E151 Lecture 9 – Common Emitter with Degeneration

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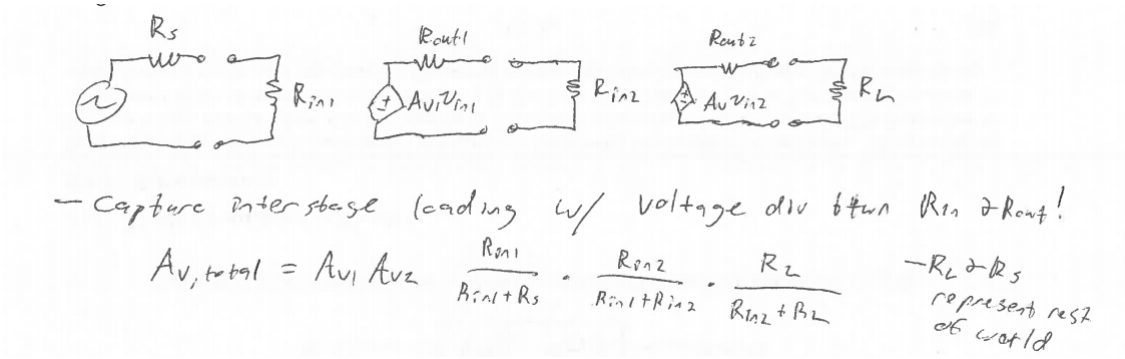
Disclaimer

These are notes for Prof. Spencer to give the lecture, they were not intended as a reference for students. Students asked for them anyway, so I'm putting them up as a courtesy. Remember that they are not intended as a substitute for attending lecture.

Multistage Picture and 2 Ports

- Large signal notes: separate bias points with AC coupling
- rin_tot = rin_1, rout_tot = rout_3,
- V_SW,tot = min VSW ← Use FFT/THD to tell if you violate VSW



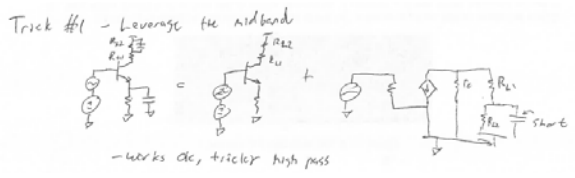
CE with Degen

- Issue: V_SW ↔ av and rin+(V_SW or A_V) ↔ rout

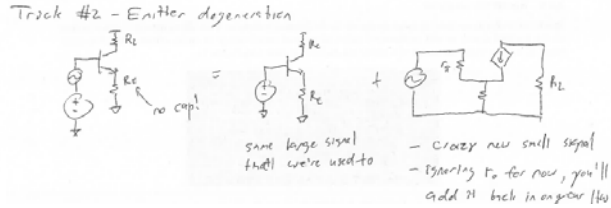
$$V_{OMAX} - V_O = I_C R_C$$
$$A_V = g_m R_C = V_{SW}/\phi_{th}$$

$$r_{in} = r_\pi = \frac{I_C}{\beta \phi_{th}}$$ Pins Ic value

- Issue for another day … really hard to get small rout
- Can get overconstrained designs, so we need other amplifier types



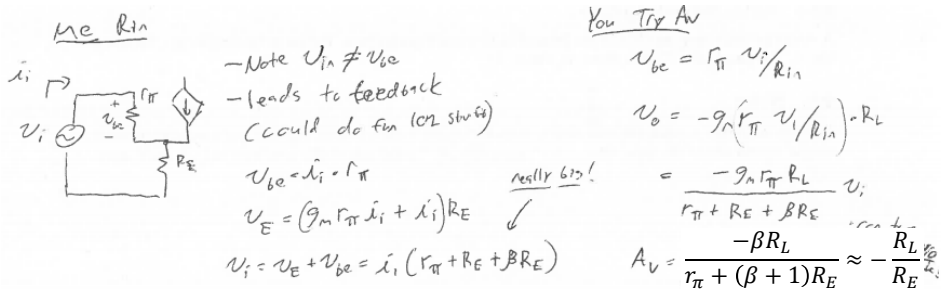
Just throws away swing



Trick #3: Active loads!

CE with Degen

- Find rin, rout, av



- rout = R_L if ro presumed infinite, you will do more on your HW