Schlumberger

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PD Plot 7 User Documentation

Version 7.0.134 and later
July 26, 2007

1. Overview

PD Plot 6 is a fully featured reporting and interpretation tool for all Wireline and D&M formation testing tools. It is intended for SLB and client users.

PD-Plot 7 is also real time enabled, so that anyone can monitor the testing job progress by file sharing using the InterACT system.

Access to program features appropriate for SLB and Client users is controlled by a licensing system.

1.1. Support

Support is available through InTouch at Intouch-dcs@slb.com

2. Supported Tools

2.1. MDT

Support is provided for the following modules

- All single probes including Quicksilver
- Dual Probe
- Packer
- LFA/OFA
- CFA
- AFA
- Sampling (all)
- Pump out including standard and up-down Pump Out modules

2.2. STETHOSCOPE

Support is provided for StethoScope 825, StethoScope 675 and StethoScope 475 (SWFT) tools.

2.3. XPT

2.4. CHDT

This includes the standard cased hole CHDT and recent Open Hole Kit options.

2.5. SRFT

2.6. RFT

3. Required Auxiliary Software

3.1. PDS View

PDS View is required to work with PDS files.

http://www.oilfield.slb.com/content/services/evaluation/software/data_utilities.asp?

3.2. Adobe Acrobat Writer (not Reader)

All users will require either require full Acrobat Writer® version 5, 6 or 7 or PDF Creator® to supply PDF document creation functions.

PD-Plot 7 uses the technique of printing to a PDF printer driver, which in turn creates the PDF documents of each PD-Plot 7 report section. PD-Plot 7 does not generate native PDF on its own.

PD-Plot 7 can control both Acrobat Writer and PDF Creator® to create, format and move pdf files to the correct current job folders through specialized printing functions.

PDF Creator® is available free of charge for SLB users from their Radia Software Manager. Adobe Acrobat Writer® is not required. unless users find they need to directly alter the contents of PDF files.

PDF Assembler is a companion software that enables the assembly, ordering, page numbering and book marking of the individual PDF documents created by PD-Plot 7. It also requires Acrobat Writer® version 5, 6 or 7 or PDF Creator® to create table of contents or other document components not directly created by PD-Plot 7.

4. Licensing

4.1.1. Overview

PD-Plot 7 is designed as a Schlumberger and client software. SLB users make full interpretations and reports while client users will use it primarily as a viewer or light

pressure vs. depth interpretation tool, with no need to use SLB functions related to building reports.

A three level licensing system is in place.

1. No license

   If you are an SLB user, you will be granted level 1. This assures that any SLB employee without access to a license can still prepare interpretations and build reports, though without printing.

   If you are an Client, you will granted level 0 (viewer) status, and be able to load only previously supplied **PD-Plot 7** project (pdp) files and DLIS pressure time data files for viewing only.

2. Level 1 license

   If you are an SLB or client user, you will have access to most program functions but will not be able to print.

3. Level 2 license

   If you are an SLB or client user, you will have access to all program functions

4.1.2. Obtaining a license

PD-Plot 7 uses a FlexLM license system Contact your local Schlumberger GeoMarket organization to obtain licensing level 1 or 2.

4.1.3. Schlumberger Users

Schlumberger users working on a standard image PC will be automatically granted a level 1 license. Full access to all program features (especially printing) will require a level 2 license.

4.1.4. Client Users

Client Users with a level 1 license will be able to access most functions with the primary exception being the ability to print. No access is granted to the Print/Report Generator window, and when on the Pressure Time Interpretation window, the Make Report button is disabled.

Clients with no license will be able to load supplied single well PD-Plot 7 project files and work with them, or to view real time data jobs. No ability to create projects or add data to existing projects is granted.

Any function which is Schlumberger specific is not accessible.

5. Quick Start Instructions

The following instructions may be useful to SLB interpreters with limited PD-Plot 7 experience to get an initial feel for how to use the program to accomplish common tasks.

5.1. XPT Job – SLB User

This example involves a small XPT job performed over several test depths. Most other tools share the same basic work flow.

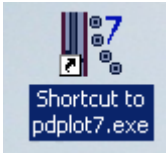
It is assumed the following job has these data files available.

- Field XPT Print
- Field DLIS file(s) of all XPT tests.
- Depth Indexed Log Data in DLIS or LAS format over tested interval.

1. Create a new folder on you local hard drive

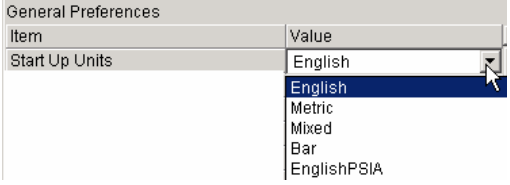
This folder will contain the primary PD-Plot 7 data storage file and will be the "home" folder for PD-Plots standard data folders to be created later.

2. Start PD-Plot

Click your desktop shortcut 

3. Set Default Unit System.

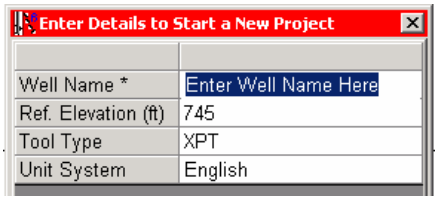
Open the **File** menu, and select **Preferences** 



Drop down the **Start Up Units** field and select the unit system that mostly closely matches your needs. **English** = pressure in PSIG and depth in Feet, **Metric** = pressure in kPa and depth in Meters.

4. Start new project file

Select the **File** menu, then **New Project** 



Enter the **Well name**, **Reference Elevation** and **Tool Type**. The **Unit System** should be your Preference selection made earlier.

Click **Ok**

You are asked to save the initial project file. Navigate to the project folder created above in step one, and accept the default project name, which is <well name>.pdp. Always keep the .pdp file extension. Click **Save**.

5. Create Project Folders and Populate them

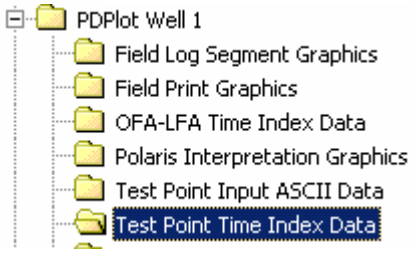
Open the **File** menu, and select **Manage Project Folders** .

Select **Create Project Folders** 

Accept the confirmation dialog. This creates a series of sub folders under you project folder.

Open an Explorer window and find the folder where the new project file is located.

Open the **PDPlot Well 1** folder, and click on the **Test Point Time Index Data** Folder.



Copy all Field DLIS files containing the test points into this folder

Click on the **Well and Log Data** folder

Copy the well log LAS or DLIS file(s) to this folder.

Click on the **Field Print Graphics** folder

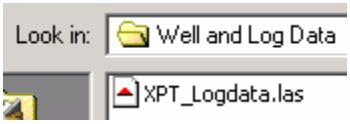
Copy the field PDS print file of the XPT to this folder.

Load LAS Log Data

Click the **Tools** menu, and select **Edit Well Information**

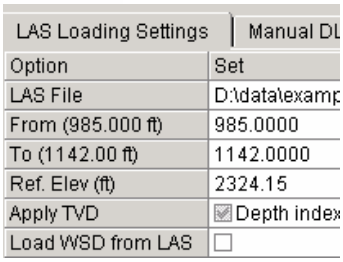
Move to the **Log Data** tab 

Click the **Open LAS** button on the right 



and select the LAS log data file previously placed in the Well and Log Data folder.

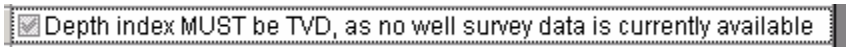
Make changes and selections to the top section as required.



Set the load interval (From and To) to the minimum interval required.

Check **off Load WSD** (well site data) **from LAS** to fill the well site data for later reporting

Take special note of the Apply TVD selection. The LAS depth channel MUST be TVD if you have no Well survey data loaded that could TVD the LAS as it is loaded.



If you had previously loaded well survey data, and the LAS you are loading is in Measured depth, then you would check off this **Apply TVD** selection.

If you had previously loaded well survey data, and the LAS you are loading is in TVD depth, then you would NOT check off this **Apply TVD** selection.

Select the channels you wish to load from the channel list.

Click the **Load** button. The LAS data is loaded, the table shows the channels and interval that were loaded.

Top Depth	Base Depth	Ref Elevat...
985.00	1142.00	2324.15

LAS Data

Depth	AHF10	AHF20
ft	OHMM	OHMM

etc….

6. Populate Test Point table from field DLIS

The test point table can be populated with basic test point data by reading the latest DLIS file you have available. It is best if a DLIS can be found that was recorded AFTER the last XPT test. Each DLIS only contains the results of all previous tests, not the test information from the DLIS being loaded

Open the **File** menu, then 

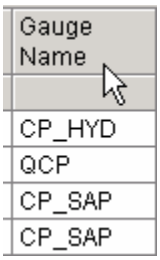
, then select DLIS/LAS 

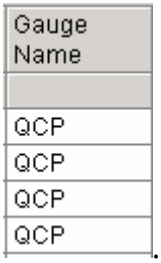
Select the latest DLIS file you have available, and click **Open.** The test point table should fill with test point data.

Review this table and the field print and determine if all test points are present

If only one gauge is being used for the interpretation, then remove test point rows for the other gauges for simplicity.

First sort the test point table by Gauge. Click on the Title cell of the ”Gauge name” column to sort the table.



(after the sort) 

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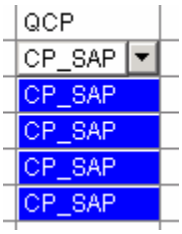
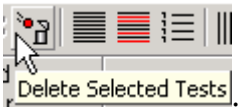
Decide to keep the QCP tests only.

Select a column of cells in all rows of the table that are from all **other** gauges,



then click **Delete Tests** button on Test Point Table tool bar. 

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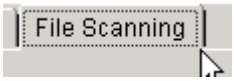
7. Scan and Rename P vs. T DLIS files

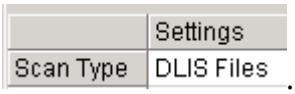
PD-Plot 7 interactive interpretation of each Test point works much more smoothly if the DLIS files are named using the Test and File naming convention. This allows direct access of each DLIS by selecting them from the Test point table.

PD-Plot 7 can automatically scan all DLIS files and rename them to the standard.

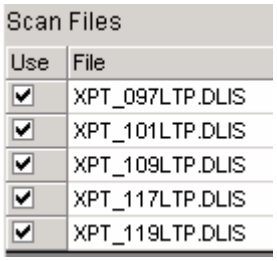
Click the **Open P vs. T window** button on the tool bar.

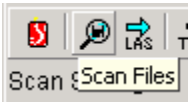
Click **Cancel** if asked for a file name.

Click on the File Scanning tab 

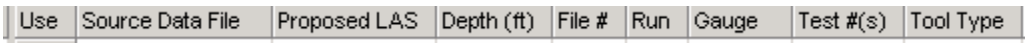
Set the Scan settings to **DLIS Files** 

. This should show a list of al DLIS files in the **Test Point Time Index Data** folder

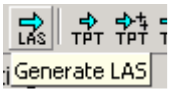


Click the **Scan Files** button 

Each DLIS file is scanned and the **Scan Table** is sequentially filled.

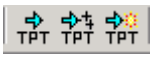


Perform the LAS File creation and custom naming now. Click the **Generate LAS** button



This will convert all DLIS to LAS, and name the LAS according to the **Proposed LAS** file name column.

At this point you may also use the Scan Table to update or fill the Test point table with the test information that has been found during the scan.

Click one of **the Add to Test Point table** tool bar buttons. 

The first replaces the test point table with the scan table, the second adds all scans to the current test point table, and the third only adds NEW tests (as determined by unique Test, File, MD Depth and Gauge)

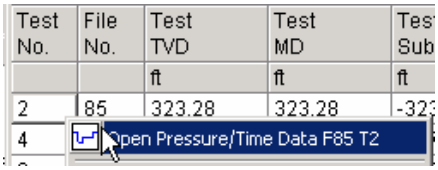
8. Interpreting Each Test Point

Note: Detailed instructions are available later in the documentation.

The steps

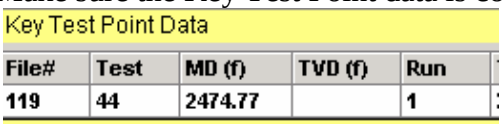
Load each Pressure time file in sequence.

Right click on the test point table row that represents the test you wish to interpret and select **Open Pressure/Time Data FxxTyy** from the context menu.

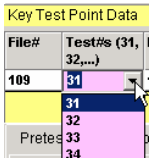


Then for each test in this file,

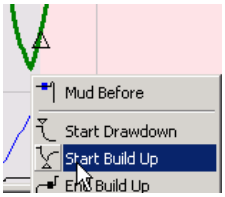
- Make sure the Key Test Point data is correct. Edit as necessary



- Set the Test Number to select that part of the test (when more than one test)

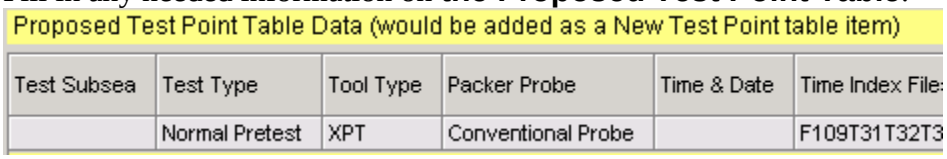


- Make time picks to mark the test events.

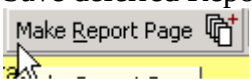


- Interpret the Pressure vs. Time plot and Flow Regime plots to get formation pressure and mobility estimates.

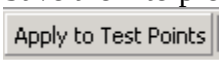
- Fill in any needed information on **the Proposed Test Point Table**.



- Save deferred Report Pages as needed for later report generation.



- Save the interpreted information of each test to Test Point Table.



- Save the results of this test back to the LAS file. Select **File**, then **Save Data File**.

- Repeat for the next test in this file (when more than one test)

- Load the next P vs. T data file from the test point table.

These steps are explained in detail later in the documentation

9. Make Pressure Depth plot(s) with interpreted test point data

Note: Detailed instructions are available later in the documentation.

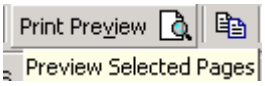
After all test points are interpreted, create a Pressure Depth plot with associated log data displays, and scale and interpret the pressure data. Template files found in the program folder are used to store and retrieve the pressure depth layout.

Save the various pressure depth plots and log displays with your added interpretation as deferred report pages (see Views) as you interpret each zone or layer.

