TERRA SLS
SURFACE LOGGING SYSTEMS

MLogger and TControl Rig Up and Configuration Manual

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Getting the MLogger Rigged Up

1. Plug the UPS (uninterruptible power supply) into a power outlet.
2. Turn on the UPS by holding the Power button until the UPS beeps (approximately two seconds). **DO NOT** plug in high current items like laser printer, heat lamps and coffee makers into the UPS. The more equipment plugged into the UPS, the less battery backup time. Under normal load conditions a fully charged UPS battery will provide power for 1 hour. If there are problems see UPS Troubleshooting.
3. Attach the sample and exhaust lines to the appropriate poly-flow fittings at the back of the instrument. The sample line from the trap should be attached to the fitting marked **Sample in**. Exhaust lines must be attached to the fittings marked **Exhaust** and ran outside. You don't necessarily need to connect a line to the **Zero Air** fitting or **Carrier Air** fitting. If you do, be sure to run these lines away from the exhaust lines.
4. Connect to the EDR (Electronic Drill Recorder) workstation using the gray Null Modem (9-pin) cable. There are two 9-pin connections on the MLogger. COM1 is located on the front and COM2 is located at the back (COM2 is the default connection used in the TControl program).
5. Connect the Ethernet cable that provides internet to the MLogger into the red Ethernet port. This port is labeled WAN (Wide Area Network). Most EDR companies will provide a wired internet connection.
6. Connect the blue Ethernet cable to any blue Ethernet port (this cable is provided by Terra SLS). There are two Ethernet ports located at the back of MLogger labeled with a "3" and "4". There is also one Ethernet port located at the front. The MLogger also has a wireless connectivity that can be used.
7. Connect the black power cord to the three prong socket at the back of the MLogger. Plug this power cord into the Powerware Battery back up unit.
8. Turn the instrument on (The power switch is located at the back next to the power cord socket). There are two green lights on the front of the instrument, near the top. The lower green light is the Hard Drive activity light; it will flash while the system is booting and occasionally while the system is running. The upper green light is the "**I'm Alive!**" light. It will blink on and off continuously when the MLogger program is running. Wait until you see the green "**I'm Alive!"** light begin a slow, steady blink before attempting to connect with the TControl program. It can take up to six minutes for the **"I'm Alive!"** light to begin blinking. Please be patient. If the **I'm Alive** light has not begun to flash after six minutes, again, please be patient. Some MLogger's may have been shut down improperly and is performing a scan disk that will require eight to ten minutes to come alive.

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There is a video of this procedure located at:

http://www.terrasls.com/html_pages/downloads.html

New Hardware and Software Note

Beginning in January '08 there is a new software version of TControl and MLogger. **TControl 2-6-5** and **MLogger 2-6-23** are designated as the latest upgrades to the MLogger TGC-C, TGC, TG models. Some units will still be running the older versions designated TControl 2-6-3 and MLogger 2-6-11. Downloads of both versions of the current TControl software are available at our website:

http://www.terrasls.com/html_pages/downloads.html

New MLoggers have wireless capability and will have a large label on the outside of the box to identify this. The following instructions are found on this label:

1. Left click on the  icon.
2. Left click on the **Control Panel** icon; and double left click on the **Network Connections** icon.
3. Right click on the **Wireless Network Connection** icon and select **View Available Wireless Networks** from the pop-up menu.
4. Identify the correct wireless connection (i.e. **MLogger)** and left click on the MLogger connection, and then click on **Connect.**
5. Next, type in the network key: **12345678** and then confirm. When a connection is made, open the TControl software to connect.

Getting TControl Set Up

1. TControl is the program that controls the MLogger gas detector. This program needs to be installed on a Windows computer. There are two ways to load this program on the computer. There is a CD provided in the front lid of the MLogger, or a download from the web at:

   http://www.terrasls.com/html_pages/downloads.html
2. Turn off all firewall programs including the Windows firewall. If turning these firewalls off presents a problem, then please allow the TControl program as an exception in those programs.
3. Set the computer to obtain network addresses automatically. This is a default setting for most all computers, but the settings can be found in the network connections properties.
4. Connect the blue Ethernet cable coming from the MLogger into the computer's network Ethernet port. If the wireless connection is used, then please connect to the wireless network SSID "MLogger". Please refer to the instructions listed for this connection located on the top of the MLogger's case.
5. Check for the MLogger's flashing, green "I'm Alive" light before attempting a connection.
6. Open up the TControl program by double left clicking on the red and blue "T" icon: 
7. Left click on the "Connect" option from the program's tool bar located at the top of the window.
8. Select the local connection address of: 192.168.123.3 from the drop down menu. Left click on the connect button in the "Connect to Logging Device" window.
   a. NOTE: If a remote connection is being attempted, then a static public IP address is required.

9. A window will appear that will ask for passwords to be set up. This is the project creation window.
    a. NOTE: If a window appears and prompts a password to be entered, then the MLogger has not been "Nuked".

How to Nuke a MLogger

At the beginning of a well, the system must be erased and reset (*Nuked*). This must be done while the green **"I'm Alive"** light is blinking or it will not take effect. The system is "**Nuked"** by inserting a pencil or pen into the small hole at the back of the instrument, above the 20 pin connector. There is a small button inside that needs to be held down for 5 seconds. Don't push too hard! This Nuke will force a reboot of the system and will require eight minutes for the system to go down and come back up. The TControl software connected at the time of a Nuke will display a "lost connection" error.

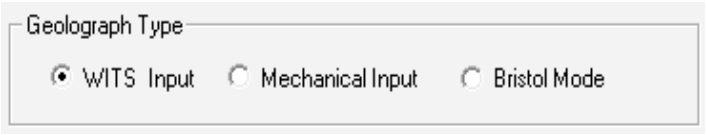
All control and edit functions on MLogger are done from your Windows computer. You must be logged on to MLogger to edit or control it. You do not need to be logged on for MLogger to log. Once MLogger is set up and turned on, it will log using settings that you have specified.

