Lecture 19

↳ refer to the printout on Transistor Amp. Config.

Darlington Pair

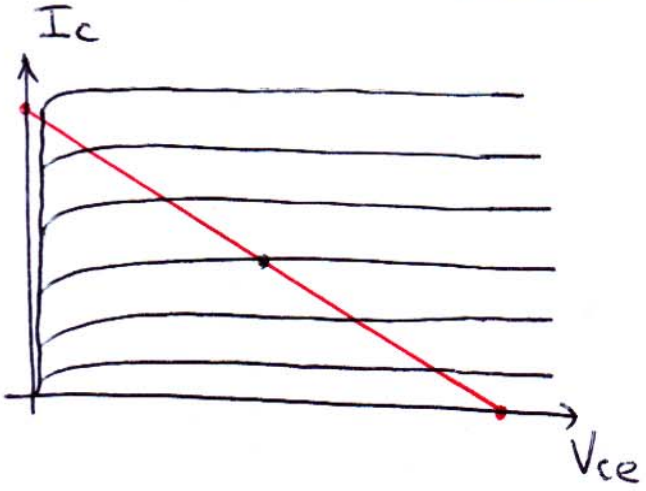
Note:

—

—

—

Power in transistors



class A amplifiers

-

-

pros :

cons :

class B

-

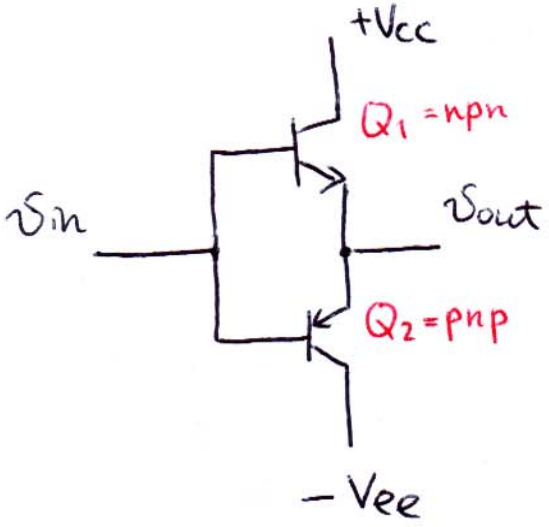
pros :

cons :

class C

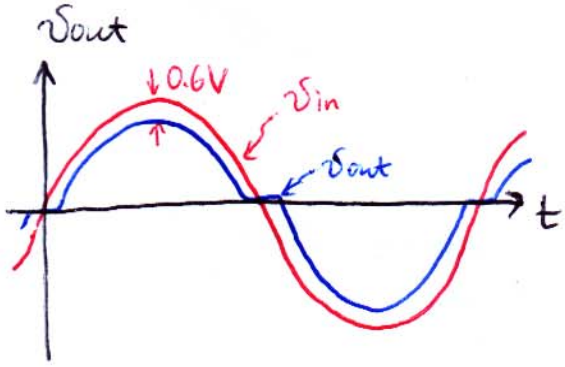
-

Notes on push-pull complimentary stage



- "complimentary" = both npn & pnp used
- "push-pull" only one transistor is ON (active), the other is OFF
- this is class B amplifier

- Note: both transistors cannot have forward biased be-juction simultaneously: $V_{be_1} = V_{be_2} = v_{in} - v_{out}$ b/c they are complementary
- G ~ 1 for volt. , can have G >> 1 for current

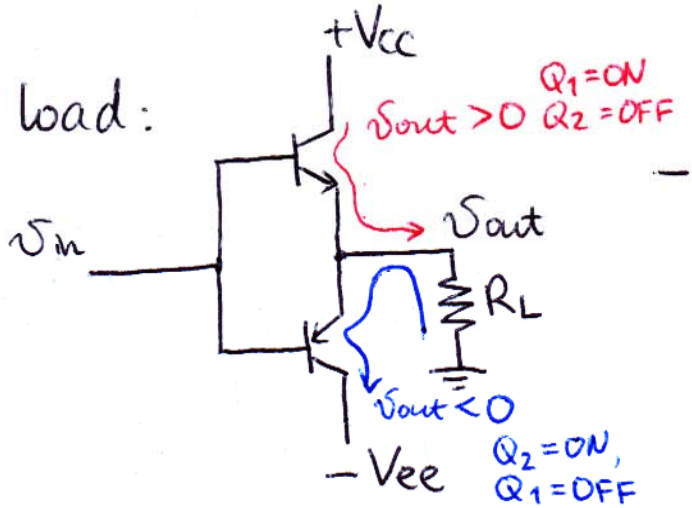


← Lab Manual, Fig 6.36

Note: there will be no cross-over distortions if no load is attached.

