BJT Bias
Collector Bias (H.8)

20170425

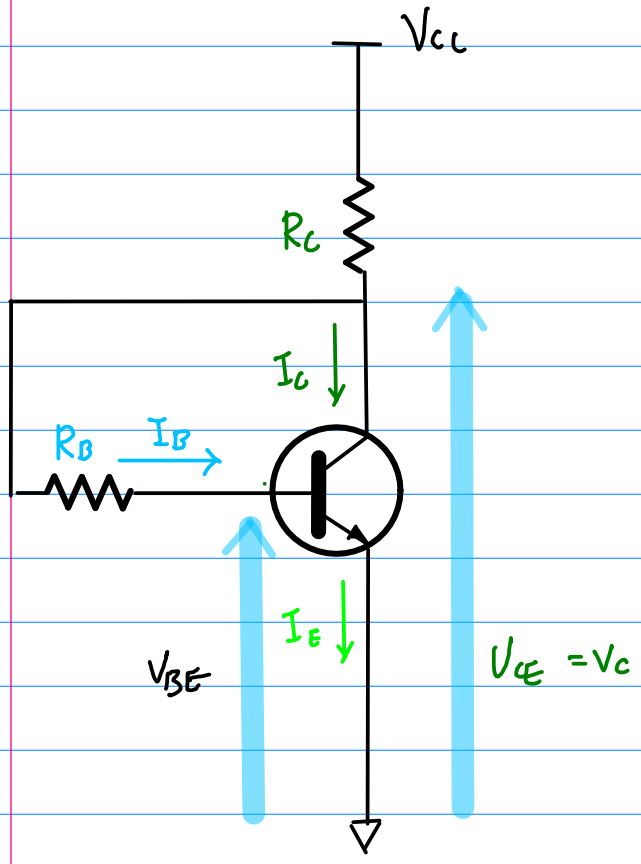
References

Based

[1] Floyd, Electronic Devices 7th ed
[2] Cook,

[2] en.wikipedia.org

Collector Feedback Bias

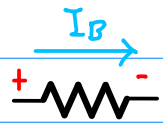


$$I_E = I_B + I_C$$
$$= \frac{I_C}{\beta} + I_C$$

$$I_C \cong I_E$$

$$I_C = \frac{V_{CC} - V_{BE}}{R_C + R_B/\beta_{DC}}$$

$$V_{CE} = V_{CC} - I_C R_C$$



V_C R_B V_{BE}

$$\boxed{I_B = \frac{V_C - V_{BE}}{R_B}}$$

$$I_B = \frac{I_C}{\beta}$$

$I_C \gg I_B$

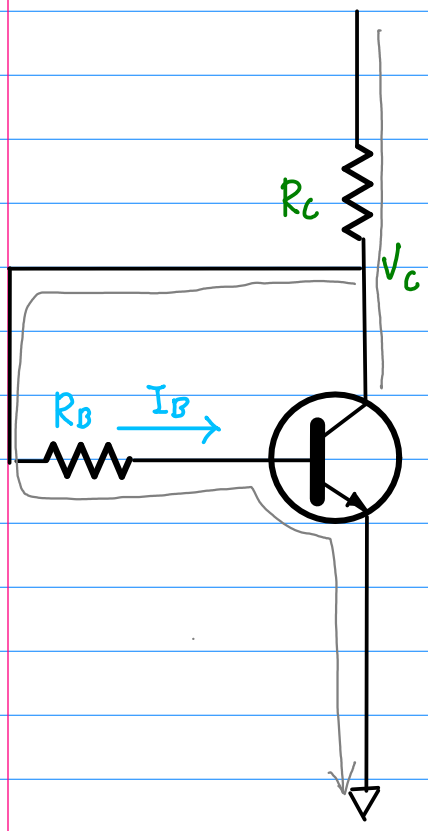
$$\boxed{V_C \cong V_{CC} - I_C R_C}$$

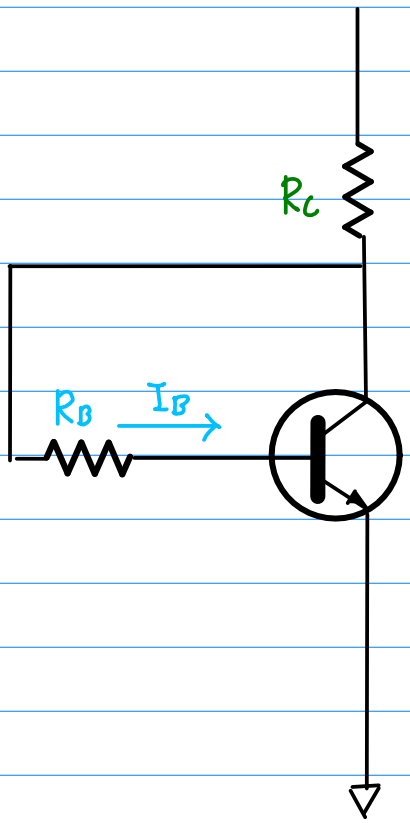
$$\frac{I_C}{\beta} = \frac{V_{CC} - I_C R_C - V_{BE}}{R_B}$$

$$\frac{I_C R_B}{\beta} = V_{CC} - I_C R_C - V_{BE}$$

