



WET Labs Host Software

User's Guide

The user's guide is an evolving document. If you find sections that are unclear, or missing information, please let us know. Check our website periodically for updates.

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1. Hardware Setup

To determine variances in the ocean environment at a single location over a long period of time, the data logger is placed in moored mode. While moored, the data logger will perform one data collection cycle, then go into a low power “sleep” for a preprogrammed period of time. When the period of time has expired, it will perform a second cycle (starting with pre-flush), and then return to a low power sleep. This cycle will be repeated until (1) battery supply is exhausted, (2) onboard data storage is used up, or (3) the data logger is retrieved and power is removed.

1.1 Install Host Program

WET Labs Host software is shipped on a CD and can be run from any host computer running Windows 95 or newer. We recommend at least 250 MB of free disk space and a minimum processor speed of 500 MHz to run the Host program.

Insert the WET Labs Host software CD into the host computer and copy the program and five associated files to a desired location on the host computer. It may be desirable to create a shortcut for the program for quick access: right-click on the WLHost.exe file and in the resulting popup menu select “Create Shortcut.” Drag the resulting icon to the computer’s desktop or other desired location.

1.2 Connect Data Logger to Host PC using a Power Supply

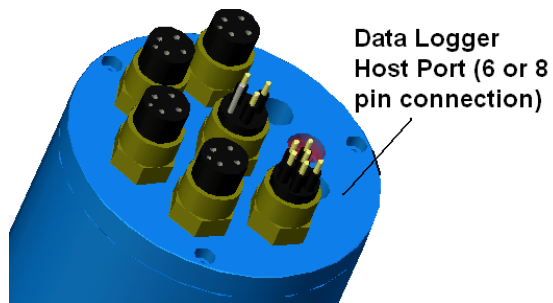
Required components

- DH-4 or ac-9 Plus
- Host cable
- 12V power supply

Select a power supply that can provide power to the logger at a **voltage** and **current** that’s within the range of all the instruments and pumps that will be connected to the logger. (A 12V power supply is used for most bench testing.) The data logger can accept power between 6.5 and 18 volts and requires a maximum current of 140 mA.

Make sure the power supply and host PC are turned off before connecting them to the logger.

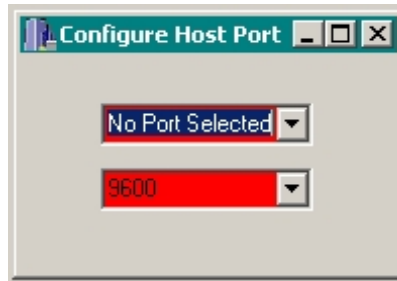
1. Connect the host cable’s DB-9 serial connector to the host computer’s COM port.
2. Connect the blue connector/white wire of the host cable or battery cable to the ground (-) terminal on the power supply.
3. Connect the red connector/black wire of the host cable or battery cable to the voltage (+) terminal on the power supply.
4. Connect the round 6- or 8-socket cable end to the data logger’s host connector (as identified in the data logger’s User’s Guide).
5. Connect the instruments to be used to the appropriate 4-pin serial or 6-socket analog ports as identified in the data logger’s User’s Guide.



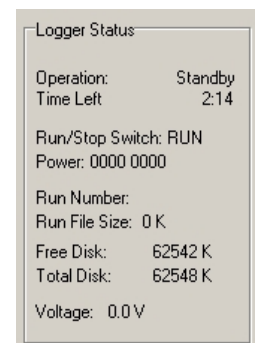
2. Quick Setup for Moored Logging

2.1 Port Settings for Moored Logging

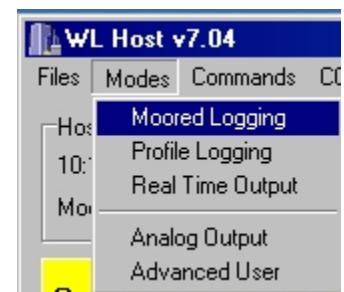
1. Start the WL Host program. Select the COM port and 9600 baud rate at the pop-up window:



2. Turn on power (12 VDC) to the data logger.
3. Verify that communication has been established with the data logger. In the Host window, the **Logger Status** window will become populated and in the host configuration window the baud rate background will change from red to white.



4. At the DH-4 host window, select Moored Logging from the Modes menu.



5. Go to the Port Setup tab and press Get Setup to load the logger's settings into the Host program. Check the current DH-4 setup against the expected setup.
6. If the DH-4 does not contain the expected setup and the file is located on the host computer, use the Open Setup File button to load the correct values.

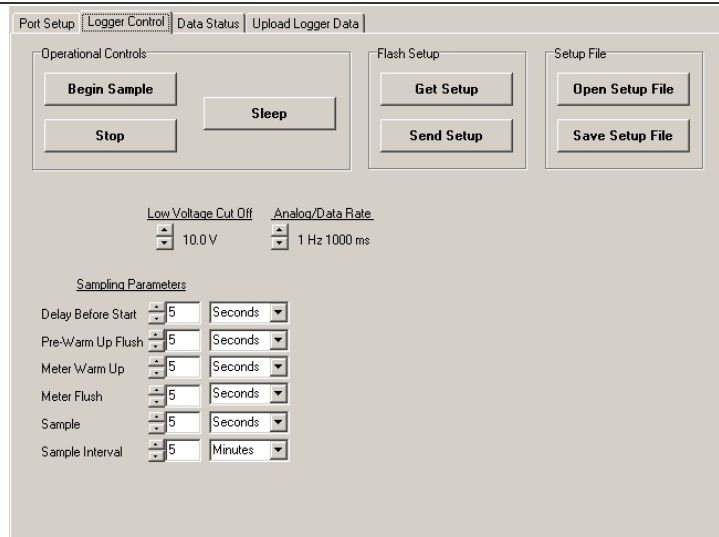
Port Setup			Logger Control			Data Status			Upload Logger Data			Real Time Data		
						Flash Setup			Setup File					
						Get Setup			Open Setup File					
						Send Setup			Save Setup File					
Host Port Setup														
Host: RS232			OFF											
Port	Serial Port Type	Port Setup	Once per Hour	Port	Analog Ports	Once per Hour	Port	Pump Ports	Once per Hour					
Port 1	Serial 1 OFF	OFF	<input type="checkbox"/>	Port 9	Analog 1 OFF	<input type="checkbox"/>	Port 16	Pump 1 OFF	<input type="checkbox"/>					
Port 2	Serial 2 OFF	OFF	<input type="checkbox"/>	Port 10	Analog 2 OFF	<input type="checkbox"/>	Port 17	Pump 2 OFF	<input type="checkbox"/>					
Port 3	Serial 3 OFF	OFF	<input type="checkbox"/>	Port 11	Analog 3 OFF	<input type="checkbox"/>	Port 18	Pump 3 OFF	<input type="checkbox"/>					
Port 4	Serial 4 OFF	OFF	<input type="checkbox"/>	Port 12	Analog 4 OFF	<input type="checkbox"/>	Port 19	Pump 4 OFF	<input type="checkbox"/>					
Port 5	Serial 5 OFF	OFF	<input type="checkbox"/>	Port 13	Analog 5 OFF	<input type="checkbox"/>								
Port 6	Serial 6 OFF	OFF	<input type="checkbox"/>	Port 14	Analog 6 OFF	<input type="checkbox"/>								
Port 7	Serial 7 OFF	OFF	<input type="checkbox"/>	Port 15	Analog 7 OFF	<input type="checkbox"/>								
Port 8	Serial 8 OFF	OFF	<input type="checkbox"/>											

7. Verify the Serial Port Type, associated Port Setup baud rate, Analog Ports, and Pump Ports settings (use either the port configuration sheet or the instrument manual for proper setting). Change as necessary to fit your set of instruments.
 - **Note** that each analog bulkhead on the DH-4 has the capability of supporting two analog channels. Therefore, each analog bulkhead has two analog definitions in the DH-4 host program. (i.e. Analog 1 and Analog 2 correlate with analog bulkhead 1, Analog 3 and Analog 4 correlate to analog bulkhead 2, etc).
 - To use both channels on a given bulkhead, there must be a Y cable that originates from the DH-4 bulkhead and terminates at each of the supported instruments. If a Y cable is not available, each analog port will only support one analog device at the odd numbered Analog ID (i.e. analog bulkhead 1 = Analog 1, analog bulkhead 2 = Analog 3, etc.).
8. Once the configuration is confirmed, use the Save Setup File button to save the file with a name and path that is logical to the user.

2.2 Logger Control Settings for Moored Logging

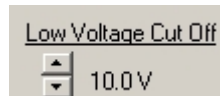
There is one “global” settings page that defines the controlling operations for all the instruments attached to the DH-4.

Go to the Logger Control tab.

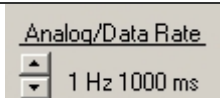


1. Verify sampling parameter settings. Change if necessary. Refer to Section 6.2 for details on sampling parameters and other controls on the **Logger Control** tab.

2. Check the **Low Voltage Cut Off** setting. Set to the highest value of the minimum voltage requirement for all the meters being used. For example, if deploying an ac-9 (min. requirement 10.0 V), and an ECO fluorometer (min. requirement 7.5 V), set the **Low Voltage Cut Off** to 10.0 V.



3. Check **Analog/Data Rate** setting. Set to the fastest meter's data rate. For example, if deploying an ac-9 (running at 6 Hz) and an ECO fluorometer (running at 1 Hz), set the **Analog/Data Rate** to 6 Hz.

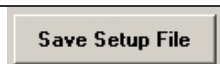


If the logger is being used with meters whose total output is more than 1024 bytes of data per sample, set the **Analog/Data Rate** higher than the meter data rate to prevent data loss. For example, if the total output is 2500 bytes/second, set the logger to at least 3 Hz.

4. Press **Send Setup** to activate any logger configuration changes made to the setups in the **Port Setup** and **Logger Control** tabs.

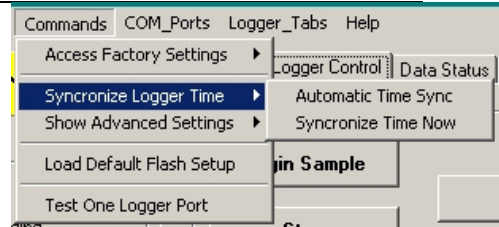


5. Press **Save Setup File** to save the logger configuration settings on the Host PC. The saved setup file can be recalled and loaded into a logger at a later date or time or to remotely review the logger's configuration.



Note that both the **Logger Control Setup** and the **Port Setup** are saved in the **Setup File**.

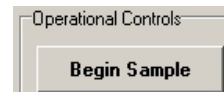
- Synchronize the data logger and the host PC clocks. In the Commands drop down window, select **Synchronize Logger Time** and **Synchronize Time Now**. Uncheck the **Automatic Time Sync** if it is selected. Manual time synchronization should be used in moored mode to prevent loss of time clock drift information.



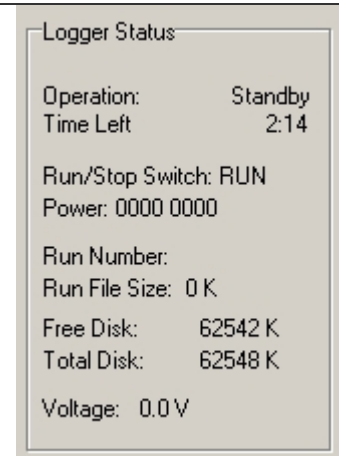
Note

Turning on Automatic Time Sync will prevent you from seeing the logger clock drift and should not be used for a stand-alone logger (moored applications).

- Press **Begin Sample** to initiate a sample sequence or to set the **Sleep** function (Section [6.2](#)).



- The data logger's status will appear on the left portion of the screen.
- Once the DH-4 has completed a sample sequence, it will enter the standby mode.
- The DH-4 is now operational and the Host test cable can be removed.

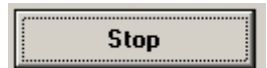


2.3 Viewing Data

If the host cable is left connected to the DH-4 during the sample, the **Data Status** tab displays the current status of all serial and analog meters. Refer to section [6.3](#) for details of what each status line represents.

Port Setup	Logger Control	Data Status	Upload Logger Data	Real Time Data																																																																																																																
<table border="1"> <thead> <tr> <th colspan="4">Logger Serial Port Inputs</th> <th colspan="4">Logger Analog Inputs - Volts</th> </tr> </thead> <tbody> <tr> <td>Serial 1:</td> <td>OFF</td> <td>Serial 5:</td> <td>OFF</td> <td>A1:</td> <td>0.000</td> <td>A5:</td> <td>0.000</td> </tr> <tr> <td>Bytes/Second:</td> <td>0</td> <td>Bytes/Second:</td> <td>0</td> <td>A2:</td> <td>0.000</td> <td>A6:</td> <td>0.000</td> </tr> <tr> <td>File Size:</td> <td>0 K</td> <td>File Size:</td> <td>0 K</td> <td>A3:</td> <td>0.000</td> <td>A7:</td> <td>0.000</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td>A4:</td> <td>0.000</td> <td></td> <td></td> </tr> <tr> <td>Serial 2:</td> <td>OFF</td> <td>Serial 6:</td> <td>OFF</td> <td colspan="4">Analog File Size: 0 K</td> </tr> <tr> <td>Bytes/Second:</td> <td>0</td> <td>Bytes/Second:</td> <td>0</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>File Size:</td> <td>0 K</td> <td>File Size:</td> <td>0 K</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Serial 3:</td> <td>OFF</td> <td>Serial 7:</td> <td>OFF</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Bytes/Second:</td> <td>0</td> <td>Bytes/Second:</td> <td>0</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>File Size:</td> <td>0 K</td> <td>File Size:</td> <td>0 K</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Serial 4:</td> <td>OFF</td> <td>Serial 8:</td> <td>OFF</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Bytes/Second:</td> <td>0</td> <td>Bytes/Second:</td> <td>0</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>File Size:</td> <td>0 K</td> <td>File Size:</td> <td>0 K</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>					Logger Serial Port Inputs				Logger Analog Inputs - Volts				Serial 1:	OFF	Serial 5:	OFF	A1:	0.000	A5:	0.000	Bytes/Second:	0	Bytes/Second:	0	A2:	0.000	A6:	0.000	File Size:	0 K	File Size:	0 K	A3:	0.000	A7:	0.000					A4:	0.000			Serial 2:	OFF	Serial 6:	OFF	Analog File Size: 0 K				Bytes/Second:	0	Bytes/Second:	0					File Size:	0 K	File Size:	0 K					Serial 3:	OFF	Serial 7:	OFF					Bytes/Second:	0	Bytes/Second:	0					File Size:	0 K	File Size:	0 K					Serial 4:	OFF	Serial 8:	OFF					Bytes/Second:	0	Bytes/Second:	0					File Size:	0 K	File Size:	0 K				
Logger Serial Port Inputs				Logger Analog Inputs - Volts																																																																																																																
Serial 1:	OFF	Serial 5:	OFF	A1:	0.000	A5:	0.000																																																																																																													
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When you wish to stop the sample, connect the host cable and press **Stop** at the **Logger Control** tab.



