



RST INSTRUMENTS LTD.

VW Single Channel Datalogger
Instruction Manual

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RST VW Single Channel Datalogger

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Instruction Manual

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1 OVERVIEW

The RST Vibrating Wire Single Channel Datalogger was designed to be very simple to use, be deployable in harsh environments and to be as compact as possible. The user-friendly software and standard AA batteries allow easy downloading of the data and maintenance in the field. Even users with very little experience with Geotechnical Instruments will be able to connect, download data and change settings with a matter of a few inputs.

2 QUICK-START INSTRUCTIONS

The following is a brief outline with references to other parts of this manual to get you up and running quickly with the RST Single Channel VW Datalogger:

2.1 DATALOGGER SETUP

1. Insert the supplied CD-ROM into your drive. The disk contains an auto-run feature. Click on the install software button.
2. Follow the on-screen instructions to install the software. The default directory is: **C:\Program Files\RST Instruments\LogViewer**
3. Remove the cover of the datalogger by the four Phillips screws.
4. Insert the stripped ends of the cable for the VW Transducer through the cable gland and attach them to the terminal strip. Where:

Terminal ID	Wire Colour
C1	Red
C2	Black
T1	Green
T2	White
SH	Bare (shield)

5. Insert two standard 'AA' Alkaline batteries into the holder.
6. Using the supplied COM cable, connect the datalogger to your computer's serial port. If you do not have a serial port, place a USB to serial adapter in line with the COM cable. These adapters are available from most electronics stores or from RST Instruments Ltd. (part#: 01-CUSB-232A).
7. Launch the software. Upon connection, the status screen should automatically appear.
8. Navigate to the *Setup* tab and setup the datalogger to the desired parameters. Once the desired parameters are set, press the *Apply* button to apply the changes and start logging.
9. If you wish to record the data in specific Engineering Units, press the *Eng Units* tab enter the appropriate parameters and press the *Save & Apply* button to update the logger.
10. If desired, the sensor current reading can be monitored in real time by selecting the *Monitor* tab.
11. Under the *Status* tab, check to make sure the parameters are correct and that the logger is either *logging* or there is a *log pending*.
12. Exit the software and disconnect the COM cable.
13. The datalogger should now be taking readings. Return when desired to download the data. Make the habit of checking the battery voltage every time you connect.

2.2 DOWNLOADING DATA

1. Connect the COM cable to your computer and the datalogger and launch the software. If the connection is successful, the *Status* screen should pop-up automatically.
2. Press the *Collect Data* button to download the data. A data file (*.csv) will automatically be created in the same folder the program resides in. The default directory is: **C:\Program Files\RST Instruments\LogViewer**
3. If you wish to keep the old data on the logger and continue logging, disconnect the COM cable.
4. After downloading, if you wish to erase the old data and continue logging with the same parameters, press the *Setup* tab and press *Apply*. The program will prompt you whether you would like to erase the existing data on the logger.
5. If you wish to change any logging parameters, do so under the *Setup* menu and press *Apply* to save the changes.
6. Disconnect the COM cable when finished.

3 LOGGER MENU

Once connected to the datalogger, the Logger Menu should automatically pop up in a window. If this does not occur, under the *View* menu select *Logger Menu*, or click on the vibrating wire icon in the toolbar.

The logger menu contains five tabs: *Status*, *Setup*, *Monitor*, *Graphical* and *Eng Units*. Each tab option is explained in detail below. A Help button is available in the main window, which launches the appropriate help files when pressed.

3.1 STATUS

The status tab contains three main components: *Logger*, *Sampling* and *Battery*.

