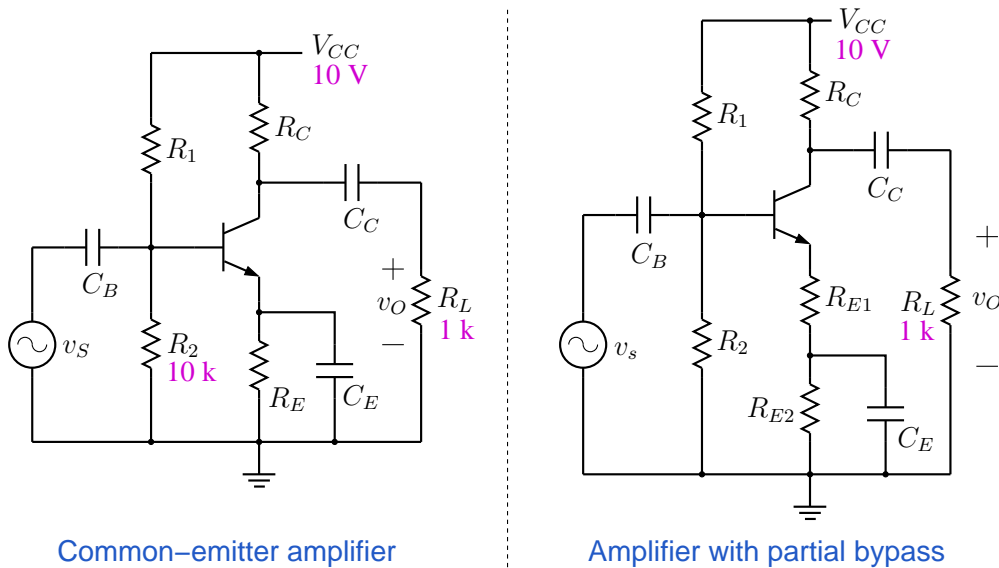


Common-emitter amplifier

Experiment: Procedure/Observation



1. Design a common-emitter (CE) amplifier for $I_C = 1 \text{ mA}$, $V_{CE} = 5 \text{ V}$, $V_E = 2 \text{ V}$ (let $R_2 = 10 \text{ k}$).
2. Wire up the circuit. Make sure that C_B , C_C , C_E are sufficiently large for the signal frequency of 5 kHz to be in the mid-band region.
3. Calculate A_{VL} , A_{V0} , R_i , R_o for your design.
4. Check your calculations against measurements made with a signal frequency of 5 kHz (use oscilloscope, not multi-meter). Keep the input voltage sufficiently small so as to give an undistorted output. A voltage divider (with 1 k Ω and 47 Ω , for example) may be used.
5. Increase the input amplitude to a point where you begin to see some distortion at the output. Note this amplitude.
6. Measure the frequency response of the amplifier. Observe both input and output voltages for each measurement, and make sure that the output is not distorted.
7. Partially bypassed R_E : Replace R_E with R_{E1} and R_{E2} (see figure), keeping the other component values the same as before. Select R_{E1} and R_{E2} to obtain approximately the same bias point (as the CE amplifier) and a gain of about 10.
8. Calculate A_{VL} , A_{V0} , R_i , R_o for your design.

9. Wire up the amplifier and repeat the measurements you made for the CE amplifier. Compare with your calculations.
10. Plot the frequency response of the two amplifiers on the same graph (log-log plot) and comment on the salient features you observe.