



## Lab 1: Orientation

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### 1. Purpose

The objective of this exercise is to learn the fundamentals of LATEX and PSpice. In addition, you will be introduced to the Agilent Technologies test instruments at the lab bench.

Your laboratory TA(s) will lead you through tutorials introducing LATEX and PSpice.

Visually examine the set of test instruments at your lab station. You should find the following instruments:

- Agilent E3611A DC Power Supply
- Agilent E3631A Triple Output, Programmable DC Power Supply
- Agilent 33120A Function Generator
- Agilent 34401A Digital Multimeter
- Agilent 54600B Digitizing Oscilloscope or Agilent 54622A Deep Memory Oscilloscope

In addition, you should also find a Hewlett Packard PC and Deskjet printer. You will be using all of these instruments throughout the semester.

Locate the Agilent E3611A DC Power Supply. Examine the controls on its front panel. This is a relatively simple instrument to use. It is used to provide DC (constant) voltages and currents. It is important to prevent the leads of the DC power supply from touching each other. When the power supply leads touch, a short circuit is formed which can cause serious damage to the power supply. Consider what would happen if you shorted the wall socket, or a car battery! Short circuits can be dangerous, and special care should be taken to avoid them.

Locate the Agilent 33120A Function Generator. Examine the controls on its front panel. This instrument has an extensive capability including the ability to generate any arbitrary waveform. You will be using the function generator primarily as an AC (sinusoidal) voltage source.

Locate the Agilent 34401A Digital Multimeter. Examine the controls on its front panel. This instrument is used to measure voltage, current and resistance. When configured to measure voltage, its function is a voltmeter. Likewise, it may function as an ammeter and ohmmeter.

Locate the Agilent 54600A (or B) Digitizing Oscilloscope (See Figure 5).

Examine the controls on its front panel. This instrument is the workhorse. It can perform multiple functions simultaneously. For example, it can display a waveform on the screen, measure a waveforms' peak-to-peak voltage, average voltage, frequency, period, and many other parameters all simultaneously.

Connect the output of the function generator to channel 1 of the oscilloscope. Your lab TA will lead you through a sequence of measurements using the oscilloscope.

It is extremely important that you become comfortable (and proficient!) with the use of these four test instruments.

The printer will be used throughout the semester to obtain hard copies of waveforms displayed on the oscilloscope. Use the printer to obtain hardcopies of a sinusoid, a triangle wave, a square wave, and a sawtooth wave. Include these plots in your lab report.



The PC will be used to run a program written using Agilent VEE to control the Agilent test instruments remotely. Turn on the PC at your labstation and see what software is loaded on it.

Power to all instruments and the PC's is controlled by the master switch located on the front corner of the bench (just below the bench top). Please be sure that all instruments have been turned off (including the printers) as well as the master switch before leaving lab each week.

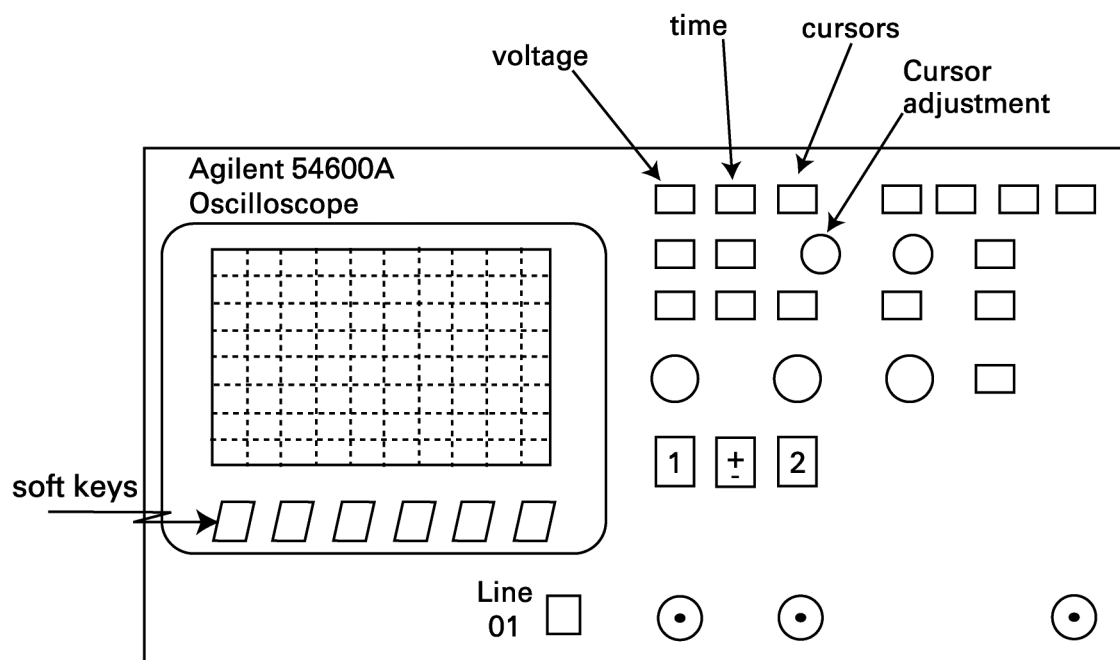


Figure 1: Agilent 54600A (or B) Oscilloscope front panel

## 2. Assignment

- 1) Read the Introduction Section of this Laboratory Manual. If any of the lab policies are unclear, please ask your lab TA for clarification.
- 2) Your lab TA will take you (step by step) through a PSpice simulation using the HP PC at your lab station. This will include using a resident editor to create a file containing your PSpice code. You will examine the .out file and explore some of the basic features of probe, the PSpice graphics postprocessor. Be sure to save the hardcopies of your results to include as part of your laboratory report.
- 3) Read the LATEX tutorial in the EE61 Coursepak.
- 4) Read and perform the exercises in the PSpice tutorial in the EE61 Coursepak using the Sun Workstations in Hudson Room 161. In order to understand the behavior of the circuits of examples 2 and 3 in the PSpice tutorial, an understanding of AC circuit analysis is required. However, you are to perform simulations of all three circuits and include the probe plots in your laboratory report. No physical explanation of the simulation results is required for examples 2 and 3.
- 5) Write a lab report entitled, "Lab 1 Orientation" using LATEX following the format illustrated in the Introduction. In your lab report describe what you did in the lab exercise and include the PSpice results you obtained while performing the PSpice tutorial (all three examples) in the EE61 Coursepak as well as the simulations performed in the lab using the HP PC's. Include **ALL** PSpice results. Be sure to draw each circuit neatly with the nodes labeled as entered in your PSpice code.