

DD-600

A member of the Data Dolphin
Family of Data Logging Systems

Real Time Wireless Monitoring Solution



Data Dolphin Installation and Usage Manual

Last Revision: May 2012

optinst.com

viewdatanow.com

datadolphins.com

emailalarm.com

Note to the user:

This manual may cover items not specific to your system or particular configuration and was prepared as a reference for the many typical uses of the DD-600.

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<i>optinst.com</i>	<i>viewdatanow.com</i>	<i>datadolphins.com</i>	<i>emailalarm.com</i>
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Bill of Materials Data Logging System (all Model 600)

Bill of Materials DD-600:

- DD-600 Data Logger with LCD
- 900 MHz End Point Radio
- Internal Rechargeable Lithium Battery Pack
- Battery Charger
- USB Cable
- Waterproof/Crushproof Clear Lid ABS Enclosure
- SMA Antenna Jack
- 5db Magnetic Mount Antenna

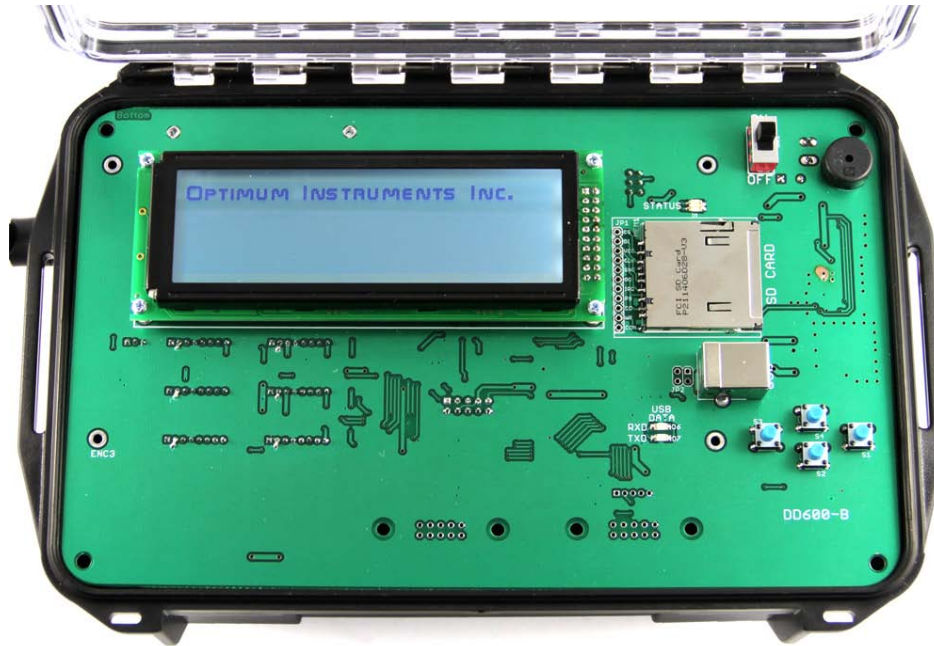
Bill of Materials DD-600 Router:

- DD-600 Data Logger
- 900 MHz Repeater Radio
- Internal Rechargeable Lithium Battery Pack
- Waterproof/Crushproof ABS Enclosure
- SMA Antenna Jack
- 5db Magnetic Mount Antenna

Bill of Materials Master Radio:

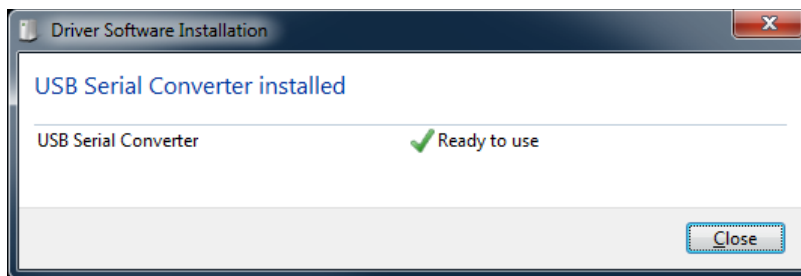
- 900 MHz Master Radio
- Waterproof/Crushproof ABS Enclosure
- TNC Antenna Jack
- 5db Magnetic Mount Antenna
- AC Adaptor
- USB Cable

Communications Connections



The DD-600 has an internal USB B-Type connector located above the buttons that can be accessed when the clear lid is opened. Use this to program the unit and configure your setup. The USB is an FTDI type and updated drivers can be found at <http://www.ftdichip.com/FTDrivers.htm> if necessary.

Windows 7 for example will automatically install the driver for you once you plug the USB cable in to your PC.



Battery Charger or AC Connections (All Models)



The above left battery charger will charge the internal lithium battery packs of the DD-600. Simply plug it into the battery charger plug on the side of the DD-600 and the light on the charger will indicate the status. RED is for charging. GREEN means charging is complete. The above right AC adaptor powers the master radio.



Sensors Connections

Sensor Wiring

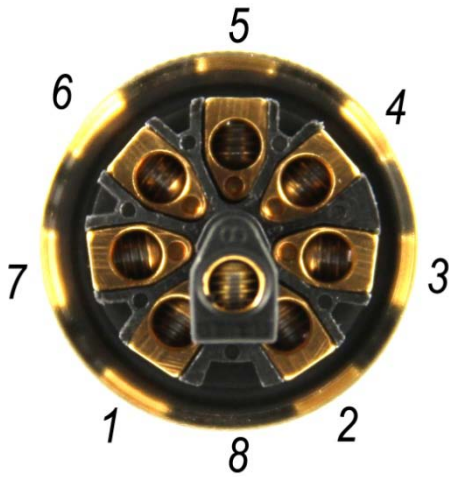


Sensor connectors are available to connect sensors to the DD-600. They are 8 pin aluminum water proof connectors that have screw terminals ready to simplify wiring. Sensor connectors can be programmed to contain information about the sensor so they become plug-and-play any time after to reduce any necessary configuration.

Take apart the connector and slide it over your sensor wire as shown below and then strip the wires and use the terminals as described on the next page.



Pin Outs



Pin Number	Pin Description
6	2.5V Reference
5	Ground
4	Smart Sensor
7	4-20mA Sensor Enable Shunt
1	Analog A Shunt
8	25.9V Excitation
2	Analog A Input
3	Ground



There are four externally available inputs for sensors to the DD-600. They are numbered 1, 2, 3 and 4 from left to right, top then down.

4-20mA Sensors

When using a 4-20mA sensor the Analog Shunt A and 4-20mA Sensor Enable Shunt pins must be connected. Use a jumper wire between pins 1 and 7. This inserts the 100 Ohm precision resistor into the circuit to convert the analog signal to be read by the DD-600.

Your 4-20mA sensor connects to the 25.9V Excitation and the Analog A input. Refer to the sensor documentation on wiring for external inputs. Pins 8 and 2 are the power source and sensor input.

Thermistors

When using a thermistor such as a YSI 5k use the 2.5V Reference (pin 6) and Analog Input (pin 2) pins to connect the sensor. A 10k precision resistor is then inserted between the Analog A Shunt (pin 1) and Ground (pin 3) connections to complete the wiring.

0-5 VDC Out Sensors

These sensors typically have a power input for excitation with a signal out. Connect the power to 25.9V Excitation (pin 8) and Ground (3) and the signal out is connected to Analog Input (pin 2)

Smart Sensor Pigtail

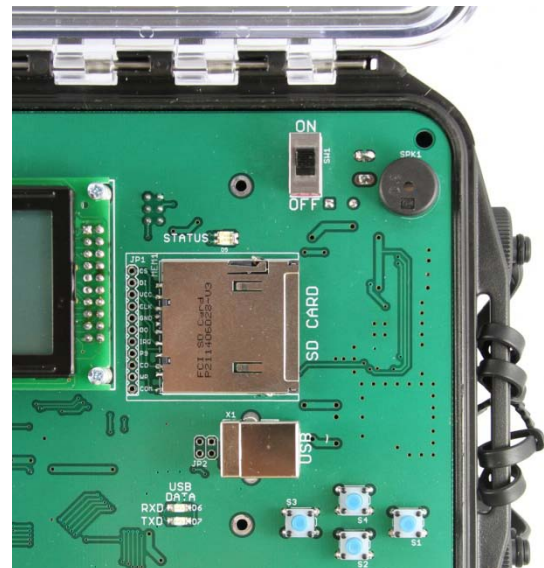
Also present in the connectors utilized by the DD-600 is a circuit that stores sensor characteristics to make future installations extremely easy. This circuit is on the Smart Sensor and Ground pins.

In Data Dolphin 2 software, when applying a sensors configuration in Setup, the same settings are stored to the sensor itself. If this sensor is moved to a new input, the DD-600 will read in and populate the input parameters upon next power cycle automatically.

Powering up the DD-600

On DD-600 Data Logger, and Router models make sure the antenna is attached securely and all other connections are properly tightened before powering the unit up. If the antenna is not connected, there is a risk of damage to the radio.

To power up the processor plug the green terminal into the processor as shown on the bottom right side of the circuit board as in the image below. Next switch the power from OFF to ON.



The DD-600 will tick and the red light will flash letting us know that the clock is not set. By using a PC and the Data Dolphin 2 software you can set the clock.

Powering up the DD-600 Master Radio

On DD-600 Master make sure the antenna is attached securely and all other connections are properly tightened before powering the unit up. If the antenna is not connected, there is a risk of damage to the radio.



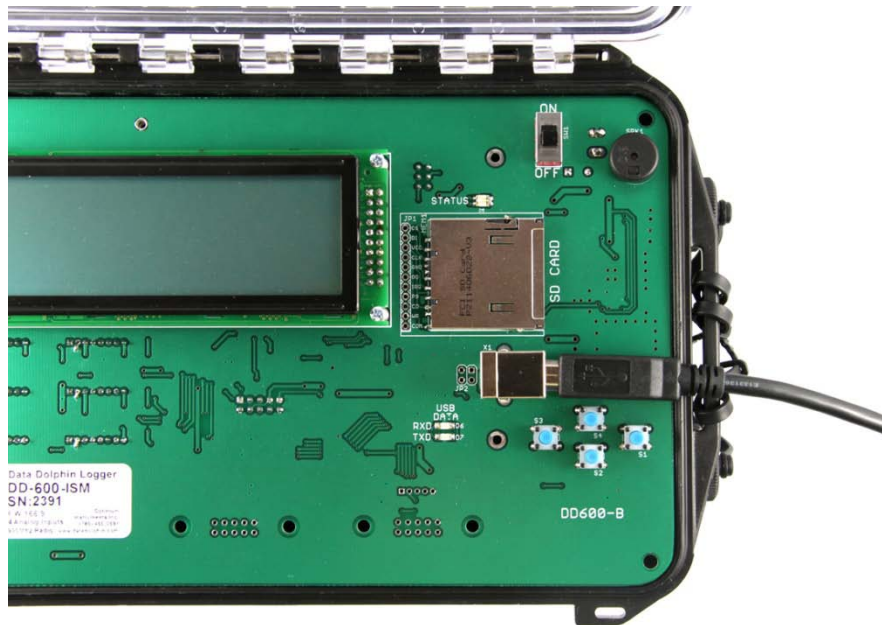
Connect the AC adaptor to the DD-600 Master Radio and then plug it into an available power source.

Plug in the USB Cable to the PC to let it also install the driver and verify your COM port as before in Device Manager. There should be some LED activity viewable through the clear lid.

