Ve216 Signals and Systems

Lab 2 Manual

(Note: this manual was originally for hardwares, some operations may not be needed in Proteus software.)

1 Objectives

- Understand the principle of envelope detector and its relationship with Amplitude Demodulation.
- Review op amp circuits.

2 What to Bring

Each group should have a thumb drive to store screen images.

3 Tasks

3.1 Modulated Sine Wave (2 pics)

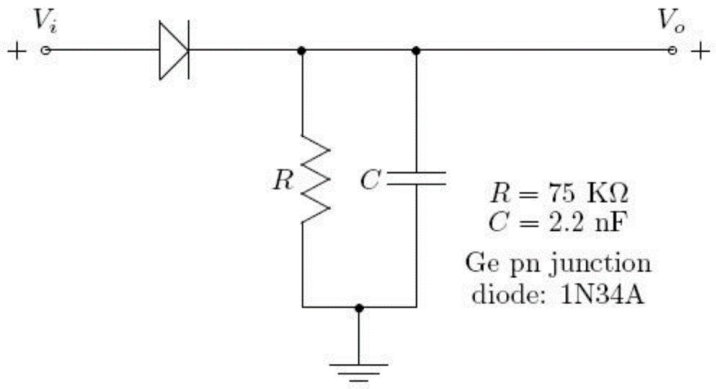
- Set the load of the function generator to be 50 Ohm.
- Use function generator to generate a modulated sine wave with baseband frequency 1kHz and modulating frequency 100kHz.
  The original signal should have 4V Vpp.
  The carrier (modulating) signal should be sine wave as well.
  The modulation depth should be 50% (modulation index 0.5).
- Directly connect the generator to the ocsilloscope to verify your generated waveform. Store the images with time division $200\mu s$ and $20\mu s$.
- In your post-lab report, give the mathematical formula of this waveform.

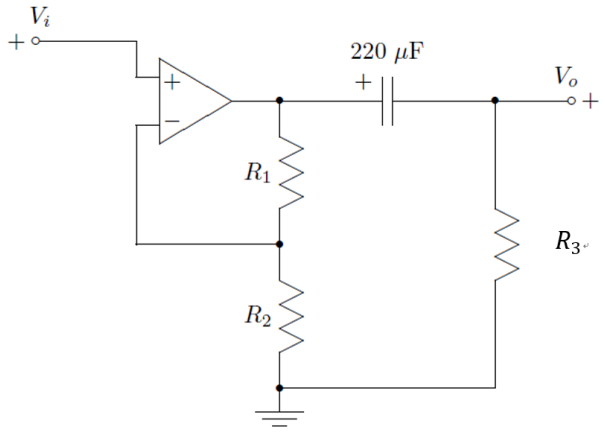
3.2 Modulated Triangular Wave (2 pics; You may choose other non-triangluar waveforms)

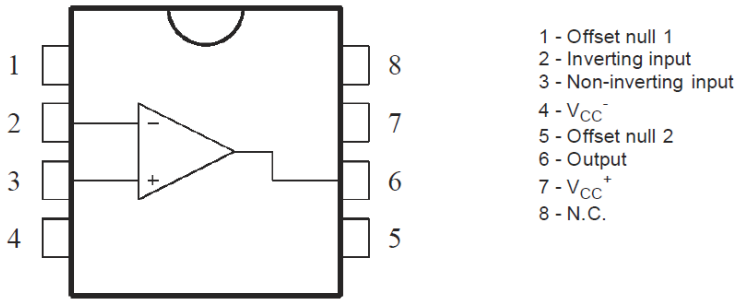
- Repeat Part 1, with the only difference that the original signal should have triangular shape.

3.3 Envelop Detector (4 pics)

- Assemble the circuit using $R = 75K\Omega$ and $C = 2.2nF$.
- Use the envelope detector to "demodulate" the two signals in Part 1 and 2. Store your images still at $T = 200\mu s$ and $20\mu s$. In each image, be sure to display both CH1 (as input) and CH2 (as output).







3.4 Amplifier (1 pic)

- Use the function generator to generate a 5kHz sine wave with 500 mV Vpp.
- Assemble the circuit using $R_1 = 15k\Omega$, $R_2 = 5.6k\Omega$, $R_3 = 82k\Omega$ and $C = 220\mu F$. Capture both input and output on the Ocsilloscope. Compare the measured gain of your amplifier with the calculated value.

4 Deliverables

Each team should submit one post-lab report.