

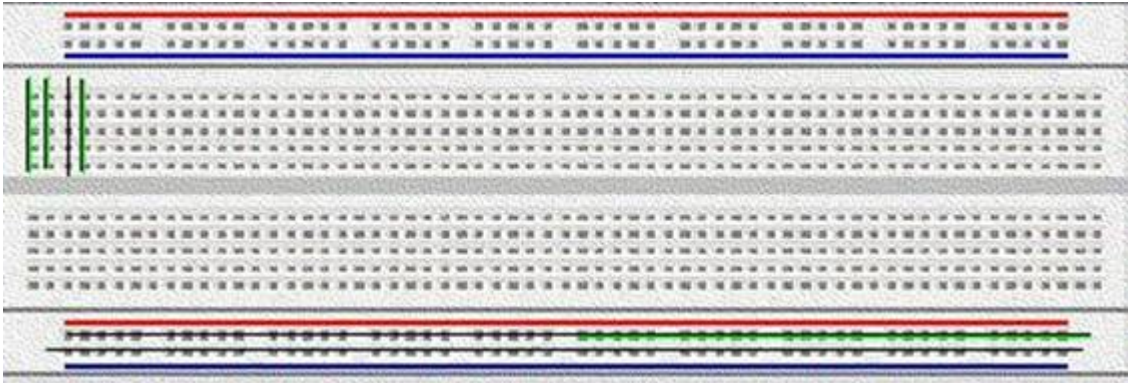
ECE Laboratory Equipment Introduction

(By Kaly Hong)

Introduction:

The following is just a quick introduction to the lab equipment you'll be using. Not all of the functions and abilities of each device is explained, just what you need to know to get started. Advanced mastery of the equipment only comes through repeated use.

The Breadboard:



- The breadboard has many strips of metal (copper usually) which run underneath the board.
- There are long columns that run down the board (rails) that have a color next to them. There are short rows of 5 holes that are connected, which form a node. The black lines on the above picture should give you an idea as to how they're connected.
- The rails are useful for running various voltages (i.e. +5v or GND) down the board, while the rows are used to build your circuits.

The Oscilloscope Probe:



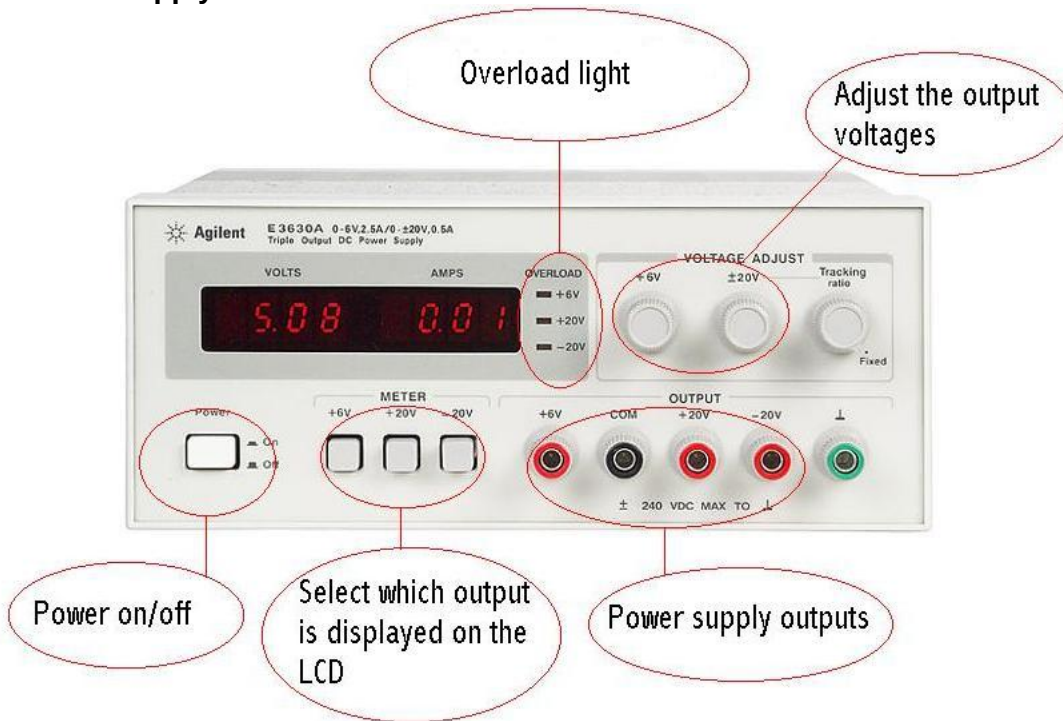
- There are many brands of scope probes. The scope probes are used with the oscilloscope to check the various signals in your circuits. Plug these into the signal outputs of the oscilloscope.
- Note that they can be set in 1x or 10x modes. You should always keep them in 10x mode unless otherwise instructed.
- They also have a black alligator clip that should always be grounded.