Creating a Project

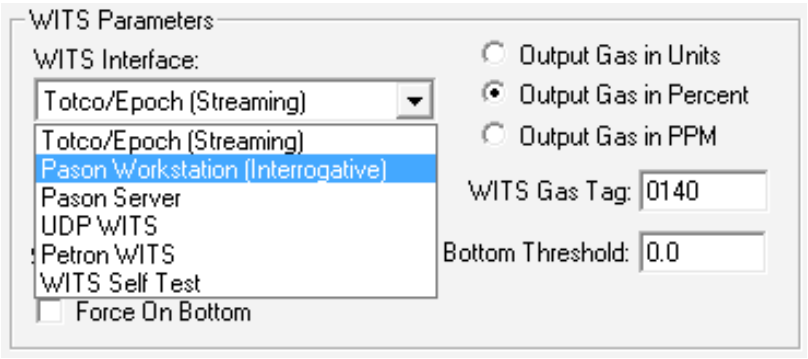
The first connection to a system after a Nuke will prompt the **Setup TControl Project** dialog box. This is where the passwords are set for the Logger and Observers.

1. These passwords must contain three or more characters, and the Logger password must be different from the Observer password.
    a. NOTE: these passwords are case sensitive and every field must be filled.
2. The Project Description is the generally accepted place to name the well along with a starting depth.
    a. NOTE: MSI recommends providing a starting depth to the well name for easy record keeping. It may be necessary to Nuke and set up a project more than once during an active well.
3. Verify the time and date displayed by the set up window. It may be necessary to change this to the correct time being observed by the rig.
    a. NOTE: TControl initially sets the project time and date to match the computer's time and date.
4. When the first three steps are completed to satisfaction left click on the connect button.
5. A series of dialog windows will appear and disappear as the connection is made. When the connection is successful, green numbers will appear in the **Logging Parameters Area**, and the TCP/IP status box should show a green **OK**. There is a small sphere in the lower right corner of the **Logging Parameters Area** labeled **XMT/REC** (Transmit and receive). If connected properly and everything is working, the XMT/REC button will flash green.
6. Set up the geolograph type in order to communicate with the rig.

a. Connect to the rig's WITS (Well site Information Transfer Standard) via the EDR (Electronic Drill Recorder) workstation.
    i. NOTE: the Null Modem cable must have one end connected to the EDR workstation and the other end connected to the **COM 2** port located at the back of the MLogger.
    ii. In TControl left click on **Setup**, and notice that the next window displayed is open to the **Geolograph** tab.
    iii. Set the **Geolograph Type** to **WITS Input**.



    iv. Next, in TControl, set the **WITS Interface** to the type of EDR you are connected to: Pason, Totco, or Epoch, etc. Select the appropriate one.
        1. NOTE: With our latest software there are a few menu options for talking WITS to an EDR. When working with Pason we recommend using **WITS Interrogate Mode**. All other EDR companies will use **Streaming WITS**. The separate WITS modes for Epoch, Totco, and Pason will work just as they did with the earlier versions of TControl.



    v. Verify that the **WITS Port** is set to **Com 2**.

        1. NOTE: The MLogger has the ability to report gas data, recorded from MLogger, back to the rig. Some EDR's prefer the gas value in percent, some in units, or ppm. Select the appropriate button. The **WITS Gas Tag** box refers to the track the rig will monitor the MLogger's measured gas. The standard track is **0140**. This value should not be changed unless the EDR service representative instructs you to.

If the EDR Company needs to manually configure their system, these are the parameters that the MLogger needs to receive: **(Starting in TControl version 2.6.5040 and later, only records 0108 and 0110 are required.)**

The MLogger uses WITS Level 0 and the following records

Bit Depth……0108
Hole Depth…….0110
SPM Pump 1……..0123
SPM Pump 2……..0124

b. If the rig uses a mechanical geolograph, select **Mechanical Input** by adding the bullet mark to the empty white circle. Any mechanical sensors need to be wired into the corresponding named terminal on the 20-pin connector located at the back of the instrument. If the mechanism has its own power supplied, (e.g. a depth recorder that sends a pulse) then it needs to be hooked up to the MLogger as follows:

   i. The lead that has power on it needs to be hooked up to the terminal pin that does **not** have a plus (+) sign next to it and the other lead will need to be hooked up to the rig ground (pin 1). Every pin with the plus sign designation next to it is a pin that has power supplied to it.

   ii. If the mechanism or switch needs to have power supplied to it from the MLogger, (up to 24 DC volts) then connect one lead to the terminal pin marked positive and the other to the adjacent terminal pin. If the adjacent pin has no sign this designates it as being negative.

      1. Set the **Depth Units/Tic** to correspond to the depth wheel or any other switch used to measure the depth. The **Anti-Bounce (Sec.)** feature is in place for recorders that bounce due to rig vibration. The default is set at five seconds and will only allow one switch closure every five seconds before resetting to accept another closure. Set the default value for the off bottom switches and pump stroke switches by adding a check mark to the appropriate box.

7. Set up the well logging parameters.
   a. Left click on **Setup,** and then left click on the **Depth/Lag** tab.
   b. Set the current depth and initial Lag time in minutes or strokes. Lag time or lag strokes is the calculated time or strokes for "bottoms up" at the current depth.
   c. Lag inc. (increment) time /100 ft. or strokes /100 ft. are the calculation of the increase in the lag time or lag strokes over 100 drilled feet.
   d. Select the **Lagging Mode.** There are three choices for Lagging Mode.

Constant Interval (ON/OFF BOTTOM), lags by time and counts all the time the rig is **ON Bottom**, but does not count the time the rig is **Off Bottom**. No consideration is given to pump information. On/Off bottom is determined from information received from the rig.

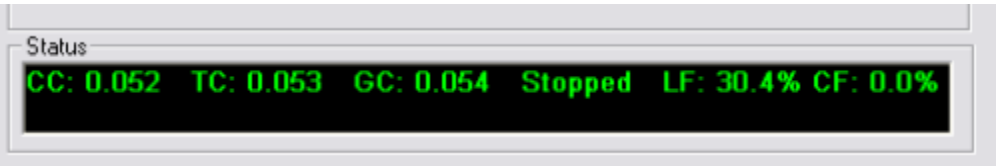
Constant Interval (Pump ON/OFF), lags by time and counts the time that the pumps are circulating (**Circ.**). It will not count the time that the pumps are not circulating (**NotCirc.**). No consideration is given to ON/OFF Bottom status. Pump activity information is determined either by your analog sensors or by the rig's electronic drill recorder.

Pump Strokes will calculate lag by counting pump strokes. Verify which pumps are actually on the hole and make the appropriate selection in the **Pump Properties** window. The system will then calculate the lag based on which pumps are selected and functioning on the rig as well as the volume of each pump.

