EEE342

Introduction to Communication Engineering Laboratory.

Lab – Report

Section: 02

Experiment no. 05

Name of the experiment:

Frequency Modulation By Varactor Modulator And Frequency Demodulation By Foster-Seeley Detector.

Prepared by:

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Additional comments (if any):

Objective:

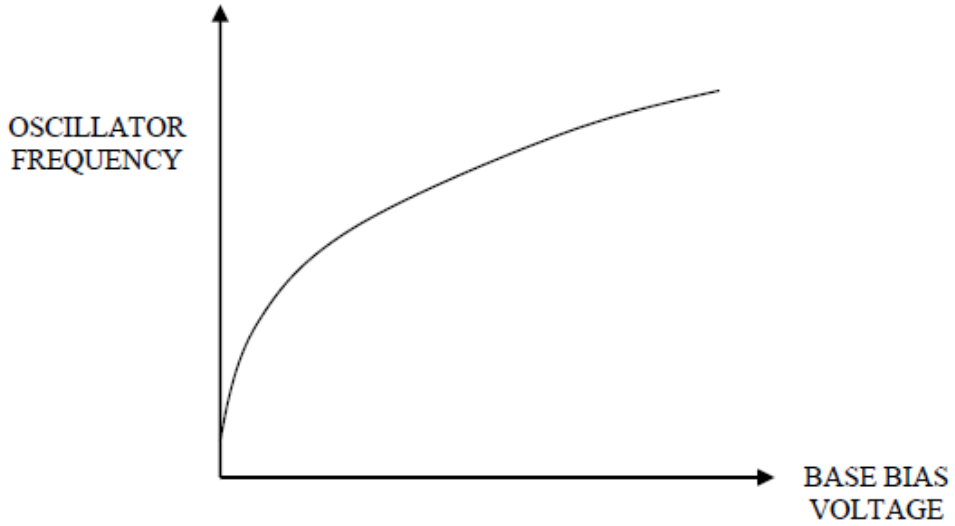
a) Demonstration of frequency modulation using Varactor modulator.

b) Demonstration of frequency demodulation using Foster-Seeley detector and effect of noise on its performance.

Equipment:

1) Anacom-2 module.
2) Power supply
3) Oscilloscope
4) Frequency meter

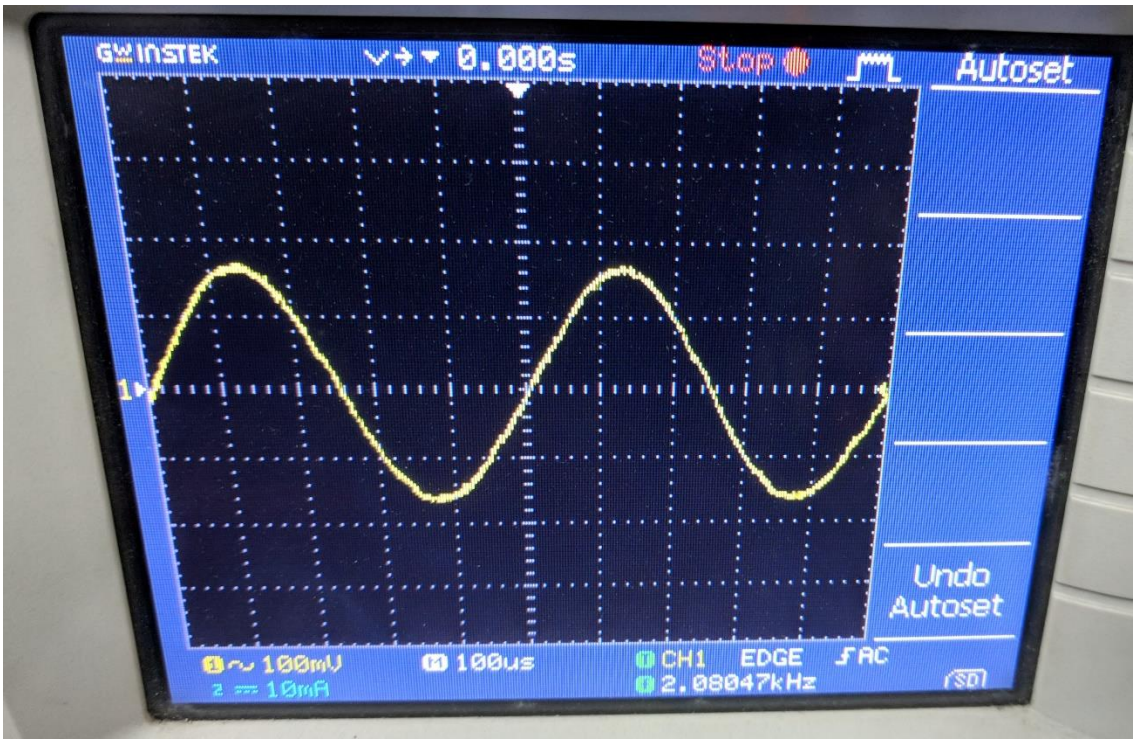
Frequency modulation by Varactor modulator:



