

1A-150 Logging System

Installation and Operation Manual



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DOCUMENTATION CONVENTIONS

This uses the following conventions to present information:



WARNING

An exclamation point icon indicates a **WARNING** of a situation or condition that could lead to personal injury or death. You should not proceed until you read and thoroughly understand the **WARNING** message.



CAUTION

A raised hand icon indicates **CAUTION** information that relates to a situation or condition that could lead to equipment malfunction or damage. You should not proceed until you read and thoroughly understand the **CAUTION** message.



NOTE

A note icon indicates **NOTE** information. Notes provide additional or supplementary information about an activity or concept.

Section 1: System Description

Function and Theory

The 1A-150 holds 150 meters of \varnothing 2.54mm (0.103") steel jacketed, single conductor, logging cable, and is compatible with all Delta Epsilon probes except Video probes.

System Components

The 1A-150's hand crank has a 4:1 ratio to make spooling the probe in/out of the borehole easy. Cable spools onto the top for ease of level winding.



NOTE: Spooling cable onto the winch drum is done manually. Take care to spool the cable evenly to insure maximum cable life.

The 1A-150 winch is equipped with a disk brake that is coupled to the winch drum through a one-way clutch. This restricts braking action to downward forces and offers no restriction when coming up the hole. Thus, the brake may be set at the bottom of the hole, and left set during the trip out of the hole. This prevents the probe from creeping down the hole if you need to stop in the hole.

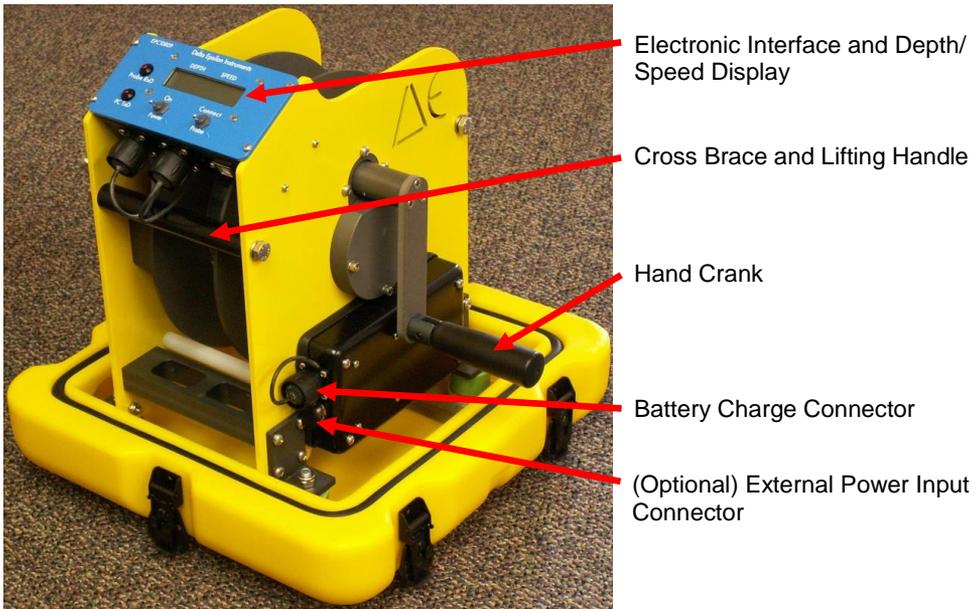


Figure 1-1

The 1A-150 winch is equipped with a disk brake that is coupled to the winch drum through a one-way clutch. This restricts braking action to downward forces and offers no restriction when coming up hole. Thus, the brake may be set at the bottom of the hole, and left set during the trip out of the hole. This prevents the probe from creeping downhole if you need to stop in the hole.

All electrical connections to the 1A-150 winches are keyed such that making a wrong connection is virtually impossible.

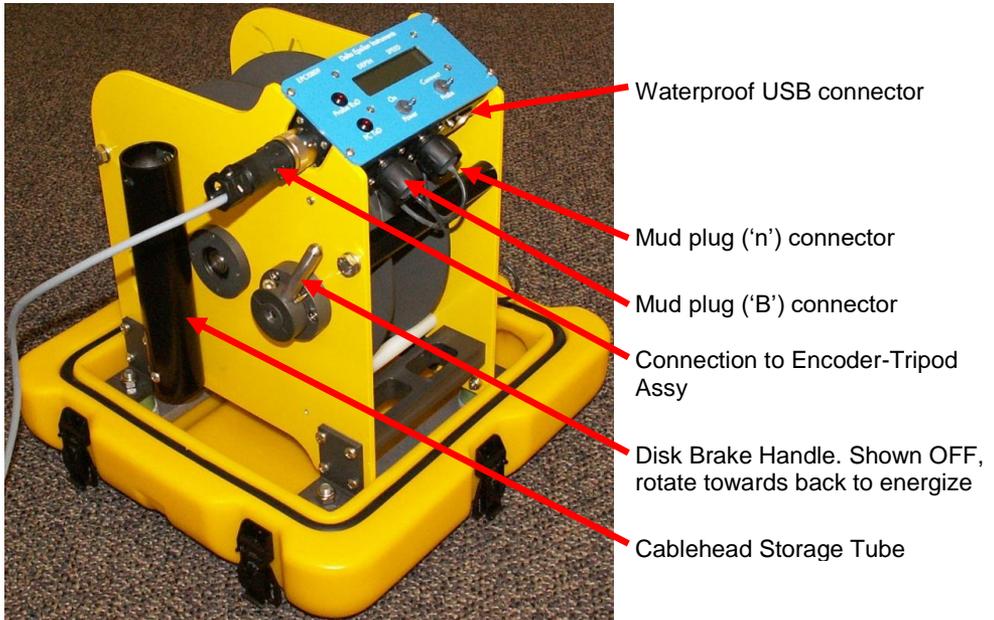


Figure 1-2

Logging requires connecting a maximum of four cables to the winch: a USB cable between 1A-150 and your PC, the encoder cable from the Tripod and, *when acquiring electric logs*, two surface electrodes (mud plugs). The mud plugs' cables are identical and interchangeable. For best electrical log results, bury the mud plugs apart from each other and away from the 1A-150 (refer to the detailed description later in this manual).

The 1A-150 is equipped with internal rechargeable Lithium batteries which provide approximately 20 hours of run time per full charge. If desired, the 1A-150 may be powered from an external source of 6VDC to 30VDC power simply by connecting the external power cable.



NOTE: With the external power cable connected, the internal batteries are disconnected from the logger circuitry. The batteries may be charged while using external power.

Section 2: System Installation

Connecting to a PC

Connect the 1A-150 to your laptop via the USB cable included and connect the cable from your Encoder-Tripod to the winch. Turn the POWER switch on the 1A-150 to ON. You will notice the systems model and serial number displayed for a few seconds, followed by a display of the current depth, logging speed, space for the probe model number, and input power voltage.



Now, turn your laptop on and launch DELogger. Set the brake to off and spool out enough cable to reach the borehole (plus an extra couple of meters).

Set the brake back to ON.

