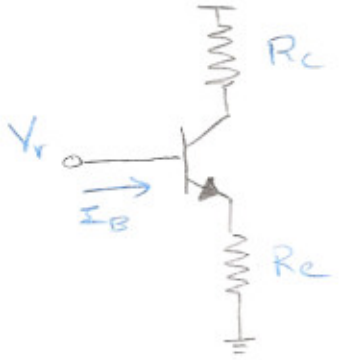
If you have a constant current through A varing resistance then the voltage also varies.




$$I_e R_e + V_{BE} = V_r$$

$$I_e = \frac{V_r - V_{BE}}{R_e}$$

$$I_c = \alpha I_e$$

$$I_c = \frac{1}{R_e}(V_r - V_{BE})\,\alpha$$

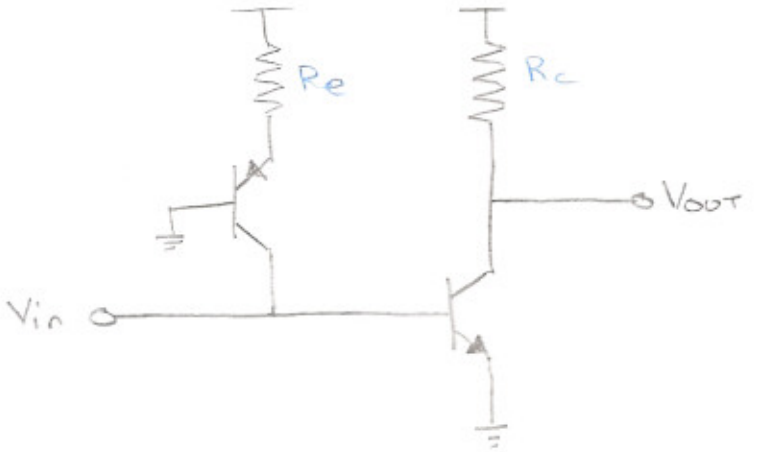
$$I_c = \frac{1}{R_e}\,[\text{constant}]$$

∴ if $R_e$ is constant $I_c$ is constant

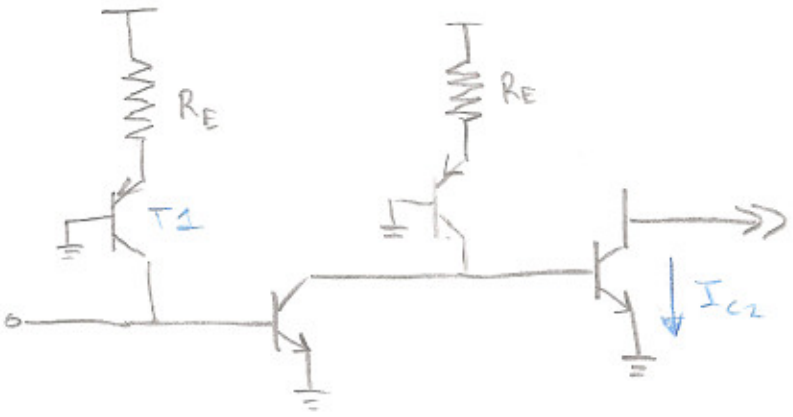
$I_c$ is independant of $R_c$

This circuit is a current generator for Load $R_c$

## INTEGRATED INJECTED LOGIC




note: If connecting to another cell we do not need $R_c$




GIVEN: $\alpha$, $V_{CC}$, $I_{C2(SAT)}$, $V_{BET}$

FIND: $R_E$ =

ANALYSIS: $I_E R_E + V_{BET1} = V_{CC}$

$$R_E = \frac{V_{CC} - V_{BET1}}{I_{E1}}$$

$I_{E1} = I_{C1} / \alpha_1$ $\therefore$ $$R_E = \frac{\alpha_1 (V_{CC} - V_{BET1})}{I_{C1}}$$

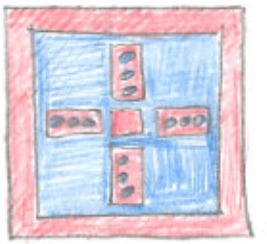
note: The input of the second stage is equal to the output of the first stage

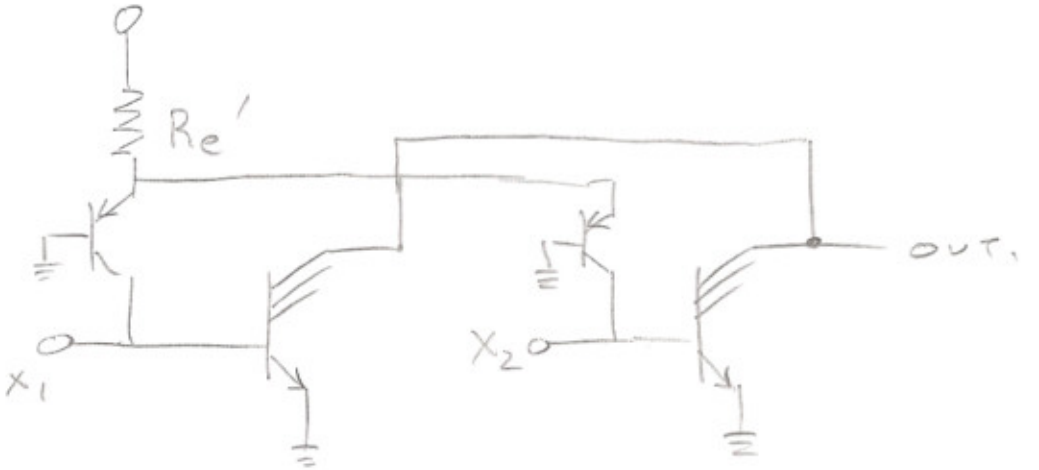
$\therefore$ $I_{C1} = I_{B2} = I_{C2(SAT)}$

$$R_E = \left( \frac{V_{CC} - V_{BE T1}}{I_{C2(SAT)}} \right) \alpha_1$$

Consider multiple connectors, if we cascade 4 cells and share $R_E$

$$R_e' = R_e / 4$$






Consider connecting collectors

| $X_1$ | $X_2$ | OUT |
|---|---|---|
| 0 | 0 | 1 |
| 0 | 1 | 0 |
| 1 | 0 | 0 |
| 1 | 1 | 0 |

note: This is a NOR gate that accomodate any design.