Auto Pump Strokes (Using Hole Profile) is a new addition to TControl ver. 2.6.5. This volumetric lag calculation uses the dimensions of the drill string and the hole to calculate lag time. After inputting the characteristics of the hole profile, string profile, and the pumps TControl will automatically determine the pump strokes.

Zero the Filaments Using the Status Bar

1. Locate the flow meters on the front of MLogger and verify that you have sample flow. The TG FLOW should be around 0.5 SCFH (standard cubic feet per hour). The MAIN FLOW should be set at 5 – 6 SCFH. A model TGC has a third flow meter labeled GC FLOW, and should be adjusted to read 0.5 SCFH.
    a. **NOTE**: the internal pump will only draw 6-7 SCFH from the trap. If you need a higher flow rate, connect a booster pump in series with the MLogger.
2. Locate the ball valve on the front of the instrument labeled: **Zero Air** and **Rig.** Turn the valve to **Zero Air**.
3. Locate the Zero knobs on the front face of the Instrument. On the Model TG there are two, one labeled TCD ZERO, and one labeled CCD ZERO. On Model TGC there will be a third knob labeled GC Zero. These are the adjustment knobs for the gas detector filaments and have a ten turn span. In other words, starting at one end of the potentiometer the knob will make ten rotations before stopping at the other end.
    a. NOTE: the detector filaments should zero around 4 – 6 turns into each pot.
4. The filament values, in the **Status** bar of TControl, are displayed in green numbers and measured in volts.



a. Adjust the knobs until the value for all the filaments is **0.050**. It won't be possible to achieve a precise **0.050** because the signals will constantly drift. Obtain a value as close as possible to **0.050**. Turn the knob counter clockwise to decrease the filament voltage and clockwise to increase it.

5. After the filaments are zeroed, the **Total Gas** window should read between 0 – 6 (units) and the red gas curve will also display between 0 – 6 units.
6. Turn the ball valve back to **Rig**. The instrument is now zeroed on ambient air, and can be re-zeroed as often as considered necessary. Now the instrument is set up and ready to begin logging. It will continue to log, using the current parameters, until modified or shut down. Instructions for calibration are described in the pages that follow.

NOTE: Be sure to zero the CCD, TCD and GC filaments at least twice a day!!!

Calibrating the MLogger for Total Gas

Before calibrating read the following:

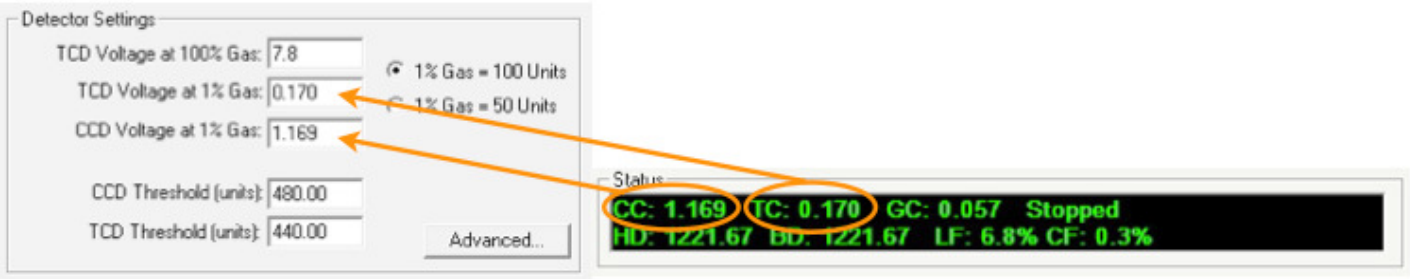
In TControl Version 2-6-5, the total gas is calibrated a little different than the earlier versions. The signal voltages for the CCD and TCD filaments are used to define the appropriate gain for each filament. This allows the MLogger to have a two-point (1% Methane and 100% Methane) calibration on the TCD filament which improves its linearity. Running the test gas into the **Sample In** port at the back of the system gives a complete gas check of the system.

- At least one test, with 100% Methane test gas, through the **Sample-in** port is recommended. Subsequent checks can be done using the **Zero Air** port; this will use less test gas.
- **All exhaust lines** must be connected to the MLogger and routed outside the work area.
- The **Zero Air** and **Carrier Ai**r lines must be routed away from the exhaust lines to avoid recycling any gas.
- Zero the instrument before any calibration is performed, (see Zero the Filaments Using the Status Bar).

Calibration with the 1% Methane Test Gas

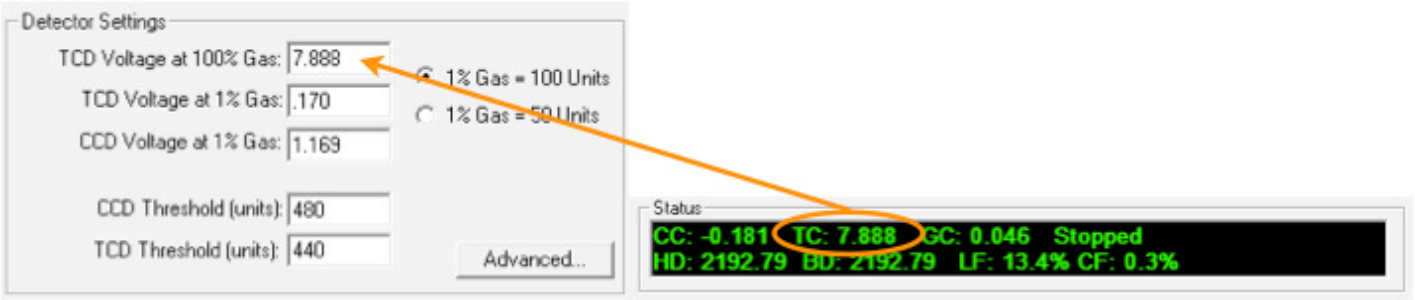
1. Zero the CCD and TCD detectors.
2. Attach the **1% methane** bottle (yellow label) to the **Sample In** port at back of the MLogger.
3. Open the valve on the test gas bottle, and verify that the ball valve is turned to **Rig**.
4. Check the MAIN FLOW meter and verify that gas is flowing from the bottle. The TG FLOW should be set at .5 SCFH air.
5. Observe the **Total Gas** climb until it reaches a maximum and begins to settle.
6. Left click on **Setup** in the TControl tool bar and then left click on the **Gas Detector** tab.
7. Look at the signal voltage for the CCD filament from the **Status** bar in TControl. Enter that number in the field labeled **CCD Voltage at 1% gas**.

