Student Name: Yolanda Chen Date: 2021.09.10
Lab partner(s): Praneel Jasinghe Lab No./Title: 3
Section # (GTA): 003/Yi Xie

Instructions:

- ***Submission must contain only original, individual, and current work.***
- ***After completion, save as PDF before submitting.***

Task 3.8.2

Objective:

This task we got familiar with using the oscilloscope and function generator and adjusted the horizontal and vertical scales.

Results/Calculations:

Step 2:

V(t) = 2 cos(2pi*1000t)

Step 3-7

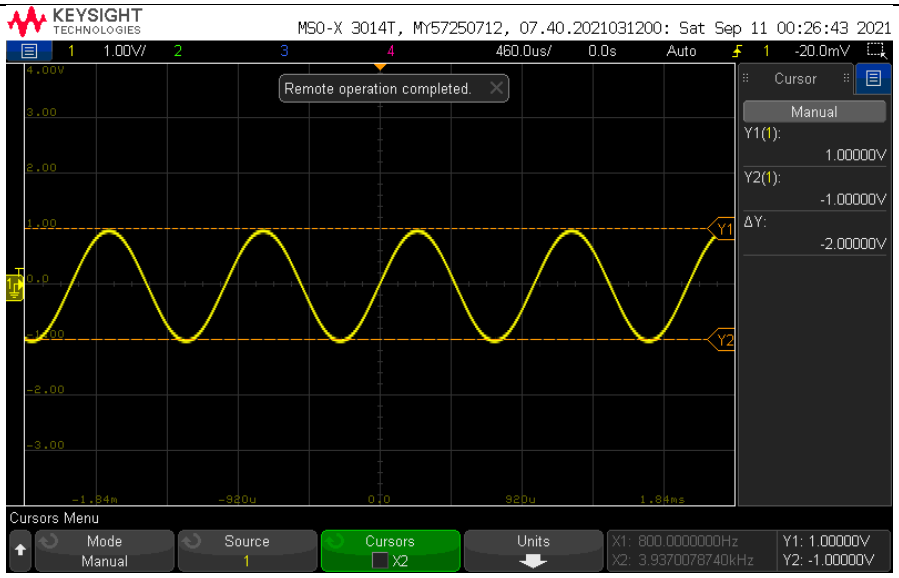

Figure 1: a screenshot of the oscilloscope display.

Step 6

Table I: Theoretical and Measured Amplitude and Frequency

	Theoretical	**Measured**	**Error (%)**
Pk-Pk Amplitude (V)	2	2.05	2.5
Frequency (kHz)	1	1.0005	0.0499

Conclusion

We can see from the percent error that the measured values are pretty close to the theoretical ones and therefore means we got the values we should be getting.

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Task 3.8.3

Objective

For this task we are doing a similar task to task 2 but with triangle wave.

Results/Calculations

Step 3-6

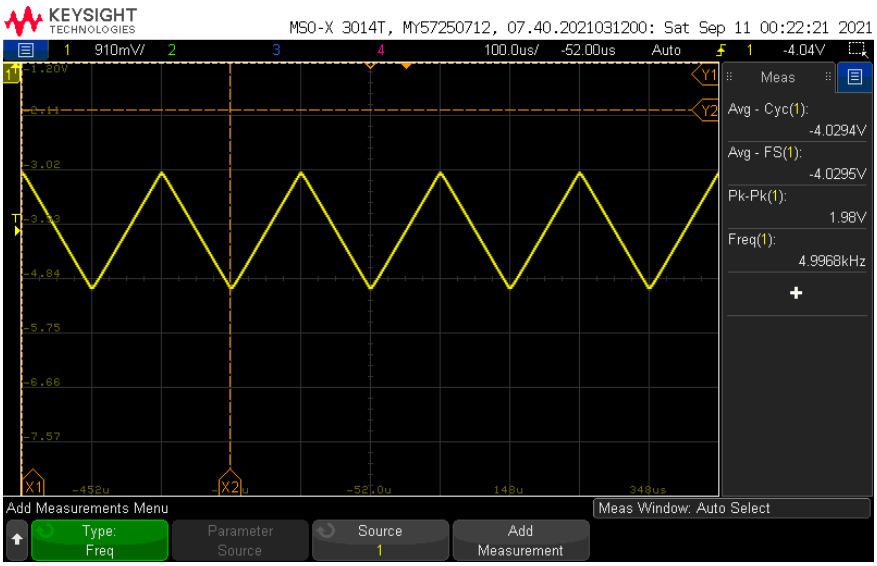

Figure 2: a screenshot of the oscilloscope display .