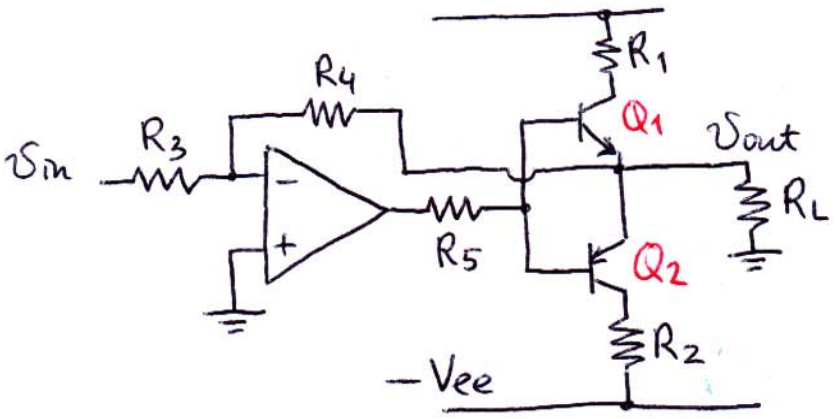
Q: why? A: no current can flow thru both $Q_{1,2}$, => $I_e \sim 0$, $V_{be} \sim 0$

with load:



- the current flows in the direction of emitter arrows for half the cycle, the other transistor is OFF

Push-pull amp with negative feedback to fix cross-over dist.



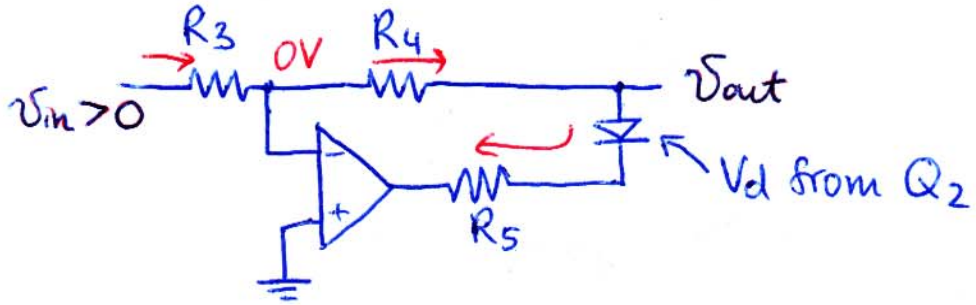
- basic idea: eliminate 0.6V diode drop using negative feedback

← Lab Manual, Fig 6.37
Exp. 6.10

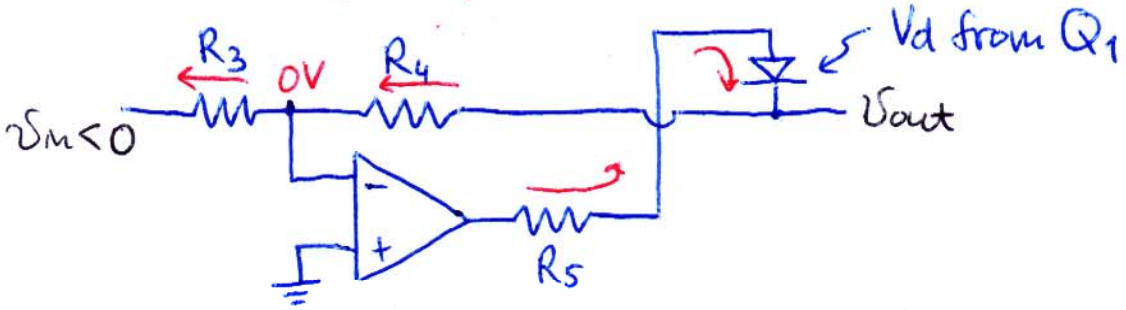
Steps to understanding this circuit:

1) negative feedback keeps $v_- = v_+$

2) when $v_{in} > 0$, the current flows to the right across R_3, R_4, and Q_2 is ON



3) when $v_{in} < 0$, the current flows to the left thru R_3, R_4, and Q_1 is ON



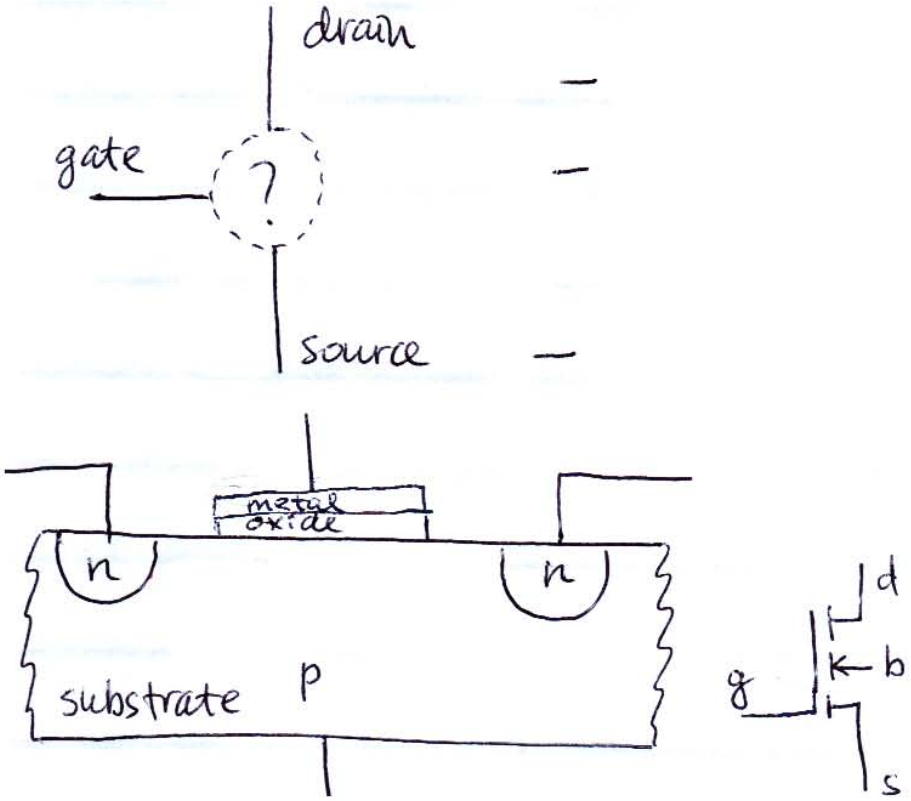
In both cases $v_{out} = -R_4 I = -R_4 \frac{v_{in}}{R_3}$