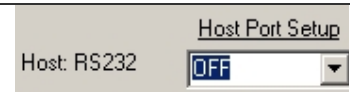
2.4 Uploading Data from the Data Logger

You can upload, extract, and save sample files that have been stored on the logger to the host PC. Refer to Section [6.4](#) for details.

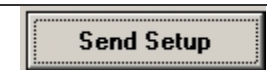
1. Go to the **Port Setup** tab and press **Get Setup** to ensure the most recent flash settings have been loaded from the DH-4.



2. Under the **Host Port Setup** combo box, choose the fastest data rate that the host cable and COM port can support. Three-meter cables can run at 115,200 baud.



3. Press **Send Setup** to send the baud rate change to the data logger. The logger will change to the meter's baud rate and the host program will follow suit. There may be a brief "loss of status" as the logger and PC change their baud rates.



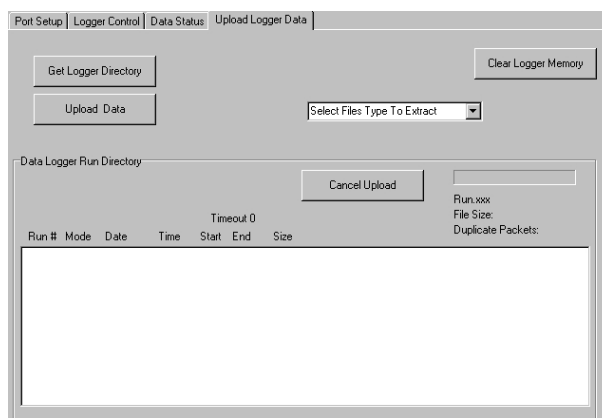
If this occurs, select **COM Ports/Logger Port/Configure Logger Port** on the main menu. This will bring up a small popup window. Switch the baud rate between the old and new rates until communication is re-established.

Occasionally, the logger and PC will lose track of each other while the baud rate change is occurring. This will be indicated by the yellow loss of data indications in the Logger Status box. See troubleshooting item #1.

4. Go to the Upload Logger Data tab, press Get Logger Directory to retrieve all the DH-4 file information.



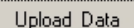
5. Select one or more of the runs that appear in the Data Logger Run Directory. In the example below, runs 000, 003, and 004 will be uploaded.



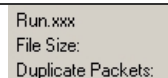
6. Select either Extract WL Archive File or Extract WL Archive and Raw Files from the combo box. Extract WL Archive and Raw Files will create individual files for each meter, as well as creating the archive file. The individual files do not contain any timing information.




7. Press Upload Data. The selected sample runs will be uploaded.



8. The status section will update while uploading is occurring.



9. Cancel Upload will stop data upload. If multiple runs have been selected, you will be prompted to cancel all uploads or individual run uploads.



Caution!

Once *Clear Logger Memory* is pressed, the data is not retrievable.

10. Be sure you have saved all the data files you wish to keep. Clear the sensor's memory.



WARNING!

Turning off the data logger while memory clearing is in progress WILL result in a corrupted data logger file system.

2.5 Setting Adjustments

The settings below are not required for a moored setup, but may be useful for adjusting the moored sample to better suit your requirements. Refer to Sections 6.1.1, 6.1.2, 6.1.3 for further details regarding optional settings.

2.5.1 Hourly Sample

You can activate the Once per Hour optional checkboxes so one or more meters will wake up and sample only once per hour. The Port Setup tab will show Once per Hour checkboxes next to each port.

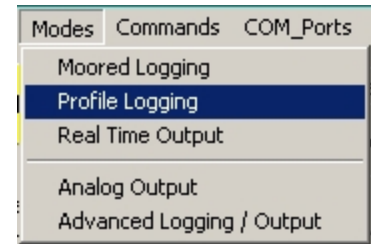
	Serial Port Type	Port Setup	Once per Hour		Analog Ports	Once per Hour		Pump Ports	Once per Hour
Port 1	Serial 1 OFF	OFF	<input type="checkbox"/>	Port 9	Analog 1 OFF	<input type="checkbox"/>	Port 16	Pump 1 OFF	<input type="checkbox"/>
Port 2	Serial 2 OFF	OFF	<input type="checkbox"/>	Port 10	Analog 2 OFF	<input type="checkbox"/>	Port 17	Pump 2 OFF	<input type="checkbox"/>
Port 3	Serial 3 OFF	OFF	<input type="checkbox"/>	Port 11	Analog 3 OFF	<input type="checkbox"/>	Port 18	Pump 3 OFF	<input type="checkbox"/>
Port 4	Serial 4 OFF	OFF	<input type="checkbox"/>	Port 12	Analog 4 OFF	<input type="checkbox"/>	Port 19	Pump 4 OFF	<input type="checkbox"/>
Port 5	Serial 5 OFF	OFF	<input type="checkbox"/>	Port 13	Analog 5 OFF	<input type="checkbox"/>			
Port 6	Serial 6 OFF	OFF	<input type="checkbox"/>	Port 14	Analog 6 OFF	<input type="checkbox"/>			
Port 7	Serial 7 OFF	OFF	<input type="checkbox"/>	Port 15	Analog 7 OFF	<input type="checkbox"/>			
Port 8	Serial 8 OFF	OFF	<input type="checkbox"/>						

If a meter is selected as Once per Hour, it will only be powered during the first sample period after the start of a new hour. This option is used to limit either the power consumption or the memory used by meters with high power or memory requirements.

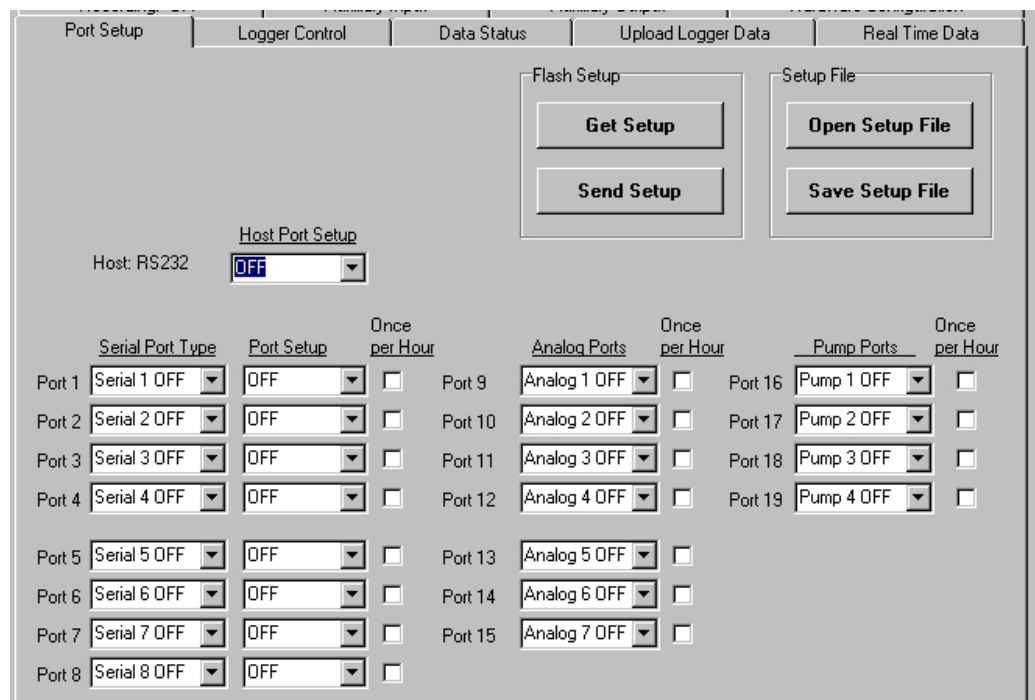
3. Quick Setup for Profile Logging

Profile Mode is used to determine the vertical “profile” of the water column. While profiling, the data logger will perform one data collection cycle (delay before start, pre-warm up flush, warm up, flush, and sample), and then stand by for further commands from the host.

1. At the DH4 host window, select Profile Logging from the Modes menu.



2. Go to the Port Setup tab and press Get Setup to load the logger’s settings into the Host program. Check the current DH-4 setup against the expected setup.
3. If the DH-4 does not contain the expected configuration and the file is located on the host computer, use the Open Setup Files button to load the correct values.



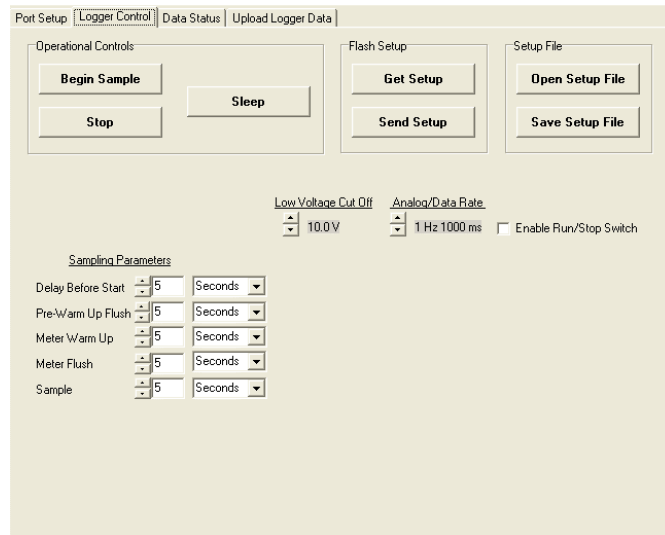
4. Verify the Serial Port Type, associated Port Setup baud rate, Analog Ports, and Pump Ports settings (use either the port configuration sheet or the instrument manual for proper setting). Change as necessary to fit your set of instruments.
 - **Note** that each analog bulkhead on the DH-4 has the capability of supporting two analog channels. Therefore, each analog bulkhead has two analog definitions in the DH-4 host

program. (i.e. Analog 1 and Analog 2 correlate with analog bulkhead 1, Analog 3 and Analog 4 correlates to analog bulkhead 2, etc.).

- To use both channels on a given bulkhead, there must be a Y cable that originates from the DH-4 bulkhead and terminates at each of the supported instruments. If a Y cable is not available, each analog port will only support one analog device at the odd numbered Analog ID (i.e. Analog Bulkhead 1 = Analog 1, Analog Bulkhead 2 = Analog 3, etc.)
5. Once the configuration is confirmed, use the **Save Setup File** button to save the file with a name and path that is logical to the user.

3.1 Logger Control Settings for Profile Logging

Go to the Logger Control tab.

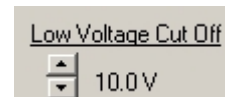


- Verify sampling parameter settings. Change if necessary. Refer to Section 6.2 for details on sampling parameters and other controls on the Logger Control tab.

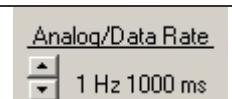
Note

The Sample Interval parameters setup is not available in profile mode.

- Check the Low Voltage Cut Off setting. Set to the highest value of the minimum voltage requirement for all the meters being used. For example, if you're deploying an ac-9 (min. requirement 10.0 V), and an ECO fluorometer (min. requirement 7.5 V), set the Low Voltage Cut Off to 10.0 V.



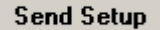
- Check Analog/Data Rate setting. Set to the fastest meter's data rate. For example, if you're deploying an ac-9 (running at 6 Hz) and an ECO fluorometer (running at 1 Hz), set the Analog/Data Rate to 6 Hz.



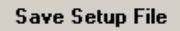
If the logger is being used with meters whose total output is more than 1024 bytes of data per sample, set the Analog/Data Rate higher than

the meter data rate to prevent data loss. For example, if the total output is 2500 bytes/second, set the logger to at least 3 Hz.

4. Press **Send Setup** to store any logger configuration changes you made to the setups in the **Port Setup** and **Logger Control** tabs.

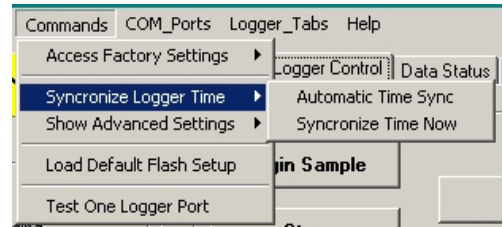


5. Press **Save Setup File** if you want to save the logger configuration settings on the Host PC. The saved setup file can be recalled and loaded into a logger at a later date or time.

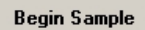


Note that both the **Logger Control Setup** and the **Port Setup** are saved in the **Setup File**.

6. Synchronize the data logger and the host PC clocks. In the **Commands** drop down window, select **Synchronize Logger Time** and **Synchronize Time Now**.



7. Press **Begin Sample** or move the magnetic switch to the **ON** position to initiate a sample sequence.

8. The data logger's status will appear on the left portion of the screen. Refer to section [5.1](#) for details about the status indicators.
9. Once the DH-4 has completed a sample sequence, it will enter the standby mode.
10. The DH-4 is now operational and the Host test cable can be removed.



3.2 Viewing Data

If the host cable is left connected to the DH-4 during the sample, the **Data Status** tab displays the current status of all serial and analog meters. Refer to section [6.3](#) for details of what each status line represents.

Port Setup		Logger Control		Data Status		Upload Logger Data		Real Time Data	
Logger Serial Port Inputs				Logger Analog Inputs - Volts					
Serial 1:	OFF	Serial 5:	OFF	A1:	0.000	A5:	0.000		
Bytes/Second:	0	Bytes/Second:	0	A2:	0.000	A6:	0.000		
File Size:	0 K	File Size:	0 K	A3:	0.000	A7:	0.000		
				A4:	0.000				
Serial 2:	OFF	Serial 6:	OFF	Analog File Size: 0 K					
Bytes/Second:	0	Bytes/Second:	0						
File Size:	0 K	File Size:	0 K						
Serial 3:	OFF	Serial 7:	OFF						
Bytes/Second:	0	Bytes/Second:	0						
File Size:	0 K	File Size:	0 K						
Serial 4:	OFF	Serial 8:	OFF						
Bytes/Second:	0	Bytes/Second:	0						
File Size:	0 K	File Size:	0 K						

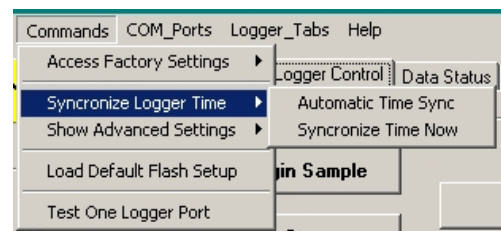
When you wish to stop the sample, connect the host cable and press **Stop** at the **Logger Control** tab or move the magnetic switch from the ON position.



