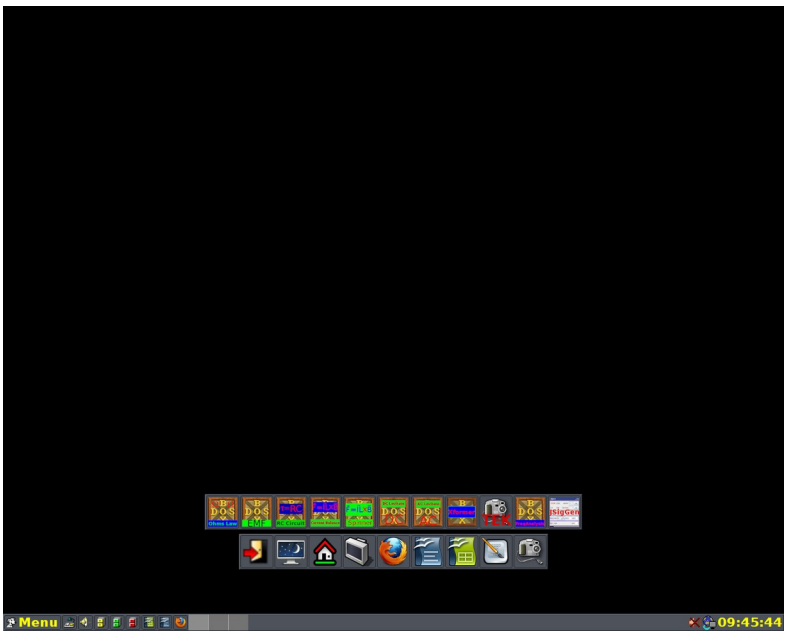
Data acquisition program Pandemic Version 2021 R3

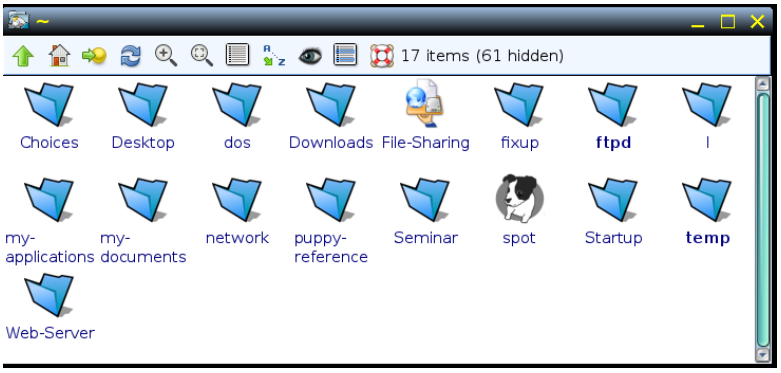
In the lab, we use the linux operating system. It works very much like systems that you are used to using. One difference is that I have set things to activate with a single click rather than a double click.

Your lab computer desktop looks like the image below.

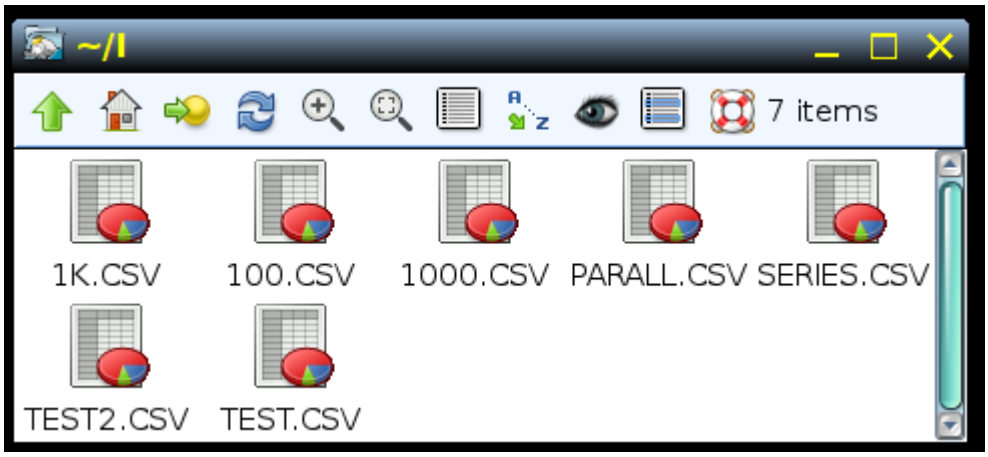


The first row contains icons that do various functions you normally might need: from left to right on the lower row, we have: (* indicates most used icons)
*Go Home Icon (shuts the computer down right away: only click when completed)
Screen saver (blanks the screen)
*File manager
Terminal window
*Firefox
*OpenOffice Writer (we presently use OpenOffice in the labs)
*OpenOffice Spreadsheet (we presently use OpenOffice in the labs)
MT paint (a drawing application)
*Screen Capture (take an image of what ever is on the screen)

