

Notes on using the TI-83/84 and CBL Unit in The Lab

The CBL unit is an attachment for the TI-83/TI-84 calculator which allows you to measure quantities like temperature, pH, absorbance, voltage and more. It also makes it possible for you to store this information in your calculator, print it out using the GraphLink cable and a desktop computer, and even minimally process it (graph, find best-fit lines, etc.). The CBL unit and a link cable are provided in the lab. What YOU need to bring each time you will be using it is the following:

→ your TI-83/TI-84 calculator with **HCHEM.8XG** files in memory ←

The purpose of this handout is to give you some general information about obtaining the **HCHEM.8XG** files, a brief introduction to using them, as well as some information about printing data, graphs, etc.

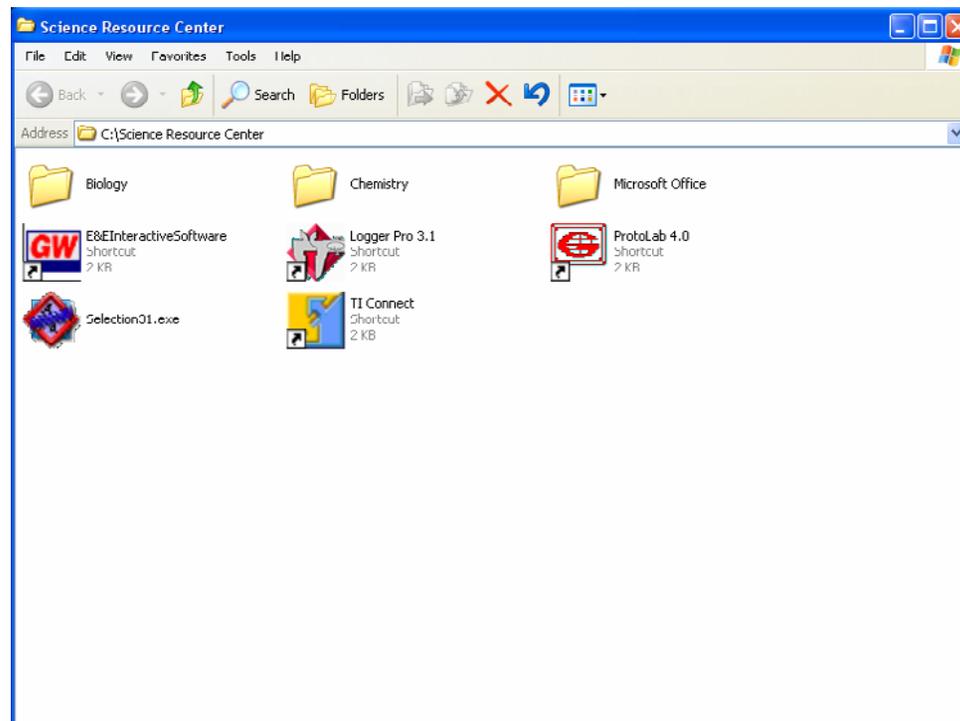
The program suite that we will use in the lab is on the Science Department Network. You can access the files only from the machines with GraphLink cables. You will need about 23,000 bytes of free RAM in your calculator to store and run the programs. To check your memory, turn your calculator on and press y \bar{A} (this selects MEM) and select **Mem Mgmt/Del...** If you do not have enough room you will need to delete some files or clear some variables. You can save programs you want for later (a favorite game...?) on diskette using the GraphLink. Once the programs are successfully transferred you should have about 7700 bytes of RAM free. The programs will NOT run if archived. **ALL SEVEN PROGRAMS MUST BE IN RAM FOR THE SYSTEM TO FUNCTION.**

How are the programs used?

The operation of the **HCHEM** programs will be demonstrated in class, but you can do a little exploring even without a CBL unit to attach. The driver program is CHEMENU. If you run this you can take a look at some of the menu choices and some of the capabilities of the programs. **A word of caution:** these programs alter a number of the factory default settings on the calculator and this can cause you difficulty in graphing (like during a Math test...). Ordinarily if you exit through the menu system the program RESET is run and the calculator is returned to its "fresh-out-of-the-box" state. But if you exit in some other way BE SURE TO RUN RESET. The program can run on its own without the rest of the system.

