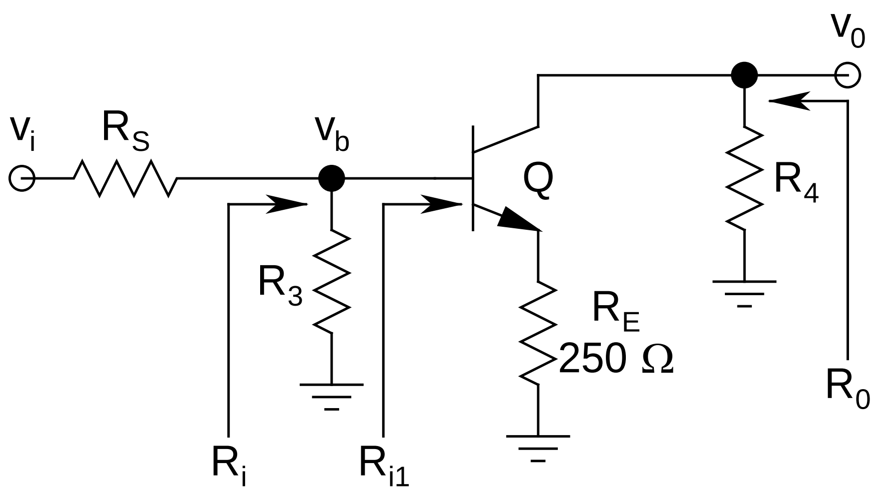
- Now let's explore what happens if ***C_E were absent***, i.e., ***R_E unbypassed***
- Redraw the ***ac schematic***:

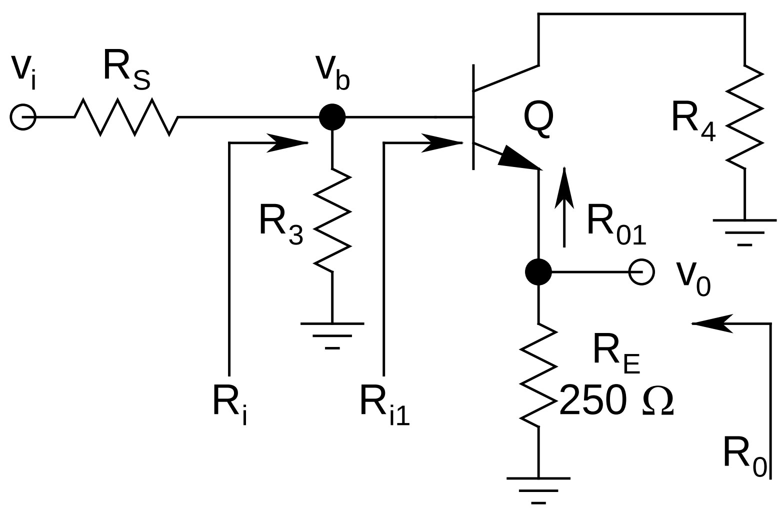


ac Midband Schematic for R_E unbypassed

- ***Note***: ***Degeneration Factor*** = $(1 + g_m R_E) \approx (1 + R_E/r_E) = 20.23$
- $R_{i1} = r_\pi + (\beta + 1)R_E = 26.55\ k\Omega$
  - ***Exactly 20.23 times of the previous case*** (1.3 kΩ)
- $R_i = R_{i1} || R_3 = 6.72\ k\Omega$
- Total resistance ***seen*** by $v_i = R_S + R_i = 7.72\ k\Omega$
- $v_0/v_b = -R_4/(r_E + R_E) = -7.6$ [***CE(D) Stage***]
  - ***Reduced by exactly 20.23 times of the previous case*** (– 153.85)
- $v_b/v_i = R_i/(R_i + R_S) = 0.87$
  - ***Improvement as compared to previous case*** (0.533)

- $A_v = -6.6$
  - ***Compare with – 82 obtained in previous case*** (***significant reduction***)
- $R_0 \approx R_4 = 2\ k\Omega$ (***if r_0 is neglected***)
- ***If r_0 is considered***, ***analysis becomes significantly complicated***, ***since the Golden Rule can't be applied*** ***due to the presence of resistance*** (***apart from r_π***) ***in the base of Q***
- ***Summary***:
  - $A_v = -6.6$
  - $R_i = 6.72\ k\Omega$
  - Resistance ***seen*** by $v_i = 7.72\ k\Omega$
  - $R_0 = 2\ k\Omega$

- ***What if the output is taken from emitter***?
- Redraw the ***ac schematic***:



ac Midband Schematic for Output Taken from Emitter

- ***R_4 actually redundant for this case*** (***collector of Q could have been connected to V_{CC} directly***)
- $R_{i1} = 26.55\ k\Omega$, $R_i = 6.72\ k\Omega$, and resistance ***seen*** by $v_i = 7.72\ k\Omega$ (***same as before***)
- $v_0/v_b = R_E/(r_E + R_E) = 0.95$ (***CC Stage***)
- $v_b/v_i = R_i/(R_i + R_S) = 0.87$ (***same as before***)
- $A_v = 0.827$ (<1, as expected, but ***could have been made closer to unity by better design***!)
- $R_0 = R_E \| R_{01}$
- ***Computation of R_{01} is slightly more involved***, ***but quite easy if the trick is understood***!