The Function Generator Cable:



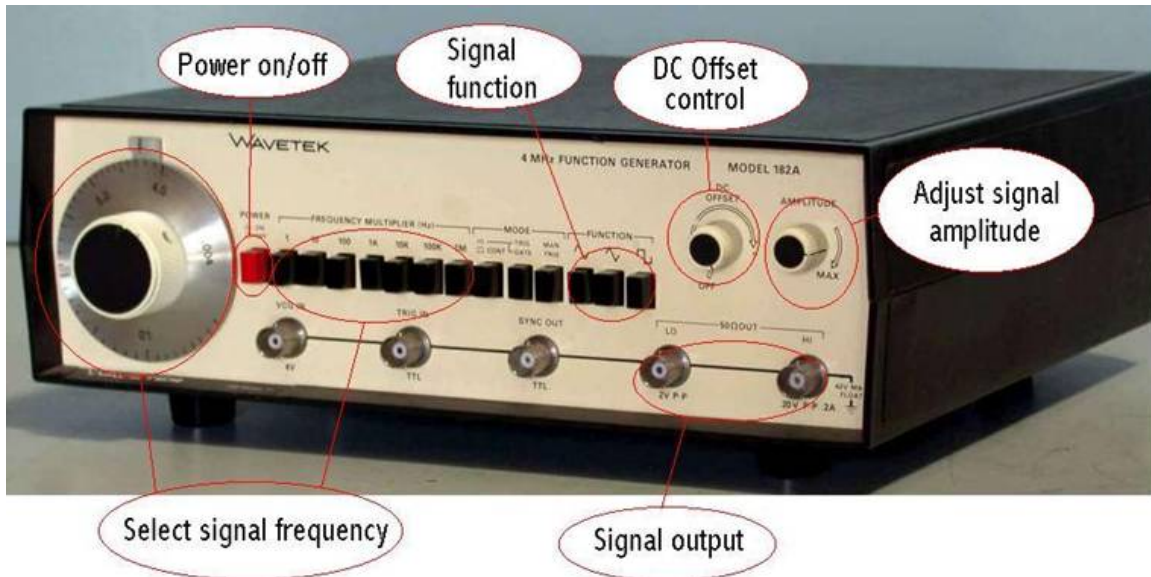
- These are used with the function generator. Plug them into the signal output of your function generator.
- The red clip usually carries the signal while the black clip should be grounded.

The Power Supply:



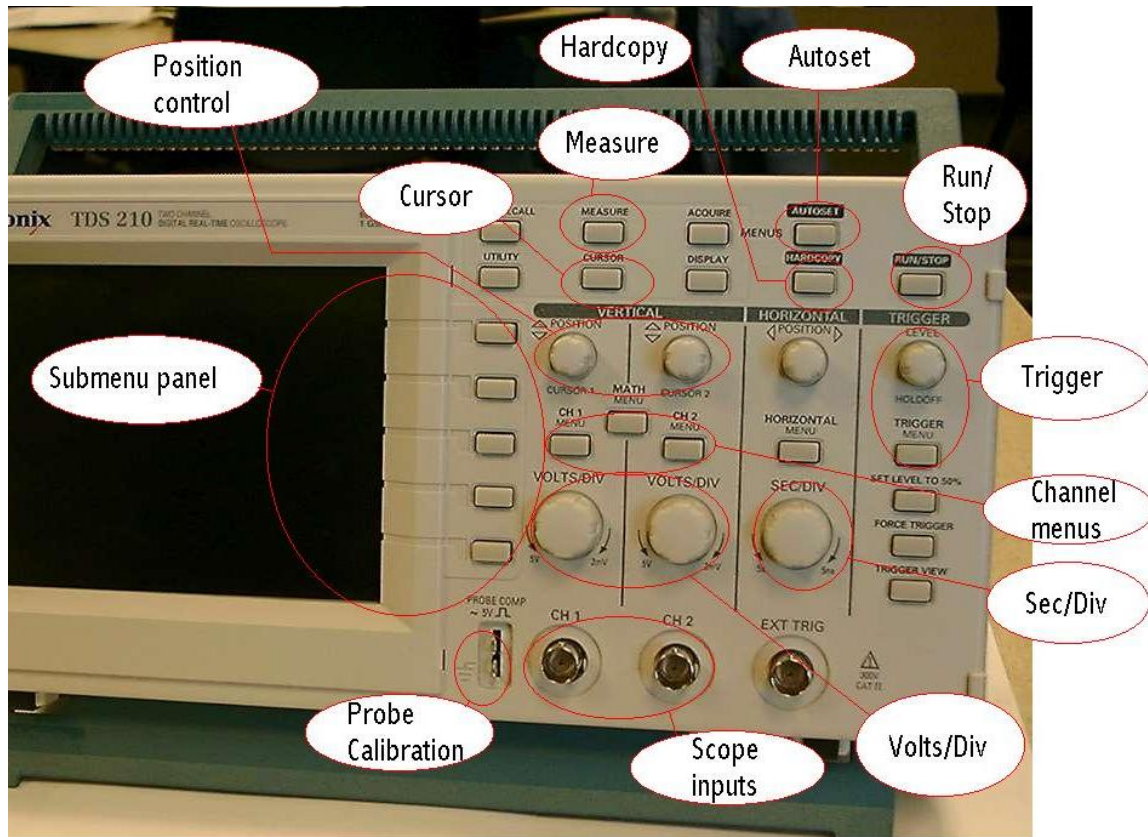
- We use Agilent E3630A power supplies in our lab. The picture above should be mostly self explanatory.
- Note that if the overload light turns on while connected to your circuit, then something has gone wrong and you should disconnect the power supply and check your wiring.
- The +6 port outputs from 0 to +6v. The +20 goes from 0 to +20v. The -20 goes from 0 to -20v.

The Function Generator:



- We use Wavetek 182A function generators in our lab.
- By using the signal frequency multiplier buttons and the knob, you can produce any signal up to 4MHz on these generators. (Ex. The 1k button is pushed and the knob is at 1. You'll get a 1KHz signal. 100k button and the knob at 3 gives you 300Khz.)
- The signal function buttons let you choose to put a sine wave, a triangle wave, or a square wave at the signal output of your generator.
- The dc offset control lets you set the dc offset of your output wave.
- The amplitude control lets you set the amplitude of your output wave.
- Connect your function generator cables to the signal output connectors. The 'lo' output can output a signal with as large as 2v peak to peak while the 'hi' output can output up to 20v peak to peak. You will usually use the 'hi' output.

The Oscilloscope:



- Below is a picture of the scope's control panel when it's off. The power button is on the top left of the scope.
- We use the Tektronix TDS 210 in our labs. You'll be using this to make various measurements.
- The run/stop button is used to make the scope start and stop taking samples of your waveform.
- The hardcopy button lets you printout a copy of your screen.
- The autoset button makes the scope try and find the best configuration to display your waveforms.
- The measure button puts the scope in measure mode. In this mode you can get the frequency and amplitude of your waveforms quickly from the submenu panel.
- The cursor button puts the scope in cursor mode. In this mode you can measure the difference in voltage or the difference in time between two points or waveforms. (Results are displayed in the submenu panel.)
- The position control knobs do different things depending on the mode of the scope. In measure mode, it moves the 0 level of the channel 1 and 2 signals up and down. Note that the small arrow to the left of the screen (when the scope is on) shows the 0 level of channels 1 and 2 respectively. If you do not see both arrows, then one of the channels is off. In cursor mode it controls cursors 1 and 2, so you can take measurements.

- The submenu panel is where all the submenu options for each menu are displayed. Most of the buttons on the control panel of the scope have submenu options.
- The scope inputs are where you connect your scope probes to.
- The volts/div knob lets you adjust the volts per division (the sensitivity). The amount of volts per division is shown on the bottom left corner of the scope screen. When the scope is on, you'll notice that there is a grid on the screen. The height of each grid is indicated by the volts per division. (Ex. The volt/div for Ch.1 is 5v and the volt/div for Ch.2 is at 1v. Then for channel 1 signals, each square height is 5v and for channel 2 signals, each square height is 1v.)
- The sec/div knob lets you adjust the seconds per division (also called sweep rate). The amount of seconds per division is shown on the bottom center of the screen. The smaller the seconds per division the more you are zoomed into your signal.
- The channel menu buttons turn your channels on and off.
- The trigger control panel controls the trigger level. The trigger level is indicated by the arrow on the right side of the scope screen. The arrow should point to your signal and