

DigiTRAK[®] LWD[™]

**and DataLog Software
for DigiTrak F5 and Eclipse**

Operator's Manual

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DigiTrak receivers are classified as Class 2 radio equipment per the R&TTE Directive and may not be legal to operate or require a user license to operate in some countries. The list of restrictions and the required declarations of conformity are available on DCI's website, www.DigiTrak.com. Under **Service & Support**, click **Documentation** and select from the **CE Documents** drop-down menu.

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Dear Customer,

Thank you for choosing a DigiTrak locating system. We are extremely proud of the equipment we have been designing and building in Washington State since 1990. We believe in providing a unique, high-quality product and standing behind it with superior customer service and training.

Please take the time to read this entire manual, especially the section on safety. Please also register your equipment online at access.DigiTrak.com. Or, fill in the product registration card provided with this equipment and either fax it to us at 253-395-2800 or mail it to DCI headquarters.

Product registration entitles you to free telephone support (in the USA and Canada), notification of product and instruction manual updates, and helps us provide you with future product upgrade information.

Feel free to contact us if you have any problems or questions. Our Customer Service department is available 24 hours a day, 7 days a week. International contact information is available on our website.

As the horizontal directional drilling industry grows, we're keeping our eye on the future to develop equipment that will make your job faster and easier. Visit us online any time to see what we're up to.

We welcome your questions, comments, and ideas.

Digital Control Incorporated
Kent, Washington
2015

Watch our DigiTrak® Training Videos at www.youtube.com/dcikent

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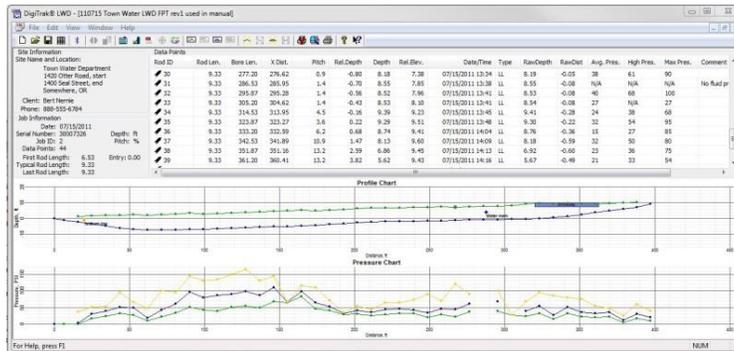
LIMITED WARRANTY

Important Safety Instructions

Always operate your DigiTrak locating system properly to obtain accurate depth, pitch, roll, and locate points. If you have any questions about the operation of the system, please contact DCI Customer Service for assistance.

This manual is a companion to your locating system operator's manual, which contains a more thorough list of warnings regarding the potential for serious injury and death, work slowdowns, property damage, and other hazards and warnings regarding the operation of horizontal drilling equipment. Please read and understand your system operator's manual completely before operating the equipment described in this manual.

Introduction



Drill and Pressure Data in DataLog; F5 and Eclipse Receivers

The DigiTrak® DataLog® System lets you collect and store drill data on an F5® or Eclipse® receiver and then upload it to a computer for storage and analysis using DCI's Log-While Drilling (LWD™) software. The DataLog system can measure and record the following types of data:

- Depth
- Pitch
- Elevation change (surface topography)
- Fluid pressure (requires an F5 fluid pressure transmitter)
- Pullback force and fluid pressure (requires a TensiTrak® transmitter)
- Transmitter heading information (requires an SST® steering transmitter)

This manual covers the DataLog function primarily on an F5 receiver; while some instructions for the Eclipse system are included, Eclipse users must also refer to the [DigiTrak Eclipse DataLog Mapping System Operator's Manual](#) available on DCI's website.

As mentioned above, the DataLog system works with TensiTrak® and SST® transmitters. For complete information on the TensiTrak transmitter and SST steering system, please consult the respective operator's manual, available at www.DigiTrak.com.

The terms and techniques used in this manual are considered basic to the DigiTrak F5 and Eclipse locating system. You must read and understand your system operator's manual and familiarize yourself with the various DataLog menus on your receiver before using the system for a production drill. If you have questions, please call DCI Customer Service for assistance.

Setting Time and Calendar

The correct time and date must be set on your F5 receiver before logging data. The option to set the time and calendar is available on the Settings option on the Main menu. For additional help on setting the time and date for your receiver, consult your operator's manual.

System Components

The DigiTrak DataLog system has four main components:

F5 or Eclipse Receiver	A receiver (locator) with DataLog menus used to display and record transmitter data.
F5, F Series, or Eclipse Transmitter	A battery- or cable-powered device located in the drill head with sensors that continuously measure and transmit information about the below-ground drill head or product pullback force. This information is displayed on the F5 receiver.
LWD Software	The computer application used for downloading and working with DataLog drill data from a receiver
Upload Adapter	A USB device required for the computer to download data from an F5 receiver, or an infrared serial cable device required to download data from an Eclipse receiver.

Receiver

The receiver tracks the position and depth of the transmitter and records drill and pullback data. The F5 receiver can record and store 50 jobs (runs) per type of DataLog file (drill or pressure-tension data) before some or all jobs must be deleted or uploaded to a computer to create room for new jobs. Each drill data job can have hundreds of data points. The number of data points that can be saved on each pressure-tension DataLog job is dependent only on the amount of memory available on the F5 receiver.

Eclipse: This manual gives instructions for using the DataLog functions on an F5 receiver; if you are using an Eclipse receiver, refer to the [DigiTrak Eclipse DataLog Mapping System Operator's Manual](#) available on our website.

Transmitter

The DataLog function will record transmitter data from all F5, F Series, and Eclipse battery-operated and cabled transmitters. This includes the F5 TensiTrak, which provides both fluid pressure and product pullback force readings, and the SST steering tool, which provides wireline heading guidance without a grid.

Standard drill data provided by a transmitter includes depth and pitch. A fluid pressure transmitter (FPT) will also provide average, high, and maximum fluid pressure readings per rod. To obtain a log including both drill and pressure data, you must record both a drill data job and a pressure-tension (P-T) data job at the same time, as depth and pitch are not recorded in a pressure-tension data file.

The transmitter and receiver must be compatible to record data. The F5 receiver is compatible with both F5 and F Series transmitters (regional compatibility requirements apply). The Eclipse receiver is compatible with Eclipse transmitters only.

LWD Software

The Log-While-Drilling (LWD™) software is provided on a USB flash drive that also contains this operator's manual, the system operator's manual, sample drill data, and Bluetooth drivers.



LWD USB Flash Drive

The software requires a computer with the following minimum specifications:

- Microsoft® Windows® XP®, Microsoft Windows Vista®, Microsoft Windows 7, or Microsoft Windows 8 operating system
- USB port
- pointing device (mouse)
- printer (optional)

Bluetooth USB Adapter

The Bluetooth® USB adapter (Amp'ed RF Model BT-210) plugs into your computer to allow the receiver to upload data. Drivers for the Bluetooth adapter are provided on the LWD flash drive and must be loaded before use; see [Installing LWD Software](#) on page 23.



Bluetooth USB Adapter

For Eclipse: An ACTiSYS infrared (IR) cable is required to upload data from an Eclipse receiver. Place the IR reader over the receiver's IR port and connect the serial plug to the computer.

If your computer does not have a serial port, use the serial-to-USB adapter provided with the IR cable. The "Prolific" driver required for this adapter is included on the flash drive.

Understanding DataLog

The as-built report you view in the Log-While-Drilling program is dependent on what you record on your receiver. The following sections describe the five types of reports DataLog can generate in Log-While-Drilling.

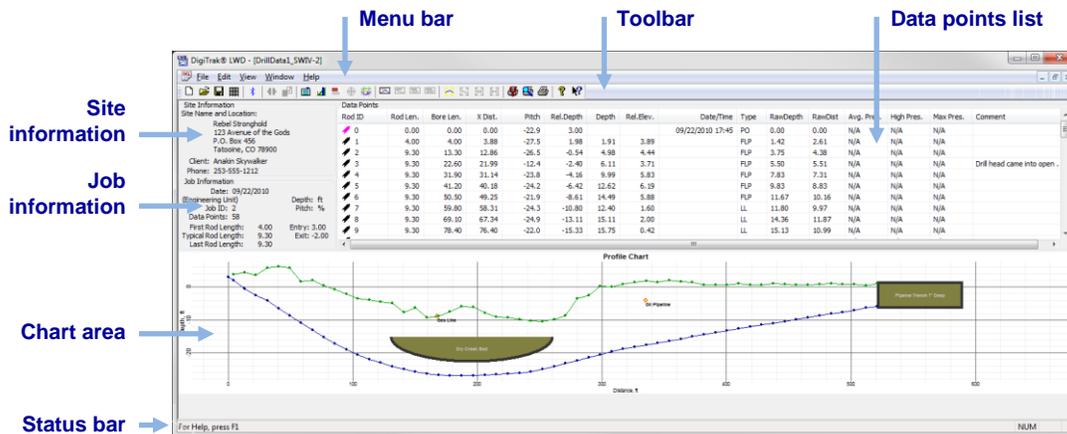
Your receiver records most transmitter data using a Drill DataLog job. Fluid pressure and TensiTrak pullback force are recorded separately in a Pressure-Tension DataLog job. To view both sets of data on one graph, both recordings must be made concurrently.



Note The DataLog feature must be enabled before a job can be started, stopped, or appended to. From the Main menu, select Drill DataLog  and/or Pressure-Tension DataLog , select the red Disabled...  icon so it turns green  (enabled), and select Exit  to return to the Main menu.

Standard Transmitter Data

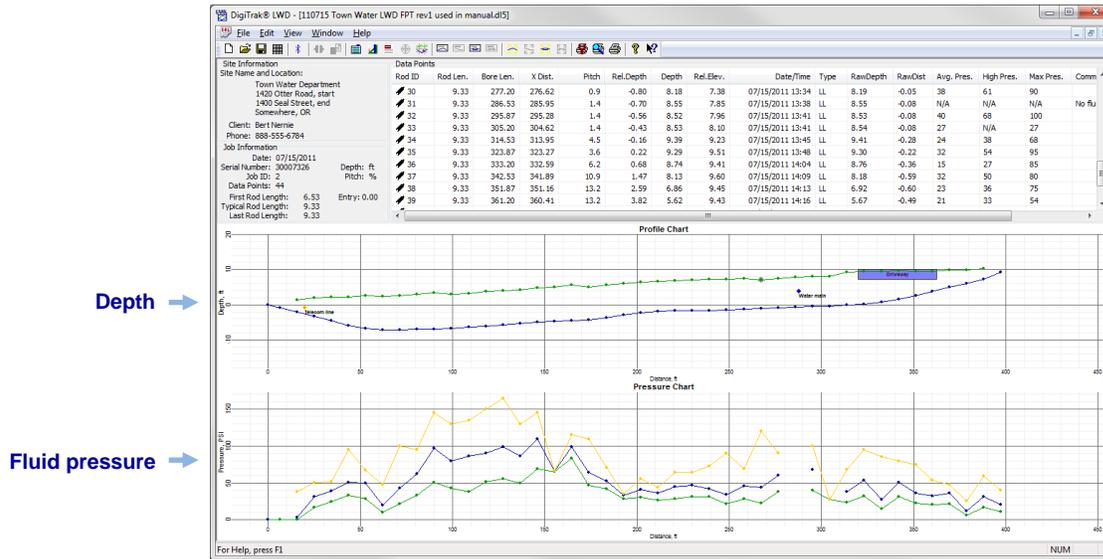
To record standard transmitter data like rod number, depth, and pitch, start a Drill DataLog job (see [Recording Data](#) on page 10). This data will appear like this in the Log-While-Drilling (LWD) program:



Drill Data Only

Standard Transmitter Data with Fluid Pressure

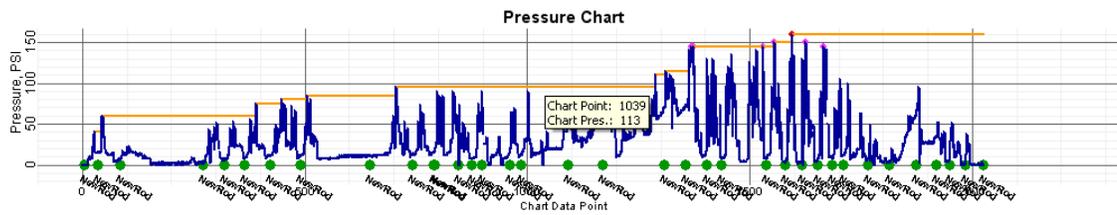
Select an FPT transmitter in the transmitter selection screen. When you access the Locate screen, the receiver will automatically prompt to start a P-T DataLog job. After you start the P-T job and return to the Locate screen, hold the trigger briefly and toggle right to begin a concurrent Drill DataLog job (see [Recording Data](#) on page 10).



Drill Data with Fluid Pressure

Fluid Pressure Data Without Drill Data

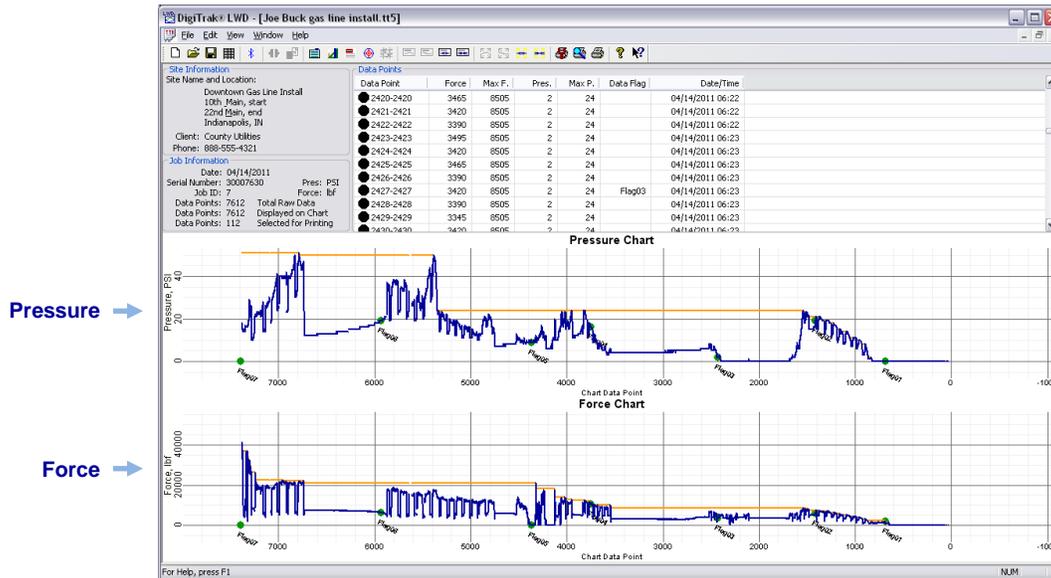
To record fluid pressure only, start a Pressure-Tension DataLog job as discussed in the previous section but do not begin a concurrent Drill DataLog job. Because no drill rod data exists for the pressure data to be paired with, the resulting LWD graph will show raw, time-based fluid pressure data only.



