eastern
mediterranean
university

CMPE226 Electronics Lab Report
Experiment # 6
Half Wave Rectification

Std. No Name

1. _____ _____
2. _____ _____
3. _____ _____

Group _____
Date _____

Objectives:

1) *To learn to recognize a half-wave rectified sinusoidal voltage*

2) *To understand the effect of a reservoir capacitor upon the rectified waveform.*

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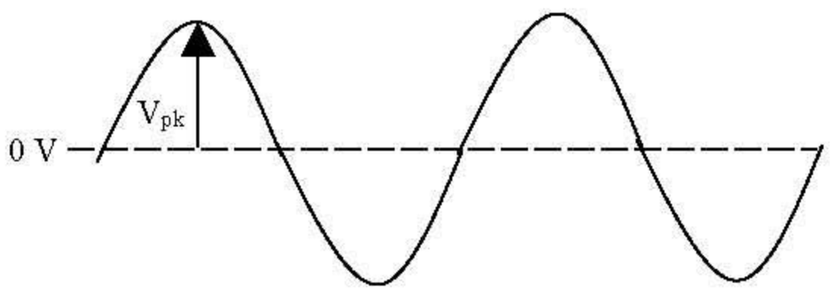
INTRODUCTION

In Experiment 1 you found that a diode conducts current in one direction (from anode to cathode) but not in reverse direction. A widely used application of this feature is the conversion of alternating voltages to direct voltages (Figure 1). This assignment studies the simplest circuits for achieving this conversion, which is called RECTIFICATION.

Figure1



A Sinusoidal Alternating Voltage

A Direct Voltage

EXPERIMENTAL PROCEDURE

1. Construct the circuit with diode (BBC 598 355) as shown in Figure 2

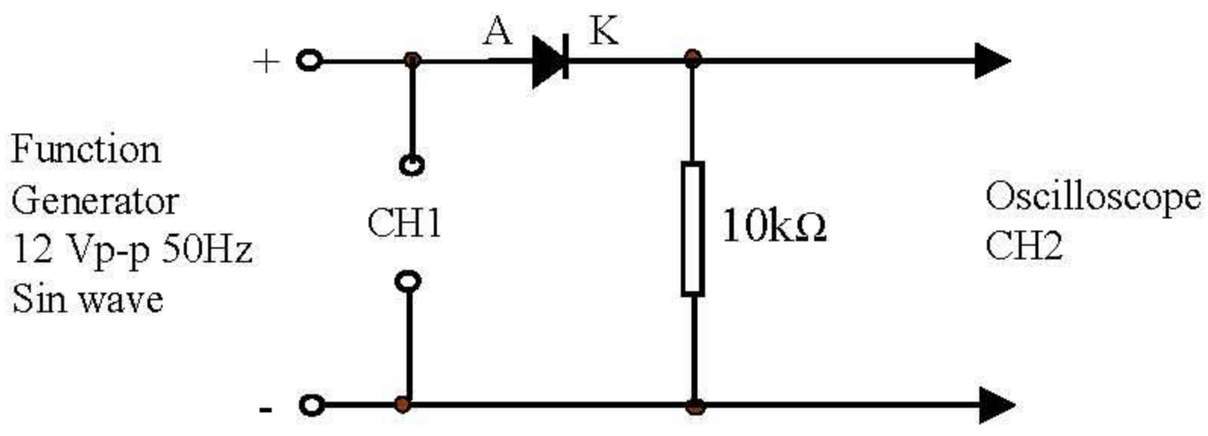


Figure 2

2. Switch on the oscilloscope and the function generator (12Vp-p, 50 Hz, Sine wave)
Set following adjustments for the oscilloscope

CH1 2V/Div (DC coupling)
CH2 2V/Div (DC coupling)
Time scale= 5ms

(Zero both the traces and then observe the two waveforms on the oscilloscope)

3. Measure and record time T (period) and peak voltage V_{pk}. Sketch the waveforms for both channel (CH1 and CH2) and label it to show the periods when the diode is conducting and those when is not.

Confirm this : V_{pk} values of both input and output should be very nearly equal to each other.

Q1. Why will peak values V_{pk} of both input and output waveforms are not equal?

Q2. How much will it differ?

Q3. Find the mean value of output?

(How to find mean value?) The mean value of a half-sinusoid can be shown by geometry to be:

$$\frac{V_{pk}}{\sqrt{2}}$$

But every half-cycle the voltages is zero. The mean value of the waveform, therefore, is

$$\frac{1}{T}\left[\frac{V_{pk}}{\sqrt{2}}\times\frac{T}{2}+0\times\frac{T}{2}\right]=\frac{V_{pk}}{2\sqrt{2}}$$

Q4. The mean voltage you obtain is positive relative to zero. How could you obtain a negative voltage. (Confirm your answer by experiment)

THE EFFECT OF RESERVOIR CAPACITOR

4. Construct the circuit with diode (BBC 598 355) and the capacitor with 1μF as shown in Figure 3

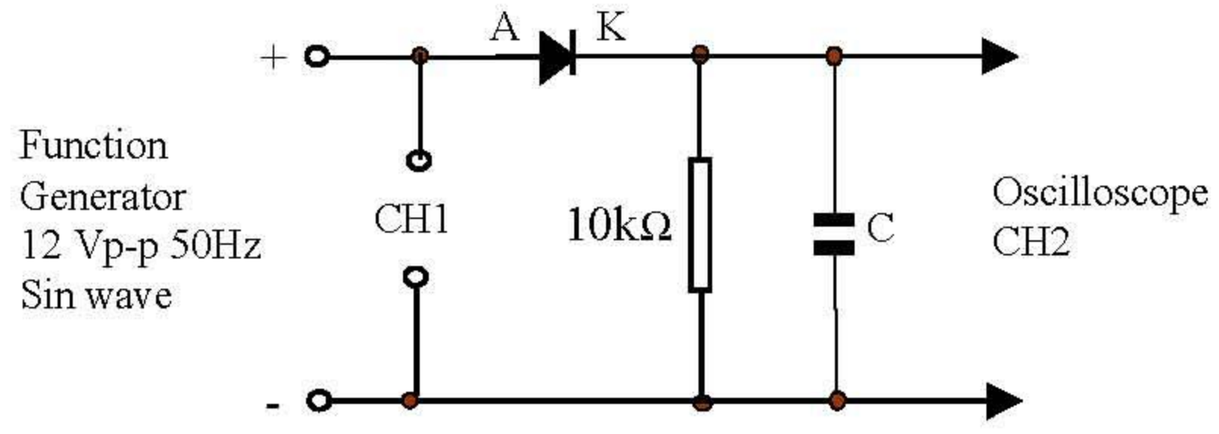


Figure 3

5 Measure and record time *T* (period) and peak voltage V_{pk}. *Sketch* the waveforms for both channel (CH1 and CH2) and label it to show the periods when the diode is conducting and those when is not.

6. And repeat the step **5** for different values of capacitors like 2.2μF and 22μF.

For 1μF

For 2.2μF

For 22μF

7. Observe the output waveform on the oscilloscope and note the value of the peak-to-peak variations in voltage for every value of capacitor.

Q5. Are the new mean voltages (*When different capacitors are added*) greater or less than it was before?

The capacitor C becomes charged up by the current through the diode during the positive half cycle. Then, we supply voltage starts to reduce again, the capacitor keeps the output voltage high and the diode cuts off. Capacitor C discharges through F until the next positive half cycle occurs

CONCLUSIONS (USE BACK SIDE OF PAGE)