



## **USB Data Logger Software**

INSTALLATION AND OPERATION DOCUMENTATION

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**REV. 01/10**  
**XXXXXXX**

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# REQUIREMENTS AND CAPABILITIES

*Your satisfaction with this software will be enhanced by a complete understanding of its requirements, capabilities, and use. Please read this document thoroughly, test the software in your environment, and be sure all operators are given adequate training before using for production runs.*

## 1.1 Physical Requirements:

- 1.1.1 A Shel Lab device with a USB port. A current list of supported Shel Lab devices may be found in the “readme.txt” file included in the zipped distribution file.
- 1.1.2 A PC with an available USB port and an unused COM port between COM1 and COM4.
- 1.1.3 A USB cable to connect them. The cable should be USB-A to USB-B.

## 1.2 Software Requirements:

- 1.2.1 Windows XP, Windows Vista, or Windows 7
- 1.2.2 Excel 2003 or Excel 2007
- 1.2.3 A Virtual COM Port driver (included)

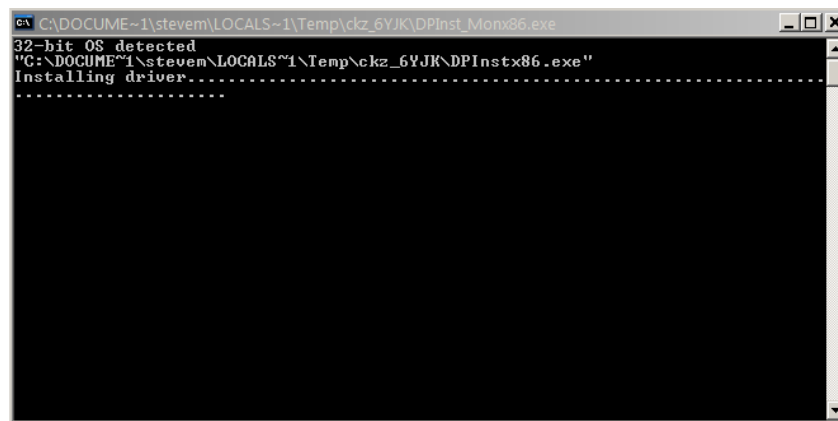
The Shel Lab USB Data Logger is distributed as an Excel workbook in the 2003 format. While it is possible that it will run in other operating systems and/or versions of Excel than those listed above, this has not been tested nor will it be supported.

## 1.3 Capabilities:

- 1.3.1 Logging may be performed on only one Shel Lab device at a time per PC. While it is theoretically possible to have more than one instance of the software running on individual COM ports, this has not been tested and is not recommended.
- 1.3.2 Up to 65,535 sets of data may be logged. At one set per minute this equates to over 1,000 hours or over 45 days. However, the actual limit to your data collection may vary, depending on the amount of memory available to Excel.
- 1.3.3 Data sets are associated with the time and date of collection.
- 1.3.4 Data sets may be viewed live, as they happen.
- 1.3.5 A simple XY plot of the data sets is built in and may be viewed live.
- 1.3.6 The Data Logger makes exclusive use of Excel, or put another way, Excel is not available for other uses while the logger is running. While it is possible to use the PC for other functions while the logger is running, heavy use is not recommended. Depending on your data logging needs, you may wish to consider dedicating a PC to the logging function.

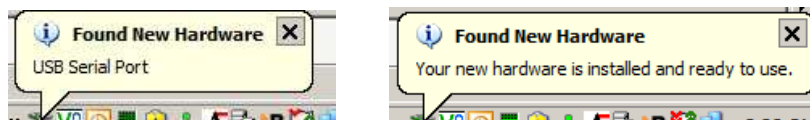
# INSTALLATION

- 2.1 **Do not** connect a USB cable between the Shel Lab device and the PC until section 2.3.2 below.
- 2.2 **Extract the zipped files** – The zipped files may be extracted to any convenient folder. (You have probably already done this if you are reading this documentation.) Read the “readme.txt” file for information on the included files, current release, and supported devices.
- 2.3 **Install the Virtual COM Port (VCP)**
  - 2.3.1 Locate and run the file CDM?????.exe (where the ?’s represent the current revision number). Depending on your user settings and operating system, you may need administrative or UAC rights to do this. You should see a box similar to this:



When it has finished copying the necessary files, the box will disappear.

- 2.3.2 Plug the USB cable in. (The device need not be turned on.) The device will be recognized and the driver installation will continue. You should see a series of notifications in the task bar similar to the ones below:

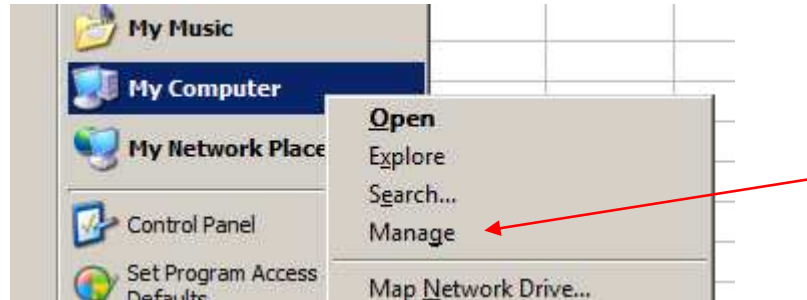


Depending on your version of windows, you may see other messages, including references to a “FT232R USB UART”. The final message may say “installed sucessfully” instead of “ready to use”.

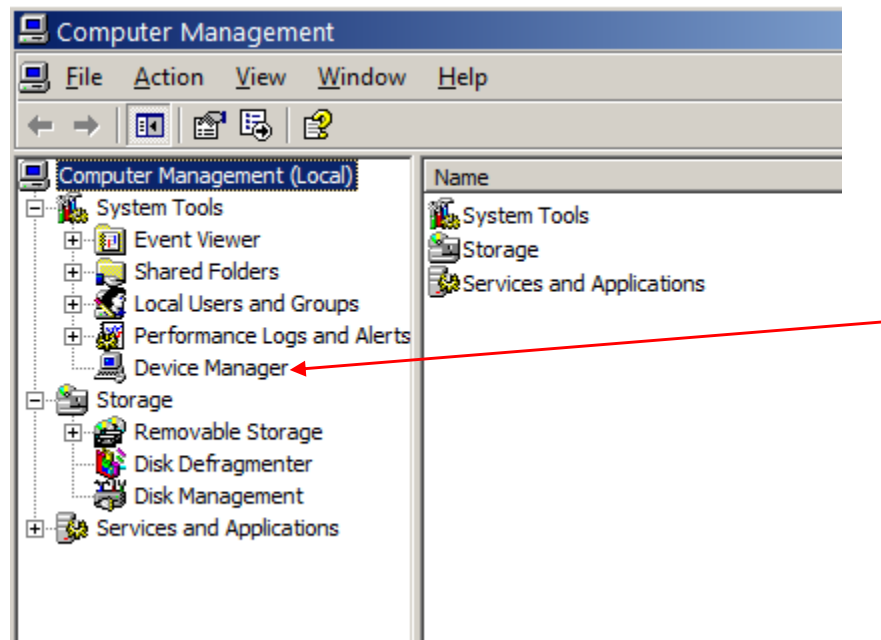
This should complete the VCP installation. If you do not get the above response, refer to the **VCP Driver** subsection (5.3) in the **Troubleshooting** section.

