

Introduction to Function Generator and Sinusoids (Updated 09 OCT 08)

A Practical Exercise

Name: _____

Section: _____

I. Purpose.

1. Introduce the measurement of sinusoids (ac voltages) using the oscilloscope
2. Introduce the operation of the function generator

II. Equipment.

Agilent E3620A Dual DC Power Supply
Agilent 34401A Digital Multimeter (DMM)
Oscilloscope
Function Generator

III. Preparation.

IV. Lab Procedure.

You must **read** and complete each step.

Step One: Function generator familiarization

The function generator can produce a wide array of different electrical signals. In EE 301 we will use the function generator to create sinusoidal electrical signals with various amplitudes and frequencies.

- Locate the function generator on your lab bench.
- Locate the function generator's output. Ensure that it has a two output (RED / BLACK) banana plug adaptor.
- Turn the power on.

Note: Functions generators will default to their last entered settings. You must deselect undesired settings. E.G. "Offset" which can be deselected by pressing the "Offset" button.

- Select the sinusoidal function by pressing the button with the Sine wave on it. The function generator display should indicate a small sine wave.

You can use different methods to set the frequency and amplitude of the sine wave. We will review one.

- Select the Frequency function (press the **Freq** button).
- Select the Enter Number function.
- Enter the desired frequency using the numbers located next to the push buttons then the enter button. E.G. enter 1.75, then press "Enter".

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- Enter the desired units by first using the “▶” or “◀” buttons to move the cursor until the frequency units on the displays flashes, and then change the units with either the rotating knob or the “▲” or “▼” buttons.
- Set the frequency of the sine wave to 1.75 kHz.

Note that you need to press “▶” or “◀” buttons until all numbers and units stop flashing.

- Select the Amplitude function.
- Select the Enter Number function.
- Enter the desired amplitude using the numbers located next to the push buttons. E.G. enter 10, then press “Enter”.
- Enter the desired units by first using the “▶” or “◀” buttons to move the cursor until the frequency units on the displays flashes, and then change the units with either the rotating knob or the “▲” or “▼” buttons.
- Set the amplitude of the sine wave to 10 Vpp.

Step Two: Measure a sine wave with the oscilloscope

- Connect the function generator’s output to CH 1 input on the oscilloscope.
- Adjust your oscilloscope settings until it displays at least one full cycle of the sine wave.
Note that with CH 1 selected and the function generator on/connected, AUTOSET will attempt to display something meaningful. Verify that CH 1 coupling is AC, and adjust Volts/Div and Sec/Div, so that one complete cycle of the sine wave is displayed.
- Using figure 1 sketch the display on the LCD and indicate Volts/Div and Sec/Div.
- Answer the following questions using the cursor function on the oscilloscope.

What is the period (T) of this sine wave? _____

What is the frequency (f) of this sine wave in hertz? _____

What is the frequency (ω) of this sine wave in radians second? _____

What is the amplitude (V_m) of this sine wave? _____

What is the peak to peak value (V_{pp}) of this sine wave? _____

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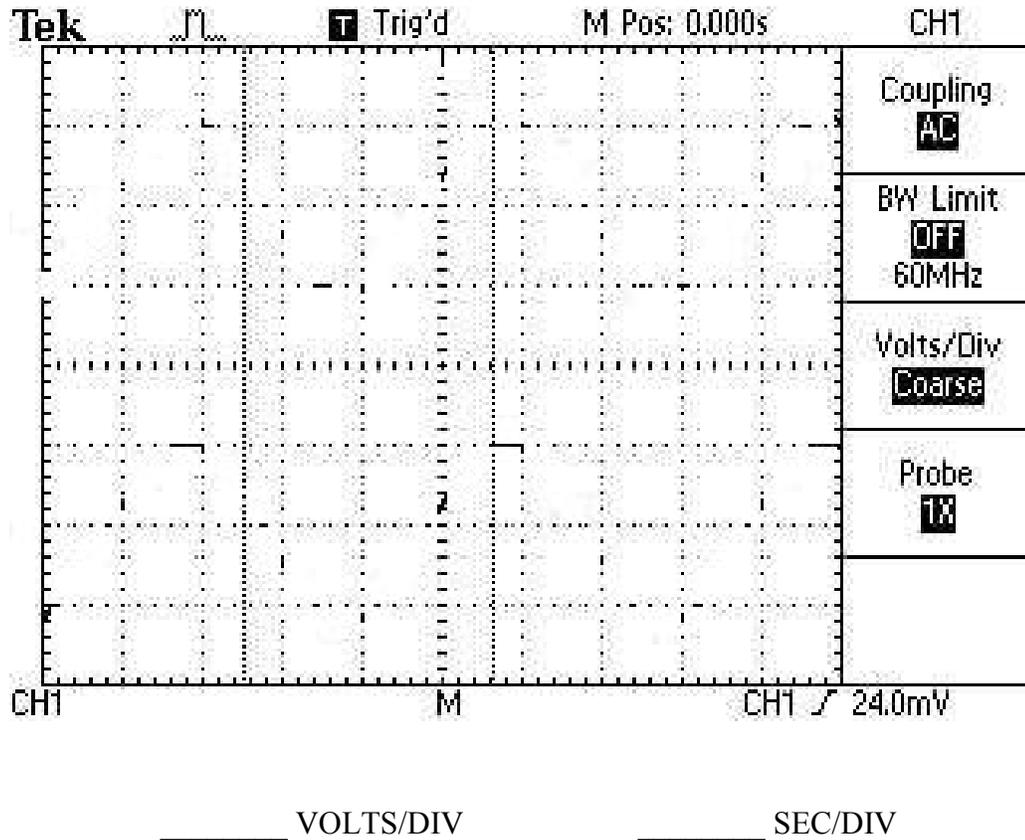


