ELE 504 Lab Report 6

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Introduction

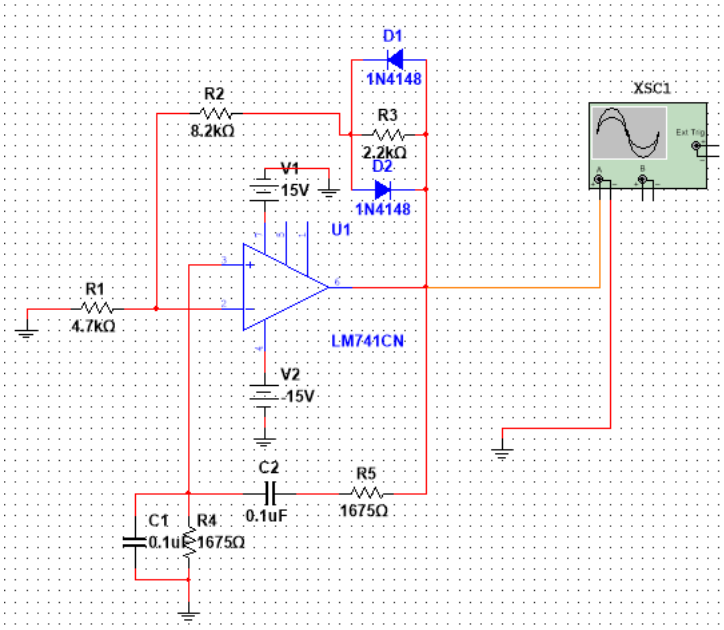
There are several different types of oscillators that are commonly used today. Two of them being the Wien Bridge Oscillator and the Phase Shift Oscillator and in this lab, these are the two oscillators that would be analyzed. This lab will look at how these two op-amp circuits can be modified to satisfy the Barkhausen Criteria in order to produce clean sinusoidal waveforms with specific frequencies and amplitudes.

Objective

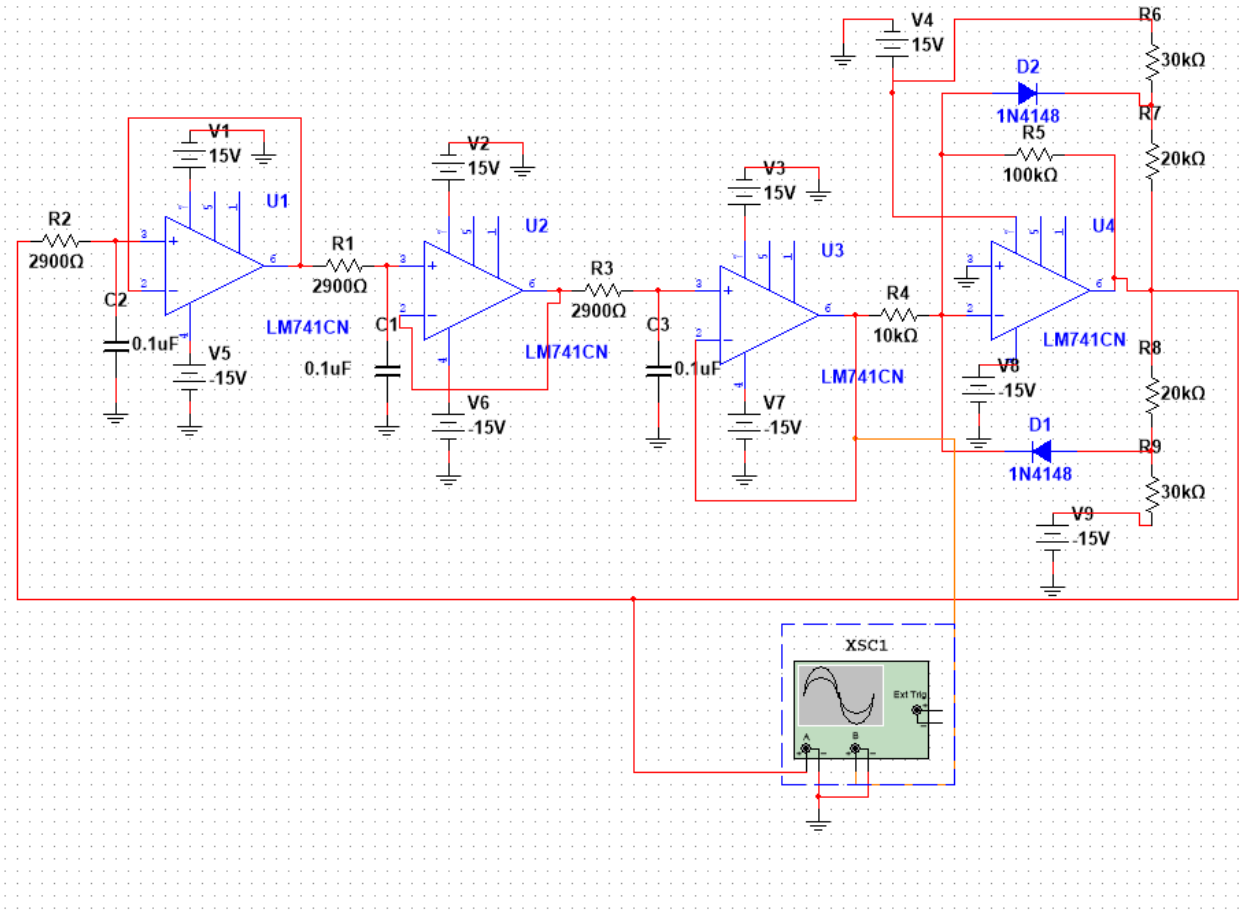
The objective of this lab is to design, simulate, build and test sinusoidal linear-oscillator circuits using the Wien Bridge and Phase Shift circuit configurations. Frequency and amplitude of the output voltage waveform will be examined and analyzed.