Fluid Pressure Only

TensiTrak Pullback Force and Fluid Pressure Data

To record fluid pressure and pullback force while using a TensiTrak® pullback transmitter, start a P-T DataLog job. Because a pilot bore transmitter is not installed during product pullback, TensiTrak graphs have the same jagged appearance as a fluid pressure job without drill data.

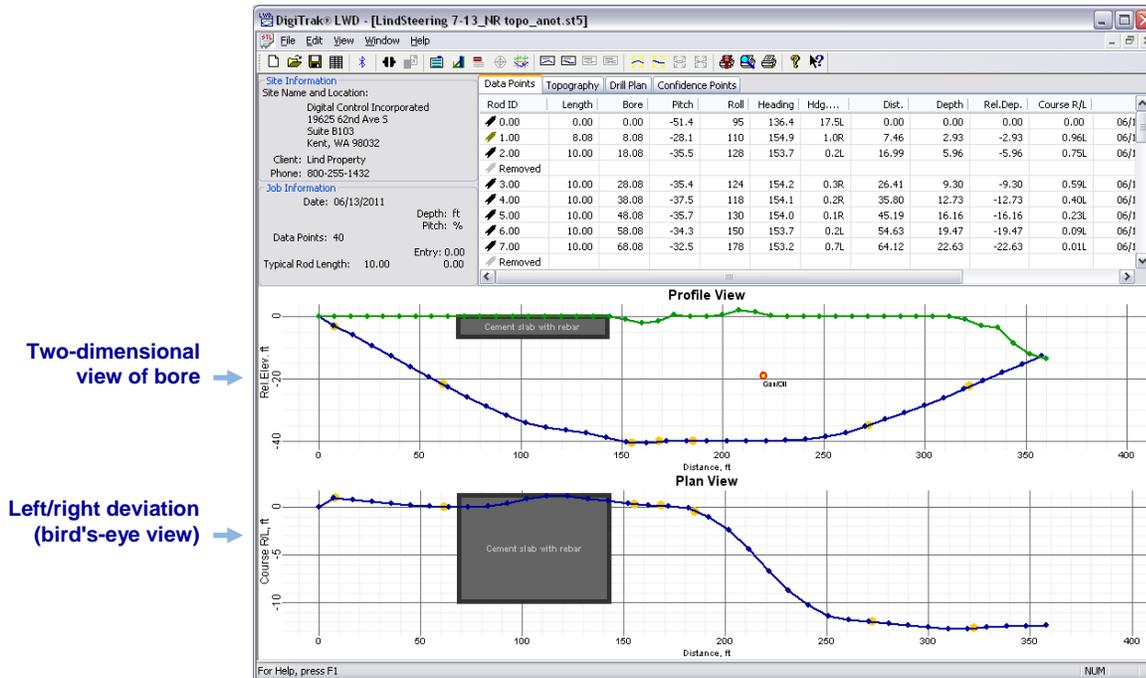


TensiTrak Pullback Force and Fluid Pressure without Drill Data

For a complete discussion of how to use and record data for a TensiTrak transmitter, please refer to the TensiTrak Operator's Manual available at www.DigiTrak.com.

Steering Tool (SST) Data

Recording elevation, bore path profile, and left/right deviation with an SST Steering Tool transmitter does not use the DataLog feature. Instead, it requires running the LWD software live on a laptop connected to the drill rig while drilling.

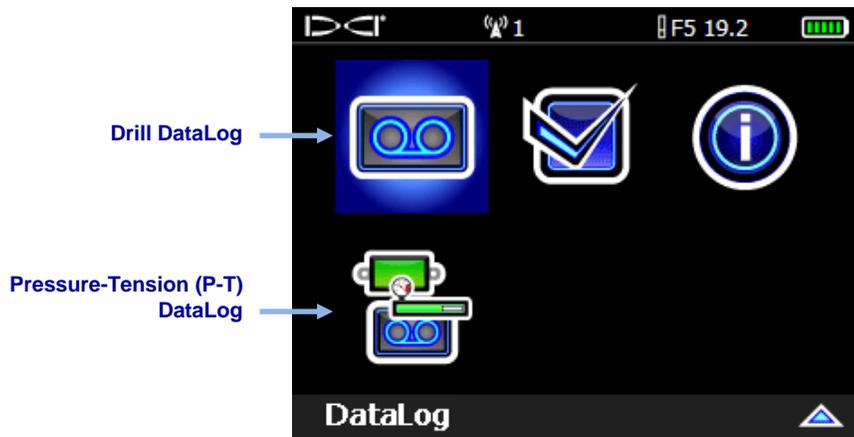


LWD Steering Tool (SST) Elevation and Course Data

For a complete discussion of how to use and record data for an SST transmitter, please refer to the SST Operator's Manual available at www.DigiTrak.com.

Receiver DataLog Menus

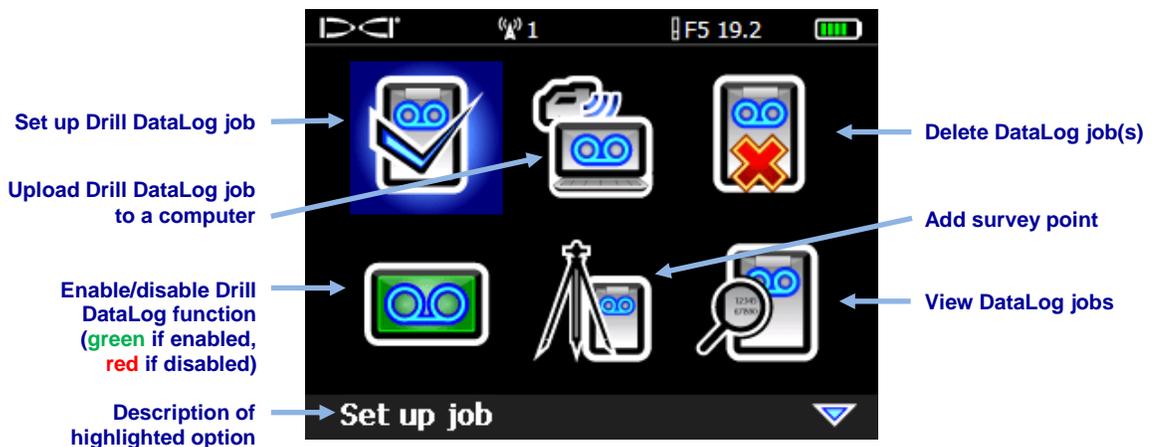
From the F5 receiver's Main menu, toggle down twice to display the Drill DataLog  and Pressure-Tension (P-T) DataLog  menu options.



F5 Receiver Main Menu, Second Screen

Drill DataLog Menu

Use the Drill DataLog menu  to record pilot hole drill data.



Drill DataLog Menu

Pressure-Tension (P-T) DataLog Menu

Use the Pressure-Tension (P-T) DataLog menu  to record fluid pressure. When you access the Locate screen, the receiver will automatically prompt to start a P-T DataLog job.



Pressure-Tension (P-T) DataLog Menu

A Drill DataLog job records all transmitter data other than fluid pressure. A P-T DataLog job records pressure and TensiTrak pullback force. To see Drill and P-T data on one report, both jobs must be recorded at the same time for one bore. When you upload a Drill DataLog that was recorded concurrently with a P-T DataLog, the LWD software automatically includes the P-T data with the Drill data.

Recording Data

To record pilot bore drill data, the receiver must be receiving data from a properly calibrated transmitter, as described in your receiver operator's manual.

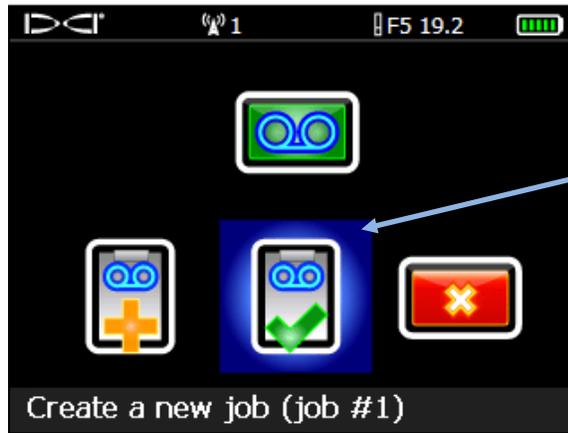
Ensure the Drill DataLog and Pressure-Tension DataLog features are enabled as described in the note on page 4.

Creating a New Job



Note To include pressure/tension data with your Drill DataLog, select an FPT transmitter in the transmitter selection screen and return to the Locate screen, where the receiver will automatically prompt to start a P-T DataLog job (see [Recording P-T Data](#) on page 21). When you return to the Locate screen, continue below to begin a concurrent Drill DataLog job.

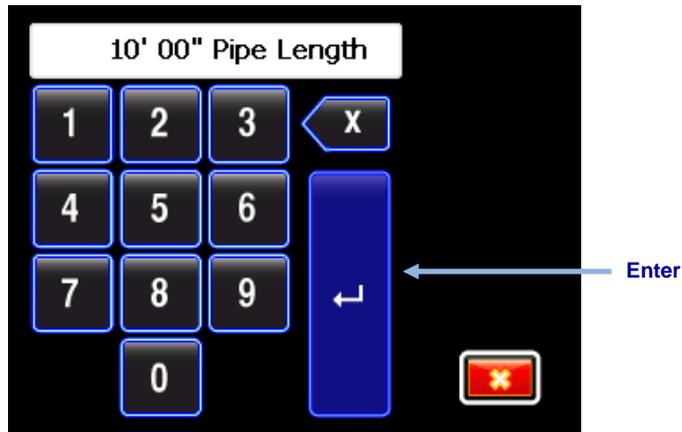
1. At the **Locate** screen, hold the trigger briefly and then also toggle right to display the **Drill DataLog Start Recording** menu.
2. Select **Create a New Job** .



Create a new job

Drill DataLog Start Recording Menu

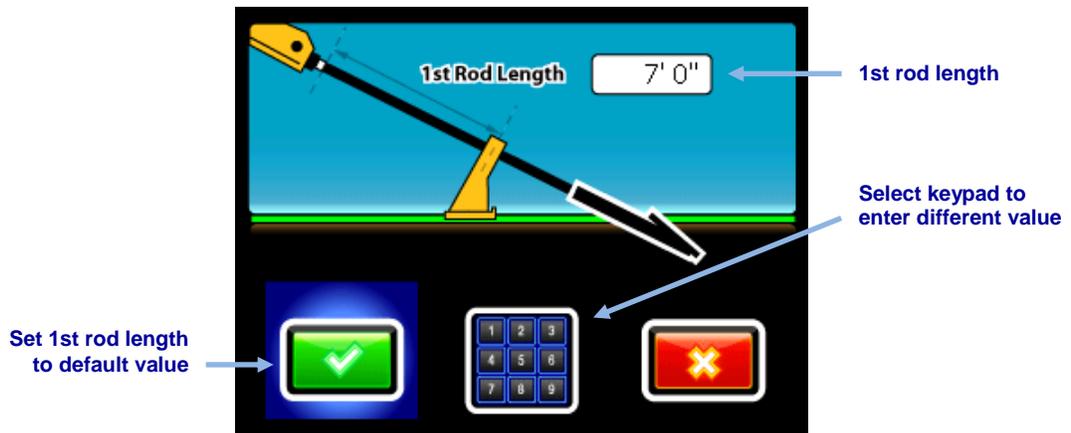
- Enter the drill rod (pipe) length to be used for this bore on the keypad, then select **Enter**  to set it as the drill rod length.



Keypad for Entering Pipe Length (Rod Length)

Ten feet (3.05 m) is the default rod length. The receiver remembers your last rod length.

- The 1st rod length input screen appears with a default value. This length is automatically calculated as 70% of your pipe length. If this is correct for your bore, select  to set this value and skip to step 5.



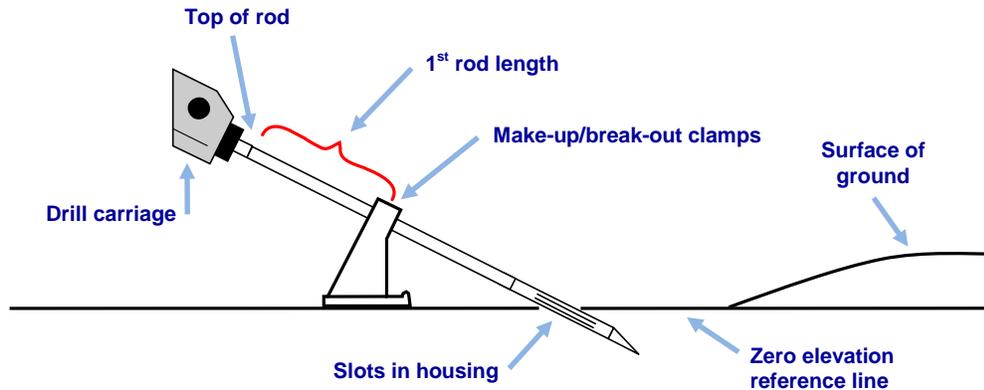
1st Rod Length Input Screen



Note If the drill head cannot be positioned so the slots are half above and half below the ground due to tooling configuration (as shown in the preceding and following illustrations), you can still illustrate this later in LWD on your uploaded bore data by opening **Job Information** (under the **Edit** menu) and entering a value in the **Rel. Elev. (Relative Elevation) At Entry** box. For example, if the housing slots are four ft. below ground, enter a value of -4. See [Survey Point Elevation Change](#) on page 31 for more information on this topic in the Log-While-Drilling software.