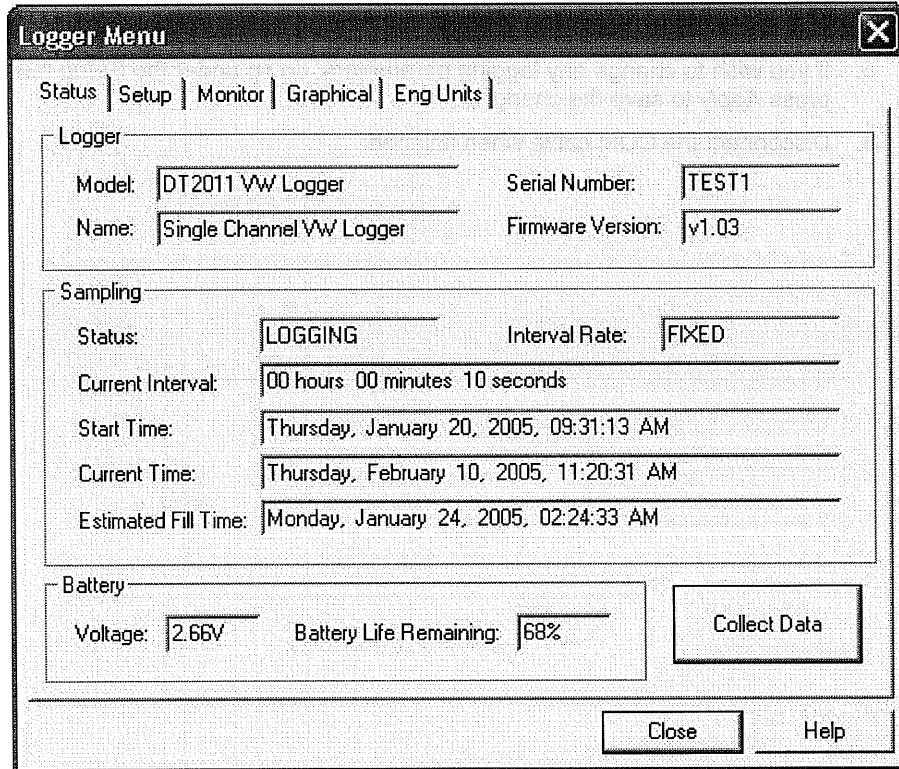


Figure 1: Status Tab

Logger

Provides information about the current *connected* datalogger. This includes the model, name, serial number, and firmware version. Ensure that the serial number matches what is expected (in this example it is *TEST1*). If it does not, check the status bar at the bottom of the screen to ensure a connection with the logger has been established.

Sampling

Provides information about the status of the logger. This includes whether or not it is logging, the log interval, and various time parameters.

Battery

Provides information on the battery voltage and the estimated battery life.

Collect Data

If the datalogger has already been configured to collect data at a specified interval, the *Collect Data* button can be pressed. The program will download the data (a progress bar will be displayed) and automatically write it to a *.csv file (section 4) in the directory the program is installed in. The default directory is: **C:\Program Files\RST Instruments\LogViewer**. Please see section 4 for the *.csv file format.

Note

When pressing the *Collect Data* button, the program will collect **ALL** the data currently contained in the datalogger. If the logging parameters are not going to be changed, and you wish to erase the current memory, you must press **Apply** under the *Setup* menu. The program will prompt you to confirm the erasing of data from its memory. If *Apply* is not pressed, the next time the data is collected (and no parameters have been changed) it will download the current readings and all of the previous data to a *.csv file.

3.2 SETUP

The setup tab contains three main components: *Interval*, *Logger Options* and *Clock Options*.