2.4 **Verify / modify the COM port used** – The simplest way to check for the assigned COM port is in the Windows Device Manager. There are many way to get there; here is an easy one:

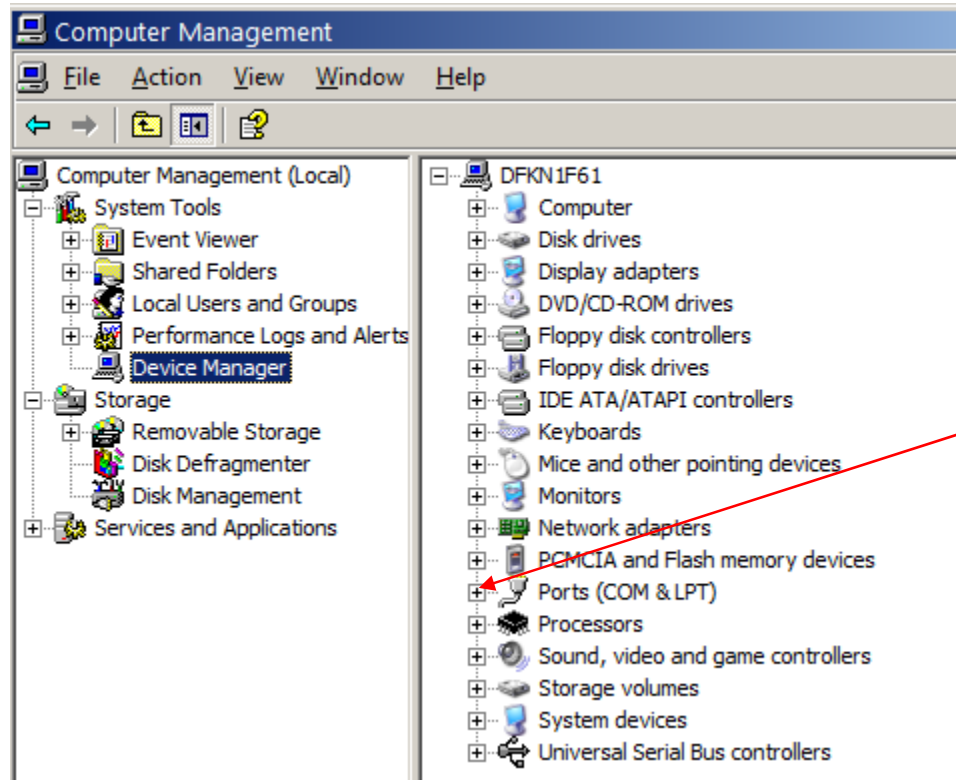
2.4.1 Right-click **My Computer** or **Computer** (on the desktop, in Windows explorer, or on the **Start** menu) and left-click **Manage**



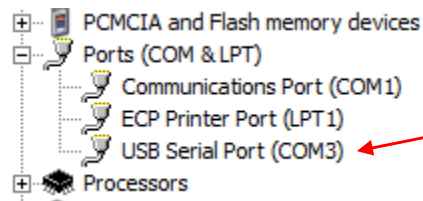
2.4.2 Select **Device Manager**. You may need administrative or UAC rights to proceed.



2.4.3 Expand the **Ports (COM & LPT)** section by clicking on the [+]



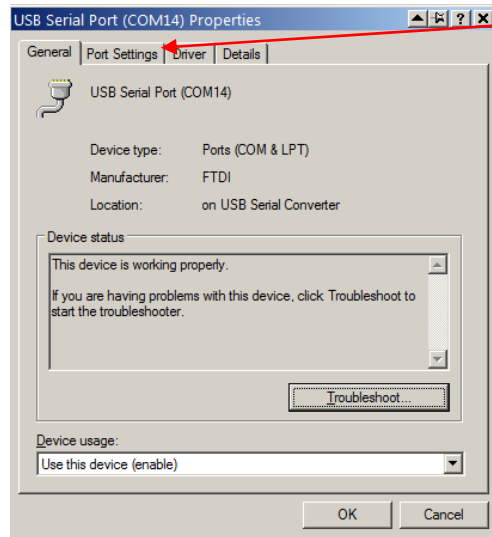
2.4.4 Hopefully the USB Serial Port has been created and the assigned number is COM4 or less. (The example below shows COM3, but any port from COM1 to COM4 is fine.) If so, you are finished with the VCP install. Make a note of the assigned COM port and skip to section 2.5



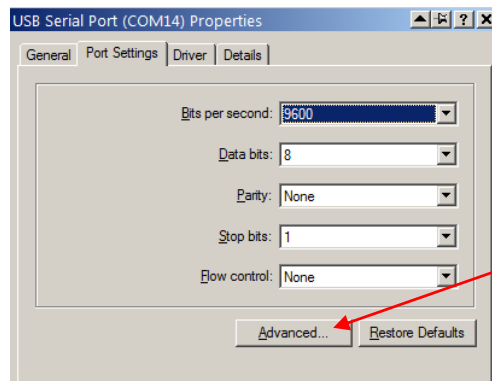
2.4.5 If the USB Serial Port is not listed, make sure that the cable is still plugged in. If it is still not listed, you should start over with section 2.3 or refer to the **VCP Driver** subsection in **Troubleshooting** (section 5).