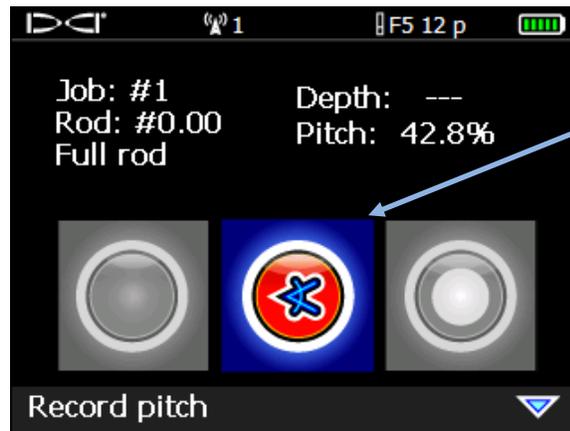
To calculate a different 1st rod length value, measure from the make-up/break-out clamps to the top of the rod when the drill head is positioned for the first data point. For this measurement, the housing slots should be half above and half below the ground (or a plane parallel to the ground if drilling into a pit). The elevation at the first data point is the Zero Reference elevation, and is generally at the surface of the ground.

Select the keypad, enter the desired value, and select **Enter** .



Measuring the 1st Rod Length

- When recording the first data point (rod 0), the only available option will be **Record Pitch Only** . With the receiver positioned within range of the transmitter (it does not have to be at the locate line or front locate point), select  to record the data point.

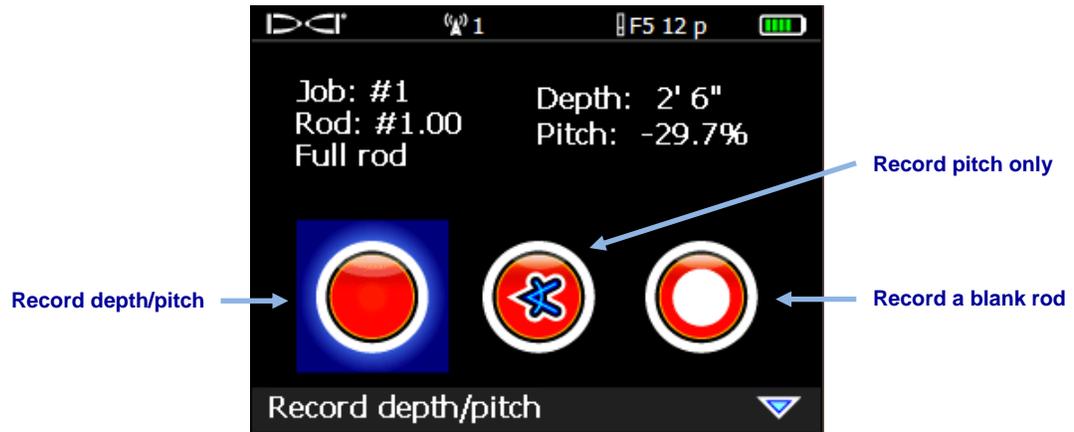


Drill DataLog Recording Options (Pitch Only)

The receiver beeps twice and returns to the **Locate** screen.

- Advance the drill head to the end of the first rod and position the receiver over the locate line (LL) or the front locate point (FLP).

7. Hold the trigger and toggle right once to display the Drill DataLog Recording Options menu, which now has all options enabled.



Drill DataLog Recording Options

8. Select one of the following:
 - **Record depth/pitch**  to log the depth and pitch information.
 - **Record pitch only**  to log only the pitch because you are unable to position the receiver at the LL or FLP. This is also useful when drilling under rebar which may decrease signal strength that can result in incorrect topography values in the graph.
 - **Record a blank rod**  if you have no data because you cannot position the receiver within range of the transmitter.

Click the trigger to record the second data point (rod 1). The receiver will beep several times and return to the **Locate** screen.

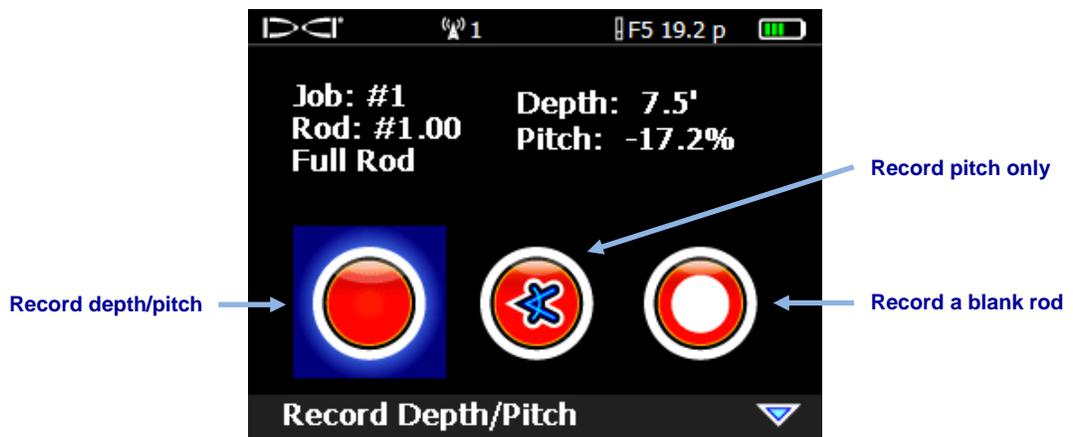
9. Continue drilling, using the trigger/toggle right sequence to record data points at the end of each drilled rod.

Recording Partial Rods

The DigiTrak Log-While-Drilling (LWD) computer software requires data points to be recorded at equally spaced intervals, such as at the end of each drill rod. However, when drilling with long drill rods and/or making significant pitch changes, you may want to record data at partial pipe length intervals to more accurately depict the bore profile and changes in topography. The LWD function can accommodate quarter, half, three-quarter, and full pipe lengths. Partial rods may only be recorded after rod 1 (second data point) has been recorded.

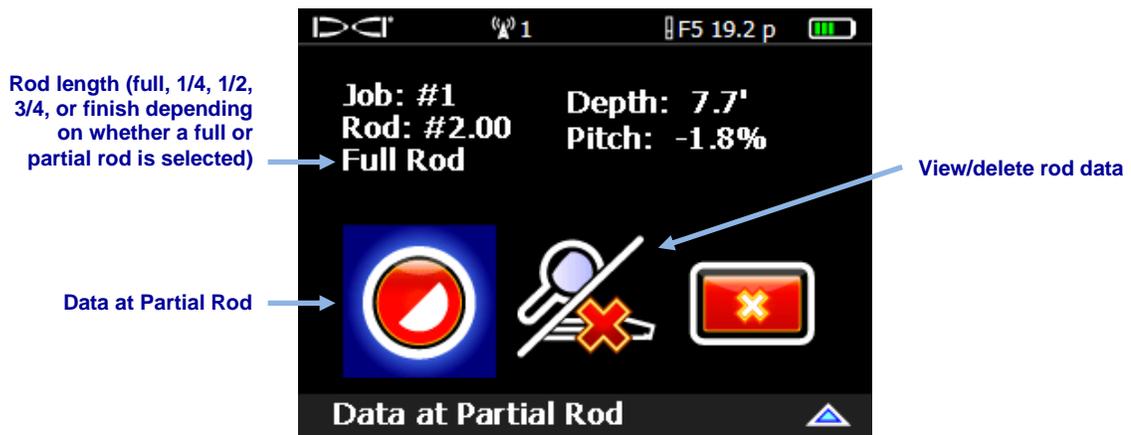
To record a partial rod:

1. Position the receiver at the FLP or over the head at the LL, if possible.
2. At the **Locate** screen, hold the trigger and toggle right once to view the Recording Options screen.



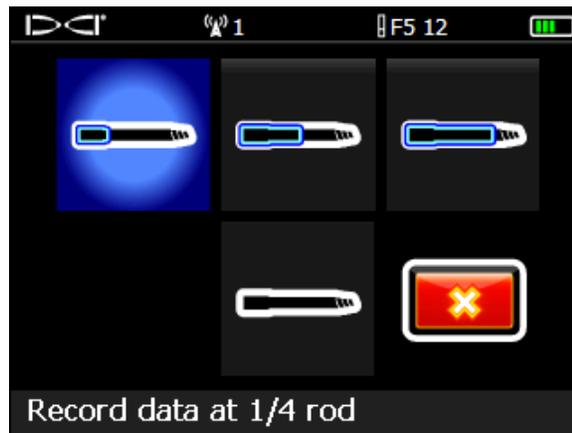
Drill DataLog Recording Options (First Screen)

3. Toggle down and select **Data at Partial Rod**  on the second page.



Drill DataLog Recording Options (Second Screen)

4. Select a partial rod length.



DataLog Partial Rod Screen

The display returns to the first recording options screen but the partial rod value ($\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$, or finish rod) appears in place of “Full Rod” for the rod length (see image in step 2).

5. Select the option to record depth and pitch (or pitch only if you are not able to position the receiver at the LL or FLP) and click the trigger to record the data point. The receiver beeps several times and returns to the **Locate** screen.
6. Record another data point at the partial rod length or end of the rod.

The “Finish Rod” option appears if a partial rod was previously recorded.

Closing or Pausing a Job

Both drill and P-T jobs must be closed before they can be uploaded. Close a Drill DataLog job after recording the last data point and documenting the last rod.

You can also pause a DataLog job so it remains open while you navigate menu options. All DataLog jobs close automatically when the receiver powers off.

1. At the **Locate** screen, toggle down to open the DataLog Close/Pause Recording menu.

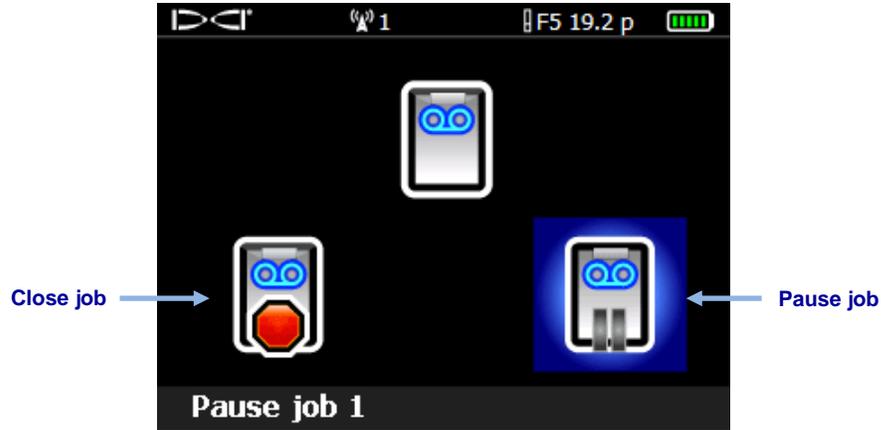
If both Drill and DataLog data are being recorded, the Drill DataLog Close/Pause Recording menu will display first (shown below), followed by the P-T Close/Pause Recording menu.

2. Select **Close Job**  to close the DataLog job. The job can now be uploaded to a computer (see [Uploading Data to a Computer](#) on page 23) or added to later (see [Appending to an Existing Job](#) on page 16).

-OR-

Select **Pause Job**  to keep the job open. When you return to the **Locate** screen:

- Drill DataLog: your next data point will record on the same job
- P-T DataLog: data will continue recording automatically



Drill DataLog Close/Pause Recording Menu (same options as P-T)

To include landmark or utilities information with your drilling data, handwrite the depth, description, rod number, and/or distance from the entry for each item. Add this information to the drill data later using the LWD software on your computer.



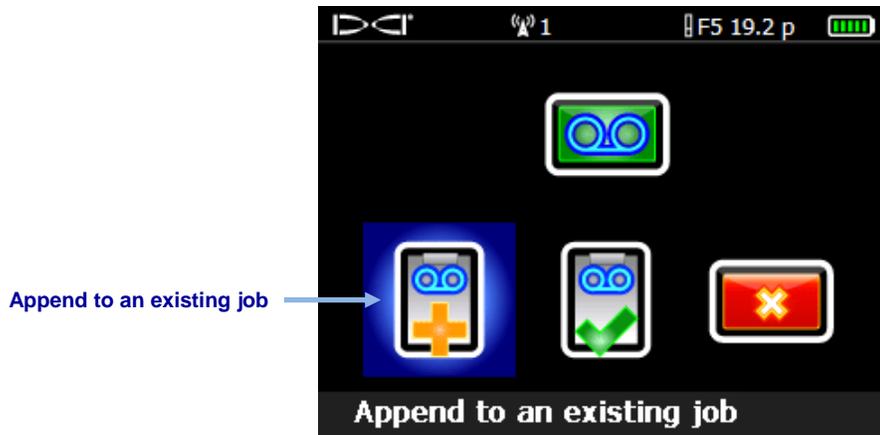
Note An F5 receiver can store a total of 50 Drill and 50 P-T jobs. The receiver displays a warning at 45 saved jobs. Trying to save more than 50 jobs will return you to the Start Recording menu where you can append to a job or exit.

Appending to an Existing Job

Use **Append** in the Start Recording menu to add data to a DataLog job that has been closed or paused.

When the P-T DataLog function is enabled and a pressure sensing transmitter is in use, the P-T Start Recording menu displays whenever the **Locate** screen is accessed. This menu lets you create (start recording) or append to an existing job. This menu is the same for the Drill DataLog function.