3.3 Uploading Data from the Data Logger

You can upload, extract, and save sample files that have been stored on the logger to the host PC. Refer to Section [6.4](#) for details.

1. Synchronize the data logger and the host PC clocks. In the Commands drop down window, select **Synchronize Logger Time** and **Synchronize Time Now**. Uncheck the **Automatic Time Sync** if it is selected.



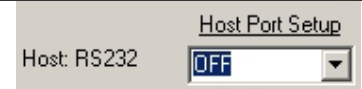
Note

Turning on **Automatic Time Sync** will prevent you from seeing the logger clock drift and should not be used for a stand-alone logger (moored applications).

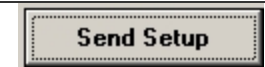
- Go to the **Port Setup** tab and press **Get Setup** to ensure the most recent flash settings have been loaded from the DH-4.



- Under the **Host Port Setup** combo box, choose the fastest data rate that the host cable and COM port can support. Three-meter cables can run at 115,200 baud.



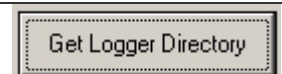
- Press **Send Setup** to send the baud rate change to the data logger. The logger will change to the meter's baud rate and the host program will follow suit. There may be a brief "loss of status" as the logger and PC change their baud rates.



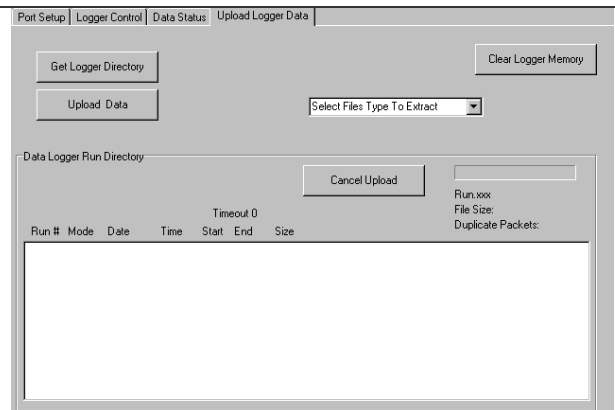
If this occurs, select **COM Ports/Logger Port/Configure Logger Port** on the main menu. This will bring up a small popup window. Switch the baud rate between the old and new rates until communication is re-established.

Occasionally, the logger and PC will lose track of each other while the baud rate change is occurring. This will be indicated by the yellow loss of data indications in the **Logger Status** box. See troubleshooting item **#1**.

- Go to the **Upload Logger Data** tab, press **Get Logger Directory** to retrieve all the DH-4 file information.



- Select one or more of the runs that appear in the **Data Logger Run Directory**. In the example below, runs 000, 003, and 004 will be uploaded.



- Select either **Extract WL Archive File** or **Extract WL Archive and Raw Files** from the combo box. **Extract WL Archive and Raw Files** will create individual files for each meter, as well as creating the archive file. The individual files do not contain any timing information.



8. Press **Upload Data**. The selected sample runs will be uploaded.

Upload Data

9. The status section will update while uploading is occurring.

Run.xxx
File Size:
Duplicate Packets:

10. **Cancel Upload** will stop data upload. If multiple runs have been selected, you will be prompted to cancel all uploads or individual run uploads.

Cancel Upload

Caution!

Once *Clear Logger Memory* is pressed, the data is not retrievable.

11. Be sure you have saved all the data files you wish to keep.
Clear the sensor's memory.

Clear Logger Memory

WARNING!

Turning off the data logger while memory clearing is in progress WILL result in a corrupted data logger file system.

12. Both **Parse Run Files** and the **Save Directory** controls of the data logger can be activated in the **Upload Logger Data** tab.

- Select **Parse Run Files** to re-extract data from a previously uploaded file.

Parse Run Files

- Select **Save Directory** to generate an ASCII record of the runs collected, along with each run's associated information (voltages, size, etc.)

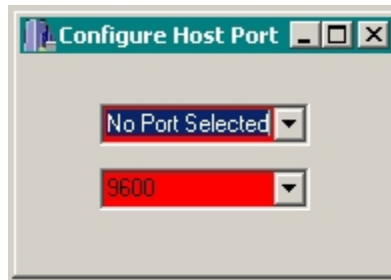
Save Directory

4. Quick Setup for Real Time Operations

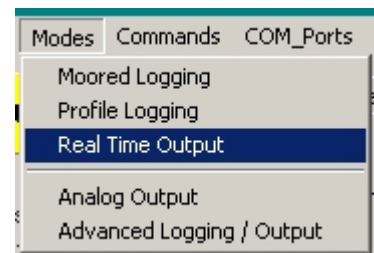
Real-time operations are used to sample an area of water while the data logger and associated instruments are towed. As the name implies, data is not logged, but sent directly to a host PC. The instruments sample either continuously or intermittently depending on the preprogrammed setup.

4.1 Real Time Settings

1. Start the Host program. Select the COM port and 9600 baud rate at the pop-up window:



2. Turn on power to the data logger.
3. At the resulting window, select Real Time Output from the Modes menu.



4. Go to the Port Setup tab and press Get Setup to load the logger's settings into the Host program. Check the current DH-4 setup against the expected setup.
5. If the DH-4 does not contain the expected setup and the file is located on the host computer, use the Open Setup File button to load the correct values.

Port Setup | Logger Control | Data Status | Upload Logger Data

Flash Setup

Setup File

Get Setup

Open Setup File

Send Setup

Save Setup File

Host Port Setup

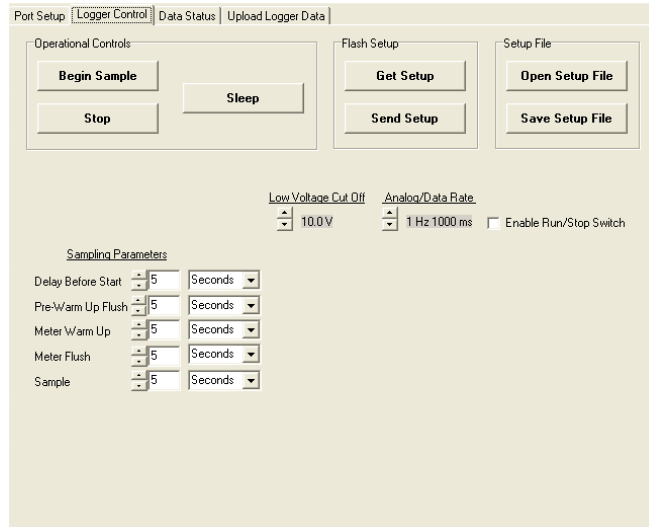
Host: RS232 OFF

Port	Serial Port Type	Port Setup	Port	Analog Ports	Port	Pump Ports
Port 1	Serial 1 OFF	OFF	Port 9	Analog 1 OFF	Port 16	Pump 1 OFF
Port 2	Serial 2 OFF	OFF	Port 10	Analog 2 OFF	Port 17	Pump 2 OFF
Port 3	Serial 3 OFF	OFF	Port 11	Analog 3 OFF	Port 18	Pump 3 OFF
Port 4	Serial 4 OFF	OFF	Port 12	Analog 4 OFF	Port 19	Pump 4 OFF
Port 5	Serial 5 OFF	OFF	Port 13	Analog 5 OFF		
Port 6	Serial 6 OFF	OFF	Port 14	Analog 6 OFF		
Port 7	Serial 7 OFF	OFF	Port 15	Analog 7 OFF		
Port 8	Serial 8 OFF	OFF				

6. Verify the Serial Port Type, associated Port Setup baud rate, Analog Ports, and Pump Ports settings (use either the port configuration sheet or the instrument manual for proper setting). Change as necessary to fit your set of instruments.
 - Note that each analog bulkhead on the DH-4 has the capability of supporting two analog channels. Therefore, each analog bulkhead has two analog definitions in the DH-4 host program. (i.e. Analog 1 and Analog 2 correlate with analog bulkhead 1, Analog 3 and Analog 4 correlate to analog Bulkhead 2, etc.)
 - To use both channels on a given bulkhead, there must be a Y cable that originates from the DH4 bulkhead and terminates at each of the supported instruments. If a Y cable is not available, each Analog port will only support one analog device at the odd numbered Analog ID (i.e. Analog Bulkhead 1 = Analog 1, Analog Bulkhead 2 = Analog 3, etc.)
7. Once the configuration is confirmed, use the Save Setup File button to save the file with a name and logical path.

4.2 Logger Control Settings for Real-time Output

Go to the Logger Control tab.

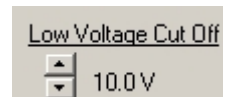


1. Verify sampling parameter settings. Change if necessary. Refer to Section [5.2](#) for details on sampling parameters and other controls on the Logger Control tab.

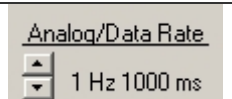
Note

The Sample Interval parameter is not available when using Real Time Output mode.

2. Check the **Low Voltage Cut Off** setting. Set to the highest value of the minimum voltage requirement for all the meters being used. For example, if you're deploying an ac-9 (min. requirement 10.0 V), and an ECO fluorometer (min. requirement 7.5 V), set the **Low Voltage Cut Off** to 10.0 V.

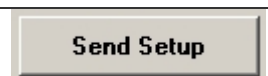


3. Check **Analog/Data Rate** setting. Set to the fastest meter's data rate. For example, if you're deploying an ac-9 (running at 6 Hz) and an ECO fluorometer (running at 1 Hz), set the **Analog/Data Rate** to 6 Hz.



If the logger is being used with meters whose total output is more than 1024 bytes of data per sample, set the **Analog/Data Rate** higher than the meter data rate to prevent data loss. For example, if the total output is 2500 bytes/second, set the logger to at least 3 Hz.

4. Press **Send Setup** to store any changes you made to the setups in the Port Setup and Logger Control tabs.

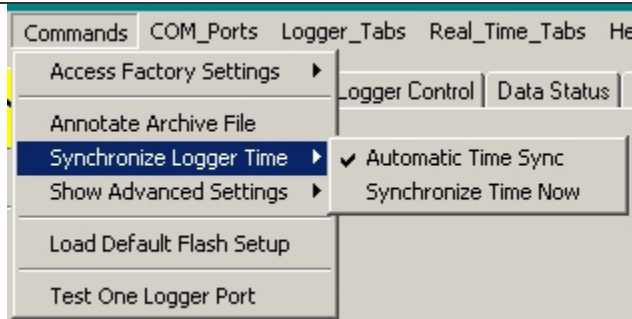


5. Press **Save Setup File** to save the logger configuration settings on the Host PC. The saved setup file can be recalled and loaded into a logger at a later date or time or to remotely review the logger's configuration.

Save Setup File

Note that both the **Logger Control Setup** and the **Port Setup** are saved in the **Setup File**.

6. Synchronize the data logger and the host PC clocks. In the **Commands** drop down window, select **Synchronize Logger Time** and **Synchronize Time Now**.

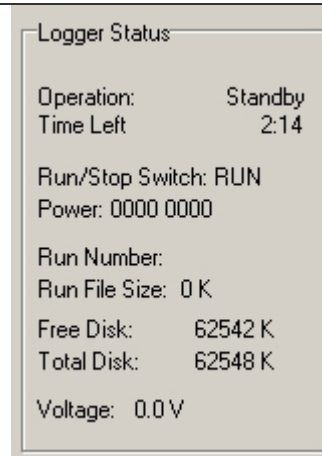


7. Press **Begin Sample** to initiate a sample.

Operational Controls

Begin Sample

8. The data logger's status will appear on the left portion of the screen. Refer to section [5.1](#) for details about the status indicators.



4.3 Viewing Data

The Data Status tab displays the current status of all serial and analog meters as they actively sample. Refer to section [5.3](#) for details of what each status line represents.

Port Setup		Logger Control		Data Status		Upload Logger Data		Real Time Data	
Logger Serial Port Inputs				Logger Analog Inputs - Volts					
Serial 1:	OFF	Serial 5:	OFF	A1:	0.000	A5:	0.000		
Bytes/Second:	0	Bytes/Second:	0	A2:	0.000	A6:	0.000		
File Size:	0 K	File Size:	0 K	A3:	0.000	A7:	0.000		
				A4:	0.000				
Serial 2:	OFF	Serial 6:	OFF	Analog File Size: 0 K					
Bytes/Second:	0	Bytes/Second:	0						
File Size:	0 K	File Size:	0 K						
Serial 3:	OFF	Serial 7:	OFF						
Bytes/Second:	0	Bytes/Second:	0						
File Size:	0 K	File Size:	0 K						
Serial 4:	OFF	Serial 8:	OFF						
Bytes/Second:	0	Bytes/Second:	0						
File Size:	0 K	File Size:	0 K						

When you wish to stop the sample, press **Stop** at the Logger Control tab. Alternatively, you can let the sample run to completion.



4.4 Recording Data

When you have verified that the logger and all the meters attached to it are functioning, data can be recorded to the host PC.

Select the Recording: (ON/OFF) tab (see below). Select the Record Logger Data check box.

Port Setup	Logger Control	Data Status	Real Time Data	Recording: OFF	Auxiliary Input	Auxiliary Output
<p>Record Status</p> <p>Recording: OFF</p> <p>Archive File:</p> <p>File Size: 0 K</p> <p>Record: No Data</p>						
<p><input checked="" type="checkbox"/> Record Logger Data</p> <p><input checked="" type="checkbox"/> Record Aux Input</p>						
Record Archive		Stop		Record Raw Input		
1 Hour Archive Files						
1 Day Archive Files						

Select the **Record Aux Input** check box to record data from additional COM ports on the Host PC. See Section [5.7](#), Auxiliary Inputs, for details. Auxiliary inputs will be recorded as Mux ID 1.

Choose one of the four record buttons and enter a file name.

1. **Record Archive**—Records an archive file until the **Stop** button is pressed. To make the file name compatible with the file extraction program WAP, use a single word file name without any spaces and a 3 digit file extension where the extension runs from 000-999. This option is recommended for recording data while profiling.

Example: CruiseOne.001 would be acceptable. CruiseOne.dat is not recommended. Cruise One.001 is not acceptable.

2. **1 Hour Archive Files**—Creates a new archive file at the start of each hour appending a 2 digit year, Julian date, and hour on the end of the file name. To make the file name compatible with the file extraction program WAP, use a single file name without any extensions. This option is recommended for recording data during towed or flow through operations.

Example: If the user enters the file name CruiseOne at 7:05 pm on January 17, 2004, the host will create a file named CruiseOne04_17.019. If the Host is still recording at 8:00 pm, the Host will close the existing file and create a new file named CruiseOne04_17.020.

