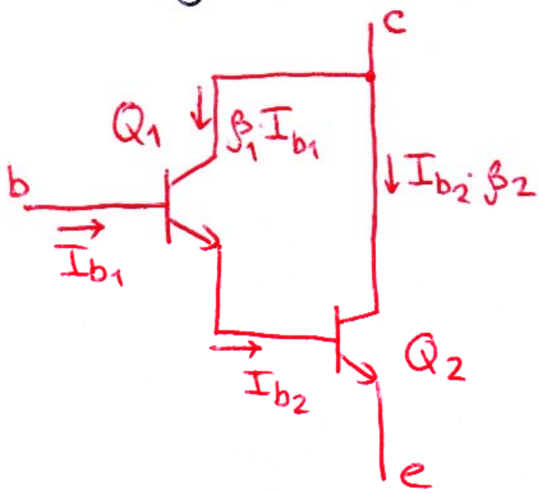
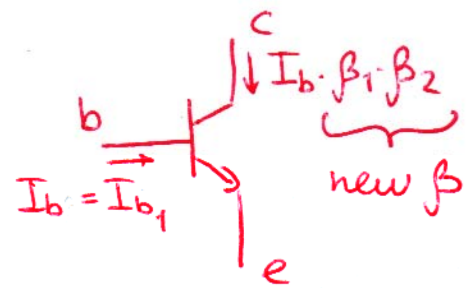
Lecture 19

↳ refer to the printout on Transistor Amp. Config.

Darlington Pair



acts like a single trans. with large β



$$I_{c_1} = \beta_1 \cdot I_{b_1} \approx I_{b_2}$$

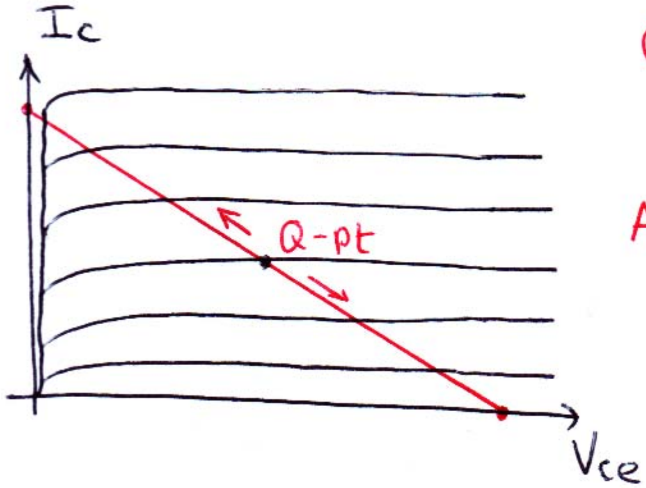
$$I_{c_2} = I_{b_2} \cdot \beta_2 \gg I_{c_1}$$

$$I_c = I_{c_1} + I_{c_2} \simeq I_{b_1} \cdot \beta_1 \cdot \beta_2$$

Note:

- $V_{be} \sim 2 \times 0.6\,V$
- Q_2 cannot be driven into saturation b/c $V_{cb_2} = V_{ce_1} > 0$ (cannot forward bias cb-junc.)
- use to make R_{in} large in UBER, CC, CE amps (whenever $R_{in} \propto \beta$)

Power in transistors



Q: power consumption in Q largest?

A: power → 0 in cutoff; also small in satur.
Max in active

Class A amplifiers

- transistor is active for largest range of inputs
- draws power when no signal

pros: great fidelity (360° of ac transmitted); speed

cons: poor efficiency (< 50%)

class B

- transistor is in cutoff with no signal, turns on for only half the cycle (180°)

pros: better efficiency ($P \sim 0$ when no signal) e.g. OK for audio

cons: some problems with fidelity; need $V_{be} \sim 0.6V$ for Q to go active

class C

- transmits < 180°; Q can go into saturation worst fidelity, good efficiency (simple loudspeaker)