1. At the **Locate** screen, hold the trigger and toggle to the right once.
2. Select **Append...** .



Drill DataLog Start Recording Menu (same options as for P-T)

3. Select the job number to append to.

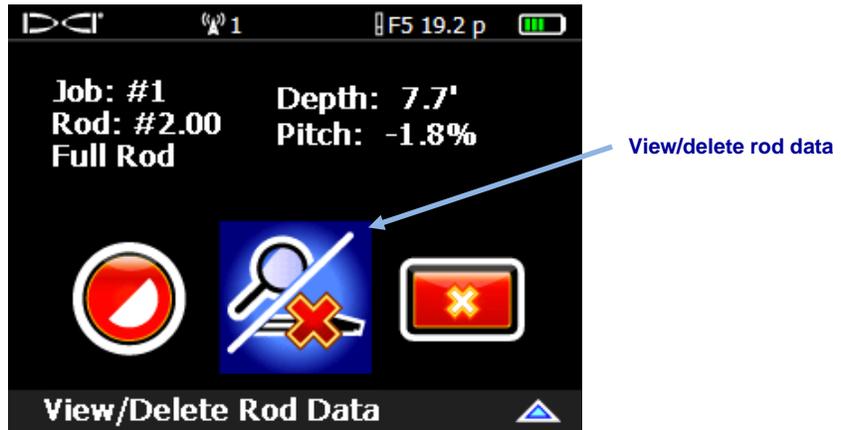


Sample DataLog Jobs Lists

4. **Drill DataLog only:** On the Drill DataLog recording options screen, select the appropriate option to continue logging data points.
5. Continue recording drill rods or partial rods as described earlier in this section.
P-T data continues recording automatically.

Viewing and Deleting Rods from the Receiver

1. At the **Locate** screen, hold the trigger and toggle right once to view the Recording Options screen.
2. Toggle down and select **View/Delete Rod Data** .



Drill DataLog Recording Options (View/Delete Rod Data)

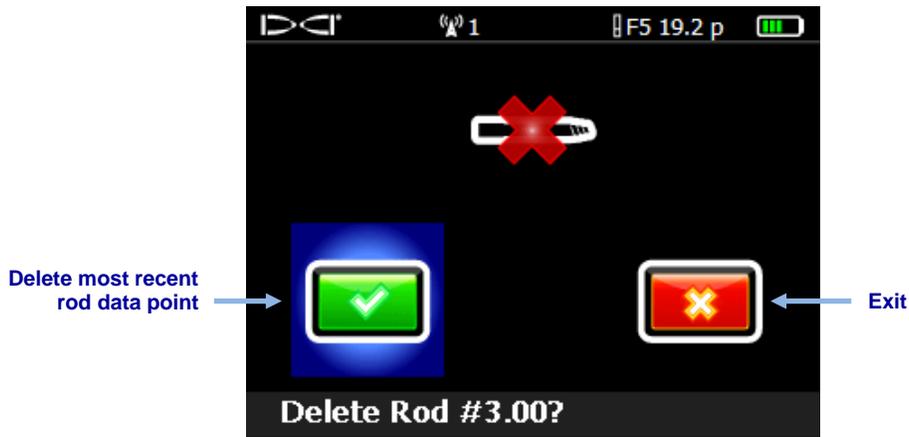
3. In the View Rod Data List, the most recent rod data (the only one that can be deleted) is highlighted in the top row. Click to select it (to return to the **Locate** screen without deleting the data point, simply toggle left or right).

Rod ID	Position	Depth	Rel Depth	Pitch
10	191.0'	0.4'	33.8'	17.7%
9	171.3'	0.4'	30.3'	17.7%
8	151.6'	0.4'	26.8'	17.7%
7	132.0'	0.5'	23.3'	17.7%
6	112.3'	0.5'	19.8'	17.7%
5	92.6'	0.5'	16.4'	17.7%
4	72.9'	0.4'	12.9'	17.7%

Run #40 Rod: 20.00' SP: --

View Rod Data List

- Click  to delete the last rod data point, or **Exit**  to cancel and return to the **Locate** screen.



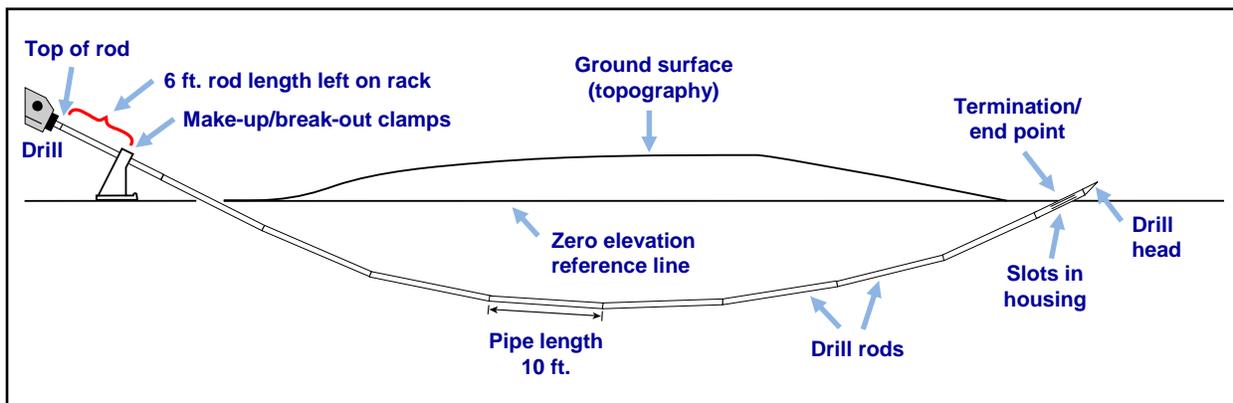
Delete Rod Screen

- Continue these steps for each rod you need to delete, selecting the most recent data point from the list shown in step 3 and then  to delete. When you are finished deleting rods, toggle left or right in the View Rod Data List to return to the **Locate** screen. Visually confirm that the number of rods used matches the View Rod Data list.

Measuring and Documenting the Last Rod (Optional)

When the drill head exits the ground, measure and document the length of the last rod, as it does not get recorded with the drill data in the receiver. Enter this value manually in the LWD software after the job is uploaded.

The last rod measurement is the pipe length minus the length of drill rod left on the rack. For example, if the pipe length is 10 ft. and 6 ft. remain from the make-up/break-out clamps to the top of the rod, the last rod measurement will be $10 - 6 = 4$ ft.



Last Rod Measurement

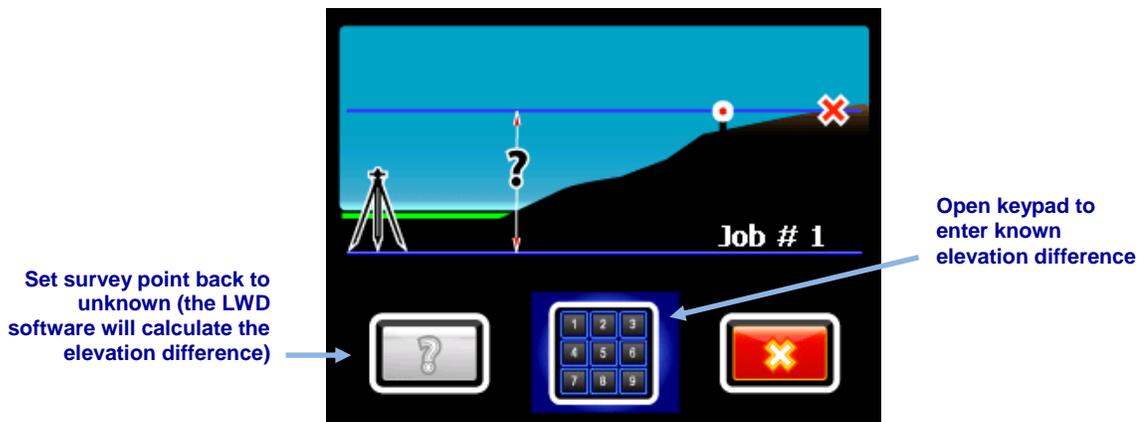
Adding a Drill DataLog Survey Point



If there is a difference in elevation between the entry and exit of the bore, consider adding a survey point to correct for any accumulated pitch variance that may affect the profile graph. This provides a more accurate graph of the bore and terrain in the LWD software.

From the **Main** menu, select **Drill DataLog**, then **Add survey point**. The survey point can also be entered later in the Log-While-Drilling software after data upload (see [Survey Point Elevation Change](#) on page 31).

1. In the Drill DataLog menu , select Add survey point .
2. From the list of existing drill jobs displayed, select the job to add the survey point to.
3. Select the keypad.



Survey Point Menu

4. Use the onscreen keypad to enter the surveyed value for the difference in elevation between the entry and exit of the bore.

This keypad includes a “+/-” button, since the elevation difference can be positive or negative. The keypad assumes the value will be positive, meaning the exit has a higher elevation than the entry. Use the +/- button to change as needed.

5. Select Enter  to set the displayed value as the survey point value. The screen returns to the DataLog menu.



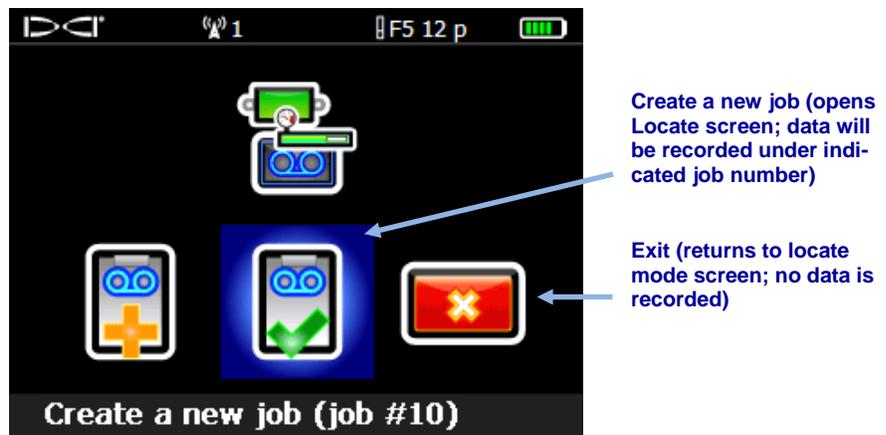
Note A survey point can be added to the job later in the Log-While-Drilling software. See [Survey Point Elevation Change](#) on page 31.

Recording P-T Data

Select an FPT transmitter in the receiver transmitter selection screen and when you access the Locate screen, the receiver will automatically prompt to create a Pressure-Tension (P-T) DataLog job.

Recording with Drill Data

1. At the P-T DataLog Start Recording menu, select **Create a new job** . The new job number displays at the bottom of the screen.



P-T DataLog Start Recording Menu

The receiver returns to the **Locate** screen and P-T data begins recording, as indicated by the recording icon next to the roll indicator.



P-T Data Recording Icon

At the Locate screen, hold the trigger briefly and then also toggle right to begin a concurrent Drill DataLog job (see [Recording Data](#) on page 10).

Recording Without Drill Data

To record Pressure-Tension data only, start a P-T DataLog job as described in the previous section but do not begin a concurrent Drill DataLog job when you return to the Locate screen.

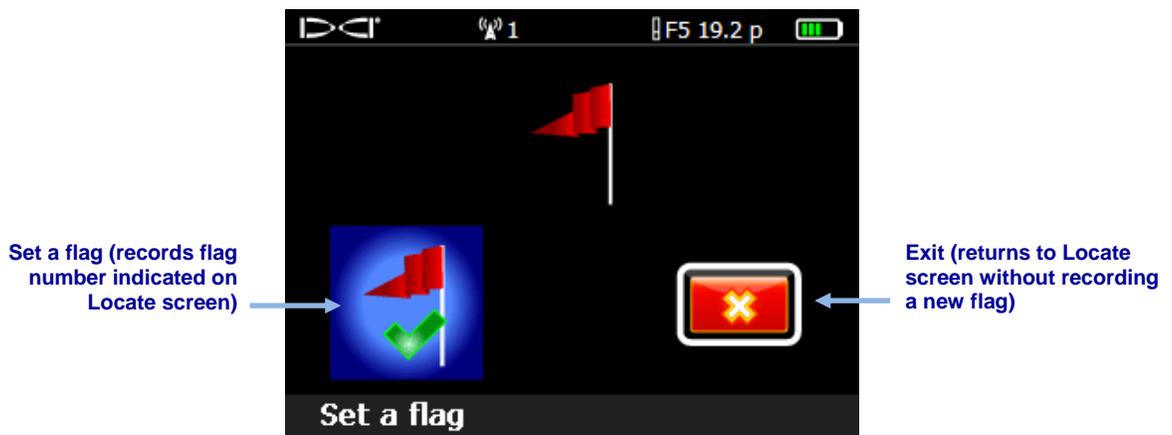
Because no drill rod data will be recorded, the resulting LWD graph will show raw, time-based fluid pressure data only.

Setting Data Flags

Only use data flags with TensiTrak, or when recording fluid pressure without a concurrent Drill DataLog. Data flags help match data points to a specific point along the bore path.

The Flag Recording menu is available only when a P-T job is already running and the receiver is at the **Locate** screen. DCI recommends that you record flags at significant points along the bore path, such as before and after crossing under a roadway or stream, to help correlate physical locations along the drill/pullback path with the P-T file data points.

1. At the **Locate** screen, toggle right to display the Flag Recording menu.



DataLog Flag Recording Menu

2. Select **Set a flag**  to record a flag. Once a flag is recorded, it cannot be deleted from the P-T data file.
3. Keep notes of flag numbers and details of the location where each flag was recorded, such as “entering under road” or “far edge of streambed”. Add this information to the P-T data file after it is uploaded to your computer.

Installing LWD Software

Minimum system requirements for use of LWD software on a computer can be found on page 3.

The default location for the LWD program files is c:\Program Files\DCI\DigiTrakLWD. LWD data files and sample data files will be placed in My Documents\DCI. You can change both of these default locations during installation.

1. Close any open applications.
2. Insert the LWD flash drive into a USB port and view the contents of the drive.
3. Open the LWD Kit folder and double-click **Drivers for LWD** to install drivers.
4. Open the Bluetooth Driver folder and double-click the *.**exe** file to install Bluetooth drivers (if you don't see file extensions like .exe, double-click the file of type *Application*).
5. Open the DigiTrak LWD Software folder and double-click on the **setup** file (setup.exe) to install the LWD software.

After these drivers and software have been installed, the LWD shortcut icon  appears on your desktop.

Uploading Data to a Computer

Uploading DataLog jobs from the F5 receiver to your computer involves adding the F5 receiver to the LWD software's Bluetooth device list and then uploading the files to the computer over the Bluetooth connection.