8. Look at the signal voltage for the TCD filament from the **Status** bar in TControl. Enter that number in the field labeled **TCD Voltage at 1% gas**.
9. Left click the **Apply** button and then left click the **OK** button.



Calibration with the 100% Test Gas

1. Zero the TCD detector, and attach the **100% methane** (green label) to the **Sample In** port at the back of the MLogger.
2. Open the valve on the bottle, and verify that the ball valve is turned to **Rig.**
3. Then check the MAIN FLOW meter to verify that gas is flowing from the bottle. The TG FLOW should be set at .5 SCFH air.
4. Observe the **Total Gas** climb until it reaches a maximum and begins to settle.
5. Left click on **Setup** in the TControl tool bar and then left click on the **Gas Detector** tab.
6. Look at the signal voltage for the TCD filament from the **Status** bar in TControl. Enter that number in the field labeled **TCD Voltage at 100% Gas**.
7. Left click **Apply** and left click **OK**.



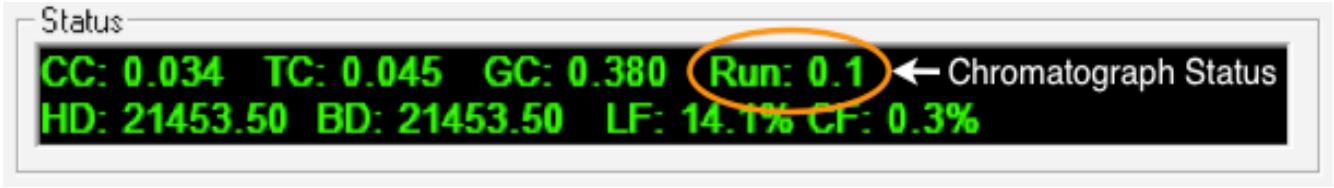
Calibration Values Will Remain In the MLogger Until Nuked

Calibrating the Chromatograph

1. Zero the GC filament. Instructions about zeroing the filaments can be found here.
2. Attach the 1% blend (white label) sample gas bottle to the test gas port on the front of the MLogger.
3. Turn the valve on the front of the MLogger to point to **Test Gas.** Open the valve on the test gas bottle.

a. NOTE: Turn the flow all the way up on the GC flow meter for maximum gas flow.

4. Left click on **Setup**, in the TControl tool bar, and left click on the C**hromat** tab.
5. Next left click on **Start a Calibration Run**.
6. Shut off the test gas after the chromat run has begun to count to avoid wasting test gas.
    a. NOTE: There is a chromat run indicator located in the Status box that will read **Stopped**, **Setting up**, or **Run** depending on state of the chromat valve. Notice that the run indicator counts increments of tenth's of a minute.
7. Adjust the GC Flow to 0.5 SCFH after the valve is turned from **TEST GAS** back to **RIG.**



Peak Height Calibration

A video of this procedure is available at: http://www.terrasls.com/html_pages/downloads.html

When a chromat run is finished and the chromat curves or peaks are visible, place the mouse cursor in the chromat window and right click. This will open the **Chromatograph Input** window.

NOTE: If the different curves or peaks are not clearly visible adjust the scales of the chromatograph. Left click here for the procedure to change the scale values.

1. Click on **Peak Height Calibration**, in the lower left corner of the **Chromatograph Input** window. The **Chromatograph Calibration – Peak Heights** window will appear.
2. Enter the 1% blend (white label) calibration gas PPM values into the **Input Sample PPM** table for all hydrocarbon components.
3. Move the cursor back to the chromat graph window and set the GC output scale (left hand scale) to the 0% (minimum) and 2% (maximum).
4. Move the cursor to the first peak and zoom in on it using the zoom function (left click here to read the procedure). Carefully place the crosshair at the top of the peak and left click. The peak height will appear in the calibrated scale factor column.
    a. NOTE: The numbers that appear in the Calculated Scale Factor column are scale factors only. TControl uses these values to find the PPM values after calibration is finished.
5. Repeat the same process for each hydrocarbon component.
    a. NOTE: Make sure the bullet in the Peak column is correctly associated with the right hydrocarbon.
6. After all the hydrocarbons have been given a scale factor, left click the **OK** button in the **Chromatograph Calibration – Peak Heights** window.
7. Left click on the **Save** button in the **Chromatograph Input** window.

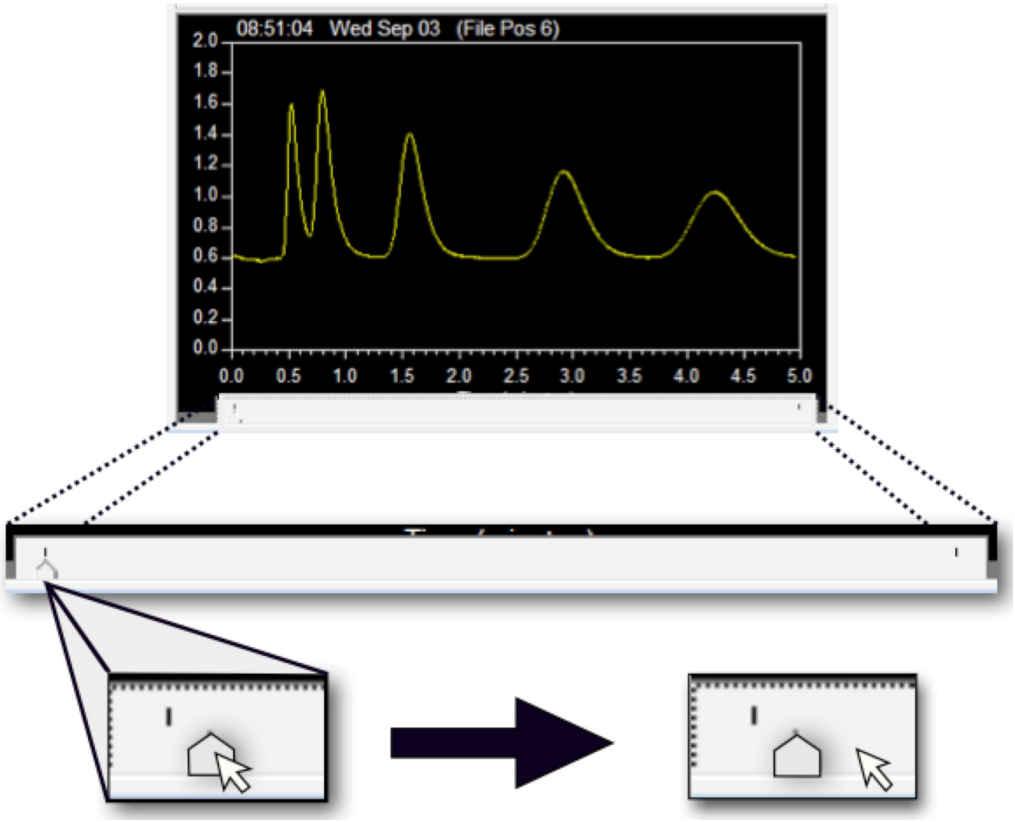
Integration Calibration

A video of this procedure is available at: http://www.terrasls.com/html_pages/downloads.html