The second row contains acquisition program software. From left to right on the second row, we have:
*Ohms Law
EMF
*RC Circuits
*Current Balance
*DC Magnetic Levitation
*AC Magnetic Levitation
*Faraday's law and Transformers
*Download a TEK oscilloscope screen
*HP, LP, and RLC Circuits
*Java Signal Generator
All your data that the acquisition programs take will be in the form of ".csv" files which means comma separated variables. These are contained in the directory I in your home directory. If you click on the file manager icon then a directory similar to that shown below will appear.



The drive I is the directory in which all your data will be written. If you click on this directory icon, it will take you into that directory. Mine, for example looks like what I have shown below.



This directory is important because after you take your data, you will need to email yourself the ".csv" files that contain your data. **So you will need to know your email password, and you enter your email with firefox**. **If you log into your lyon account, you will need to use the basic html interface after logging in but you do have that option at the top of the page. I recommend against putting the files on your google drive for now. I did it with the old firefox with the basic html, but it is very slow. It seems that I have not had great success using the google drive with this older firefox.** There is another way to do this, and I may revise this for future labs so that you can access your data from another computer. For now, let's try this technique first. You also need to know that this directory will be cleared when the computer is shut down.

Another directory of importance is the downloads directory. This is the directory that normally the spreadsheet helpers will be downloaded into. Since we are not doing analysis in the lab however, this will not be used initially.

You should start your computer at the beginning of lab by pushing the button on the computer. You will need the password I have given you. To shut your computer down at completion of the lab section, click on the "go home" icon.

Importing data into your spreadsheet helper

The csv files that contain will need be be imported into the spreadsheet helpers for analysis. I have the columns arranged so that the columns of the csv data file can be directly copied and pasted into your helper in the correct order. If this is done on the lab computers, then the first row of the of the csv files will not be imported. However doing this elsewhere you should not copy the titles of each column. I will have a screen cast that shows an example for OhmsLaw of how to do this. Never-the-less I am also providing an example below. The spreadsheet after importing the csv file looks like this.

A1 fx Σ = Current[A]

	A	B	C	D	E	F	G	H
1	Current[A]	Voltage[V]	date	time	systemtime			
2	0.022343	2.454	02-27-2021	14:22:28	0.5736791405			
3	0.036926	4.0483	02-27-2021	14:22:32	3.789975276			
4	0.0546	5.415	02-27-2021	14:22:37	9.7539426035			
5	0.06586	6.611	02-27-2021	14:22:41	13.218891177			
6	0.07877	7.83	02-27-2021	14:22:44	16.210228733			
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								

Highlight the columns as I have indicated below.

	A	B	C	D	E	F
	Current[A]	Voltage[V]	date	time	systemtime	
	0.022343	2.454	02-27-2021	14:22:28	0.5736791405	
	0.036926	4.0483	02-27-2021	14:22:32	3.789975276	
	0.0546	5.415	02-27-2021	14:22:37	9.7539426035	
	0.06586	6.611	02-27-2021	14:22:41	13.218891177	
	0.07877	7.83	02-27-2021	14:22:44	16.210228733	

Copy and paste this into your spreadsheet helper as I am indicating below. The cells that were green should now not be green which means you wrote over the existing data in the helper.

	Current [A]	Voltage [V]	Resistance [Ω]	Expected Resistance [Ω]
2	0.022343	2.454	9.37E+001	1.00E+002
3	0.036926	4.0483	intercept	% deviation
4	0.0546	5.415	4.28E-001	-6.513
5	0.06586	6.611	RSQ	
6	0.07877	7.83	0.9973	

In particular for the Ohm's law, the fit should be done automatically, a graphical analysis should result with a linear fit providing the measured resistance (in the yellow box). It is important to also note that you will need to input the expected resistance which was in this case 100Ω. You do not need to enter the Ω. You will do a screen capture of that completed, including all parts, crop it down to size and incorporate that in your lab report. **However this should be done outside of the lab and these instructions may be different for different platforms.**