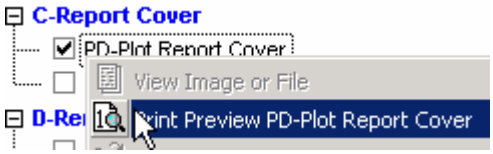
10. Generate the Interpretation Report

Open the **File** menu, then select 

The print window contains a lengthy list of printable report pages. Check off those that are needed for your report.

Preview the report by clicking the **Preview** button. 

Preview any one section by right clicking on the item on the selection list then select **Preview <item name>**



Print the entire report by selecting Print from the file menu.

Make a PDF report (if full Acrobat Writer 5 or 6 is installed) is also possible. See details later in the report.

5.2. Real Time Job – Client User

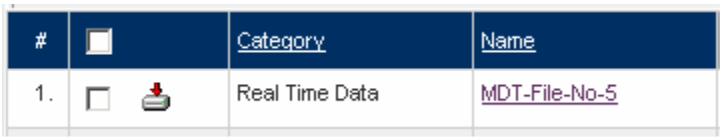
To illustrate work flows for clients or SLB users monitoring Real time MDT or STETHOSCOPE jobs, follow these basic guidelines.

5.2.1. InterACT real Time File Access

The use of InterACT to access Real Time data from wireline or D&M testing jobs makes it simple to download a file to your desktop

Go to the InterACT web site at www.interact.slb.com.

Log in and navigate to your Organization, Field, Well and finally to the Real Time Data folder.

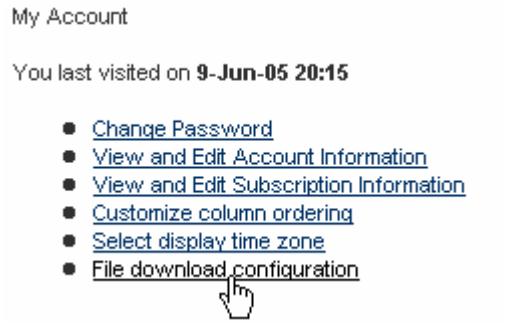


Note: Items with this icon with the ball and sound waves  indicate data that is streaming into InterACT in true real time.

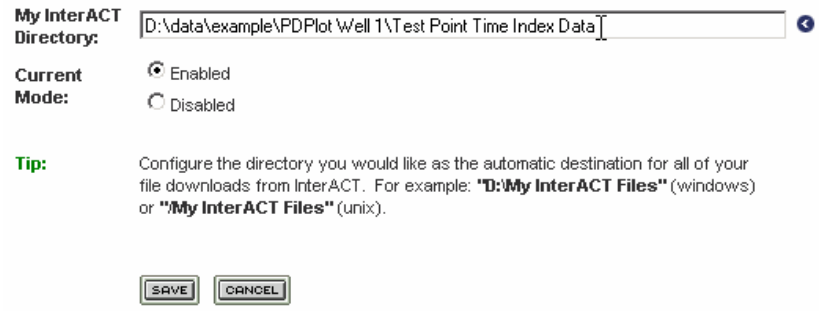
5.2.2. Setting up your InterACT to download files to your project folder.

Click the **My Account** link upper left.

Then click **on File download configuration** link



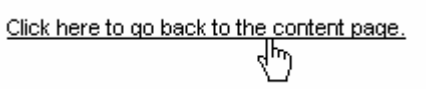
This setup allows you specify a folder where all downloads will go without being asked each time a download is initiated.



When the setting are complete, click the **Save** button.

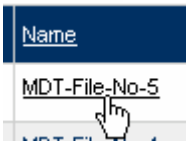
Then click the "Click Here" to follow this link.

Then click this to return to the InterACT page you were originally using.



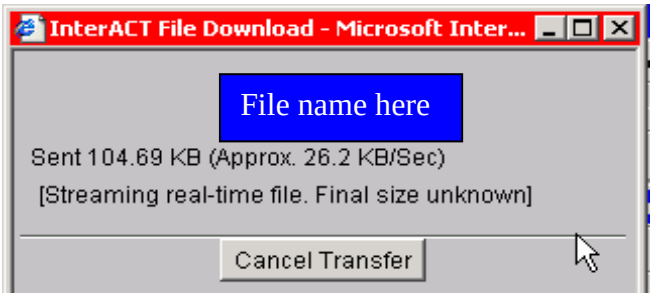
5.2.3. Initiating a file download

Click on name of the file you want to start downloading.



The download will begin. If it asks you for a folder and file name to place the file, navigate to the folder where you wish to start your PD-Plot 7 project for this well.

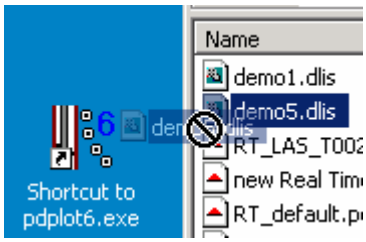
The download begins.

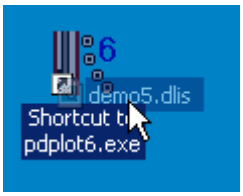


This window stays open to show you the progress. Cancel the transfer if required using the **Cancel Transfer** button.

5.2.4. Opening the Real Time File in PD-Plot

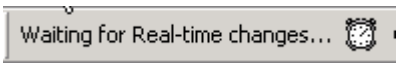
Opening a Real Time DLIS file in PD-Plot 7 is as easy as dropping the real time DLIS file onto your desktop short cut to PD-Plot.

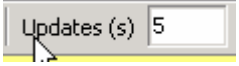




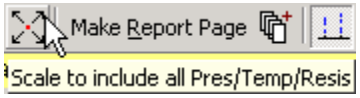
When you do this, PD-Plot 7 opens, creates a default project file in the same folder as the DLIS file, then opens the software and takes you directly to the Pressure Vs. Time window where it begins to load, plot and update as the file changes.

The tool bar there will tell you the progress of the download and monitoring.



The real time file are periodically checked for changes. The update interval is shown on the tool bar. 

The plot can be auto scaled at any time using the **Auto-Scale** button



The Time axis will continue to expand as new data arrives if the **Auto-Update** button on the real time tool bar is "on" 

Full details on using Real Time functions are available later in the document.

5.2.5. Real Time Data From STETHOSCOPE Jobs

Drilling and Measurements Formation Pressure While Drilling tool (STETHOSCOPE) uses a different type of file structure for real time data. Small ASCII files containing the data are used instead of DLIS

There are two types of files. Look for **RT_LAS_TxxRyy.LAS** and **RTRT_phaseb.rta** files. Only the RTRT_phaseb.rta files are available in true real time. RT_LAS files contain more data, and require additional telemetry time to build

6. Project Organization

6.1. Overview

PD-Plot 7 projects often encompass a large quantity of input data files and generated output files from the interpretation and reporting process.

To help the SLB user to organize these files into a coherent and easily understood structure for client usage, PD-Plot 7 has a built in method to assist.

When files are opened in PD-Plot 7 for any purpose, the default folder for each data type is based on this assumed folder structure making it easier to find relevant data.

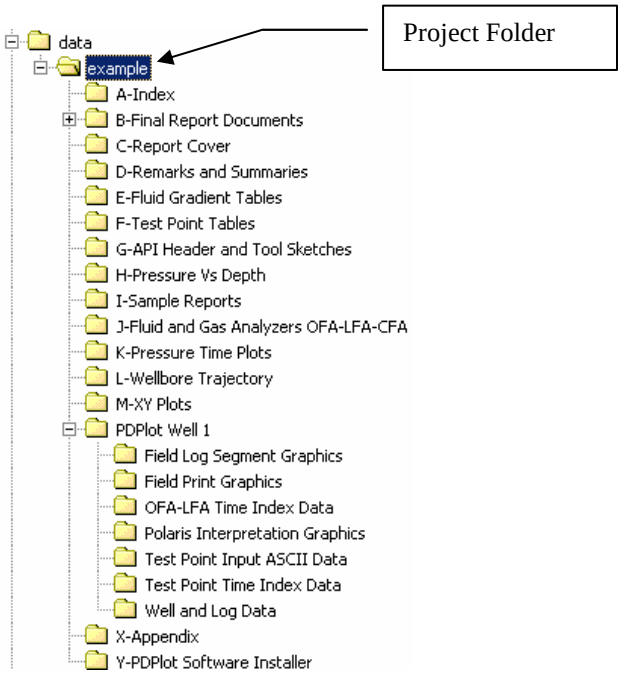
6.2. Project File and Folder Structure

Each PD-Plot 7project consists of the main project file **(<project name>.pdp**) located in the folder of the users choice. The user is encouraged to create a unique folder for this file separated from other projects. PD-Plot 7can generate a standard folder structure using the current project folder as the starting point.

6.2.1. Creating Project Folders

Open the project file in PD-Plot. Create a new project and open it if necessary. From the **File** menu, select **Manage Project Folders**, then select **Create Project Folders**.

After confirmation, the project folders are created using the project folder as the home folder.



6.2.2. Removing Project Folders

If it becomes necessary to remove the project folders, follow these instructions. Remember that all files in these folders will be lost as well.

Select the **File** menu, then select **Remove Project Folders**

6.2.3. SLB Users – Data Distribution in Standard Folders

Files from the job being interpreted should be placed in the following folders. Each GeoMarket may have their own standards regarding contents. This is a guideline.

Field Log Segment Graphics

Un-compose the PDS field print into its components using the File Scanning functions on the Pressure Time interpretation window. This also renames them according to File and Test. Place all PDS files representing each test into this folder.

Field Print Graphics

Place the composed PDS field print in this folder.

OFA-LFA Time Index Data

No longer used.

Polaris Interpretation Graphics

This folder will be populated as the SLB user interprets pretests with deferred report page files (*.pti)

Test Point Input ASCII Data

> This area is used to store ASCII data files containing test point information. Common examples are: Polaris ASCII dump files, WFTI ASCII dump files. User created Excel ASCII files containing test point data.

Test Point Time Index Data

Place all Time index DLIS files of each test in this folder. They will converted to LAS as tests are interpreted. The File Scanning features on the Pressure time window should be used to scan and rename files with Test and File number naming conventions after the raw field DLIS files are placed in this folder.

Well and Log Data

Place any associated data in this folder. Well Log LAS, well surveys, tops information, drilling data, TimeDepth data etc.

7. Supporting Test Point Data Formats

7.1. Test Point Data

The Test Point Table can be filled from many data sources other than via interactive pressure time interpretation. This section describes the supported file types and their origin.

Note that only Level 2 licenses enable this feature.

All are loaded from the File menu, Add Test Points to Well From… menu

7.1.1. Schlumberger WFTI Export

Schlumberger OP Maxis field acquisition software (WFI Plot) application can export an ASCII file that can be imported to fill the test point table. These files are named by default as **WFTI_TABLES.wfi**

7.1.2. Schlumberger Polaris ASCII export

Schlumberger GeoFrame software Polaris application can export an ASCII file that can be imported to fill the test point table. These files are named by default as **Polaris_PtInfo_Dump.txt**

7.1.3. Schlumberger DLIS/LAS

Each Schlumberger DLIS files generated at the well site while testing contains a table of results of all previous test points (WFIP table). PD-Plot 7 can extract this table and populate the test point table. This is done using the D2A application supplied with PD-Plot.

Note: Due to the fact that the WFIP table (and others) are written to DLIS files when the file is first *opened*, prior to the data acquisition that will be eventually stored in that file, these table in any given DLIS file only contain the results of all PREVIOUS tests.

To obtain a full representative Test Point Table, the user must load a DLIS that was written AFTER the last successful test. Note also that only DLIS files opened as TIME

index (station) files will contain the WFIP table, so tie-in files, or WSD files created after the last test will NOT contain a full WFIP table.

Note also that the degree of interpretation done by the field engineer can affect the detail of what is stored in this table. At least the File#, Test# and depth, as well as packer type and gauges are always stored. Additional interpretation will only exist if the WFTI application was used.

7.1.4. ASCII Table from Multi-column text files

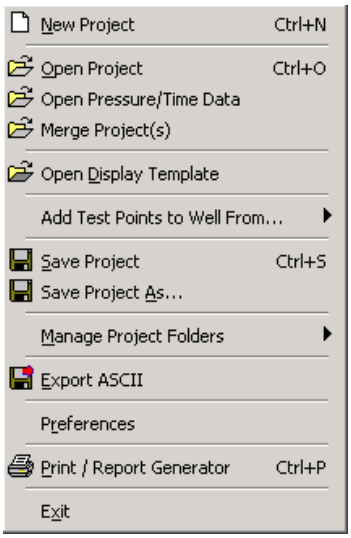
The user can build a simple multicolumn ASCII file containing columns of test#, depth, pressure etc, and load this into PD-Plot 7 to populate the test point table.

8. Interface

8.1. Main window Menus

8.1.1. File menu

The **File** menu on the main window is used to access File, Printing and Exit functions.



Menu Item	Function
New	Starts new empty project
Open Project	Opens existing project
Open Pressure/Time	Opens a Pressure vs Time file for Real time test

Data	monitoring.
Merge Project(s)	Merges test points from other projects into current project, creating new wells.
Open Display Template	Opens a display template
Add Test Points to Well From…	Opens window where data files are imported
Save and Save Project As...	Saves the current project to a file.
Manage Project Folders	Create or delete the special PD-Plot report folder structure under the current project folder.
Export ASCII	Export the test point table to an ASCII file
Preferences	Open the Preferences window.
Print/Report Generator	Opens the printing functions window
Recently Opened Projects	Select this sub menu item to open a sub menu with a list of the last four projects.
Exit	Closes PD-Plot

8.1.2. Edit Menu

The **Edit** menu provides access to the Window's clipboard for the tables on the Test Point, Fluid Gradients, and Well List windows, and other editable tables and text.

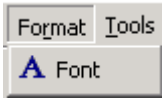
Menu Item	Function
Undo	Un-do last editing change.
Cut (Ctrl-V keyboard shortcut)	Cut selected text to clipboard
Copy (Ctrl-C keyboard shortcut)	Copy selected text to clipboard
Paste (Ctrl-V keyboard shortcut)	Paste text from clipboard to selected field.

Undo functionality only exists for limited items.
Note: The Cut function is restricted on some table columns, as there may be required or specifically formatted data that must not be removed. If

nothing happens when this function is selected, it is intentionally prevented.
Note: while actively editing the cell contents of any table (in edit mode), you must use the right click menu to cut, copy or paste from the clipboard.