Quick Guide on Downloading and Viewing Recorded data

Connecting your Logger to your Computer

Attach the USB cable from your computer to your Dolphin Data Logger. See image below for location on DD-600.

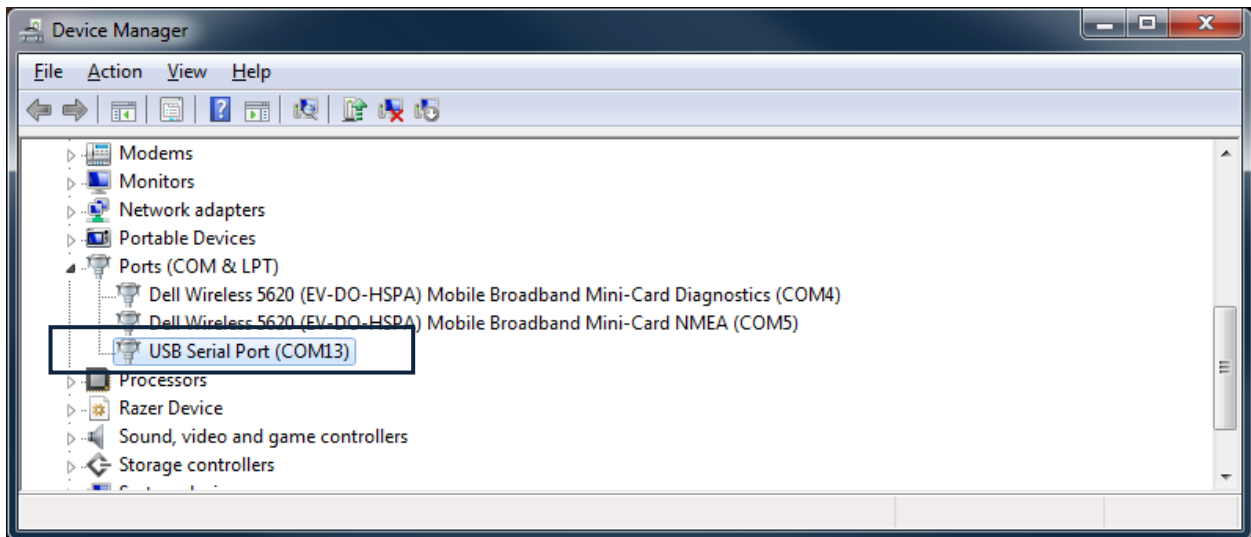
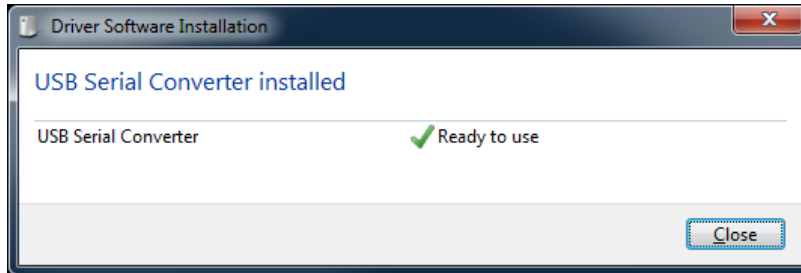


Computer and DD-400 Data Logger



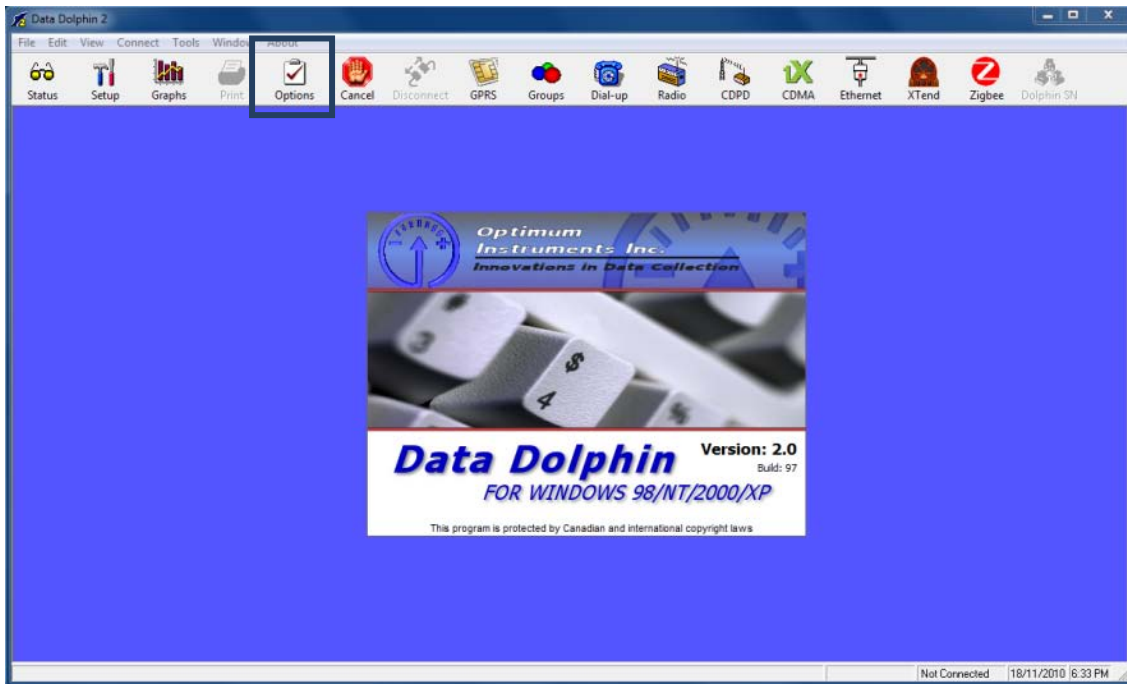
USB Cable for Data Logger

After installing, the System will generate an additional COM Port, USB Serial Converter for the DD-600 to communicate with your PC.



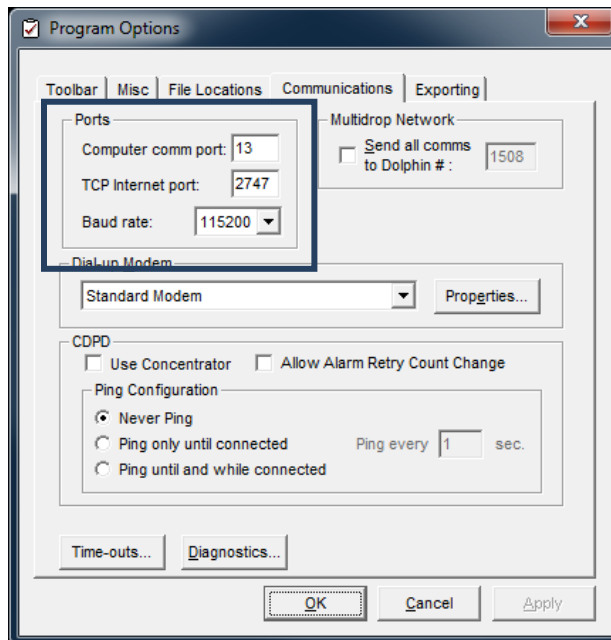
Device Manager

Use this port in your Data Dolphin Windows Configuration software as your Communications port. COM13 was assigned in this example image.



Data Dolphin Software

Load Dolphin and click on the Options button located in the toolbar.

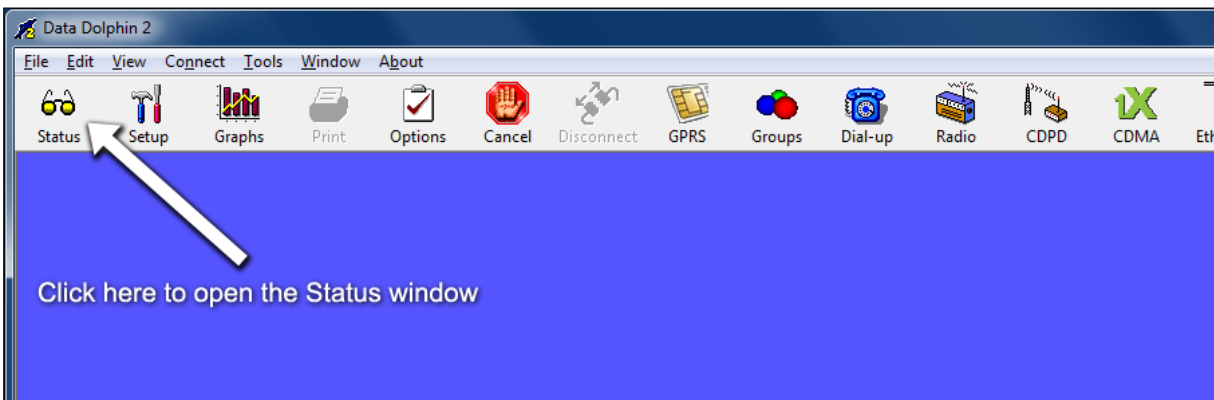


Data Dolphin Options

Select the communications tab and change the Communications port to your port shown in Device Manager. Also set the Baud Rate to 1115200 for the DD-600.

Downloading the Data and Status from your Data Logger

Reading the Current Status of the Inputs

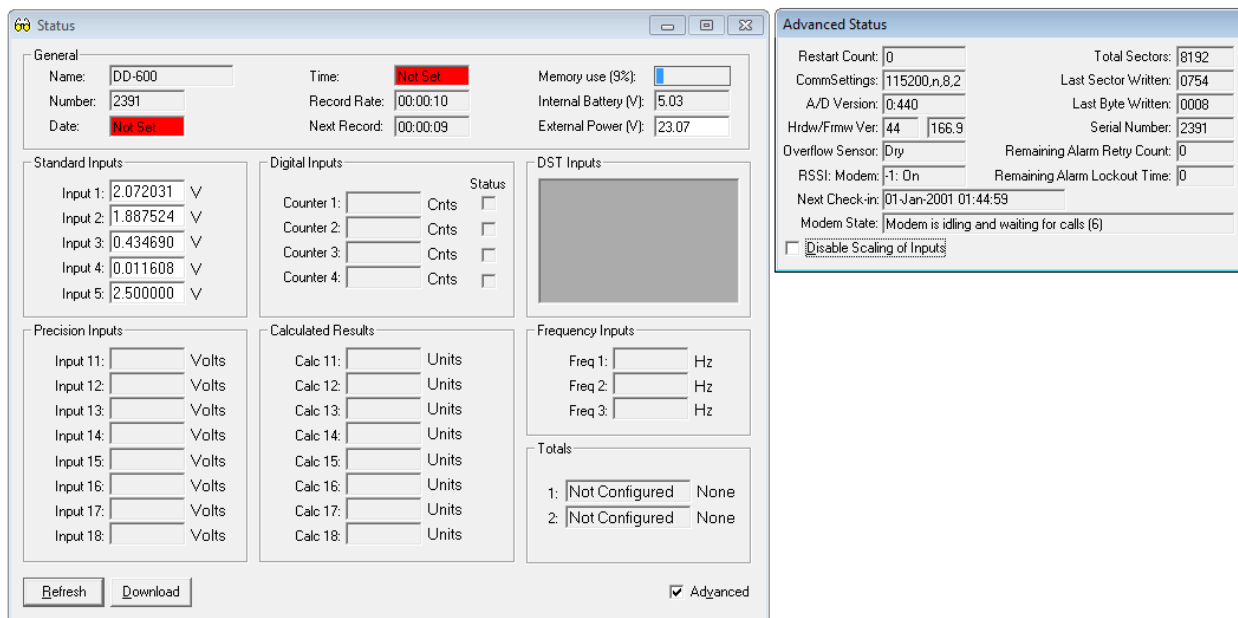


Data Dolphin Status

The Status window accessed in the Data Dolphin software by clicking on the Status button on the toolbar, gives the user a live update of the measured values on the inputs of the data logger. A data logger can connect to a computer with the Data Dolphin software either remotely (with a wireless modem) or directly via a serial port connection.