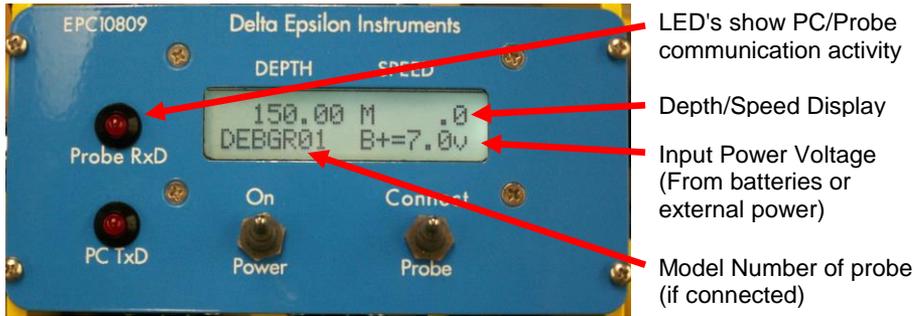


Figure 2-1

Connect a probe to the cable. If you are running Resistivity or other electric logs you will need to tape all exposed metal on the cablehead/probe top connection and bury the surface electrodes (see Section 3: System Operation). When a probe is properly connected, turn the *Probe* switch to *Connect*. During the connection process you will observe the LED's (mentioned above) blink and see the following screens:



Connecting with 24V powered probe



When probe communications are established, the probe's model and serial numbers are displayed for a few seconds.



Normal logging display: Cable depth and speed on top line; probe model number and uphole DC input voltage (or probe battery voltage if a battery powered probe is connected) on bottom line

Position the tripod over the borehole and feed the logging cable under the pressure roller. Make sure the brake is ON and then hand lower the probe and slack cable into the borehole. Winch the probe up so the cablehead/probe top junction is at ground level, or a known level, and preset the depth using DELogger.

With one hand holding the hand crank, release the brake by pulling the handle towards you until it hits the stop pin. Then proceed to lower the probe down into the borehole. The brake is not recommended to control speed while lowering the probe into the borehole. When you are at the bottom of the borehole, or at the desired depth, set the brake to ON (Push the brake lever away from you and down). With the brake engaged you can safely release the hand crank.



NOTE: The cable must wrap a minimum of 1/4 of the way around the measuring wheel to prevent slippage and insure accurate depth measurements.

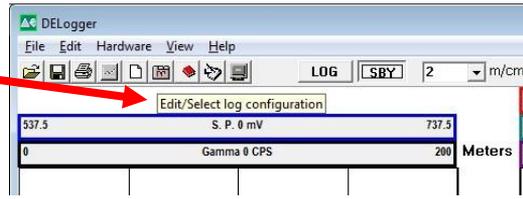


Position the cable wiper on the Encoder-Tripod assembly so it will wipe the cable during the trip up, out of the borehole.

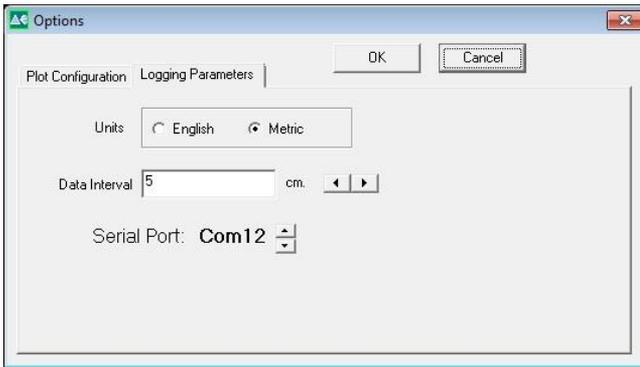
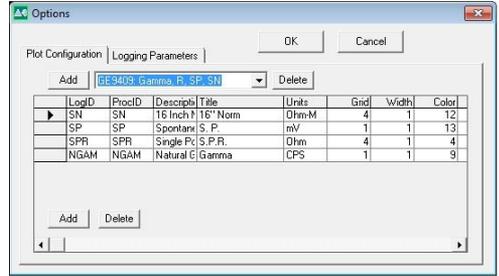
Section 3: System Operation

System Configuration

Click on the Edit/Select Log Configuration button (or select *Edit/Log Configuration* from the pull-down menu) to setup for logging. All settings become default for the next time the logger is used.



In the *Plot Configuration* tab you may select the probe type to be used from the drop down menu (GE9409 in this example). Various plotting parameters, such as which grid the plot is on, trace color, trace width, etc. may be set. Scrolling the screen you may also select filtering, default span and bias, and other parameters. See the *DELogger Log Acquisition Software* section for detailed instructions.



The *Logging Parameters* tab allows selecting data acquisition units, acquisition interval and the COM port the USB port has been assigned to by Windows (COM port 12 in this example). See Appendix A for detailed setup information.

Click OK to save you settings and close the window. When all is ready, click LOG on the task bar to begin data acquisition. Notice "status" in the lower left hand corner of the screen changes to "logging" after a few seconds. This indicates you are ready to log. You may now crank the handle (leave the brake ON) at a uniform speed (3-5 meters/minute) to acquire a log. You can stop at any time to, for example, change ranges or straighten out the winding of the cable. When you are finished logging, click on STBY and then you may save the log to an LAS format (text) file. LAS format files are text and so may be edited with any text editor (in Windows you may use notepad.exe, or Word.exe if the file is saved in .txt format).

Connecting a Probe

Remove the protector caps from the probe and cablehead. When the probe and cablehead are not in use always keep their caps in place to keep the connectors, O-rings, O-ring glands, and threads free from dirt. Keep a thin film of grease on the O-rings and mating surfaces. In addition, keep the probe top and cablehead retaining nut threads greased and free from dirt. Insert the cablehead into the probe top, aligning the key on the

cablehead with the key in the probe top. Press the two together while screwing the cablehead retaining nut onto the probe. When fully assembled the bottom of the retaining nut should come to within about 1/8" (3mm) of the probe top. Do **not** use wrenches to tighten the cablehead retaining nut. Use only normal hand force. When using a probe with electric logs (resistivities, spontaneous potential, etc.) all exposed cablehead/probe top surfaces must be insulated from the borehole fluid by wrapping them with high-quality electrical tape.

Keep any exposed probe housing around the electrodes insulated, but do not cover any of the electrodes with electrical tape. Apply tape from the electrode/insulating washer edge up over the neoprene sleeving. Cover at least 1" (2-3cm) of the neoprene sleeving. Overlap each wrap by at least half with the next wrap.