8.1.3. Format Menu

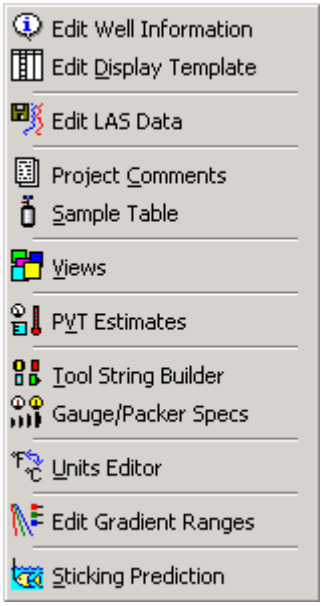
The **Format** menu contains items that control the window and some pressure plot appearance items.



Menu Item	Function
Font	Sets the font for all PD-Plot windows and tables

8.1.4. Tools Menu

The **Tools** menu on the main window is used to access all editing windows. Several items have a corresponding button on the main tool bar.



Menu Item	Function
Edit Well Information	Opens Well Information window
Edit Log Presentation	Opens Log Presentation Editing window
Edit LAS Data	Opens LAS Loading/Editing window
Report Writer	Opens Report Writer window
Sample Table	Opens Sample Table window
Views	Opens Views window
OFA/LFA Plots	Opens OFA/LFA window
PVT Estimates	Opens PVT Estimation window
Tool String Builder	Opens Tool String Editing window. (MDT RFT only)
Gauge/Packer Specs	Opens Gauges /Packer probes window
Units Editor	Opens Units Editor window
Edit Gradient Ranges	Opens Gradient Ranges window
Sticking Prediction	Opens Sticking prediction window

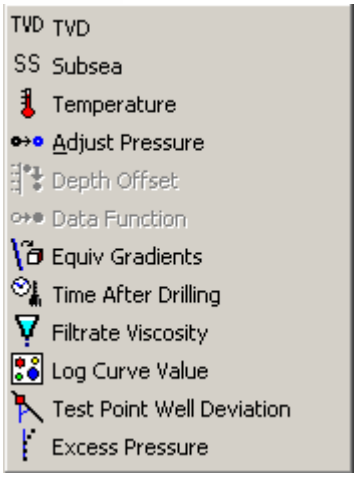
8.1.5. Option Menu

The **Options** menu controls plotting items that can be toggled On (depressed), or Off (up).

Menu Item	Function
Use XX12 Depth No's	Camouflages all depth numbers by substituting X for all but the last two digits.

8.1.6. Compute Menu

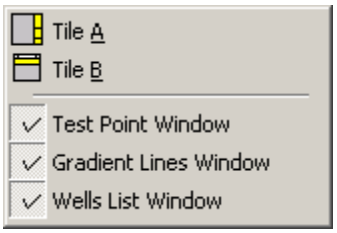
The **Compute** menu on the main menu bar has five functions which perform various computations.
Note: These items do not have a tool bar equivalent.



Menu Item	Function
TVD	Computes TVD depth from MD depth and inclinometer data entered on Well Information window.
Subsea	Compute Sub sea depths from TVD depths using Reference Elevation
Temperature	Estimate test point temperatures given a bottom hole temp and/or gradient.
Filtrate Viscosity	Computes viscosity column assuming water based mud filtrate properties entered on wellsite data table, and test point temperature.
Adjust Pressure	Performs offset and gain adjustment of selected pressures .
Depth Offset	Applies a depth offset to selected test points.
Data Function	Generic gain and offset data function of any selected numeric items on the test point table.
Compute Equivalent Gradients	Computes and fills the equivalent density (or gradients) columns from the formation or Mud pressure and TVD depth.
Time After Drilling	If Time depth data is loaded, this computes elapsed time from point where bit was last penetrating prior to this test point and fills Time after drilling test point table column.
Filtrate Viscosity	Computes filtrate viscosity from mud filtrate properties and downhole temperature at each test point depth and fills the Filtrate Viscosity column.
Log Curve Value	Reads value of any loaded LAS data channel at each test point depth and fills the either the Porosity column or one of the User Defined columns.
Test Point Well Deviation	Using the currently loaded well survey data, computes a deviation angle at each test point depth and fills the Well Deviation column.
Excess Pressure	Opens the Excess Pressure computation window. This data is not presented on the test point table, it is only available as a plottable data item once computed.

8.1.7. Window Menu

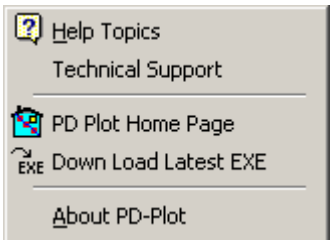
The **Windows** menu is used to arrange and/or show and hide the four main program windows on the main screen in one of four preset arrangements.



Menu Item	Function
Tile A, B	Arranges the windows in one of two common arrangements.
Test Point Window	Shows or hides the Test Point table window
Gradient Lines Window	Shows or hides the Gradient Lines window
Wells List Window	Shows or hides the Wells List window

8.1.8. Menu

The **Help** menu provides access to the on-line help available with PD-Plot.



Menu Item	Function
Help Topics	Opens the on-line help file
Technical Support	Opens the on-line help file on the technical support topic.
PD Plot Home Page	Opens browser on PD-Plot 7 SLB web page (only available to SLB users)
Download Latest EXE	Begins download of latest PD-Plot 7 version (only available to SLB users)
About PD-Plot	Opens a window that shows the version and licensing information or PD-Plot 7

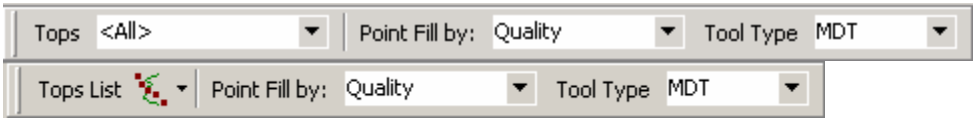
9. Tool Bar Description

9.1. Main Window

The main window tool bar displays commonly used functions. These items are all available on the File and Tools menus as well.

Icon	Function
	Start a new project
	Open an existing project
	Save current project
	Open Print window
MD TVD SS	Toggle between viewing in MD, TVD or Subsea depth.
	Open the Views window
	Open the Edit Log Presentation window
	Open the Report Writer window
	Open the Tool Builder window (MDT and RFT only)
	Open the Units Editor window
	Open the Gradient Ranges window
	Open the PVT Estimation window

The other tool bar contains drop down lists.



Icon	Function

Tops List	Opens a window containing a table that shows all Tops in all wells. Can be used to select which tops are used to control test point visibility. In multi well situations, gives overview of which tops appear in which wells.
Point Fill by: Quality	Selects various criteria used to uniquely color fill test point symbols. Options are Tops, Fluid type, wells, Quality, Run, and by the contents of the two User defined columns.
Tool Type MDT	List indicates overall tool type used in this job. Test point table has specific setting for each test.

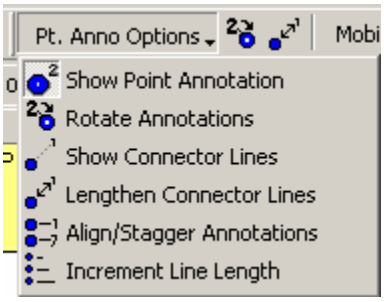
9.2. Pressure Depth Plot Window

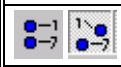
The tool bar above the Pressure-Depth plot window allows easy access to most of the commonly used functions and options related to plotting.

9.2.1. General Draw and scale and annotate functions.

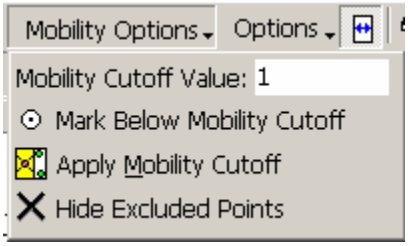
Icon	Function
	Redraw the plot
	Suppress automatic re-draw.
	Scale all data to fit in their tracks.
	Open the Scales/Intervals window
	Add an annotation to the plot
	Open the annotation editor window

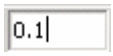
9.2.2. General plotting options



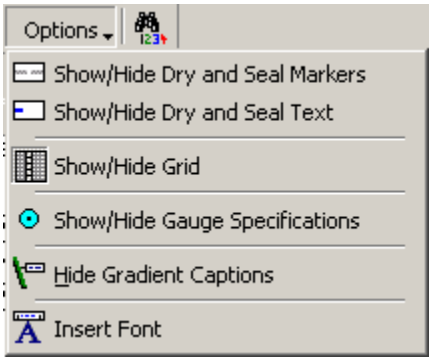
Icon	Function
	Show or hide test point annotations
	Show or hide connection line from test point symbols to annotation text
	Rotate the annotation text around the test point by 45 deg
	Extend the connecting line length in 8 steps
	Arrange the annotations all at the same angle or at staggered angles.
	Option to increase the connecting line length in steps (or leave all the same) to further assist in annotation separation for clarity

9.2.3. Mobility Interpretation Related



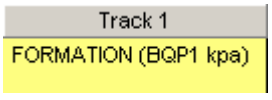
Icon	Function
	Fill all formation pressure test point symbols with red with drawdown mobility below the cutoff value
	Set the status of all test with drawdown mobility below the cutoff value to Excluded (X'ed)
	Show or hide test points that have been excluded due to mobility cutoff
	Enter the drawdown mobility cutoff value in md.

9.2.4. General Viewable Options Related



Icon	Function
	Shows or hides the Dry and Seal Failure markers on each side of formation pressure tracks/
	Show or Hide “Dry Test” and “Lost Seal” text next to Dry/Seal test markers
	Show or hide the background grid on the plot
	Show either regular test point symbols or accuracy/repeatability specification symbols
	Show or hide the gradient captions.
	Insert Font. Sets the font and size to use in the Pressure Vs. Depth display Insert.

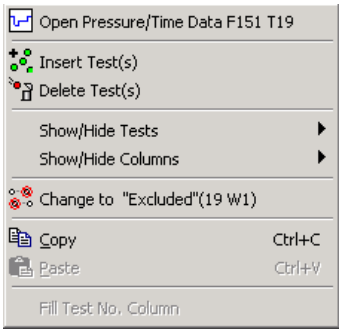
9.2.5. Data Monitor. Mouse position data value tracking.

Icon	Function
	Show or hide the Data Monitor tool bar fields. When on, the X and Y location of the mouse is shown here.  Note. Only the current data item (Yellow in insert) value is shown, and only when the mouse is in that track. 

9.3. Test Point Table Window

The tool bar on the Test Point window allows easy access to most of the commonly used functions on the Test Point table.

These items are also available on the context sensitive menu that will appear if any cell of the test point table is right-clicked.



Icon	Function
	Open Pressure Time Interpretation window. If accessed by right click on specific test point row, menu indicates file naming (Fxx Tyy)
	Add a row(s) to the test point table
	Copy an existing row to a new row.
	Delete select rows (test points)
	Show all rows (test points)
	Hide selected rows (test points)
	Show all rows (test points) containing the same text as the currently selected text.
	Show all columns
	Hide selected columns
	Hide all empty columns
	Select from the list one currently hiding column to be shown
	Open Column naming window to give the current set of visible columns a name, or to restore a previously named column set
	Fill File name column with File/Test or Test/Run name.
	Add a row to the sample table and fill it with the test point details of the currently selected test.
	Open the Export ASCII window to export the test point table data to file for transport to another program.

9.4. Gradients Table Window

The Gradient lines tool bar is divided into three groups. Some tool bar buttons are also available by right clicking anywhere on the table cells to access a popup menu.

Icon	Function
Formation	List that shows current pressure type and allows selection of another type
	Discard selected gradient line(s)
	Compute contact depth of two selected gradient lines.
	Re-Select test points used in original fit of the selected gradient line.
	Constrain the gradient line length, to shallowest and deepest test point in interval, or leave where initially placed.
Update	Updates gradients and line captions based on options.
Den Grad	When creating captions for gradient lines, use Density or Gradient.
PPm + PPm	When a line is determined to be water, add Salinity value to gradient caption.

Icon	Function
Tools	Tools menu, containing…. (Also available by right clicking when pointing to table cells)
	Compute contact depth of two selected gradient lines.
	Use Gradient Range data to determine new gradient line color and caption or not.
	Re-Select test points used in original fit of the selected gradient line.
	Updates gradients and line captions based on options.
	Create a copy of the selected gradient line.
	Option to show only those lines whose top and bottom depth are within the current display depth interval or all lines.

	Table column control. Shows all columns
	Table column control. Hides selected columns.
	Open window to name and save the current table layout.

9.5. Wells List Window

The tool bar on the **Wells List** window provides easy access to the functions applicable to this window.

Icon	Function
	Add a well to the project. Only available with level 2 licencing.
	Delete the selected wells (and all test points, tops etc) from the project
	Export the Wells list window table to an ASCII file for import to other software.

10. Test Point Table

10.1. Overview

The test point table contains complete data on each pressure test in the project.
All test point data for all wells in the project are present on this table.
Each row represents the test point from one pressure test from one pressure gauge. Each test row is uniquely identified by the **File**, **Test No** and **Gauge Name** columns.

10.1.1. Test Point Table Column Description

The test point table contains many columns to fully describe each test point

File No.	Test No.	Run	Orig. MD	Test MD	Test TVD	Test Subsea	Formation Pressure	Last-Read Buildup	Mud Before	Drawdown Mobility	Mud After	Filtrate Visc.	Test Type	Spherical Mobility	Horner Mobility

Column	Description
Well name	Well name for each test point. Only visible in multi well projects.
File No	A number that identifies the source DLIS data file (Integer)
Test No	A sequential number that indicates a unique test. (integer or text)
Run	The logging run number of this group of tests.
Test MD	The measured depth (MD) of the test
Test TVD	The True Vertical Depth (TVD) of the test. Can be computed from Inclinometry data if loaded.
Test SS	The sub sea elevation of the test. Computed from the reference Elevation of the well this test point belongs to and its TVD depth.
Formation Pressure	The formation pressure of the test. This is primary pressure data intended to be the "answer" or best estimation of formation pressure at this depth.
Last Read Buildup	Final pressure at the end of the buildup of this test.
Start BU Pressure	Pressure at the Start of Build up pick for this test.
Drawdown Mobility	Mobility computed from the flowing drawdown portion of the test.
Mud Before	Hydrostatic borehole pressure measured before the packer assembly is set
Mud After	Hydrostatic borehole pressure measured after the packer assembly is retracted.
Filtrate Viscosity	Computed or estimated viscosity of the fluid that enters the tool during the pretest drawdown.
Test Type	A standardized description of the type of result obtained for this test. A selection must be made from a drop down list.
Spherical Mobility	A computed mobility from the build up where spherical flow was detected.
Horner Mobility thickness.	A computed mobility thickness product from the build up where Horner "radial" flow was detected.