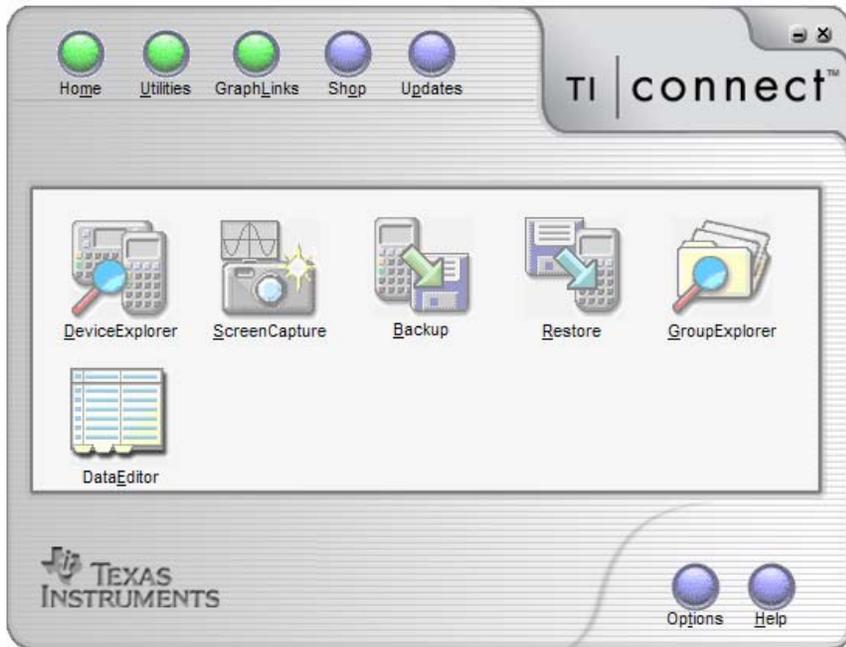
GETTING STARTED WITH A TI-83/TI-84

To download **HCHEM.8XG** into your calculator, plug a Link cable from one of the equipped computers into the data port of the calculator. If you have a TI-83, this port is on the bottom. If you have a TI-84, the port is on the left side of the top. Be sure the plug is inserted firmly. Not inserting the plug firmly is THE major cause of problems both at the computers and in the lab, so get in the habit of doing it now. After logging on to the computer in the Science Resource Center you should see:

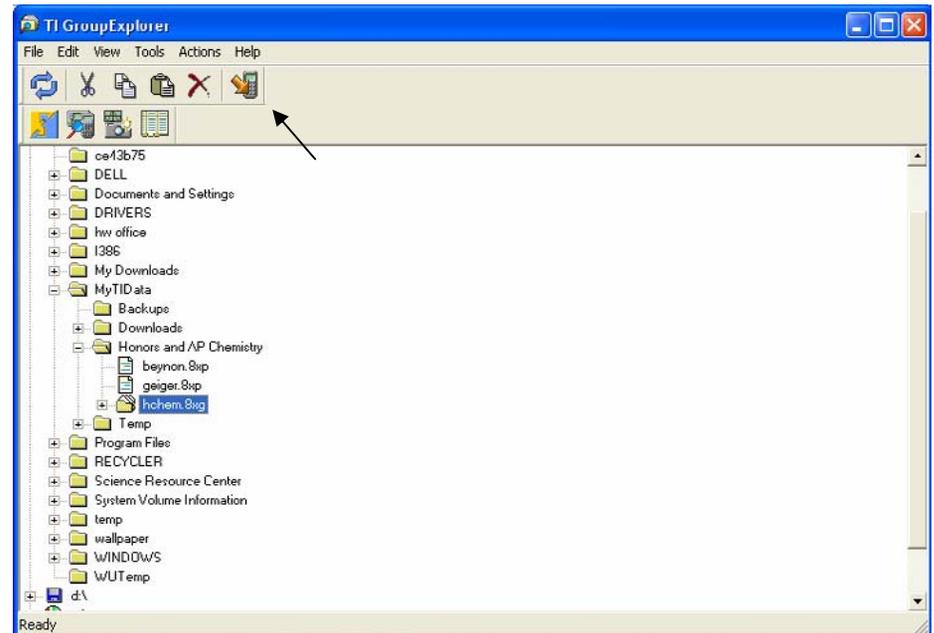


1. Double click on the TI Connect icon: 

2. You should see this screen:



One way to transfer the programs to your calculator is to use the GroupExplorer option (other ways are possible but this way you can transfer both groups and single programs). Click on that icon and you should see a directory listing of the hard drive. Find the folder called **MyTIData** and expand it if needed (click on the + sign). Now find the folder called **Honors and AP Chemistry** and expand it if needed (click on the + sign). You should then see something like the image on the facing page.



Notice that I have clicked on the program group **hchem.8xg**. If you do the same and then click on the right-most icon in the top row (see where the arrow is pointing in the image above?) the program group will be transferred to your calculator. That's all there is to it!

From a friend:

If a classmate already has the programs you can copy them as long as you have one connecting cable. Connect the two calculators (be sure the plugs are inserted firmly...).

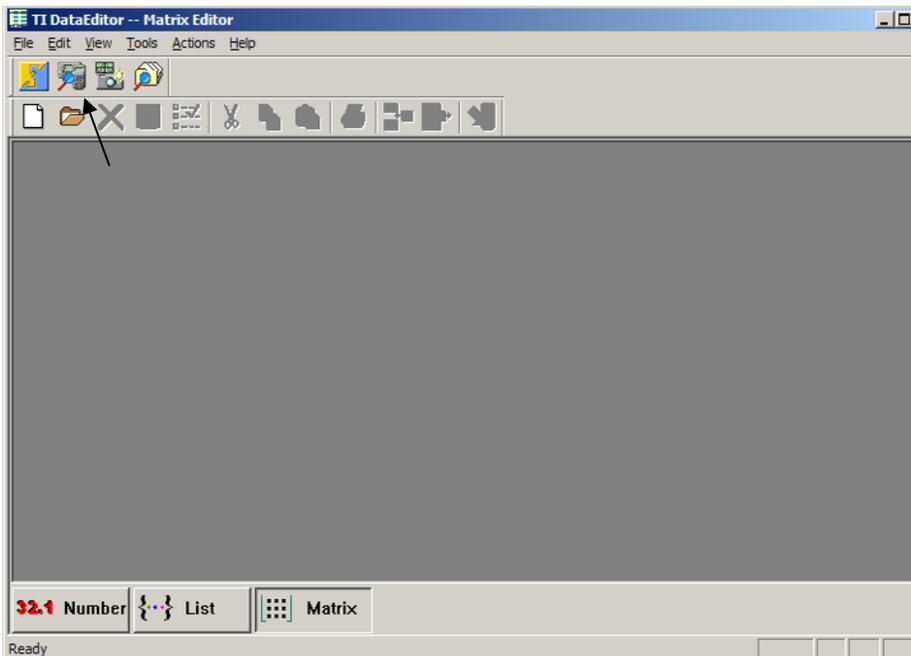
1. Turn on both calculators. On the one which has the programs already press y " (this selects LINK). Select choice 3 or **Prgm...** You should see a screen listing all the programs in memory. There are 7 files in the suite: CHEMENU, CHEMTIME, CHMCALIB, CHMMONIT, CHMTRIGP, MAT2LST, and RESET. As you scan through the list using the cursor keys, press | for each of these programs.
2. On the receiving calculator, press y " (this selects LINK) and select **RECEIVE**. You should get the **Waiting...** message.
3. On the sending calculator select **TRANSMIT**. The programs should be copied into the receiving calculator.
4. Press y z (this selects QUIT) on both calculators when done.

If you have your own GraphLink cable at home you can also download the free TI Connect software from TI and the HCHEM.8XG programs from the class website.