i.e. Vd does not come into the expression

Lecture 20

MOSFET

Metal-Oxide-Semiconductor Field _____ Transistor

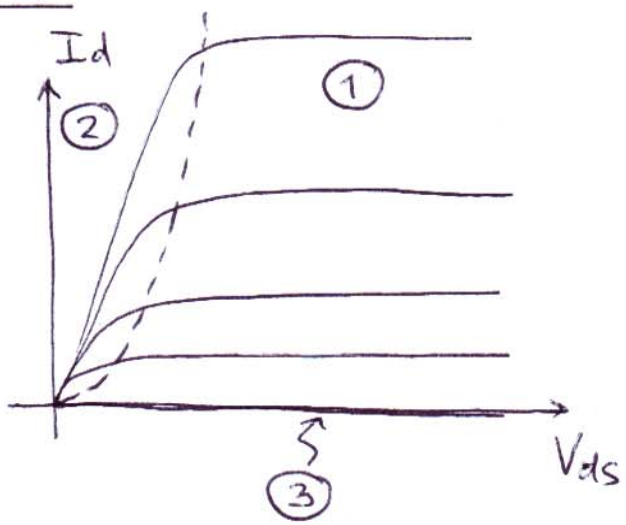


n-channel enhancement mode MOSFET

P-channel enhancement mode

to go between n-, p-channel types

Transfer characteristics



(1)

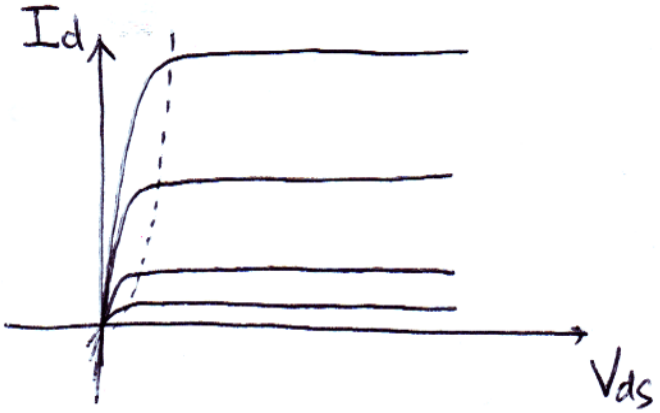
(2)

(3)

P3360/AEP 3630

Lecture 21

MOSFET modes



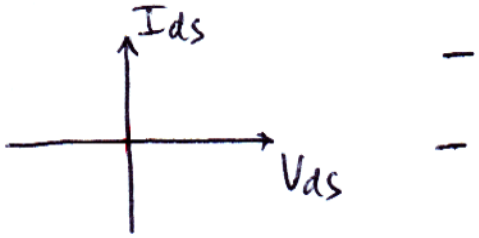
mathematical model

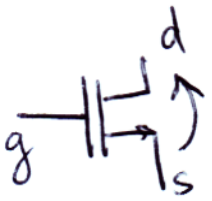
If $V_{gs} < V_T$,

Else if $V_{ds} < V_{gs} - V_T$,

else,

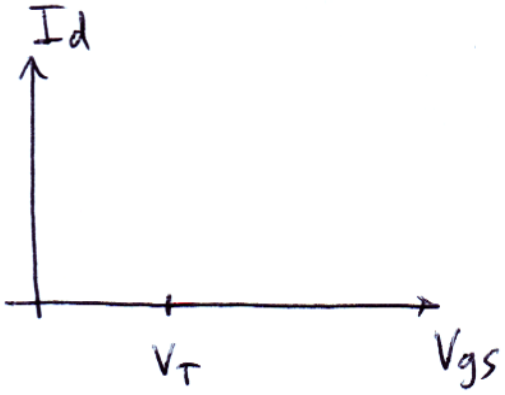
Ohmic region





$R_{ds} =$

saturation (= active) region



$$I_d = K(V_{gs} - V_T)^2$$

—

MOSFET circuit analysis

① large signal

② small-signal analysis