Column	Description
Fluid Type	Interpreted fluid type. Initialed filled if test point data is used in gradient line fit that is identified by a fluid name.
Temperature	Formation temperature at beginning of drawdown
Temp After	Formation temperature at end of buildup
Porosity	Formation primary porosity
Remarks	General textural remarks
Gauge Name	Name of gauge used to acquire this test
Gauge Serial Number	Unique ID number for the gauge.
Packer/Probe	Name of the packer/probe type used for this test.
Tool String	Name given to the tool string
Point Annotation	The text that appears next to test points on the plot (Test # is used is this column is blank)
Time and Date	Time and Date of when this test was taken.
User Defined Columns 1 to 7	User defined columns that can be assigned any string of characters. These data's can be plotted as a data items if they are numeric. Colors can be assigned to each unique

	item that will be then used to shade plotted data points.
Pretest Volume	Total pretest volume taken during pretest
Pretest Time	Total pretest time taken during pretest
Pretest Flow rate	A computed Flow rate using pretest volume and time columns
Equivalent Formation Density /Gradient	A computed density or gradient using the formation pressure and TVD depth.
Equivalent Mud Density/ Gradient	A computed density or gradient using the Mud Before or After pressure and TVD depth.
Formation Top	The name of the formation that this test point is within. Taken from the list of formation tops entered/present
Tool Type	Identifies the tool used to acquire this data point Options are MDT, RFT, FPWD475, FPWD675, FPWD825, XPT, SRFT, CHDT.
Well Deviation	The deviation of the well bore at this test depth.
Dept Corr.	Depth correction to apply to test points appearing on the Time vs Depth trace in a TimeDepth track. This applies a secondary correction to the primary Sensor/Bit depth Offset to account for additional depth corrections (D&M Stethoscope use primarily)

FPWD Quality	FPWD Other	Time After Drilling	Circ Rate	Probe Orientation	1 Min DeltaP	Gauge Noise	Gauge Flatness	Mud Comp.	Pressure Corr.	Pres Diff	Last-Read Buildup Invest.	Drawdown Mob Invest.
		hr	cc/sec	deg		PSIA	PSIA	1/psi	PSIA	PSIA	PSIA	md/cp

StethoScope Specific Columns	
Column	**Description**
FPWD Quality	Quality Indicator. Not yet defined
FPWD Other	Not yet defined
Time After Drilling	Time from time bit last at this depth to time of this test. Must has time Depth data loaded to compute.
Circulation Rate	Circulation rate at time of test.
Probe Orientation	Probe orientation relative to borehole
1 Min Delta P	Pressure 1 minute after buildup begins.
Gauge noise	A measure of gauge stability
Gauge Flatness	A measure of gauge stability
Mud Compressibility	Computed from drawdown pressure and user picks
Pressure correction.	Pressure correction applied
Pressure difference	Pressure difference between investigation and final phase last read buildup pressures
Last Read Buildup Invest.	Last read buildup pressure at end of investigation test.
Drawdown Mob. Invest	Drawdown mobility computed during investigation test

10.2. Adding Data to the Test Point table

10.2.1. Overview

Data can be added to the test point table in several ways.

Various file types can be read, as well as direct filling via interactive interpretation of pressure vs. time data. Users can also just add rows manually then enter data as required.

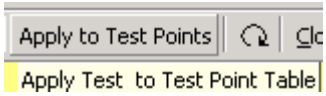
Note that licensing controls what specific types of data can be loaded.

If test point data is to be added from a file, this is handled from the **File** menu, **Add Test Points to Well From** sub menu. Select the option that fits the type of data you have.

Interactive interpretation of Pressure vs. Time data files can also be used to populate the test point table.

10.2.2. Pressure vs. Depth Interpretation

Test point table rows are added or updated from the Pressure vs. Time window as the user interprets the actual test data. The update occurs when the Apply to Test Point button is used.



10.2.3. DLIS WFIP Table loading

Open the **File** menu, the select the **Add Test Points to Well From**… item. Select **DLIS/LAS** from the next menu.

After selecting the DLIS file, it is opened and the WFIP table is read.

You will be asked if you want to load the well site data from this file. Doing so will replace all current well site data.

You will be informed as to how many new test points are to be added to the test point table. Only tests with unique Test MD, File #, and Gauge name are added.

Note that due to a DLIS issue, any file loaded will NOT contain the test point table data for that test, just all previous tests. Attempt to load the LAST DLIS file that is available.

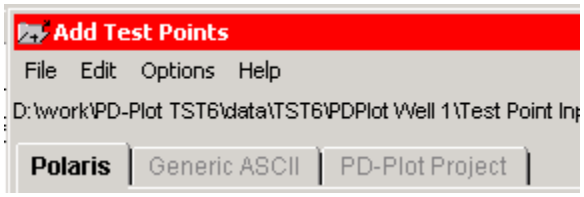
10.2.4. Polaris ASCII dump file

Place the Polaris dump file in

<project folder>\PDPlot Well 1\Test Point Input ASCII Data

Open the **File** menu, the select the **Add Test Points to Well From…** item. Select **Polaris Export** from the next menu. Open the Polaris DUMP file.

A new window opens and the file is loaded into the table

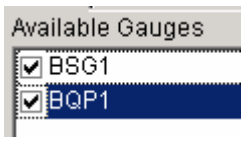


Use?	File Number	Test Number	Probe Location	Test Type	Probe Type	T
☑	71	6	Vertical 1	Volumetric	Large-Diameter	
☑	72	8	Vertical 1	Normal	Large-Diameter	

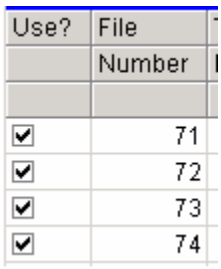
Set the options (below) then click **Apply** to add the selected tests to the test point table.

10.2.4.1. Options

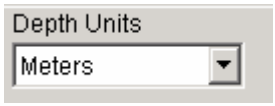
Select Gauges. The gauges that are available are shown in the list. Check off the gauges you want to load.



Select the Test Points to load by selected needed rows using the **Use?** column.

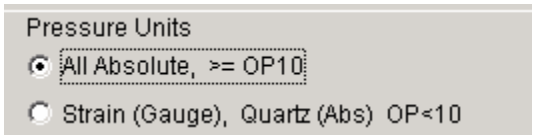


Depth Units. Make sure the Depth units dropdown has the INPUT units of the file.

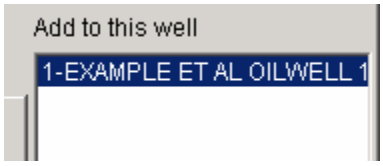


Select **Load All** or **Load New** to add all test points or select only those that are "new" to the test point table, ie new Test/File/MD depth and Gauge.

Pressure Units. Due to a problem with DLIS units for strain and quartz transducers in some older versions of DLIS, indicate the OP version used to create the DLIS files used to interpret the job.



Select the Well. If the project has more than one well, you can select the well that the test points will be added to.



10.2.5. WFI ASCII dump file

Open the **File** menu, the select the **Add Test Points to Well From…** item. Select **WFTI Export** from the next menu.

Select the **WFTI_TABLES.wfi** file. New test points are added to the test point table.

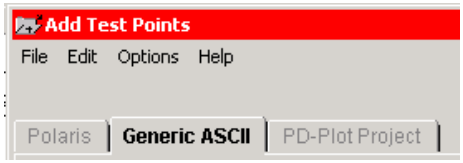
10.2.6. Generic ASCII Table

The user can construct an ASCII table file containing columns of depth, pressure, mobility etc, and can load that to populate the test point table.

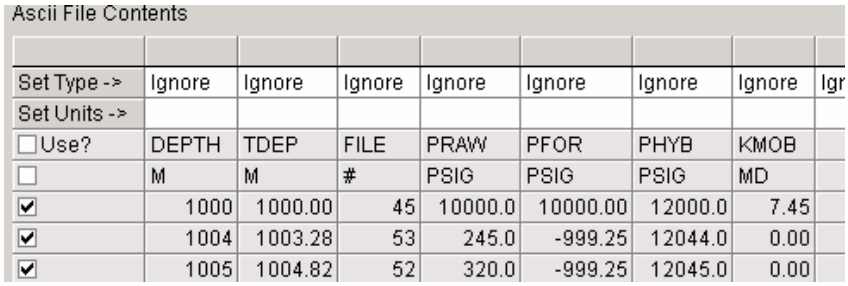
PD-Plot 7 must be told which columns of data match with the columns in the file, and must know the units of the data in the file.

The easiest way to create such files is to use Excel, then save an ASCII file using the CSV (comma separated values) file type.

Open the **File** menu, the select the **Add Test Points to Well From…** item. Select **ASCII Table** from the next menu.

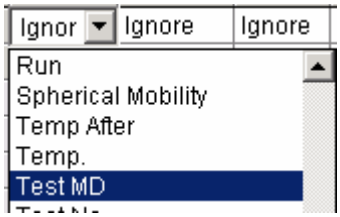


The file is loaded into the table.

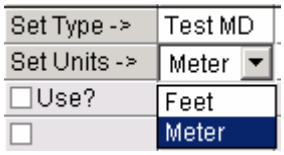


The grey cells contain the file contents, the two header rows **Set Type→** and **Set Units→** now need to set to indicate what type of data is in which column, and what the units are of the values in each column.

Click the cell with the word **Ignore**, and select the data type from the resulting dropdown list.



Then set the units for this item in the cell directly below.



Repeat for each column. Columns left with the **Set Type = Ignore** at not loaded.

Set Type ->	Test MD	Test TVD	File No.	Last-Read Buildup	Formation Pressure	Mud Before	Drawdown Mobility	I
Set Units ->	Meter	Meter		PSIG	PSIG	PSIG	md/cp	
☐Use?	DEPTH	TDEP	FILE	PRAW	PFOR	PHYB	KMOB	
☐	M	M	#	PSIG	PSIG	PSIG	MD	

Special Multi-well functions

If the file contains data from more than one well, make one of the file columns the well name. When you load the file, specify the column that is the well name by setting its Type to "Multi-Well: Well Name"

Set Type ->	Multi-well: Well Name	Test MD	Test TVD
Set Units ->		Feet	Feet
☐Use?	WELL	DEPTH	TDEP
☐	#	M	M
☑	well1	1005	1004.82

PD-Plot 7 will then create as many new project wells as are found by the texts in this column, and add test points to each well

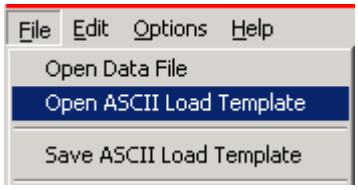
10.2.6.1. Options

Selecting rows to load or ignore

Use the **Use?** Column to set those rows that you do not want to load. Inspect the first few and last few rows to be sure only valid data is loaded.

Saving the column names/units

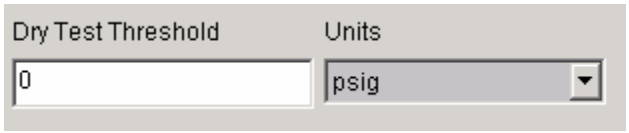
Once the **Type** and **Units** are set, you can save this into a template for later retrieval if you often load files with this column structure. Use the **File** menu , **Open/Save Template** items



to save and retrieve these files.

Dry Test Threshold

You can apply an arbitrary cutoff to automatically assign the test type to Dry Test for tests with a formation pressure below the specified pressure.

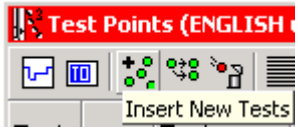


Delimiter options

If the ASCII file does not initially load and fill the columns as you expect, you may be able to improve the loading if you select one of the Delimiter options that you think applies, then re-open the file.

10.2.7. Manual Table Entries

Test point table rows can be manually added using the tool bar on the test point table



Click the **Insert New Tests** button, then enter the number of rows to add. Fill the various columns with the new data. Be sure to enter the MD Depth and Formation pressure at least. IF the project has multi-wells, make sure you set the Well column to the correct well.

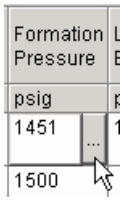
10.3. Adding Quality Indicators

Quality judgments can be made on certain data types in the test point table. These quality indications are done by assigning a 0-10 rating, which is translated to a color spectrum, This color can then be used to fill the plotted data points to give visual indicators of quality. Summary tables can be printed that show how many test points of each quality are available.

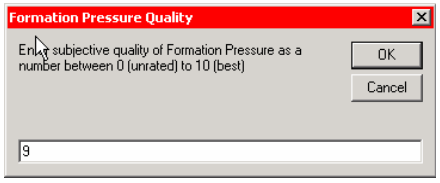
These items have quality indicators

- Formation Pressure
- Drawdown mobility

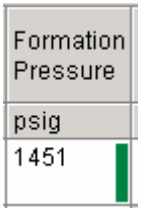
To add or update the quality/color of these data's, first click on the cell containing the data, then click on the extreme right side of that cell. A button appears in the cell.



Click the button then enter the quality number. Click **OK** to accept the change.



The cell is now painted with the color that matches this 0-10 rating.

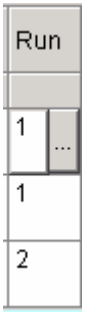


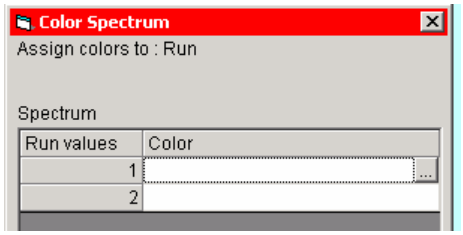
The color spectrum that matches 0-10 values with color can be edited on the Preferences window.

10.4. Frequency Coloring

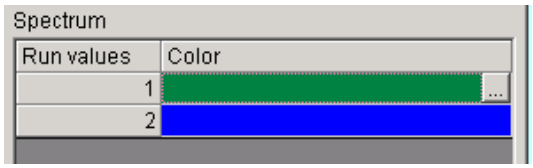
There is another coloring scheme for the **RUN** column and the seven **User Defined** columns. This scheme simple assigns colors to all items with the same value in the column.

When you click the right side of any **Run** column cell, then click the … button, you open a window that has a table of all unique values in all cells of this column





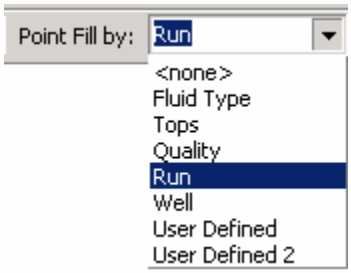
Click the **Color** column cells on this table, and assign colors to each of the **Run Values** (1 and 2 in this case).