Step 5

Table II: Theoretical and Measured Amplitude, Frequency and Average

	Theoretical	**Measured**	**Error (%)**
Pk-Pk Amplitude	2V	1.98 V	1
Frequency	5kHz	5.0019 kHz	0.038
Average	4V	4.0302V	0.7549

Conclusion

This task is pretty similar to task 2, just with different parameters and waveform. The table above shows that we have a small percent error which thus means that our values are correct.

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Task 3.8.4

Objective

This task is to let us be familiar with slow signals and roll mode. We are to set the oscilloscope on roll mode and see the difference between that and normal mode.

Results/Calculations

Step 3

No, the graph is really messy and changing all the time.

Steps 4-6

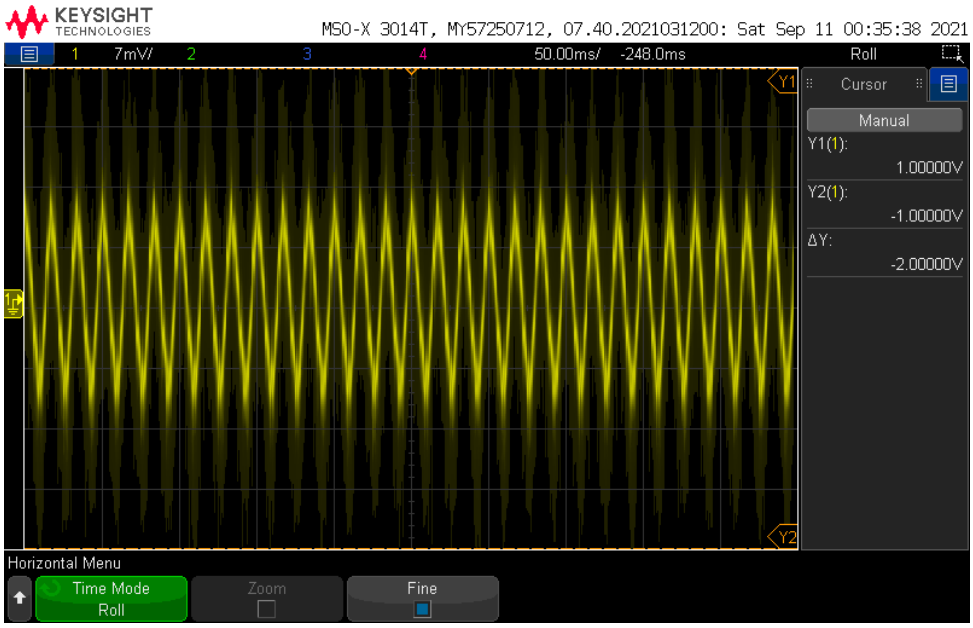

Figure 3: a printout of the oscilloscope display on Roll Mode .

Conclusion

We got to see the difference between roll mode and normal mode. When the signal was in normal mode, it was really messy, and we couldn't really see a pattern because the graph is always changing. But when we set it to roll mode, we can see the wave and when we stop it, we can get a clear picture of the wave.

