

Feng Chia University
Electrical Engineering Fundamentals I Lab

Laboratory 5

X-Y Mode

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I. Introduction

- Decide if two signals are Synchronous or Asynchronous.
- Display two signals ($X(t)$ and $Y(t)$) as Y versus X
- Observe Lissajous Patterns on Oscilloscope

II. Materials

- Waveform Generator
- Oscilloscope

III. Circuit diagram

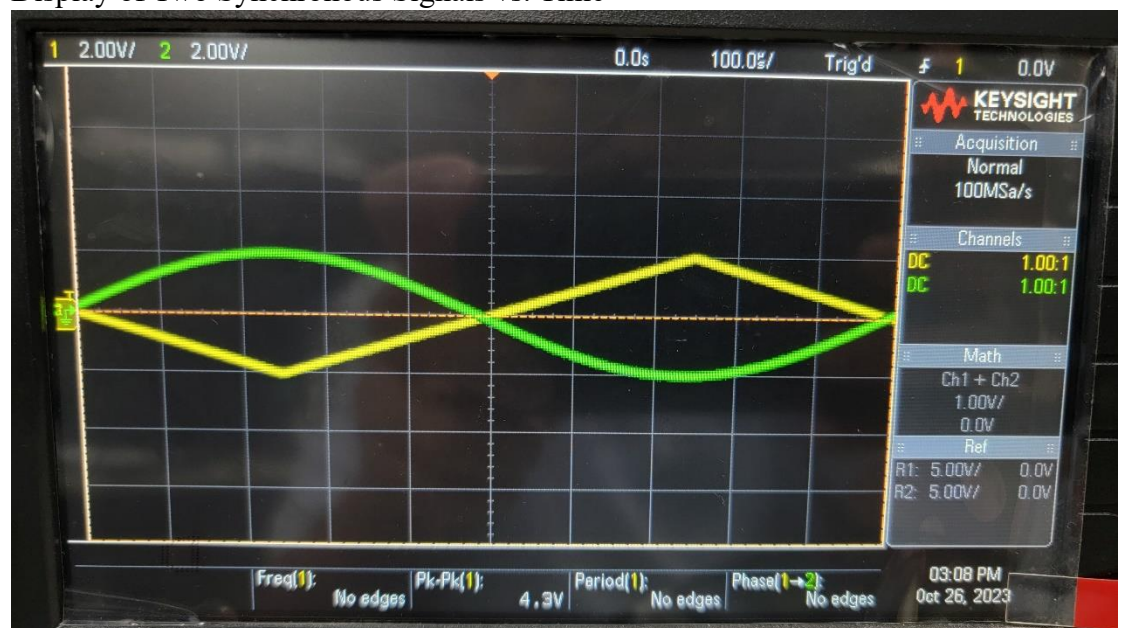
Connect two Waveform Generators to a Oscilloscope

IV. Methods

Use oscilloscope to observe and record the graph in X-Y mode generated by function generators.