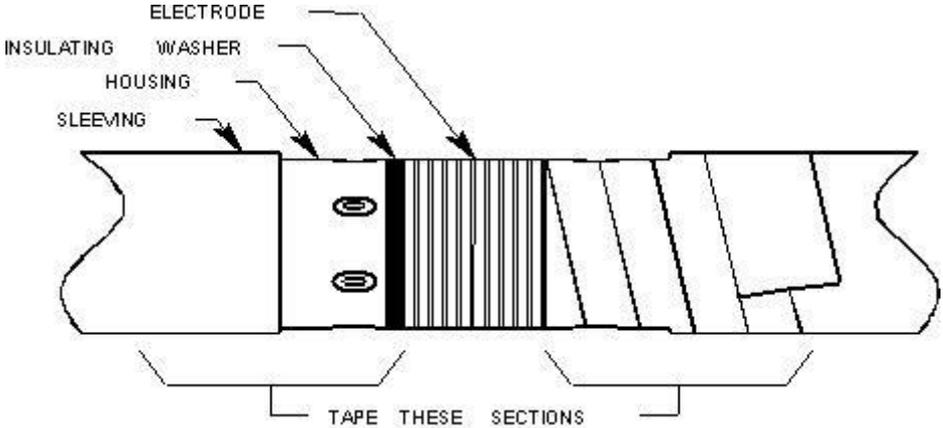


Figure 3-1

Burying the Surface Electrodes

Electric logs such as short and long normal resistivity, Spontaneous Potential, and Single Point Resistance require surface electrodes. Delta Epsilon's "mud plugs" are made of

stainless steel in the shape of paddles for easy burying and cleaning. Delta Epsilon uses two surface electrodes for the above measurements. Best results are attained when the electrodes are buried as far from each other as possible and as far from the borehole as possible. This is especially important when logging in highly resistive formations. The mud plug's electrical connection, that is, where the cable connects to the mud plug, must be protected from moisture.



Figure 3-2

During initial manufacture this area - the “handle” - is covered with heat shrink tubing with an adhesive liner that forms a waterproof seal around the connection. If this becomes nicked or cut, use electrical tape as necessary to restore the seal.

Running the 1A-150 on External Power

The 1A-150 may be powered from any source of clean 6-24v DC power using an optional External DC power cable. Current varies with input voltage, probe power requirements, etc. Worst case, with 6.0vdc in, the current should be 0.5A or less and decrease as the input voltage is increased.

DELogger Log Acquisition Software

Overview

DELogger is a program used for simple data acquisition from Delta Epsilon logging hardware using a laptop or other personal computer. It requires a system operating with Windows 95, 98, Windows NT, XP, or Windows 7. DELogger can collect a set of logs from the hardware, write it to a disk file, print it to a printer installed in Windows, and plot it to a thermal plotter that is part of the hardware, and play back previously recorded logs.



NOTE: Selecting Plot without a dedicated Delta Epsilon Plotter attached will cause the program to quit responding.

Operation of DELogger is based on a chosen set of logs, called a log configuration herein. You first choose a log configuration and then DELogger tries to access the proper logging tool or load matching data from a file. Data must be available for every log that is in the chosen log configuration, but it is not necessary to include, in the chosen configuration, every log that is available from the logging tool or from the file. Any number of log configurations may be created and saved. A particular configuration is chosen by selection from a list and facilities are included to maintain the list.

The properties of each log may be chosen while setting a configuration. You may choose which to display a log, its color, whether it is filled, and whether it is filtered. Once a log configuration is chosen, that set of logs is displayed on the screen. You may choose and change the depth scale, the bias and span for each log, and the range of depths currently displayed. Keyboard shortcuts are included to make these adjustments possible by either use of the mouse or use of keystrokes. At any time, the scales currently displayed may be saved manually. These scale settings become the default settings for the currently chosen log configuration.

At any time, all of the data for the chosen log configuration is retained in your computer's memory much like a document in a word processor. You may stop logging, continue logging or re-run parts of the hole to overwrite data already collected. The data currently in memory may be saved to a file in a standard LAS v2.0 format. The current data may be completely deleted at any time to clear the data set for a new log. A previously saved log may be re-loaded into memory from its LAS file.

Data is collected from the hardware through your computer's serial port. A commercially available RS-232 to USB converter may be used to connect to PC's that have no RS-232 (COM) port. You must set DELogger's COM port number to be the same as the COM port number assigned to the converter (during converter software installation). Data acquisition

is initiated by clicking the Log button. At this time, the program checks that communications with the logging tool are possible. Acquisition of logging may be suspended or stopped by clicking the SBY button. Acquisition may be resumed by again clicking the Log button.

Header data is saved in the LAS file with log data and header data may be entered at any time. Currently entered header data becomes the initial header data for the next log to minimize re-entry of header information. Header topics may be added or deleted.

Quick Tour of DELogger

Set up Log Display Parameters

- From the menu, Choose Edit and Log Configuration.
- Click the down-arrow in the Drop Down box and click Four Logs.
- Click OK. Note the logs that will be displayed and their colors.
- From the menu, choose Edit and Log Configuration again.
- Click the box for NGAM and Color. Enter the number 5.
- Click OK. Note that the color of the Gamma trace has changed.

Set up Logging Parameters

- From the menu, Choose Edit and Log Configuration.
- Click the tab labeled Logging Parameters.
- Click the small arrows to increase or decrease the data interval.
- Alternately, enter your own data interval.
- Click OK.

Set up the Header Information

- From the menu, Choose Edit and Header.
- In the column labeled Entry, enter information of your own choice.
- Add an entry in the header
- Click the bottom line of the grid, next to the small star.
- Enter information of your choice. The Description is the text that will be printed to identify your data. The LAS column is a mnemonic that will identify this data in the LAS file. See Saving Currently Displayed Data.
- Delete an entry in the header
- Click any box in the row to be deleted.
- Click Delete.
- Click Close.

Connect and check the Logging Probe

- Connect the logging probe to the winch and the serial cable to the computer.
- Click Hardware and Check Hardware.
- If the hardware and the software are correct, a box will be displayed that shows the hardware model numbers and serial numbers.
- If the hardware is not operational, or the wrong probe is connected, an appropriate message will be displayed.
- Collect some data
- Run the winch and align the top of the probe with the top of the hole (which is zero depth) or with some other known depth reference. The reference point on the probe is the top of the probe.

- Double click the box labeled Acquisition Depth and enter the reference depth.
- Click the X next to the box to set the reference depth into the computer and into the winch.
- Run the winch to the bottom of the hole or to a point at which you want to begin logging.
- Click LOG.
- Run the winch at the chosen logging speed. Note the data being collected. At any time, scales may be adjusted. See the next step.

Adjust the scales and the display

Click the box at the top of the log. A box showing span and bias will appear. Adjust span and bias by clicking the arrow or by double clicking the text box and entering values. Experimentation allows you to set any span and bias to display the log as you wish.



NOTE: The display settings do not affect the data that is recorded for the log. The recorded data is in absolute units.

Save the currently displayed scales

From the menu, click Edit and Save Scales. The currently displayed scales will be the scale settings the next time you start DELogger.

Adjust the length of the log displayed.

Click the down arrow in the box showing ft/in or m/cm. Select a scale. The scale of the log will be adjusted.

View a different part of the log.

Click or drag the scroll bar at the right side of the log to view data above or below that being displayed. While you are logging, DELogger will try to keep any recently collected data in view so the scroll bars may move back where they were.

Save the currently displayed log in an LAS file

- From the *File* menu, select *save as*.
- Select the folder to save the file.
- Enter a file name and click *save*. The “.LAS” extension is added automatically.