Note that the names of the inputs displayed in this window are those entered when the inputs were initially programmed.

By using the Setup button one can configure the sensor names and coefficients and units to ensure they are read in and understood correctly. If the sensors are enabled with Smart Pigtailed, this information will be read in automatically from the sensor.



The screenshot shows the 'Status' window of the Data Dolphin software. It is divided into several sections:

- General:** Name: DD-600, Time: Not Set, Memory use (9%): [Progress Bar], Number: 2391, Record Rate: 00:00:10, Internal Battery (V): 5.03, Date: Not Set, Next Record: 00:00:09, External Power (V): 23.07.
- Standard Inputs:** Input 1: 2.072031, Input 2: 1.887524, Input 3: 0.434690, Input 4: 0.011608, Input 5: 2.500000.
- Digital Inputs:** Counter 1-4 with 'Cnts' and 'Status' checkboxes.
- DST Inputs:** A large empty box for digital signal timing.
- Precision Inputs:** Input 11-18, all set to 'Volts'.
- Calculated Results:** Calc 11-18, all set to 'Units'.
- Frequency Inputs:** Freq 1-3, all set to 'Hz'.
- Totals:** 1: Not Configured None, 2: Not Configured None.
- Advanced Status (Right Panel):** Restart Count: 0, Total Sectors: 8192, CommSettings: T115200,n,8,2, Last Sector Written: 0754, A/D Version: 0.440, Last Byte Written: 0008, Hrdw/Frmw Ver: 44, 166.9, Serial Number: 2391, Overflow Sensor: Dry, Remaining Alarm Retry Count: 0, RSSI: Modem: -1: On, Remaining Alarm Lockout Time: 0, Next Check-in: 01-Jan-2001 01:44:59, Modem State: Modem is idling and waiting for calls (6), Disable Scaling of Inputs.

Buttons for 'Refresh' and 'Download' are at the bottom left, and a checked 'Advanced' checkbox is at the bottom right.

Figure 1: The Data Dolphin Software's Status window

Refreshing the status window

The information that the Status window displays is only valid at the time the window is opened or refreshed. As the actual measured levels are changing from second to second, the information in this window becomes less accurate and relevant as time goes by. Clicking on the “Refresh” button in the bottom right hand corner of the Status window will take a quick “snapshot” of all the inputs and operational parameters of the data logger.

Downloading the Data

The data that is recorded by the data logger is stored in a permanent memory chip. Each record is time-stamped and stored in the memory in a normalized database fashion that allows different inputs to be turned on and off without restarting the data logger.

Downloading the Data and Status from your Data Logger

Downloading the collected data from the data logger to your PC

All data downloaded from the data logger is stored on your computer in a binary cache file and in a site database (data logger *internal serial number.mdb*) that contains the time of the record and the record's value in both a raw and scaled format.

To retrieve the data from the Data logger's memory, first establish a communication session with the unit. Next, select "Download Latest Data" from the "Tools" drop down menu or click on the "Download" button in the Status window. The progress of the download can be seen beside the "Memory Use" gauge of the Status window and at the bottom of the main window on the progress bar.

The Data Dolphin software will then update the site database on your PC with the most recent data that the data logger has collected. To do this, the Data Dolphin software will compare the time of the last record in the site database with the time of the most recent data logger reading. It will then download all data collected between these two times.

Data logger memory and site database conflicts

If the configuration of any your data logger inputs or settings have been altered since your last download, the settings stored in the site database on your computer and the settings in the data logger's memory will be in conflict. If this is case, the Data Dolphin software will not know which settings to apply to the new data that the data logger has collected, and the message box shown in Figure will appear. If you have altered them intentionally, click *Process with Dolphin settings* to use the settings in the data logger's memory. Click the *Overwrite DB settings* checkbox if you wish to overwrite the settings in your site database to reflect your new data logger configuration. If you have altered the data logger settings but still wish to process the new data using the old settings, then click *Process with Database Settings*. Whatever choice you make, click the *Ok* button to continue with the database processing.



Data Dolphin and database conflict message box

Loading the Data into Microsoft Excel

Exporting the Recorded Data to a CSV File(SDI-12 Data is loaded thru different menu)

To allow greater flexibility in viewing the recorded data, an export function is available in the *File* drop down menu. By exporting the data to a CSV (Comma Separated Variable) file and then opening the file with a spreadsheet program such as Microsoft Excel, it is possible to analyze and manipulate the data in ways that are not yet possible with the Data Dolphin software.

Exporting the recorded data to a CSV file

1. Select *Export Data to CSV File* from the *File* drop down menu as shown in Figure 1 below.

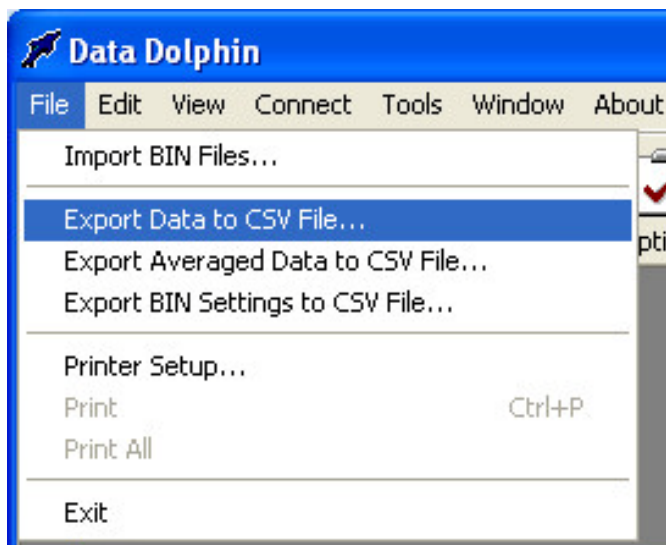


Figure 1. Export Data menu

2. Next, highlight the site or sites of interest by clicking on the site number in the sites list box. You can select multiple sites at once by holding down the Ctrl button as you click on the individual site numbers. You can also select a range of sites by selecting the first site in the range, depressing the shift key and clicking the last site in the range. You can also select a group of sites by selecting it from the Groups drop down list box above the site list.

- Use the calendar control (Figure 2) to select the date range of the data to be exported. A separate CSV file will be created for each site that you have specified. Note that no CSV file will be generated if there is no data during your selected time period.

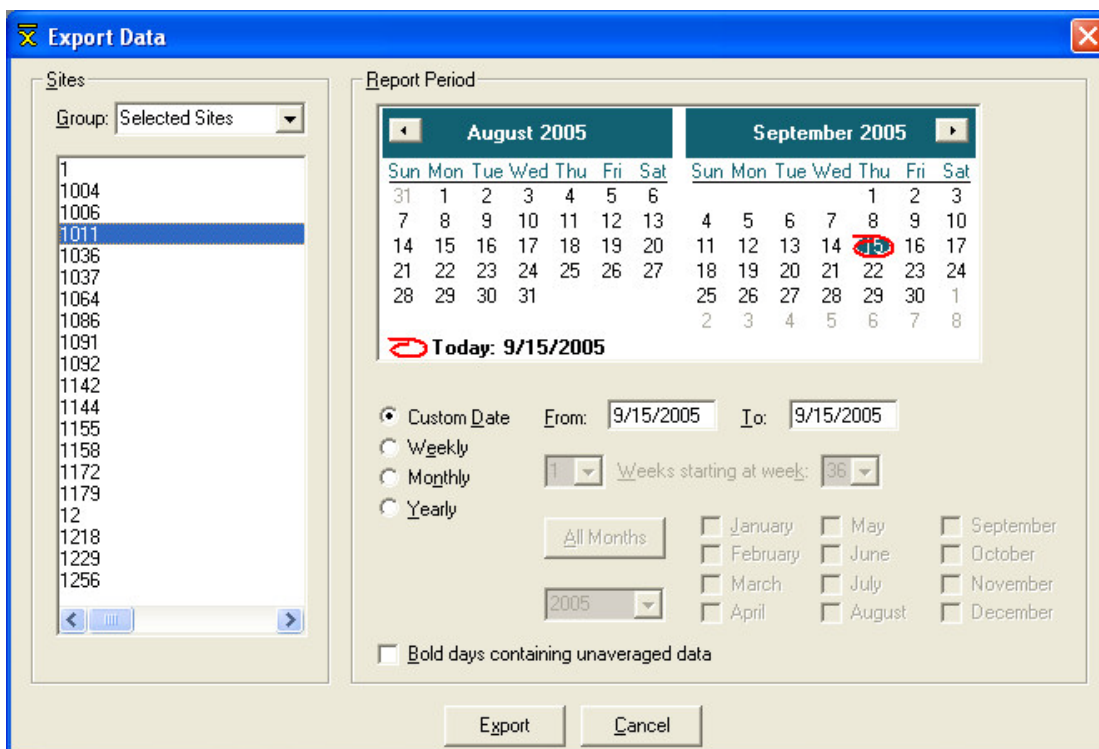


Figure 2. Export site and date selection

- The 'Select Inputs to Export' input box (Figure 3) allows you to choose individual inputs of the sites or all of the recorded inputs at once by typing 'ALL'. If you wish to export calculated flow, enter input number 32. If there is no data for the time period you have selected in step 2 for a particular input, then that input will have a series of zeros entered into the CSV file.

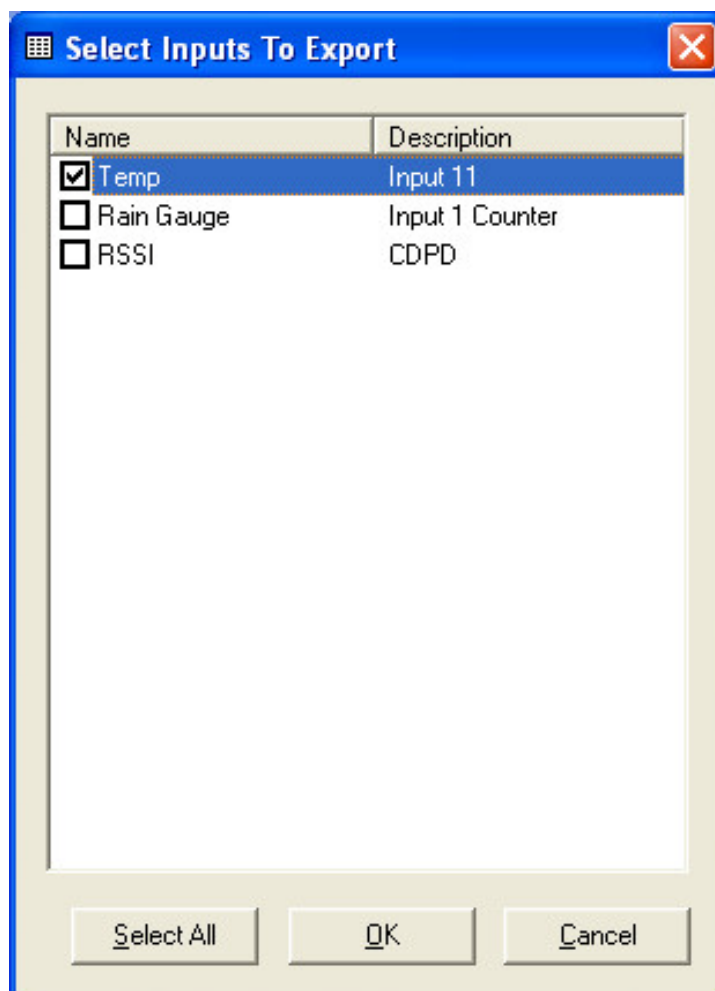


Figure 3. Selection of inputs to export

5. After choosing the inputs, you must then enter the name of the file that will be used to store the exported data. You will have to enter a separate filename for each of the sites you chose in step 2. Each of the sites will be processed individually, always with a prompt for a CSV file name (see Figure 4). If you do not add an extension to the name, the default of 'CSV' will be added automatically.