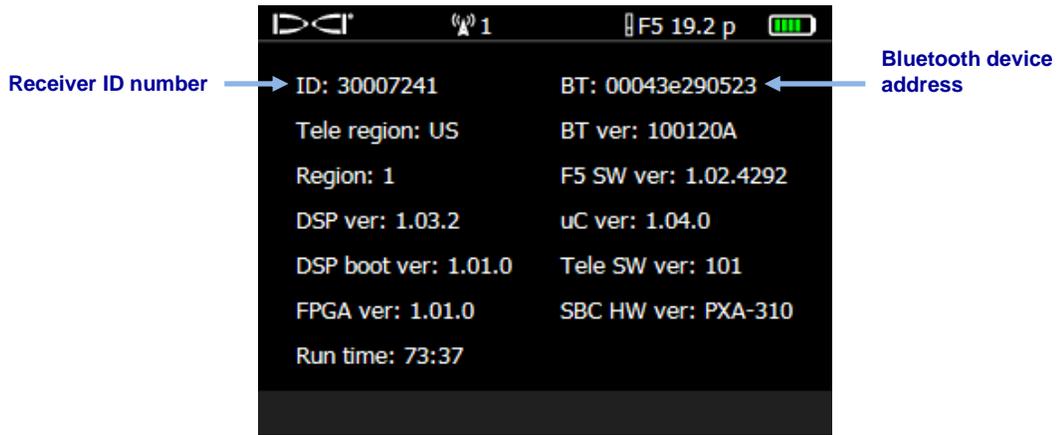
For Eclipse: Skip to [Uploading Data from an Eclipse Receiver](#) on page 25.

Add F5 Receiver to LWD Bluetooth Device List

An F5 receiver must be added to the Bluetooth device list in the LWD software prior to first use.

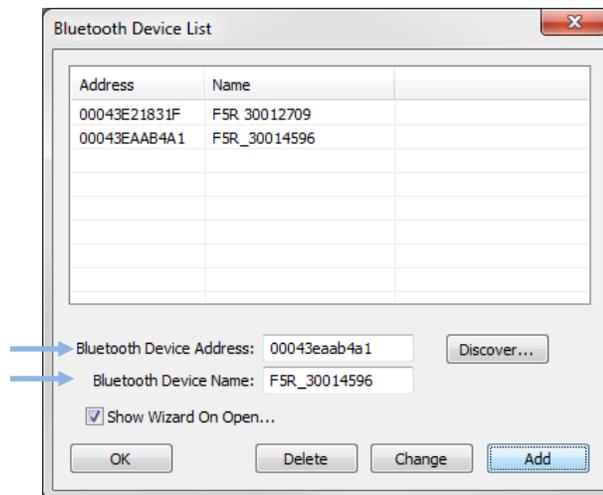
1. Power on your computer and insert the Bluetooth USB adapter (Amp'ed RF Model BT-210) into a USB port.
2. Power on the F5 receiver and select **System Info**  from the Main menu.

- Keep this screen open, or write down the receiver ID number and the Bluetooth device address.



Receiver System Information Screen

- Open LWD by double-clicking the LWD icon  on your desktop.
- Click **Bluetooth**  (menu **View > Bluetooth Device List**) to open the Bluetooth Device List dialog box.
- Enter your **Bluetooth Device Address** in the specified field.



Bluetooth Device List Dialog Box

- In the **Bluetooth Device Name** field, enter your receiver ID number.
- Click **Add**.
- Click **OK**. The device appears in the Bluetooth device list.

You are now ready to upload job data.

Uploading Data from an F5 Receiver

DCI recommends uploading data to a computer following every DataLog job.

1. Open the DataLog menu for the type of job file you are uploading: drill data  or pressure-tension .
2. Select **Upload job** .
3. Select the job to upload.



Note Data must be communicated to the computer within 15 minutes or the receiver will power off due to inactivity.

4. Open LWD by double-clicking the LWD icon  on your desktop.
5. Click **New**  (menus **File > New**).
6. Select the type of file to upload (drill data or pressure-tension) and click **OK**.
7. On the blank form that displays, click **Connection**  (menus **File > Upload Control**).
8. On the Upload Control dialog box, select **Bluetooth**.
9. In the **Serial Port Connection** drop-down list, select *Silicon Labs CP210x USB to UART Bridge (COM#)*.
10. Select your receiver's name from the Bluetooth drop-down list.
11. Click the **Connect to Device** button to begin uploading.
12. After the data has been transferred, the DataLog Job Information dialog box will appear. You may enter the requested details now or later.
13. Click **OK**.

The new job data displays in the information fields and chart areas in the LWD application window.

Uploading Data from an Eclipse Receiver

Upload data from an Eclipse receiver requires the ACTiSYS IR cable provided with the Eclipse DataLog system and, if you do not have a serial port on your computer, the USB-to-serial adapter.

1. Plug the ACTiSYS IR cable into the serial (COM) port on your computer (or USB port, if using the USB-to-serial adapter).
2. Power on the computer and receiver.
3. Open LWD by double-clicking the LWD icon  on your desktop.
4. Click **New**  (menus **File > New**).
5. Select the type of file to upload (drill data or pressure-tension) and click **OK**.
6. On the blank form that displays, click **Connection**  (menus **File > Upload Control**).

7. On the Upload Control dialog box, select **Infra-Red**.
8. In the Serial Port Connection drop-down list, select the communication (COM) port assigned to the IR cable.
9. From the Main menu, toggle right and select **DataLog**.
10. Select **Send Data**.
11. The receiver displays the last job logged. Select the correct job to upload.
12. Align the IR reader on the end of the cable with the red IR port on the left side of the receiver's display window, then click the trigger to begin uploading.

The drill data will appear immediately on the computer screen if the upload is successful.

Uploading Recommendations

DCI recommends that you upload data for each run twice, saving each with a different name. This ensures that no matter how many changes you make to the file in LWD, you will still have an original backup to refer to.

If you recorded a data point using the pitch-only or blank rod option, that data point will appear to be missing data. The LWD software will make assumptions to fill in the missing data or you can enter your own data.

Deleting a DataLog Job

1. In the Drill DataLog menu , select **Delete DataLog job** .
2. Select the button to delete one  or all  jobs.



Delete DataLog Jobs Menu

3. If deleting one job, select from the list of available Drill and P-T DataLog jobs.

4. At the confirmation screen, select **Confirm**  to delete or **Exit**  to cancel.



Confirm Job Deletion Screen

A deleted job cannot be recovered. Ensure you have uploaded jobs you want to save to a computer before deleting them from the receiver.

Using LWD

Starting LWD Program and Opening Files

Start the Log-While-Drilling (LWD™) program by double-clicking the LWD icon  on the desktop. Click **New**  (menus **File > New**) to start a new DataLog job file and select the type of job file to start: drill data, pressure-tension, or steering.

A new drill data form will be blank; an LWD form with data will look like this:

LWD Drill Data Window

Click **Open**  (menus **File > Open**) to open an existing DataLog file. You can also open a DataLog file directly from Windows Explorer by double-clicking a *.dl5 Drill DataLog or *.tt5 pressure-tension file.

The LWD Help menus are an excellent source of in-program information. Detailed information on reading and editing the data fields are provided in the **Help**  files. With the **Tooltip Helper** , click on a screen element for help with that function.

Many of the LWD menu commands are similar to those used in other Windows programs, and some have associated icons on the toolbar. Point the cursor at any icon in LWD for a tooltip describing its function. Icons or menu items that are grayed out do not pertain to the current DataLog file type. See [Appendix B – Menu](#) on page 48 for a complete list of menu options and their corresponding menu bar buttons. For example, click **Display Units**  (menus **Edit > Display Units**) to change units of measurement between decimal feet (ft.) or meters (m).

Components of an LWD Screen

Site Information

Click **Site Information** , or in the menus select **Edit > Site Information**, or double-click in the Site Information area shown below to edit this information.

Site Information
Site Name and Location:
 Rebel Stronghold
 123 Avenue of the Gods
 P.O. Box 456
 Tatooine, CO 78900

Client: Anakin Skywalker
Phone: 253-555-1212

Site Information X

Job Site Information

Name: Rebel Stronghold

Address1: 123 Avenue of the Gods

Address2: PO Box 456

City: Tatooine CO 78900

Customer Information

Name: E. Palpatine

Contact: Anakin Skywalker

Phone: 253-555-1212

Address1: 12345 Coal Creek Parkway SE

Address2: Apt. #1

City: Far Away WA 98005

Contractor Information

Name: Darth Vader

Contact: Grand Moff Tarkin

Phone: 253-555-4321

Address1: Lucas Center

Address2: 4 Alderaan Avenue

City: Tunizia, AZ 54321

Job General Comments

General Comments listed here will appear on the printed report. If the comments wrap automatically, use the "Print Preview" operation before printing to see how comments will appear on the printed report. Otherwise, manually press the Enter key to insert new lines.

OK Cancel

Site Information on Screen (left) and Dialog Box

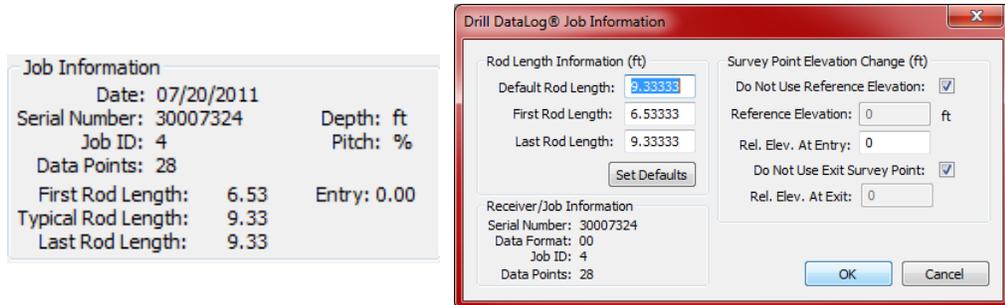
All the address and contact information for the job, client, and contractor are listed on the printed report (see [Saving, Printing, and Sending Your LWD Job](#) on page 44 for more information).



Note Site information remains from job to job to reduce the need for reentering identical data. If this information doesn't save from job to job, particularly for versions after Windows XP®, try this: exit LWD, right-click the desktop LWD icon, select **Properties**, select the **Compatibility** tab, check the box for "Run this program as an administrator", and click **OK**.

Job Information

Click **Job Information** , or in the menus select **Edit > Job Information**, or double-click in the Job Information area shown below to edit this information.



Job Information on Screen (left) and Dialog Box

The Job Information section displays statistical information about the job. Some fields may not be changed.

- Date** For an F5 receiver, the date corresponds to the first uploaded data point; for an Eclipse receiver, it's when the job was uploaded; for imported Eclipse files, it's the date the file was imported into the LWD application.
- Serial Number** ID or serial number of the receiver
- Job ID** Number assigned to the job in the receiver
- Data Points** Number of data points collected (includes manually inserted data)
- Typical/Default Rod Length** Length of the rods in use.
- Depth** Measurement units being used for depth, feet (ft.) or meters (m)
- Pitch** Measurement units being used for pitch, percent (%) or degrees (°)
- Pressure** Measurement used for pressure, pounds per square inch (psi) or kilo-Pascals (kPa) (not shown above)
- Entry** Entry position relative to the (0, 0) coordinates on the charts (positive or negative distance on the profile view chart and left (L) or right (R) position on the plan view chart)

Rod Length Information

Typical/Default Rod Length

Rod length data is included in F5 receiver uploads, but can be changed here if it was entered incorrectly on the receiver.¹

First Rod Length

The rod length for the first data point (rod 0), which is usually a partial rod. This value is determined by measuring the amount of drill rod left in the rack from the make-up/break-out clamps to the top of the rod when rod 0 is recorded.

Last Rod Length

The rod length for the last data point, which is usually a partial rod. This value is determined by measuring the length of the drill rod left on the rack from the make-up/break-out clamps to the top of the rod and then subtracting this distance from the rod length. For example, if the length of rod left on the rack is 6 ft. 1.8 m, and your rod length is 10 ft., the last rod will measure 4 ft. (10 ft. – 6 ft.).

Survey Point Elevation Change

Do Not Use Reference Elevation

Select if the entry and exit are at the same elevation. Clearing this check box enables the Reference Elevation field below it.

Reference Elevation

The elevation of a reference geographical survey point near the bore. If a reference elevation is not required, select the **Do Not Use Reference Elevation** box to disable this field. The terrain surface at the drill head's entry will be the zero elevation reference on the chart and the data points list. When a reference elevation is used, its value becomes the zero reference on the chart and the data points list.

Relative Elevation at Entry

The vertical distance from the zero elevation reference line to the point where the bore penetrates the ground. In most cases, the entry is at the terrain surface. When using an entry pit, this point is at the bottom of the pit.

Do Not Use Exit Survey Point

Select this box if there is no elevation difference between the entry and exit. The exit will then be calculated based on the pitch, rod, and depth data only.

Rel. Elev. at Exit

The positive or negative difference between the entry and exit elevations. Enter a negative value if the exit is lower than the launch; do not use a + symbol for a positive value. This information can be captured on the F5 receiver by setting a Survey Point.

¹ For Eclipse receiver uploads, set the default rod lengths by clicking the Set Defaults button. This setting will then be used for all new Eclipse uploads. Changes made to the settings of an individual file will stay with the saved file.



Note If using an entry pit, include the depth of the pit in the value for **Rel. Elev. At Entry**. Rod 0 must be edited to show the depth of the pit below the reference elevation. If a reference elevation is not used, edit rod 0 to show the depth of the pit as the relative elevation at entry.

Data Points List

The data points list is a table displaying all data points in the job. Within this table you can insert, edit, delete, hide, or remove individual data points. The columns included in the table depend on the type of DataLog file open. See [Components of an LWD Screen](#) on page 29 and [Pressure-Tension DataLog Features](#) on page 39 for more information.

Chart Area

The chart area provides a graphical display of the data contained in the data points list. Hidden or deleted data points will not display in the chart area. The type of data displayed depends on the DataLog file type and the data recorded. Drill data files show a profile chart and, if an FPT is used, a pressure chart; pressure-tension files show a pressure chart and, if a TensiTrak transmitter is used, a force chart; steering files (not addressed in this manual) include profile and plan view charts.