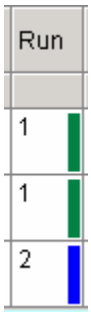


Click **OK** to complete the color assignment.

The colors are then applied to ALL rows of that column.

This color can then be applied to all formation pressure, Last Read Pressure and Drawdown mobility data points through the **Point Fill By…** list on the main tool bar.





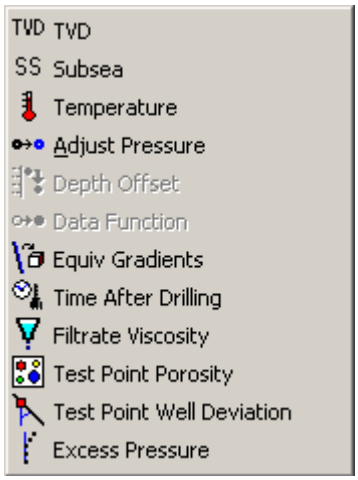
This color sequencing is also applied automatically as you change or add values to the Run column. The default sequence of these colors can be set on the Preferences window.

10.5. Test Point Table Computations

Several columns of the test point table are computed based on changes to other test point table data's or related project data.

Some computations are performed automatically as the related data's are changed, and some are initiated by direct user selections from the Compute menu.

The **Compute** menu is used to initiate certain computations.



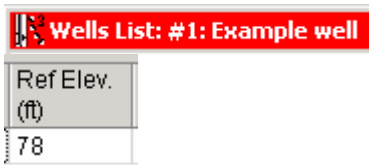
10.5.1. Computations for Depth

10.5.1.1. TVD

True vertical depth column is computed from the measured depth column using the currently entered well survey data for each well in the project. All test point rows are affected.

10.5.1.2. Subsea

The Subsea depth column is computed from the TVD depth column using the well reference elevation for each well in the project.



All test point rows are affected.

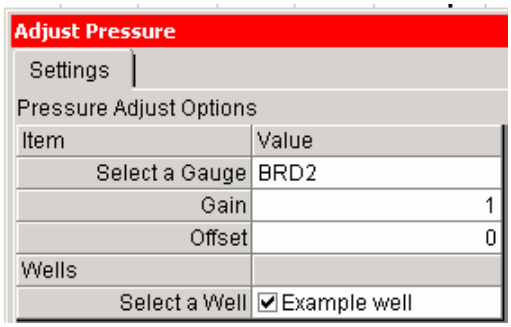
10.5.2. Computations used for data correction

10.5.2.1. Adjust Pressure

This item adjusts the pressure readings on the test point table. This is most commonly used when an error has occurred when loading data where input units were incorrectly assumed.

The user can control which gauges are corrected.

When selected from the Compute menu, this function opens a new window.



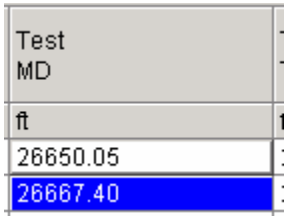
Select the gauge, set the gain and offset (new pressure = origPressure * gain + offset) , select the wells that apply, and click **Apply** button.

Note: for reference, when converting gauge units to absolute units, ADD 14.7 (psi) or 101.3 (kPa) or 1 (Bar).

10.5.2.2. Depth Offset

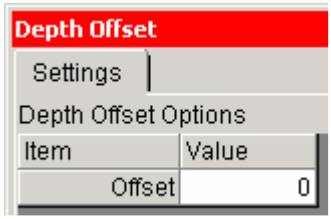
Used to blanket adjust the Measured depth of a selected group of test points.

Note: Affects only selected test points from the **Test MD** column. Drag mouse over cells to be offset, then select **Compute** menu, then select **Depth offset**.



Compute menu

enter **Depth Offset** in Value cell, then click **Apply.**

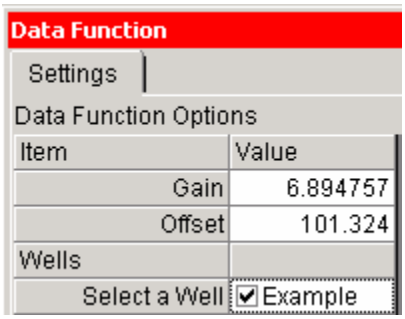


10.5.2.3. Data Function

Used to apply simple gain and offset function to ANY numeric data on the table. Only selected cells are affected.

Select the cells to function, then open Compute menu and select **Data Function**

Enter the **Gain** and O**ffset** and click **Apply** button.



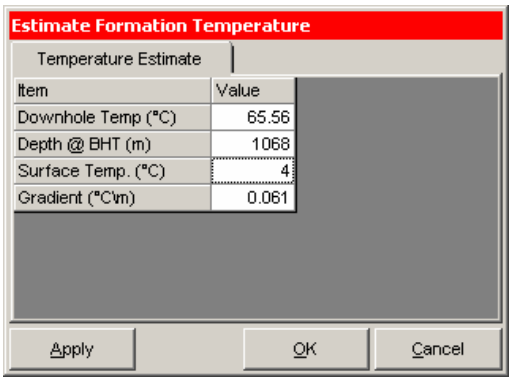
10.5.3. Other computations

10.5.3.1. Compute Temperature Estimate

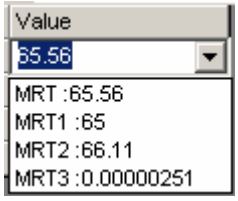
Used to estimate formation temperature at each test point. Uses either a downhole temperature at a depth and an estimated gradient, or via the down temp and a regional average surface temperature.

Select the range of test points that will have the estimated temperatures computed. Open the **Compute** menu, then select **Temperature.**

Enter the **Downhole temperature** and **Depth**. A gradient computed to surface is computed, but you may enter your own.

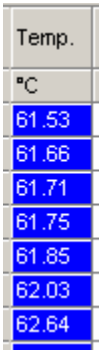


The initial temperature comes from the Max Recorded temperature from the well site data. Additional values may be available on the dropdown list.



If you know the regional average surface temperature, enter that value, and interpolation will be done from this value to the downhole temperature value instead.

Click **Apply** to compute the test point temperatures. The **Temp.** column of the test point table will become visible and be scrolled into view. Review the temperature entries carefully.



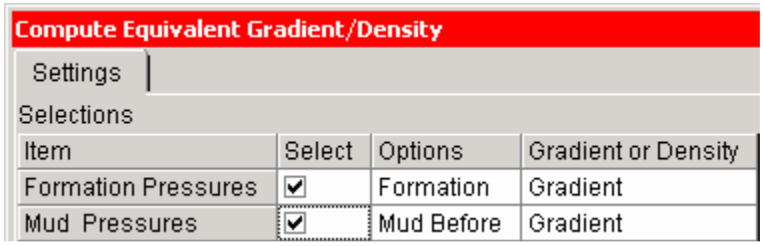
10.5.3.2. Compute Equivalent Gradients

Used to compute an equivalent grading for either or Formation or Mud hydrostatic pressures. Uses the TVD depth and pressure from Formation or Mud (Before or After) to fill either column. Affects all test points.

Equiv. Formation Density
LB/G
13.728

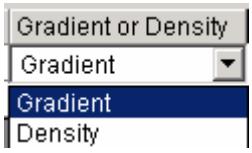
Equiv. Mud Density
lb/gal
14.831

Open the **Compute** menu then select 



Set the check boxes to select which pressure types to use.

Set **the Gradient or Density** column to select the type to compute.



Click the **Apply** button to compute the affected test point tables columns.

10.5.3.3. Compute Time After Drilling

When Time Depth data is loaded, you can compute the time from when the bit first passed (while drilling) each test point depth, to the time the test point was taken.

Note: The Time and Date column for each test point must be filled in for the computation to be accurate.

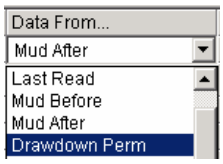
Open the **Compute** menu, then select 

The **Time After Drilling** column is computed for test points that have a valid Time and Date entry.

Time After Drilling	Time & Date
hr	
38.5	28-Mar-2005 00:00:00

10.5.3.4. Filtrate Viscosity

Filtrate viscosity can be estimated from temperature and mud filtrate resistivity using a simple algorithm. This viscosity is used to compute the drawdown Permeability from drawdown Mobility and Spherical Permeability from Spherical Mobility for plotting only.



The well site data must have valid filtrate viscosity and temperature values, and each test point must have a valid temperature column entry.

Well Site Data

Resistivity of Mud Filtrate Sample (RMFS)	1.23
Mud Filtrate Sample Temperature (MFST)	68

Test point temp

Temp.
°F
156.8

Open the **Compute** menu, then select 

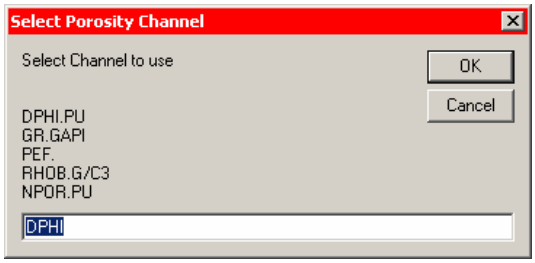
The **Filtrate Viscosity** column is filled in with the estimates.

Temp.	Filtrate Visc.
°F	cp
156.8	0.439

10.5.3.5. Log Curve Value

This function fills either the Porosity or one of the User Defined test point table columns with the value of any selected LAS log curve currently loaded.

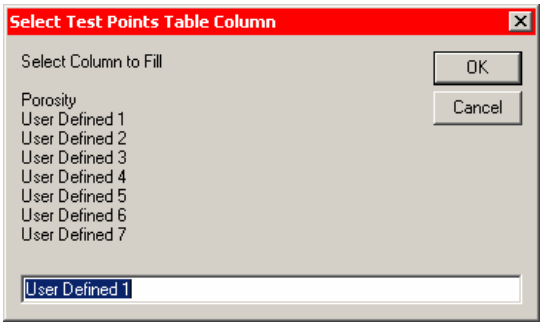
Select the **Test Point Porosity** item from the **Compute** menu



Enter the name of the channel to use. All currently loaded LAS channels are shown.

Click **Ok**

Select the column by name where you want the log channel data to be placed.



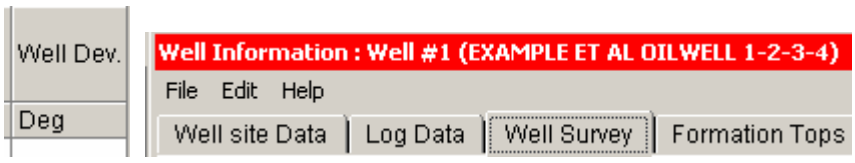
If you select a porosity channel (any channel with units of V/V or PU), the default is Porosity, but you can fill any of the listed columns.

Click **OK**

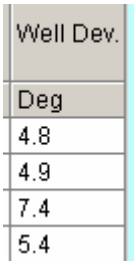
The selected column is filled with LAS log data values at each test depth.

10.5.3.6. Test Point Well Deviation

This function fills the Well Deviation column using the currently loaded Well Survey data for each well/



Select the **Test Point Well Deviation** item from the **Compute** menu. The **Well Deviation** column is filled for all test points.



Note that if no well survey data is entered, the Well Deviation column will be cleared.

10.5.3.7. Excess Pressure

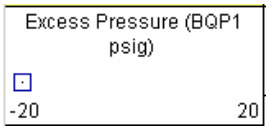
The technique of Excess Pressure is implemented using the method described by Alton Brown (AAPG Bulletin, v. 87, no. 2 (February 2003), pp. 295–311). This techniques is used to highlight the difference between pressure measurements forming potential gradients to clarify data that falls on the same or different gradients.

The concept is create an excess pressure computation using inputs of reference gradient, and reference pressure and depth, then plot this excess pressure as data points for inspection and interpretation.

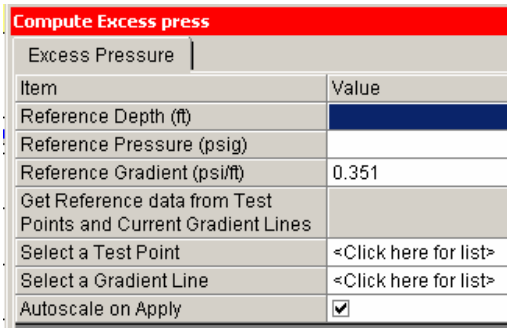
Select **Excess Pressure** from the **Compute** menu

If the current template does not have an item for Excess Pressure, you will asked if you wish to add it.

The Excess Pressure item will default to use square symbol. Change it as required.



The following window opens to allow entry of the necessary parameters.



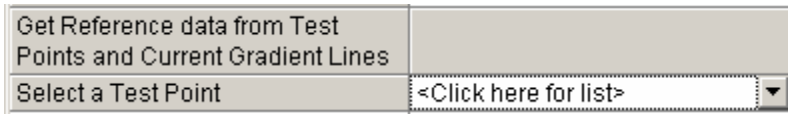
You must enter data for the first three items.

Reference Depth (ft)	3346.38
Reference Pressure (psig)	1454.29
Reference Gradient (psi/ft)	0.3509

Once entry is complete, you may click the Apply button to see the plotted Excess Pressure data. Adjust the reference picks until a suitable answer is obtained.

If you wish to select one of the gradients already computed, or use one of the test points as the reference for depth and pressure, then use the lower part of the table

Select A Test Point



File	Test	TVD(ft)	FP (psig)	Type
41	2	3293.65		Limited draw-down
42	3	3296.6		Limited draw-down
43	4	3323.29	1479.19	Normal Pretest
46	7	3346.38	1454.29	Normal Pretest

Select one of the test points from the list. This fills the Reference Depth and Pressure values with the data from that test point.

Select a Gradient Line

Grad (psi/ft)	Density (g/cc)	Caption
0.070	0.160	0.070 psi/ft (Gas)
0.351	0.809	0.351 psi/ft (Oil)
0.498	1.148	0.498 psi/ft (Water)(222120 ppm)

Select one of the gradient lines from the list. The value fills the Reference Gradient value, and the shallowest test point used in the initial computation of this gradient is used to fill the Reference Depth and Pressure values.

Auto-Scale the Plot

To auto scale the Excess Pressure data when a new reference value is entered, check off the Auto Scale on Apply check box

This will cause the maximum value of excess pressure to be computed and used to form a scaling for the excess pressure data. The center of the scale will always be 0.

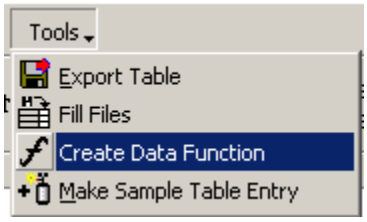
If you wish the scales you have set to remain after a change of reference values, then uncheck the item.