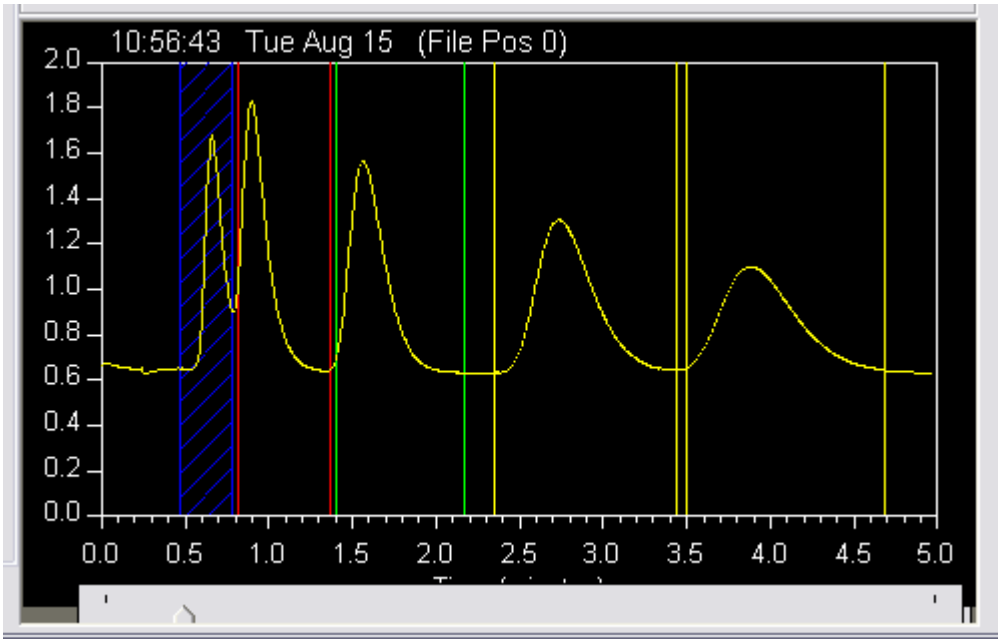
When a chromat run is finished and the chromat curves or peaks are visible, place the mouse cursor in the chromat window and right click. This will open the **Chromatograph Input** window.

NOTE: If the different curves or peaks are not clearly visible adjust the scales of the chromatograph. Left click here for the procedure to change the scale values.

1. Left click on the **Integration Calibration** button at the lower left of the window (below the Peak Height Calibration button). The **Chromatograph Calibration – Retention Times** window will appear.
2. Enter your calibration gas values into the **Input Sample PPM** table for all components (click here for a descriptive picture of the procedure).
3. Move the cursor back to the chromatograph window and set the GC output scale (left hand scale) to the 0% (minimum) and 2% (maximum).
4. Move the mouse cursor to the **Peak** column and place the bullet in the white circle next to C1.
5. Move the mouse cursor to the chromatograph window and look for a gray pointer at the bottom of the window, just below the horizontal time scale.



6. Use this gray pointer to move the different retention windows. Notice that the gray pointer is attached to a blue vertical line with hash marks; place this line on the right side of the C1 peak (first peak from the left).
7. Switch to the next retention line by moving the mouse pointer off the gray pointer and left click, but remain within the gray bar the pointer slides in.
8. Move the second blue retention line to the left side of the C1 peak.
9. Next, move the bullet in the **Peak** column to C2 and repeat the same process as with C1. Each hydrocarbon has a designated color for its retention window. C1 is blue, C2 is red, C3 is green, and i-C4 and n-C4 are yellow. Place the retention window around the peak that corresponds to the correct hydrocarbon.



10. After all the retention windows are placed with the correct peak for the correct hydrocarbon left click the OK button in the **Chromatograph Calibration – Retention Times** window.
11. Lastly, left click on the **Save** button in the **Chromatograph Input** window.

Using the Chromatograph

1. Left click on the **Setup** option in the TControl tool bar, and then click on the **Chromat** tab.
    a. There are two chromatograph run modes.
        i. **Start a Single Run** mode means you must manually start each chromat run by clicking on the button. The length of the chromat run is customizable and so is the valve open time. Valve open time controls how long the carrier air is directed through the sample loop.

ii. **Start Continuous Runs** mode, once started, continues to run over and over again until the **Stop Continuous Runs** button is activated. In this mode there is the timing option of setting an **Idle Time** in minutes. This is the amount of time the chromat will rest between chromat runs.

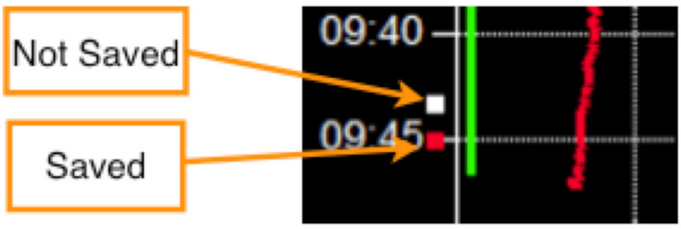
iii. **Stop Current Run Now** button is the emergency stop. For example, a gas kick may appear in the middle of a chromat run; this button will stop that run and make another run possible. Left click on any of the two chromat activation buttons to begin a new run to capture the gas show desired.

2. The MLogger user should determine the optimum chromatograph mode, timing, and carrier air pressure.
    a. NOTE: If a longer chromat run time and wider peaks are desired, then the user should increase the chromat run time and lower the carrier air pressure. If a shorter chromat run time and tighter peaks are desired, then decrease the chromat run time and increase the carrier air pressure.