3. **1 Day Archive Files**—Creates a new archive file at the start of each new day appending a 2 digit year and Julian date to the end of the file name. This option is recommended for recording data during moored operations.

Example: If the user enters the file name CruiseOne on January 17, 2004, the Host will create a file named CruiseOne04.017.

4. **Record Raw Input**—WET Labs use. Use this record option only if directed by WET Labs personnel.

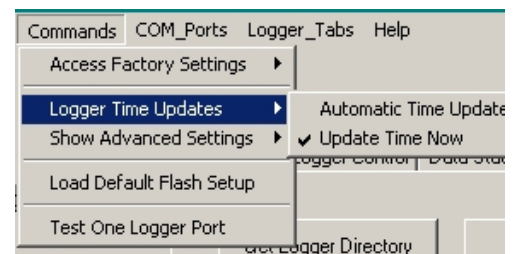
4.5 Setting Adjustments

Refer to Section 6.2 for further details about optional settings for real-time deployments.

4.5.1 Automatically Update Time

Automatic Time Update will constantly update the data logger's time while it's connected to a host and is **not** sampling and should be used to keep the logger time synchronized with the host PC time.

Update Time Now will synchronize the data logger to the host PC.



5. Reference: Displays and Menus

This guide describes the functions of the various buttons, selectable options, and status indicators of the WET Labs Host Program and is designed to be used primarily as a reference section. Functionally, the program is divided into tabs for logger setup and data collection, with additional options available from the pull-down menus at the top of the screen. Note that depending on the operational mode you've chosen, not all tabs will be visible.

5.1 Status Displays

The **Setup Status** banner in the upper left hand corner of the host program indicates whether the parameters on the **Port Setup** and **Logger Control** tabs contain the same values that the logger is currently using.

If a yellow **Setup is Not Current** banner is visible, the host may not contain the same settings that the logger does. To get the current logger settings, press the **Get Setup** button on either the **Port Setup** or **Logger Control** tabs.



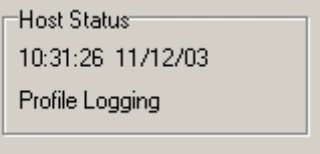
Setup is Not Current

If the yellow status banner is not visible, the host and the logger have matching parameters for the **Port Setup** and **Logger Control** settings.

Both the presence and lack of the status banner can both give false status indications. This can occur when changing baud rates or changing loggers while programming more than one logger at a time. When in doubt, press the **Get Setup** button to retrieve the logger's current setting.

5.1.1 Host Status

- **Time and Date:** Displays the time and date of the host PC and the data logger. The host program automatically updates the time if the data logger is in standby mode and **Automatic Time Sync** is turned on.
- **Mode:** Displays the operating mode of the host: **Moored Logging**, **Profile Logging**, **Real Time Output**, **Analog Output**, **Advanced Logging/Output**.



Host Status
10:31:26 11/12/03
Profile Logging

5.1.2 Logger Status

- **Operation:** Shows the operation the data logger is currently performing.

Stand By—Waiting for a command.

Delay—A delay at the start of a data collection sequence before the meter warm up is to occur. The delay period is generally used to allow for deployment of the DH-4 and instruments. This period should be set to a time that's long enough to replace the host interface cable with a dummy plug, and place the data logger in the water prior to the meter and pump start up.

Pre-flush—A period during which the pumps are run to flush meters prior to warm-up. Data is not stored.

Warm Up—A period during which the selected meters are powered to reach a stable operating temperature. Data is not stored. The auxiliary pump is not in operation.

Flush—A period during which the selected meters are powered, and the auxiliary pump is powered to flush out the meter passages. Data is not stored.

Sample—The data collection segment of the sample sequence. All selected meters and pumps will be on. Data will be logged if logging has been selected. Data will be transmitted if **Real Time Data** has been selected.

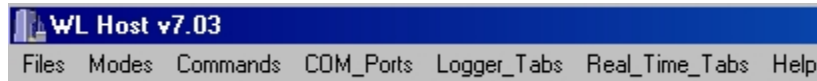
Logger Status	
Operation:	Standby
Time Left	2:14
Run/Stop Switch:	RUN
Power:	0000 0000
Run Number:	
Run File Size:	0 K
Free Disk:	62542 K
Total Disk:	62548 K
Voltage:	0.0 V

- **Time Left:** Shows the actual time remaining in each operation described above. During Standby, the **Time Left** is elapsed time since the standby operation began. **Time Left** is the key indicator as to whether the data logger and the Host are communicating.
- **Run/Stop Switch:** Indicates whether the magnetic switch is in the ON or Run position or not.
- **Power:** Indicates which relays 1–8 have been turned on. This is primarily a factory debug display.
- **Run Number:** Indicates the file name (run.000 to run.999) that data logger is currently recording to or most recently recorded to. Starting with an empty disk, the data logger will sequentially increment the run number for every profile or moored data file collected.
- **Run File Size:** Indicates the file size of the file indicated by Run Number.
- **Free Disk:** Indicates the amount of flash disk space in Kbytes that is unused. The data logger can use all but the last 200 Kbytes of this flash disk for data storage.
- **Total Disk:** Indicates the total flash disk size in Kbytes. This shows the used and unused space. All but the last 200 Kb of the flash disk are available for data storage.

- Voltage: Three possible displays.
 - Current displays existing voltage and is updated once per second.
 - Start displays the voltage at the start of the most recent sample.
 - End displays the voltage when the last sample was ended.

5.2 Pull-down Menus

WET Labs Host pull-down menus are shown below. If you are using Moored Logging or Profile Mode, the Real_Time_Tabs menu will not be available.

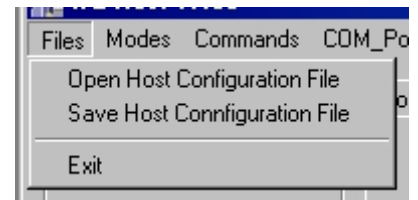


5.2.1 Files Menu

Open Host Setup File: Opens a saved WL Host setup file.

Save Host Setup File: Saves a WL Host program setup configuration. (Particularly useful for saving settings for both moored and profiling operation.)

Exit: Closes the host program, automatically saving the existing (currently selected) configurations in a file named las.whl.



5.2.2 Modes Menu

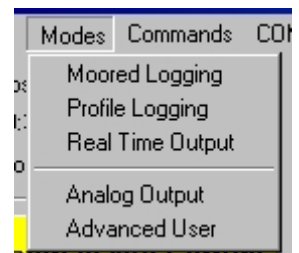
Moored Logging: for use with a moored application.

Profile Logging: for use with profiling applications.

Real-time Output: Use when no data will be stored on the logger, but rather sent directly to a host PC in real time.

Analog Output: Use to sample and transmit ASCII data from a set of analog meters in real time. If any digital/serial meters are to be used, use Real Time Mode.

Advanced Logging/Output: Use for deployments where a combination of moored and profile settings are desired.



5.2.3 Commands Menu

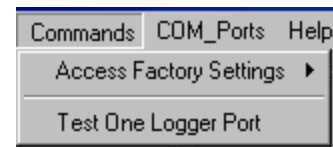
When Real Time and Advanced User modes are selected, the options shown at right are available.



When Moored or Profile modes are selected, the options at right are available.



When Analog mode is selected, the options at right are available.



5.2.3.1 Access Factory Settings >

Reset to Monitor: Exits the host program and allows the user to access low level functions. See Section [6.4.5](#) for details on using this function.

Show Analog Calibration: View calibration settings for analog instruments. This window can also be used for troubleshooting with WET Labs personnel.

Show Hardware Configuration: View hardware configurations for all instruments. This window should only be used for troubleshooting with WET Labs personnel.

Load Default Flash Setup: Resets the data logger to the factory-set defaults.

Debug Off: Factory use only.

5.2.3.2 Annotate Archive File

This allows you to add notes about a given run. These are inserted into the archive file as ASCII text in logger ID 1, Port 9. Enter the text to be stored in the Annotate Here box.

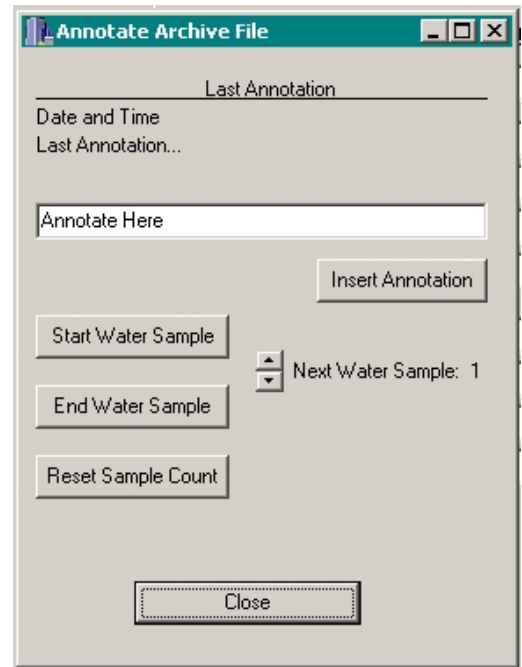
Select **Insert Annotation** to add user-entered text to the archive file.

Select **Start Water Sample** to input the time and date the water sample started.

Select **End Water Sample** to input the end time.

Water sample annotations may also be incremented or decremented by clicking on the up arrows next to **Next Water Sample**.

Select **Reset Sample Count** to return the count to 1.



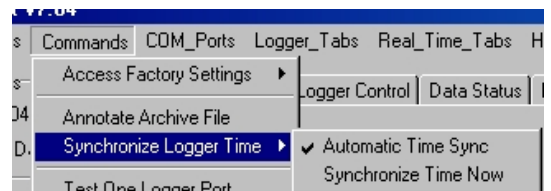
5.2.3.3 Synchronize Logger Time >

Automatic Time Sync will constantly update the data logger's time while it's connected to a host and **not** sampling and should be used to keep the logger and the host PC clocks synchronized.

Synchronize Time Now will synchronize the data logger to the current host PC time.

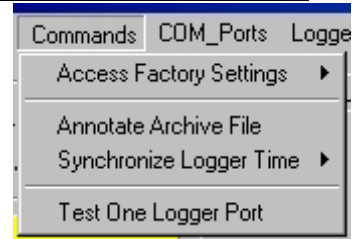
Note

Turning on **Automatic Time Sync** will prevent you from seeing the logger clock drift and should not be used in **Moored Mode**.



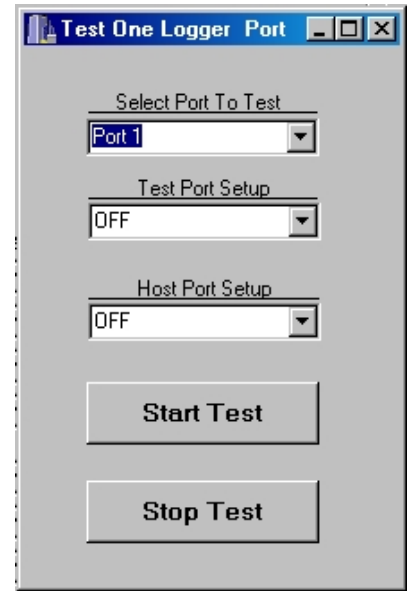
5.2.3.2 Test One Logger Port:

Allows you to test that a meter is properly connected and communicating with the host. Serial ports 1–8 or analog ports may be tested at a user-selected baud rate.



To test a port:

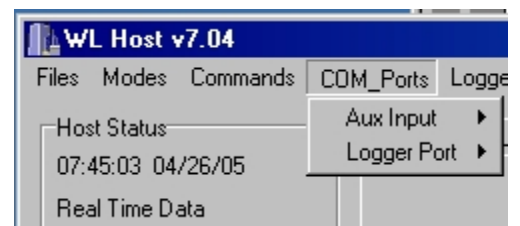
1. Select the data port (and thus instrument) you wish to test.
2. Select the instrument's baud rate.
3. Select the host computer's baud rate.
4. Select Start Test. The Real_Time window appears, showing scrolling data.
5. Select Stop Test when communication is verified.



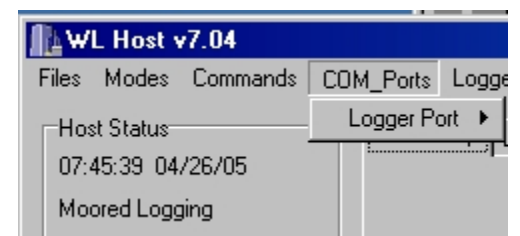
5.2.4 COM_Ports Menu

COM_Ports menu includes Auxiliary Input and Logger Port options. If you are using Moored Logging or Profile Mode, the Auxiliary Input option will not be available.

COM_Ports menu options, Real Time Data or Advanced User mode selected.

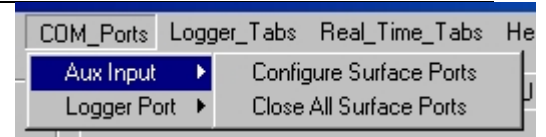


COM_Ports menu option, Moored, Profile, or Analog mode selected.

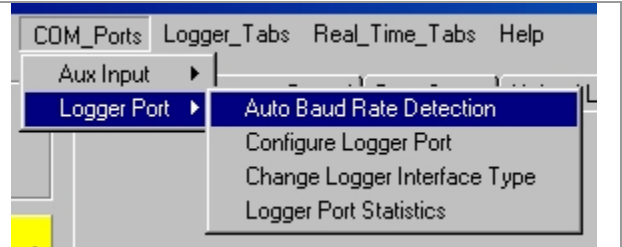


COM_Ports/Aux Input >

- Configure Surface Ports displays the Auxiliary Input tab.
- Close All Surface Ports hides the Auxiliary Input tab.



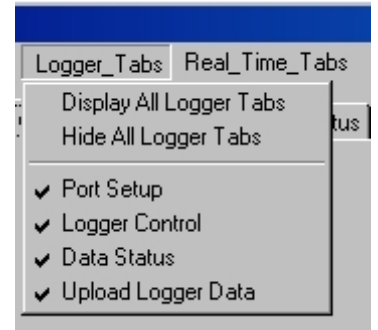
COM_Ports/Logger Port >



• Auto Baud Rate Detection	Automatically detects the logger's baud rate.
• Configure Logger Port	<p>Popup window allowing you to select COM 1–2 and baud rate of logger. Available COM ports for the host PC are 1 through 8.</p> <p>Host Baud Rate: Selectable rates of 600, 1200, 2400, 4800, 4800 7,E,1, 9600, 9600 7,E,1, 19200, 38400, 57600, 115200. Note that “7,E,1” setup is 7 data bits, an even parity bit, and 1 stop bit.</p> <p>Use any of the settings to change the COM port setting on the host computer. This selection is used when the Host program is restarted and the data logger's baud rate had been changed or has an unknown setting. If you are unable to re-establish communications with the data logger using any of these Host Baud Rate settings, restart the Host program. If this fails to re-establish communications, cycle the power to the data logger and restart the Host program. This will cause both units to start in their default 9600 baud rates.</p>
• Change Logger Interface Type	Allows you to change the interface from RS-232 to RS-422 once communication is set up.
• Logger Port Statistics	Popup window that displays Bytes/Sec, Total Input, Packets/Sec, Byte/Sec, Mod Errors, Loops and Skips, No Data Timer, and Bad Data Timer.

