

Appendix D Schematic Figures Gone Bad

This appendix for the Engineering Lab Reports Manual is intended to address common errors seen in schematic figures in student papers. Currently most examples are from EE. A wider variety is desirable.

Example 1 A schematic from LTSpice

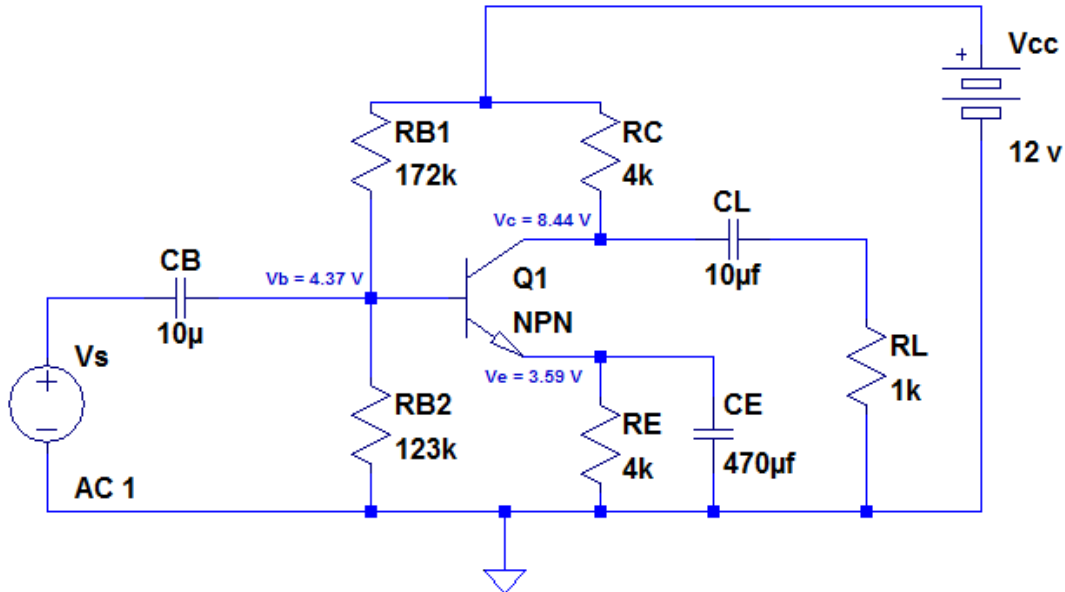


Figure 1: Designed Common Emitter Amplifier using calculated values.

This is a copy and paste figure from LTSpice. If this was a notional schematic, the use of non-polarized capacitor symbols might be considered acceptable. But, this figure seems to show instead what was built. The student would not have used non-polarized capacitors for CB, CE, or CL. (Non-polarized ones are typically big and expensive, and you don't need them.) Be sure to show the polarization correctly.

A second issue is that the bias point Voltages at the transistor terminals are too small. A reader would need a magnifying glass. Any smaller and they would not be readable at all.

Component units are inconsistent. Resistances are given in magnitude only with no units, such as “4k”, but some capacitors are given in Farads (presumably), as “470uf”. The proper abbreviation for Farads is a capital F. You should be consistent. While it is in principle best to always give units, in some technical contexts that is often not done, and you need to follow the conventions of your application field. Ask your instructor about this issue if in doubt.

It is odd that some components seem to have been converted to “standard values”, such as the 470 uF capacitors, while others, such as the “123k,” resistor have not. Ensure that the schematic is consistent in its level of development.

In the simulation, it is perhaps necessary to show the DC supply and its connections. However, in a well prepared schematic that is usually not done. Instead a connection to power is shown, and similarly several individual connections to ground would be shown. The effect is to de-emphasize power wiring so that signal connections can be more easily discerned. Redrawing circuits this way for undergraduate laboratory reports may not be required, but you would want to do that in industry.

The blue lines may print and copy OK, but it would be better to make all the colors black (or white) for printing and copying.

Example 2: An illustrative schematic:

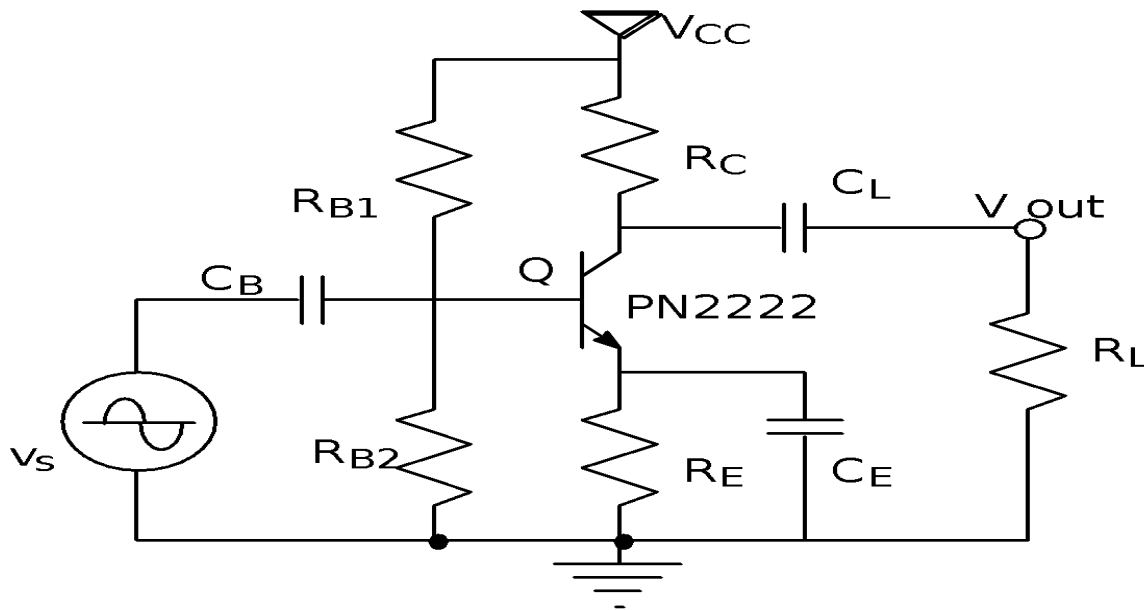


Figure 1: Common Emitter Amplifier Schematic

This schematic is abstract; it shows the circuit configuration for a nominal common emitter amplifier without specifying component values. It appears to have been copied from some source, perhaps a textbook. Or the lab exercise instructions. Is attribution given?

The second problem is that the figure seems to have been stretched. It's dimensions have been changed, but not proportionally. Not that the circle for the Vs source is not round! (Holding "shift" when resizing a figure usually ensures that dimensions remain proportional.)

A third problem is an error in the original! Do resistors R_{B1} and R_{B2} connect to the transistor base? If so, there should be a dot there! As shown, they connect to each other but not to the transistor base and capacitor C_B . That's an error! Such a circuit won't work. (The dots on the ground at bottom are slightly offset, and to be consistent there should also be dots where C_E and C_L connect to the transistor terminals.