Calculate PPM and Save Chromatograms

MLogger stores every chromatograph run as raw data. **The user determines which chromatograph runs should be calculated into PPM's, and saved in the data file for export using the following method:**

1. **Right click in the TControl chromatograph window. The Chromatograph Input window will appear.**
    a. **NOTE: there are no default calibration factors. The Scale Factor and Calculated PPM boxes will be zeros until the chromatograph is calibrated.**
2. **Select a chromatogram using the Previous, Next, and Latest buttons.**
    a. **Chromatograms are labeled as records, beginning with record 0 followed by the date and time they occurred.**
    b. **The logger window displays small white boxes along the side of the time scale. These represent unsaved chromatograms. After processing and saving the chromatogram, the white box will change to red.**
    c. **Placing the mouse cursor on any one of these small boxes and right clicking will open up the chromatogram that box represents.**



Peak Height Processing

NOTE: if the chromatograph was calibrated with the Peak Height Calibration method do not click the Integrate button to process the chromat. Likewise do not click on the peaks of the chromat curve when calibrated for integration. The scale factors are different for the two methods of calibration.

1. Once the instrument is calibrated you will apply the **Scale Factor** to the peak by first verifying that the bullet in the **Peak** column is next to the correct hydrocarbon symbol (C1, C2, etc.).
2. Position the crosshair as closely as possible to the top of the peak, zoom in on the peak if necessary and left click. A number appears in the calculated PPM column in the **Chromatograph Input** window. The bullet in the **Peak** column will automatically move to the next hydrocarbon.
3. Repeat this same process for each hydrocarbon.
4. Click on the **Save** button and this chromatograph will be saved in the data file. The log will show that a chromat has been saved by changing the small white box to a red box in the logger window.
5. Move to the next chromatogram, and repeat the process.

Integration Processing

NOTE: if the chromatograph was calibrated with the Integration Calibration method do not left click the chromatogram peaks to process the chromat. Likewise, do not click on the integrate button when the MLogger is calibrated for peak height operation. The scale factors are different for the two methods of calibration.

1. After the chromatograph is calibrated using the integration calibration method, select a chromatogram to process.
2. Use the **Previous**, **Next**, and **Latest** buttons to navigate to a chromatogram.
3. Verify that each curve is within the correct retention window.
4. Left click on the **Integrate** button and the PPM's are all calculated at the same moment.
5. Move to the next chromatogram, and repeat the process.

Setting Up the CO_2 Detector (Green Box Only)

1. Connect with TControl
2. Left click **Setup,** left click on the **Misc**. tab.
3. Left click on the **Request AUX Channel 1 box** from the **Request AUX Tracks from Logger.** A check mark should appear in this box.
4. Left Click on the **Select** button from the **Select WITS/Aux Plot Track** box.
    a. Scroll down to the bottom of the **LAS/AUX Plot Track** window and left click on the --- MLogger Aux Channel 1 or CO_2, PPM . This will highlight your selection.
    b. Left click **OK.**
5. Left click **Apply** and Then **OK**.
6. Adjust the CO2 flow meter to 0.2 SCFH for optimal readings.
7. Make sure no moisture develops in any jar filter.

Notice the new Aux track 1 or CO_2 scale just below the Total Gas, Units scale. This is the CO_2 scale and can be adjusted the same way as any other TControl scale. This unit is calibrated and ready to use once the AUX track is set from the steps provided above. It was calibrated from a mixture of 10% CO_2 and air. The CO_2 content is a certified 10% or 100,000 ppm from a specialty gas company. This infra red detector has a detection range of 0-20%. Later CO_2 MLogger models have been modified to perform 100% CO_2 detection (contact the MSI office to determine which MLoggers have this modification). **This detector is extremely sensitive to moisture**. Please have all moisture removed from the sample before it comes into the MLogger.

The calibration process is multi step process at this stage of development but not impossible to talk someone through. If this unit needs to be recalibrated for any reason please contact the MSI office for support.

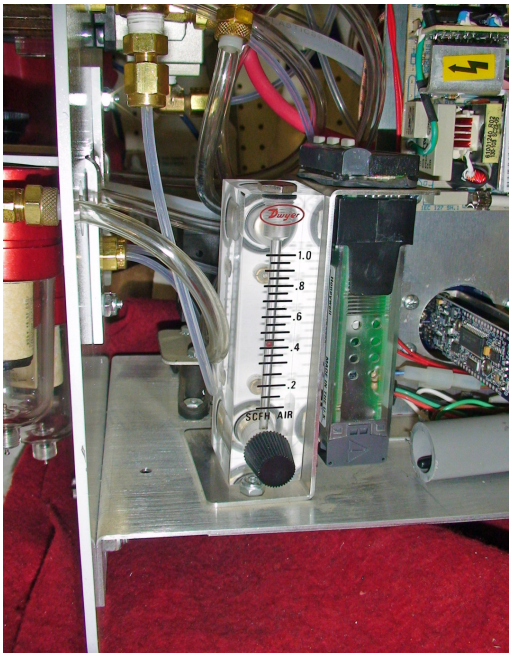
Calibrating the CO_2 Detector

1. In TControl, left click on the **Tools** option in TControl's task bar. This option is only available in TControl 2.6.5.
2. Select the **Monitor** option from the pull down menu and left click. This will open a window that may ask for verification before it will proceed. Select the "Yes" option when prompted.
3. Eventually a window will appear that will display all of MLogger's current data, this is the Monitor window.