Initialization of the MX55 meters

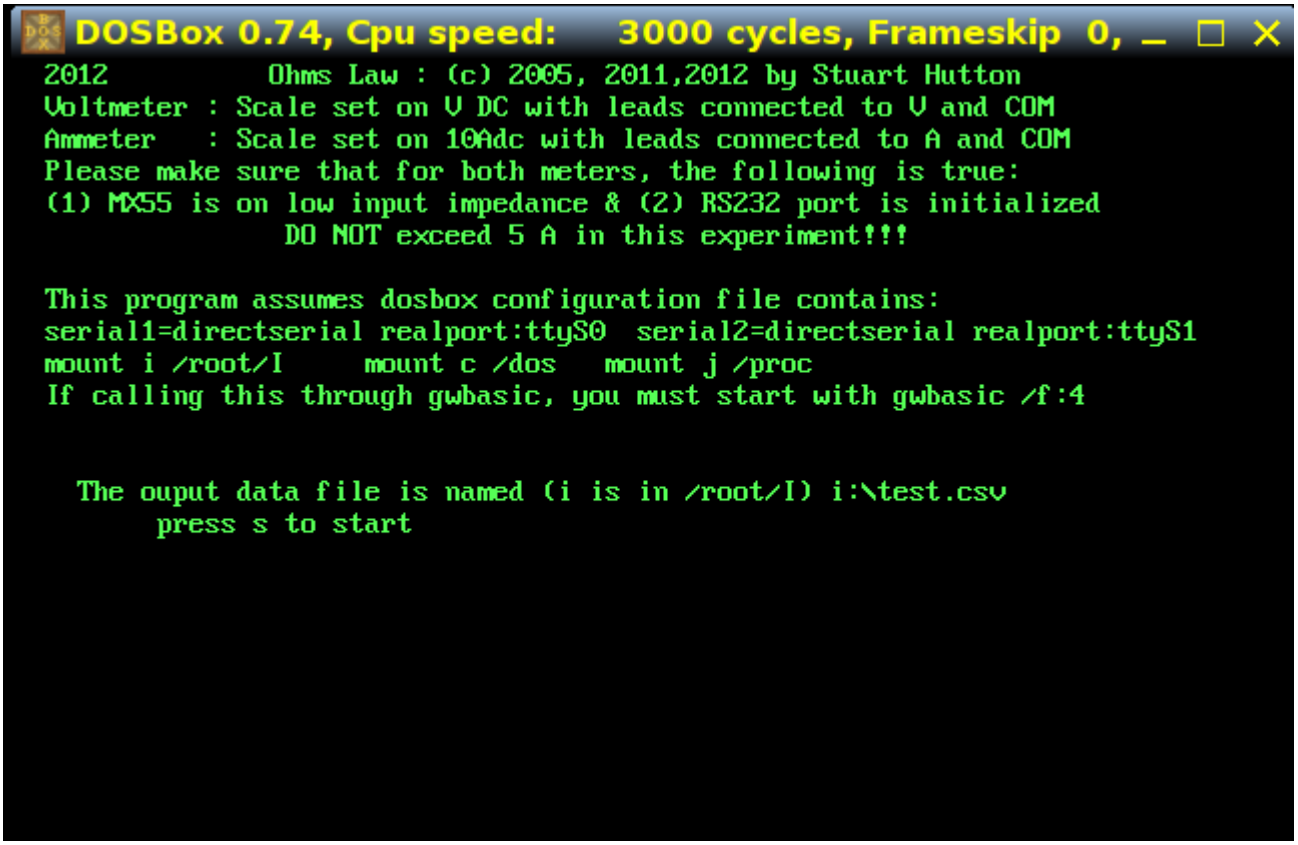
Whenever the MX55 meters are initially off, you will need to initialize the RS232 interface of the meters so that they can be interfaced with the computer. This is done by holding down the pk+/- button and then turning the switch on. One meter today will be the voltmeter (with meter with two wires in each hole) and the other meter will be the ammeter (with only one wire in each hole). For this lab, leave those connections as they are. The voltmeter should be set to the Vdc setting while the ammeter should be set to the μA scale. This is done by rotating the knob on the voltmeters. When you have completed your data collection, switch the meters back to off because otherwise the batteries will run down.