Circuit Screenshots

Circuit 1: WIEN BRIDGE OSCILLATOR CIRCUIT



Circuit 2: PHASE-SHIFT OSCILLATOR CIRCUIT



Results and Tables

Figure 1: WIEN BRIDGE OSCILLATOR - Vo(t) Waveform

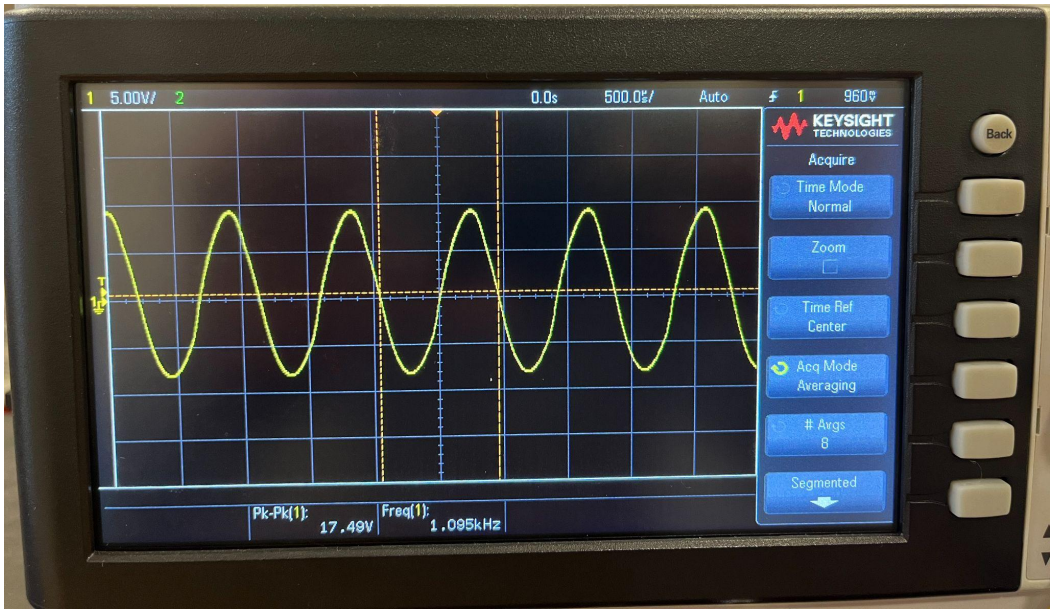


Figure 2: PHASE-SHIFT OSCILLATOR - Vo(t) Waveform

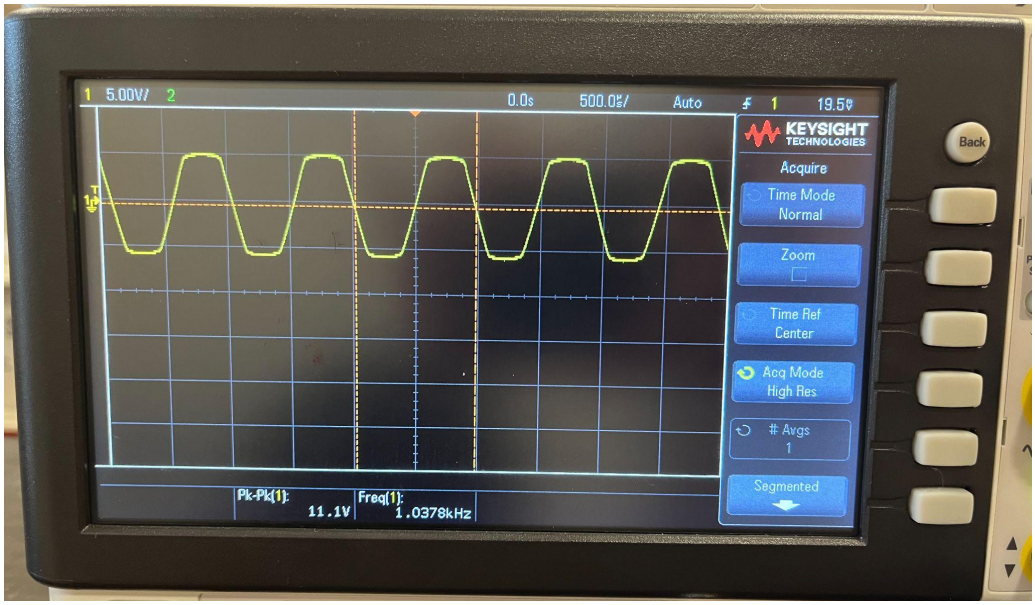


Figure 3: PHASE-SHIFT OSCILLATOR - Vo1 and Vo Waveform

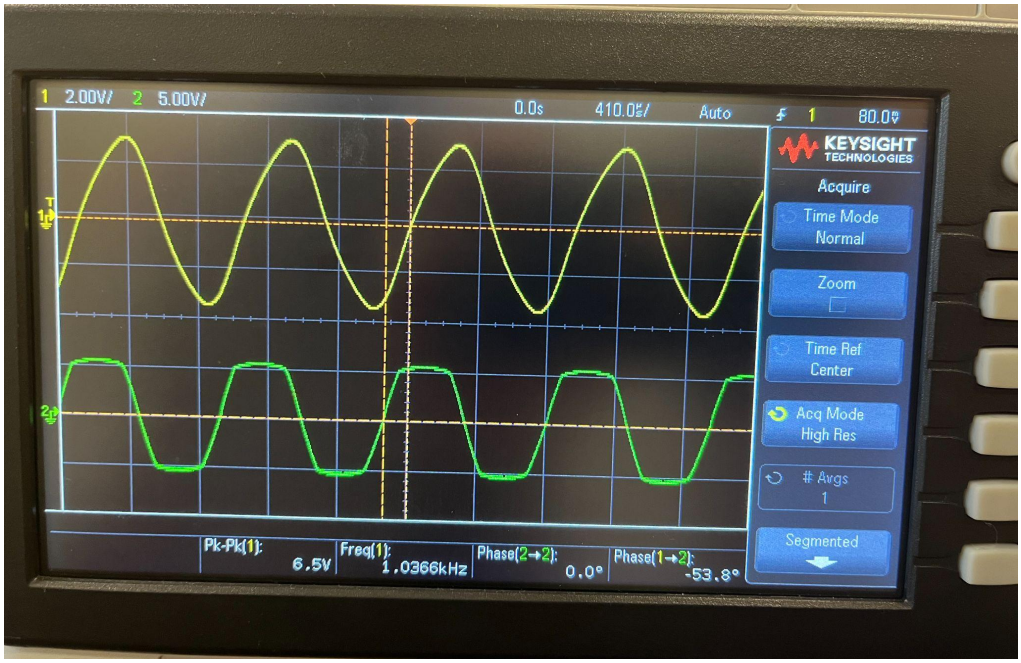


Figure 4: PHASE-SHIFT OSCILLATOR - Vo2 and Vo1 Waveform