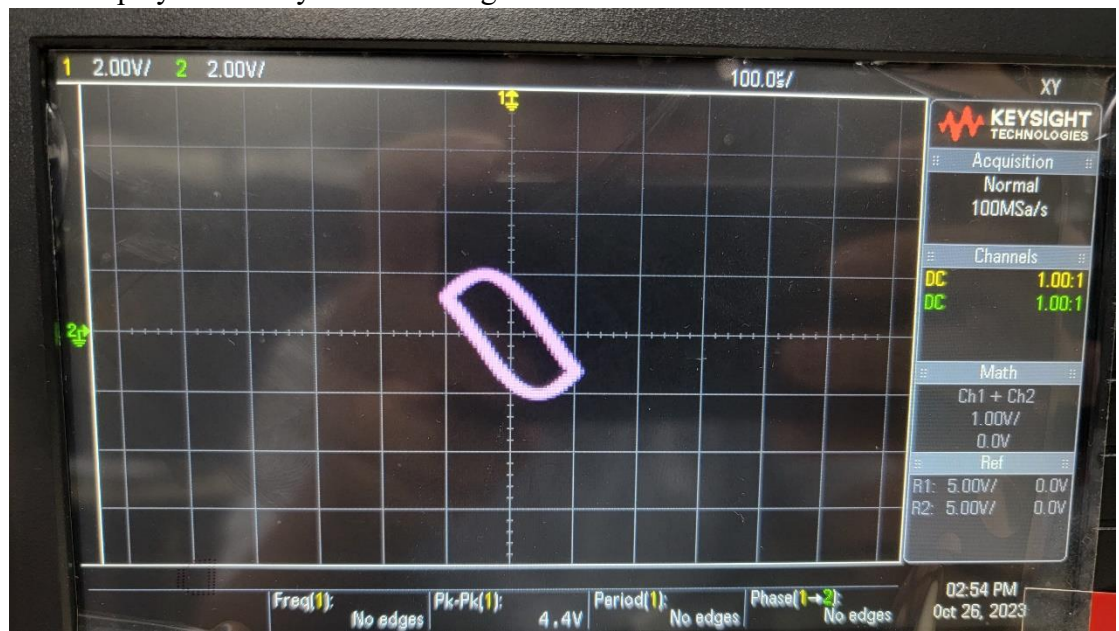
V. Experiments data

- Experiment 5.a Display of Two Synchronous Signals:
 - Display of Two Synchronous Signals vs. Time



Vertical Scale CH1	=	2.00 V/Div
Vertical Scale CH2	=	2.00 V/Div
Horizontal Scale	=	100 μ s/Div
Status	=	Run
Trigger Setting:		
▼→Trigger Point	=	Center = 0.00 s
Source	=	CH1
Slope at Trigger	=	↑
Coupling	=	DC
Mode	=	Normal

