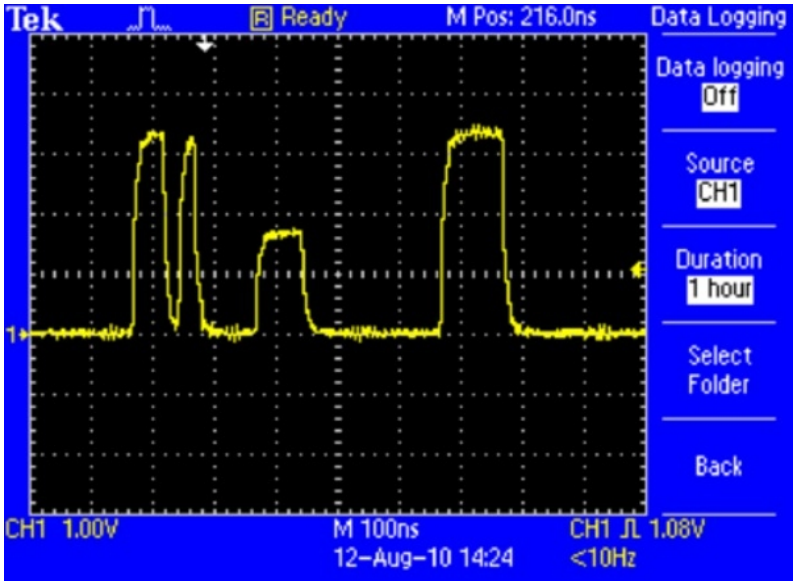
How to Take, Store, Transfer and Present Data

Taking and Storing Data:

- The wrong way
- The slightly-less wrong way
- The good way
- The best way

Transferring and Presenting Data:

- By hand
- By picture
- By data files and a scientific data analysis program



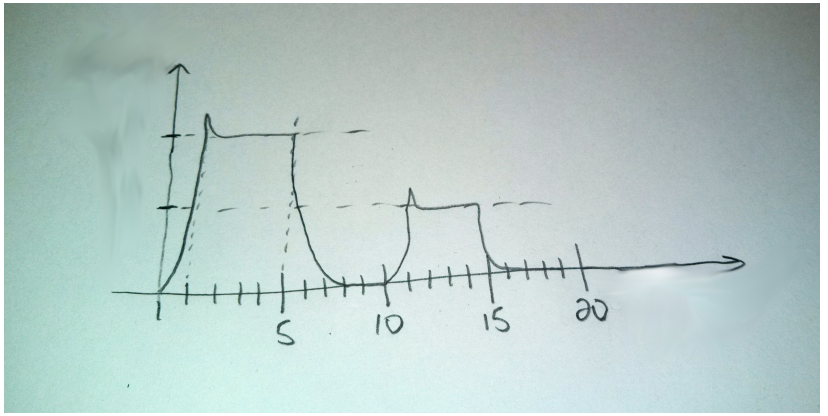
Taking Data

The wrong way(s):

- Looking at it with your eyes and committing it to memory.
- Looking at it and writing some qualitative notes in your lab book.
  e.g., - "I did it."
  - "I did the measurement and saw that *it* worked."
  - "I saw the effect (qualitative)."

The slightly-less wrong way(s):

- Take a picture or a screen shot (see first slide).
- Draw the data (e.g., oscilloscope trace) in your lab book with few numerical details.