Running the acqusition programs

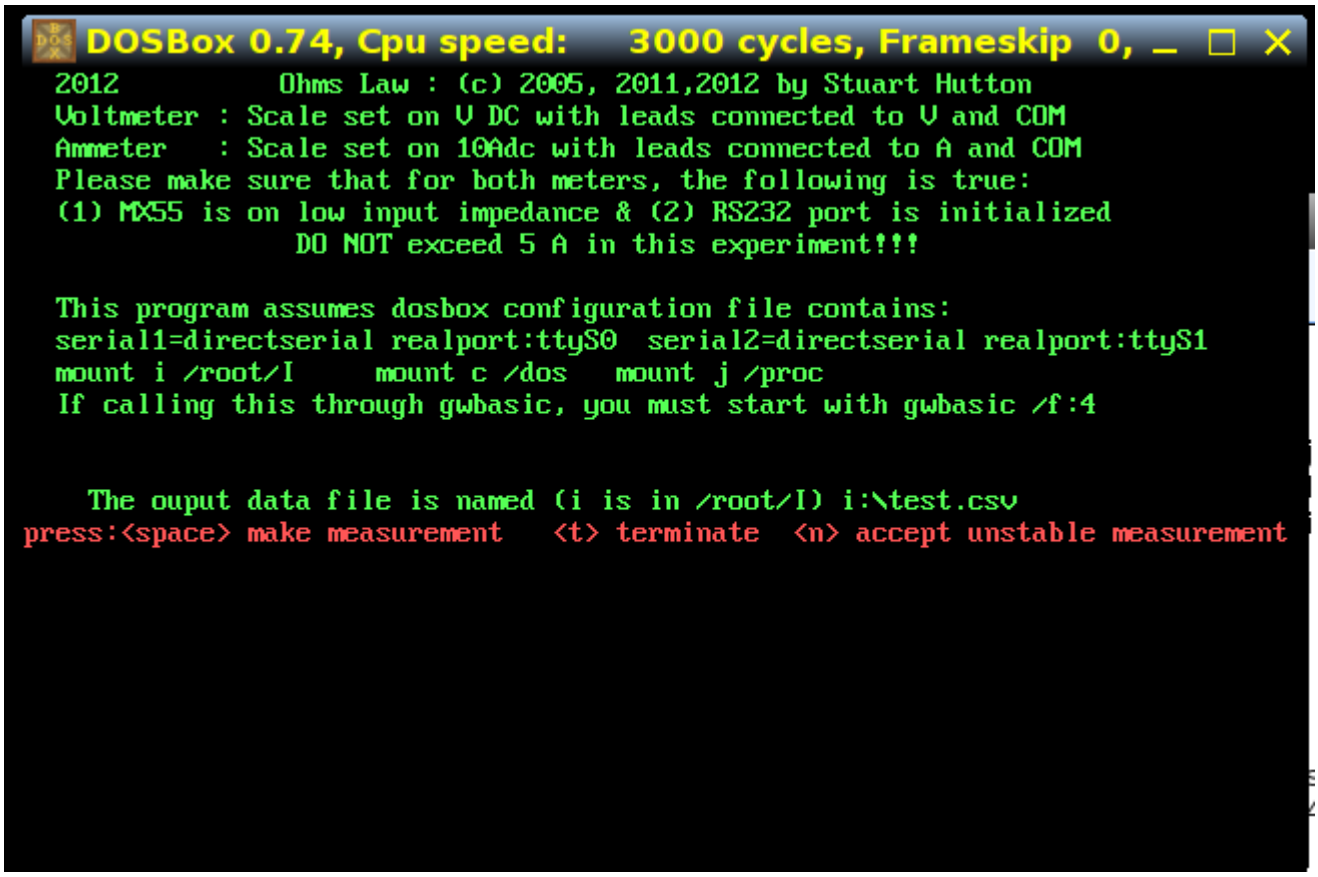
I will use the Ohm's Law program as an example here. Almost all the other programs function in very similar ways.
Single click on the correct program icon.
This screen will appear:

You will name your file. **The rules are these: you need less than 9 letters, no periods or other special characters or spaces.** Only use numbers or letters. If you do not obey these rules, your file will not be written. I am going to use the file name test. You will need to press enter after you type your file name. Keep the file names short and simple.