10.5.3.8. Create Data Function - Test Point Table

The user can use any numerical data on the test point table to create a complex function of their own. The result can be used to fill any existing test point table column.

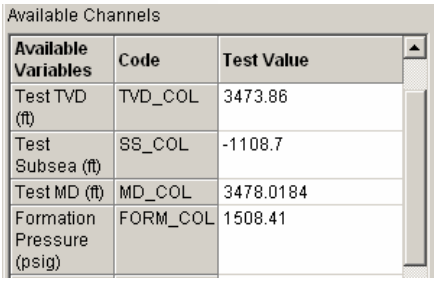
The function can use inputs from more than one column.

To access this function, select the **Tools** menu on the Test Point table window and select **Create Data Function**



The resulting window allows the user to select the channels, select the specific math functions, do tests with example or current data, and to specify the column that will contain the result. Click the Apply button to perform the computation. You can apply the computation to all or just the currently selected group of test point table rows.

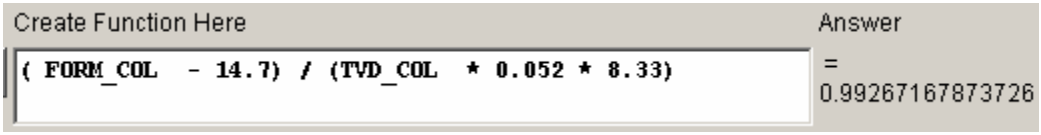
Available channels table



The table on the left contains a list of all channels on the test point table. Only items with numeric data are suitable for use.

The values of each item from current test point table row are shown in the Test Value column. You can use these values to test you function.

Function Entry area



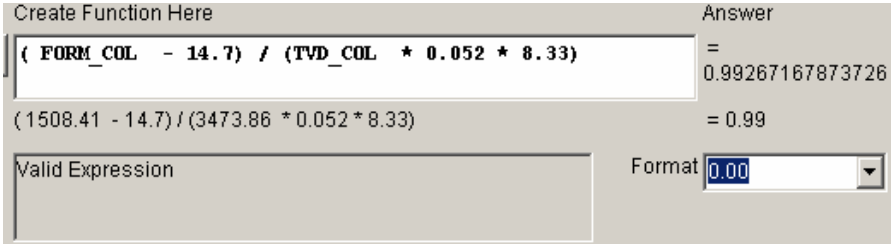
This area is where the function is created. It consists of three types of entries.

1. Place holders for the specific test point table items such as FORM_COL for the formation pressure column
2. Math function operators such as + -, brackets etc.
3. Constant values, such as 14.7 or 0.052.

Entering the formula

The user can type directly into this field but for the portions that select specific test point table items, you can just double click on the Available Channels table on the row of the item you want to add. The code for that item will be added at the cursor insertion point.

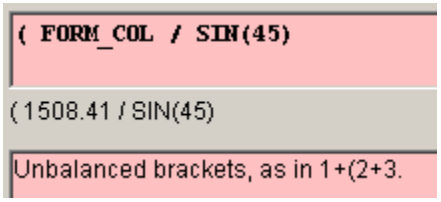
Expression Checking



As you build your formula, two actions are being done each time you edit the field:

Syntax check

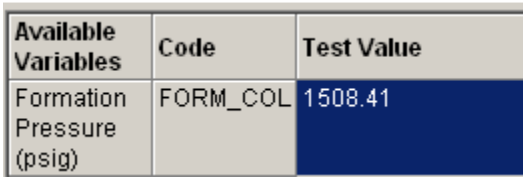
The completeness of the expression, such as matched left and right brackets is constantly checked. If the syntax is bad, the entry field will have a red background, and the information field will try to explain the likely source of the problem.



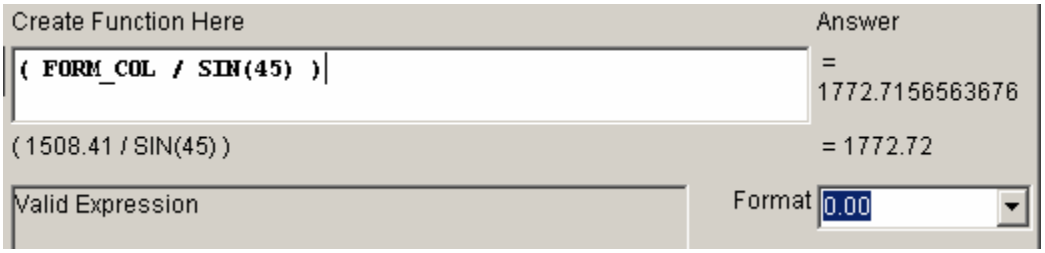
Common math problem, such as division by 0 are also checked.

Evaluation of the formula using the Test Values

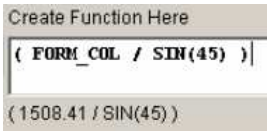
If the test point table items that appear in the expression have test values, then the total expression is evaluated and the result is shown to the right of the table.,



Available Variables	Code	Test Value
Formation Pressure (psig)	FORM_COL	1508.41

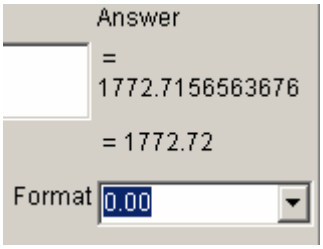


Below the entry field, the expression has the value substituted into the expression at each variable.

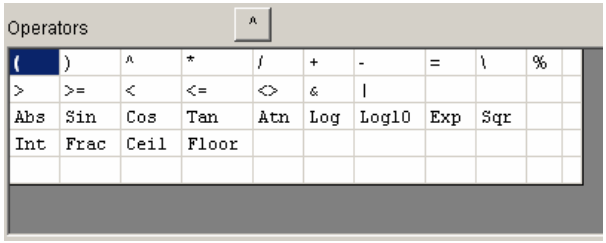


To the right of the table, you see the result.

It is presented as an unformatted and formatted value. Set the number of decimals are required.

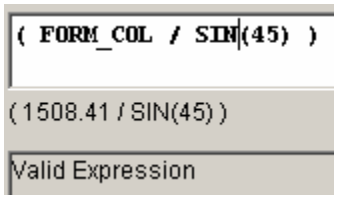


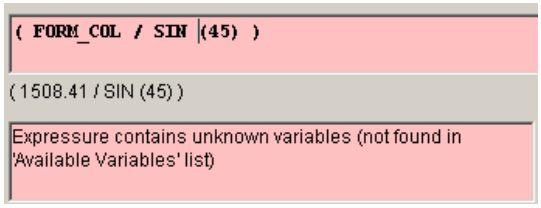
Operators table



The list of available operators is shown below the entry field. Double click any of them to add them to the entry area at the current cursor insertion point. You may also just type them directly.

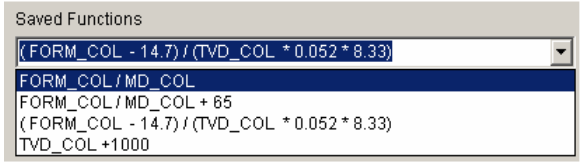
Operators that are functions themselves, (sin, Sqr etc) must be followed with a set of round brackets with the expression to evaluate, with no spaces between the function name and the first bracket, or an error will result.





Logical Functions

Saved Functions list

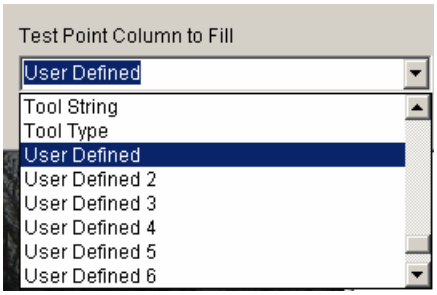


Functions can be saved for later use. When the Apply button is clicked, the user is asked if they want to save the function.

To use a saved function, drop the list down, and select the desired function. You will be asked if you want to replace the current function.

Test point Column to receive computed data

The result of the function will be written to the selected test point table when the **Apply** button in clicked. Specify the target column in the Test Point Column to fill list.



Note that if you select a column that is used in the formula as in input, you will loose the original value of the inputs.

10.5.4. Adding and Deleting Test Point Table Rows/Tests

Adding Test Points Manually

Click the row where the new rows are to be inserted.

Click the **Add Test Points** button on the tool bar 

Enter the number of test point rows to add, and click **OK.** Fill in the test point information for the new tests. At least the Test TVD and Formation Pressure columns must contain data.

Adding Test Points from other data files

See Test Point Data Loading

Deleting Test Points (rows)

Select any white background cell or any range of cells from the rows to be deleted. Click the **Delete Test Point** button  on the tool bar.

10.5.5. Showing/Hiding Test Point Table Rows

Test point table rows can be hidden. Test Points that are on hidden rows do not plot on the plot area. You can hide individual or groups of tests, all tests from one or more project wells, or related test points in many ways.

Show All Rows

If multi-well, check off all check boxes on the Wells List window **Use?** Column, then;

Click **the Show All Tests** tool bar button  .

Hide Selected Rows

Select any cell(s) on the row(s) you wish to hide and click the **Hide Selected Tests** tool bar button 

Show Rows containing selected item/text

Often you want to show only tests with common attributes, such as all “good” tests or all tests using one specific gauge. To do this, click on any cell containing the text you want to use as the identifier, then click **the Show Only Same As** tool bar button  . All rows containing the exact selected text in the same column will be shown, all others will be hidden.

Show test points from certain selected wells

Use the Well’s List **Use?** column check box, and only check those well’s who’s tests you want to see.

10.5.6. Showing/Hiding Test Point Table Columns

Test point table columns can be hidden to show only the columns that are important to you. Once set, the arrangement of the columns can be saved to use later.

Show All Columns

Click on any editable cell in column you want to hide, and Click the **Show All Columns** tool bar button  .

Hide Selected Columns

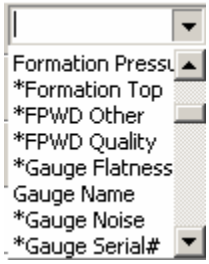
Click on any editable cell(s) in adjacent column(s) you want to hide, then click the **Hide Selected Columns** tool bar button  .

Hide All Empty Columns

To quickly hide all columns that are empty, click the **Hide Empty Columns** tool bar button  .

Show Specific Columns

The user can find or show any column by finding it on a list. Drop down the list on the tool bar. It contains all columns (in alphabetical order). Columns that are currently hiding begin with *.

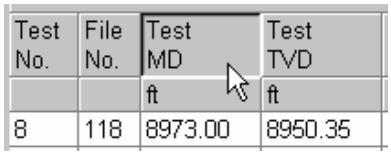


The selected column is found and brought into view on the table. It is made visible if it is currently hiding.

10.5.7. Test Point Table Column Order

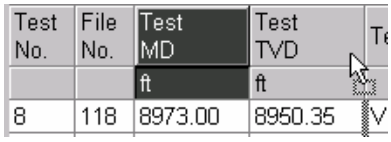
To change the order of the columns on the test point table, simply drag the top fixed (gray background) cells left or right and drop them at the required position.

Hold down the left mouse button on the column header of the column you wish to move. (Releasing the mouse button at this point will cause the column to sort)

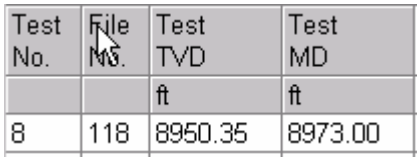


Test No.	File No.	Test MD	Test TVD
		ft	ft
8	118	8973.00	8950.35

Drag the mouse to the left or right. The mouse changes to show you are moving a column as other columns are encountered. Note the dark gray between columns as you move across boundaries that shows you where the column will be positioned if the mouse is released.



When the dark gray bar is where you wish the column to be located, release the mouse button. The column are now moved.

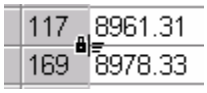


10.5.8. Test Point Table Fixed Columns

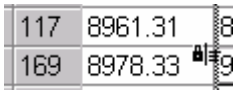
You can set fixed columns that do not scroll. These columns have the dark gray background. These fixed columns also determine which columns appear on all printed pages as well. Typically File No, Test No and Test TVD are the minimum recommended fixed columns.

Changing the Fixed Columns

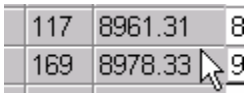
Point to the boundary between the columns that are fixed and non-fixed



A small lock icon appears. Drag the icon left or right to position the boundary as you need. Note the dark gray vertical line showing the boundary location.



Release the mouse button to complete the fixed cell boundary change.



10.5.9. Naming and Using Test Point Table Column Arrangements

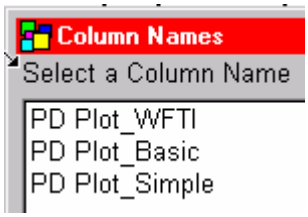
The test point table column order and the visibility of each column can be changed. Often there may be several column arrangements that you need to meet specific needs.

The current settings can be saved and later retrieved to quickly jump from one column arrangement to another.

Saving the current Column Arrangement

Set the column order as needed, and make the columns you need visible.

Click the **Select or Name Columns** tool bar button  . This opens the column naming management window.



The current named column sets are shown. The three shown here are fixed in PD-Plot 7 and cannot be changed or deleted.

Click the **Save As** button, enter a name for the column arrangement and click **OK**.

Using an existing named column arrangement

Click the **Select or Name Columns** tool bar button  . This opens the column naming management window. Select the previously saved column name from the list. Click the **Apply** button or double click the named item on the list.

Deleting a Column Name Set

Select the Column Name you want to delete from the list. Click the **Delete** button.

Renaming a Column Name Set

Select the Column Name you want to rename from the list. Click the **Save As** button, give it a new name, click **OK**. Then delete the old Column name.

10.5.10. Sorting Test Points

The test point table can be sorted by any single column in either ascending or descending order.

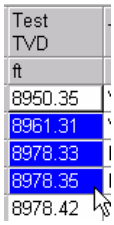
Sorting entire columns

Click either of the top two gray background fixed rows at the top of any column. Each successive click will sort the entire table first in ascending order, then descending order.

Note: If you drag the mouse left or right while you hold down the left mouse button, you may initiate column moving. Simply release the mouse button, and click again without moving it left or right.

Sorting selected rows

You may sort only selected rows of the table. Drag the mouse over the selected rows of the column to be sorted to select them.