2.4.6 If the USB Serial Port is listed but the COM port assigned is greater than COM4, this sometimes occurs when a device (e.g., Bluetooth) uses a COM number outside of the standard COM1-4 range and tells the registry that the next available COM number is higher. Try the following:

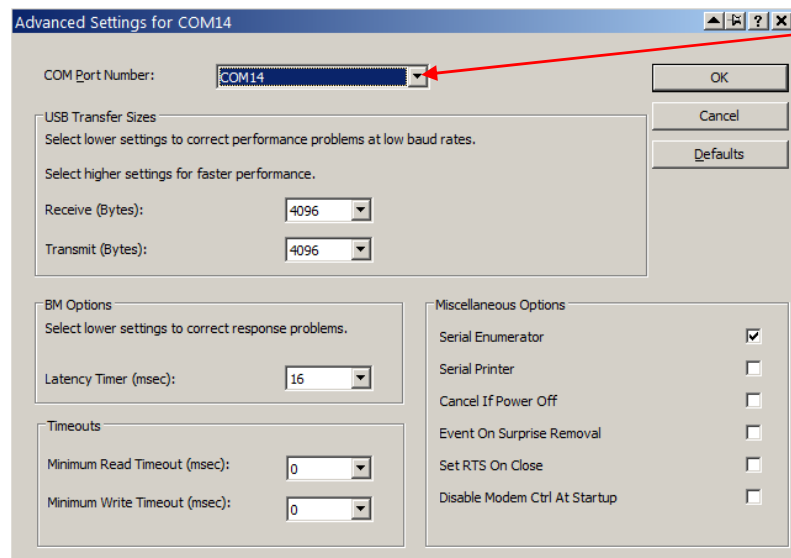
2.4.6.1 Double-click the listed USB Serial Port. You should see a dialog box similar to the one below. Select the **Port Settings** tab.



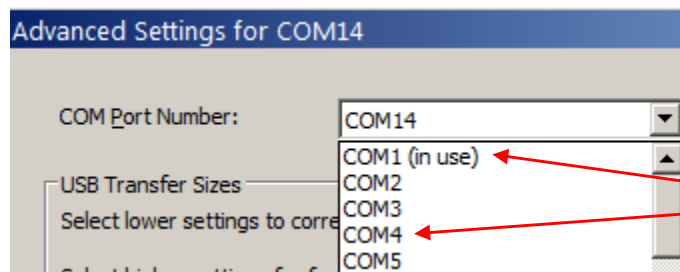
2.4.6.2 Click on the **Advanced** button.



2.4.6.3 Click on the drop-down button next to the COM Port Number.



2.4.6.4 Scroll up to where you can see COM1 through COM4.



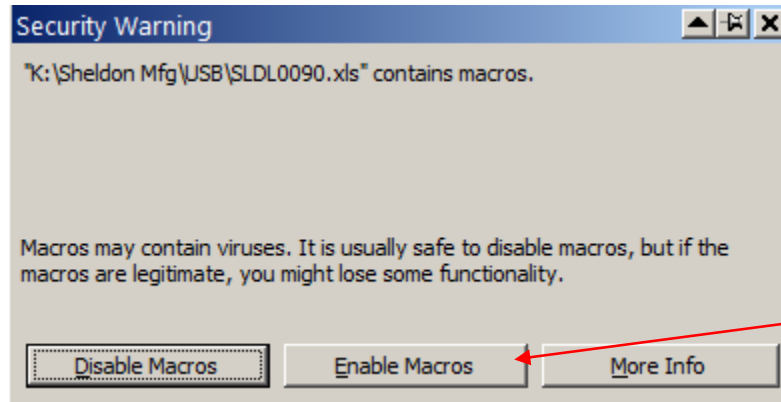
2.4.6.5 The goal here is to find a COM Port Number that either does not say “(in use)” or explicitly says “unused”. If COM1 through COM4 are in use, you must find a way to free one up, perhaps by uninstalling another device or moving it to a higher number.

2.4.6.6 If one of the 4 COM Port Numbers is available, make a note of it, select it, click on the **OK** button twice, and continue.



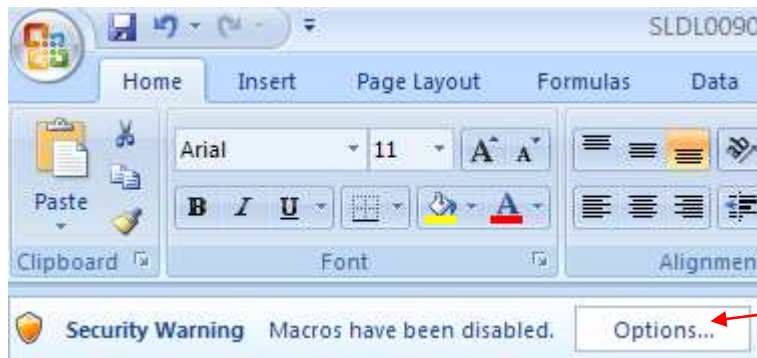
- 2.5 **Open the Excel file** – Locate and open the file **SLDL????.xls** (where the ?'s represent the current revision number). As you may expect, this workbook is highly dependent on Visual Basic code (macros) to function. If your Excel security settings are set at the default, macros are disabled. How you enable macros varies as to your Excel version.

2.5.1 **Excel 2003** – You may see a dialog box that looks like this:

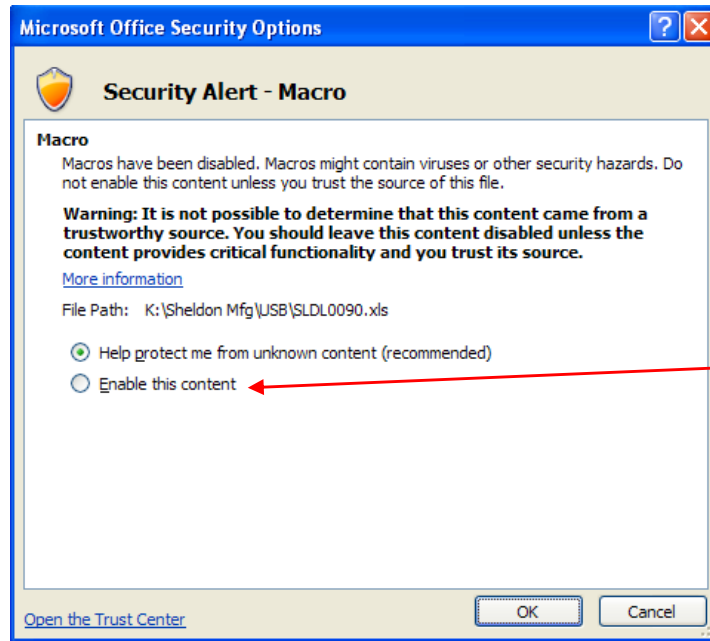


If you downloaded this file from the Shel Lab website, it should be safe to click on **Enable Macros** and continue to section 3.

2.5.2 **Excel 2007** – The top of your Excel window may look like this:



Click on the **Options** button. The following should appear:



If you downloaded this file from the Shel Lab website, it should be safe to select the **Enable this content** radio button, then click on **OK**, and continue to section 3.

