



Date: 12/2/13

Project 5

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Oscillator Circuits

The two circuits designed and tested in lab was the Colpitts and Phase-Shift Oscillators. The design for the phase shift oscillator has a feedback factor of $\frac{1}{2}$ which has to be compensated by a phase shift of 180 degrees. Each filter is 180 degrees each filter. The circuit was simulated in both Pspice and Microcap. The results showed sustained oscillations and in microcap the waveform was a sine wave.

The design for the Colpitts oscillator was also done. The value of R was chosen to be 10k. The value of C was chosen to be 10nF. Multiplying the two values, $C = \frac{1}{R \cdot f}$, there I also chose C_1 equal to C_2 . The circuit was simulated by connecting capacitors in series. The frequency of 8 kHz the inductor value was chosen. The circuit simulation in Microcap and Pspice model was used. The results showed sustained oscillations. The waveform generated in Pspice is in figure 1.

In the lab both circuits were tested. In figure -1 the circuit worked as expected. As we increase the frequency, but the amplitude of the frequency. For the resistor value was 10k. After the circuit was left on for some time, the amplitude of the oscillations decreased.

Initially the Copitts oscillator was designed with a biasing circuit, but in the lab this circuit did not produce any oscillations. When the biasing circuit was removed the circuit oscillated at 9.3 kHz. By adding increasing C_2 to 15nF the frequency decreased to 8.01 kHz. Since the C_{eq} value in calculations – 2 is in the denominator the frequency and capacitance are inversely related.

Design

Calculation

Calculation

$$14.1n + 4.7n$$

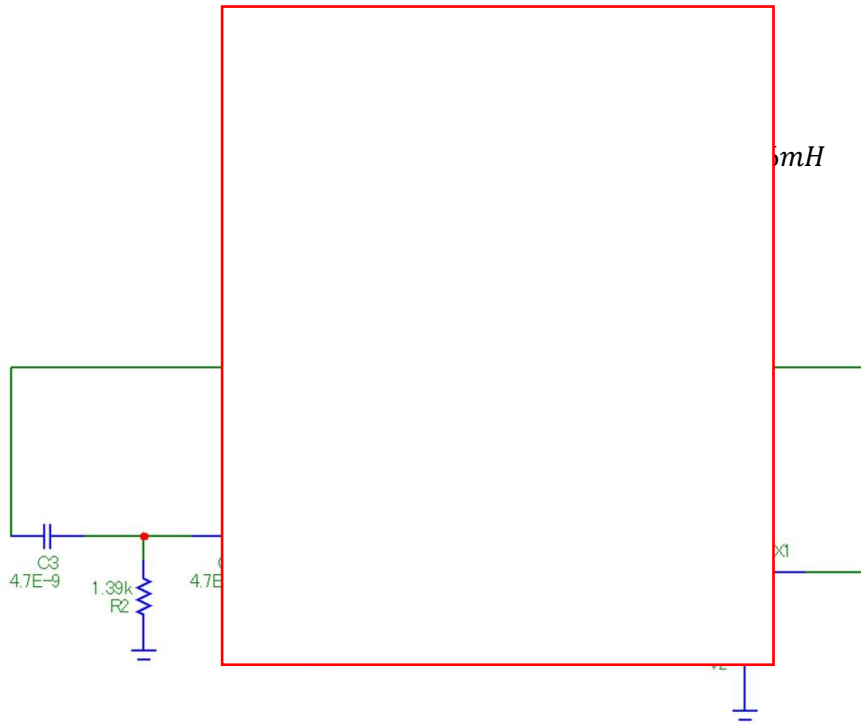


Figure – 1 (Phase Shift Oscillator, lf347 Op-amp)