Figure 1

- Write the equation of this sine wave as a function of time, $v(t) = V_m \sin(\omega t + \theta)$.

$v(t) =$ _____

Step Three: Review (Optional)

- Change your function generator's output to a sine wave with a frequency of 2.2 MHz and an amplitude of 7 Vpp.
- Adjust your oscilloscope settings until it displays at least one full cycle of the sine wave. Note that with CH 1 selected and the function generator on/connected, AUTOSET will attempt to display something meaningful. Verify that CH 1 coupling is AC, and adjust Volts/Div and Sec/Div, so that one complete cycle of the sine wave is displayed.
- Using figure 2 sketch the display on the LCD and indicate Volts/Div and Sec/Div.

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Answer the following questions using the cursor function on the oscilloscope.

What is the period (T) of this sine wave? _____

What is the frequency (f) of this sine wave in hertz? _____

What is the frequency (ω) of this sine wave in radians second? _____

What is the amplitude (V_m) of this sine wave? _____

What is the peak to peak value (V_{pp}) of this sine wave? _____

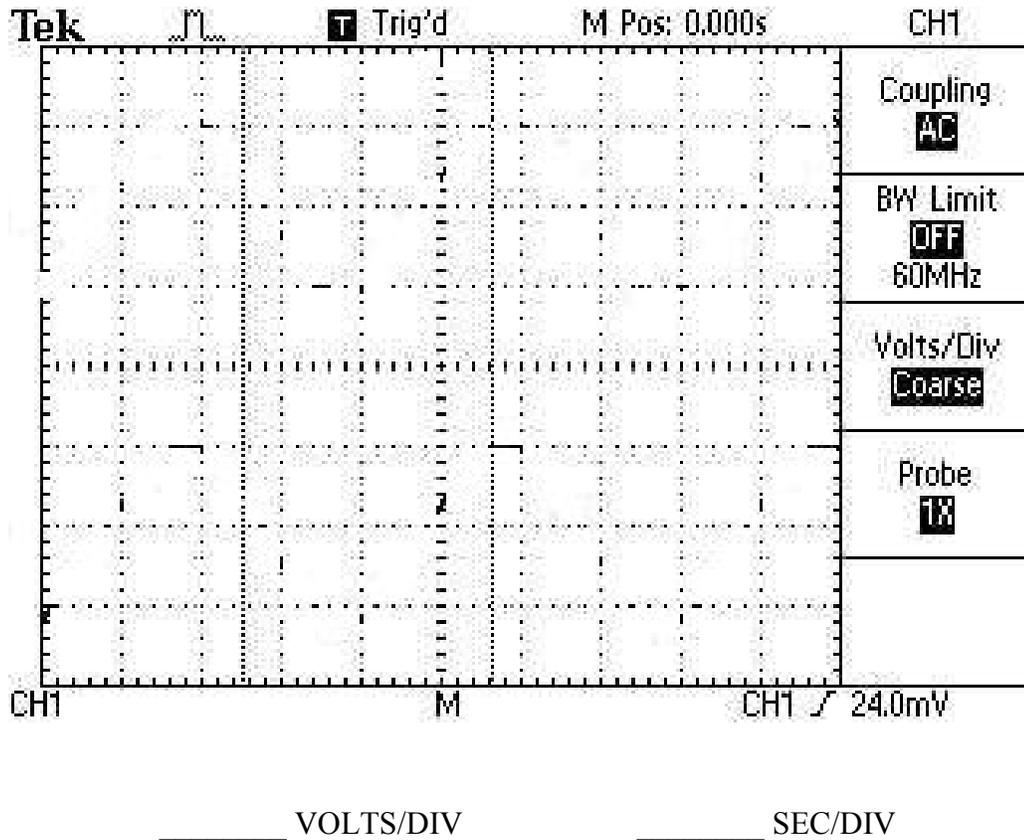


Figure 2

Write the equation of this sine wave as a function of time, $v(t) = V_m \sin(\omega t + \theta)$.

$v(t) =$ _____