The common features of chart areas include:

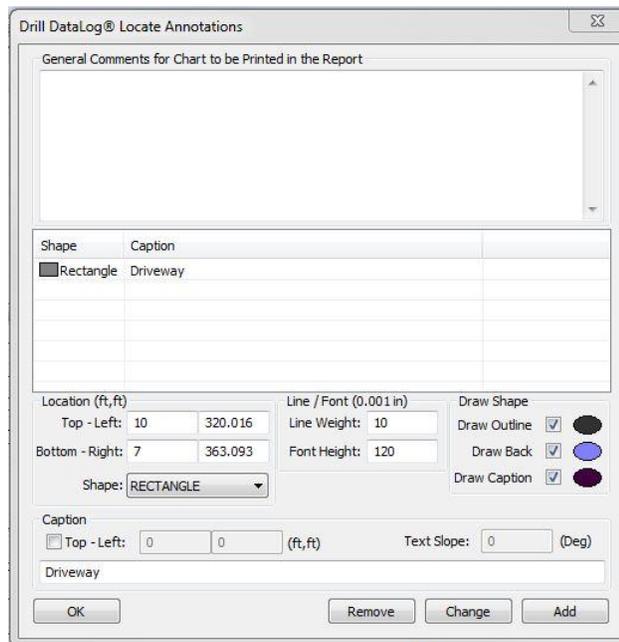
Data Points	Data points that have not been hidden or deleted
Values	Value of the points contained in the chart area
Cursor Coordinates	Place the cursor anywhere on the chart area to see the value of the coordinates at that point. Place the cursor on a data point to display data values recorded at that point.
Zoom	Hold the Control key and drag the pointer through an area to zoom in. To return to normal scaling, Control+click anywhere in the chart area.

Editing and Annotating Charts

Profile, pressure, and force charts can be edited and annotated in a number of ways. For example, under the **Edit** menu, use the Annotations commands to draw shapes and captions directly on charts to describe job site conditions and other points of interest, or use the Properties commands to change boundaries of charts.

Drawing Shapes and Adding Captions

To draw shapes and enter information to be included on the chart and the printed report, hold the Shift key and draw a box where you would like a shape to appear on the chart. This opens an annotations dialog box that includes the Location coordinates of the box.



Annotations Dialog Box

Alternatively, click **Profile** , **Pressure** , or **Force Chart Annotations**  (all also in the **Edit** menu) and enter Location coordinates manually.

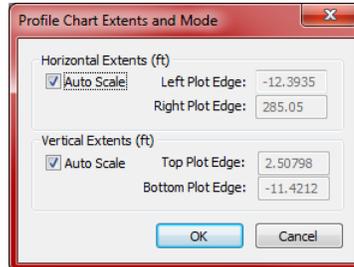
Double-click an existing annotation to change its properties (captions cannot be edited in this manner, only objects).

Select a **Shape** to add from the drop-down box. Adjust the **Line Weight** and **Font Height** as needed. Use the check boxes and double-click the ellipses in the **Draw Shape** section to set shape properties and colors.

Select the **Draw Caption** check box to activate the Caption section. A caption does not require a shape. Captions appear centered in the shape by default. To change the location or orientation of caption, use the **Top - Left** and **Text Slope** fields.

Editing Chart Properties

To edit properties such as chart boundaries and scaling, click **Profile** , **Pressure** , or **Force Chart Properties**  (all also in the **Edit** menu).



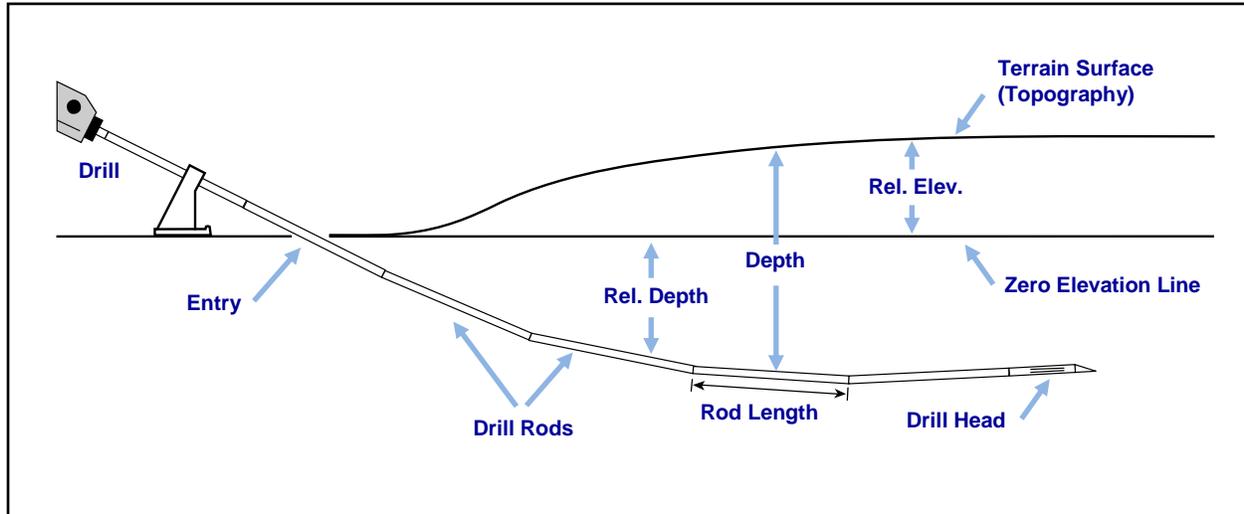
Profile Chart Properties Dialog Box

To enter different coordinates for chart boundaries, clear either or both of the **Auto Scale** check boxes and enter new values.

Data Points List

The data points list is a table displaying all data points in the job in sequential order, along with their associated data. Depth and pitch units are displayed in the job information box. The columns in the table are as follows:

Rod ID	Rod number and status of the data point. A colored flag is displayed to indicate the status of the data: <ul style="list-style-type: none"> • Red Flag: Pitch missing; enter pitch for the bore path to be calculated correctly. • Magenta Flag: Depth missing; highlights pitch-only data points for the operator. Open the Edit Data Point dialog box and click OK to restore this flag to either blue or green depending on the data entered by the operator for depth. • Blue Flag: Data point has been edited • Gray Flag: Data has been hidden or removed • Green Flag: Overwritten data • Black Flag: Original data
Rod Len.	Length of the rod
Bore Len.	Length of the bore (sum of all the previous rod lengths plus the current rod length)
X Dist.	Horizontal distance from the entry
Pitch	Pitch value recorded at the specified data point



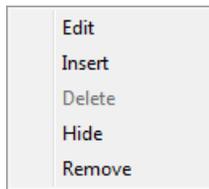
Rel. Depth	The depth of the drill head below the zero elevation line.
Depth	The distance from the drill head to the terrain surface. This can be measured, entered manually by the user, or interpolated by the LWD software based on inserted or missing data.
Rel. Elev.	The positive or negative difference from the Zero Elevation Line.
Date/Time	The date and time the specified data point was recorded. This information will not appear on the printed report.
Type	Information regarding the type of data recorded at the data point: <ul style="list-style-type: none"> • BL: Blank (no pitch or depth data recorded with data point) • PO: Pitch Only • LL: Locate Line • FLP: Front Locate Point • IN: Inserted data point. Pitch and depth defaults are interpolated from adjacent data and not displayed by default. This data can be modified if required by overwriting the default values listed. The new data point is listed alphabetically (such as, the first point manually inserted after rod number 2 is listed as 2-A, the second as 2-B, etc.).
RawDepth	The projected depth displayed on the receiver.
RawDist	The horizontal distance from where a data point was taken at either the FLP or the LL to point directly above the transmitter.
Comment	Any comments on individual data points can be added to show in this column (see Edit Rod/Data Point below).

Symbols in the data points list identify different types of data:

- o** data **overwritten** manually
- e** rod length **edited**
- i** data **interpolated**
- f** data **filled** in; data missing in original upload
- h** data **hidden**
- x** pitch data missing

Editing Data Points

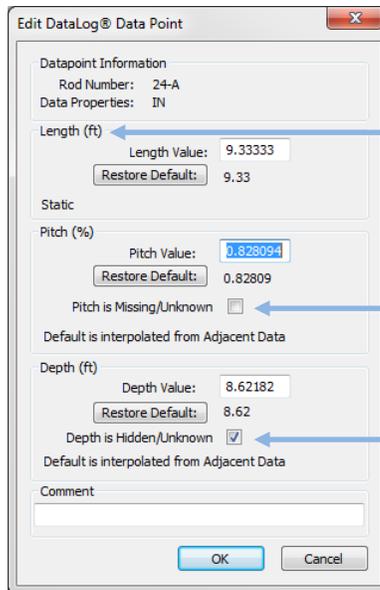
Right-click a data point in the table to open a pop-up menu with the options to Edit, Insert, Delete, Hide, and Remove.



Data Point Table Shortcut Menu

Edit Rod/Data Point

Right-click the data point and select **Edit**, or simply double-click a data point in the list or on the chart. Edit the data or add comments as required. Click **OK** to save changes, or **Cancel**.



Rod length in same units as depth measurement

Box is automatically checked if blank rod is inserted

Box is automatically checked if blank or pitch-only rod is inserted

Edit Data Point Dialog Box

If a blank data point exists, the **Pitch is Missing/Unknown** check box is selected by default. If you don't enter the correct pitch value and uncheck the box, there will be a gap in the data line on the chart. The missing data point will be emphasized on the chart.

If a new rod is inserted or a blank or pitch-only data point is recorded, the **Depth is Hidden/Unknown** check box is selected by default. If you don't enter the depth value and uncheck the box, there will be a gap in the data line on the chart and the missing point will not be shown.

To restore original recorded data, click the **Restore Default** button next to the data to be restored.

Insert Rod/Data Point

Right-click the data point prior to where the new data point is to be inserted and select **Insert**. A new data point appears in the data list and on the chart.

The new data point will be numbered the same as the one prior to it with a letter appended. For example, the first point manually inserted after rod 2 will be listed as 2-A, the second as 2-B, and so on. The values listed for pitch and depth are interpolated from adjacent data, and depth is hidden by default. The rod type will be listed as IN for inserted data. You may change data values as needed. To restore original interpolated data values, click **Restore Default** under the corresponding data field.

Delete Inserted Rod/Data Point

Right-click the data point to be deleted and select **Delete**. The data point is removed from the data points list and from the chart.

Original data cannot be deleted. If a rod is unintentionally recorded twice, select **Remove** to remove that data point.

For Eclipse: Eclipse receiver data is imported, considered original data, and cannot be deleted.

Hide

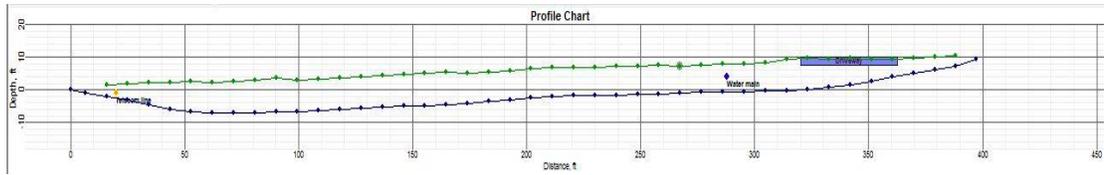
When this option is selected, the data point still appears in the data list but it is hidden on the chart. The data is still included in the calculations. A checkmark is placed next to the option on the pop-up menu.

Remove

Select this option to remove the data point from the list, chart, and calculations. Use this option on original data that was unintentionally recorded twice.

Profile Chart

The profile chart is a visual representation of the DataLog data.



Drill Data Profile Chart

Data Points

Data points on the profile chart display as blue dots. Hover over a data point to display data recorded at that point. Click a data point on the profile chart to display its corresponding row in the data points table. Gaps in the data points indicate missing data.

Highlighted data points (points with gray circle behind them) indicate a rod has been inserted or the pitch has been edited.

Green terrain points can only be edited for depth, after which they will also be highlighted.

Sometimes hiding a data point on the chart is helpful to allow other elements to display, such as a utility flag. A data point hidden on the profile chart will still display in the data points list.

Utility Flags

Use utility flags to show the location and type of utilities on the chart and printed report. To add or edit utility flags, click **Edit Utility Flags**  (menu **Edit > Utility Flags**) to open the Utility Flags dialog box. Or, Shift+click a chart data point to open the dialog box with the location of a new flag automatically specified at that point.

The Utility Flags dialog box contains a table with the following data:

Utility ID	Type	X Dist	Depth	Comment
1	Telecom	20.00	2.50	Telecom line
2	Water	288.00	4.00	Water main

Below the table are input fields for adding a new utility flag:

- Depth: ft
- Distance:
- Depth:
- Type: (Dropdown menu)
- Text Slope: (Deg)
- Comment:

Buttons: OK, Delete, Change, Add

Utility Flags Dialog Box

The fields on the Utility Flags dialog box are as follows:

Type	Select from the drop-down list. The flag will appear on the chart as a circle using APWA (American Public Works Association) recommended colors.
X Dist (Distance)	The horizontal length on the surface of the ground from the entry to the utility
Depth	The vertical length from the surface to the utility
Comment	The default caption is the type of utility; enter a comment to create a new caption.
Text Slope	The angle of the caption text on the chart

Don't confuse Utility Flags with Data Flags in pressure-tension files, which are added by the receiver operator as data is recorded.

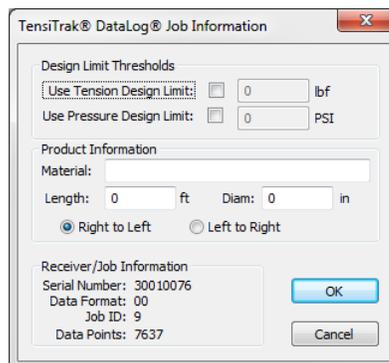
Pressure-Tension DataLog Features

In addition to the features described in the beginning of the previous section, Pressure-Tension files contain information and controls specific to the logging of fluid pressure (provided by a pressure-sensing transmitter) and pullback force (provided by a TensiTrak transmitter).

Remember: record a Drill DataLog concurrently with a P-T DataLog to refine your fluid pressure data with regular transmitter data and create a more typical line chart as shown on page 5.

Job Information

To add and edit job information to be included on the printed report—such as pressure or tension limit thresholds allowed for the job, product type installed for a TensiTrak job, and direction of graphed data—click **Job Information**  (menus **Edit > Job Information**) or double-click the Job Information box.



