Repeat twice with a low β and a high β:

Low $\beta = \frac{2 \text{ LSD of college\#}}{5} + 75$

High β = Low $\beta + 150$

EEE210 : Electronic Circuits and Devices

Lab #7 : Biasing of a BJT

Experimental work : Use the NPN transistor 2N3904 or an equivalent. The pin out of the 2N3904 is presented in figure 1.

Build each of the circuits in figure 2. Measure V_B, V_C and V_E. Calculate V_{BE}, V_{CE}. Calculate I_B, I_C noting that : using Falstad circuit simulator.

$$I_B = \frac{15 \text{ V}}{R_1} - \frac{V_B}{R_1 || R_2} \quad \text{(for circuits \#2, \#3, \#4)}$$

Measure I_B, I_C, V_{CE}, V_{BE}.

$$I_C = \frac{15 \text{ V} - V_C}{R_C}$$

Note : Because the base current maybe very small, the above formula for I_B may yield negative values ; this is due to the inaccuracy of the instruments and the resistors.

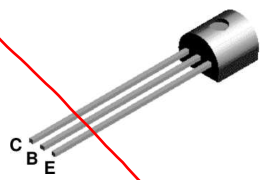
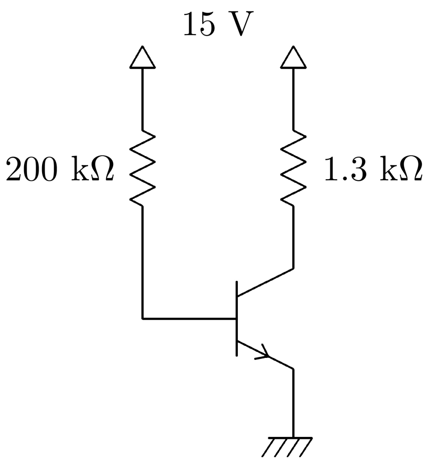


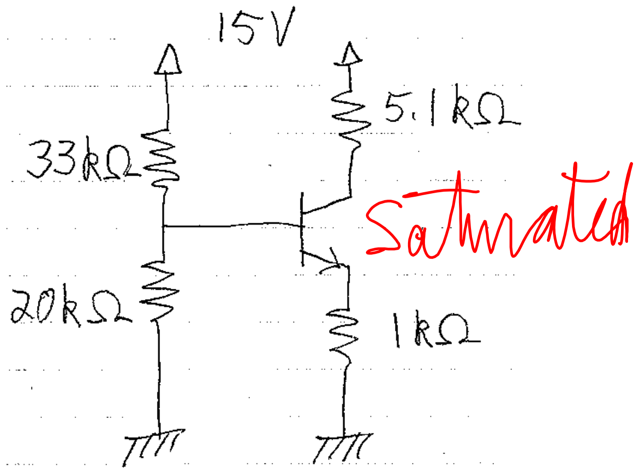
FIGURE 1 –

Report : Calculate (theoretically) the Q–point of the BJTs in the circuits of figure 2 using the static current gain β = 180 100. Compare the theoretical Q–points with the measured Q–points.

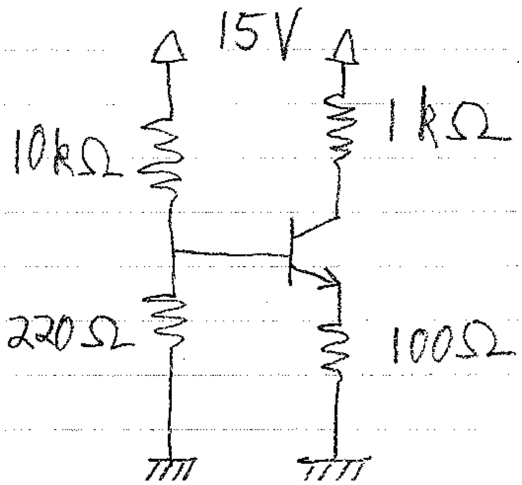
with low β and with high β.



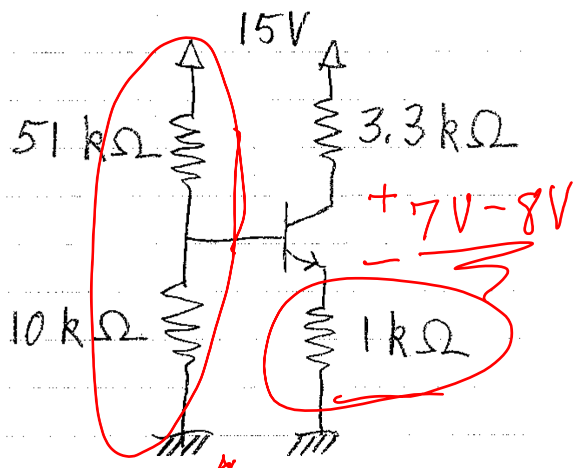
(a) circuit #1



(b) circuit #2



(c) circuit #3



(d) circuit #4

FIGURE 2 –