2. X-Y Display of Two Synchronous Signals



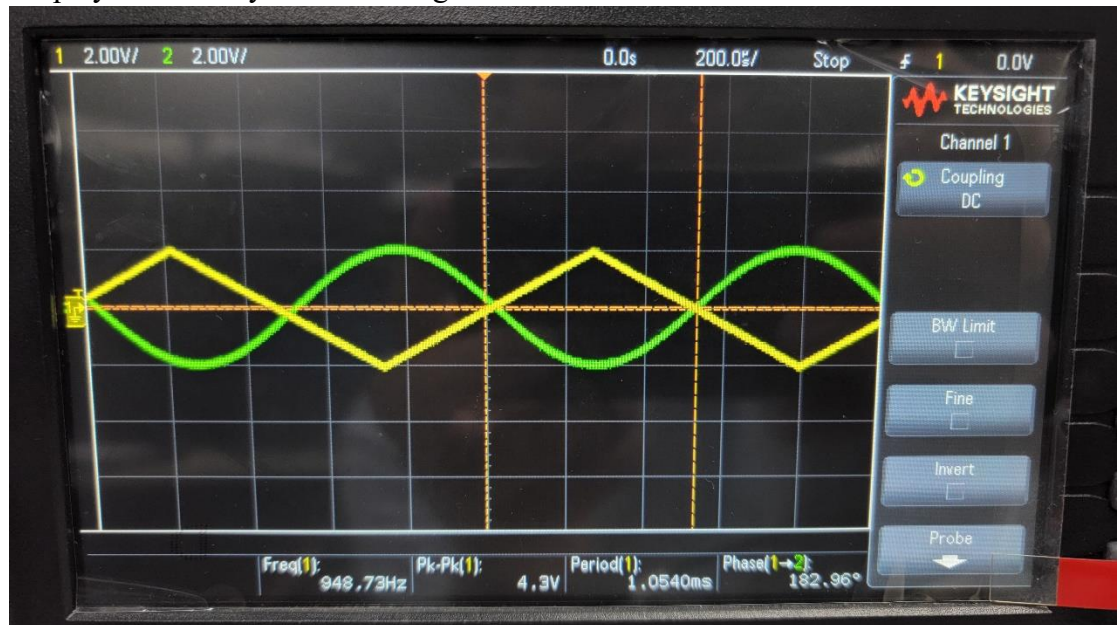
Vertical Scale CH1 = 2.00 V/Div

Vertical Scale CH2 = 2.00 V/Div

Status = Run

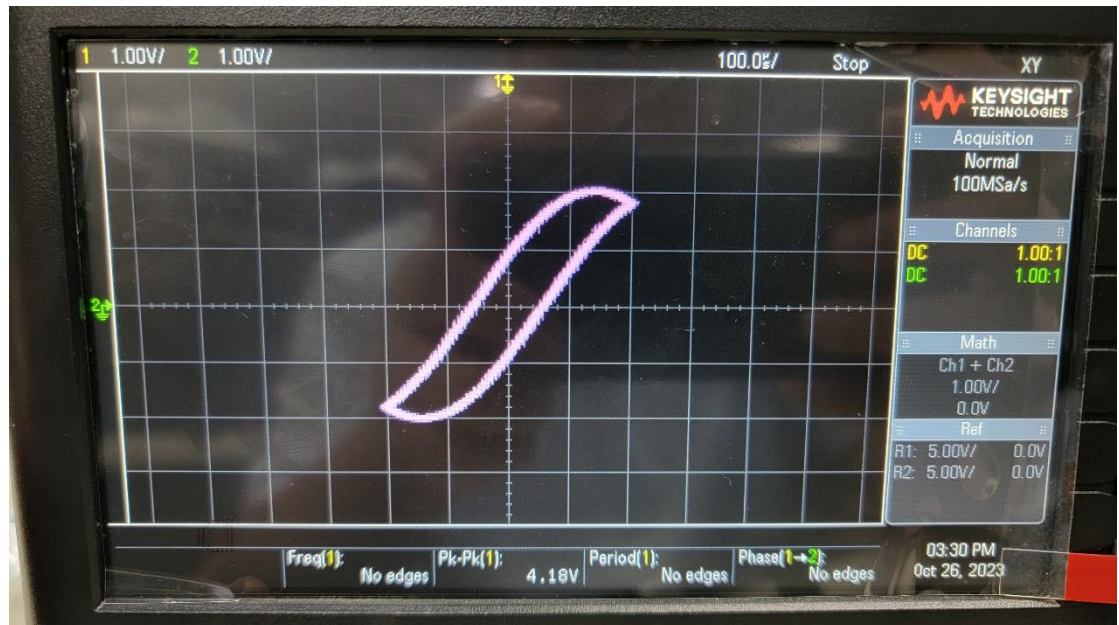
b. Experiment 5.b Display of Two Asynchronous Signals:

1. Display of Two Asynchronous Signals vs. Time