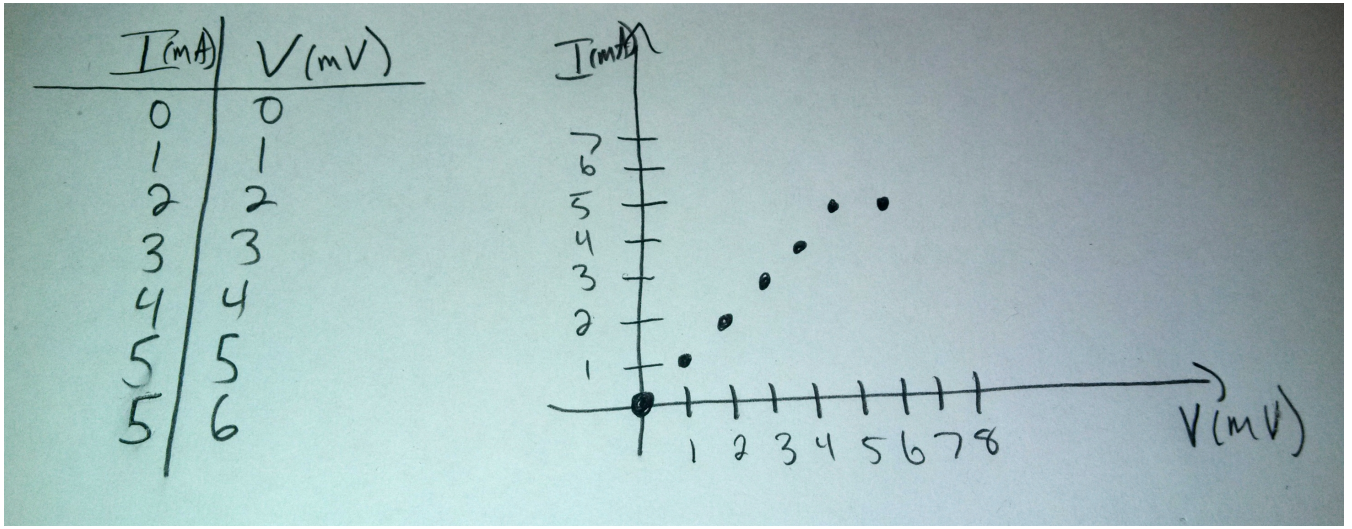


Observe: NO title, axes labels or units.

Taking Data

The Good Way (*small sets of data*):

- Hand written data is fine BUT accompany it WITH a graph AND put it in your lab book.



Observe: Data columns are labeled with units. Graph has labeled axes with units.

Taking Data

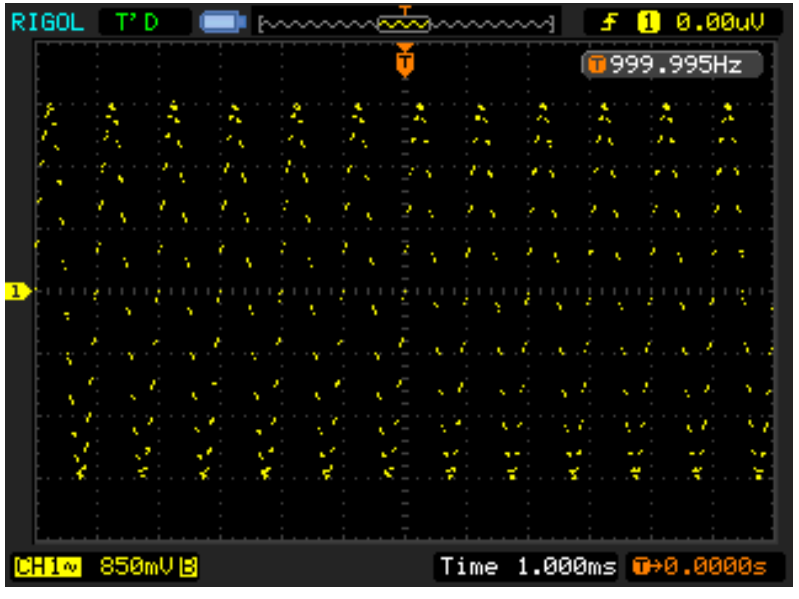
The Best Way (*large sets of data*):

- Hand-written data is fine but exhaustive. However, we are not still in the 19th Century SO **STORE** THE **DATA** IN A **DATAFILE.** Also, **MAKE A GRAPH**.

  e.g., Using the Rigol DS1102E oscilloscope I can display a waveform and store the accompanying data files NewFile0.csv and NewFile0.txt. The csv file is the csv (comma-separated values) data and the txt file stores the oscilloscope's current parameters. See below.

Note: The Rigol DS1102E has 8 bit vertical resolution. So, to get least vertical digitization in the data expand the waveform over the entire screen.

Screen shot



NewFile0.csv

X,CH1,
Second,Volt,
-6.00000e-03,1.70e-01,
-5.98000e-03,7.14e-01,
-5.96000e-03,7.48e-01,
-5.94000e-03,1.22e+00,
...

NewFile0.csv after importing into spreadsheet program.

X	CH1
Second	Volt
-0.006	0.17
-0.00598	0.714
-0.00596	0.748
-0.00594	1.22
-0.00592	1.26

Taking Data

When saving data an option is often given to save the equipment's operational settings. For the Rigol DS1102E they're saved to the text file shown below.

The NewFile0.txt parameter file

Analog Ch	State	Scale	Position	Coupling	BW Limit	Invert
CH1	On	850mV/	0.00uV	AC	On	Off