View a log previously saved

- From the menu, click Edit and Clear.
- From the menu, click File and Load.
- Enter a directory and a file name.
- Click Open.
- The LAS file will be displayed.

Print a log that is displayed

From the menu, click File and Print. Choose your printer and set it up as usual. The log will be printed on your printer.

Adjusting scales

- Log scales are adjusted by clicking the scale box at the top of the corresponding log. A scale-adjustment box drops down and displays buttons and text boxes in which you may adjust both bias and span. The buttons adjust the scale values in

a direction to move the log curve in the direction of the button. The boxes allow you to enter a specific scale if you so choose. To close a scale adjustment box click anywhere on the logs or press the escape key.

- The scales may be operated from the keyboard as well as with using the mouse. The tab key cycles through each of the scale-adjustment boxes and then to the depth scroll bar. When a scale adjustment box is shown, the bias may be adjusted using the left and right arrow and the span may be adjusted using the up and down arrows.
- The depth shown in the display is adjusted by clicking and/or dragging the scroll bar at the right of the screen. A click of the small arrows at the top of the bar adjusts the depth displayed upward or downward by one division. A click between the arrow and the scroll-bar button adjusts the depth displayed upward or downward by on full screen. Dragging the button from top to bottom scrolls the log from top to bottom. When the scroll bar has the focus, indicated by its flashing, then depth shown in the display may also be adjusted by using the up, down, page-up, and page-down arrow keys.
- The range of displayed depths is adjusted by selecting the depth scale (ft./in.) on the toolbar. You may adjust the depth scale to some large value, say 50 ft/inch to display the entire log. Then you may adjust the depth scale to some normal value, say 10 ft/inch to display detail.

Checking the Hardware

- On the menu, select Hardware/Check Hardware.
- If no communications to the EPCI can be established a message will be displayed.
- If communications to the EPCI can be established but no probe is connected or the probe is not working properly, a message will be displayed.
- If communications are established and a probe is connected, a box will be displayed showing model numbers, serial numbers, and software versions.

Choosing a Log Configuration

A log configuration is a particular choice of logs and a particular assignment of plotting parameters for each log. You may choose:

- the API grid that each log will be plotted upon
- the color displayed for each log
- whether or not the area under the log curve is filled
- whether or not the log is filtered
- Each log is given a name. For example, NGAM is the natural gamma-ray log; SPR is the single point resistance. The names of all available are displayed when a 'new' display configuration is chosen.



NOTE: If you have a calibrated gamma probe, you can add an Assay trace which calculates %eU308 from the gamma curve. Choose ASSY from the pull down menu of log names. Scroll to the far right to enter your probes k factor.

- To choose, create, or edit a display configuration, choose Log Configuration from the Edit menu or click the related toolbar button.
- To change to another configuration, click the drop-down list box and click the chosen configuration from the list.

- To delete an entire configuration, click the Delete button next to the drop-down list box.
- To create a new configuration, click the new button next to the drop-down list box. Edit the text to describe this configuration. Then add logs as below.
- To delete a log from a configuration, click the log ID in the grid and then click the Delete button below the grid.
- To add a log click the add button below the grid. Then choose the log you want to add from the pop-up list box. Then choose the grid, color, initial span and bias values, and the Fill and Filtered options. You may change the descriptive title for a log.



CAUTION: Choosing a new configuration erases any log data currently in memory. Therefore, you should not change the log configuration before current data have been saved and you should use care to assure that a new 'blank' file is not saved to the file name as an existing file.

Clearing the screen

All of the logs shown may be cleared by selecting Clear from the Edit menu or by clicking the corresponding tool. Clearing deletes all of the log data in memory.

Copying to the clipboard

A copy of the logs as they are displayed on your screen may be copied to the clipboard and pasted into another application such as a word processor. To copy to the clipboard, select Copy from the Edit menu.

Loading previously saved data

- To load data from a LAS file, first choose a log configuration that is compatible with that file. The Log ID's that are selected in the log configuration must be present in the LAS file. Not all of the logs in the LAS file need to be loaded. DELogger will load only the data for each log chosen for display with the log configuration.
- To load data, choose -Load from the File menu or click the associated toolbar button. Follow usual Windows 95 director and file selection procedures to locate the desired file.

Entering information into the header

Header information is retained in a permanent file. The saved data is always the last header used. Header information may be added, deleted, or edited. The header information shows a Description, an Entry, and an Abbreviation. The Description is the caption that is plotted in headers. The Entry is the header data. The Abbreviation is the abbreviation used for LAS files. If you want your files to conform to the LAS standard so that they can be read by other applications, then use care in adding or deleting the Abbreviation.

Operating the caliper arms

- On the menu, select Hardware/Open and Close Caliper arms.
- Click Open to open the arms and Close to close the arms.
- Wait until the status box indicates that the arms are opened or closed.

Printing to your printer

The existing log may be printed to your windows printer by selecting Page Setup and Print from the File menu. When printed, the header is printed at the top of the log, then the log is printed as it is shown on your screen. One complete page is printed on your printer even if not all of the data are displayed on your screen.

Saving currently displayed data

- Data are saved and retrieved by DELogger in a file that is formatted according to the LAS version 2.0 format specified by the Canadian Well Logging Society. This file contains the log header data, other information, and the logging data.
- Data may be saved at any time during or after logging. It is not required that files carry any particular file-type-extension but it is recommended that the LAS extension be used.
- Data that has been previously saved in a LAS file may be loaded from that file back into DELogger. Additional data may then be collected. Then when the data are saved, all of the data will be saved. This provides a convenient way to make a complete log of a log, which was previously partially collected. When, during logging, data are collected at depths for which data is already present, the old data is overwritten. If the probe is run up and down the hole, then new data will overwrite old data.

USB Communications

Set the COM port in DELogger (in *Log Configuration/Logging Parameters*) to the port number Windows has assigned to it. This is listed under "*Ports (COM & LPT)*" in the Device Manager (accessible from Windows *Control Panel*).

Section 4: System Maintenance

The 1A-150 Winch was designed to be weather/water resistant, however to insure a long, trouble free operating life, you should make every effort to keep the winch clean, dry, and protected from the elements. The use of a high-pressure spray - such as found in a car wash - is NOT recommended. Use moist cloths to wipe the unit down and remove contaminates. Use of a cable wiper (as found on your Encoder-Tripod assembly) will help remove most of the drilling mud and water before it reaches the winch.

Reheading Instructions for GOI-4 Cablehead

The following tools and hardware will be necessary to re-head the cable:

- GOI-4/1-H-100 re-heading kit (see below).
- Heavy duty cable cutter for 0.10" steel armor logging cable.
- 1/8" hex wrench.
- 4" Clamp or medium sized locking pliers.
- Electrical wire cutters.
- Electrical wire strippers.
- Soldering iron (35W-75W) and rosin core solder.
- Ohmmeter capable of measuring >100MΩ as well as zero to 100Ω.
- Medium sized vise with smooth jaws (two pieces of soft wood may be used to protect the cable).
- Waterproof (marine) grease.