$$I_C \left(\frac{R_B}{\beta} + R_C \right) = V_{CC} - V_{BE}$$

$$I_C = \frac{V_{CC} - V_{BE}}{R_C + R_B/\beta}$$





$$I_B = \frac{V_C - V_{BE}}{R_B}$$

$$V_{CE} = V_C$$

$$V_{CE} = V_{CC} - I_C R_C$$

$$I_C \gg I_B$$

$$V_C \cong V_{CC} - I_C R_C$$

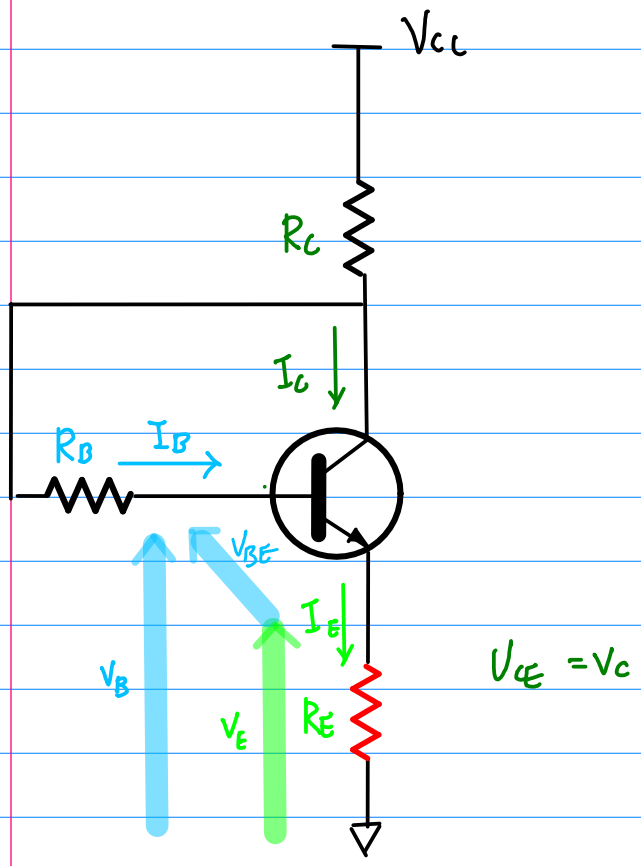
$$I_B = \frac{I_C}{\beta_{DC}} = \frac{V_{CC} - I_C R_C - V_{BE}}{R_B}$$

$$\frac{R_B}{\beta_{DC}} I_C = V_{CC} - I_C R_C - V_{BE}$$

$$\left(\frac{R_B}{\beta_{DC}} + R_C\right) I_C = V_{CC} - V_{BE}$$

$$I_C = \frac{V_{CC} - V_{BE}}{R_C + R_B/\beta_{DC}}$$

Collector - Emitter Feedback



$$I_E = \frac{V_{cc} - V_{BE}}{R_c + R_E + R_B/\beta}$$

$$V_E = I_E R_E$$

$$V_B = V_E + V_{BE}$$

$$V_c = V_{cc} - I_c R_c$$

$$V_{CE} = V_c$$