PRINTING COLLECTED DATA

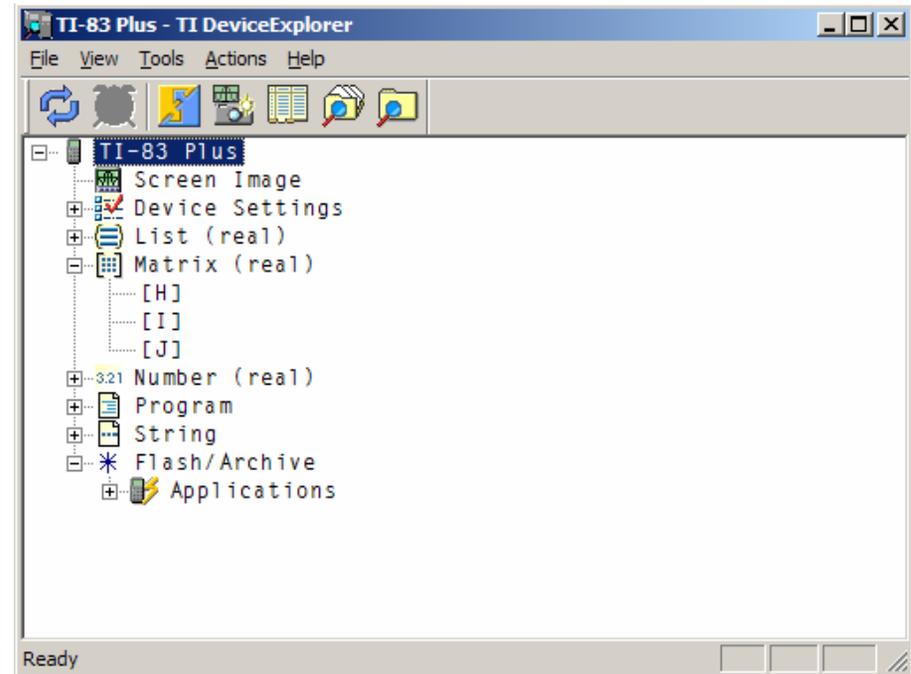
If you need a hard copy of the data stored in the calculator for some reason, there are a couple of options for printing. As data is collected by the CBL it is stored in matrices [H], [I], and [J] in the calculator memory. Each matrix can hold up to 99 "sets" of data. A "set" is one independent variable (such as time) and up to 3 dependent variables (perhaps three temperatures or maybe a few different measurements all followed at the same time). When matrix [H] is full, data automatically goes to matrix [I] and so on. You can look at the contents of the matrices to see which have data in them by pressing $\text{y} \text{---}$ (this selects MATRX) and selecting the one you want. Then press [] . The matrix elements are listed and you can scan through them using the arrow keys. The first matrix element is always the independent variable. The second element contains data from CBL channel 1, the third contains data from channel 2, etc. Multiple data sets within a matrix are separated by a "-2000" marker. Once you know where the data is stored, you can print those matrices by doing the following:

1. From the TI Connect home screen as shown on the previous page, select the last icon, DataEditor. You should see something like this:



Notice that the third button on the bottom left is depressed. If your screen does not look that way, click the Matrix button.

Next click on the second icon in the top row (see the arrow on the diagram on the facing page?). This will connect the computer with your calculator and display a "directory" of the calculator RAM. Click on the + sign in front of Matrix:



To copy matrix [H] from your calculator to the DataEditor, double click on it. You will then see the matrix data displayed on the DataEditor screen. There is now a printer icon in the second row of icons on the DataEditor.

HOW TO USE DATA FROM THE CALCULATOR IN EXCEL

It is possible to save matrix data from the DataEditor screen in a format that *Excel* can recognize. This is generally known as "comma-separated-value" or .CSV format.

With the matrix data transferred to the DataEditor as in the previous example for printing, Click on File at the top left and choose Export. Choose an appropriate place to save the file in .CSV format. *Excel* is able to open this file without any further conversion.