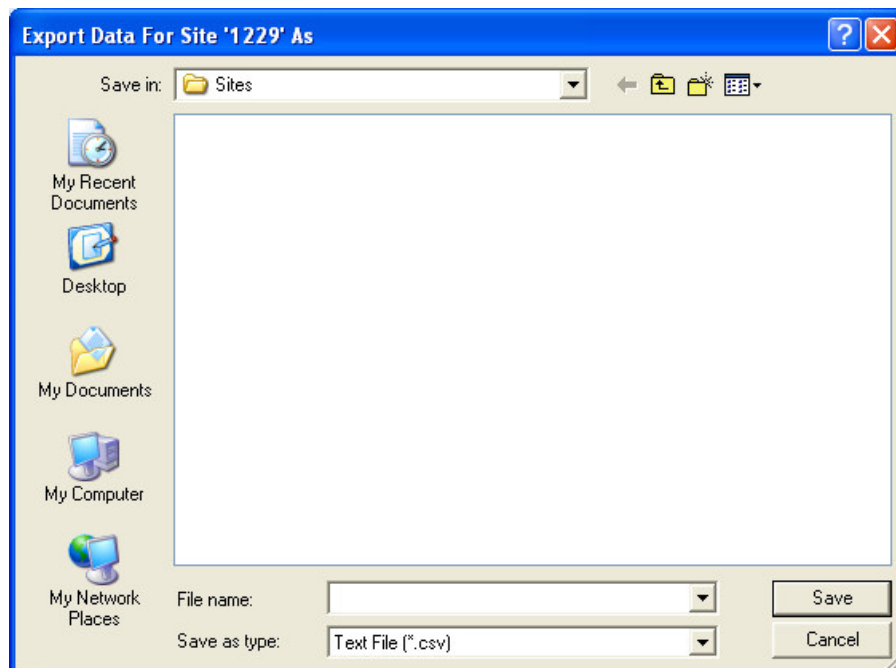
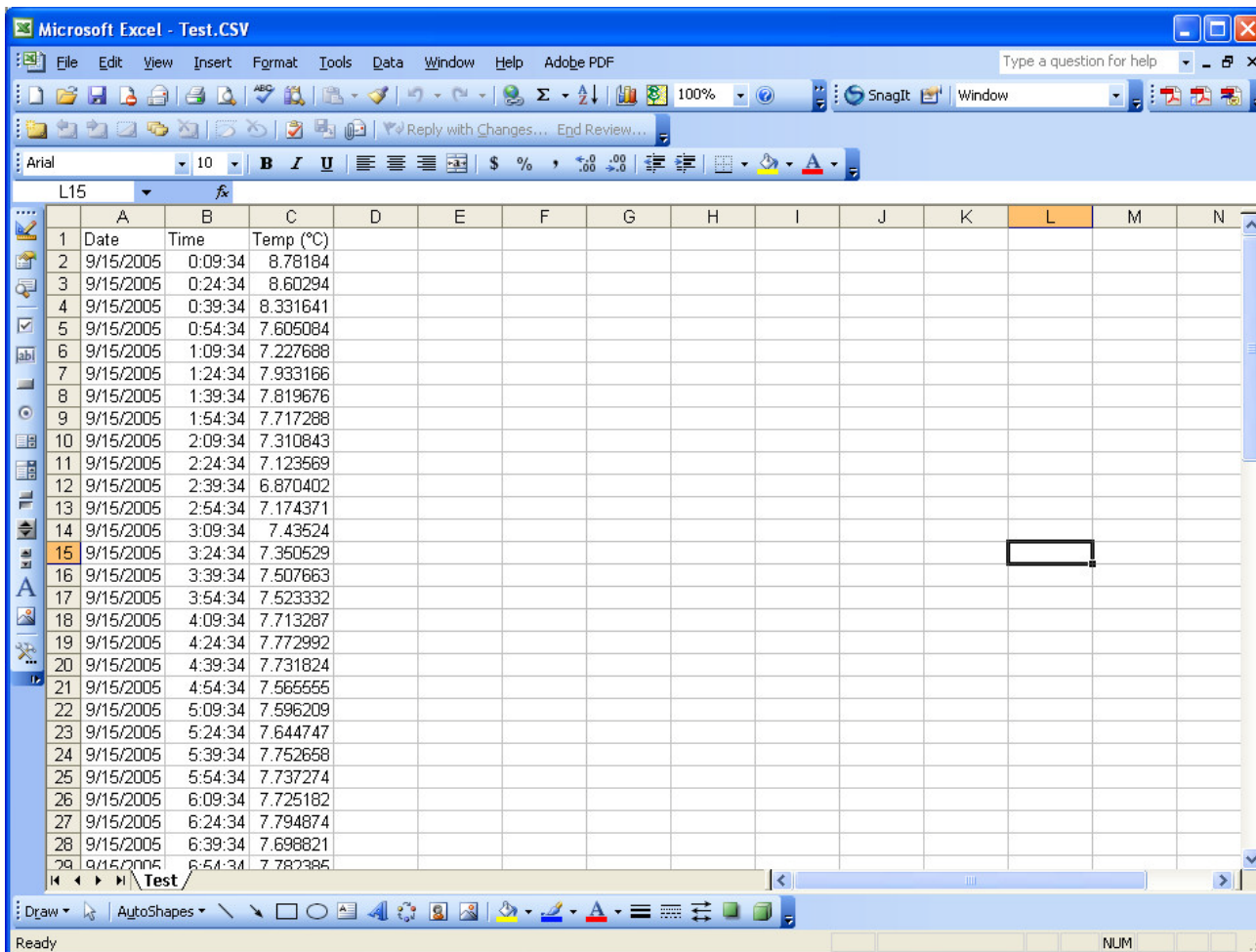


Figure 4. Selecting filename for exported data

An example of how the exported data might appear in Microsoft Excel is shown in Figure 5 below.



	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	Date	Time	Temp (°C)											
2	9/15/2005	0:09:34	8.78184											
3	9/15/2005	0:24:34	8.60294											
4	9/15/2005	0:39:34	8.331641											
5	9/15/2005	0:54:34	7.605084											
6	9/15/2005	1:09:34	7.227688											
7	9/15/2005	1:24:34	7.933166											
8	9/15/2005	1:39:34	7.819676											
9	9/15/2005	1:54:34	7.717288											
10	9/15/2005	2:09:34	7.310843											
11	9/15/2005	2:24:34	7.123569											
12	9/15/2005	2:39:34	6.870402											
13	9/15/2005	2:54:34	7.174371											
14	9/15/2005	3:09:34	7.43524											
15	9/15/2005	3:24:34	7.350529											
16	9/15/2005	3:39:34	7.507663											
17	9/15/2005	3:54:34	7.523332											
18	9/15/2005	4:09:34	7.713287											
19	9/15/2005	4:24:34	7.772992											
20	9/15/2005	4:39:34	7.731824											
21	9/15/2005	4:54:34	7.565555											
22	9/15/2005	5:09:34	7.596209											
23	9/15/2005	5:24:34	7.644747											
24	9/15/2005	5:39:34	7.752658											
25	9/15/2005	5:54:34	7.737274											
26	9/15/2005	6:09:34	7.725182											
27	9/15/2005	6:24:34	7.794874											
28	9/15/2005	6:39:34	7.698821											
29	9/15/2005	6:54:34	7.782385											

Figure 5. Exported data in Excel

Graphing the Recorded Data

A powerful feature of the Data Dolphin Software is the ability to graph the recorded data.

(SDI-12 Data can be viewed in Excel only)

The data to be graphed is selected using the calendar selection window. Application specific graphs and tables can be generated using Optimum's accessory software packages. *PumpPro* software is used to produce pump station specific graphs and tables while *Rain Reporter* is used to generate rainfall intensity and IDF graphs and tables.

Graphing Functionality in the Data Dolphin Software

The Graph window

Click on the *Graphs* button on the tool bar or alternatively choose *Graphs* from the *View* drop down menu. This will open the **Graph** window, as shown in Figure 6 below:

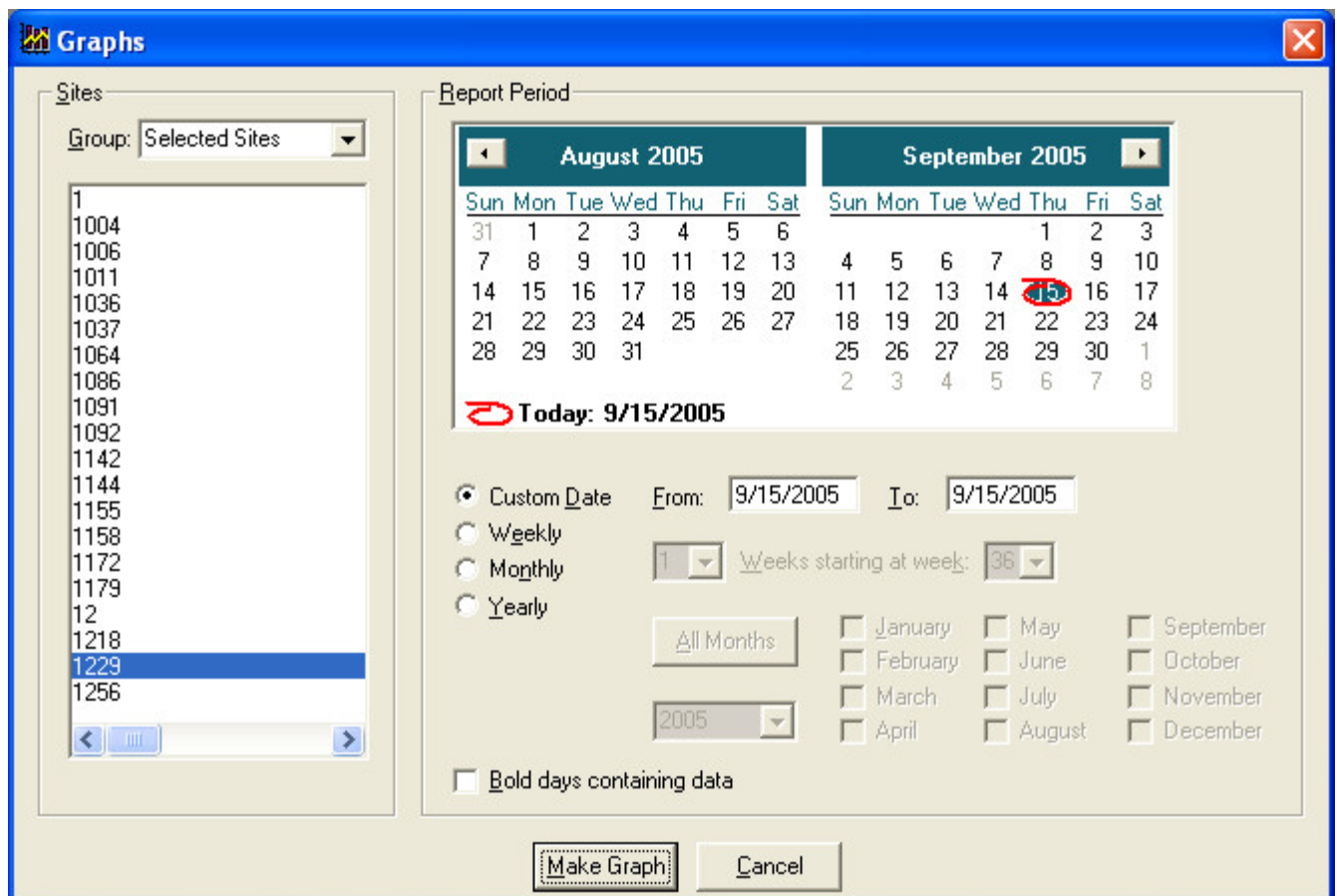


Figure 6: The Graph window

The **Graph** window consists of two distinct sections:

Sites: This box lists the unit numbers of sites that have a site database. A site database is automatically created when the raw data is retrieved from the Data Dolphin.