Pressure-Tension Job Information Dialog Box

Design Limit Thresholds

Allows you to enter limits for acceptable pressure and/or tension (pullback force) values recorded during the bore and/or product installation. The design limit thresholds displays on the printed report.

Use Tension Design Limit Select to enter a value for the maximum pullback force allowed for the project.

Use Pressure Design Limit Select to enter a value for the maximum fluid pressure allowed for the project.

With a design limit threshold, data points in the list and chart area will be yellow or red as the design threshold limit is approached or exceeded.

Product Information

Material	Details about the material installed for a TensiTrak job
Length	Total length of product installed during the product pullback
Diam	Diameter of the product installed
Right to Left or Left to Right	The direction the data displays on the graph area. The data should be displayed relative to the direction of the pilot bore profile chart for accurate comparison. Select Right to Left when product is pulled in from the pilot bore exit. Select Left to Right when the pressure and/or tension data is recorded starting from the entry of a pilot bore.

Data Points List

The data points list is a table displaying all data points in the job in sequential order, along with their associated data. Pressure and force units are displayed in the job information box. The columns in the table include:

Data Point	The number and status of the data point
Force	The force value recorded by the receiver at the specified data point. An "x" indicates no data.
Max F.	The maximum force value recorded by the receiver at all data points up to the one indicated. An "x" indicates no data.
Pres.	The pressure value recorded by the receiver at the specified data point. An "x" indicates no data.
Max P.	The maximum pressure collected during the job up to when the data point was recorded
Data Flag	Marked if a flag was recorded on the F5 receiver at a specified data point
Date/Time	The date and time the specified data point was recorded. This information does not display on the charts or printed report.

Removing Data Points

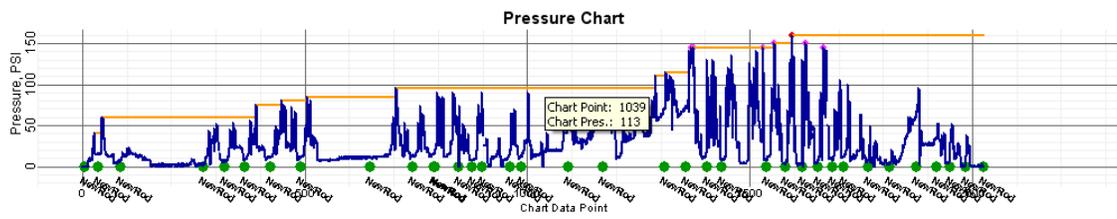
Click on the graph where you want to remove data points. The data points list adjusts to show the group of data points near that location.

- To select a range of data points in the list, click on the first data point, then Shift+click the last data point to include all points in between.
- To select multiple data points that are not in a continuous range, Control+click each data point.

Right-click in the selected data points and select **Remove**. The data points list will indicate the points have been removed from the chart.

Pressure Chart

The pressure chart shows the downhole fluid pressure recorded every four seconds, with the data at the end of each rod shown as a green dot. If a pressure limit threshold was set, data points will be magenta or red as the pressure threshold is approached or exceeded. In this case, the pressure limit threshold was set to 150 psi (see [Job Information](#) on page 39).



Fluid Pressure Chart

Fluid pressure from a P-T DataLog graphs in the somewhat jagged manner shown above; for a smoother representation, record a Drill DataLog concurrently (see [Recording P-T Data](#) on page 21).

Data Points

- Blue** Normal data points
- Red** The point exceeded the maximum design pressure or force limits
- Magenta** The point is within 5% of the entered design pressure or force limits. Edit design limits in the [Job Information](#) dialog box shown on page 39.
- Orange** The maximum pressure (force) recorded up to that data point

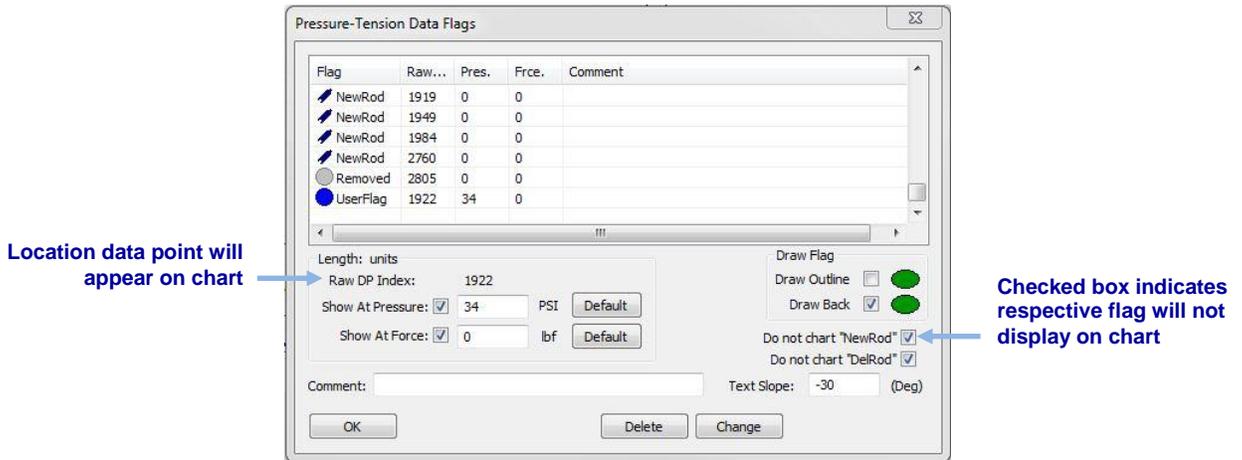
Data points within 15% of the maximum or high pressure are automatically selected for printing. To change this selection, right-click a data point in the list and selecting **Print** or **Don't Print**.

Select multiple data points as noted in [Removing Data Points](#) on page 41.

While you can remove data points on the charts, they will still display in the data points list marked as “-X”. This can be useful in cases where data was being collected while the machine was idle. The data can be restored to the chart at any time.

Data Flags

Highlighted data points—points with a green circle behind them—had a data flag added by the receiver operator. Edit the color, label, and location of data flags in the Pressure-Tension Data Flags dialog box by clicking **Data Flags**  (menus **Edit > Data Flags**, or right-click the data point in the list and select **Add Data Flag**, or double-click an existing data flag).



Pressure-Tension Data Flags Dialog Box

When a fluid pressure transmitter is used during a pilot bore and the drill data file is also recorded, as shown above, a data flag is recorded with every new or deleted rod and marked as “NewRod” or “DelRod”, respectively. You can hide or display data flags for new and deleted rods on the pressure chart.

Data flags manually added by the receiver operator, whether during a pilot bore or product pullback, are identified on the chart with the flag number that displayed when it was recorded, as shown on the pull force chart in the following section.

Data flags added in LWD are called user flags. You can add comments to user flags and flags recorded during data collection. Flags recorded by the operator during data collection cannot be deleted.



Note Don't confuse data flags with utility flags. Utility flags do not apply to a pressure-tension file.

Fields on the Pressure-Tension Data Flags dialog box include:

- Raw DP Index** The data point number in the list of all data points; cannot be edited
- Show At Pressure** The pressure at which the data flag will display; if the check box is cleared, the flag is not displayed on the chart
- Show At Force** The force at which the data flag will display; if the check box is cleared, the flag is not displayed on the chart
- Draw Flag** Use the check boxes and double-click the ellipses in the Draw Flag section to set shape properties and colors.

Click **Change** to save changes to the file, then **OK** to exit. Just clicking **OK** closes the dialog box without saving changes.

The edited flag appears on the chart as a circle using the color chosen in the Draw Flag section.

The default caption consists of the number and type of the data flag. Enter a different caption in the **Comment** field, and change the caption angle using the **Text Slope** field.

By default, the data flag displays at the pressure (force) that was measured when the flag was recorded or added. Use the **Show At...** check boxes to move the marker away from the measured data, if needed.

Pull Force Chart

The pull force chart only displays for TensiTrak jobs. It shows the product pull force measured at each data point. Data points will be yellow or red as a force threshold is approached or exceeded. In the case below, the force limit threshold was set to 40,000 lbf. (1915 kPa).



Pull Force Chart

Data points and data flags on the force chart can be manipulated using the same methods as for the pressure-tension chart (see previous section).

See the [DigiTrak F5 TensiTrak Operator's Manual](#) for complete instructions on using LWD software with the TensiTrak system.

Drill DataLog Data Points

Hover over a data point to display data recorded at that point. Click a data point on the profile chart to display its corresponding row in the data points table. Gaps in the data points indicate missing data.

The colors and types of data points are as follows:

- Green Data Points** The average pressure recorded during that rod and any rods previously recorded and deleted
- Blue Data Points** The high pressure recorded during that rod and any rods previously recorded and deleted. This is the average plus 1 standard deviation—this includes 84% of the pressure readings (assuming a normal distribution). Statistically, there will have been occasional spikes above this pressure.
- Gold Data Points** The maximum pressure recorded during the rod and any rods previously recorded and deleted

Highlighted Data Points Points with a green circle behind them indicate that rods have been deleted during the data collection process.

Pressure data cannot be deleted. If an overpressure event was recorded during a rod that was subsequently deleted, it will be merged into the data of the next recorded rod. Identifying the location of the overpressure event would require having recorded the pressure log and uploading it as a pressure-tension file, which would contain flags marking all recorded and deleted rods.

Saving, Printing, and Sending Your LWD Job

Saving Project Files

To save your project, click **Save**  (menus **File > Save**). If the file has already been saved, it will re-save under its current file name and location. If the file has not yet been saved, name the file and select the save location in the **Save As** dialog box, then click **Save**.

The default file name is *DrillData#.dl5* for drill data files and *Pressure-Tension#.dl5* for pressure-tension files. In both cases, “#” represents a number that starts at 1 and advances automatically as files are saved.

To save an open file with a different file name or location, select **File > Save As**. Change the file name and location as desired, then click **Save**.

To export a comma-separated value (*.csv) Unicode text file for use in a spreadsheet, click **Export Spreadsheet**  (menus **File > Export Spreadsheet**).

DCI recommends saving a copy of each final job file in a separate folder as a backup.

Printing and Previewing Project Files

To print job data, click **Print**  (menus **File > Print**). DCI recommends selecting **Landscape** orientation using the **Properties** button.

To preview pages before printing, click **Print Preview**  (menus **File > Print Preview**). On the preview window, click **Print** to reach the print dialog box or **Close** to return to the file.

To edit printing properties such as the printer, paper size, and paper orientation, click **Print Setup**  (menus **File > Print Setup**).

Page one of the print job contains job information such as location, client, and contractor information, along with the statistical data about the job and job comments. Page two contains profile and plan view charts. Page three and beyond list topography survey data and drill data. Deleted data points will not display.

Sending Project Files

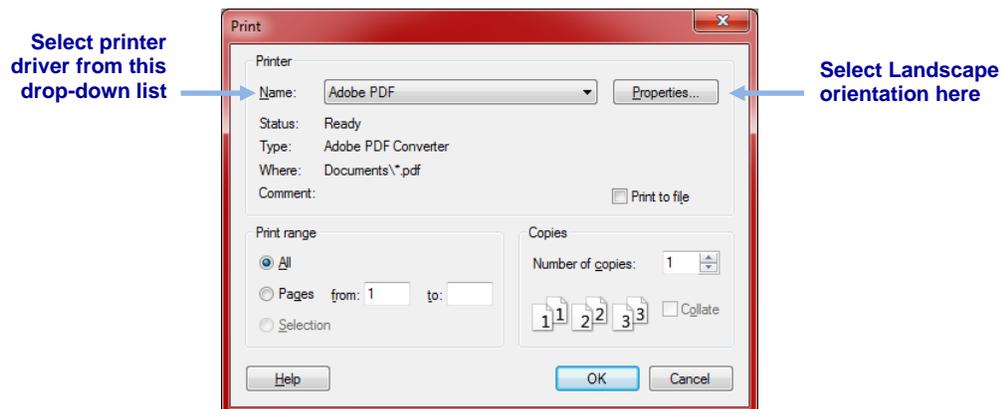
Your LWD project file can be opened by anyone who also has the DigiTrak LWD software.

To send a report to a customer who does not have the LWD software, install a PDF print driver¹, then print to this “printer” to create an electronic report viewable on any PDF reader.

As an option to PDF, Microsoft Windows systems include a “Microsoft XPS Document Writer” in the list of available printers. Your customer will require Microsoft Internet Explorer to read this encapsulated postscript (XPS) format without an XPS reader. Please refer to <http://windows.microsoft.com/en-US/windows-vista/Print-to-the-Microsoft-XPS-Document-Writer> for additional information on using this format.

Once you have your preferred PDF writer installed (or if you are using the XPS writer):

1. Click **Print**  (menu **File > Print**).
2. Use the **Name** drop-down list to select your PDF writer or Microsoft XPS Document Writer.



3. Click **Properties**, select landscape orientation (recommended), and click **OK** to save the orientation and close the **Properties** dialog box.
4. Click **OK** to print (generate) the file.
5. Choose the folder where you want to save the file and enter a **File Name**.
6. Click **Save**.

Depending on your print settings, you may automatically see the generated PDF file, or you may need to find and open it to see it. Most users will find it convenient to send the PDF file to their customer as an attachment to an email.

¹ Popular options include Adobe Acrobat, CutePDF, Bullzip PDF, and FoxIt PDF; many of these have free versions.

Appendix A - DataLog Menu Symbols

The following menu options perform identically for both the standard Drill DataLog and pressure-tension (P-T) DataLog functions. Page numbers below refer to the first page the button is mentioned in this manual.

Buttons are listed alphabetically.



Append to an Existing Job – Continues adding data to an existing DataLog job. Select the job number from the list. Page 16.



Confirm Delete – Appears after a request to delete jobs to confirm the deletion. Select to confirm deletion or select **Exit** to cancel deletion. Page 27.



Create a New Job – Starts a new DataLog job. With the Drill DataLog function, you will be prompted to set up the job with rod lengths. With the pressure-tension DataLog function, the **Locate** screen will appear and logging will begin. Pages 10 (drill) and 21 (P-T).



Delete All Jobs – Deletes all jobs stored in the receiver. Page 26.



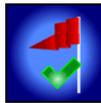
Delete Job – Deletes the selected DataLog job(s) from the receiver. Also used in the Delete Job menu to select one job to delete. Page 26.