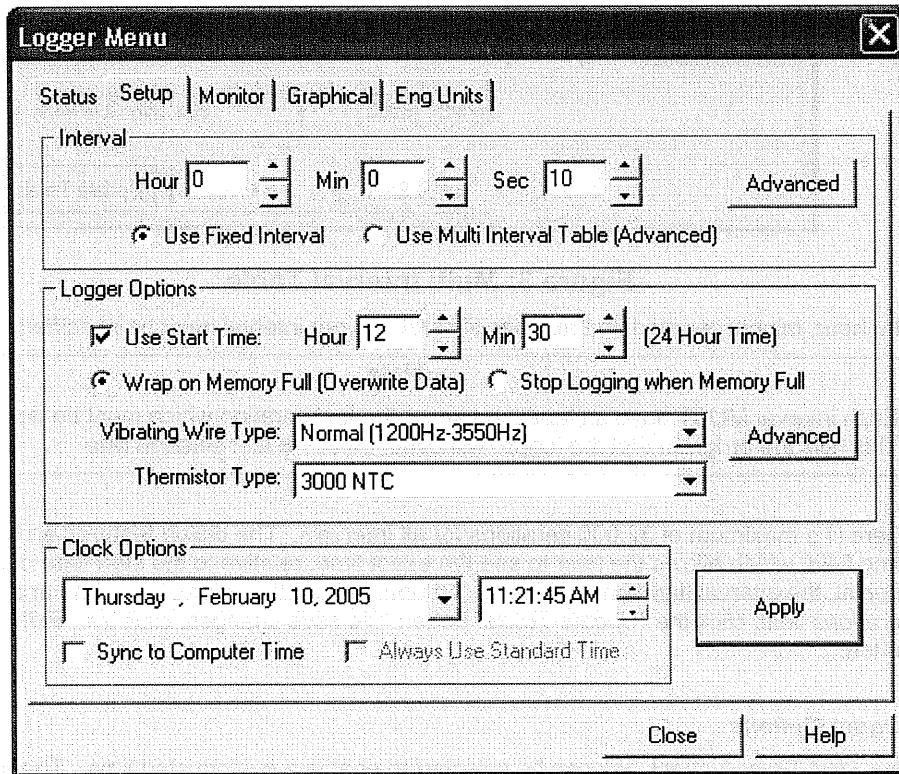


Figure 2: Setup Tab

Interval

This section is used to set the logging interval. *Fixed Interval* and *Multi Interval* options are available. The fixed logging interval can be invoked by choosing the "Use Fixed Interval" radio button, and set within the main setup tab. Arrow buttons allow the user to scroll up or down preset values.

To setup the logger with multiple intervals, select the *Use Multi Interval Table (Advanced)* radio button. Clicking the “Advanced” button launches the Multi Interval Table dialog, where up to 12 custom, multiple intervals can be applied.

Multi Interval Table					
	Hour	Min	Sec	Iterations	Interval Fill Time
Interval #1:	0	0	10	3000	0d 08h 20m 00s
Interval #2:	0	0	20	2000	0d 11h 06m 40s
Interval #3:	0	0	40	1500	0d 16h 40m 00s
Interval #4:	0	1	0	1000	0d 16h 40m 00s
Interval #5:	0	2	0	500	0d 16h 40m 00s
Interval #6:	0	5	0	0	83d 08h 00m 00s
Interval #7:	0	0	0	0	
Interval #8:	0	0	0	0	
Interval #9:	0	0	0	0	
Interval #10:	0	0	0	0	
Interval #11:	0	0	0	0	
Interval #12:	0	0	0	0	
Totals:				8000	86d 05h 26m 40s

Exit & Save Cancel Update Totals

Figure 3: Multi Interval Table

The hour, minute, second and number of iterations per interval must be specified.

Note

Each interval **MUST** have an iteration except the last iteration which must be set to zero. This tells the program that the logger will continue at the last iteration rate.

There is a maximum of 32,000 iterations for all intervals. The dialog features an Interval Fill Time field, which allows the user to see the exact time, relative to the start time of the interval, the interval iterations will finish. To update both the *Interval Fill Time* and *Total Iterations* field, click the “Update Totals” button. To save changes, click the “Exit & Save” button.

Logger Options

Use Start Time: A check box can be selected to enable a custom start time. The hour and minute can be entered in 24-hour format.

Note

If a custom start time is entered and this time has already past, the logger will not start until 24 hours has passed. For example: If the current time is 13:01 and the start time is set to 13:00, the datalogger will not start logging data until 13:00 *the next day*.

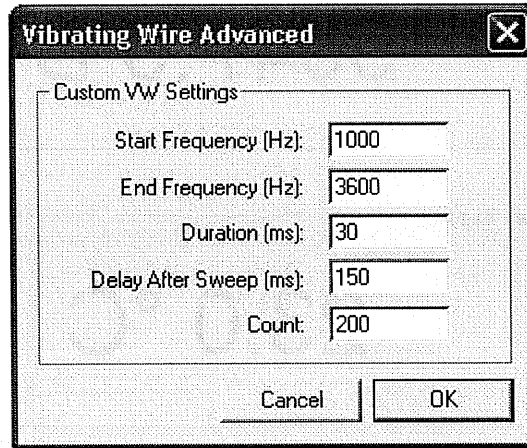
If a custom start time is applied, i.e. for some time in the future, the *Status* will read *Log Pending* until that interval is reached.

Wrap on Memory Full (Overwrite Data): When the datalogger memory becomes full, it will overwrite itself.

Stop Logging when Memory Full: Datalogger stops collecting data when it reaches its memory storage limit.

Thermistor Type: A drop down menu allows the user to select the type of thermistor used in the vibrating wire instrument.

Vibrating Wire Type: A drop down menu allows the user to select from a list of preset sweep frequency settings. The software also allows a custom, user defined sweep frequency for use with non-standard vibrating wire sensors. To select this option, simply click the "Advanced" button, fill in the required fields, and select the "Custom (Advanced)" option from the drop down menu.