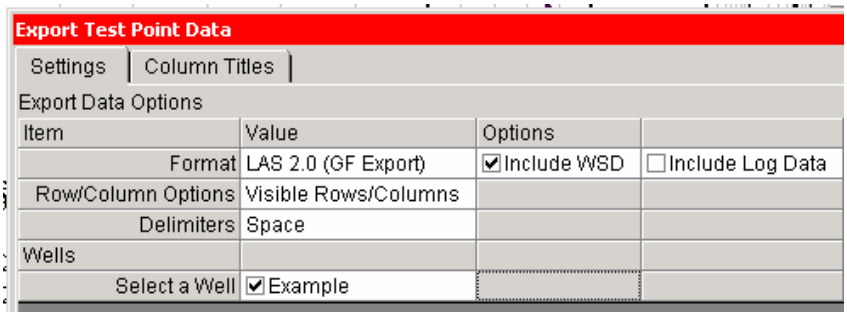
Then click the top fixed row cell to sort the table. Answer the question about sorting just this selection or the entire column.

If the sort order was incorrect, immediately click the top fixed row cell again (without changing the selection) to sort the selection in the other order.

10.5.11. Exporting Test Point Table Data

The test point table data can be exported to a delimited ASCII file for import to other software.

Click the **Export** button on the tool bar  or select the File menu, then Export ASCII.



Set the options as required and click the **Apply** button. Specify a filename (try to keep the suggested extensions) and click **Save**.

Export Options

Export Options	Choices

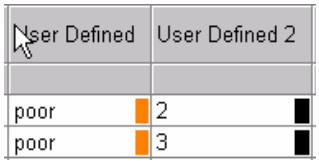
Format	LAS 2.0 (GF Export) LAS 3.0 LAS 2.0 (GF Export) Plain ASCII PAS
Rows/Column Options	Visible Rows/Columns or All Rows/Columns.
Delimiters	Comma Tab or Space. Use Tab or Comma if file is going to be loaded into Excel. Space is most common for LAS.
Include WSD	Switch to include Well Site Data in LAS 3.0 format in ~Parameter section
Include Log Data	Switch to include LAS log data. Applies to LAS 3.0 only
Select a Well	If project has more than one well, you may select which wells test point data will be written to the file. (WSD and Log Data as well if options set for LAS 3.0)

10.5.12. User Defined Columns

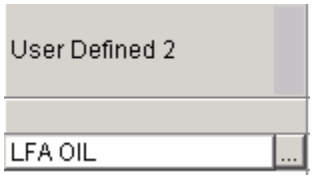
Seven columns of the test point table are available for user defined data. Any data such as numbers or text can be entered.

Data in any of these columns can be plotted on the log display (for numerical data only) as separate data symbols.

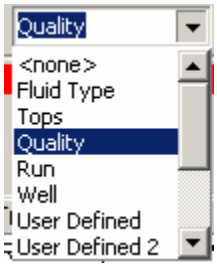
Spectrum colors (if used) can be set to fill the plotted points.



Click the right edge of the cell, then the  button, then set the color from the spectrum window.



Set the **Point Fill by** list on tool bar to the user defined type as required to fill the plotted points with color.

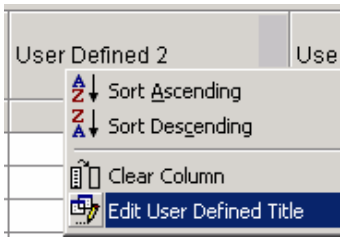


See **Editing Log Presentation** to determine how to plot user defined data.

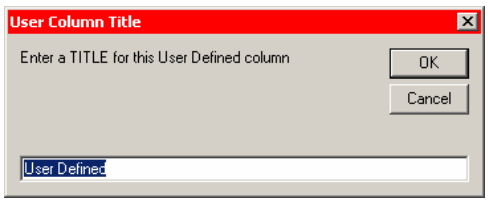
Setting User Defined Column Names

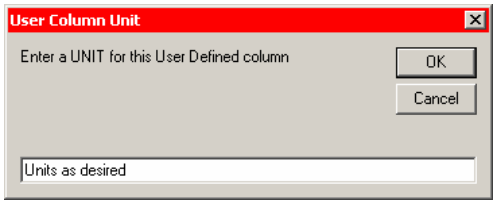
The user defined columns can have custom names and units applied to properly label them for identification and plotting.

Right click on the gray title cells existing name. Select **Edit User Defined Title**.



Enter the new title, then the units if desired.





Once the new title is displayed on the test point table, the User defined columns can be identified by the dark grey shading band on the right edge of the title cell.

10.5.13. Setting Color Spectrums

Several Columns can have its data “rated” by assigning a color spectrum based on purely arbitrary rules or by assigning unique colors to unique groupings of data.

This color marker is then shown used when printing the test point table to indicate your rating or to highlight important features. The coloring can also be selected as the fill color for most plotted data points.

The following Test Point data items have Color Spectrum availability

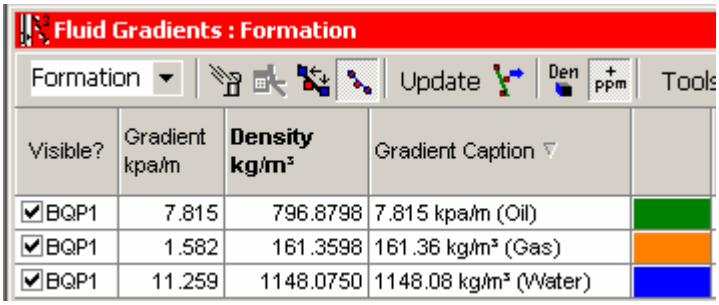
- **Formation Pressure**
- **Drawdown Mobility**
- **Run**
- **User Defined 1 through 7**

See Color spectrum for more details

11. Fluid Gradients Table

11.1. Over view

As gradient lines are fitted to formation, last read pressure, mud before or mud after pressures, the details of these gradient lines are recorded on the Fluid Gradient Table.



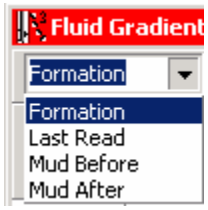
Editing of the slope, captions, or appearance is handled from this table.

11.2. Available Data Columns

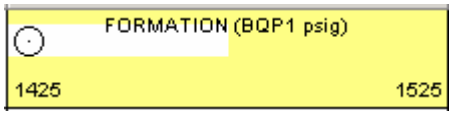
Column	Function
Visible?	Determines if this line is visible
Gradient	Gradient of line
Density	Equivalent Density computed from Gradient.
Color	Color used to draw the gradient line
Gradient Caption	The caption that appears with the line
Contact Depth	The depth of the contact this gradient line forms with another.
Contact Caption	The caption that appears with the contact line
Show Contact?	Determines if the contact line is drawn.
Top	The top depth of the line
Base or Contact Depth	The base or contact line depth of this line
Caption Location	The location of the gradient caption on the line, one of six possible.
R^2	The best fit line quality factor
STD	The standard deviation of the fit.
Comment	A user comment for this line.
Gradient Error	The Gradient error statistics including gradient +/- range.

11.3. Working with the Fluid Gradient table

Only one type of gradient line is visible on the table at one time. The pull down list on the tool bar shows the type that is current.



Change the type by making a selection from the list, or click on the insert of any plotted PRESSURE item. (yellow = current data type) Formation, Last Read, Mud Before or Mud After.



11.3.1. Gradient Table Tool bar

See Gradient Lines tool bar description for more details

11.3.2. Arrange Gradient Lines Table Columns

The columns of the Gradient Lines table can be ordered and shown or hidden to contain only the data items are important to you, or to customize the printed table for specific users.

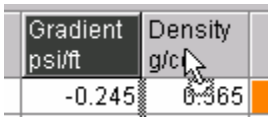
Once set to your needs, the arrangement can be named and saved for later retrieval.

The printed Gradient Lines tables is an exact reflection of the current configuration of the screen table. The various named table configurations are also available to choose from when printing.

11.3.3. Moving Columns

The columns are moved left or right by dragging the header cells of any column. Hold down the left mouse button on any gray title cell, and drag the column to the new

position. A gray bar between columns shows the destination of the column if it were then dropped.



11.3.4. Showing and Hiding Columns

Click the **Show All Columns** button to show all available columns.  .

Select any cell(s) on the columns you want to hide, the click **the Hide Selected** columns button  .

11.3.5. Saving Gradient Table Configurations

After the table is arranged with the column order and appearance you need, save the configuration by clicking the **Name Column Configuration button**  .

A window opens showing previously saved configurations. Click the **Save As** button, enter a new name, and click **OK**. Your new configuration appears on the list. Click **OK** to close the window.

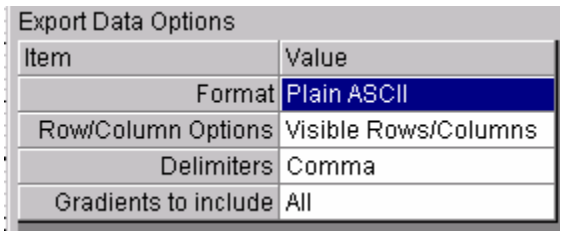
11.3.6. Applying Previously saved Named Configurations

Click the **Name Column Configuration button**  . Select the named configuration from the list, and click **Apply**.

11.3.7. Exporting Gradient Lines Table to ASCII Files

Click the **Export ASCII** button on the Gradient Lines table tool bar  .

From the window that opens set the options are needed.



You have control of the file format, which columns and rows to include, file delimiter and Gradient types to include.

Click **Apply** to save the ASCII file. Give the file a name and click **SAVE**. Try not to change the file extension if possible.

11.3.8. Gradient Line Caption Option

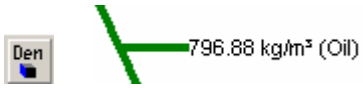
As gradient lines are fitted to test point data, a caption is created. The text used depends on several settings.

Note. To update captions if changes are made to the gradient caption options, select the rows of the table that you wish to update, then click the **Update** button.

11.3.8.1. Gradient or Density

The option of whether to use the Gradient or Density values is controlled with the **Density/Gradient** tool bar option button.

When up, new gradient line caption will display Density text.

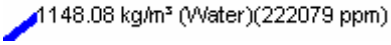


when depressed, new gradient line captions will display Gradient text

11.3.8.2. Water Gradients: Adding Salinity

One additional option relates to gradient lines determined to be water. You may add the equivalent Salinity value to the text. Click on this toolbar button, 

, then create a new gradient line in a water zone.



the gradient text will contain the equivalent salinity at the pressure and temperature of the shallowest test point in the line fit interval. Note, the test points must have temperature data entered in the test point table.

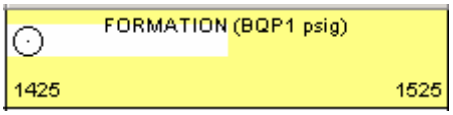
11.3.8.3. Fluid Type

The fluid type word (Oil, Gas, Water)

is determined by the current entries in the Gradients Range table. See that section for further details of usage of this feature.

11.3.9. Selecting Visible Pressure Types

]The Gradient Lines table only shows one of the four types of gradient lines. The set that is currently visible is controlled by either the currently selected pressure data type on the plot area, or by the list on the Gradient Lines table tool bar.

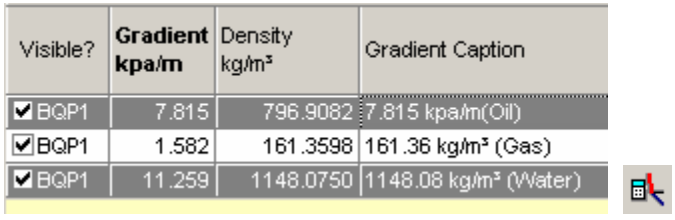


11.3.10. Computing Contact Depths.

To compute the intersection depth between two gradient lines, select those two lines from the gradient table, then click the **Compute Contact** tool bar button.

Note that this button is only enabled when exactly two rows of the table are properly selected.

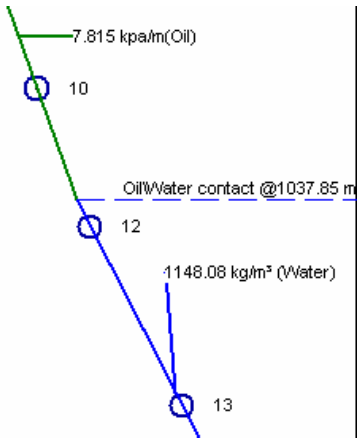
Hold down the **Ctrl** key and click on any cells of the two rows you wish to choose. When properly selected, both rows will have a dark grey background, and the Compute Contact button will be enabled.



Visible?	**Gradient kpa/m**	Density kg/m³	Gradient Caption
☑ BQP1	7.815	796.9082	7.815 kpa/m(Oil)
☑ BQP1	1.582	161.3598	161.36 kg/m³ (Gas)
☑ BQP1	11.259	1148.0750	1148.08 kg/m³ (Water)

Click the button to compute the contact depth.

The contact depth is indicated on the plot by a horizontal dashed line with a caption that indicates the depth, and the fluid types of the two lines used in the computation.



This information is added to the gradients table in these three columns.

	Contact Depth m	Contact Caption	Show Contact?
		Gas\Oil contact @3347.15 ft	☐
	1000.22		☐
	1037.85	Oil\Water contact @1037.85 m	☑

Note that the contact line belongs to or just another set of properties of the deeper of the two selected gradient lines.

This allows you to enter the contact depth you wish to use and show the contact line with any caption you choose.

12. Wells List Window

12.1. Overview

The wells list window contains the critical details for each well in the project.

12.2. Available Data Columns

#	Symbol	Well Color	Well Name	Ref Elev. (m)	Symbol Size	Symbol Thickness	UTM X	UTM Y
1	⊙		EXAMPLE #1	685.12	1.2	Medium	325476.2	1234.56

Column	Function
Use?	Determines if the test point table rows belonging to this well are showing or hiding which controls whether the test points plot or not.
Symbol	The shape of the symbols used the test points belonging to this well.
Well Color	The color used to fill the test points belonging to this well (**Point Fill By** list on tool bar must be set to "Well")
Well Name	The name of the well. All data files added to the project are checked against this well name.
Reference Elevation	The elevation above Sea Level of the reference point on well or rig where the pressure gauge on the logging tool is set to 0 depth. Used to compute the Sub sea depth column. Usually this is Kelly Bushing elevation. Sub sea = Ref. Elev. – TVD depth. Well site data ELZ parameter (elevation log zero)
Symbol Size	The diameter of the symbol used for test points belonging to this well
Symbol Thickness	The thickness of the line used to outline the symbols of test points belonging to this well.
X UTM	X location
Y UTM	Y location

12.3. Working With the Wells List window

12.3.1. Tool bar

The tool bar on the Wells list window controls important functions on this window.