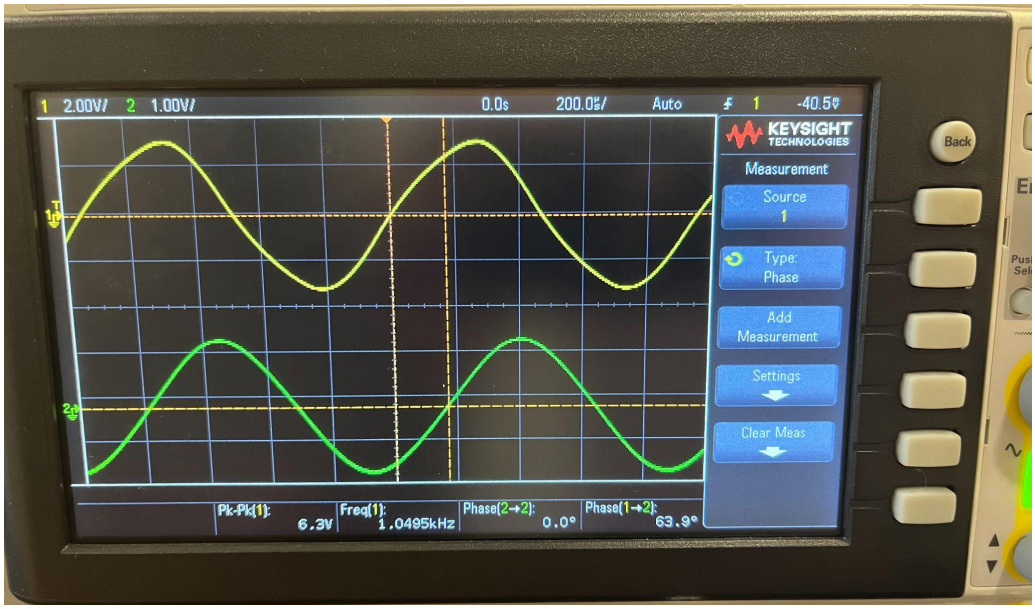


Figure 5: PHASE-SHIFT OSCILLATOR - Vo3 and Vo2 Waveform

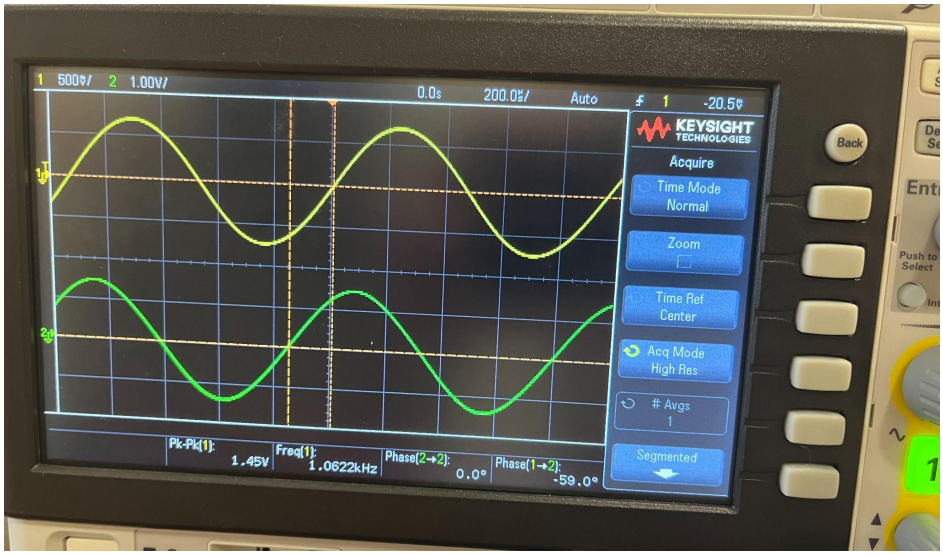
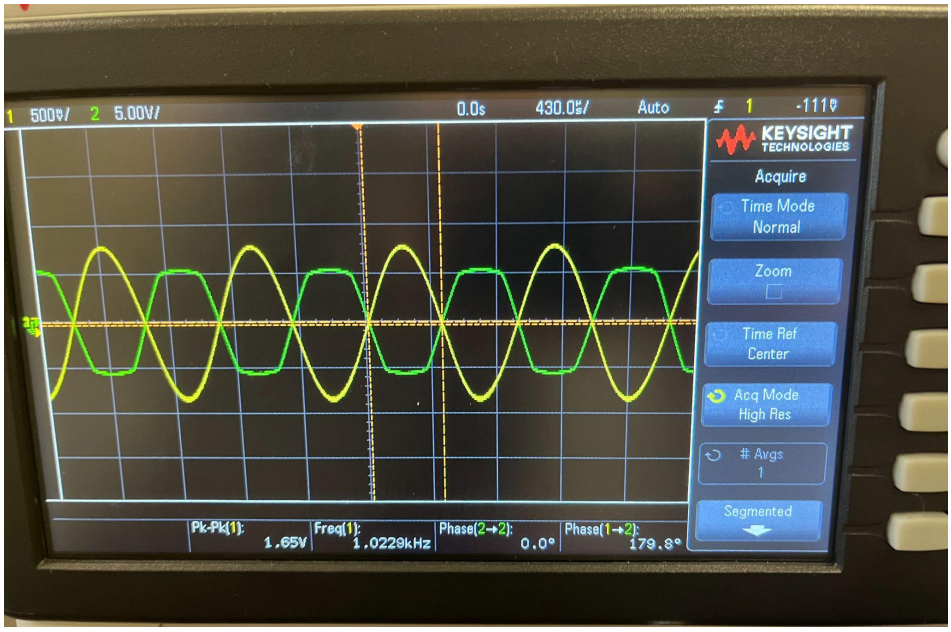


Figure 6: PHASE-SHIFT OSCILLATOR - Vo and Vo3 Waveform



Conclusion

After completing the lab, several conclusions can be drawn. Firstly, the Wien Bridge Oscillator in **Circuit 1** was observed to provide a sinusoidal waveform with a peak-to-peak voltage of 17.49V and a frequency of 1095 Hz. These results are consistent with the prelab analysis where the desired peak-to-peak voltage was around 17.1V and the frequency was 950Hz . Secondly, The Phase Shift Oscillator in **Circuit 2** was observed to provide a sinusoidal waveform of 11.1V and frequency of 1095Hz. This was consistent with the prelab which had an expected peak-to-peak voltage of 10 V with a frequency of 950Hz . Lastly, the phase shifts at the individual stages of the Phase Shift Oscillator were observed to be close to 60° for the first three stages and close to 180° for the last stage. This aligned with the prelab analysis where the 4 phase shifts added up to 360°. Slight discrepancies in values were likely due to the resistor values not being perfectly accurate (exact resistors were not available). Overall, the results in the lab were very accurate and were consistent with the expected results derived in the prelab.