}{R_{E1}} = 1.42mA$$

$$r_{be} = r_{bb'} + (1+\beta)\frac{26mV}{I_{EQ}} = 1.217k\Omega$$

$$R_i = R_{B1} // R_{B2} // [r_{be} + (1+\beta)R_E]$$

$$= 1.63k\Omega$$

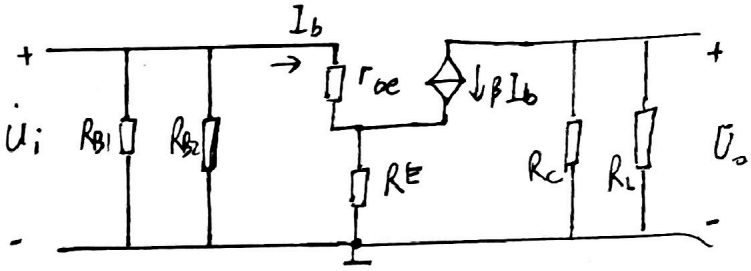
$$R_o = R_c = 8.2k\Omega$$

$$A_u = \frac{\dot{U}_o}{\dot{U}_i} = -\frac{\beta(R_L // R_c)}{r_{be}+(1+\beta)R_E} = -174$$

$R_E = 200\Omega$ 时

$$I_{EQ} = \frac{U_B - 0.7}{R_E + R_{E1}} = 1.18mA$$

$$A_u = -\frac{\beta(R_L // R_c)}{r_{be}+(1+\beta)R_E} = -15.5$$



$$R_i = \frac{\dot{U}_i}{\dot{I}_i} = R_{B1} // R_{B2} // [r_{be}+(1+\beta)R_E]$$

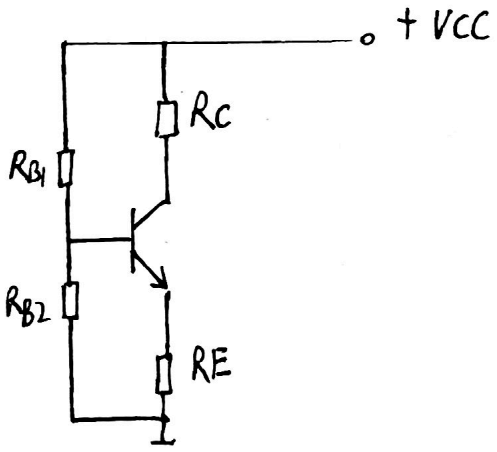
$$= 6.3k\Omega$$

$$R_o = R_C = 8.2k\Omega$$

R_E 增大时，$|A_u|$ 减小，R_i 增大

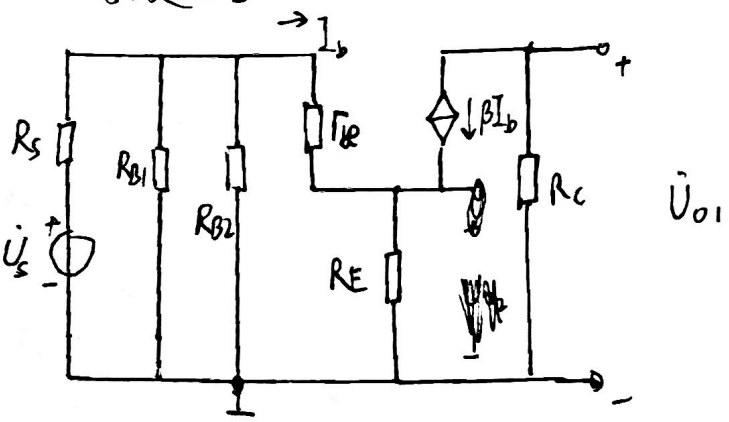
2-18.