The image shows a dialog box titled "Vibrating Wire Advanced" with a close button (X) in the top right corner. Inside the dialog, there is a section titled "Custom VW Settings" which contains five input fields with their respective values: Start Frequency (Hz) is 1000, End Frequency (Hz) is 3600, Duration (ms) is 30, Delay After Sweep (ms) is 150, and Count is 200. At the bottom of the dialog, there are two buttons: "Cancel" and "OK".

Figure 4: Custom Vibrating Wire Settings

Clock Options

Allows the user to set the date and time of the datalogger. Checking the *Sync to Computer Time* and pressing *Apply* synchronizes the datalogger clock to that of the PC it is currently connected to.

Apply Button

After any changes have been made on the datalogger *Setup* screen, pressing the *Apply* button saves these changes and downloads them to the datalogger's memory.

3.3 MONITOR

Selecting the monitor tab sets the datalogger into monitor mode. The top portion of the screen reports in B-units ($f^2 \times 10^{-3}$) and the bottom portion reports the thermistor temperature in degrees Celsius.

If successfully connected to the datalogger, the sensor reading and temperature reading is updated approximately once per second. Clicking the check boxes changes the display to Engineering Units, or degrees Fahrenheit.

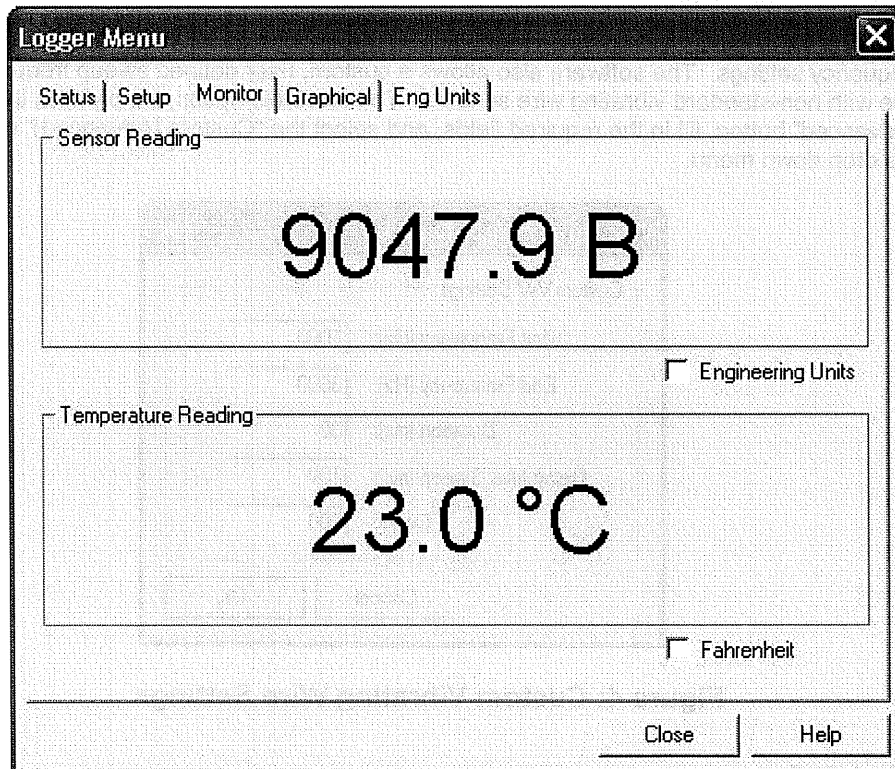


Figure 5: Monitor Tab

3.4 GRAPHICAL

Selecting the graphical tab invokes the datalogger graphical monitor. The graphical monitor displays the last 20 monitor readings in a Sensor Reading vs. Time graph. If successfully connected, the graphical monitor is updated approximately once every two seconds.