4. Find the area in the Detector Data where the **Aux1 Volts** are displayed. This is where the Volts data used in the TControl calculator are found.
5. Go back to the TControl program and left click on **Setup** and then left click on the **Gas Detector** Tab.
6. Find the area called **CH 1 Two Point Measurement** and have the 10% CO_2 test gas ready to use.
7. The test gas needs to be hooked up to the Sample in port at the back of the MLogger. This is a blend test gas and the CO_2 part is 10%.
    a. When there is no test gas running in the unit, consider that to be 0% CO_2.
    b. Enter 0 in the **Measured1** field
    c. Enter the **Aux1 Volts** value from the **Monitor** window into the **Volts1** field.
8. Now turn on the test gas bottle and allow the gas to make its way through system (approximately two min.) and observe the **Aux1 Volts** in the **Monitor** window as it increases.
    a. Wait until the **Aux1 Volts** reaches a maximum (this will happen at approximately two minutes), and record that maximum value in the **Volts2 field** in TControl. Turn off the test gas once a maximum value is reached.
    b. Look at the label of the test gas bottle and find the CO_2 amount (usually 10%) and record that 10% in the **Measured2** field by typing in 10.
9. Left click on the calculate button and watch as the boxes next to the **CH1 Two Point Measurement** receives new values.
10. There should a positive number for the **Channel 1 Slope (m)** and a negative number for the **Channel 1 Intercept (b).**
11. Left click on the apply button and then left click on the OK button and the CO_2 detector is now calibrated.
12. Check the calibration by running some more test gas but do only a small amount. Let it run for about 45 seconds and turn off the test gas. The Aux 1 or CO_2 scale at the bottom of the TControl Logger Window Area should have a scale that will show the zero point in the scale.
    a. A gray line will start from the zero point and rise up to the 10% mark on the scale and then fall back down to the zero point. If the gray line is not quite on the mark then a slight adjustment is needed to the **Channel 1 Slope** and **Intercept** values.
        i. When on **Zero Air** verify where the gray line is in relation to the zero mark. If the line is greater than zero, then adjust the **Intercept** value by slightly less. If the gray line is less than zero then adjust the Intercept number by slightly more.
        ii. If the gray line did not reach close enough to the 10 percent mark then adjust the **Slope** value. If it fell short of the 10% mark increase the Slope value a little, and if it was greater than 10% decrease the Slope value a little.

Calibrating for 100% CO_2 using the Dilution Flow Meter

SPECIAL NOTE: If you are NOT using air dilution, then this flow meter needs to be turned OFF. Turn the knob clockwise until it stops. The CO_2 detector is designed for detecting 0 – 20%, using the dilution flow meter will allow you to read up to 100 % CO_2 when properly adjusted. These steps can only be performed after regular calibration has been performed see calibration procedure.



Dilution flow meter located just inside and behind the front panel

1. Run The 10% CO_2 test Gas into the **Sample In** port.
2. Observe the gray curve on TControl. If no grey curve is visible change the CO_2 scale or consult the set up procedure.
3. Adjust the dilution flow meter (see above picture) until the gray curve settles on the 2% measurement in TControl. ****Do NOT allow the sum of the two flow meters (dilution flow meter and the CO2 flow meter) to be greater than 0.5 SCFH***
4. In TControl left click on **Setup** and then left click on the **Gas Detector** tab.
5. Find the calibration number for **channel 1 Slope (m)** and then multiply that number by 5. This new number is the new channel 1 slope (m). Find the calibration number for **channel 1 intercept (b)** and then multiply that number by 5. This new number is the new channel 1 intercept (b).
6. Enter the new calculated values into the respective fields and left click on **Apply** and then left click **OK**.
7. Steps 1-5 must be redone after a nuke is performed.

Zoom In On Chromatogram Peaks

1. Right click in the chromatograph window to open the **Chromatograph Input** window. When the chromatograph input window is open, the ZOOM function is now available.
2. Position the mouse cursor (crosshair) on the peak or area of interest, and right click.

3. To zoom out, right click once more.

Using the Chromatograph Options Button

During normal operation the chromatograph may display very small peaks that may, or may not be of interest to the user. If the user wishes to only view chromatogram peaks above a certain value off a calculated PPM, then this option will display only the values determined by the user.

1. In the **Chromatograph Input** window look for the button labeled **Options.** It is located at the bottom of the window between the **Manual Chart Input** and the **OK** buttons.
2. Left click on the **Options** button to open the **Chromatograph Options** window. Notice the **Integration Noise Threshold, PPM** field in the middle of the window.
3. Enter the PPM value of the peak you wish to define as the threshold.
    a. NOTE: Any peak that has a PPM value **less** than the defined threshold will not appear in the calculated PPM's column in the **Chromatograph Input** window.

Changing Scales in TControl

Every scale in the TControl program has the ability to be customized. Each scale will allow for a manual input to determine a maximum and minimum. To access this option move the mouse cursor over the scale that will be changed and right click the mouse. A window will appear that provides a pull down menu with pre-designated values or enter the values manually. However, not all scales are created equal.

1. The **Total Gas, Units** scale has the ability to lock or tie the PPM scale to the Total Gas scale. This will force the Hydrocarbon, PPM scale to take the same scale range the Total Gas scale currently occupies. Place or remove the check mark to active the option.
    a. NOTE: The numbers are displayed as equivalent quantities from one scale to another.
2. The Time Axis has an option that will convert the time centric view to a depth centric view. Place a check mark in the square labeled Depth Plot to activate this view.

Gas Chromatograph Interpolation Modes

Select **Setup** and click on the **Misc.** tab under **GC Interpolation.** There are four possible interpolation modes for the Chromat Data. **NOTE:** whichever mode is selected at the time of data export is what will be in the exported file, and will also be displayed on the screen. The data point for each depth or time slot will be interpolated based upon the following:

1. **Enable GC Interpolation** – When checked, the unknown data points (data points between saved chromat records) are interpreted based upon the ratio of the last saved chromat record (i.e. If not checked then you get a straight line plotted between saved chromat records. When checked you get a ppm value that follows the character of the Total Gas curve) **Default is checked**

2. **Normalize GC values** - When checked the raw chromat ppm data is corrected to reflect percent of total gas (see formula below): **Default is checked**

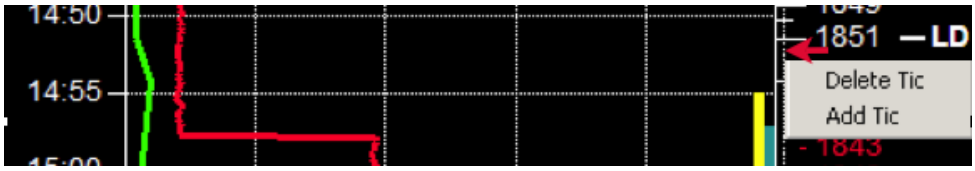
   Plotted C_1 value = measured value of $[C_1 / (C_1+C_2+C_3+C_4)]$ x TG
   Plotted C_2 value = measured value of $[C_2 / (C_1+C_2+C_3+C_4)]$ x TG
   Plotted C_3 value = measured value of $[C_3 / (C_1+C_2+C_3+C_4)]$ x TG
   Plotted C_4 value = measured value of $[C_4 / (C_1+C_2+C_3+C_4)]$ x TG