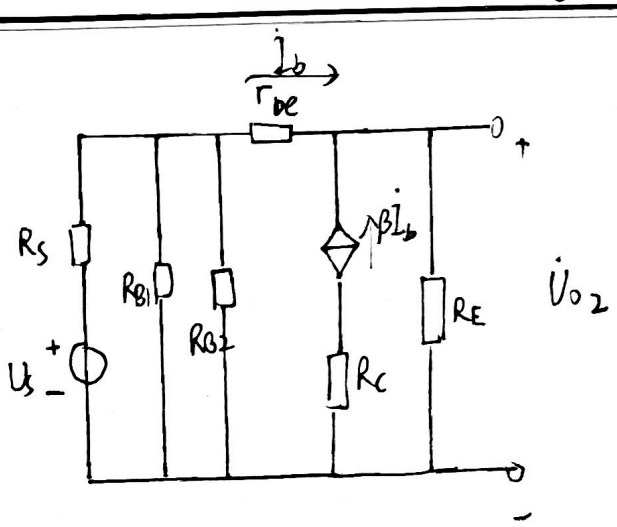
直流通路



联系方式：_____

微变等效电路





$$U_B = \frac{R_{B2}VCC}{R_{B1}+R_{B2}} = 4.3\ V$$

$$I_{CQ} \approx I_{EQ} = \frac{U_B - 0.7}{R_E} = 1.8\ mA$$

$$U_{CEQ} = VCC - I_{CQ}(R_C + R_E) = 2.8\ V$$

$$r_{be} = r_{bb'} + (1+\beta)\frac{26mV}{I_{EQ}} = 1.2k\Omega$$

$$R_i = R_{B1} // R_{B2} // [r_{be} + (1+\beta)R_E] = 8.2k\Omega$$

$$A_{u1} = \frac{\dot{U}_{O1}}{\dot{U}_S} = \frac{-\beta R_C}{r_{be}+(1+\beta)R_E}\frac{R_i}{R_i+R_S} = -0.79$$

$$R_{O1} = R_C = 2k\Omega$$

$$A_{u2} = \frac{\dot{U}_{O2}}{\dot{U}_S} = \frac{(1+\beta)R_E}{r_{be}+(1+\beta)R_E}\frac{R_i}{R_i+R_S}$$

$$= \text{约} 0.797$$

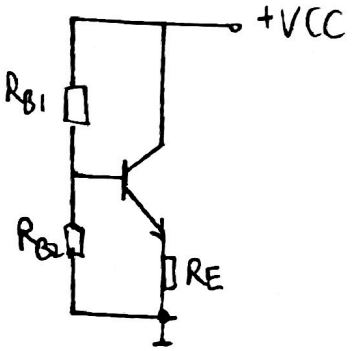
$$R_{O2} = R_E // \left(\frac{r_{be}+R_S // R_{B1} // R_{B2}}{1+\beta}\right)$$

$$= 33\ \Omega$$

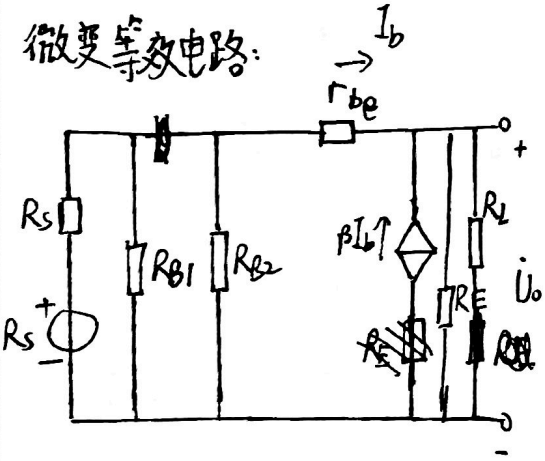
联系方式：_____

2-19

直流通路：



微变等效电路：



$$U_B = \frac{R_{B2}\,VCC}{R_{B1}+R_{B2}} = 4.9\ V$$

$$I_{CQ} \approx I_{EQ} = \frac{U_B - 0.7}{R_E} = 2.1\ mA$$

$$U_{CEQ} = VCC - I_{CQ}R_E = 7.8\ V$$

$$r_{be} = r_{bb'} + (1+\beta)\frac{26mV}{I_{EQ}} = 1.35\ k\Omega$$

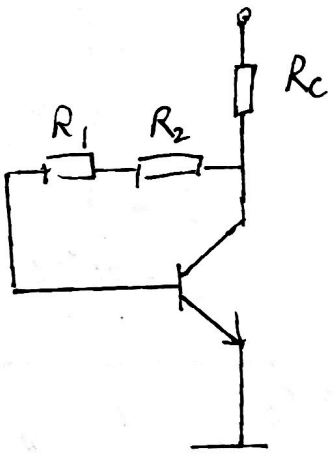
$$A_u = \frac{\dot{U}_o}{\dot{U}_i} = \frac{(1+\beta)(R_E /\!/ R_L)}{r_{be} + (1+\beta)(R_E /\!/ R_L)} = 0.987$$

$$R_i = R_{B1} /\!/ R_{B2} /\!/ [r_{be} + (1+\beta)R_L'] = 21.8\ k\Omega$$

$$R_o = R_E /\!/ \frac{r_{be} + R_S /\!/ R_{B1} /\!/ R_{B2}}{1+\beta} = 23\ \Omega$$