Report Period: This box allows the user to specify a specific time period to be reflected in the generated graphs.

Generating a graph of site data is a simple process of selecting the site for which you want to generate a graph and then a time period for that graph. Follow the steps for successful graph creation:

1. If you want to generate graphs for a designated group, choose the group name in the *Group* drop down box and a separate graph will be generated for each site defined in the group. Note that the selection box will be grayed out if you have not created any groups. Pick Selected Sites in the drop down box if you wish to generate a graph for a specific site.
2. Select the site or sites for which you want to generate a graph by clicking on their numbers. Hold down the CTRL key while selecting the site numbers to select multiple sites. A separate graph window will be generated for each site you select.
3. Now select the time period for your graph(s). The **Graph** window's intuitive time controls allow the user to quickly specify time periods.
 - a. Click on the *Yearly* option button with your mouse if you want to graph the data for a specific year. When you click on this button, only the year combo box will be enabled near the bottom of the **Graph** window. Click on this drop down box to choose the year you wish to graph.
 - b. Click on the *Monthly* option button to specify a month or months. The Month check boxes to the right of the year drop down box will be enabled when the *Monthly* option button is selected. Clicking the *All Months* button will place a check in all of the month check boxes.
 - c. Click on the "Weekly" option button to pick a specific week in the year. The month and year controls will be disabled, and the calendar control and week controls will be enabled. The week controls consist of two drop down boxes as shown below in Figure 7:



Figure 7: Week controls

- d. The first control selects the number of weeks, and the second control selects which week from a 52-week year to begin graphing. You can enter the desired values into these boxes with your keyboard, the mouse or by clicking on the calendar control above. Click on the *Custom Date* option button to graph a specific time range outside regular week and month boundaries. You can specify the dates by clicking on the *From* and *To* text boxes and entering the dates in your system date format. Another, more intuitive method would be to use a click and drag operation on the calendar control (see below).
- e. Calendar control – A time period may be selected on this control by simply using a select and drag method. A month can be quickly selected by clicking on the month text to reveal a pop-up menu as shown below in Figure 8. You can also rotate through the months by clicking on the arrow buttons in the upper left-hand and right-hand corners.

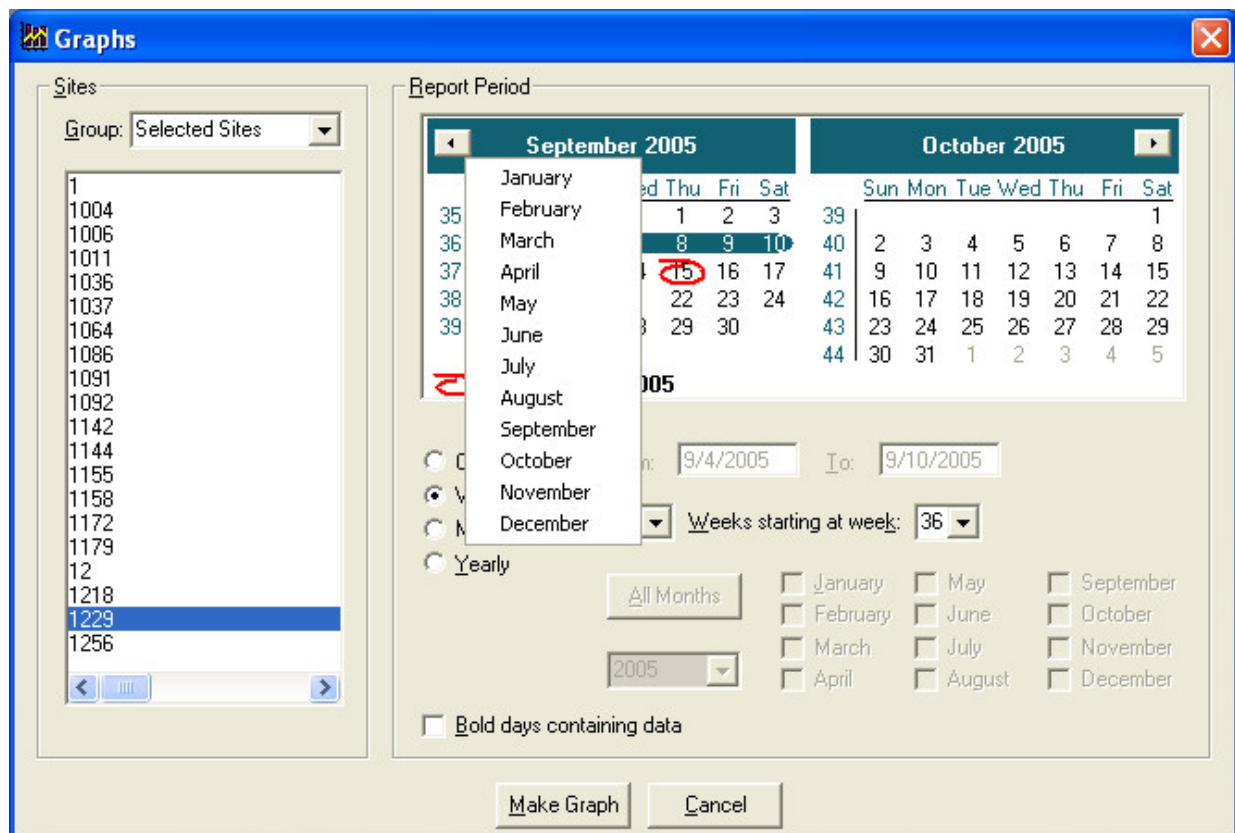


Figure 8: Graph selection with month drop-down

- f. A year control can also be exposed by clicking on the year text. A scroll control will appear, to allow you to scroll up and down through the years.
 - g. The calendar control is only enabled for the *Weekly* and *Custom Date* options. In the *Weekly* option, a week or group of weeks can be selected, depending on the value set in the *Weeks* drop down box. For example, if a 3 is entered into this combo box, 3 weeks will be selected at a time. To select a week or group of weeks, simply click on any day of the week(s) you wish to graph on the calendar control. They will instantly be highlighted and the combo boxes below will be updated to reflect this selection.
 - h. When using the *Custom Date* option, click and drag functionality is enabled on the calendar control allowing you to pick a specific day or days within the two months currently being displayed. To specify a time range, select the start day by clicking on it, hold down the shift key and then select the end day.
 - i. For your reference, the current day is shown on the control with a red marker circle and printed in the bottom left-hand corner of the calendar control as shown in Figure 6.
4. Click *Make Graph*. This will bring up the input selection box, shown in Figure 9 below. After the sites and date range has been selected, the inputs to be graphed must be chosen. The inputs can be selected separately (1,3,8), sequentially (1-4) or all at once (ALL). If you wish to export calculated flow, enter input number 32.

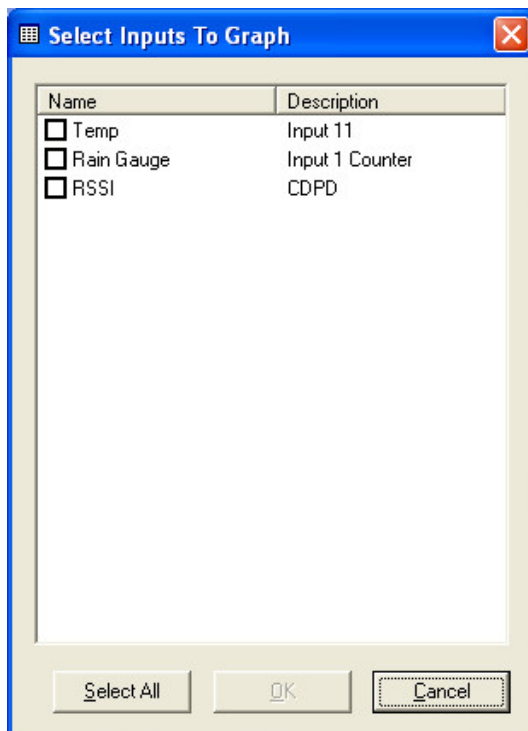


Figure 9. Selecting the inputs to graph

5. Click *OK*. Your computer will begin processing the data for the sites, time period and inputs you have specified. The progress of the current data processing operation will appear on the progress and status bars. When complete, a window similar to the one below in Figure 10 should appear.