Analog Ch	Impedance	Probe
CH1	1M Ohm	1X

Time	Time Ref	Main Scale	Delay
Main	Center	1.000ms/	0.000000s

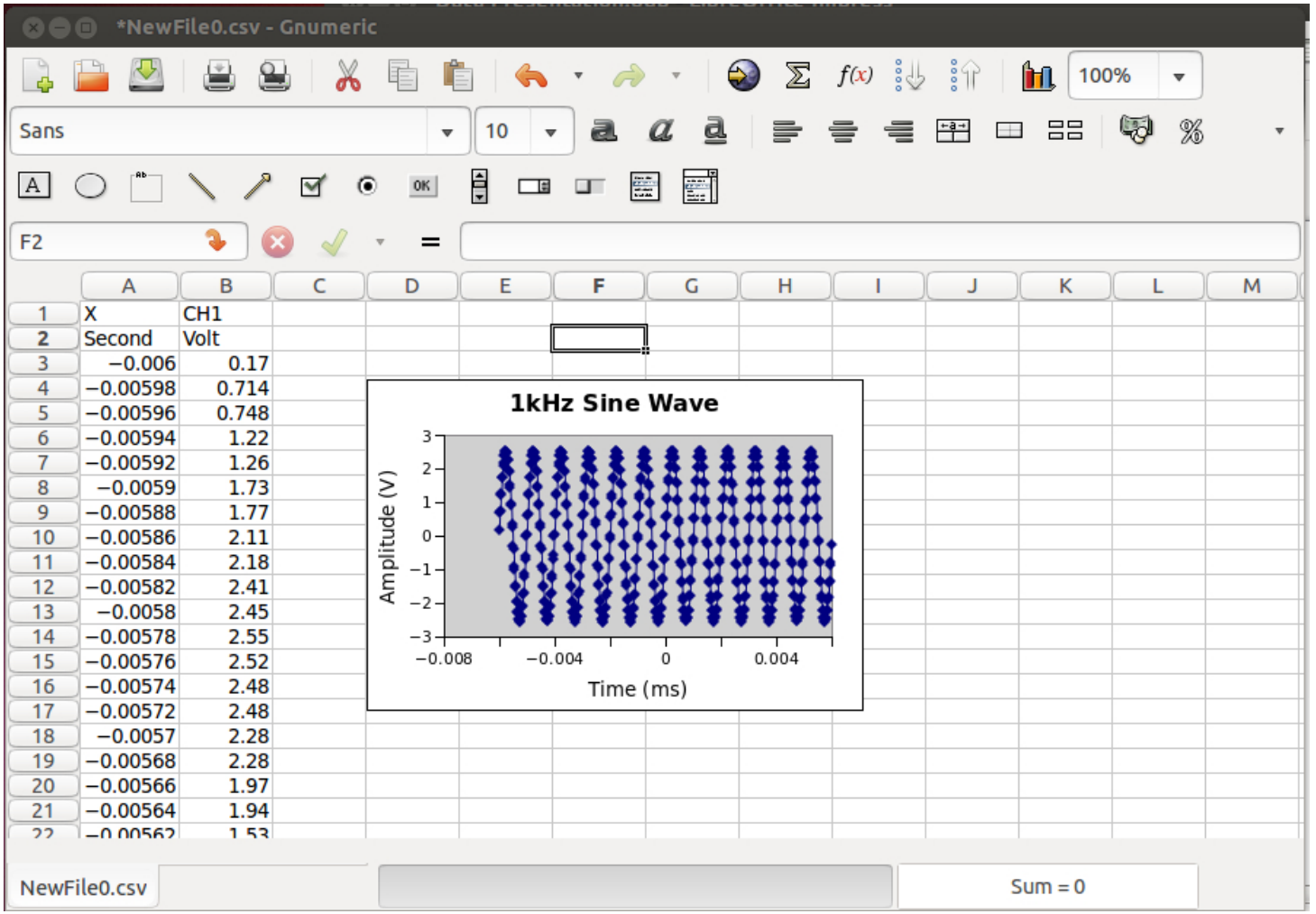
Trigger	Source	Slope	Mode	Coupling	Level	Holdoff
Edge	CH1	Rising	Auto	DC	0.00uV	500ns

Acquisition	Sampling	Memory Depth	Sample Rate
Normal	Realtime	Normal	250.0kSa

Presenting Data

The data plus graph presented in Gnumeric

Steps:
1) Store data in csv file.
2) Store parameters in txt file.
3) Import data file into data analysis program.
4) Create well-labeled graph.
5 Save for presentation.
6) Print graph and insert into lab book. Make a note in lab book where data file can be found



	A	B
1	X	CH1
2	Second	Volt
3	−0.006	0.17
4	−0.00598	0.714
5	−0.00596	0.748
6	−0.00594	1.22
7	−0.00592	1.26
8	−0.0059	1.73
9	−0.00588	1.77
10	−0.00586	2.11
11	−0.00584	2.18
12	−0.00582	2.41
13	−0.0058	2.45
14	−0.00578	2.55
15	−0.00576	2.52
16	−0.00574	2.48
17	−0.00572	2.48
18	−0.0057	2.28
19	−0.00568	2.28
20	−0.00566	1.97
21	−0.00564	1.94

Observe: Data + Graph. Graph has title, axes labels and units

Data can be stored on a hard disk, floppy disk, USB stick, etc...
Data can be transferred by floppy, USB stick or network (USB, Serial, GPIB, Ethernet, etc...)

Conclusions

- Take data.
- Take data the right way.
- Record the data in your lab book.
- Have the data ready in numerical and graphical form when you discuss your experiment.
- Show a graphical representation of your experimental setup (see next slide).
- **Don't make people work too hard to understand you.**
- **Don't assume people are familiar with your experiment. Remind them of the general idea before delving into the details.**

Graphical Outline of Experimental Setup

When discussing your experiment and data include a graphical outline of your experimental setup. For example, for the data I presented previously the setup would look like that shown below.