Vertical Scale CH1	=	2.00 V/Div
Vertical Scale CH2	=	2.00 V/Div
Horizontal Scale	=	200 μ s/Div
Status	=	Stop
Trigger Setting:		
▼→Trigger Point	=	Center = 0.00 s
Source	=	CH1
Slope at Trigger	=	↑
Coupling	=	DC
Mode	=	Normal

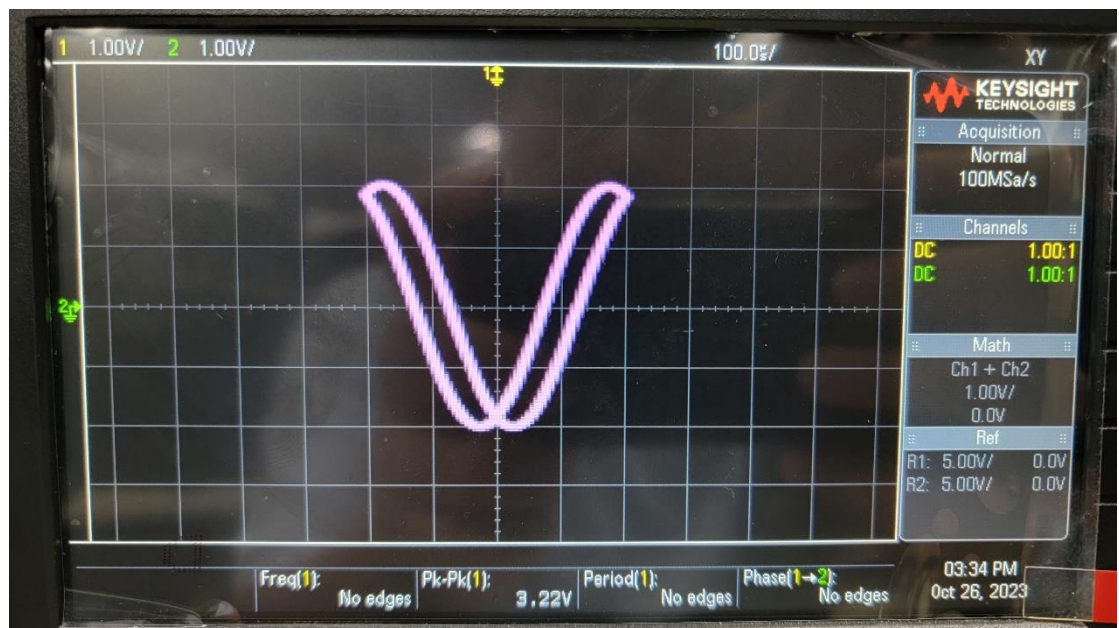
2. X-Y Display of Two Asynchronous Signals