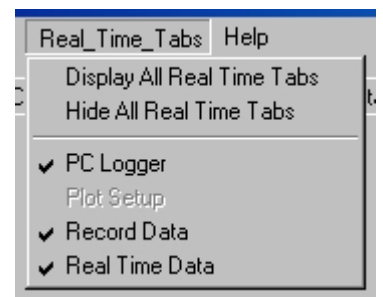
5.2.5 Logger_Tabs Menu

These items activate viewing preferences for data logger setup. You can hide or display all tabs, or selectively display any combination of the four.



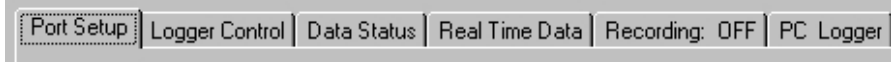
5.2.6 Real_Time Tabs Menu

The items in this pull-down menu activate tabs for real-time data acquisition. You can hide or display all tabs, or selectively display any combination of the six. Note that these are only visible if you're in Real Time or Advanced Logging/Output mode.



6. Reference: Window Tabs

There are six tabs associated with all aspects of operating the data logger for various types of deployments. Note that depending on the mode you've chosen, not all tabs will be available.

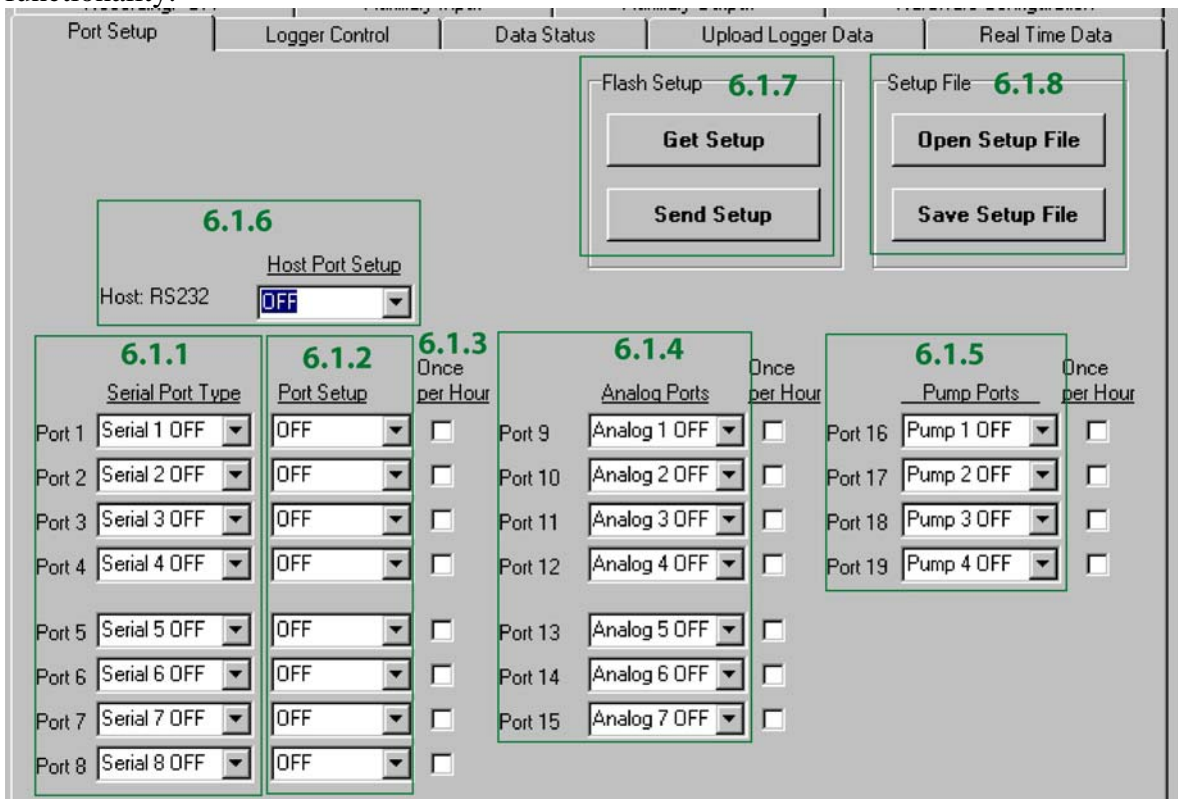


Visible tabs for each mode:

Moored Logging	Port Setup, Logger Control, Data Status, Upload Logger Data
Profile Logging	Port Setup, Logger Control, Data Status, Upload Logger Data
Real Time Output	Port Setup, Logger Control, Data Status, Real Time Data, Recording:, PC Logger
Analog Output	Port Setup, Logger Control, Real Time Data
Advanced Logging/Output	Recording:, PC Logger, Port Setup, Logger Control, Data Status, Real Time Data

6.1 Port Setup Tab

The numbers in green correspond with the location in the manual for a description of functionality.



The screenshot displays the 'Port Setup' tab with the following sections highlighted in green:

- 6.1.1**: Serial Port Type (Ports 1-8)
- 6.1.2**: Port Setup (Ports 1-8)
- 6.1.3**: Once per Hour (Ports 1-8)
- 6.1.4**: Analog Ports (Ports 9-15)
- 6.1.5**: Pump Ports (Ports 16-19)
- 6.1.6**: Host Port Setup (Host: RS232, OFF)
- 6.1.7**: Flash Setup (Get Setup, Send Setup)
- 6.1.8**: Setup File (Open Setup File, Save Setup File)

6.1.1 Serial Port Type

Refer to the data logger's User's Guide to identify which bulkhead connector is associated with each serial port for your specific data logger. Except where noted, all serial ports are powered during the warm up, flush, and sample segments of a run. Serial ports may be powered during pre-flush if the port is selected as a pump. Options:

OFF—The port will not be powered, nor will any data be accepted from this port during data sampling.

AC9—Any data is accepted by this port. The port will be turned off if the voltage drops below 10.0V.

AC-S—Any data is accepted by this port. This port will be turned off if the voltage drops below 9.5 V. This allows a sample to continue while protecting the ac-s from damage.

ASCII—ASCII data that is terminated with <Carriage Return><Line Feed> (CR LF) will be accepted by this serial port.

Binary—All data will be accepted by this serial port. The serial port type has no restrictions on the format of the data that it receives, making it a good initial selection when setting up new meters.

ECO-G2—This port will accept <CRLF>-terminated data and recognizes the “close shuttered shutdown” command used by the 2nd generation ECO meters. This allows the meter to close its bio-wiper before the DH-4 removes power during moored deployments.

GPS—Accepts NMEA-0183 data format GPRMC.

Pump—This port will provide power for pump operation during the flush and sample segments of the data collection. If pre-flush is selected, this port will be powered throughout the sample sequence, including pre-flush and warm-up. No data will be processed from this port.

Remote Host—This port provides power and data to telemetry equipment. When the DH-4 is either in standby or sample mode, the DH-4 will power this port and transmit data out the port.

SBE 37-SM—The data logger will query the SBE-37SM every 4 seconds, at which point the SBE's data will be retrieved. The SBE 37-SM must be logging data and be “sleeping” between samples.

VSF-S—This type will accept ASCII data from the first generation of ECO meters such as the VSF and DFL. Additionally, at the end of the sample segment the ECO-G1 “close shutter” command will be sent to the meter.

WL-Test—Used by WET Labs personnel and not available to the user.

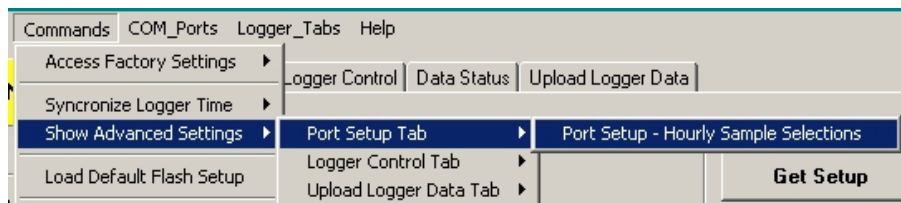
Wake/Binary—At the warm-up cycle, the logger will send a 500 ms “break” command to “wake” meters that are self-powered (internal batteries). The logger reads all data.

6.1.2 Port Setup

Under the **Port Setup** column, select the required baud rate for use with the meter selected under the **Serial Port Type**. All ports setups will have setups of 8 data bits, no parity bits, and 1 stop bit with the exceptions of “4800,7,E,1” and “9600,7,E,1,” which will have setups of 7 data bits, an even parity bit, and 1 stop bit.

6.1.3 Once Per Hour

This option is used during moored deployments so that instruments with a high current draw will run only during the first sample period after the beginning (“top”) of the hour. This allows the user to obtain several samples per hour from instruments with lower current draws, without the power penalty of the high current draw instruments.



The **Port Setup** tab will show **Once per Hour** checkboxes next to each port when in **Moored Logging** mode.

Serial Port Type	Port Setup	Once per Hour	Analog Ports	Once per Hour	Pump Ports	Once per Hour
Port 1 Serial 1 OFF	OFF	<input type="checkbox"/>	Port 9 Analog 1 OFF	<input type="checkbox"/>	Port 16 Pump 1 OFF	<input type="checkbox"/>
Port 2 Serial 2 OFF	OFF	<input type="checkbox"/>	Port 10 Analog 2 OFF	<input type="checkbox"/>	Port 17 Pump 2 OFF	<input type="checkbox"/>
Port 3 Serial 3 OFF	OFF	<input type="checkbox"/>	Port 11 Analog 3 OFF	<input type="checkbox"/>	Port 18 Pump 3 OFF	<input type="checkbox"/>
Port 4 Serial 4 OFF	OFF	<input type="checkbox"/>	Port 12 Analog 4 OFF	<input type="checkbox"/>	Port 19 Pump 4 OFF	<input type="checkbox"/>
Port 5 Serial 5 OFF	OFF	<input type="checkbox"/>	Port 13 Analog 5 OFF	<input type="checkbox"/>		
Port 6 Serial 6 OFF	OFF	<input type="checkbox"/>	Port 14 Analog 6 OFF	<input type="checkbox"/>		
Port 7 Serial 7 OFF	OFF	<input type="checkbox"/>	Port 15 Analog 7 OFF	<input type="checkbox"/>		
Port 8 Serial 8 OFF	OFF	<input type="checkbox"/>				

6.1.4 Analog Ports

The data logger has the capability of accepting data from up to seven analog instruments depending on the configuration of the data logger (see your instrument-specific configuration sheet). Under the **Analog Ports** column, select the analog port operation. Use your data logger’s User’s Guide to identify which bulkhead connector is associated with each analog port for your specific data logger. There may be more than one analog port for each bulkhead. The analog port options are:

Off—This port will not be powered, nor will any data be accepted from this port during sampling.

Analog On—This port will be powered and will accept an analog input during the data collection. Unless otherwise noted in the data logger’s User’s Guide, the input range is 0–5 V.

Pump On—This port will provide power to a pump during the flush and sample segments of data collection. This port will not process any data during the run.

6.1.5 Pump Ports

The data logger can accept data from up to four pumps, depending on the configuration of the data logger. Use your data logger’s User’s Guide to identify which bulkhead connector is associated with each pump port for your specific data logger. The pump port options are:

Off—This port will not be powered, nor will any data be accepted from this port during sampling.

Pump On—This port will provide power to a pump during the flush and sample segments of data collection. This port will not process any data during the run.

6.1.6 Host Port

Selectable baud rate for the host port-to-DH-4 connection.

6.1.7 Flash Setup

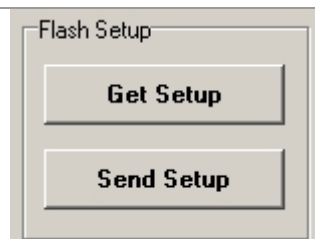
Get Setup will retrieve the setup currently stored on the data logger. All the setup parameters will be filled in, and the Setup Status Banner will indicate that the setup is current.

Send Setup will send the currently displayed setup to the data logger. The logger will read the setup and echo the setup back to the host program. The host will then set the status banner to indicate the setup is current.

It is not necessary to press **Send Setup** for each setup parameter that is changed. Change all the setup fields to match the desired data logger setup, and then press the **Send Setup** button.

Caution

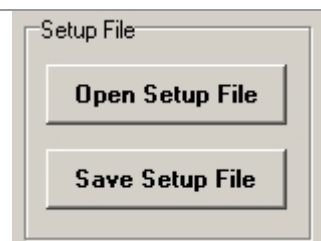
Pressing the *Send Setup* button will cause any currently running data collection operation to terminate.



6.1.8 Setup File

Open Setup File allows you to select a previously saved set of DH-4 logger configurations. Once selected, a pop-up window will remind you to press **Send Setup** to send the setup to the data logger.

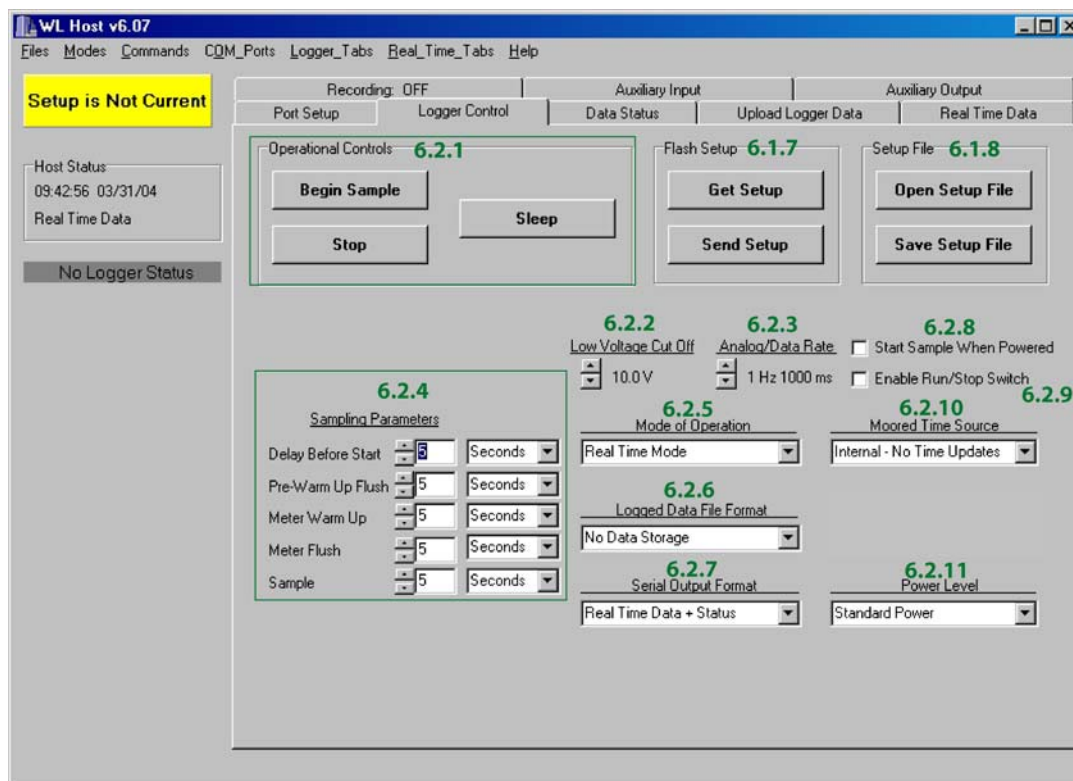
Save Setup File allows you to save selected logger configurations from the **Logger Setup** and **Logger Control** tabs (file extension .lst) to a PC.