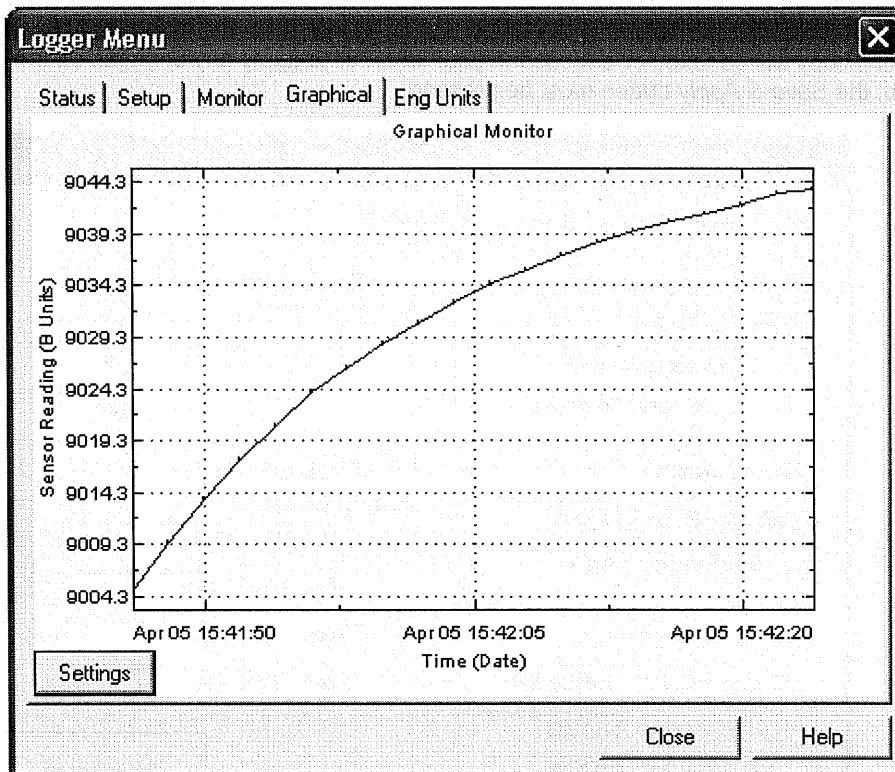


Figure 6: Graphical Tab

The "Settings" button launches the Graphical Monitor Options dialog, which allows the user to manipulate the graph. Options include the ability to display Engineering Units, set minimum and maximum Sensor Reading ranges (y-axis), and set the number of monitor data points displayed (x-axis, range between 10 and 80).

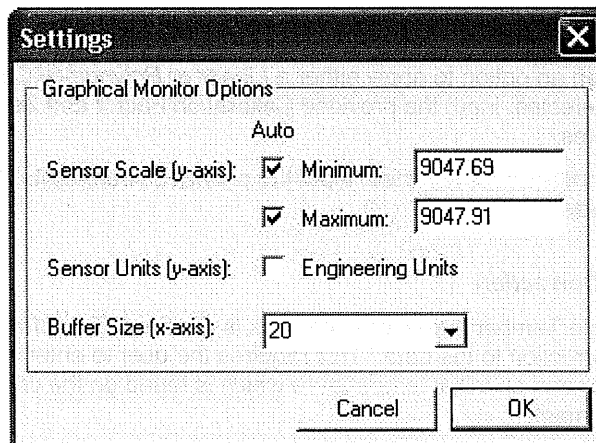


Figure 7: Graphical Monitor Options

3.5 ENGINEERING UNITS

Often the user may wish to report the readings directly in engineering units, rather than B-units ($\text{ft}^2 \times 10^{-3}$). Data required for the conversion to engineering units is always found on the calibration sheets for the transducer.

Each transducer is shipped from the factory with a calibration sheet. If you have not received a calibration sheet, or the sheet has been lost, please contact RST Instruments and a copy will be faxed or e-mailed to you. In order to apply any changes on the Eng Units tab, the *Save & Apply* button must be pressed.

The screenshot shows the 'Eng Units' tab in the 'Logger Menu' dialog. The 'Enable Engineering Units' checkbox is checked. Under 'Conversion Method', 'Linear Conversion' is selected. The 'Linear Conversion' section shows a Calibration Factor of 0.1005 and a Zero Reading of 9064. The 'Polynomial Conversion' section shows Coefficient A as 1.852e-008, Coefficient B as -0.1008, and Coefficient C as 912.23. The 'Enable Temperature Correction' checkbox is unchecked, and the 'Enable Units Conversion' checkbox is checked. The 'Units Conversion' section shows Units Type as Pressure, Input Units as kPa, Output Units as psi, and Output Offset as 0. A 'Save & Apply' button is located at the bottom right of the dialog, with 'Close' and 'Help' buttons at the bottom left.

Figure 8: Eng Units Tab

Conversion Method

The user is given an option to apply either a *Linear* or *Polynomial* Conversion. If *linear conversion* is selected, input the provided Calibration Factor and Zero Reading into the appropriate boxes.

If *polynomial conversion* is selected, input the provided coefficients (A, B & C) into the appropriate boxes.

