Department of Mechanical Engineering
Michigan State University
East Lansing, MI 48824-1226

Oscilloscope Student Manual

A useful aid to completing ME 451 labs

Philips Oscilloscope used in ME 451 Lab.



Created and Updated by TA's of ME 451
Last Revision: 9/15/2005



Figure 1. Picture of oscilloscope with buttons

Oscilloscope Function According to the Numbers in Figure 1

1. This button changes the voltage scale on the screen of the oscilloscope. If the number in the screen next to this button reads 10 for example, then that means you are applying a scale of 10 volts per large division for channel A. Button 2 is the same thing for channel B. Notice that the signals input from A and B can have different scales. Finally, remember that an oscilloscope just reads the signal. It cannot change the signal; only the scale and how it is read can be changed. If you need to change the signal, you have to look at the input, which often comes from a signal generator.

2. Refer to 1 above.

3. Button 3 is used to change the time base. Pressing this button forward or back changes the time per large division. This button is often used to get more of the signal on the screen horizontally.

4. Button 4 is the auto set button. You should press this after turning on the oscilloscope. If your signal is going into the scope at this time, don't be surprised if a channel is not picked up or if the signal is displayed completely out of whack. This button just generally resets the oscilloscope and you will manually need to set up the scope yourself.

5. A/B button changes what channels show up on the screen. Pressing this button scrolls through many different scenarios where A is shown, but not B, B is shown but not A and then both are shown.

6. Button 6 inverts signal B, which means it changes its sign. You will probably never use this button in 451 labs.

7. Pressing this button shows where the ground for the input signal is. When you press this button, the signal for that channel will go away and you should see a straight line on the screen. You can use the Y-position knobs to adjust the horizontal position of the ground. You must then press the ground button again to get the signal back on the screen. Notice that there is a ground button for each signal, and in general, the buttons or knobs along the horizontal for each channel will affect the signal for that channel. IE: Y-position knob, voltage scale, ground, etc.

8. AC/DC. A symbol AC or DC will show up next to the voltage scale number when the oscilloscope is on. In this lab, you ***always*** want that symbol to be DC, which tells the scope that it is looking at a DC signal. We won't work with AC signals in this lab. To change how the scope reads the signal, press the button. Note that again there is an AC/DC button for each channel.

9. TB Trig Mode. When you trigger a signal, you make sure that it goes through a specified point. This means that the signal will be "live" but not changing all over the screen. There is no easy way to describe this, but press this button a few times and see how the signal appears on the screen. You want the words Trig'd and Trig to show up just below the numbers for channel B. Trig will show up in the time base section of the screen. If you see "NOT" next to Trig'd, then please refer to buttons 10 and 15.

10. This button changes the signal, which the oscilloscope triggers off of. You want it to trigger off of the input signal from a reference source such as a signal generator or you can also trigger it off of the external coaxial input. (Ext AC) Most of the time you will trigger off of Ext AC. To do this, hook a coaxial cable to the EXT input on the scope and connect the other end to the sync output from the signal generator. This enables the scope to trigger better than if it was triggered just off of the input signal from the signal generator. In essence, the sync output is just a very accurate signal output for timing purposes so it works well for triggering.

11. Digital memory. Toggling this button will show a point moving across the screen or the signal that was traced out by that point. Pressing this button to see for yourself.
12. This button changes the point at which the signal is triggered. The signal is either triggered as it starts an upward trend or a downward trend.

13. Pressing "Lock" locks the signal on the screen. Lock can be useful, but it is extremely helpful to use triggering instead of Lock. When you trigger the signal, you can change the time base and voltage scale and the signal will constantly adapt. That is what was meant by "Live" back in the discussion for button 9. However, when you lock the signal, you can't change its time base or move the signal relative to the other channel's signal.

14. Press this button and set the option to DC. Used for triggering.

15. This number refers to all of the knobs in this column. All you have to know is that all of these knobs must be turned all the way to the right for the trigger function to work correctly.

16. These knobs simply change the horizontal position of the signal. Note that there is one knob for each channel.

17. This knob changes the x-position of both signals. This is particularly useful for finding the phase angle between two signals since you can move your reference signal to a solid vertical line and measure the time from the peak of that signal to the peak of the next one.