6.2 Logger Control Tab

The Logger Control tab shown below has all of the options from the Commands menu selected for illustration.

The numbers in green correspond to the section in the manual for a description of functionality.



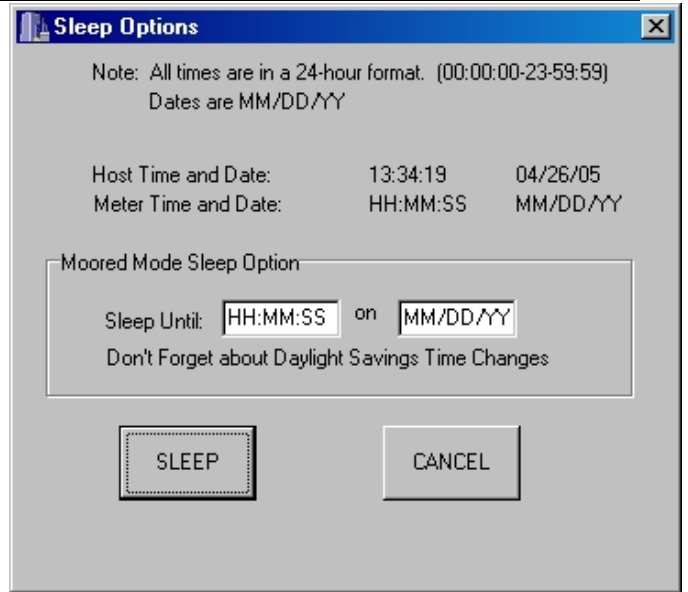
6.2.1 Operational Controls

Begin Sample will start the sequence setup currently stored in the data logger. Note that if you have changed settings, you must press **Send Settings** to load the new settings into the logger. Use the **Get Setup** and **Send Setup** buttons to verify the desired setup is in the data logger.

Stop: Press to halt operations on the data logger and enter a stand-by mode.

Sleep: Causes a pop-up menu to appear with the options to:

1. **Sleep Now**—Go into a low power sleep until the data collection is started with the magnetic switch.
2. **Sleep Now**—Wake when a start command is received from the host PC.
3. **Sleep Until**—Sleep until the specified date and time and then start the sample sequence.



See Port Setup tab for descriptions on Flash Setup (6.1.7) and Setup File (6.1.8).

6.2.2 Low Voltage Cut Off

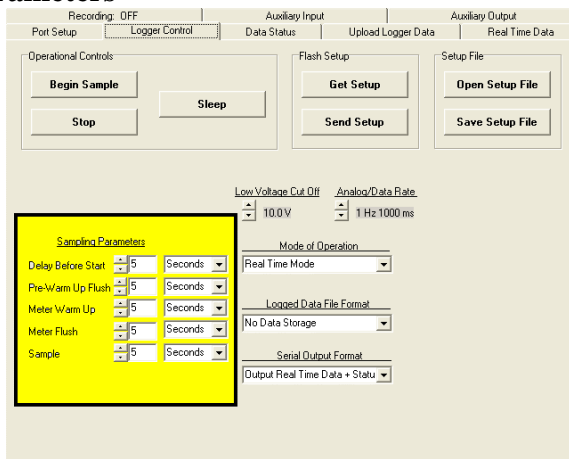
Sampling will stop if the input voltage to the data logger drops below the specified voltage. This is selectable from 6.5 to 14.0 volts.

6.2.3 Analog/Data Rate

Determines the speed at which analog data is transmitted and also selects the time interval for serial data packets. The selectable range is from 1 to 10 Hz, which equals sample intervals of 1000–100ms.

If the logger is being used with meters that output more than 1024 bytes of data per sample, set the Analog/Data Rate higher than the meter's sample rate to prevent data loss. For example, if a meter outputs 2500 bytes/second and samples at 1 Hz, set the logger to at least 3 Hz.

6.2.4 Sampling Parameters



Delay Before Start—An estimate of the amount of time required to remove the host cable and replace it with a dummy plug, and place the instrument suite in position for a drop. Enter a time longer than the deployment of the data logger assembly is expected to take, or the data logger may start the meter and pump for data collection while the data logger assembly is still on the deck, or in the air. Selectable in seconds, minutes, hours from 0–60.

Pre-Warm Up Flush—Useful for moored applications, where it may be desirable to set a longer flush cycle prior to meter warm-up.

Meter Warm Up—The amount of time the selected meters will be powered prior to meter flush time. This time is used to allow the instruments to stabilize electronically. During this time period the meter(s) are powered, but the pumps are not powered, and data from the meters is collected and displayed, but not stored. A warm-up time of 2–3 minutes is recommended. Valid warm up times range from 0–10 minutes. The total warm up time for the meters is the sum of the warm up time and the flush time. Selectable in seconds, minutes, hours from 0–60.

Meter Flush—The amount of time desired to flush the selected meters sample tubes of air bubbles and debris. During this time period, both the selected meters and the auxiliary pumps are powered, and data is collected but not stored. A time period of 10–30 seconds is recommended. Selectable flush times are 0–120 seconds.

Sample—The length of time required for the data sample profile or periodic moored sample. During this time period, the data logger will power selected meters, the auxiliary pumps, and will collect and store data from the meters. Selectable in seconds, minutes, hours from 0–300.

Sample Interval (moored mode only)—The interval of time between samples. Selectable in seconds, minutes, hours.

WET Labs meters have minimal warm up times that the data logger will adhere to. All ac-9 and SAFire meters are given a minimum warm up time of 10 seconds. If the sum of the warm up and flush times does not equal or exceed 10 seconds, the warm up time will be increased until 10 seconds is reached.

When a setup is sent to the data logger, it will review the meter types, select the longest warm up time required, and apply that warm up time to the setup. This means the user setting may be overridden.

Caution

The data logger does not receive the profile parameters until the *Send Setup* button is clicked on. You must press the *Send Setup* button to change the data logger profile parameters or the last saved profile parameters will be used.

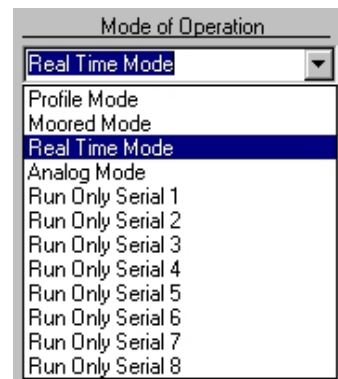
Caution

Clicking on the *Send Setup* button will cause the data logger to halt any current operation.

6.2.5 Mode of Operation

The data logger has twelve operating modes that are accessible from the Advanced User mode (right).

The last known mode the data logger was using will be shown under Mode of Operation.



Profile Mode

Profile Mode is used to determine the “profile” of the water column. While profiling, the data logger will perform one data collection cycle (delay before start, pre-warm up flush, warm up, flush, and sample), and then stand by for further commands from the host.

Moored Mode

To determine variances in the ocean environment at a single location over a long period of time, the data logger is placed in moored mode. While moored, the data logger will perform one data collection cycle (as in the profile mode), then go into a low power “sleep” for a preprogrammed period of time. When the period of time has expired, it will perform a second cycle (starting with warm up), and then return to a low power sleep. This cycle will be repeated until (1) battery supply is exhausted, (2) onboard data storage is used up, or (3) the data logger is retrieved and power is removed.

Real Time Mode

Real-time data logging is used to sample an area of water while the data logger and associated instruments are towed. As the name implies, data is not logged, but sent directly to a host PC. The instruments sample either continuously or intermittently depending on the preprogrammed setup.

Analog Mode

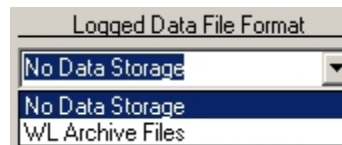
Selecting Power Analog Ports will power all the analog ports that have been selected on the Logger Setup tab after a minimum 5-second delay. An ASCII data stream will be output from the data logger, but the data will not be recorded.

Run Only Serial X (Serial #1 through 8)

Selecting either of these options will power only the instrument selected after a minimum 5-second delay. Data will be output but not recorded. Using these options will reset the operational setup for the Host.

6.2.6 Logged Data File Format

The data logger has two data collection options that are available from the Advanced User mode.



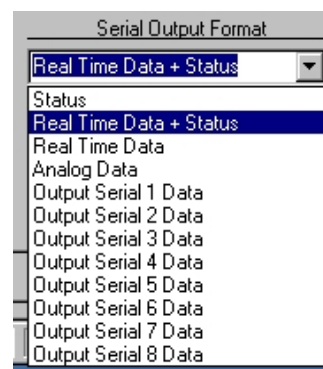
If **No Data Storage** is selected, data will be collected, but not stored. This allows the user to collect data for a length of time that exceeds the on-board memory capacity. This is useful if collecting data via a sea cable or larger capacity data logger, such as ac-9 Plus.

If **WL Archive Files** is selected, the data will be collected in 100 ms packets and stored in the standard WET Labs Archive File format. These files contain timing information that allows the WET Labs Archive Processing program (WAP) to merge the data in a time coherent manner. See Appendix B for a description of the WL Archive file format.

Please note: the timing information in the WET Labs Archive File format contains a significant amount of overhead that can consume a large amount of the data logger’s flash disk. This is particularly true of slow baud rate instruments that have a small record spread out over a larger period of time. For example, while collecting data from a CTD meter running at 1200 baud, the data logger may end up adding 20 bytes of overhead to just 10 bytes of data collected over the 100 ms time interval. The file will contain more timing information than data. The overhead usage on fast, “burst-mode” instruments is not as significant, as few hundred bytes of data may be collected in the 100 ms interval. In this case, the overhead may be reduced to only 10–20 percent of the data file. For more information on this option, refer to the WET Labs Archive File Processing User’s Guide.

6.2.7 Serial Output Format

There are several options for data output for the data logger (right). Under all options, the normal data logger status will be transmitted until the sample segment is reached. When the sample segment is reached the output format and host baud rate may change according to the output format option selected.



Status: Shows the overall data logger system operation in a binary format, suitable for display using the data logger Host program.

Real Time Data + Status: Will output all the real time data and the logger status.

Real Time Data: Will output all the real time data.

Analog Data: The host port baud rate will be unchanged and an ASCII record with all the analog measurements will be transmitted.

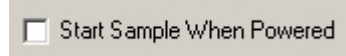
Output Serial X (Serial 1–8) Data: Outputs the data from the selected port during the sample. The host port baud rate will be changed to match the baud rate of the serial port selected.

Regardless of the output selected, the data from all the instruments selected will be recorded in the format specified in Logged Data File Format box.

Additional Controls

6.2.8 Start Sample When Powered

When Start Sample When Powered is checked, The meter will proceed immediately to Delay Before Sample when power is applied to the data logger. It is not necessary to select Begin Sample.



When a DH-4 is powered up and Start Sample When Powered was selected when the DH4 was turned off, the DH-4 will automatically start the programmed sample sequence after a four-second delay.

6.3 Data Status Tab

The Data Status tab provides real-time status information about each of the ports as sampling progresses.

Port Setup		Logger Control		Data Status		Upload Logger Data		Real Time Data		Recording: OFF		PC Logger	
Logger Serial Port Inputs				Logger Analog Inputs - Volts									
Port 1:	OFF	Port 5:	OFF	A1:	0.000	A5:	0.000						
Bytes/Second:	0	Bytes/Second:	0	A2:	0.000	A6:	0.000						
File Size:	0 K	File Size:	0 K	A3:	0.000	A7:	0.000						
				A4:	0.000								
Port 2:	OFF	Port 6:	OFF	Analog File Size: 0 K									
Bytes/Second:	0	Bytes/Second:	0										
File Size:	0 K	File Size:	0 K										
				PC Logger									
Port 3:	OFF	Port 7:	OFF	Port 1: In 0 Out 0									
Bytes/Second:	0	Bytes/Second:	0										
File Size:	0 K	File Size:	0 K										
Port 4:	OFF	Port 8:	OFF										
Bytes/Second:	0	Bytes/Second:	0										
File Size:	0 K	File Size:	0 K										

The following information is available for Ports 1–8 under Logger Serial Port Inputs:

1. **Port ID#:** Port is OFF, or shows the port type selected.
2. **Bytes/Second:** the number of bytes received in one second.
3. **File Size:** Shows the size of the file being generated by the meter. This is only correct if the Host is left connected to the data logger during data collection.

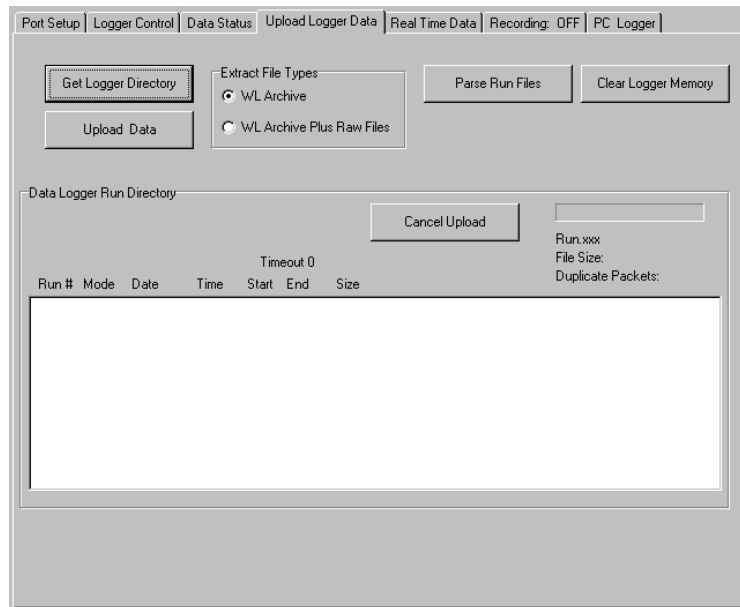
The Logger Analog Inputs—Volts provides a real-time view of analog data being sent to the data logger. Data is stored as a time-stamped ASCII file in table format.

