

University of California, San Diego
Department of Electrical and Computer Engineering

ECE65, Fall 2010

Lab Introduction
ECE 65 Lab Orientation

Experiment #1: Equipment Setup

1) Before you start taking any measurements, you should ALWAYS reset the settings on the oscilloscope to its default settings. Follow these instructions to reset the oscilloscope:

- a) Push Save/Recall
- b) Push subpanel button next to Setups/Waveforms to highlight Setups
- c) Push subpanel button next to Recall Factory
- d) Turn Ch.2 on by pushing Ch.2 Menu
- e) To make screen brighter, push Display and then the subpanel button next to Contrast Decrease once or twice.
- f) Push Measure and then Autoset

2) Now prepare the oscilloscope for measurement readings. First, change the source channels. To do this, follow these instructions:

- a) Push subpanel button next to Source/Type to highlight Source.
- b) Push corresponding subpanel buttons to change the last two source channels from Ch.1 to Ch.2 as shown on the right.

3) Next, change the measurement types to the following: Freq, Pk-Pk, Period, Pk-Pk. To do this, follow these instructions:

- a) Push subpanel button next to Source/Type to highlight Type.
- b) Push corresponding subpanel buttons until you find the desired measurement type.

Source Type
CH1 Freq
CH1 Pk-Pk
CH2 Period
CH2 Pk-Pk

4) Connect function your generator cable to the output knob. Make sure your function generator is off for now.

5) Connect your two scope probes to the oscilloscope, one to Ch.1 and the other to Ch.2. Make sure both scope probes are set to X10.

Experiment #2: Introduction to Using Function Generator and Oscilloscope

1) Connect the function generator cable directly to Ch.1 of the oscilloscope. Then turn on the function generator.

2) Turn Ch.2 off by pushing Ch.2 Menu twice and then return to the measure screen by pushing Measure and then Autoset.

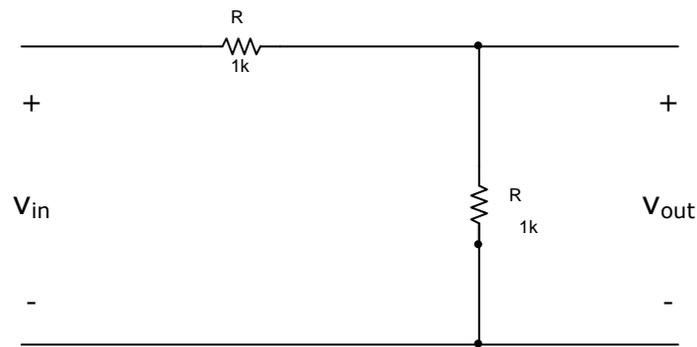
3) On your own, generate the following waveform: a sine wave with amplitude 2.5V with frequency 60 kHz and no DC offset. You may need to press Autoset to see the sine wave clearly on the oscilloscope.

4) Make the following adjustments to the oscilloscope:

- a) Set volts/div to 2.00 V
- b) Set sec/div to 5.00 μ sec
- c) Center graph on 2.00 V

5) Print out a hardcopy by pressing Run/Stop and then Hardcopy. Sign and date the hardcopy. In addition, label the graph as $V_{in}(t)$, draw the time axis, and mark the scales on the voltage axis (y-axis) using the volts/div on hardcopy as a guide.

Experiment #3: Building a Circuit and Using Cursor Function on Oscilloscope

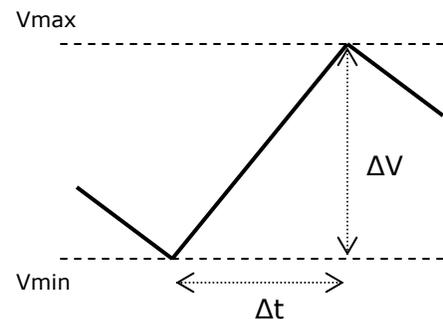


1) Build the circuit above on your breadboard and attach the function generator as V_{in} . Measure V_{in} on Ch.1 and V_{out} on Ch.2 of the oscilloscope.

2) Turn Ch.2 on by pushing Ch.2 Menu once and then return to the measure screen.

3) Generate a triangle wave with a peak-to-peak of 5V, frequency 200 Hz, and no DC offset. Push Autoset. Confirm the setup of your breadboard and lab equipment with a Lab TA before continuing on with the rest of the instructions.

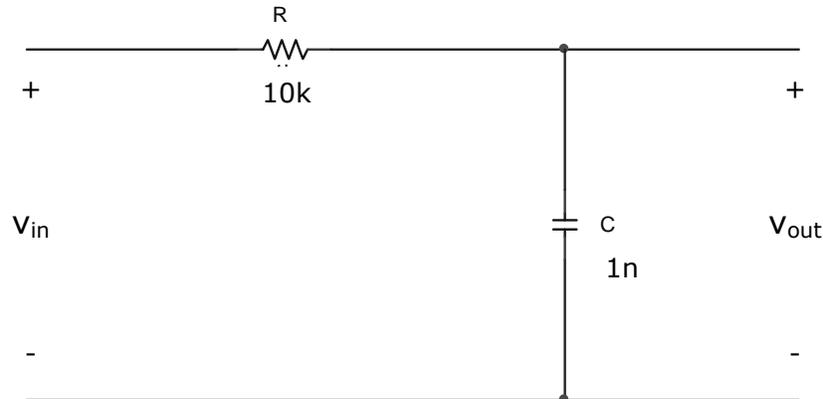
- 4) For the input waveform on Ch.1, use the cursor function to perform these tasks, recording each of your measurements on your hardcopy from Experiment #2:
- a) Measure the minimum voltage of input waveform.
 - b) Measure the maximum voltage of input waveform.
 - c) Position the cursor 1 and cursor 2 knobs to measure ΔV of rising edge of waveform.
 - d) Change cursor type to time and measure Δt of rising edge of waveform.



5) Repeat (4) for output waveform on Ch.2

6) Using your measurements from (4) and (5), compute the slope of the rising edge of the triangle wave for both the input and output waveforms in units of V/msec. Record your calculations on your hardcopy from Experiment #2. Check your results with a Lab TA.

Experiment #4: Wrap-Up



1) Follow instructions from experiment #1 to reset the oscilloscope.

2) Build the circuit above on your breadboard and attach the function generator as V_{in} . Measure V_{in} on Ch.1 and V_{out} on Ch.2 of the oscilloscope.

3) Use the function generator to generate a square wave with amplitude 5V, frequency 250 kHz, and no DC offset.

4) Center both graphs on 0.00 div (0.00 V). Set volts/div to 2.00 V for both Ch.1 and Ch.2, and then set sec/div to 1.00 μ sec. Print out one hardcopy. Sign and date it.

5) Push Autoset so that the graphs are no longer centered on 0 V. Leave volts/div and sec/div as is on the screen. Print out another hardcopy. Sign and date it.

6) Using your hardcopy from (5):

a) Label each graph – that is, which one is $V_{in}(t)$ and which one is $V_{out}(t)$.

b) Draw time axis on both graphs so that the time axis is drawn where the voltage is 0 V.

c) Mark the scales on the voltage axis (y-axis). Use the volts/div on hardcopy as a guide.

7) Using the cursor function, calculate the slope of the rising edge of the output waveform in units of V/ μ sec. Record this calculation at the bottom of your hardcopy from (5)

8) Turn in your hardcopies to the Lab TAs. Clean up your lab station and then you are free to go. We will see you again next week for help with Lab 1.