The following items are included in the re-heading kit available from Geotech.

- 4" (10cm) of #24AWG Black wire.
- 4" (10cm) of #24AWG Orange wire.
- One ¼-28 Grease fitting.
- One ¼-28x¼" SS Set screw.
- One strain relief cone (#GOI-0x100-CONE).
- One strain relief sleeve (#GOI-0x100-SLEEVE).
- One connector Insert boot (#GOI-4-BOOT).
- Four 2-014 O-rings (two for the cablehead plus two spares).
- Two 2-013 O-rings (one for the CONNECTOR INSERT plus one spare).
- One roll Scotch 88 electrical tape.
- One tube O-ring grease (Suberlube).
- 6" x Ø.75 adhesive lined heat shrink tubing.
- 6" x Ø1.0 adhesive lined heat shrink tubing.
- 4" x Ø1.5 adhesive lined heat shrink tubing.

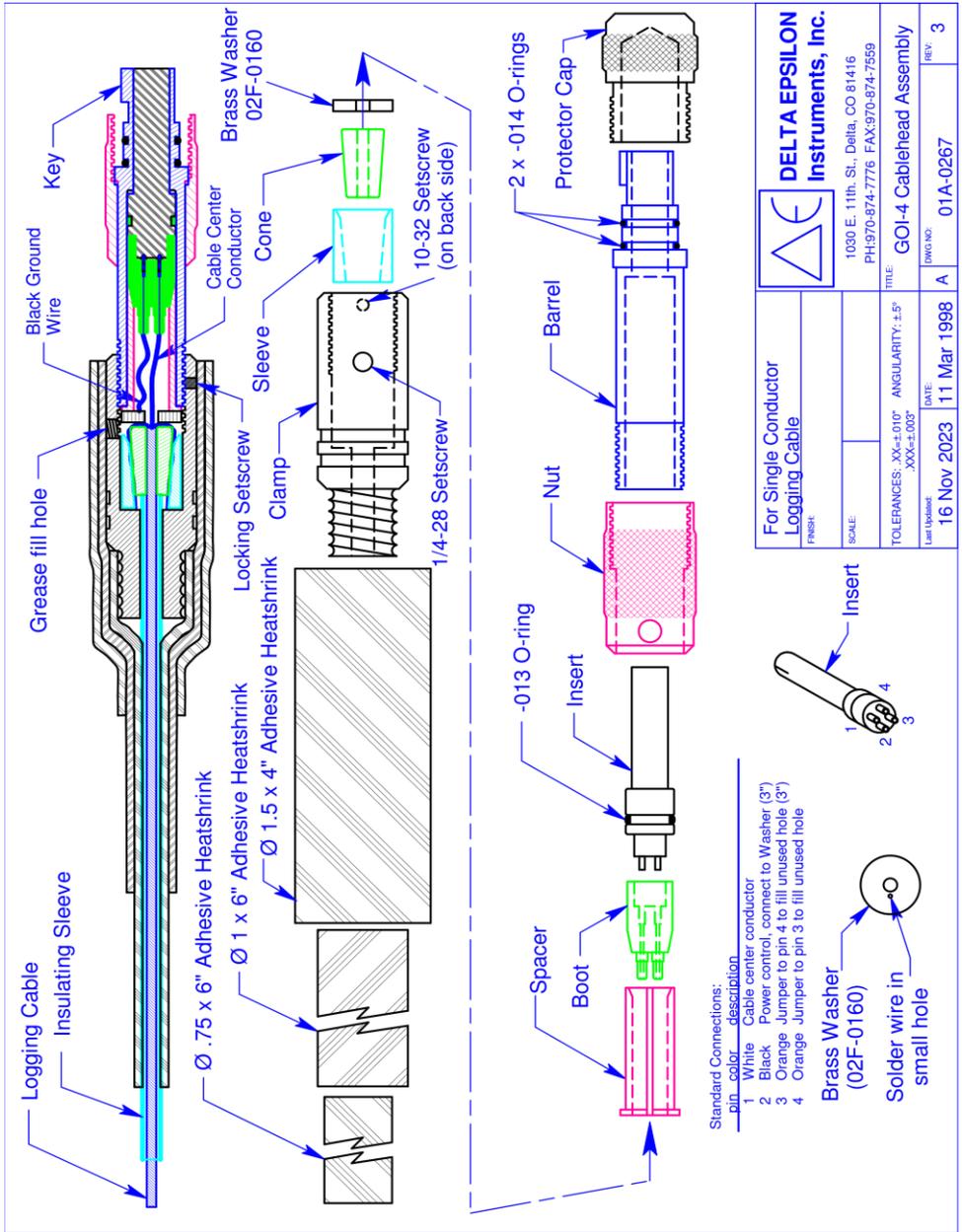


Figure 4-1

Dismantling the Cablehead

1. During the reheading process, you will want to remove any kinked or damaged sections of cable. Unspool all cable with INSULATING SLEEVING and any that is damaged or badly kinked. Unspool an additional seven meters (20') or so to give you room to work. Remove any electrical tape from the cablehead assembly. Slide the INSULATING SLEEVING away from the cablehead (towards the winch) past any kinked or damaged sections of cable. Leave at least two meters (6') of good bare cable exposed.
2. The inside of the cablehead is full of grease so do this step over paper or cloth rags that can be thrown away. Unscrew the BARREL and slide the CLAMP back up the LOGGING CABLE to expose the SLEEVE, CONE, WASHER, SPACER, BOOT, and INSERT. Then push on the INSERT (use a blunt object on the end opposite the wires) and force it out of the BARREL. Cut the LOGGING CABLE about two cm (1") from the end of the BOOT. Remove and clean the grease off these parts, taking care not to damage any of the remaining wires.
3. Dismantle the CONE and SLEEVE strain relief. It may be necessary to support the SLEEVE (from the cablehead end) and drive the CONE out of the SLEEVE.
4. Cut off any damaged sections of cable. Inspect the INSULATING SLEEVING and replace it if necessary. To run electrical measurements, such as Resistivity or Spontaneous Potential, you need a minimum of 7.5 meters (25') of INSULATING SLEEVING. Make sure to cut the cable cleanly and squarely. A sharp chisel can be used if a cable cutter is not available. Leave at least 2 meters (6') of bare cable (extending past the end of the INSULATING SLEEVING) with which to work.

Heading the Cable

1. Make sure the following parts are on the cable in the order given, starting from the winch end of the cable:
 - a) Minimum of 7.5 M (25') of INSULATING SLEEVING.
 - b) CLAMP with internal threads towards probe
 - c) SLEEVE with small diameter opening towards winch.

