Lab 4
Sine Wave Generators

In this lab you will build and test two different designs for sinusoidal oscillators.

Pre-lab

1. Determine the values of R and C in step 5.
2. Determine all component values in step 9.

Wien Bridge Oscillator

1. Build the circuit in HH Figure 5.42A, but leave out the positive feedback network for the time begin. Use one of the amplifiers in your lab kit and measure the resistance of the lamp.
2. Turn the circuit on and adjust the gain to 3 at 0.1 Vpp input.
3. Next, measure the gain for an input of 0.01 Vpp input and 1 Vpp input. They should be different.
4. Does the gain increase or decrease as the input amplitude is increased, and why?
5. Add the positive feedback network to your circuit, selecting components to produce an oscillation frequency of 1 kHz
6. Turn on the circuit and watch it oscillate. If it does not oscillate, how can you correct that?
7. Measure the oscillation frequency and compare with a theoretical prediction.
8. Increase the loop gain by a a lot by increasing the gain of the inverting stage. What is the effect on the shape of the sine wave? Explain what is happening.

Phase-Shift Oscillator

9. Build the phase-shift oscillator depicted in SS Figure 13.8, with a frequency of 10 kHz. Adjust the amplifier gain to compensate for losses in the phase shift-network.
10. Measure the oscillation frequency and compare with theory.
11. Explain how the circuit operates.