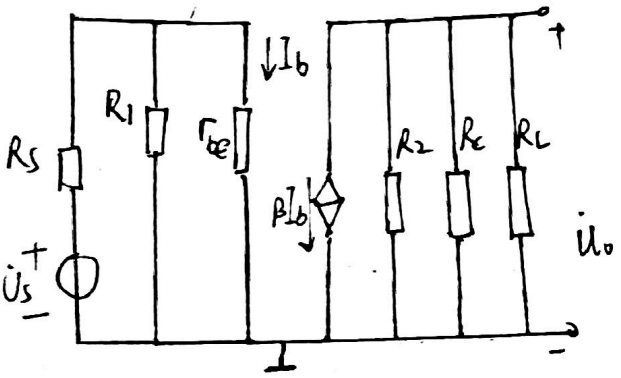
2-24

直流通路：



联系方式：_____

微变等效电路



$$A_u = \frac{\dot{U}_o}{\dot{U}_i} = \frac{-\beta R_L'}{r_{be}} = -149$$

$$R_i = r_{be} // R_1 = 1.3\ k\Omega$$

$$R_o = R_c // R_2 = 7.3\ k\Omega$$

$$A_{us} = \frac{R_i}{R_i + R_s} A_u = -83$$

$U_B = 0.7V \quad U_C = 4V$

$$I_{RC} = \frac{VCC - U_C}{R_C} = (1+\beta) I_B$$

$$= 1.34\ mA$$

$$\therefore I_B = 26\ \mu A$$

$$2R_1 I_B = U_C - U_B$$

$$\therefore R_1 = 62.8k\Omega$$

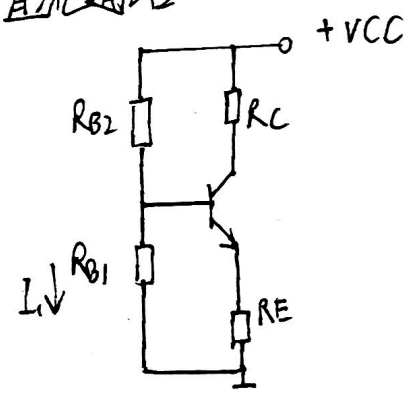
$$r_{be} = r_{bb'} + (1+\beta)\frac{26mV}{I_{EQ}}$$

$$= r_{bb'} + (1+\beta)\frac{26mV}{I_{CQ}}$$

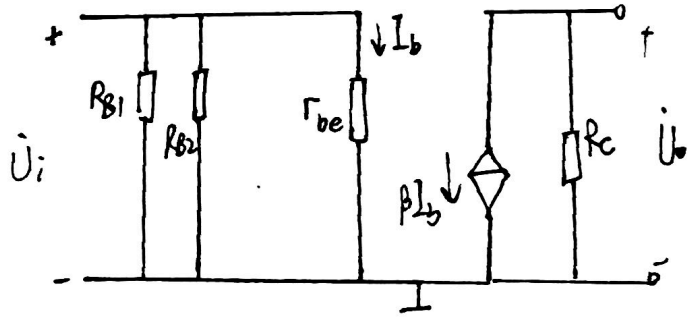
$$= 1.3\ k\Omega$$

2-25

直流通路



微变等效电路



联系方式：_____

$I_{BQ} = \frac{I_{CQ}}{\beta} = 10\,\mu A$

$I_1 = 10\, I_{BQ} = 100\,\mu A$

$U_B = I_1 R_{B1}$

$\therefore R_{B1} = 35\,k\Omega$

$R_{B2} = \frac{VCC - U_B}{U_B} R_{B1} = 85\,k\Omega$

$R_C = \frac{VCC - U_{CEQ} - (U_{BQ} - U_{BEQ})}{I_{CQ}}$

$= 5.2\,k\Omega$

$R_E = \frac{U_B - U_{BE}}{I_{EQ}}$

$= 2.8\,k\Omega$

$A_u = \frac{\dot{U}_o}{\dot{U}_i} = \frac{-\beta R_C}{r_{be}} = -193$

$R_i = R_{B1} // R_{B2} // r_{be} = 2.4\,k\Omega$

$R_o = R_C = 5.2\,k\Omega$