   Where: C_1 = measured ppm methane
   C_2 = measured ppm ethane
   C_3 = measured ppm propane
   C_4 = measured ppm i-C_4 + n-C_4
   TG = measured gas units of Total Gas x 100 (equivalent ppm)

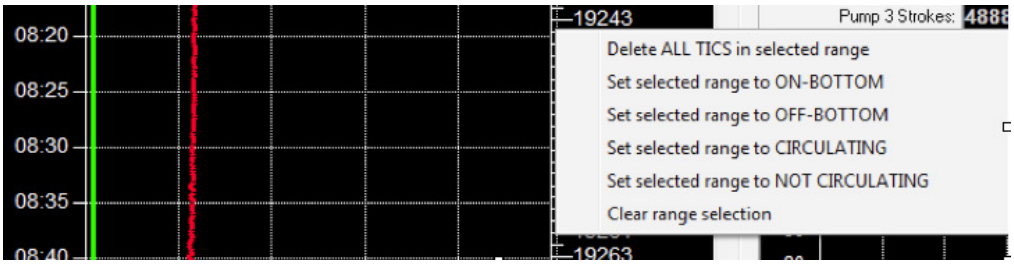
Editing the TControl Data

The MLogger is the machine generating data for the TControl software. The TControl program is the control, display, and editor for all the data. Data is manipulated from the Logger window area and every editor is accessed by right clicking when the cursor is in a specific area.

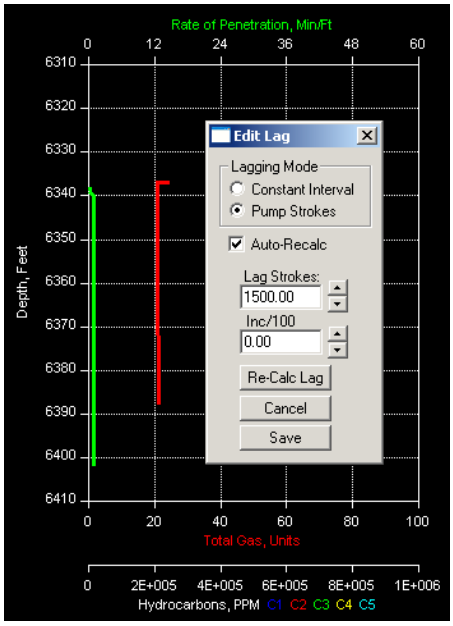
1. Edit depth by adding or deleting a tic.
   a. NOTE: The cursor will become horizontally oriented and turn red in color when able to edit a depth tic.



2. Edit a selection of depth tics.
   a. The horizontal red arrow will select the amount of tics when a left click is held and dragged up or down. A gray block will appear as the length of area selected increases.
   b. Right click to open an editor with options to apply to the area selected.



3. Edit the lag.
   a. Right click when the cursor is present in the Logger window area.
   b. NOTE: This editor will change the Logger window from time centric to depth centric.



Exporting the TControl Data

TControl currently supports data export in ASCII, standard LAS format (a formatted ASCII file), and Pason LPLOT. The export files contain: Depth, ROP, Total Gas, and Chromatograph Data if a chromatograph is present. The Chromatograph data can be sent in several formats; the default is interpolated and normalized PPM's.

1. Left click **File** on the TControl menu bar, left click **Export LPLOT**, **Export LAS**, or **Export ASCII**.
2. Select **Export All Data, Export Recent Data, or Export Depth Range.**
    a. **Export Recent Data -** input how many feet of recent footage to export.
    b. **Export Depth Range** - export a range beginning with a **starting depth** and stopping with the **ending depth**.
    c. Select the units the chromat data will be displayed in.
3. Select the folder where the file is to be saved, give it a name, and click **Save**.
    a. SUGGESTION: A good way to stay organized is to create one folder to contain all exports from a single well. The file name for every export should always have a certain depth label that is specific to that export.

Setting Alarms with TControl

The MLogger system supports alarms for Total Gas, ROP, and Depth. The alarms can be set to sound your computer speaker, and to cause a switch closure on MLogger that can be attached to a remote alarm. Select **Setup** from the TControl menu bar, and then select the **Alarm** tab. Choose the alarms you want to activate, and then set the value for each alarm selected. When an alarm goes off, an alarm condition window appears, and the computer beeps. The Alarm window shows all alarms that have been set. The alarm that has been

tripped will be flashing on and off. **Your computer must be connected to MLogger via TControl in order for the alarms to activate**.

Reboot and Power Down MLogger

1. To reboot or halt MLogger, select **Setup**, then **System**.
2. Click **Reboot** to reboot MLogger, and **Halt** to stop the instrument. **You should always use the halt function to stop the instrument**.
3. There is a shortcut button to halt the MLogger located in the upper right corner of the TControl screen. Look for **Power down Remote Device (MLogger). C**licking on this will open two subsequent windows that verify the shutdown procedure.
4. Halt and reboot will kill your connection to the instrument, and you will not be able to reconnect until the instrument is up and running again.
5. When the system is halted, look at the two green LED's at the front of the MLogger. When they quit blinking (about five minutes), it is then safe to turn the power off.
6. If reboot is chosen, wait approximately ten minutes and check to see if the "I'm alive" light is flashing before trying to reconnect.
7. If halt is chosen, the power switch must be toggled to start again. **Your computer must be connected to MLogger with TControl in order to shut down MLogger.**

UPS Troubleshooting

Powerware 9120 users will notice the LCD at the front of the UPS. All information concerning the operation or diagnostics will appear in this LCD window. At the beginning of power up or when the UPS restarts after a power outage the unit will automatically perform a self test. The UPS will also alert you with different audible alarms or beeps if there are any problems.

1 beep every 5 sec.	Utility power failure	UPS is on battery backup
2 beeps every 5 sec.	Battery running low	2 min of battery time left
3 beeps every 5 sec.	Battery need replaced	Replace battery
2 beeps per second	Power requirements exceed UPS capacity	Remove some equipment from the UPS
2 beeps per second	UPS is on battery power requirements exceed capacity	Remove some equipment from the UPS
1 beep per second	Site Fault-ground wire does not exist	Check outlet for ground or other wiring problem
Constant Beep	Over charge, Output Short, High Output Voltage, Low Output Voltage	Save your work and turn off the equipment. Contact service rep.