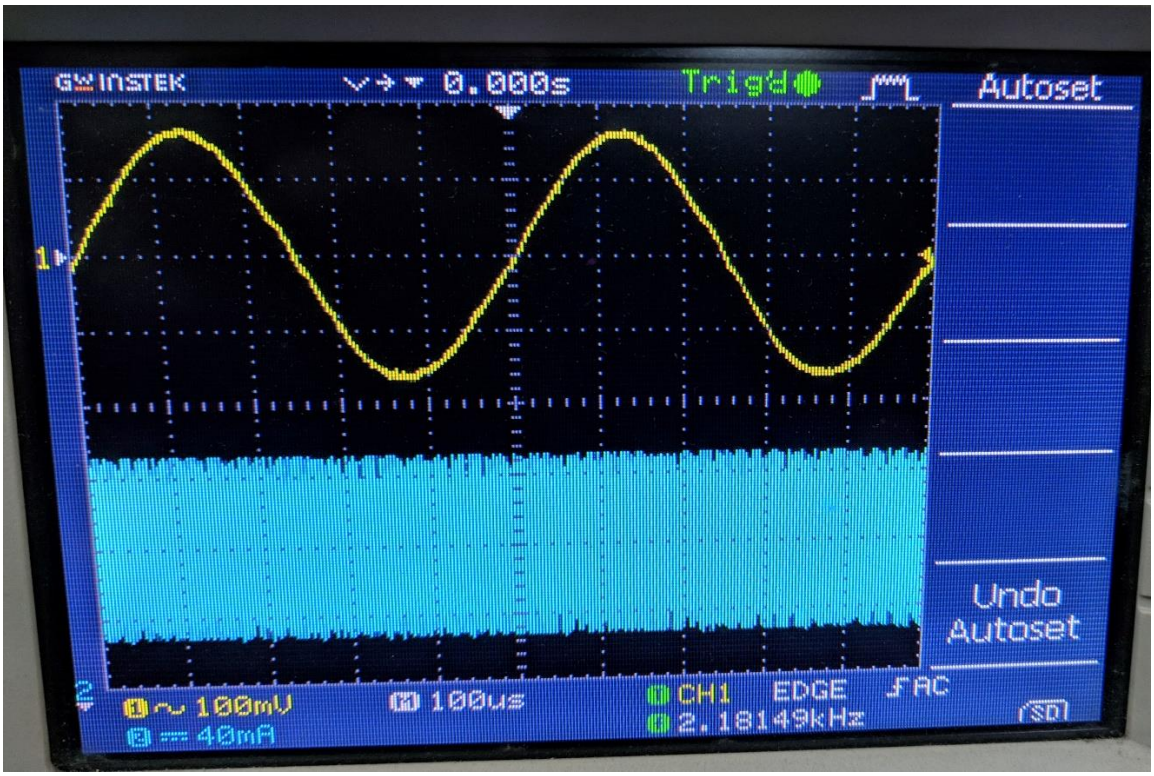
Here, varactor modulator works as a frequency generator. If it is possible to change the base bias voltage with sinusoidal modulating signal a sinusoidal change in oscillator frequency can be obtained. We are generating frequency signal from message signal.