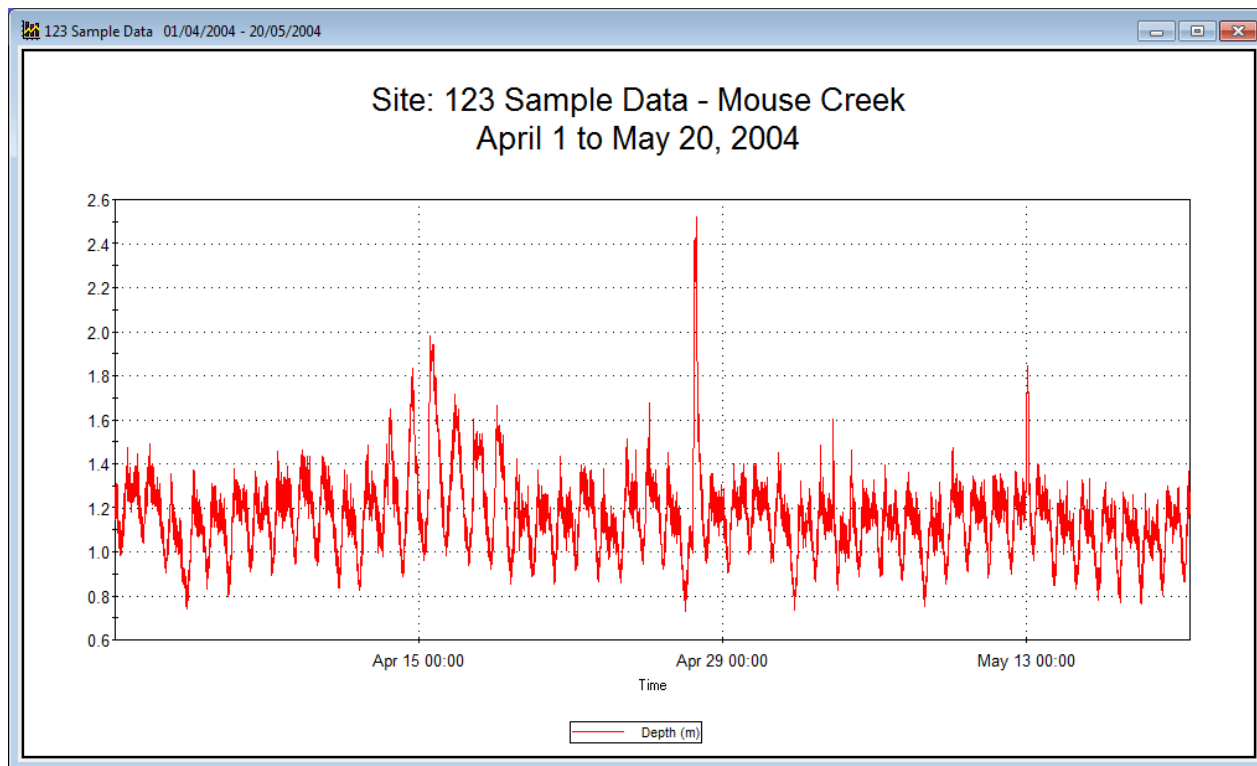


Figure 10: Graphing output window

6. If you do not get a graph window after following steps 1-4 above, then it is likely that the site database contains no valid data for the time period you specified.
7. To find the value of any point on the graph, simply hold your mouse pointer over the point, and the time and intensity values at that point in time will be displayed below the graph as shown in Figure 11.

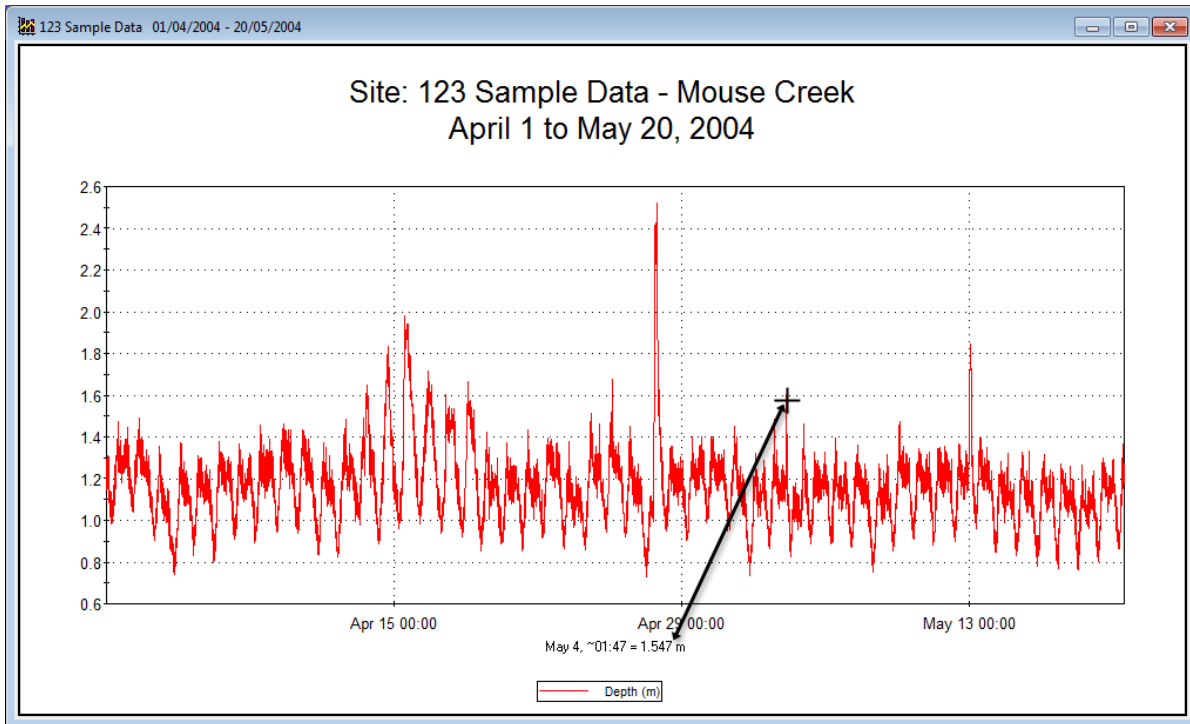


Figure 11 : Graph output with cursor data display

Advanced Graphing Options

For more advanced control of your graph window, you will want to open the **2D Chart Control Properties** window.

To open this properties window, simply right-click with your mouse pointer on any **Graph Output** window. A small pop-up menu, similar to the one displayed in Figure 13 will appear.

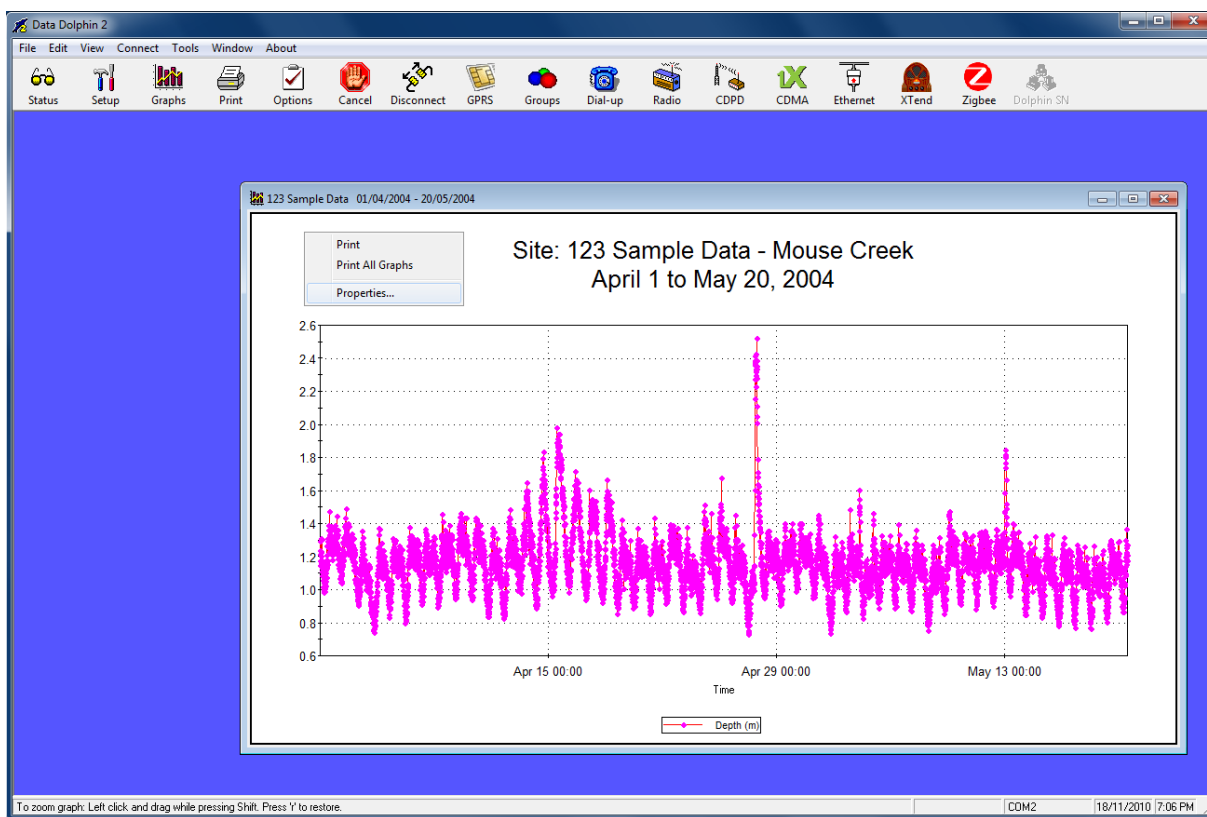


Figure 12. Right click the graph to expose the graph properties

Next, select and click *Properties*. This will open the **2D Chart Control Properties** window, as shown in Figure 13. For help on using this properties window, click on the *Help* button in the bottom right hand corner. Note that any changes you make in the **2D Chart Control Properties** window will only apply to the current graph you are modifying. These changes will be lost as soon as this graph is closed.