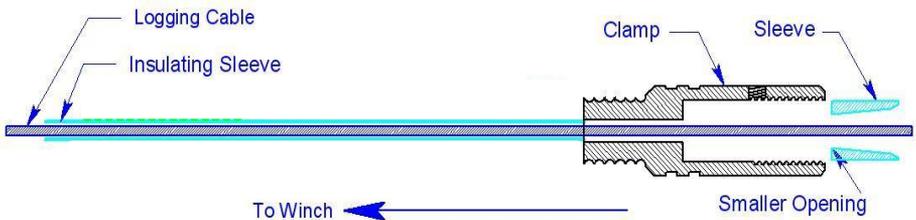


Figure 4-2

2. Slide the INSULATING SLEEVING, CLAMP, and SLEEVE up the cable (out of the way) a couple of meters (6'). Tightly wrap several (6-8) wraps of electrical tape around the cable about 20cm (8") down from the cut end of the cable. The tape helps keep the cable from slipping during reheading.

3. Very gently clamp the cable in a vise. Position the top of the tape even with the top of the vise. The cable is easy to damage so use as little pressure as possible.
4. Slip the CONE onto cable, small end first, down onto the cable.
5. Carefully unwrap each strand of the outer layer of armor. Straighten the 3-4cm (1.5-2") nearest the top of the CONE and fold the strands down over the CONE. This helps when feeding the strands between the CONE and SLEEVE.

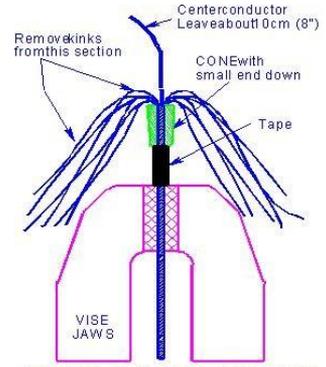


Figure 4-3

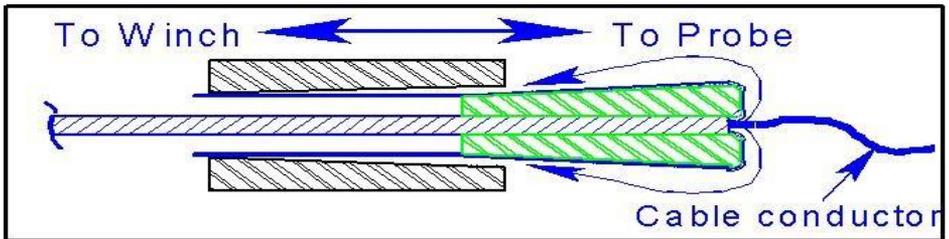


Figure 4-4

6. Now, do the same with each strand in the inner layer, feeding the strands between the strands of the outer layer. Take care not to nick or kink the cable wire.
7. Take the cable out of the vise and fold the strands down over the CONE. While holding the ends of the strands, slip the SLEEVE up over the strands and as far over the CONE as possible. The strands thus become clamped between the CONE and SLEEVE. Keep the strands straight, making sure no strands cross over one another.
8. Clamp the cable very loosely at the bottom of the SLEEVE (cable wire pointing up). Allow the strands to extend through the vise. Grip all the strands and the cable and pull down firmly, seating the CONE into the SLEEVE.
9. Pull evenly on each strand to work the CONE down into the SLEEVE. Make sure there are no loops on the top of the CONE as they can dig into the cable wire and short it to armor when the head is fully assembled. Pull on each strand individually, working around the CONE until 3mm (0.1"), or less, of the CONE remains outside the SLEEVE. It is very important the strands not cross over one another and no loops remain above the CONE.

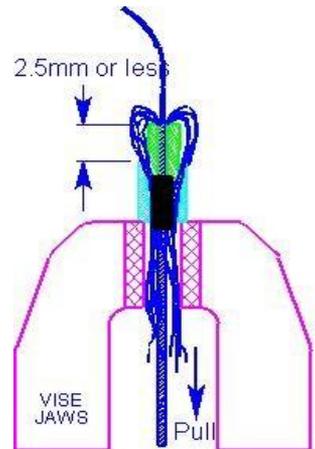


Figure 4-5

10. Remove the cable from the vise and trim the strands as close as possible to the bottom end of the SLEEVE (end nearest the winch). Remove the electrical tape.

Making the Electrical Connections

1. Slide the BOOT off the CONNECTOR INSERT and clean any grease from the electrical contacts. Unsolder and discard the old piece of cable wire. If the jumper wire (connecting INSERT pin 3 to 4) or the wire between INSERT pin 2 and the WASHER are nicked or otherwise damaged they must be replaced. Inspect the BOOT and replace it if it is nicked, cracked, or cut. Apply a small amount of grease onto the wires to help them slide through the BOOT. Take care not to cross any wires between the INSERT pins and their matching holes in the BOOT.
2. Inspect the wire going from the WASHER to pin two (2) of the INSERT. Replace the wire if it is abraded or cut. Repair the connection if it is bad. Install the WASHER over the CABLE center conductor. Make sure the wire exits on the side that faces the probe.
3. Cut the new CABLE center conductor, leaving 10cm (4") free. Feed it through the BOOT, strip about 0.6cm (.25") of insulation from the free end, and solder it into pin 1 of the INSERT.
4. Inspect the jumper wire going from INSERT pin 3 to pin 4. Replace the wire if it is abraded or cut. Repair its connections if they are bad.
5. Apply a small amount of grease to the inside of the BOOT and, while keeping moderate tension on the wires to the wires, slide the BOOT onto the INSERT until it snaps into place. Keep the wires straight. A kinked wire could cause a bad seal. Proper sealing depends on there not being any voids inside the boot.
6. Install a new O-ring on the CONNECTOR INSERT (#013) and apply a small amount of grease to the O-ring and inside the threaded end of the BARREL. Slip the SPACER over the wires and use it to push the BOOT/INSERT assembly into the BARREL until the mating end is flush with the end of the BARREL. Align INSERT pin 1 (the one the CABLE connects to) with the key on the BARREL. Also, make sure no wires become pinched between the BARREL, SPACER, or BOOT/INSERT.
7. Slide the CLAMP up over the CONE and SLEEVE, SPACER, BOOT and INSERT assembly. Turn the BARREL counter-clockwise two turns to pre-twist the wires. Then screw the BARREL assembly clockwise into the CLAMP. Make sure no wires become pinched between the SPACER, WASHER, BARREL, or CLAMP. Tighten the BARREL by hand and then use the pliers to snug it up (up to an additional ¼ turn). Confirm that pin 1 of the INSERT is still aligned with the key on the BARREL.



NOTE: Check the CLAMP periodically (once per month) to make sure it has not come loose. The cable should be reheated at least every six months. More often if you are logging in corrosive borehole fluids.

8. Disconnect the Winch to EPCI Depth/Speed display cable from the winch and perform the following tests:
 - a) Measure $>100M\Omega$ between the INSERT pin one (1) (or pin G of the plug) and cable armor.



NOTE: If your ohmmeter does not have a $100M\Omega$ range but has a conductance (1/ohms) range, a reading of less than 10nS is OK.

- b) Measure approximately 25Ω per 300m (1000') of cable, between the INSERT pin 1 and pin G of connector J3.



NOTE: If the cable does not pass both of these tests, you must cut the cable and start over!