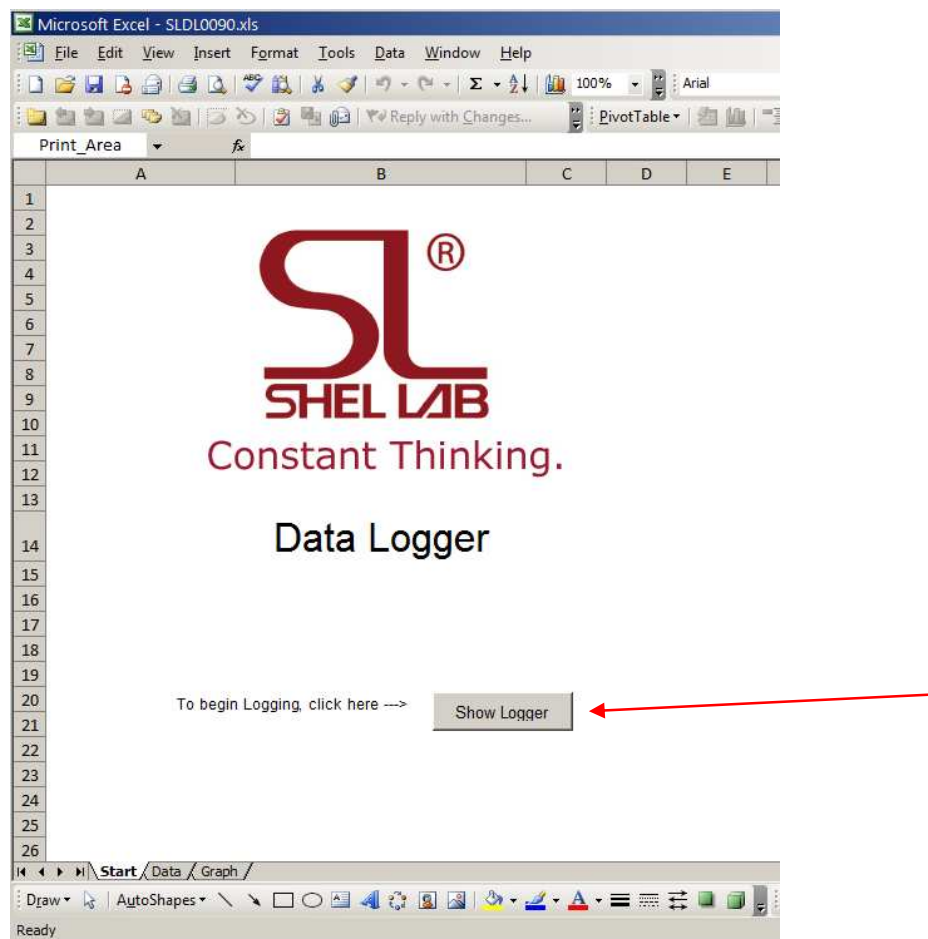
If your security settings are set higher, it is possible that other notices may appear or macros may be disabled with no notice at all. If this is the case, refer to your Excel documentation about enabling macros for this workbook.

## BASIC OPERATION

- 3.1 **Data Stream** – When a Shel Lab USB-enabled device is turned on, it immediately sends some text to the USB port with internal Shel Lab project and version information that can be ignored. A minute later and each minute thereafter, a string of text is sent containing data from the internal sensors. The type and number of data items will vary depending on the type of device.

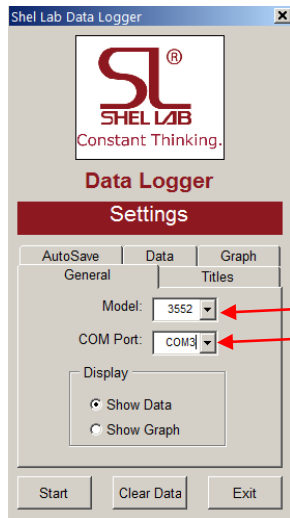
The Data Logger will ignore the initial info, then for each data instance, it will parse out the text string into numeric data and note the date/time of occurrence. Each date/time and data set will then be stored in consecutive rows of the worksheet titled **Data**.

- 3.2 **Initial Settings** – The starting screen for the Shel Lab USB Data Logger looks like this:



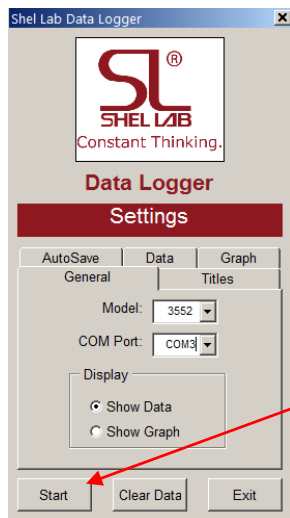
Click on the **Show Logger** button to start.

A control panel similar to the one below should appear:



For basic operation, you need only adjust two settings by clicking on the drop-down buttons next to them. Select the Shel Lab USB-enabled device from the list in the **Model** box. Then in the **COM Port** box select the appropriate number from the installation section (2.3.4 or 2.3.6.6) above.

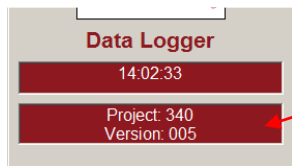
### 3.3 Start the Logger – Click on the **Start** button to begin.



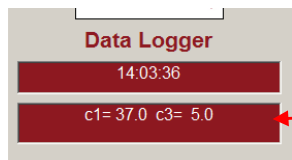
The Logger will start counting down the time in the upper red box. The text in the lower red box will continue to say “Last Data” until some data arrives.



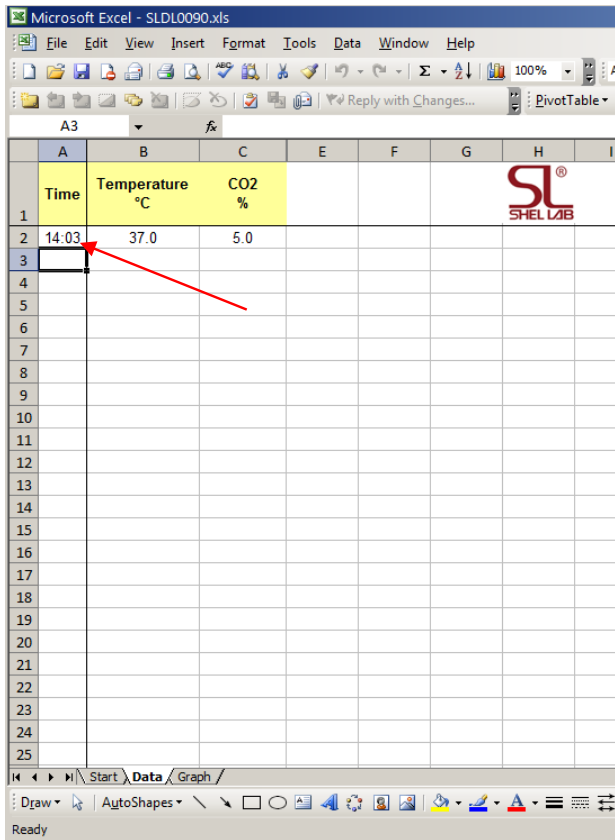
If the device is turned on after logging begins, you will get data that looks something like this:



After the device is turned on or if it was already turned on, within a minute the first data set should appear.