Temperature Correction

When the Enable Temperature Correction box is checked, the software will apply a temperature correction to the data. This requires the user to enter in the temperature correction factor and an initial temperature which is found on the calibration sheet for that particular instrument.

If the calibration sheet is missing, please contact RST Instruments and a copy of the calibration sheet can be faxed or e-mailed to you.

Units Conversion

Units Type: Choose pressure or distance using the drop-down menu.

Input Units: These are the units of the calibration constants you inputted into either the linear conversion or polynomial conversion methods. In general, the calibration constants reported on the calibration sheets are either in kPa/B unit or psi/B unit. In the case of strain gauges, this could be mm/B unit.

Output Units: Select the appropriate output units from the drop-down list.

Output Offset: This is a user defined offset value. Under certain circumstances, the user may wish to enter in the elevation of the pressure transducer. In this way the reported pressure will be correlated to a reference elevation (i.e. above sea level).

Save & Apply

As a reminder, whenever **ANY** changes are made under the Engineering Units tab, the Save & Apply button must be pressed in order to update the logger with the appropriate information.

4 DATA FILES (*.CSV)

Whenever the *Collect Data* button is pressed under the *Status* tab, the software will collect all the current data stored in the memory of the datalogger. A progress bar will be displayed showing the status of this collection.

The software will automatically write the data to a *.csv file in the same directory that the program is installed in. This would be **C:\Program Files\RST Instruments\LogViewer**, if the default directory was chosen during the install. The *.csv file has the following format:

serialnumber_yymmdd_hhmmss.csv

This file can then be opened directly with Microsoft Excel™ or other spreadsheet programs. A new file will be created each time the data is collected. It is the users responsibility to copy data into a single spreadsheet if desired.

The following is how the data appears in Excel:

Microsoft Excel - VW00000000_041201_132718.csv

File Edit View Insert Format Tools Data Window Help

100%

Arial 10 B I U

B4 v1.03

	A	B	C	D	E	F
1	Model	DT2011 VW Logger				
2	Name	Single Channel VW Logger				
3	Serial Number	Sample Unit				
4	Firmware Version	v1.03				
5	Sampling Status	LOGGING				
6	Sampling Rate	FIXED				
7	Current Interval	0 Hours 2 Minutes 0 Seconds				
8	Start Time	Wednesday December 01 2004 01:06:00 PM				
9	Current Time	Wednesday December 01 2004 01:27:18 PM				
10	Battery Voltage	2.78V				
11	Battery Life Remaining	76%				
12	Engineering Units	Enabled	Linear Conversion CF=0.10 ZR=9064.00			
13	Temperature Correction	Disabled				
14	Units Conversion	Enabled	Pressure Input=kPa Output=psi Offset=0.00			
15						
16	Date/Time	Eng Units	Temperature	B Units		
17	12/1/2004 13:06	0.36	22.83	9039.43		
18	12/1/2004 13:08	0.36	22.72	9039.43		
19	12/1/2004 13:10	0.36	22.7	9039.43		
20	12/1/2004 13:12	0.35	22.59	9039.88		
21	12/1/2004 13:14	0.35	22.51	9039.88		
22	12/1/2004 13:16	0.35	22.46	9039.88		
23	12/1/2004 13:18	0.35	22.42	9039.88		
24	12/1/2004 13:20	0.35	22.41	9039.88		
25	12/1/2004 13:22	0.35	22.38	9039.88		
26	12/1/2004 13:24	0.35	22.35	9039.88		
27	12/1/2004 13:26	0.35	22.37	9039.88		

Ready NUM

Figure 9: Sample Data File

5 CHANGING THE BATTERIES

The single channel VW Datalogger uses standard 'AA' alkaline batteries which are readily available. The following steps outline the procedure to change the batteries:

1. Connect to the datalogger via the COM or USB cable and download the data.
2. Disconnect from the computer and remove the top cover (4 phillips screws).
3. Remove the batteries from the carrier and replace with fresh ones. If the unit is being used in a cold environment, RST also offers Lithium-Ion AA cells.
4. Replace the lid.
5. Connect to the PC again and navigate to the *Setup* screen. Verify that the settings are correct and press the *Apply* button. *You must press Apply to reset the datalogger regardless if the setup parameters are changed or not.* Please see note below.

Very Important

Upon replacement of the batteries, it is important to connect to the datalogger and re-apply the datalogger setup settings. This re-initializes the datalogger and ensures that the time settings are correct. Failure to do this could result in improper time stamps after the batteries are replaced.