Enable / Disable DataLog – When “Enabled, click to disable” shows, the icon is green, the DataLog function is enabled, and you can access DataLog menu options at the **Locate** screen. When “Disabled, click to enable” shows, the icon is red, the DataLog function is disabled, and no logging will occur. Page 4.



Pause Job – Opens the receiver’s Main menu but keeps the job open with no data recording. Data continues recording on the current job number when you re-enter the **Locate** screen without powering the receiver down. Page 15.



Set a Flag – Records a flag while a P-T DataLog job is running. Flags can be recorded at fixed intervals or at specific points along the bore path to help correlate physical locations with recorded data points. Page 22.



Close Job – Saves and closes a DataLog job. A job can be viewed, appended to, and uploaded until it is deleted from the job list. Page 15.



Upload Job – Uploads DataLog jobs to a computer with DigiTrak LWD software installed. The receiver can store a maximum of 50 DataLog jobs per file type (drill data or pressure-tension). Page 25.

The following menu options apply specifically to the Drill DataLog function.



Add Survey Point – Records a surveyed value for the difference in elevation (reference elevation) between the start and end of the bore. This value will help provide a more accurate profile graph in the LWD software. Page 20.



Record a Blank Rod – Logs a data point with no pitch or depth information; use when the receiver cannot be positioned within range of the transmitter. Page 13.



Record Depth/Pitch – Logs the depth and pitch information at a front locate point (FLP) or locate line (LL) data point. This option is unavailable at the first rod data point and when pitch or depth information is not available. Page 13.



Data at Partial Rod – Logs a data point after finishing a partial rod. Recommended when using long drill rods during significant pitch changes or to accurately plot small changes in topography. Page 14.



Record Pitch Only – Logs only the pitch information at a data point; use when the receiver cannot be positioned over the FLP or LL. This option will be unavailable if pitch information is not available, in which case you must record a blank rod. Page 12.



Set Up Job – Sets up a new job or appends data to an existing job. Only accessible when DataLog is enabled. If no Drill DataLog job has been started, this option can also be accessed from the **Locate** screen by holding the trigger and toggling right.



View DataLog – Displays data for a specific job. Page 8.



View/Delete Rod Data – Shows all logged data points; lets you delete the last logged data point. Page 18.

Appendix B – Menus

Menu Bar and Toolbar

Many of the LWD menu commands are similar to those used in other Windows programs, and some have associated icons on the toolbar. Point the cursor at any icon in LWD for a tooltip describing its function. Icons or menu items that are grayed out do not pertain to the current DataLog file type. Page numbers below refer to the first page the command is mentioned in this manual.

File Menu

Command	Icon	Description
New		Create a new job (drill data, pressure-tension, or steering). Once a selection is made, a new blank job screen appears. Page 25.
Open		Open an existing job. Page 28.
Save		Save an open job. If the job has not yet been named/saved, this opens the same dialog box as Save As . Page 44.
Save As		Save the current job to a specified file name and folder. Page 44.
Print		Print the job. Page 44.
Print Preview		Display the job onscreen as it will appear printed. Page 44.
Print Setup		Select options such as a printer, paper size and orientation. These options are usually also available on a Windows Print dialog box under a button called Properties . Page 44.
Import Eclipse Data		Import an Eclipse DataLog file (*.dld) or Eclipse TensiTrak file (*.ttd).
Export Spreadsheet		Export a comma-separated value (*.csv) text file for use in spreadsheet software. Page 44.
Upload Control		Link to a DigiTrak receiver to upload files. Page 25.
File 1, 2...		Open a recently opened file.
Exit		Exit the DigiTrak LWD program.

Edit Menu

Command	Icon	Description
Site Information		Enter and edit the location, contact information, and comments that display in the Site Information box in the upper left corner of the program. Shortcut: double-click the site information box. Page 29.
Display Units		Select the depth, pitch, temperature, and force/pressure units displayed on the LWD charts. The depth unit setting in the receiver will determine the units displayed. Page 28.
Job Information		View and edit job details including rod length, survey point information for drill data files, and information about the product being installed for pressure-tension files. This dialog box displays immediately after uploading a DataLog file. Shortcut: double-click the Job Information box. Page 30.

Command	Icon	Description
Profile Chart Annotations		Make comments and insert drawings to appear on the profile chart. Shortcut: Shift+drag a box on the chart. Page 33.
Pressure Chart Annotations		Make comments and insert drawings to appear on the pressure chart. Shortcut: Shift+drag a box on the chart. Page 33.
Force Chart Annotations		Make comments and insert drawings to appear on the force chart. Shortcut: Shift+drag a box on the chart. Page 33.
Profile Chart Properties		Adjust the scaling of the Profile Chart. Page 34.
Pressure Chart Properties		Adjust the scaling of the Pressure Chart. Page 34.
Force Chart Properties		Adjust the scaling of the Force Chart. Page 34.
Utility Flags		Add, change, or delete flags and data regarding utilities. Page 38.
Data Flags		Change or delete P-T data flags. Page 42.

View Menu

Command	Icon	Description
Toolbar		Show or hide the toolbar.
Status Bar		Show or hide the status bar.
Bluetooth Device List		Show a list of registered Bluetooth devices. Page 24.

Window Menu

Command	Icon	Description
New Window		Open the current file in a new window.
Cascade		Arrange windows in an overlapped fashion.
Tile		Arrange windows in non-overlapped tiles.
Arrange Icons		Arrange icons of minimized windows.
Window 1, 2...		Go to specified window.

Help Menu

Command	Icon	Description
Help Topics		An index of Help topics. Page 28.
About DigiTrak LWD		Displays the version number of the DigiTrak LWD software.

LIMITED WARRANTY

Digital Control Incorporated ("DCI") warrants that, when shipped from DCI, each DCI product (other than software products) will conform to DCI's current published specifications in existence at the time of shipment and will be free, for the warranty period ("Warranty Period") specified below, from material defects in materials and workmanship. In addition, DCI warrants that each DCI software product will perform in substantial accordance with the specifications set forth in the documentation for such software for the Warranty Period specified below. The following limited warranty ("Limited Warranty") is made solely to and for the benefit of the first end-user ("User") purchasing the DCI product from either DCI or a dealer expressly authorized by DCI to sell DCI products ("Authorized DCI Dealer") and is not assignable or transferable.

The foregoing Limited Warranty is subject to the following terms, conditions and limitations:

1. A Warranty Period of twelve (12) months shall apply to the following new DCI products: receivers/locators, remote displays, battery chargers and rechargeable batteries, and software programs and applications. A Warranty Period of ninety (90) days shall apply to all other new DCI products, including transmitters and accessories. A Warranty Period of ninety (90) days shall also apply to services provided by DCI, including testing, servicing, and repairing an out-of-warranty DCI product. The Warranty Period shall begin from the later of: (i) the date of shipment of the DCI product from DCI, or (ii) the date of shipment (or other delivery) of the DCI product from an Authorized DCI Dealer to User.
2. If a DCI product (excluding software products) does not perform as warranted during the Warranty Period, DCI will inspect the product and if DCI determines such product to be defective, DCI will, at its sole option and discretion, either repair or replace the product. If a software product does not perform as warranted during the Warranty Period, DCI will, at its sole option and discretion, either bring the defective software into material compliance with the specifications for such software or refund the purchase price paid for the defective software. **THE FOREGOING ARE USER'S SOLE AND EXCLUSIVE REMEDIES FOR BREACH OF THIS LIMITED WARRANTY.** All warranty inspections, repairs and adjustments must be performed either by DCI or by a warranty claim service authorized in writing by DCI. All warranty claims must include proof of purchase, including proof of purchase date, identifying the DCI product by serial number, and be submitted before the end of the Warranty Period.
3. The Limited Warranty shall only be effective if: (i) within fourteen (14) days of receipt of the DCI product, User registers the DCI product with DCI through its product registration website at access.DigiTrak.com; (ii) User makes a reasonable inspection upon first receipt of the DCI product and immediately notifies DCI of any apparent defect; and (iii) User complies with all of the Warranty Claim Procedures described below.

What is not covered

This Limited Warranty excludes all damage, including damage to any DCI product, due to: failure to follow DCI's operator's manual and other DCI instructions; use of a DCI product outside the specifications for which the DCI product is designed (including, without limitation, temperature); abuse; misuse; neglect; accident; fire; flood; Acts of God; improper applications; connection to incorrect line voltages and improper power sources; use of incorrect fuses; overheating; contact with high voltages or injurious substances; use of batteries or other products or components not manufactured or supplied by DCI; or other events beyond the control of DCI. This Limited Warranty does not apply to any equipment not manufactured or supplied by DCI nor, if applicable, to any damage or loss resulting from use of any DCI product outside the designated country of use. User agrees to carefully evaluate the suitability of the DCI product for User's intended use and to thoroughly read and strictly follow all instructions supplied by DCI (including any updated DCI product information which may be obtained from the DCI website). In no event shall this Limited Warranty cover any damage arising during shipment of the DCI product to or from DCI.

User agrees that the following will render the above Limited Warranty void: (i) alteration, removal or tampering with any serial number, identification, instructional, or sealing labels on the DCI product, or (ii) any unauthorized disassembly, repair or modification of the DCI product. In no event shall DCI be responsible for the cost of or any damage resulting from any changes, modifications, or repairs to the DCI product not expressly authorized in writing by DCI, and DCI shall not be responsible for the loss of or damage to the DCI product or any other equipment while in the possession of any service agency not authorized by DCI.

DCI does not warrant or guarantee the accuracy or completeness of data generated by HDD locating systems. The accuracy or completeness of such data may be impacted by a variety of factors, including (without limitation) active or passive interference (including from salt water) and other environmental conditions, failure to calibrate or use the device properly and other factors. DCI also does not warrant or guarantee, and disclaims liability for, the accuracy and completeness of any data generated by any external source or derived from data generated by any external source that may be displayed on a DCI device, including (without limitation) data received from any HDD drill rig.

DCI reserves the right to make changes in design and improvements upon DCI product from time to time, and User understands that DCI shall have no obligation to upgrade any previously manufactured DCI product to include any such changes.

THE FOREGOING LIMITED WARRANTY IS DCI'S SOLE WARRANTY AND IS MADE IN PLACE OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, IMPLIED WARRANTY OF NON-INFRINGEMENT, AND ANY IMPLIED WARRANTY ARISING FROM COURSE OF PERFORMANCE, COURSE OF DEALING, OR USAGE OF TRADE, ALL OF WHICH ARE HEREBY DISCLAIMED AND EXCLUDED. If DCI has substantially complied with the warranty claim procedures described below, such procedures shall constitute User's sole and exclusive remedy for breach of the Limited Warranty.

Limitation of remedies and liability

In no event shall DCI or anyone else involved in the creation, production, or delivery of the DCI product be liable for any damages arising out of the use or inability to use the DCI product, including but not limited to indirect, special, incidental, or consequential damages, or for any cover, loss of information, profit, revenue or use, based upon any claim by User for breach of warranty, breach of contract, negligence, strict liability, or any other legal theory, even if DCI has been advised of the possibility of such damages. In no event shall DCI's liability exceed the amount User has paid for the DCI product. To the extent that any applicable law does not allow the exclusion or limitation of incidental, consequential or similar damages, the foregoing limitations regarding such damages shall not apply.

This Limited Warranty gives you specific legal rights, and you may also have other rights which vary from state to state. This Limited Warranty shall be governed by the laws of the State of Washington.

Warranty claim procedures

1. If you are having problems with your DCI product, you must first contact the Authorized DCI Dealer where it was purchased. If you are unable to resolve the problem through your Authorized DCI Dealer, contact DCI's Customer Service Department in Kent, Washington, USA at 1.800.288.3610 (or, for international markets, the corresponding telephone number for that market) between 6:00 a.m. and 6:00 p.m. Pacific Time and ask to speak with a customer service representative. Prior to returning any DCI product to DCI for service, you must obtain a Return Merchandise Authorization (RMA) number. Failure to obtain an RMA may result in delays or return to you of the DCI product without repair.
2. After contacting a DCI customer service representative by telephone, the representative will attempt to assist you in troubleshooting while you are using the DCI product during actual field operations. Please have all related equipment available together with a list of all DCI product serial numbers. It is important that field troubleshooting be conducted because many problems do not result from a defective DCI product, but instead are due to either operational errors or adverse conditions occurring in User's drilling environment.
3. If a DCI product problem is confirmed as a result of field troubleshooting discussions with a DCI customer service representative, the representative will issue an RMA number authorizing the return of the DCI product and will provide shipping directions. You will be responsible for all shipping costs, including any insurance. If, after receiving the DCI product and performing diagnostic testing, DCI determines the problem is covered by the Limited Warranty, required repairs and/or adjustments will be made, and a properly functioning DCI product will be promptly shipped to you. If the problem is not covered by the Limited Warranty, you will be informed of the reason and be provided an estimate of repair costs. If you authorize DCI to service or repair the DCI product, the work will be promptly performed and the DCI product will be shipped to you. You will be billed for any costs for testing, repairs and adjustments not covered by the Limited Warranty and for shipping costs. In most cases, repairs are accomplished within 1 to 2 weeks.
4. DCI has a limited supply of loaner equipment available. If loaner equipment is required by you and is available, DCI will attempt to ship loaner equipment to you by overnight delivery for your use while your equipment is being serviced by DCI. DCI will make reasonable efforts to minimize your downtime on warranty claims, limited by circumstances not within DCI's control. If DCI provides you loaner equipment, your equipment must be received by DCI no later than the second business day after your receipt of loaner equipment. You must return the loaner equipment by overnight delivery for receipt by DCI no later than the second business day after your receipt of the repaired DCI product. Any failure to meet these deadlines will result in a rental charge for use of the loaner equipment for each extra day the return of the loaner equipment to DCI is delayed.

Product demonstrations

DCI personnel may be present at a jobsite to demonstrate basic usage, features, and benefits of DCI products. User acknowledges that DCI personnel are present only to demonstrate a DCI product. DCI does NOT provide locating services or other consulting or contracting services. DCI does not assume any duty to train User or any other person, and does not assume responsibility or liability for the locating or other work performed at a jobsite at which DCI personnel or equipment are or have been present.