At the same time, in the background the Logger will switch to the **Data** sheet and show the data set.



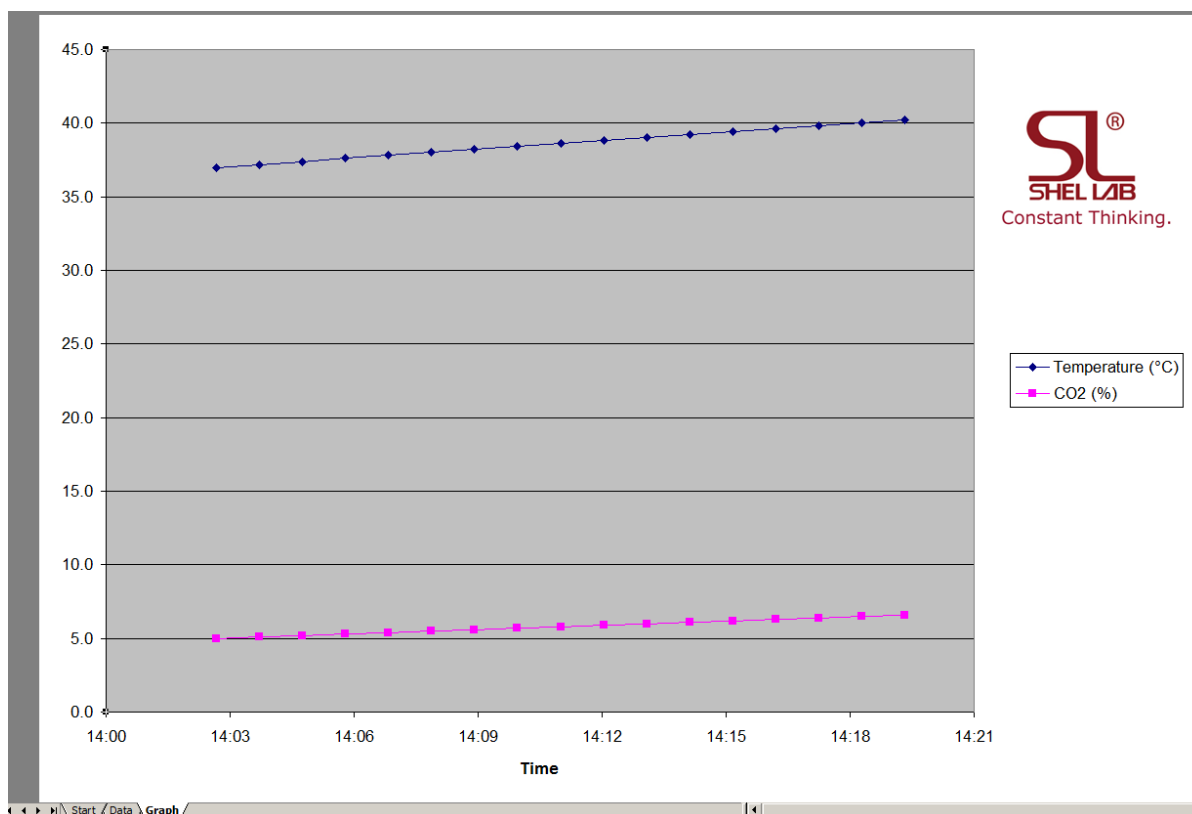
Note that while the time is shown, the actual value in cell A2 contains the date and the time. When the logger is off, you may format the column to display differently if desired.

Each subsequent data set will be added beneath the previous until the **Stop** button is clicked.



This stops logging and takes you back to the control panel.

- 3.4 **Show Graph** – While there are many ways Excel can graph data, a simple XY plot of variables vs. time is included that can be viewed on the fly. If the **Show Graph** radio button is selected instead of **Show Data**, the first data set will take you to the **Graph** sheet. The graph will adjust automatically as new data is added. The data sets will still be stored on the **Data** sheet.



### 3.5 Operation Notes

3.5.1 The device and the Logger are independent of each other. If the Logger is left running, the device may be powered off and on – the Logger will continue to store data sets whenever they are sent to it. Conversely, the Logger may be stopped and restarted – any data that the device sends while it is stopped will be lost. However, the one minute between each data set should be sufficient time to stop logging, change a setting (e.g., data display to graph display), and restart without losing any data.

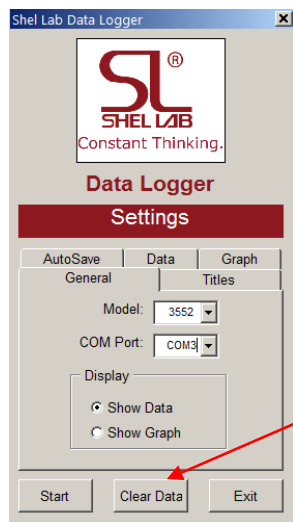
#### 3.5.2 Disconnecting the USB cable

3.5.2.1 **Warning** – Do not disconnect the USB cable while the Data Logger is running. This will cause an error that will require a restart of the macro code and data may be lost.

3.5.2.2 If the Data Logger is not running, you can safely detach the USB cable. If your PC sound is enabled, you should hear two beeps when disconnecting.

3.5.2.3 The USB cable must be reconnected before restarting the Data Logger or an error will occur. If your PC sound is enabled, you should hear two beeps when reconnecting.

3.5.3 **Clearing the Data** – When logging is stopped, clicking on the **Clear Data** button will remove all logged data from the **Data** sheet to start over. You will be asked to verify that this is your intention.



3.5.4 **Exit** – Clicking on the **Exit** button stops the macros and takes you back to the **Start** sheet. You can now save the file, look at the **Data** and **Graph** sheets, and/or manipulate the data as you would any Excel workbook.