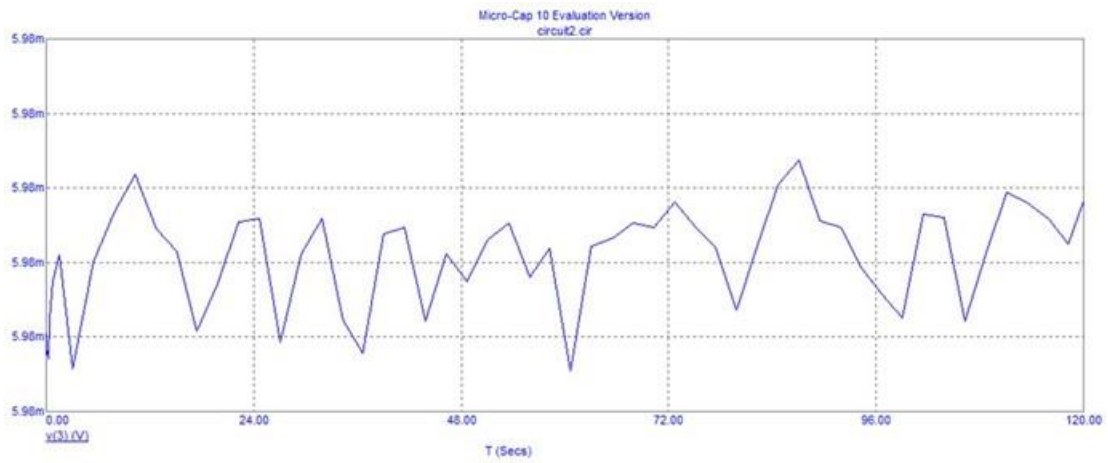


Figure – 2 (Micro Cap Simulation of the op-amp phase-shift oscillator)

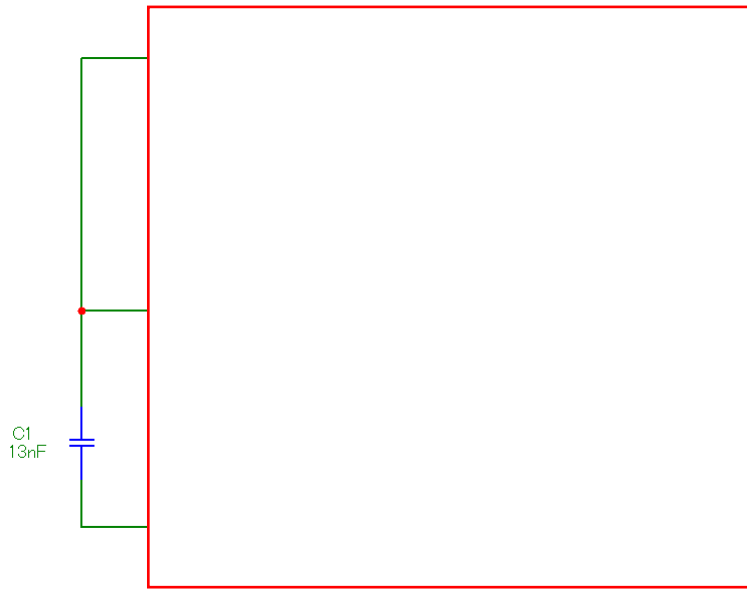


Figure – 3 (Colpitts circuit, irf3704 nmos transistor)

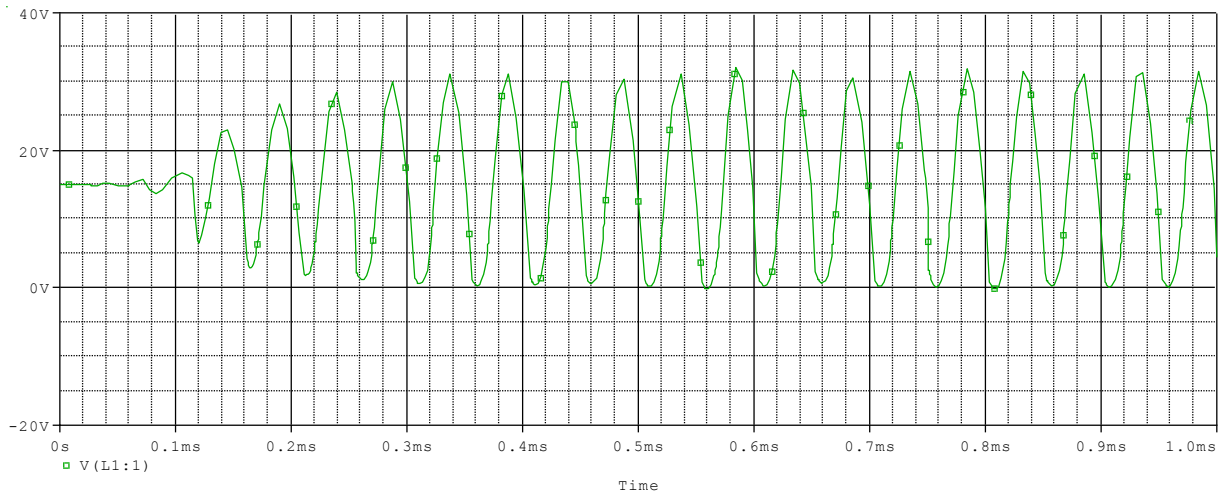


Figure – 4 (Pspice simulation of the Colpitts Oscillator)