Vertical Scale CH1 = 1.00 V/Div

Vertical Scale CH2 = 1.00 V/Div

Status = Stop



Vertical Scale CH1 = 1.00 V/Div

Vertical Scale CH2 = 1.00 V/Div

Status = Stop

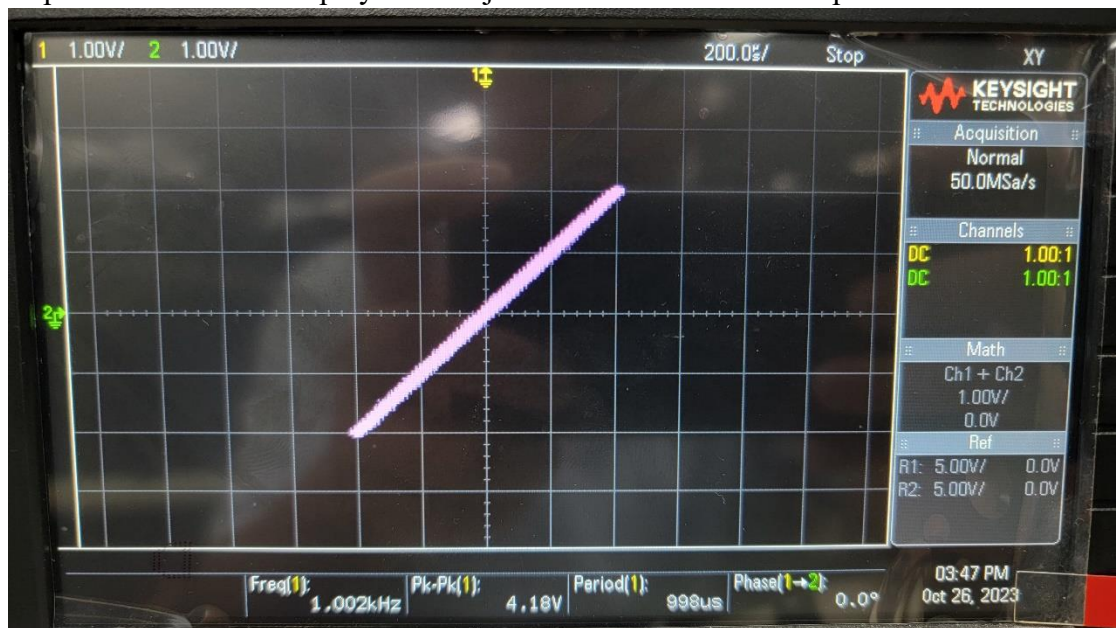


Vertical Scale CH1 = 1.00 V/Div
 Vertical Scale CH2 = 1.00 V/Div
 Status = Stop

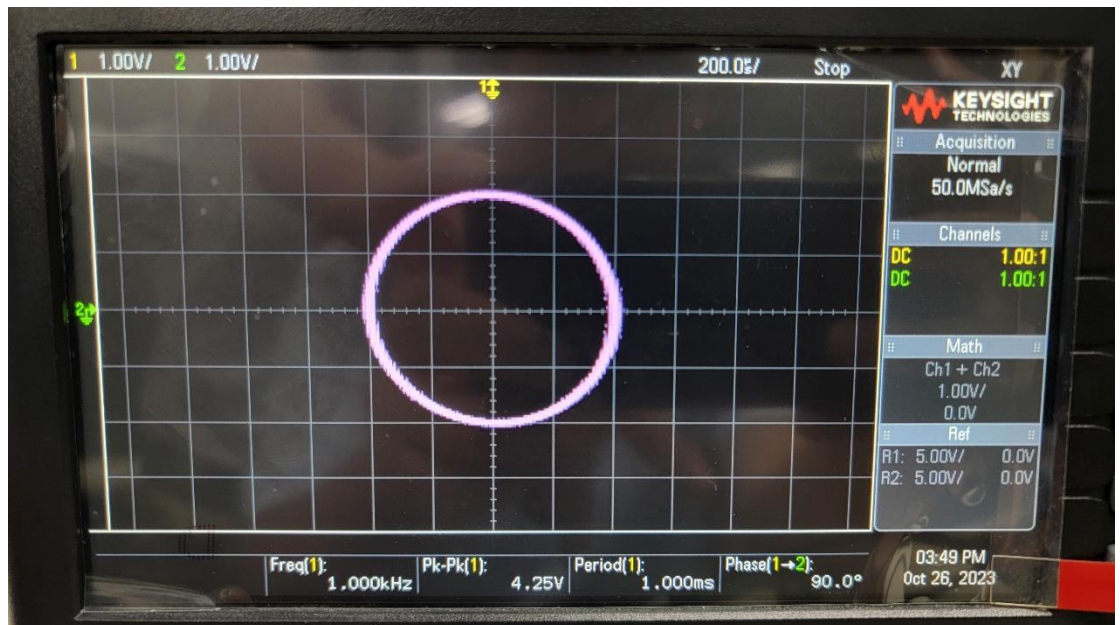


Vertical Scale CH1 = 1.00 V/Div
 Vertical Scale CH2 = 1.00 V/Div
 Status = Stop

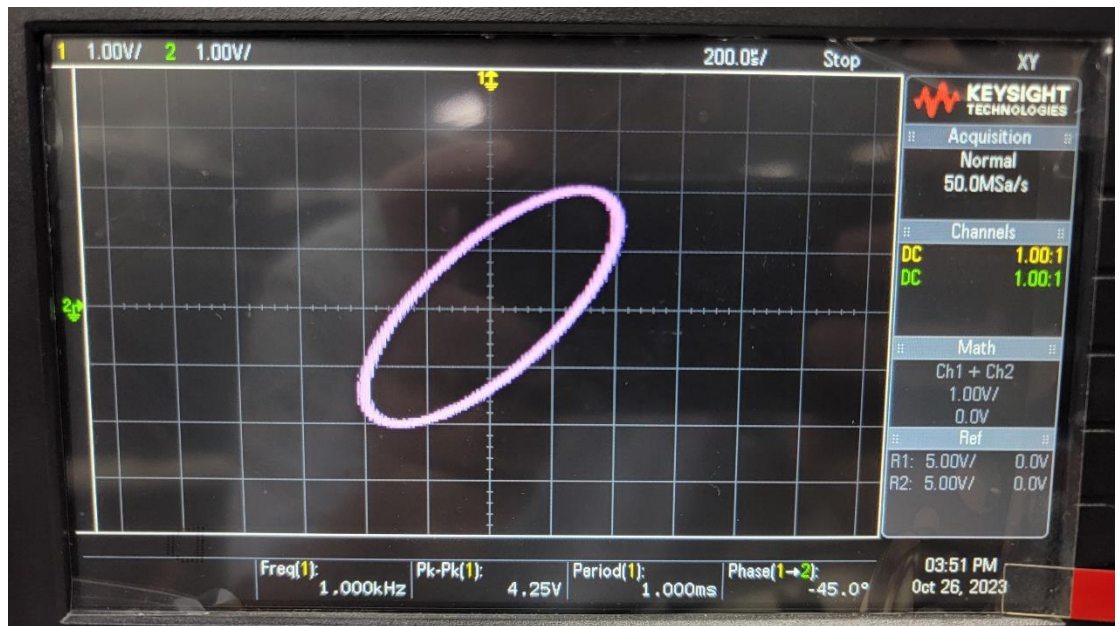
c. Experiment 5.c X-Y Display of Lissajous Patterns on Oscilloscope:



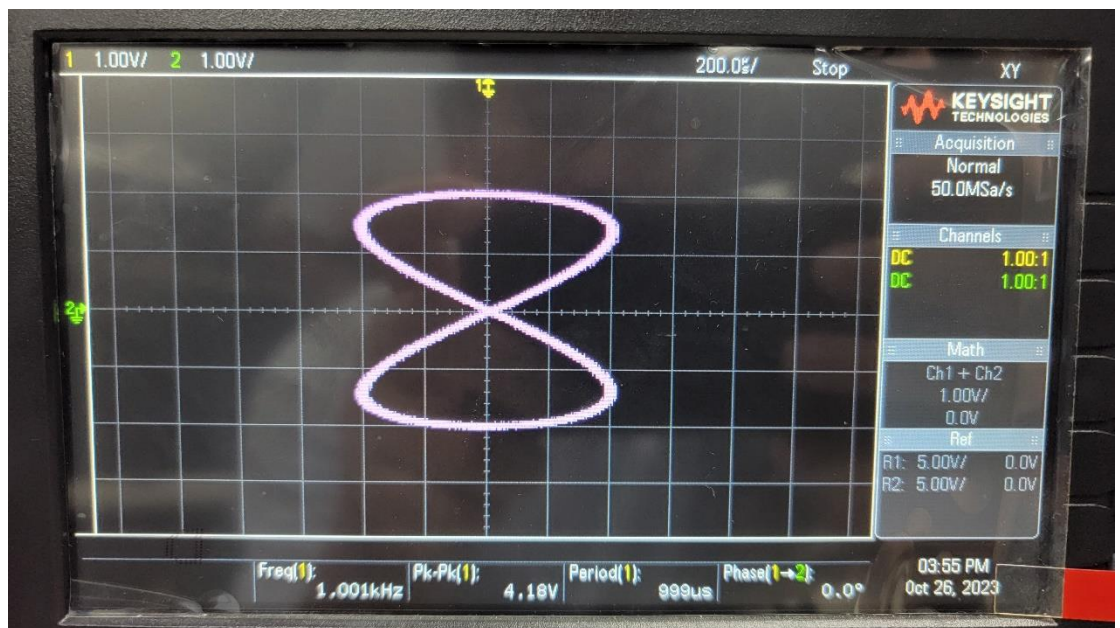
$A_1 = 2.00 \text{ Vpp}$
 $A_2 = 2.00 \text{ Vpp}$
 $f_1 = 1000 \text{ Hz}$
 $f_2 = 1000 \text{ Hz}$
 $\theta = 0^\circ$



$A_1 = 2.00 \text{ Vpp}$
 $A_2 = 2.00 \text{ Vpp}$
 $f_1 = 1000 \text{ Hz}$
 $f_2 = 1000 \text{ Hz}$
 $\theta = 90^\circ$



$A_1 = 2.00 \text{ Vpp}$
 $A_2 = 2.00 \text{ Vpp}$
 $f_1 = 1000 \text{ Hz}$
 $f_2 = 1000 \text{ Hz}$
 $\theta = -45^\circ$



$A_1 = 2.00 \text{ Vpp}$
 $A_2 = 2.00 \text{ Vpp}$
 $f_1 = 1000 \text{ Hz}$
 $f_2 = 500 \text{ Hz}$
 $\theta = 0^\circ$

VI. Results

See Experiments data

VII. Discussion

By using X-Y Mode, we can easily observe propagation delay between two waves.

VIII. Conclusion

With Oscilloscope, we can easily observe the wave generated by waveform generator.