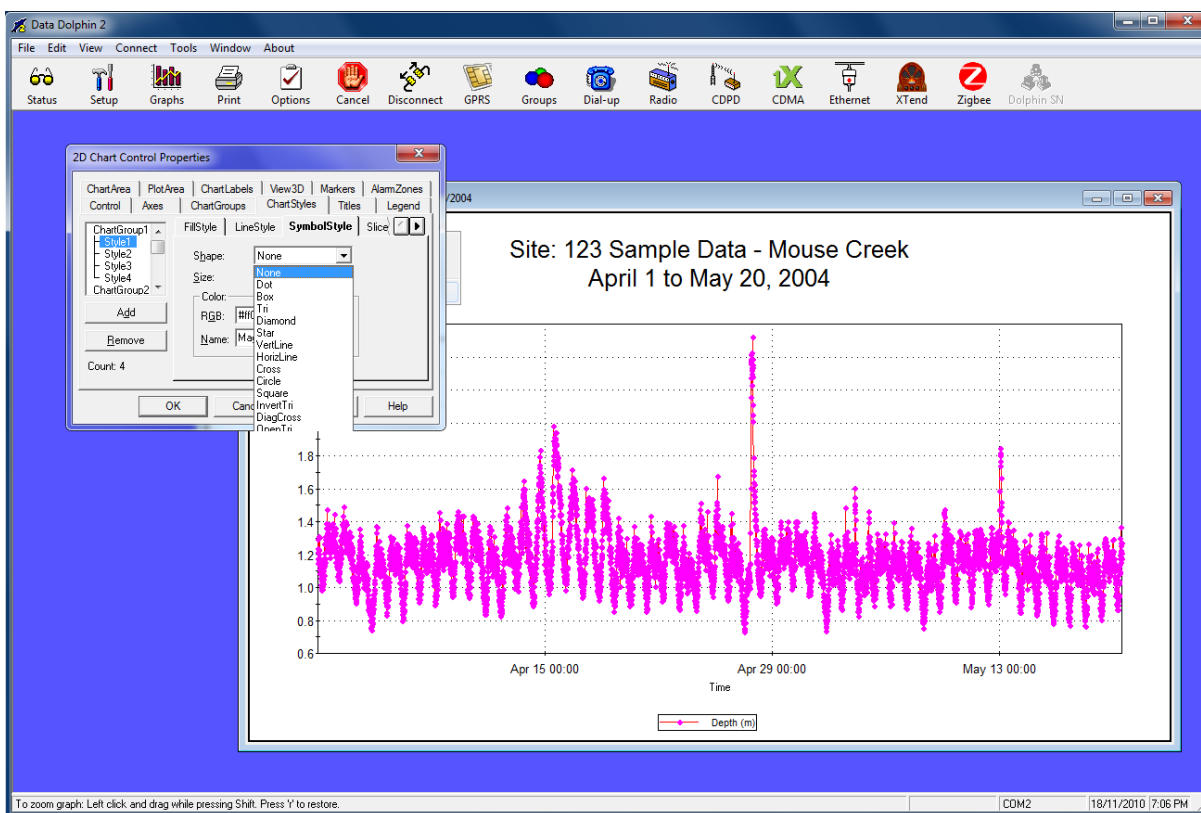


Figure 13: Advanced graph properties

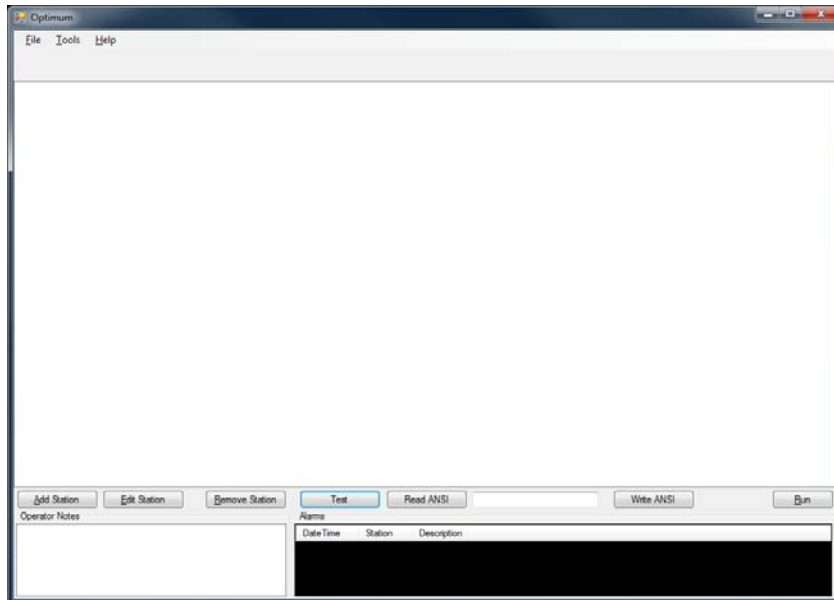
Printing Graphs

The Data Dolphin Software provides three different ways to print a graph. Print a graph by

1. Clicking on a graph so that it is selected as the current graph. Then click the Print button on the toolbar. The graph will be printed by your system's default printer.
2. Selecting a graph to print, and then selecting *Print* under the *File* drop down menu.
3. Right clicking on the graph you wish to print, and selecting *Print* from the pop-up menu.

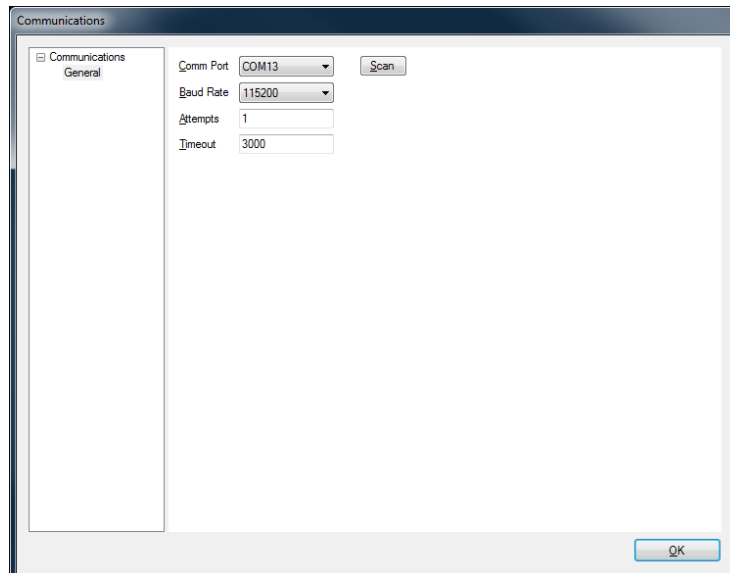
To print multiple graphs, make sure the graphs for all the sites you wish to print are open. Next, select *Print All* from the *File* menu **OR** right click on a graph and select *Print All Graphs* from the pop-up menu to print all the currently open graphs.

Using the Data Dolphin HMI Software



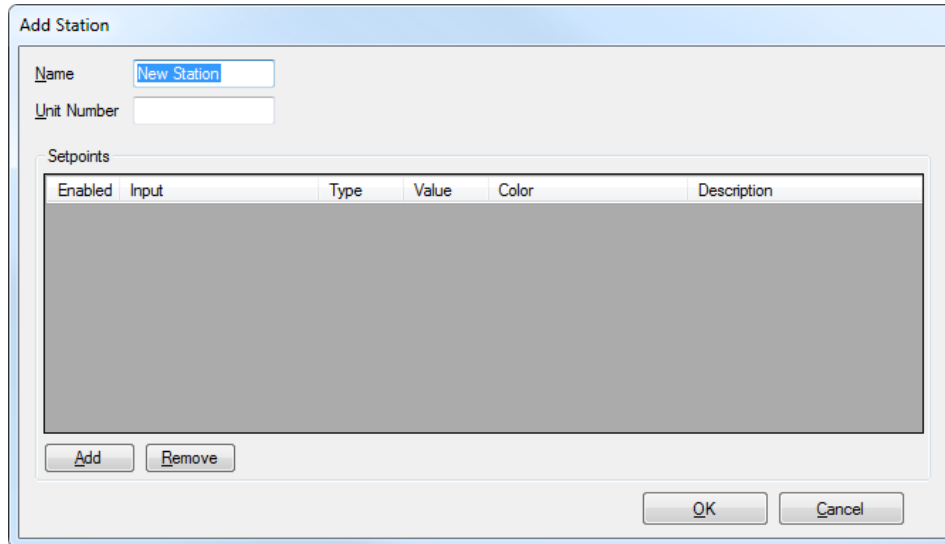
The main window after the DD-HMI software has been installed will look like the above screen shot.

First set up the COM port to match the COM port your Master Radio is connected on. Baud rate is 115200.



Press “Add Station” to bring up the next screen.

The station requires a name, and for the unit number to be entered.

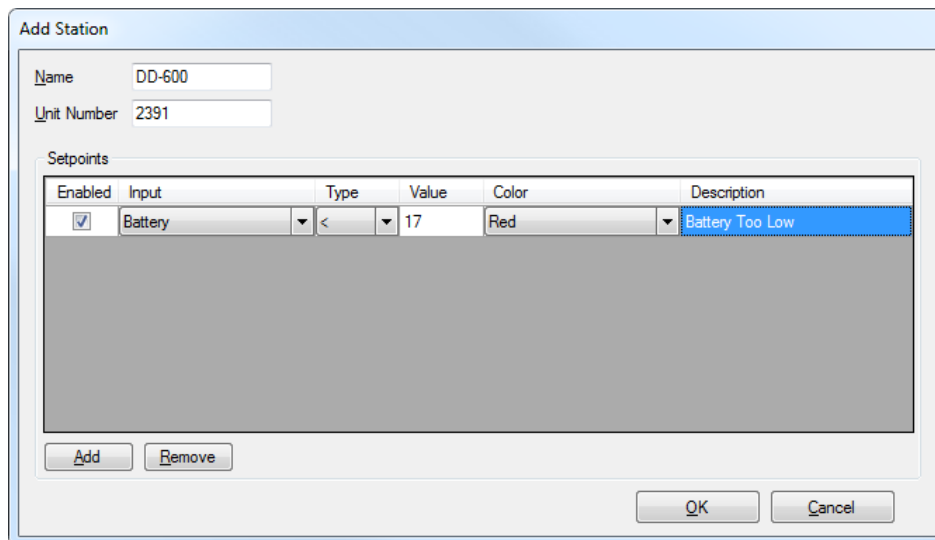


Add Station

Name:

Unit Number:

Enabled	Input	Type	Value	Color	Description
---------	-------	------	-------	-------	-------------



Add Station

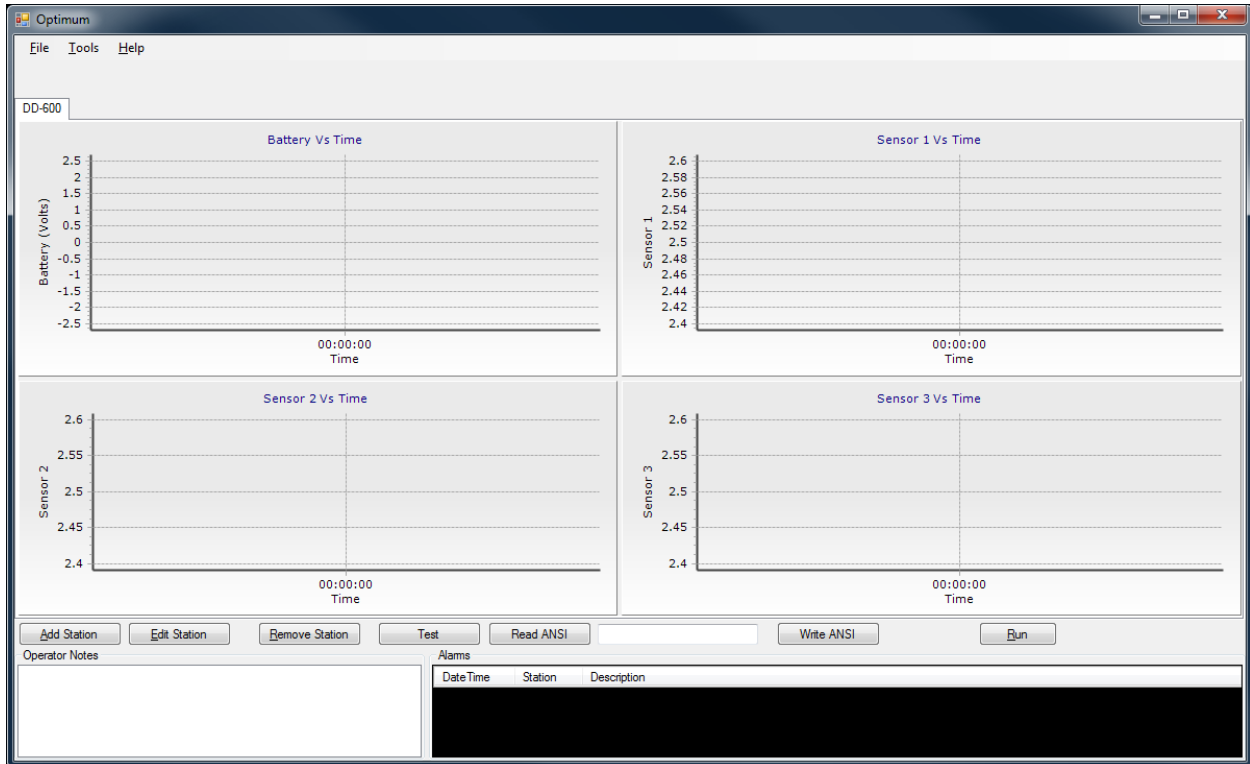
Name:

Unit Number:

Enabled	Input	Type	Value	Color	Description
<input checked="" type="checkbox"/>	Battery	<	17	Red	Battery Too Low

Press add and you will then be able to enter in alarm set points for when an intended value is out of a specified range. This allows one to be alerted when an item such as Battery Level has dropped too low for example.

Press OK when finished with this screen to return to the main screen.