3.5.5 **Show Logger & Restart** – If you click on the **Show Logger** button and then restart logging, new data will be added below any existing data.

3.5.6 While the control panel is visible, the Data Logger macros are running and the underlying Excel spreadsheet is locked out – you can only see what Data Logger lets you see. You must exit before you can save the file. (Unless you use AutoSave – see section 4.2)

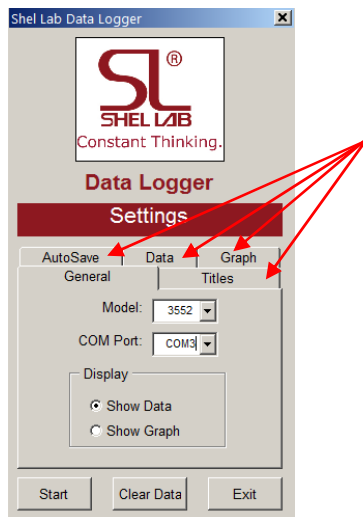
3.5.7 Up to 65,535 sets of data may be logged. However, the actual limit to your data collection may vary, depending on the amount of memory available to Excel. **Note:** the program does not do any error checking for the amount of available space or memory, so you should be cautious about pushing the limits of data collection amounts.

3.5.8 The Data Logger makes exclusive use of Excel, or put another way, Excel is not available for other uses while the logger is running. While it is possible to use the PC for other functions while the logger is running, heavy use is not recommended. Depending on your data logging needs, you may wish to consider dedicating a PC to the logging function.

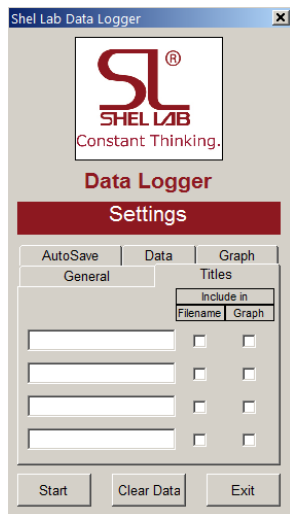


# SETTINGS

Use the additional settings tabs to add to the function and flexibility of the Data Logger. Click on them to see the settings for each category.



## 4.1 Titles



You can use up to four boxes to provide filenames for the AutoSave function and/or titles for the Graph.

- 4.1.1 **AutoSave Filename** – The default filename is formed by adding the Shel Lab device's Model number to the letters "SL", e.g., "SL3552.xls". Text in a box that has a check in the **Include in Filename** column will be added, each separated by a "-".
- 4.1.2 **Graph Title** – The default graph title is blank. If there is a check in the **Include in Graph** column, the graph title becomes "SL " + the model number + " – " then the text box.

For instance, if you enter the following on the **Titles** tab:

Titles	
Include in	
Filename	Graph
Batch_33	<input checked="" type="checkbox"/>
Run_25	<input checked="" type="checkbox"/>
Incubator Batch 33	<input checked="" type="checkbox"/>
Run 25	<input checked="" type="checkbox"/>

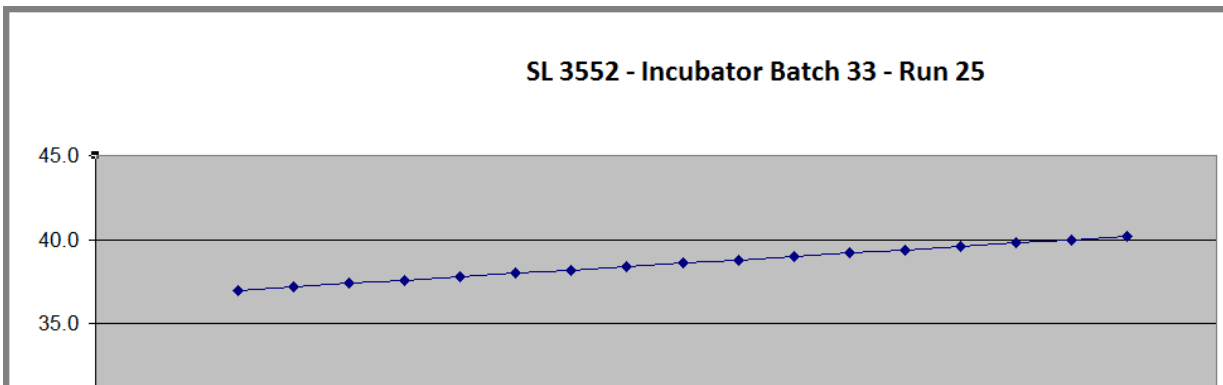
Start Clear Data Exit

The AutoSave filename will look like this:

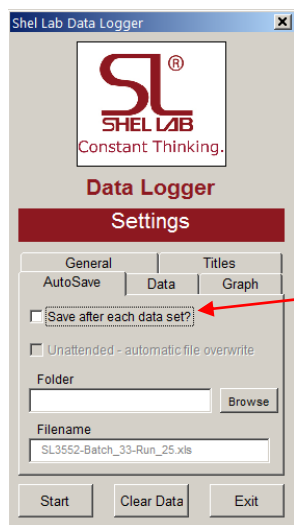
Filename

SL3552-Batch\_33-Run\_25.xls

The Graph title will look like this:

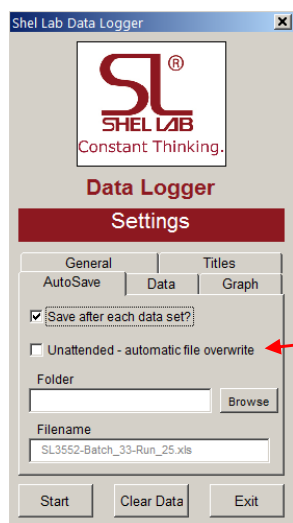


- 4.2 **AutoSave** – While the Data Logger is active, Excel's AutoRecover feature will not function. This tab allows the user to save the file automatically after each data set is logged.



#### 4.2.1 Save after each data set?

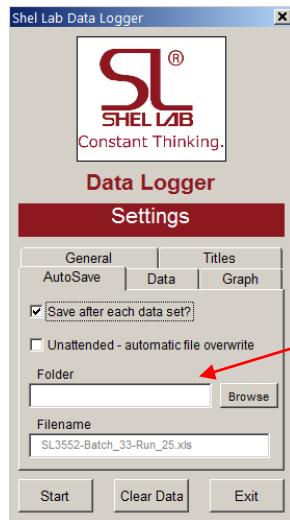
- 4.2.1.1 Unchecked – You must exit the control panel and save manually.
- 4.2.1.2 Checked – The workbook will be saved automatically after each data set is logged, according to the **Folder** and **Filename** below.