Injecting Grease and Reassembly

1. Slide the INSULATING SLEEVING up against the CLAMP.
2. Remove the SETSCREW and replace it with a GREASE FITTING. Use a grease gun filled with waterproof grease (such as marine trailer grease) to fill the cavity inside the CLAMP and BARREL. Grease will exit the small hole in the BARREL when it is full. Inject a bit more grease to make sure the entire cavity is full of grease. The grease will protect the connections and strain relief parts. Replace the GREASE FITTING with the stainless steel $\frac{1}{4}$ -28 SS SETSCREW. Tighten only until snug. Do not over tighten the SETSCREW.
3. Wipe excess grease from the end of the CLAMP. Use a “half-wrap” method (current wrap overlaps $\frac{1}{2}$ of the previous wrap) to cover the CLAMP and at least 5cm (2”) of INSULATING SLEEVING with high quality (Scotch 88) electrical tape. Apply two, or more, layers.
4. Re-check the resistance measurements between the cable center conductor and cable armor (described in the previous section). If all tests pass, replace the O-rings (two each 2-114) on the cablehead. Apply a small amount of O-ring grease to the O-rings and carefully slip them into their glands. Take care not to stretch the O-rings as you are installing them.
5. Reconnect the Winch to EPCI Depth/Speed display cable and test the system. Open the DELogger program on your PC and click on “*Hardware/Check hardware*” to see that the program can communicate with the attached probe. The probes model and serial numbers will be displayed.
6. Put the PROTECTOR CAPS back on the cablehead and probe when you are finished.



Figure 4-6: Typical finished assembly

GE0809b/cb Gamma/Electric Logging Probe



SN/SP electrode

'A'/SPR electrode

Overview

The GE0809b acquires four measurements in one pass in the borehole; natural gamma, self potential, single point resistance and short (16") normal resistivity. With the optional LNA0809 adapter a long (64") resistivity is also acquired. The GE0809b operates from four, easily replaceable, AA batteries. The GE0809cb is 1.75" max OD (4.4cm) x 39.5" (100cm) long and weighs 9.6 Lbs (154g).



NOTE: When the cablehead is attached to the probe, the probe is activated and draining the batteries. Do not leave the cablehead attached when the probe is not in use. Keep the probe top protector cap on when probe is not in use.

Battery Life and Types

The cutoff voltage for normal operation is 4.0V (1V/cell) and the maximum voltage the GE0809cb can handle is 28V. This allows you to use virtually any chemistry/voltage AA sized batteries from 1.25V/cell NiCad batteries to higher voltage Lithium cells. Four high quality Alkaline batteries or 2300mAh rated rechargeable batteries should provide 20 hours of continuous operation. The *Inner Battery Tube* is easily replaceable and prevents damage to the main portion of the probe should the batteries ever leak.



WARNING: When the GE0809b will not be used for an extended period of time, **REMOVE THE BATTERIES** to avoid damage in case the batteries were to leak.

Battery Replacement

To replace the batteries simply unscrew the *Bullnose* at the bottom of the probe. Then tip the probe and the batteries will slide out. If the *Inner Battery Tube* slides out with the batteries, simply push it back inside the probe. Always inspect the O-rings and replace them if they show wear of any type of damage (nicks, cuts, abraded areas, etc.). Insert four (4) AA size batteries, '+' end in first. Apply a small amount of grease to the O-rings and replace the *Bullnose*.



-120 O-Rings (2 each)

Inner Battery Tube Assembly

Batteries (put + end in first)

Bullnose

Figure 4-7

Changing 1A-150's Internal Batteries

The internal batteries must be recharged with the supplied battery charger which connects via the four pin plug. It is not possible to run off the internal batteries and charge them at the same time. A full charge may take four to six hours. When power is applied to the charger, its LED will flash briefly. The LED will flash on/off during the charge cycle and remain on continuously when charging is complete. Adapters are supplied for most International AC plug styles.

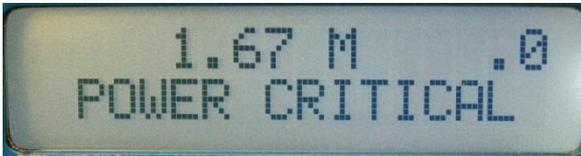


WARNING: Use only the battery charger supplied with your 1A-150. Do NOT connect any other device to the 4-Pin Battery Charge connector.

During logging, if the input voltage falls below approximately 4.2v, the bottom line of the display will switch back and forth between the normal and a "low batteries" warning:



When the input voltage falls below critical levels the 1A-150 will shut down and display the following:



At which point the 1A-150's *Power* switch must be turned *Off* and the batteries recharged.

Section 5: System Troubleshooting

Problem: You are getting frequent messages “Serial Communications Error” while logging.

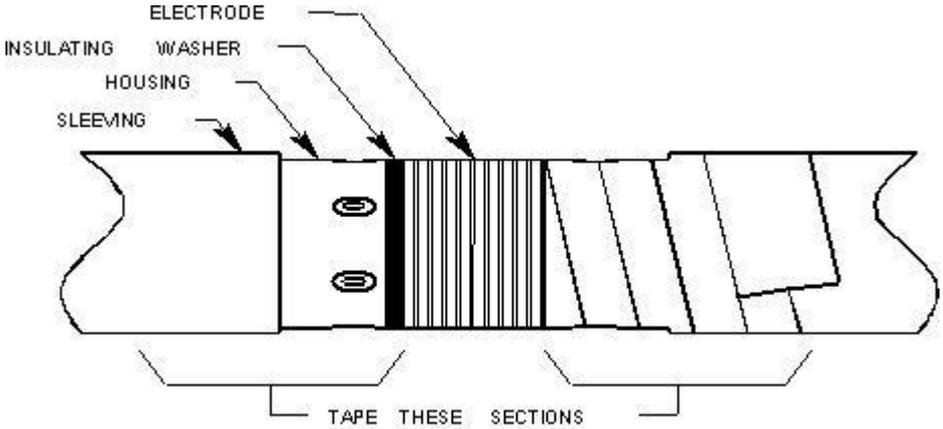
Solution: It is possible that your computer is busy working on other tasks besides DELogger. Check your Startup group (see Windows Help) and remove any programs that are being automatically started when you boot up.

Section 6: Parts and Accessories

Qty	Part Number	Description
Kit	52251016	GOI-4/1-H-100 REHEADING KIT
4"	PPE001025010	WIRE, 24AWG, BLACK, .010 PVC
4"	17500241	WIRE, 24AWG, ORANGE, STR, .010" PVC
1	12251304	ADAPTER, ZERK, SS3, ¼"-28 MALE
1	12251305	SET SCREW, SS8, ¼"-28 x ¼"
1	22251084	GOI-4 CABLEHEAD STRAIN RELIEF CONE
1	22251082	GOI-4 CABLEHEAD STRAIN RELIEF SLEEVE
1	12251084	BOOT, BLK, 4PIN
4	12251891	O-RING, BUNA, -014
2	12251890	O-RING, BUNA, -013
1	12251084	TAPE, SCOTCH 88 ELECTRICAL, 66'
1	12251303	GREASE, SILICONE, 3OZ
6"	12251171	HEATSHRINK TUBING ¾"
6"	12251065	HEATSHRINK TUBING 1"
4"	12251244	HEATSHRINK TUBING 1 ½"

Appendix A

When using a probe with electric logs (resistivities, spontaneous potential, etc.) all exposed cablehead/probe top surfaces must be insulated from the borehole fluid by wrapping them with high quality electrical tape.