Analog File Size: Shows the approximate amount of memory used for analog data.

PC Logger Shows the number of bytes read on each PC logger port.

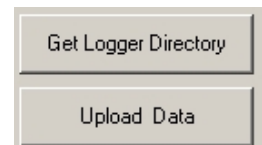
6.4 Upload Logger Data Tab

The Upload Logger Data tab allows you to extract sampling data from the data logger or to upload (save) and extract data from the data logger.



6.4.1 Get Logger Directory

Selecting **Get Logger Directory** will retrieve the run directory from which you may select one or more runs to upload. This can **ONLY** be performed with the data logger in standby mode.

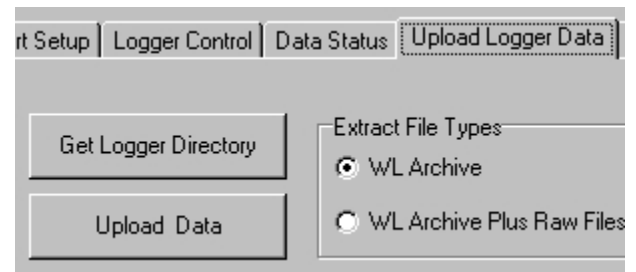


Each data logger run directory contains the information listed below.

Run #	000 to 999.
Mode (mode of operation)	Either Prof (Profiling) or MOOR (Moored)
Date	The date the run was started.
Time	The time of day the run was started.
Start/End	The measured supplied voltage at the start and end of the run.
Size	Total file size including all the data files and file overhead.
Serial	The serial port numbers (1–8) of any serial port that was active during the run.
Analog	The analog port number (1–7) of any analog port that was active during the run.
Pumps	The pump port number (1–4) of any pump port that was power during the run.

6.4.2 Upload Data

Selecting Upload Data will result in a window that allows you to name and save the file to which data will be saved.



6.4.3 Clear Logger Memory

Clear Logger Memory will clear the logger's flash memory.



Caution!

Once "Clear Logger Memory" is pressed, the data is not retrievable.

WARNING!

Turning off the data logger while memory clearing is in progress WILL result in a corrupted data logger file system.

Once the memory clearing process has started, the status will change to Clearing Memory with a red background. Data is stored in the data logger using flash memory. Depending on the amount of data stored, the number of runs recorded, and the flash memory size, clearing data may take several minutes. The status for the data logger must return to the Standby state before any further actions are taken with the data logger. This includes turning the data logger off.

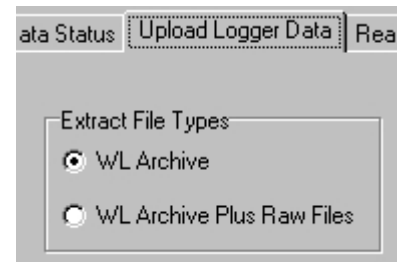
If, after clearing the logger's memory using the Clear Logger Memory button, the values for Free Disk and Total Disk are not zero, it will be necessary to clear the logger's memory in a terminal program.

1. In WL Host, select **Commands/Access to Factory Settings/Reset to Monitor**. The resulting window will ask if you are sure you want to cease operations and exit to monitor program. Select **Yes**.
2. Start a terminal program with settings at 9600 baud, 8 data bits, 1 stop bit, parity, none. Press **Enter** to display C: prompt.
3. Type “format,” press **Enter**. The resulting message “Formatting this drive will erase all its data. Are you sure?” Type “Y.” Type “app” then **Enter**.
4. Exit the terminal program, restart WL Host and verify Free Disk and Total Disk are both 0.

6.4.6 File Extraction Types

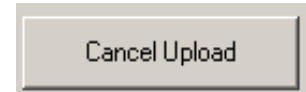
Extract WL Archive Files creates a file that combines the data from the files selected to view together.

Extract WL Archive Plus Raw Files will create individual files for each meter, as well as creating the archive file. The individual files do not contain any timing information.

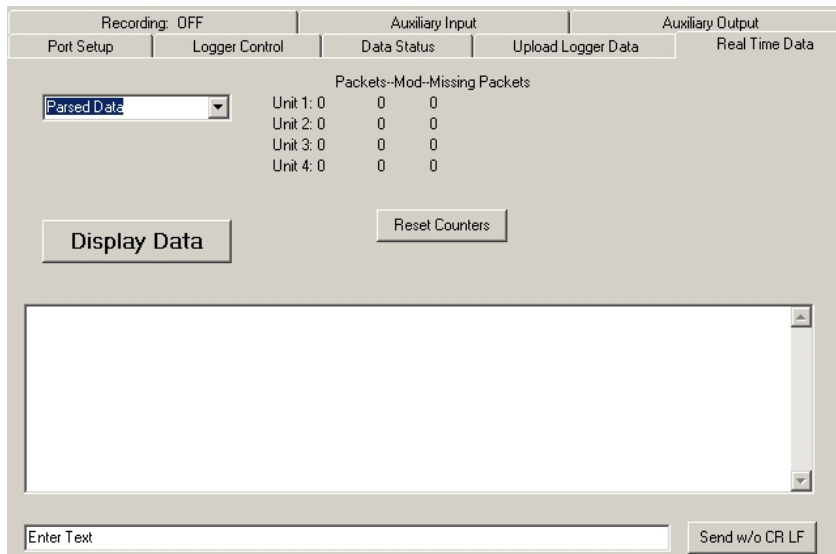


6.4.7 Cancel Upload

Cancel Upload will stop data upload. If multiple runs have been selected, you will be prompted to cancel all uploads or individual run uploads.

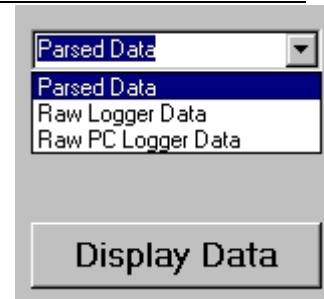


The **Real Time Data** tab is visible when in Real Time Output, Analog Output, or Advanced Logging/Output modes.



The top combo box allows selecting Parsed Data, Raw Logger Data, or Raw PC Data for output in the display area.

Display Data enables the output. Note that after it is selected, the button changes to Stop Display.



The Packets-Mod-Missing Packets indicates

- The number of DH-Mux packets received by the host PC for each Mux Unit ID
- The number of mod errors detected for each Mux Unit ID
- The number packets lost when the last mod error was detected.

This provides the user a method of monitoring the reliability of the Logger data links.

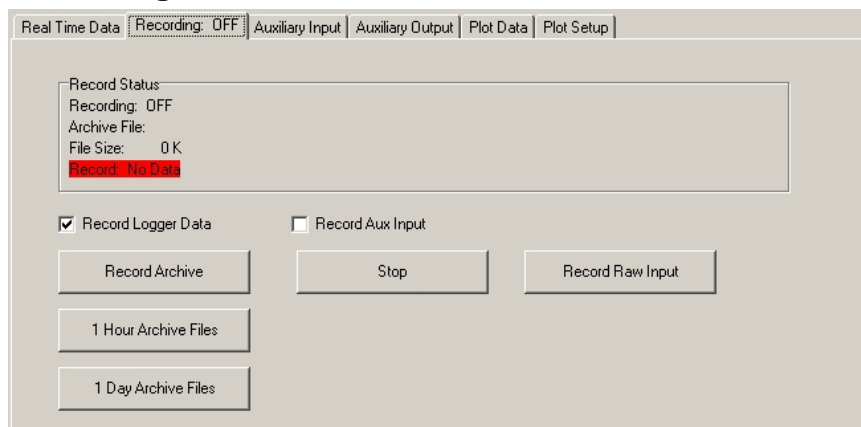
	Packets--Mod--Missing	Packets
Unit 1: 0	0	0
Unit 2: 0	0	0
Unit 3: 0	0	0
Unit 4: 0	0	0

Reset Counters allows you to reset the Packets-Mod-Missing Packets to zero.

You can send commands directly to a data logger with or without a line break by entering them into the box shown below. To send commands directly to a specific meter, select Test One Logger Port under the Commands menu, then enter the command text. Entering “break” will stop communication.



6.5 Recording: OFF/ON Tab



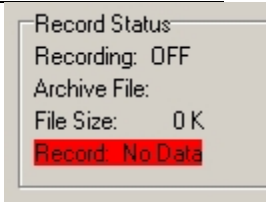
Record Status

Recording: Indicates whether data is being saved to an archive file on the host computer. It does not apply to the logger. Display is OFF or ON.

Archive File: Filename to which the collected data is being saved.

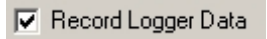
File Size: Size of file being saved. File size is updated every second.

Record: Indicates that the data is coming from either the data logger or a PC Logger as set up in the PC Logger tab. The appropriate checkbox must be checked as well. If the two are not in agreement, a yellow background will appear. If there is no communication, the background will be red.



Record Logger Data and Record PC Logger: Checking these boxes enables the user to determine what data is being recorded to the archive file.

If **Record Logger Data** is checked, all the real time data being received by the host from the DH-4 on the logger port will be recorded.



If **Record PC Logger** is checked and one or more Record PC Logger COM ports have been configured and are receiving data, the COM Port data will be saved in the archive file and will be given a Mux ID = 1.



Record Archive allows you to create a file that only contains the data from check sum verified DH-Mux records.

1 Hour Archive Files allows you to save data in one hour increments. Data will be time-stamped by the host computer in one-hour-long files.

1 Day Archive Files allows you to save data in 24-hour increments. Data will be time-stamped by the host computer in 24-hour-long files.



Replay Data activates the buttons below from the Real_Time_Tabs pulldown menu.

Record Raw Input button allows you to create a file that includes ALL the bytes received by the host program. This includes status records, DH-Mux packets, and/or any data received while the data logger is in a Direct Input mode.

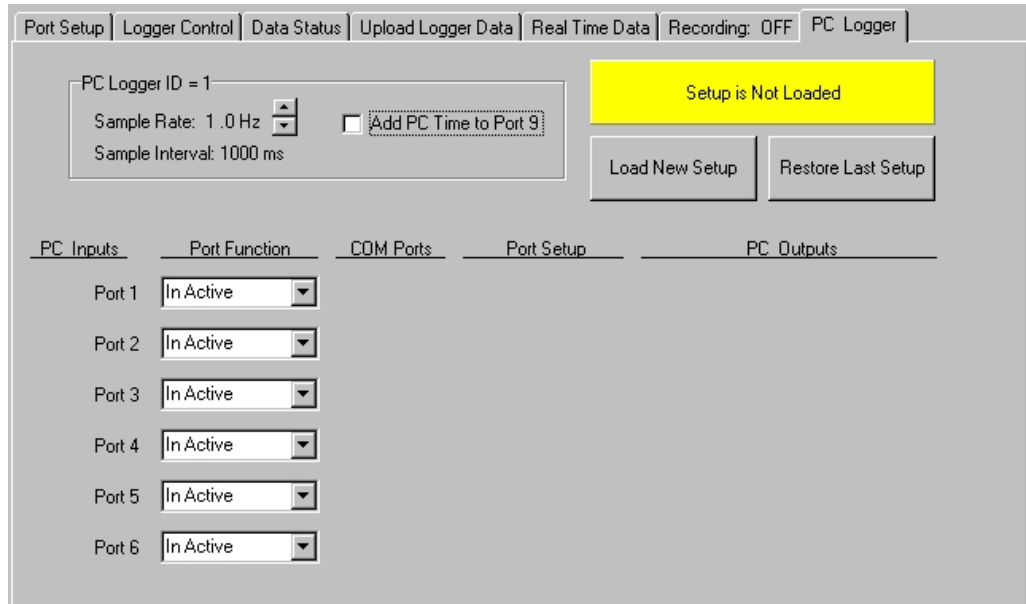


Once the file has been selected, the file status at the top of the main window will show that the host program is recording data. It will display the type of file, the file name and path, and the current file size.

Stop will end data recording.

6.6 PC Logger Tab

Options under this tab allow you to collect real-time data from individual instruments with the host PC while the logger is transmitting real-time data. The data from both the logger and the host PC are collected in the same archive file under the Recording tab.



PC Inputs	Port Function	COM Ports	Port Setup	PC Outputs
Port 1	In Active			
Port 2	In Active			
Port 3	In Active			
Port 4	In Active			
Port 5	In Active			
Port 6	In Active			

Auxiliary Logger ID: This value is hard-coded into the data logger's or deck box's firmware.

Auxiliary Sample Rate: Selectable at 1.0, 2.0, 3.0, 3.6, 6.1, 9.1, and 18.2 Hz.

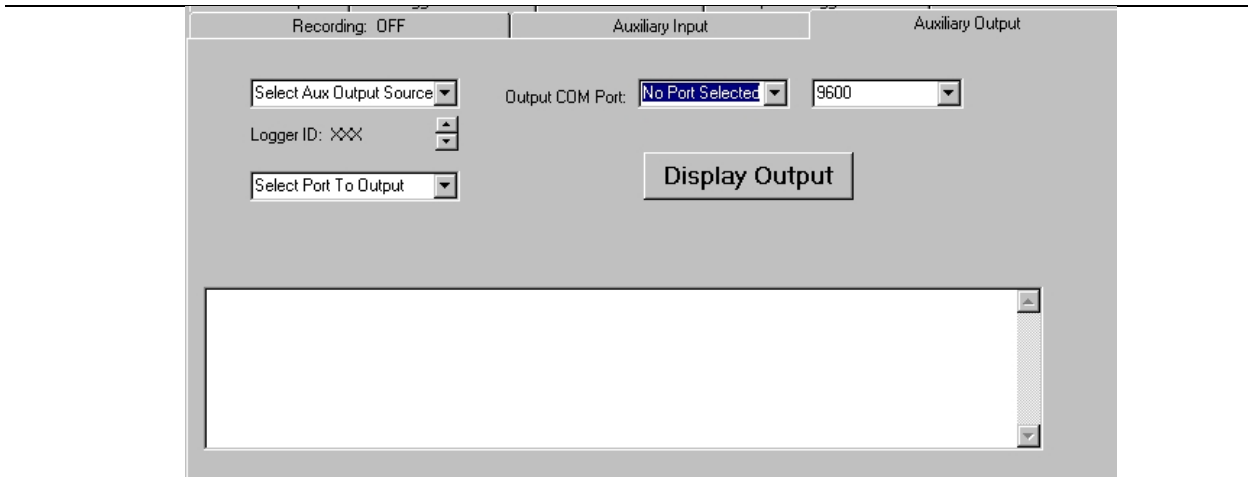
Auxiliary Input (1–6): Allows you to select a COM port and the appropriate baud rate for non-submerged data loggers.

