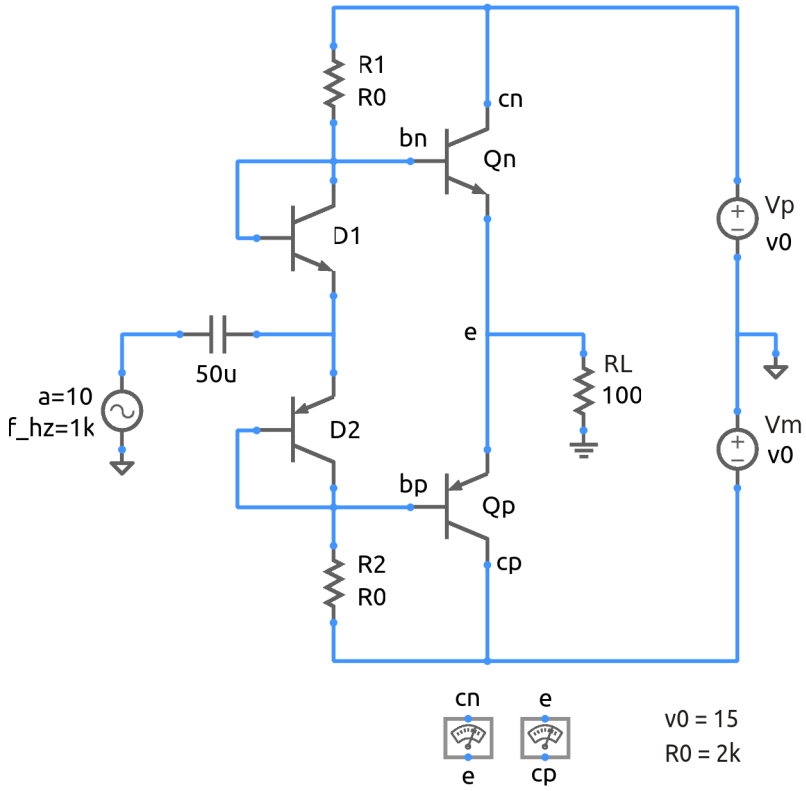
bjt_class_ab.sqproj



Shown in the figure is a Class AB amplfier which has higher efficiency than a Class A amplifier. Furthermore, it does not exhibit cross-over distortion, which is a drawback of a Class B amplifier. The input to this amplifier is $V_i = V_m \sin \omega t$, and the BJTs have $\beta = 50$. The transistors marked as `D1` and `D2` are used as diodes and can be assumed to have a voltage drop of 0.7 V when conducting.

Exercise Set

1. Simulate the circuit, and plot $V_i(t)$ and $V_o(t)$ on the same plot. Observe that there is no cross-over distortion.

2. For the values given in the circuit diagram, plot approximately (on paper) the collector currents of Q_n and Q_p as a function of time. Verify with simulation. Compare the current plots with those for a Class B amplifier (in `bjt_class_b.sqproj`).

3. Change the global parameter `R0` to 3 kΩ, and simulate the circuit again. Explain your observations.

4. If the amplitude of the input voltage V_m is changed to 12 V, what is the minimum resistance (`R0` in the figure) required to ensure distortion-free output waveform? Verify with simulation.

5. Repeat for $V_m = 8$ V.

References

1. A. S. Sedra, K. C. Smith, and A. .N. Chandorkar, *Microelectronic Circuits*, Oxford University Press, 2004.