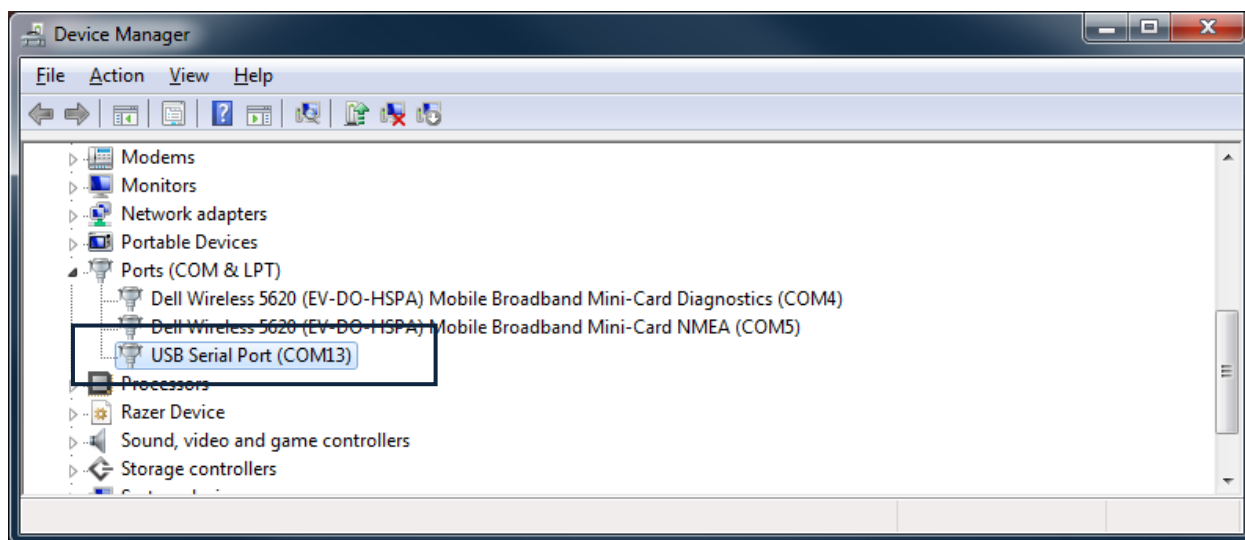


The main screen now has a tab for the Station that has been added.

Updating the Firmware

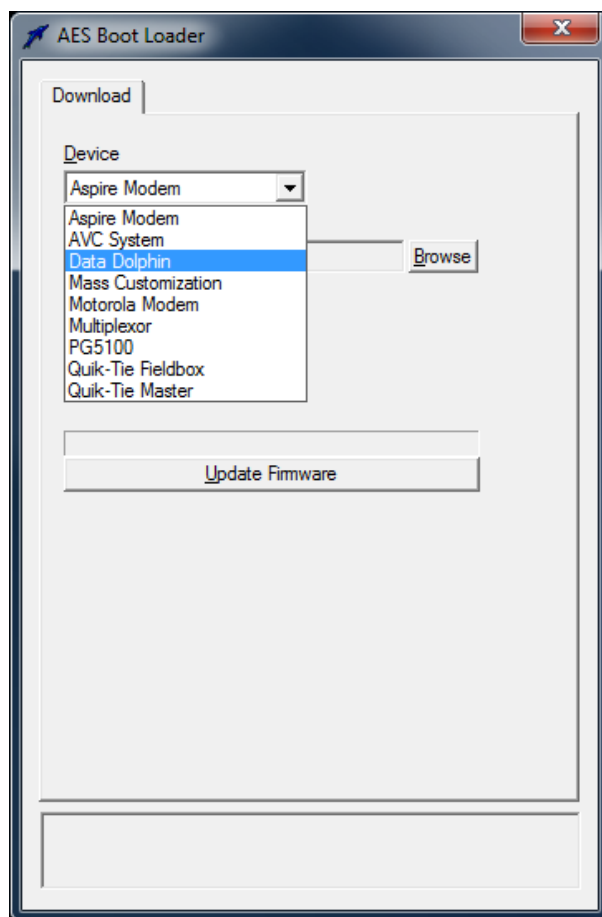
Optiloader

Note the COM port that you have connected to the Data Dolphin logger when your USB cable is connected.



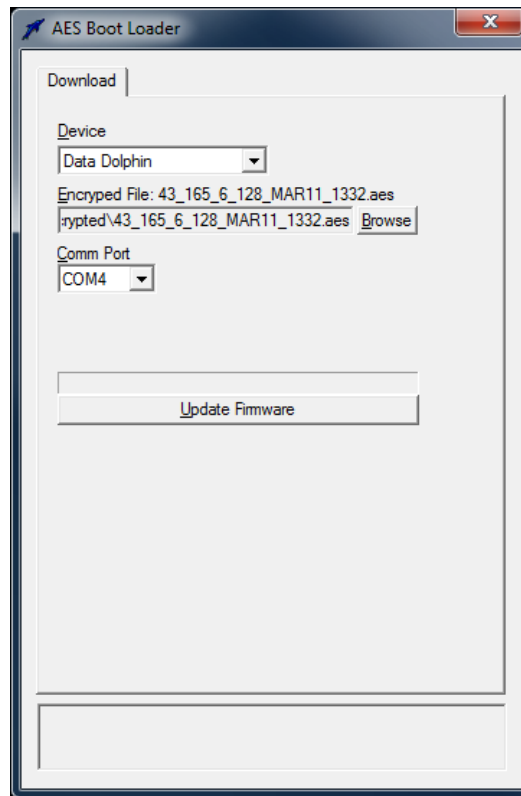
Now that the cable is connected to the unit we can start "OptiLoader.exe" program.

OptiLoader can be found on the website, www.datadolphin.com in the Support and Downloads section. The firmware upgrade file will be provided to you by Optimum Instruments. Start up OptiLoader now by double clicking on the exe from where you have downloaded it to.



Under Device select 'Data Dolphin' to be upgraded.

The bottom portion of the dialog contains a status box where status information is displayed. The box is read only and displays status information with the most current message at the top. Prior messages can be read by clicking in the box and navigating with the arrow keys.



Usage

1. Select the “Data Dolphin” setting for the **Device** to boot load.
2. Select the firmware file that is to be boot loaded into the device by clicking the **Browse** button and clicking **open** once you have located it on your computer.
3. Select the **Comm** Port (from Device Manager – Ports – Com) that is connected to the device. The application will detect all valid com ports on the computer.
4. When you are ready, cycle the power on the data logger and press **Update Firmware**.
5. The internal clock of the data logger will count down 8 seconds. It is during this time that the **Update Firmware** button must be pressed. If the 8 second boot load window passes, the Data Dolphin will start up for normal operation, and the logger will have to be reset to restart the boot load process again.

Successful start of a boot load will be indicated by the progress indicator that appears above the **Update Firmware** button as well as in the status box at the bottom of the application. When the boot load completes (100%) the Data Dolphin will be restarted automatically.

6. Close the OptiLoader program by clicking the **X** button in the top-right corner.

Troubleshooting the DD-600

Flow of Data

The flow of data through the system originates as a voltage at the sensor. This voltage is read by the data logger, at programmable set intervals, this stored data is sent as a message via radio. This message is received and transferred into a database where the values can be displayed on your PC.

Check List

- **ALWAYS make sure the antenna is properly connected BEFORE power is applied.. ALWAYS!!**
- Has the antenna been installed with a good view of the horizon?
- Voltage is lower than expected across battery/logger? See how to measure it below.
- LED's on logger not as expected?

The LED next to the switch and above the SD card slot should flash red for a short amount of time (10 to 60 seconds) after power up - then flash green and/or go out once the clock is set and when a recording is being taken.

Check Antenna Connector

Is the connection between the DD-600 and the antenna good? The cable could be loose and come off easily so ensure that it is secured tight as shown.



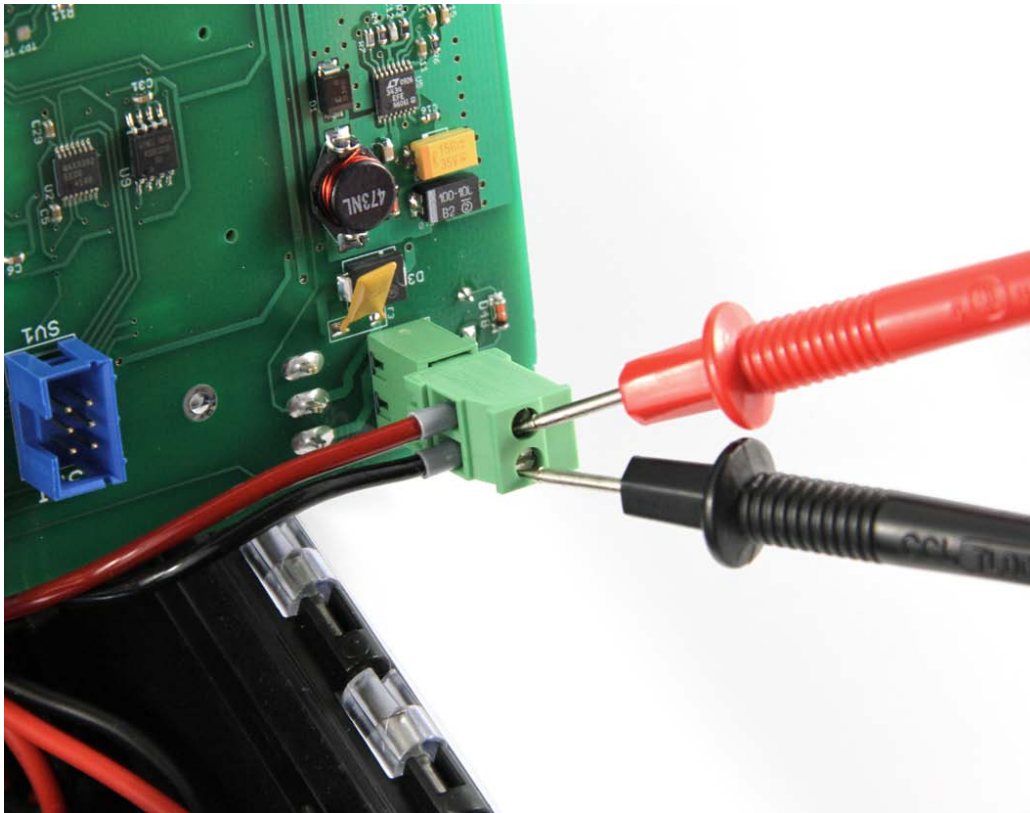
Check that the antenna element is also fully screwed on to the base.



Check DC Power

Has power been connected between the battery, and logger?

Measure the voltage across the logger power 6-25 VDC IN and Ground terminals. You should see a reading between 24.5 VDC to 25.9 VDC. To measure the power use a digital multi-meter set to volts DC and put the test leads on the green power connector as shown.



Check Sensors



Given the range of possible sensor configurations, please consult the documentation that came with your probe. The LCD on the DD-600 will display the current reading from the probe with the scaling programmed into the logger.

Ensure that the connector is fully hand tightened to the DD-600 and free of any debris.

optinst.com

viewdatanow.com

datadolphin.com

emailalarm.com

Compliance Statement

Operation is subject to the following two conditions: (1) This device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Specifications and operational details subject to change without notice.

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Mailing address:

Optimum Instruments Inc.
#201, 3132 Parsons Road
Edmonton, Alberta, Canada, T6N 1L6