#### 4.2.2 Unattended – automatic file overwrite

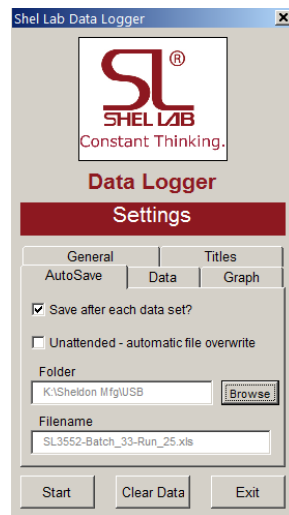
- 4.2.2.1 Unchecked – The first time AutoSave saves the file it will check to see if the file exists. If so, you will be asked to verify if you want to overwrite the file. If you say yes, it will overwrite the file; subsequent overwrites happen automatically. If you say no, you should stop logging and deal with the conflict (change the filename, set a different folder, etc.).
- 4.2.2.2 Checked – The file will be overwritten without any notice or warning. Check this only if you are sure it is safe to overwrite the file.

### 4.2.3 Folder



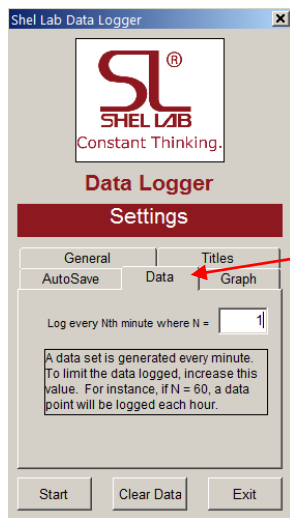
4.2.3.3 If left blank – The file will be saved in whatever Excel thinks the “current” folder is. This may not be what you’d expect, so it’s probably best to set the explicitly set the folder.

4.2.3.4 Set the folder – You cannot type a folder path here; instead, click on the **Browse** button to select a folder.



4.2.4 **Filename** – Cannot be modified here. This is generated by the settings on the **Titles** tab (section 4.1).

### 4.3 Data

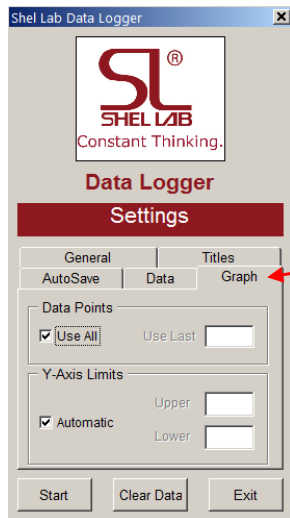


This setting allows you to control which data sets will be logged. The default value of 1 (one) will log each data set that the device sends out, every minute. If you enter a value of 5 (five) here, the first data set will be logged, the next four skipped, the next logged, and so on, effectively capturing data every 5 minutes. A value of 60 will log data once an hour.

You will see the intervening, skipped data sets in the control panel as they occur, but they will not be logged to the **Data** sheet or graph.

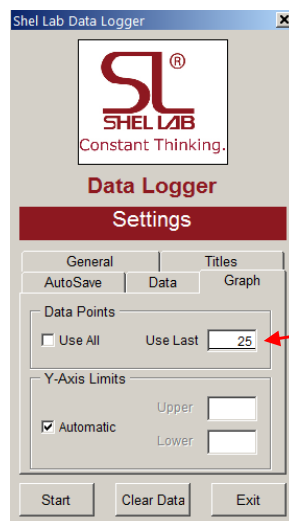
**Note:** The data set transmission rate of one per minute is set in the device and cannot be changed by the user. Entering a fractional N will not work – no data will be logged.

## 4.4 Graph



### 4.4.1 Data Points

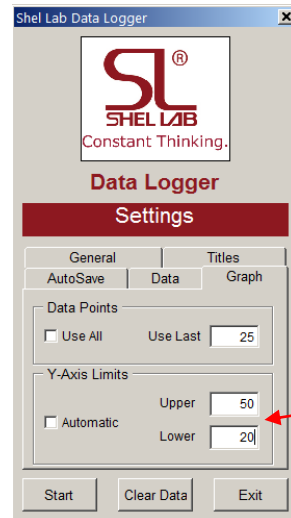
4.4.1.1 If **Use All** is checked, all data sets will be plotted.



4.4.1.2 If **Use All** is unchecked and **Use Last** is an integer  $n$  greater than zero, only the last  $n$  data sets will be plotted. This may be useful if you are logging lots of data and/or wish to focus on current trends.

## 4.4.2 Y-Axis Limits

- 4.4.2.1 If **Automatic** is checked, Excel will determine the Y-Axis limits based on the data being plotted.



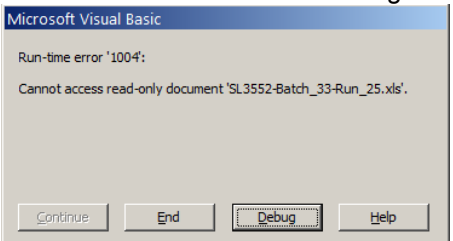
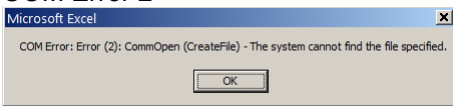
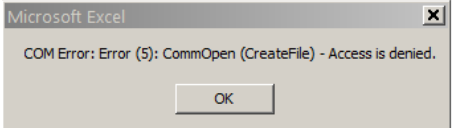
- 4.4.2.2 If **Automatic** is unchecked, the Y-Axis limits can be specified using the **Upper** and **Lower** boxes. This can be used to fix the axis so that it does not change over time. Also, in the example above, say that one data type is unlikely to exceed 20 and that the other(s) are generally above 20; these limits would allow you to focus on the other data type(s).

# TROUBLESHOOTING

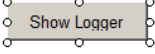
Please refer to the information below for assistance in resolving errors. Since this is a free product provided for the convenience of the users of Shel Lab devices, support will be limited and only via e-mail. If you cannot resolve your issue with the information below, contact a Shel Lab Technical Service Representative at [tech@shellab.com](mailto:tech@shellab.com)

This Troubleshooting section is broken into three parts: Program Errors, Restart Procedures, and Virtual COM Port (VCP) drivers.

