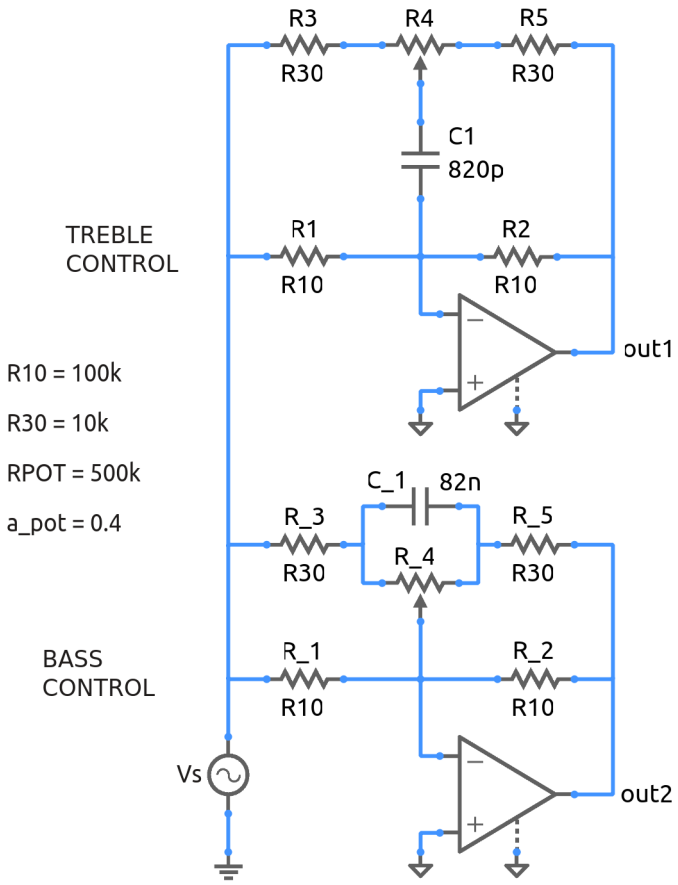
opamp_bass_treble.sqproj



(http://www.ecircuitcenter.com)

The circuit shown in the figure can be used to amplify or attenuate bass (low frequencies) and treble (high frequencies). The "dual-gang pot," which represents two potentiometers "in sync," allows idental division of the resistances marked `R4` and `R_4`, and it is implemented in the circuit file with the global parameter `a_pot`. The lower circuit gives the bass output, and the upper circuit gives the treble output.

Exercise Set

1. Run the simulation. Plot V_{out1} and V_{out2} together (on linear scale) versus frequency (log scale). Repeat for different values of `a_pot`, and comment on the functionality of the circuit.

2. Draw the two circuits at low frequencies (at which the capacitor is an open circuit) and at high frequencies (at which the capacitor is a short circuit). Calculate the bass and treble gains in each case for some value of `a_pot` (say, 0.4).

3. From the simulation results, observe that the low-frequency gain of the bass section is the same as the high-frequency gain of the treble section, and *vice versa*. Explain.

4. From the simulation results, observe that the high-frequency gain of the bass section and the low-frequency gain of the treble section is always 1, *irrespective* of the pot setting. Explain.