We know XL=2*pi*f*l AND XC=1/2*pi*f*c so voltage rise can bring two types of effect for the circuits internal frequency components.

Input Message Signal:



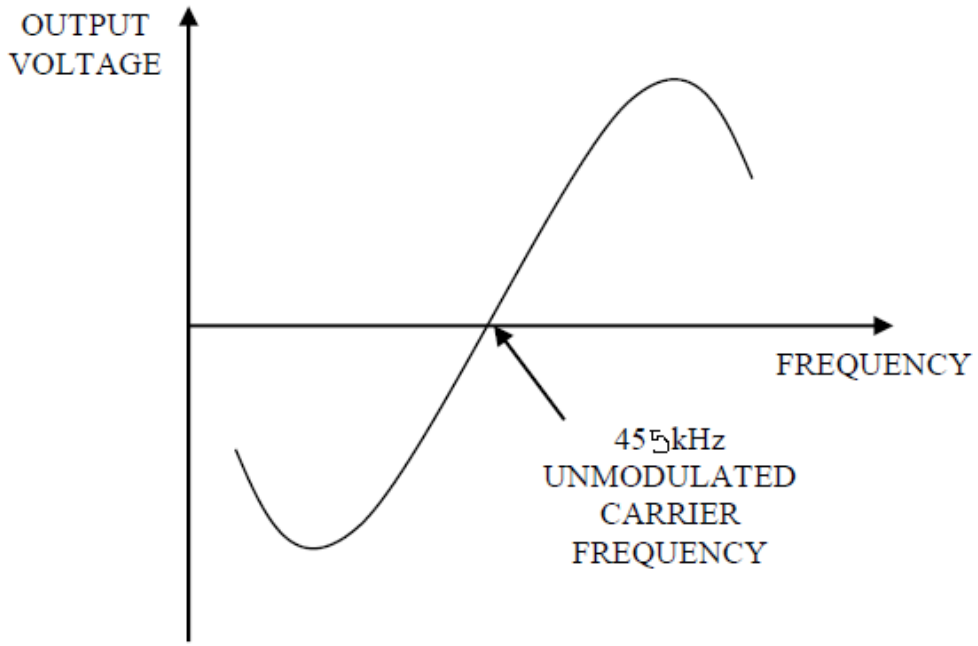
Varactor Modulator Output:



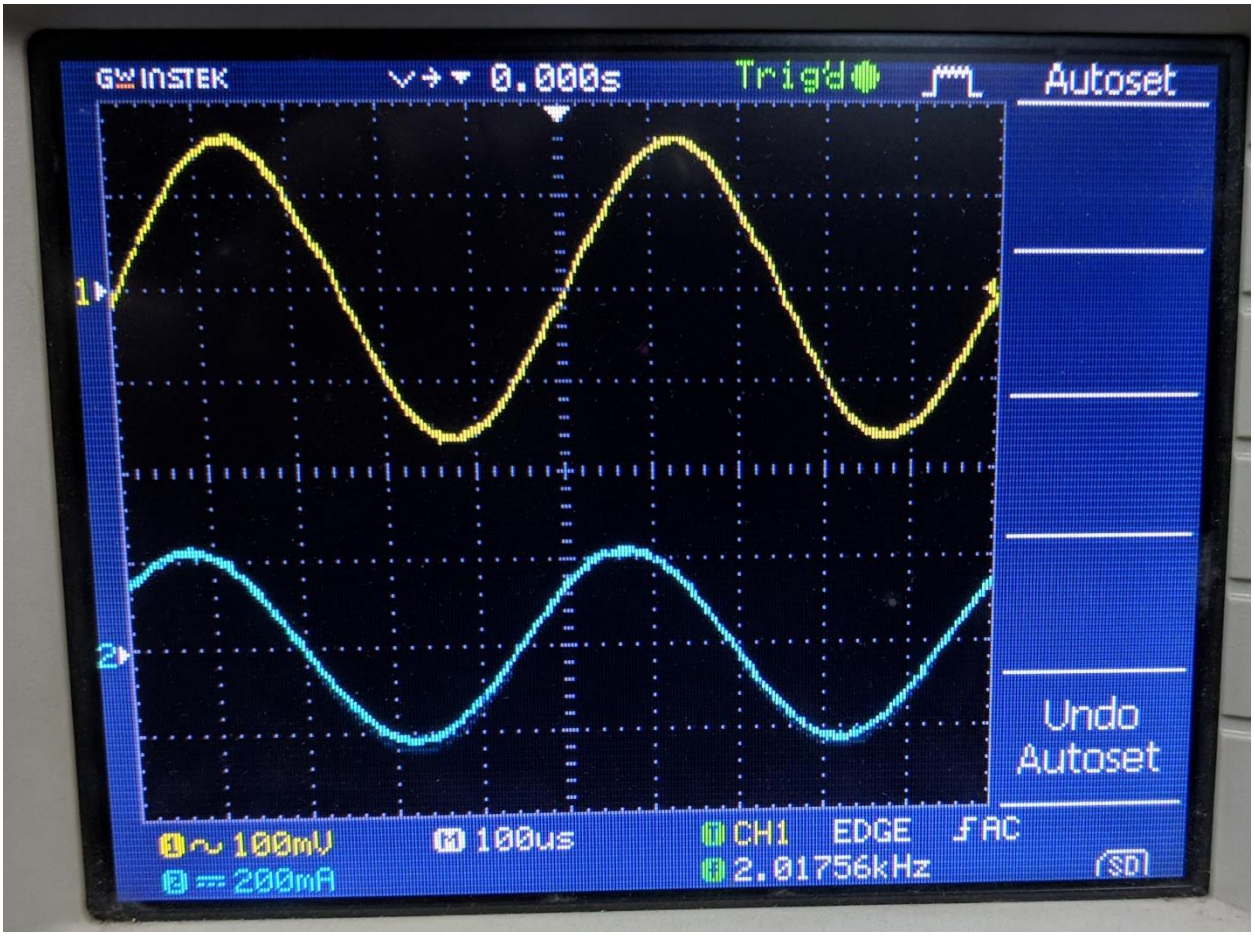
Here, for positive half cycle we will get high frequency and for negative half cycle we will get low frequency.
Maximum frequency can be obtained when voltage is maximum and when voltage is minimum frequency is minimum. Basically the intermediate frequency is the standard for comparing the voltages and frequency.
The change in audio oscillator frequency does not effect the amount of frequency deviation-it actually determines how many times per second the carrier deviates from its center position. But Oscilloscope can not show the rate of change of frequency deviation and for this reason it appears that the audio oscillator frequency have no effect.
Now if we turn the carrier frequency preset slowly CW we can observe the frequency deviation like this.

Frequency demodulation by Foster-Seeley detector:

The Foster Seeley detector is quite similar to the ratio detector at a first look. It has an RF transformer and a pair of diodes. The Foster-Seeley circuit operates using a phase difference between signals.



Reconstructed message signal:



When an un-modulated carrier is applied at the Centre frequency, both diodes conduct, to produce equal and opposite voltages across their respective load resistors. These voltages cancel each one another out at the output so that no voltage is present. As the carrier moves off to one side of the center frequency the balance condition is destroyed, and one diode conducts more than the other. This results in the voltage across one of the resistors being larger than the other, and a resulting voltage at the output corresponding to the modulation on the incoming signal.