Task 3.8.5

Step 1

```
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
% ECE 20007 Instrument Control Skeleton File   %
% 01/14/2019                                   %
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

%% Instrument Addresses
% These are found as VISA addresses in Keysight connection expert)
% Leave address blank for any unused instruments
fg_addr = 'USB0::0x0957::0x2C07::MY57801018::0::INSTR';
%dmm_addr = 'USB0::0x2A8D::0xB318::MY61210057::0::INSTR';
scope_addr = 'USB0::0x2A8D::0x1778::MY57250712::0::INSTR';
psu_addr = '';

%% Connect to devices with addresses specified
instrreset;

fg = instr_connect(fg_addr, 'usb');
%dmm = instr_connect(dmm_addr, 'usb');
psu = instr_connect(psu_addr, 'serial');
scope = instr_connect(scope_addr, 'usb');

fg_sin(fg,1, 1400,0.75,1);

fg_output(fg, 1,'ON');
%% Insert measurement code here
display_sin(fg,scope,1,0.2,4,2);


%% Disconnect from all instruments used
instr_disconnect(fg);
instr_disconnect(scope);
%instr_disconnect(dmm);
instr_disconnect(psu);

%% Insert any plotting or calculations here
```

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Step 4

```
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
% ECE 20007 Instrument Control Skeleton File   %
% 01/14/2019                                   %
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

%% Instrument Addresses
% These are found as VISA addresses in Keysight connection expert)
% Leave address blank for any unused instruments
fg_addr = 'USB0::0x0957::0x2C07::MY57801018::0::INSTR';
%dmm_addr = 'USB0::0x2A8D::0xB318::MY61210057::0::INSTR';
scope_addr = 'USB0::0x2A8D::0x1778::MY57250712::0::INSTR';
psu_addr = '';

%% Connect to devices with addresses specified
instrreset;

fg = instr_connect(fg_addr, 'usb');
%dmm = instr_connect(dmm_addr, 'usb');
psu = instr_connect(psu_addr, 'serial');
scope = instr_connect(scope_addr, 'usb');

fg_sin(fg,1, 1400,0.75,1);

fg_output(fg, 1,'ON');
%% Insert measurement code here
display_sin(fg,scope,1, 1400,0.75,1);


%% Disconnect from all instruments used
instr_disconnect(fg);
instr_disconnect(scope);
%instr_disconnect(dmm);
instr_disconnect(psu);

%% Insert any plotting or calculations here
```


```
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
% ECE 20007 Instrument Control Skeleton File   %
% 01/14/2019                                   %
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
```

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Task 3.8.6

Objective

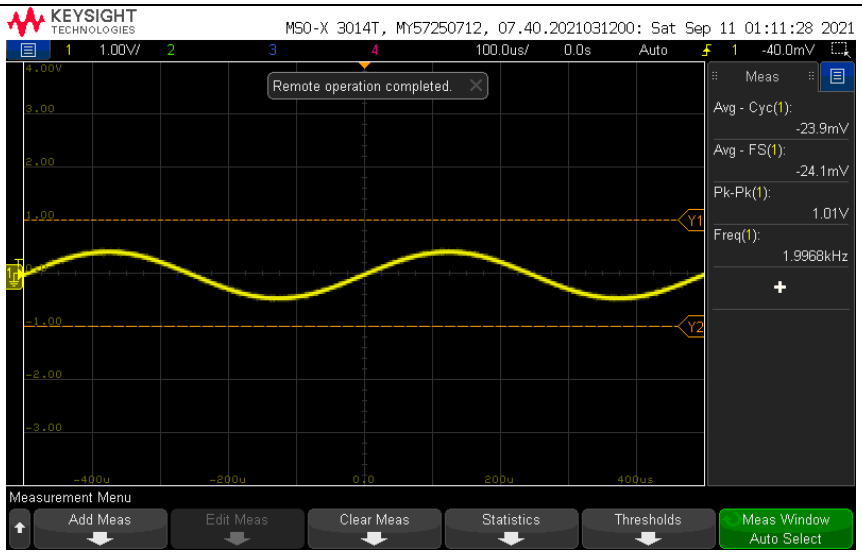
We are to build a voltage divider for this task and use the potentiometer to control the wave instead of the function generator.

Results/Calculations

Step 3

When we turned the knob anticlockwise, the wave turns into a straight line, which means that the amplitude decreased. Then when we turned the knob clockwise, the amplitude increased.

Step 4



1. Figure 4: the waveform when the output signal displayed on the oscilloscope is 1 V peak to peak

Conclusion

For this task, we got to see what the potentiometer does, how it affects the wave and how it can be used to replace the function generator when we don't have it.