## 5.1 Program Errors

ERROR MESSAGES	
<p>You see a Run-time error message</p> 	<p>An unexpected error has occurred. (This one was forced by trying to AutoSave to a file that was set to Read-Only.)</p> <p>Click on the <b>End</b> button and, if necessary, select the <b>Start</b> sheet. Follow the procedures in <b>Restart</b> below.</p>
<p>COM Error 2</p> 	<p>The COM port cannot be found.</p> <p>This may occur if:</p> <ul style="list-style-type: none"> <li>✓ The USB cable is unplugged.</li> <li>✓ The control panel is set for the wrong COM#.</li> <li>✓ The VCP driver is not correctly installed.</li> </ul> <p>Click on the OK button, fix the fault, and then follow the procedures in <b>Restart</b> below.</p>
<p>COM Error 5</p> 	<p>The COM port is already in use.</p> <p>This may occur after a Run-time error.</p> <p>Click on the OK button and then follow the procedures in <b>Restart</b> below.</p>



NOT OPERATING AS EXPECTED	
<b>Show Logger</b> button is missing from the <b>Start</b> sheet	This may happen if the macro is stopped before completion.  Follow the procedures in <b>Restart</b> below.
Nothing happens when the <b>Show Logger</b> button is clicked	Most likely, your security settings are not allowing macros to run. Refer to your Excel documentation about enabling macros for this workbook.
When the <b>Show Logger</b> button is clicked, it looks like this:  <div style="display: flex; align-items: center;"> <span>To begin Logging, click here --&gt;</span>  </div>	Either macros are not enabled or Excel is in design mode. Refer to your Excel documentation about enabling macros for this workbook or exiting design mode.

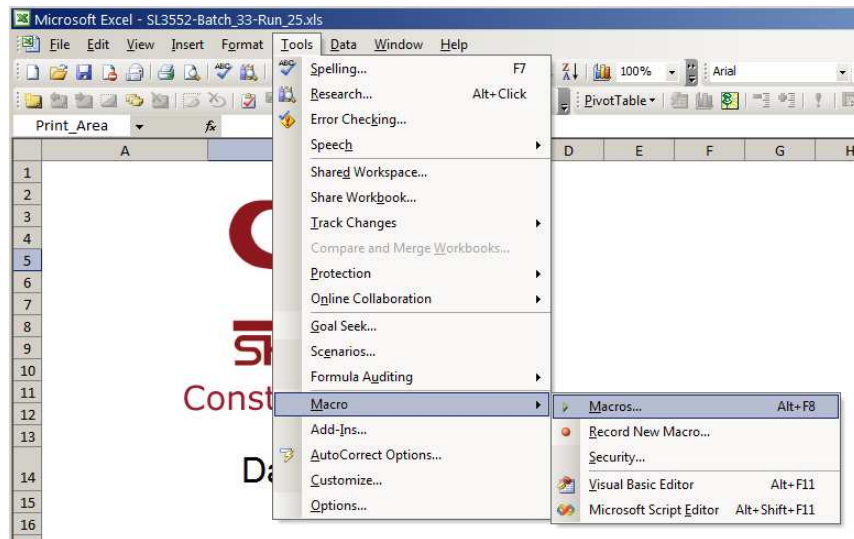
## 5.2 Restart Procedures

Typically, you will need to do both of the following.

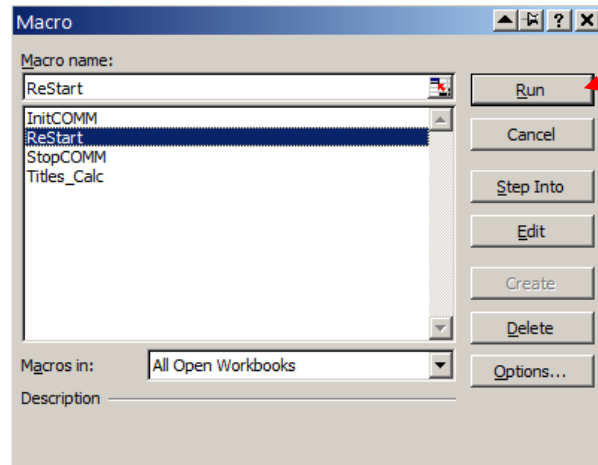
### 5.2.1 Run the ReStart Macro – Necessary if the **Show Logger** button is missing from the **Start** sheet.

#### 5.2.1.1 Excel 2003

Using the menu on top, select **T**ools, **M**acro, **M**acros



In the dialog box, select the **ReStart** macro and then click on the **Run** button.

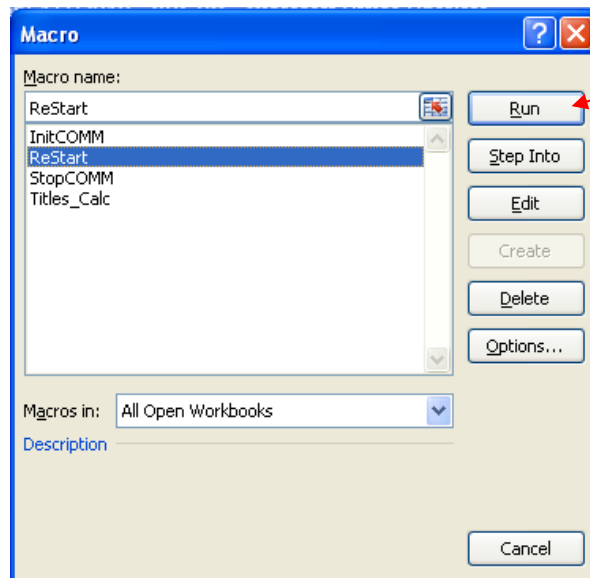


### 5.2.1.2 Excel 2007

On the Ribbon Bar, select **View**, then **Macros**, and then **View Macros**



In the dialog box, select the **ReStart** macro and then click on the **Run** button.



## 5.2.2 Reset the VCP Driver

- 5.2.2.1 Disconnect the USB cable; listen for the two falling tones. After a few seconds, reconnect the cable; listen for the two rising tones.
- 5.2.2.2 In some cases you may need to disconnect the cable, save the file (if necessary), exit Excel, reconnect the cable, and reload Excel and the file.

### 5.3 Virtual COM Port (VCP) drivers

The manufacturer of the chip that Shel Lab devices use for USB interfaces is **Future Technology Devices International Ltd.** (FTDI) and the VCP drivers are developed by them. If you have trouble installing the VCP drivers, or wish to uninstall them, FTDI's website can be a valuable tool.

A set of installation guides with step-by-step instructions for various operating systems can be found here:

<http://www.ftdichip.com/Documents/InstallGuides.htm>

If you wish to manually install the drivers, you should use the most recent FTDI drivers located at the link below, rather than the CDM?????.exe file that comes with the Shel Lab USB Data Logger package.

<http://www.ftdichip.com/Drivers/VCP.htm>