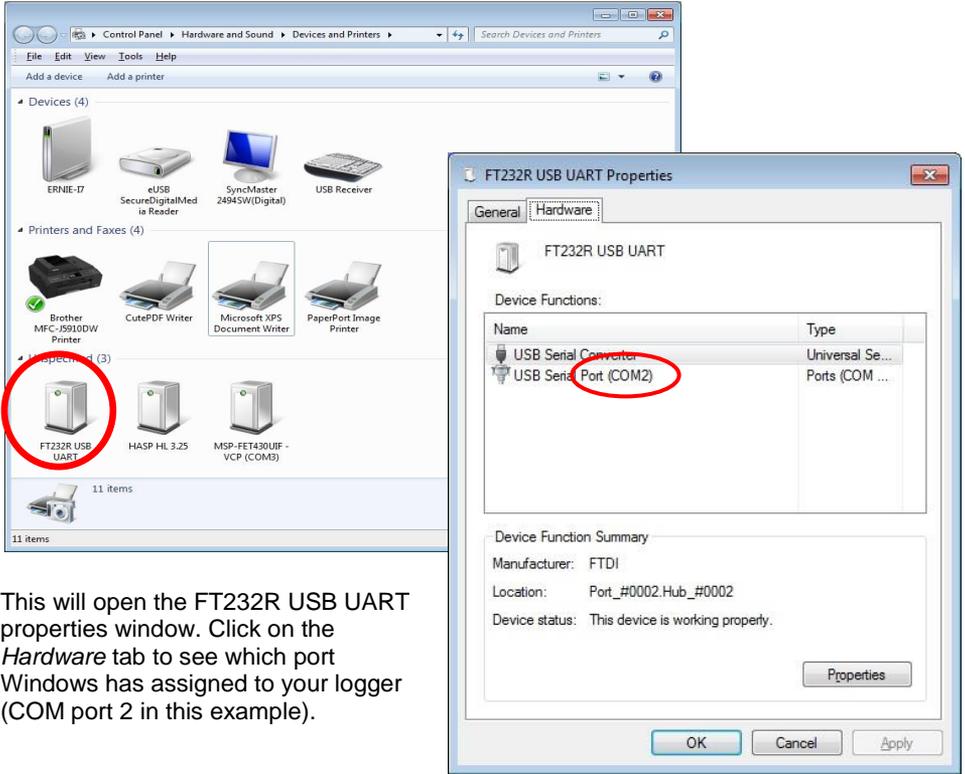


Also keep any exposed probe housing around the electrodes insulated, but do not cover any of the electrodes with electrical tape. Apply tape from the edge of the insulating washer to the neoprene sleeving. Cover at least 1" (2-3cm) of the neoprene sleeving. Overlap each wrap by at least half with the next new wrap.

Appendix B

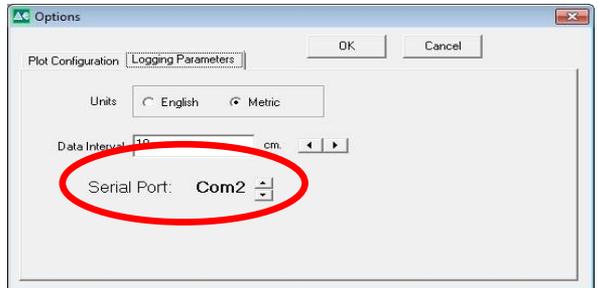
Setting Up Your USB Port

Note, the winch must be turned ON and its USB cable plugged into your PC before launching DELogger. This is to allow Windows to recognize the USB connection, open and assign a COM port to it. In addition the Serial Port in DELogger must be set to match the COM port Windows assigned to your logger. Open Devices and Printers (as shown below) and double-click on the FT232R USB UART icon.



This will open the FT232R USB UART properties window. Click on the *Hardware* tab to see which port Windows has assigned to your logger (COM port 2 in this example).

DELogger's Serial Port number must be set to match the Windows COM port. In DELogger select Edit/Log Configuration and then the Logging Parameters tab. Use the up/down arrows to set the matching COM port number and click OK.



Appendix C

1A-150 Battery Charging Instructions

Read these instructions before using the battery charger

1. Plug the battery charger in AC power.
 - a. For North America and Japan, simply flip out the AC blades
 - b. For other areas of the world, leave the blades closed and slide the appropriate mains adapter onto them.
2. The LED on the charger will flash green for 1/2 second to show power is applied.
3. Connect the cable to the corresponding connector on the Battery Box. The LED will indicate as follows:
 - a. OFF = No battery
 - b. Flashing = Charging
 - c. Solid = Fully charged
4. It is safe to leave the batteries on charge indefinitely.
5. Operating temperature: 32°F to 104°F (0°C to 40°C).
6. Storage temperature: -4°F to 185°F (20°C to 85°C).



NOTE: There is a 1A, 2AG (5x15mm), fuse inside the battery box to protect the internal battery pack from a short circuit.

Revision History

Project #	Description	Date
2377	Created Manual – AH & GR	12/5/2023

NOTES

The Warranty

For a period of one (1) year from date of first sale, product is warranted to be free from defects in materials and workmanship. Geotech agrees to repair or replace, at Geotech's option, the portion proving defective, or at our option to refund the purchase price thereof. Geotech will have no warranty obligation if the product is subjected to abnormal operating conditions, accident, abuse, misuse, unauthorized modification, alteration, repair, or replacement of wear parts. User assumes all other risk, if any, including the risk of injury, loss, or damage, direct or consequential, arising out of the use, misuse, or inability to use this product. User agrees to use, maintain and install product in accordance with recommendations and instructions. User is responsible for transportation charges connected to the repair or replacement of product under this warranty.

Equipment Return Policy

A Return Material Authorization number (RMA #) is required prior to return of any equipment to our facilities, please call our 800 number for appropriate location. An RMA # will be issued upon receipt of your request to return equipment, which should include reasons for the return. Your return shipment to us must have this RMA # clearly marked on the outside of the package. Proof of date of purchase is required for processing of all warranty requests.

This policy applies to both equipment sales and repair orders.

FOR A RETURN MATERIAL AUTHORIZATION, PLEASE CALL OUR
SERVICE DEPARTMENT AT 1-800-833-7958.

Model Number: _____

Serial Number: _____

Date of Purchase: _____

Equipment Decontamination

Prior to return, all equipment must be thoroughly cleaned and decontaminated. Please make note on RMA form, the use of equipment, contaminants equipment was exposed to, and decontamination solutions/methods used. Geotech reserves the right to refuse any equipment not properly decontaminated. Geotech may also choose to decontaminate the equipment for a fee, which will be applied to the repair order invoice.

Geotech Environmental Equipment, Inc.

2650 East 40th Avenue Denver, Colorado 80205

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