wien_osc_2.sqproj

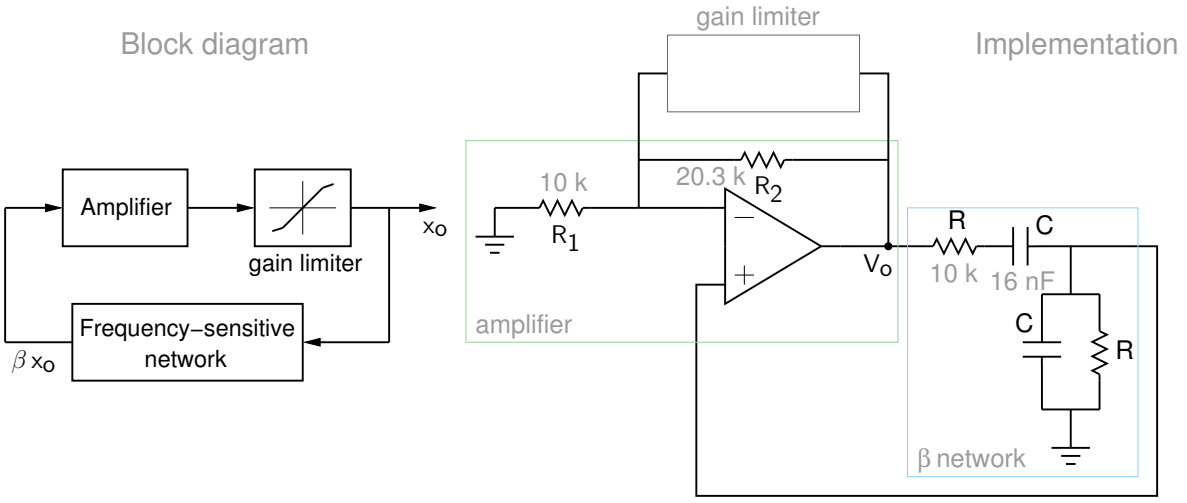

Figure 1: Wien bridge oscillator circuit.

Fig. 1 shows the Wien bridge oscillator. The circuit oscillates at frequency $f = \dfrac{1}{2\pi RC}$ if the gain provided by the amplifier (implemented here with a non-inverting Op-Amp amplifier configuration) is equal to 3 (see `ee101/ee101_osc_1.sqproj`). In practice, a gain limiting block is also required to limit the amplitude of the oscillations.

Fig. 2 shows the oscillator circuit with the gain limiting block implemented with a diode-resistor network. As the amplitude of the output voltage increases, diode D_1 or D_2 turns on, changing the effective value of R_2 and therefore the gain of the amplifier.

Exercise Set

1. Simulate the circuit and verify that the frequency of oscillation is what you would expect from the Barkhausen criterion.

2. Decrease the capacitances in the β network by a factor of 2 and see its effect on the frequency of oscillation.

References

1. S. Franco, *Design with Operation Amplifiers and Analog Integrated Circuits,* McGraw-Hill, 1998.

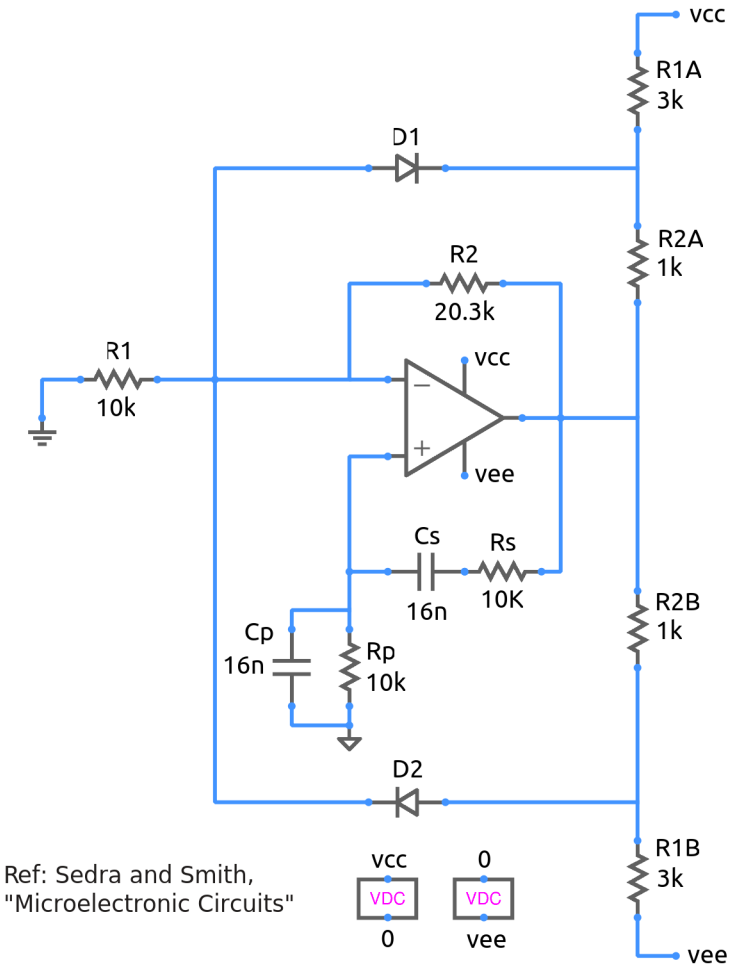

Figure 2: Complete Wien bridge oscialltor circuit with gain limiting network.

2. J. Millman and A. Grabel, *Microelectronics,* McGraw-Hill, 1988.

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