Your screen will then look like this (unless you have errors in initialzation of meters):

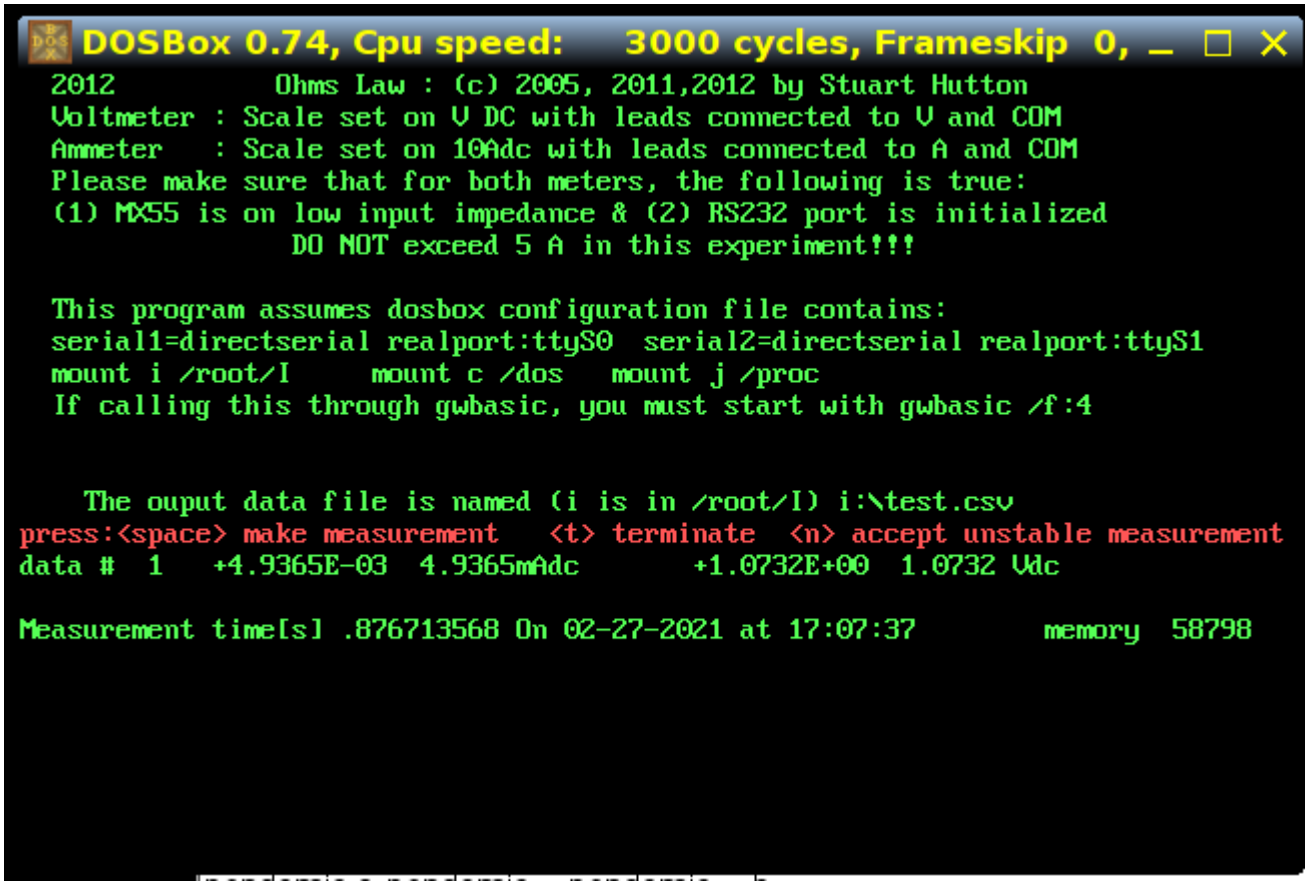


If everything looks good, press s to start. The screen then looks like this:



Normally you will not need to press n to accept an unstable measurement.

So the proceedure is this: input a voltage (turn the power supply black knob clockwise and wait a few seconds), then press space bar (no enter required) to take a measurement. The screen will (as an example) look like this:



Looking across for these readings, you see the data point number, the measured current in mAdc , the measured voltage in Vdc, the measurement time in s, the date, the time, and the system memory.

After you have completed the needed number of data points, you terminate the program by pressing t (no enter required). Do not exit in other ways since you will lose your data. The program will vanish automatically.

If it should happen that my stability criteria for the meters does not allow a stable measurement, you may press n to avoid it for that one measurement.

Most of the data acquisition programs written by me work in very similar ways. There are a few exceptions, for example, when you take the TEK screen dump, it is slightly different. Also the ac impedence program will be slightly different.

Finally, I may do an update on the software that may have slightly different notes at the top regarding setup. However, the basic operation of the program will remain unchanged. Also do not move the meters far from their original positions. You may accidentally disconnect the meters and lose all your data, gain my ire, and generally cause a mess that none of us want.