Port Function—Each PC Logger (COM) port can be configured as Meter Input or Logger Output.

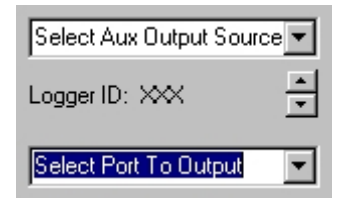
- If a port is selected as Meter Input, the data will be given a Logger ID=1, and it will be assigned a Port ID according to its position on the list of available ports. The user will need to select an available COM port and set up the port's baud rate.
- If a port is selected as Logger Output, the user must select the COM port, the data rate, and the data source. The data source can be any of the input data streams and is identified by the Logger ID (1=PC Logger, 2=DH-4) and the Ports 1–8.

6.7 Auxiliary Output Tab

The options on this tab are used to set up a second host PC serial port to transmit the data from a single channel of a data logger's data stream. All parameters must be set correctly to enable the data transmission.



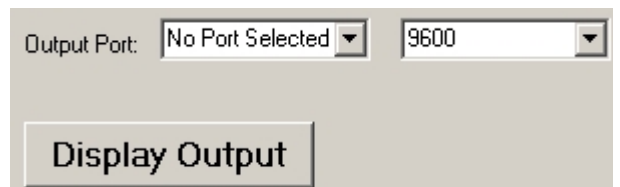
Select **Output Parsed Data** to enable data transmission. By selecting **No Aux Data** all data transmission will be stopped. Selecting any other option will enable the specified channel's data to be selected for transmission.



Logger ID is selectable from 1–4. Applies only if **Output Parsed Data** is selected.

Select **Output Serial 1–8** or **Output Analog Data** output data from the selected serial port or all the analog ports.

Output Port: Select COM Ports 1–10, and the associated baud rate.



Display Output displays any data being transmitted out the serial port. Note that after the **Display Output** button is selected, the button changes to **Stop Display**.

7. DH-4 Custom Configuration Work Sheet

Each DH-4 ships with a configuration sheet specific to that logger. It is designed to assist the user in understanding the function of each bulkhead connector, and which logic port in the Host program each connector is associated with.

The table below is meant to be used as a worksheet to aid in the setup of additional or replacement meters connected to the DH-4. The two left columns refer to the DH-4 hardware and the rest relate to settings in the Host program.

Connector Definition		WET Labs Host Software, Port Setup			Logger Control	
Connector # (clockwise from host)	Connector Class	Port #	Data Type	Instrument Type	Data Rate	Min. Voltage
Connector:						
Connector:						
Connector:						
Connector:						
Connector:						
Connector:						
Connector:						
Connector:						

Refer to the Custom Configuration Sheet that shipped with your meter for the factory settings, or edit for a specific application. See Section [6.2.4](#), Sampling Parameters, for details.

WET Labs Host Logger Control Settings			
Delay before start		Low Voltage Cutoff (minimum operating V from table above. Use highest value)	
Pre-warm up flush		Analog Data Rate (from table above. Use fastest meter's data rate.)	
Meter warm-up		Power level	
Meter flush		Time update mode	
Sample			

The table below lists supported meters, their data type and rate. See Section [6.1.1](#) for details.

Instrument type	Data type	Rate	Instrument type	Data type	Rate
a-Beta	ASCII	9600	CTD-SBE37SM	SBE37-SM	9600
ac-9	AC-9	19200	CTD-SD204 (SAIV)	ASCII	9600
ac-s	AC-S	115200	GPS	GPS	4800
ASCII meter (undefined)	ASCII	Undefined	Hydroscat-2 and -6	ASCII	9600
Binary meter (undefined)	Binary	Undefined	LISST-100 and -100-TS	ASCII	9600
C-Beta	ASCII	9600	NOT USED	OFF	
Depth	ASCII	9600	PH meter	Analog	
DH4	DH4-Mux	115200	Serial BH to Pump port	Pump	
ECO (G2)	ASCII	9600/19200	Output port	Remote-host	
ECO (Shuttered)	VSF-S		SAFire	Binary	
FRRF/FRRF-TS	ASCII		Satlantic	Binary	
ASCII	ASCII	4800	Voltage	Analog	
CTD-SBE37 and 49	ASCII	9600	WL Flow	ASCII	9600
CTD-SBE23 and 43	Analog		WETStar	Analog	

Refer to the Custom Configuration Sheet that is specific to each meter to determine the bulkhead connector order. Note that the Host bulkhead connector is #1. These pin-outs represent standard bulkhead connector wiring. Refer to the meter-specific Custom Configuration Sheet to determine if a particular DH-4 follows the functions listed below.

Connector Class A (Host)

Pin	Function	Diagram
1	Ground	<p>MCBH-6-MP</p>
2	RS-232 RX	
3	RS-422 Y	
4	V+ (10-18 VDC)	
5	RS-232 TX	
6	RS-422 Z	

Connector Class B (Single Analog)

Socket	Function	Diagram
1	Ground	<p>MCBH-6-FS</p>
2	Analog signal 1	
3	Analog 1 ground	
4	N/C	
5	N/C	
6	N/C	

Connector Class C (Dual-channel Analog)

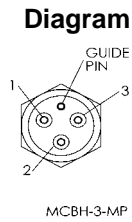
Socket	Function	Diagram
1	Ground	<p>MCBH-6-FS</p>
2	Analog signal 1	
3	Analog 1 ground	
4	V+ (10-18 VDC)	
5	Analog signal 2	
6	Analog 2 ground	

Connector Class D (Serial)

Pin	Function	Diagram
1	Ground	<p>MCBH-4-FS</p>
2	V+ (10-18VDC)	
3	DH4 RS-232 RX	
4	DH4 RS-232 TX	

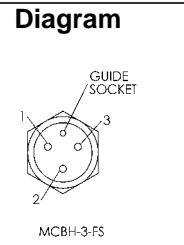
Connector E (Battery)

Pin	Function
1	Ground
2	V+ (10–18VDC)
3	N/C



Connector G (Pump)

Socket	Function
1	Ground
2	V+ (10–18 VDC)
3	N/C



Connector F (8-pin Host)

Pin	Function	Diagram
1	Ground	<p>MCBH-8-MP</p>
2	RS-232 RX	
3	RS-422 Y	
4	V+ (10–18 VDC)	
5	TS-232 TX	
6	RS-422 Z	
7	RS-422 A	
8	RS-422 B	

Appendix A: Optional Hardware Configurations

A1. Status LED

Depending on the user's requirements, the data logger may have been built with a status LED. This LED is used to indicate to the user which of the current operating segments the data logger is in when the user is either not using the host program for status or the user is not in a position to view the host program.

Regardless of how the data logger is started, the Status LED will flash according to the following sequences.

Delay:	One second on, four seconds off
Pre-Warm Up Flush:	One quick flash (50 ms) per second
Warm Up:	Two quick flashes per second
Flush:	Continuous quick flashes
Sample:	One flash (100 ms) every second
Sleep	Status LED is off

A2. Magnetic Switch

Some of WET Labs data loggers are equipped with a magnetic switch. This is a logic/control switch, not a power switch for the data logger. Applying power to the data logger will cause the data logger to become fully active, regardless of the magnetic switch's position.

WET Labs uses two different nomenclatures, providing the same utility, for its data loggers (Figure 1):

1. **RUN or ON**—Placing the magnetic actuator in the data logger's Run/ON position tells the data logger that start has been selected. If the other steps identified in Section 5 have been followed, a data sample will begin.
2. **OFF or Removed**—Removing the actuator from the Run/ON position tells the data logger to terminate the current sample if (and only if) the magnetic switch was used to initiate the sample. The actuator does not need to be placed an OFF position to terminate the sample; simply removing the actuator from the Run position will provide this function. The OFF position is merely an actuator holder and is not found on all data loggers.

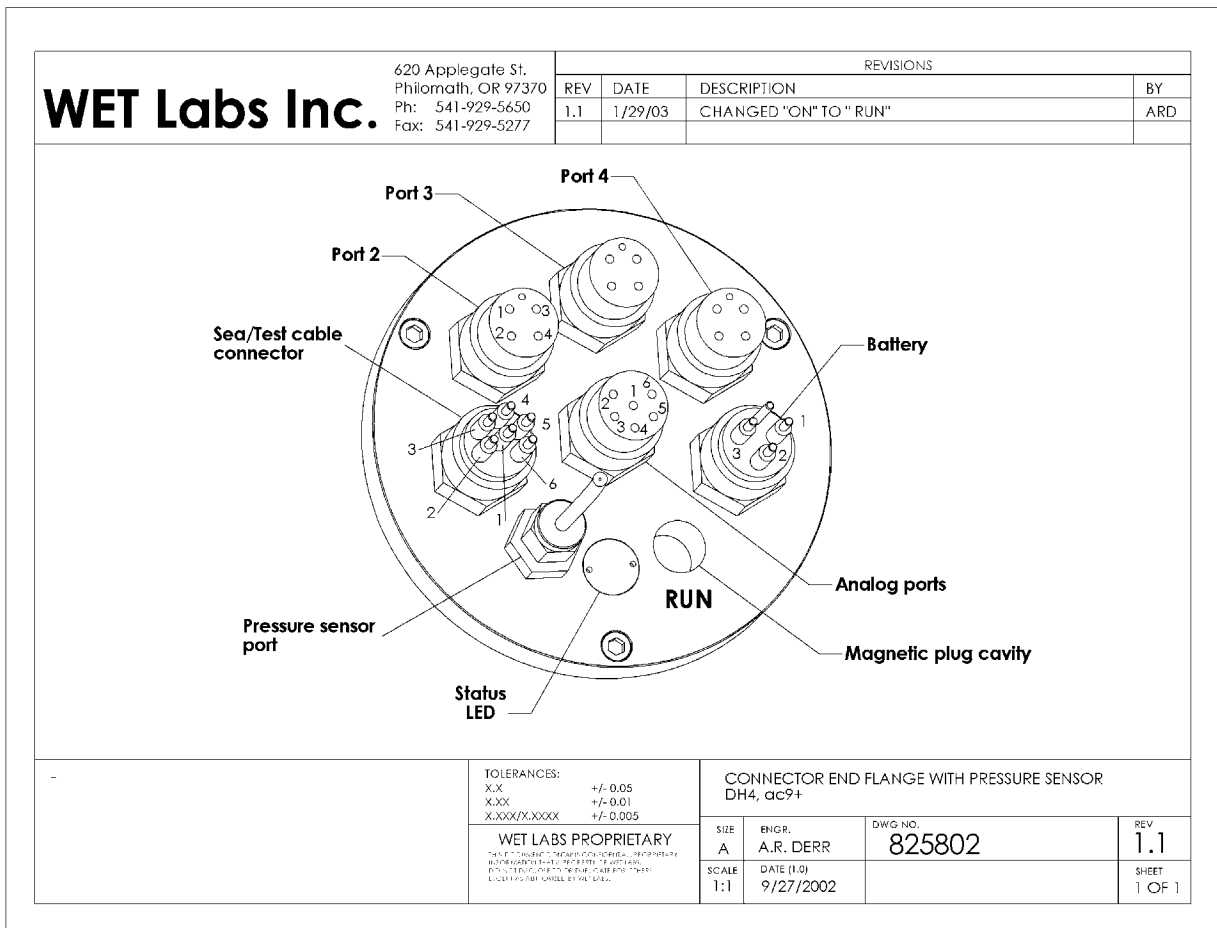


Figure 1. Example connector and RUN configuration

Appendix B: Real-Time Data Format

The data logger format consists of sequence binary data packets that incorporate a packet time stamp, data from all ports for the current time interval, and a packet check sum to allow validation on the receiving end. The header and Check Sum bytes are stripped off each packet before it is saved as a WET Labs Archive file.

The DH-Mux packet format is:

<u>Function</u>	<u>Size (bytes)</u>	<u>Default/Range of values</u>	
Header	2	0x0808	Always
Destination	1	0x01	Always
Packet Type	1	0x00-0x01	0x00=pre 6.0, 0x01=6.07 and later
Sender	1	0x00-0x04	0x02—Used for time corrections
Modulus	1	0x00-0xFF	Increments by 1 each packet
Data Length	2	0x00-0x0960	0–1024
Time	4		Packet time in ms or 100 th /second
Channel 1 Size	2		Number of bytes from Serial 1
Channel 2 Size	2		Number of bytes from Serial 2
Channel 3 Size	2		Number of bytes from Serial 3
Channel 4 Size	2		Number of bytes from Serial 4
Channel 5 Size	2		Number of bytes from Serial 5
Channel 6 Size	2		Number of bytes from Serial 6
Channel 7 Size	2		Number of bytes from Serial 7
Channel 8 Size	2		Number of bytes from Serial 8
Analog Size	2		Number of bytes from all Analog Ports
Data	0-1024		Data laid out in order Channel 1–8 + analog
Pads	4	'####'	Pad characters
Check Sum	2		Summation of all bytes from Header-Data

Note: the archive file packet is the same as the real-time format except the Header and Check Sum are not present.

Appendix C: File Handling

The data logger ships with the following file types:

- .wlh: wet labs host, the factory-set defaults for the host program software
- .lst: logger setup file, containing the instrument settings for the data logger firmware
- .plt: plot setup files
- .hdw: hardware setup files
- .alg: analog setup files

The .wlh and .lst file extensions are typically the only types used. When you press **Get Setup** in the host program, you are loading a .lst file with the logger's last saved settings. You may overwrite those settings by changing configurations in the host software and pressing **Send Setup**, thus changing the firmware. If you choose to save those configurations, pressing **Save Setup File** will save the file as a .wlh file. This can be retrieved at a later date by selecting **Open Setup File**. When you select **Get Setup**, the last configurations sent to the logger will be used.

If you do not need to change the factory default settings, you need only select **Get Setup** each time you use the data logger.



Revision History

Revision	Date	Revision Description	Originator
A	3/9/00	Release v. 7 host software (S/N 020 and above) (DCR 33)	D. Romanko
B	3/26/01	Add ASCII Archive Files to host software data options (DCR 100)	D. Romanko
C	1/2/02	Correct pinouts for v.7 (DCR 174)	S. Mole
D	5/6/04	Update user's guide and software (DCR 387)	D. Romanko
E	10/14/04	Correct class D connector pin-out and ac-9 data rate (DCR 434)	A. Barnard
E1	4/28/05	Update to reflect v. 7.03 software	D. Romanko