 Add a well

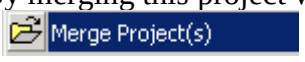
 Delete a well

 Export the table to an ASCII file

12.3.2. Adding a Well to the project

To manually add a well to the project, click the **Add a Well**  button on the tool bar

Fill in the properties for the new well on the table. Well name and reference elevation are critical.

Wells may be added to the project by merging this project with another project. Select the **File** menu, then **Merge Projects.** 

Find the PD-Plot 7 project file you need. When loaded, all wells in the merged project are added to the current project as NEW wells.

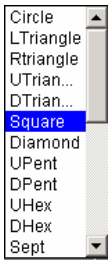
12.3.3. Deleting a well from the project

To delete a well to the project, click the **Delete Well**  button on the tool bar. All currently selected rows on the wells list table are removed, including the test point data from the test point table that is associated with that well.

12.3.4. Well symbol appearance

The default symbol used for Formation pressure and Drawdown mobility data points on the pressure vs. Depth plot is set on the Wells list table 

. To change it, click the cell, then select the new shape from the list.



The color, size and line thickness of the symbol are set with the corresponding table entries.

Well Color	Symbol Size	Symbol Thickness
	1.2	Medium

12.3.5. Map view for Multi-well Projects

If the project contains more than one well, then a new set of Tabs appears. The **Wells** tab shows the same information as for a single well project, but there is also a Map tab.

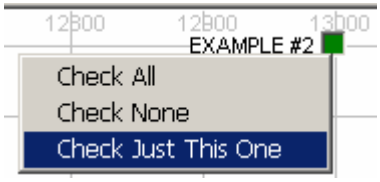
Wells | Map

#	Use?	Symbol	Well Color	Well Name	Ref Elev. (m)	Symbol Size	Symbol Thickness	UTM X	UTM Y
1	☑			EXAMPLE #1	465	1.2	Medium	12500	2000
2	☑			EXAMPLE #2	435	1.2	Medium	13000	3000

If the X and Y values are entered in the Wells list table, then the Map tab plot will contain a simple plan view plot of the wells.

These plotted symbols can be used to select which wells are turned on and off in the same way you use the **Use?** column on the Well tab.

Right click on any well symbol, and select to use **All, None**, **or Just This One** selected.



Well symbols on the map view that are turned "off" now plot as simpler uncolored symbols and the well name indicate that the well is "off".

The Wells table **Use?** column reflects this same information.

#	Use?	Symbol	Well Color	Well Name
1	☐	○		EXAMPLE #1
2	☑	◁		EXAMPLE #2

13. Pressure vs. Depth Templates

13.1. Pressure vs. Depth Display Template Window

The Display Template editing window contains the specifications that control the plotting area and the type and appearance of the data that is presented on the main Pressure vs. Depth display.

The plot is divided into Tracks. Each track can contain one or more of the available plotting data items (pressure, mobility, log traces, etc).

Each plotting item has properties that determine how it appears. Scaling, color, etc are generally controlled on this window. Some formatting is controlled by other program options, such as the color that fills pressure data points.

Access the window by clicking the **Open Display Template** tool bar button  or by selecting this same item from the **Tools** menu.

13.1.1. Plotting Data Items Table

This table sets and controls the individual data items that plot in each track.

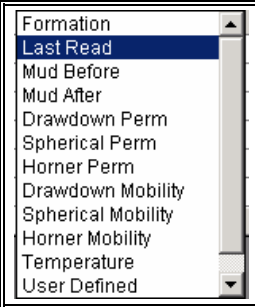
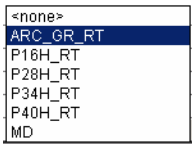
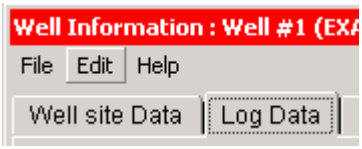
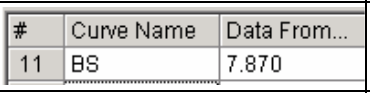
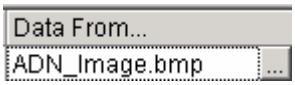
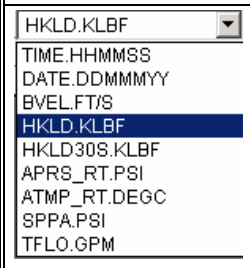
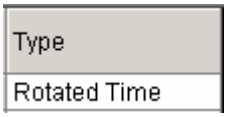
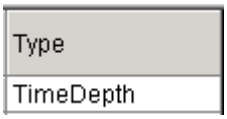
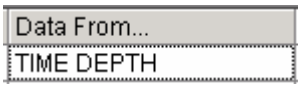
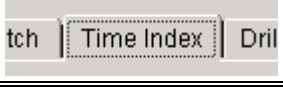
The table contains these columns.

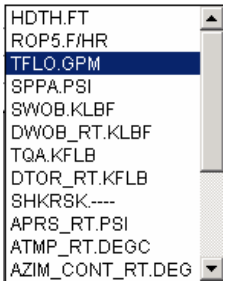
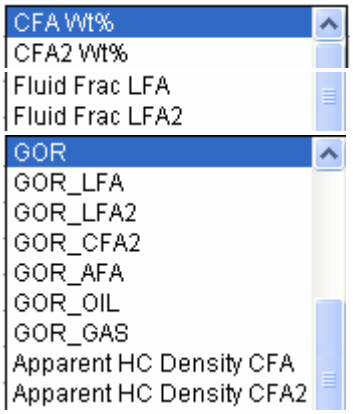
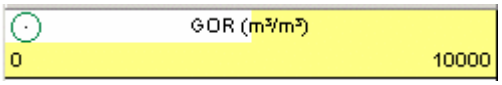
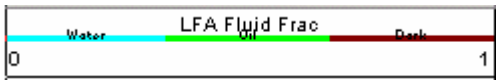
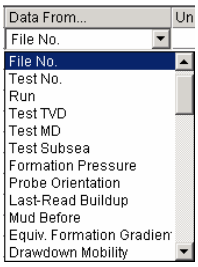
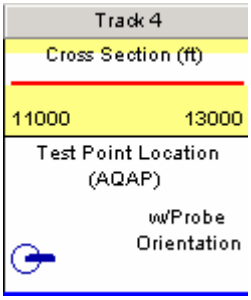
Plottable Data Items

#	Curve Name	Data From...	Units	Track	Left Scale	Right Scale	Symbol	Thick	Color	WRAP mode	Source	Visible

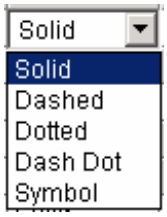
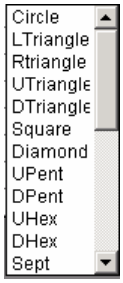
The **Source** and **Data From…** columns are linked. Here is a full description of all options for each .

Data From	Source

	**Source = All Gauges or MDT-<Gauge>:** All Test point data related to the pressure interpretation . Pressures, motilities, and temperatures.
	**Source = LAS**: All loaded LAS channels. Loaded from Well information, Log Data tab 
	**Source = Constant**: Enter a numerical value in **Data From…** column to plot a constant value (such as bit size) as a continuous vertical line in a track.
	**Source = Graphic**: File name of raster image in project folder. Left and Right Scales become Top and bottom depth over which graphic will be stretched. **Note**: Must be placed in Track with **Type = Graphic**.
	**Source** = **TimeIndex** Time Index LAS data, such as that acquired with LWD logging tools. Data loaded on Well Information, Time index tab.  Time Index data must be plotted in a track of **Type = Rotated Time**  These track will appear below a **TimeDepth** track, using the horizontal time axis as the common axis with this Time index data. One such TimeDepth track must then also be present. 
	**Source** = **TimeDepth** Specific D&M LWD Time/Depth format file that records drilling history. Loaded on Well Information, Time index tab. 

	**Source** = **Drilling** Specific depth indexed drilling data such as penetration rate, circulation rate, etc. Also LWD logging tool depth index data (resistivity, porosity etc) is displayed with this source.
	**Source** = **LFA/CFA** Special plots of CFA and LFA fluid and gas property interpretation. Some datas are discrete values, such as GOR, some data represent a spectrum of values such as Wt% from CFA or Fluid Fraction from LFA Data From = GOR: Plots a point at stored GOR value  Data From = CFA Wt%  Data From = LFA Fluid Frac 
	**Source** = **Test Point Table** Any generic numeric data from any column on the test point table can be plotted. Do not use for Formation pressure, mobility etc type data intended for the Source = MDT or All Gauges. None of the gradient fit and related functions will not be available.
	**Source = Inclinometry**: Plots the cross section of the well path defined on Well information Well Survey table. Right and left scales are right and left horizontal distance (in length units, usually ft or meters) on the current projection plane. The location of Test points are plotted on the well path. If Probe Orientation is available on the test point table, it plots as a tadpole.(0 = vertical, 90 = right)

The remaining columns are described here

Column	Function
Curve Name	The name that will appear above the log plot in the insert.
Units	The units of the data for display. Note that test point data such as pressure/perm/temp units are controlled by the project units. User Defined column units are taken from your test point table settings. Other data type units may also be determined by the project units.
Track	The track where this data item will appear. Must match one of the Track table rows.
Left and Right Scale	The data scale at the left and right edge of the track where this data item appear.s **Source = Graphic** Top Depth (left) and Bottom Depth (right) **Source = Inclinometry** Horizontal distance to the left on the well path projection plane **Source = Time Depth** Scale are Date and Time span Left Scale: 13-Dec-2000 23:17:41 / Right Scale: 18-Dec-2000 20:04:21
Symbol	For data types that plotted as continuous traces, line style choices are given.  For data types that are symbols, symbol shape choices are given 
Thickness	The thickness of data traces or well path trace. Available only for Source = LAS or Inclinometry. For symbols, the thickness of the outer boundary line.
Color	The color of the data trace or symbol
Wrap Mode	Set the way Log data traces behave when the trace goes off scale. **Source = LAS** only.
Visible	Options to control the visibility of the plotted data and the insert for that data. Options are: **Visible** – both data and insert are visible. **Hidden** – neither data and insert are visible. **Log Only** – Only data is visible

	Insert Only – Only Insert is visible

13.1.2. Track Definitions Table

This table sets and controls the dimensions and vertical grid properties of the Pressure vs depth plot.

Column	Function
Track	The track number or name. Each plotted data item references this name to determine which track it appears in.
Start (in) and Width (in)	The track left and right location in inches on the page.
Vertical Divisions	The number of vertical divisions evenly spaced across the track width (if logarithmic column is un-checked)
Depth track?	Determines if this track will have depth numbers displayed. Turns off all Vertical divisions if checked.
Aux. Depth numbers	Determines if auxiliary depth numbers (in TVD or SS or MD) are added below each main depth number in this depth track. Set type from dropdown list.
Logarithmic?	Determines if the gridding is logarithmic. If checked, Vertical divisions is ignored.
Decade Start At	If Logarithmic? column is checked, determines which of the 9 log divisions to start with at the left edge
# of Decades	If Logarithmic? column is checked, determines the number of decades for the track. See Track Table Details
Type	Determines the layout and type of data expected to be drawn in this track. See details below for special Rotated tracks.
Well	For multi-well projects, this column can be set to indicate that only data from a specific well be plotted here. This affects LAS log data and Formation tops.

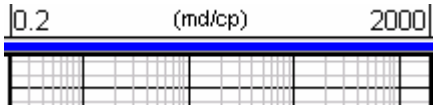
13.1.3. Scaling Logarithmic Tracks

Tracks specified to contain logarithmic grid must be carefully handled. Any data that will plot in such a track must have scales that match the grid of the track.

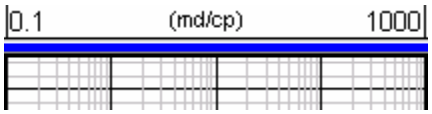
The logarithmic grid uses two parameters, a starting grid line value and the number of decades to specify how the track divisions are drawn. Each data channel appearing in this track must have “matching” scales.

If the starting grid line is set to “2”, then all data in this track must have a left scale that is a decade of 2, or 0.02, 0.2, 2.0 etc.

The right scale value is determined by the number of decades specified for the track. Take the left scale value time 10 raised to the power of the number of decades. (A good trick is to simply move the decimal on the left scale value to the right by the “no. of decades” places.)



For a decade start of 1 and # of decades set to 4, valid scales would be 0.1 to 1000, 0.01 to 100, 10 to 100000, etc



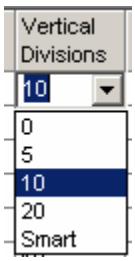
Example Track Grid Specifications and “good” data scales.

Track Starting Grid line	No. Of Decades in Track	Valid Data Left Scale	Valid Data Right Scale
2	4	0.2	2000 (= 0.2 x 10^4)
1	3	0.01	10 (= 0.01 x 10^3)
1	6	1.0	1000000 (= 1.0 x 10^6)

13.1.4. Vertical Divisions Column

This column value affects the number of vertical divisions in each track. When the track is designated as Logarithmic, this value is meaningless. It is also ignored for Depth Tracks.

Enter the number of evenly spaced division in the cell, or select from common defaults from the dropdown list

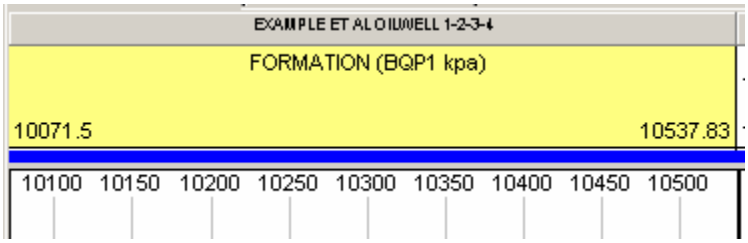


13.1.4.1. "Smart" Vertical Divisions

The Smart selection is specifically designed for tracks displaying PRESSURE data types (formation, Last Read, Mud before and after)

When selected, the vertical divisions are located at even well-rounded intervals rather than at arbitrary locations to evenly grid the track.

As well, pressure scale values are placed at the top of the track centered on each smart vertical grid line to clearly label these tracks.

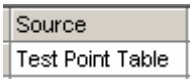


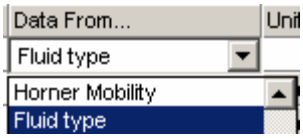
Notice that even though the scales are "rough" the vertical divisions are placed at rounded logical 50 kPa divisions.

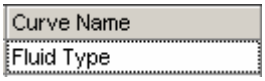
13.1.5. Test Point Table Data – Fluid Type

There is a special plotting function that allows the fluid type interpreted for any test point to be graphically plotted verses depth.

Create a new row on the Plotting data Item table.

Set the Source to Test Point Table 

Set the Data From to "Fluid Type" 

Set the Curve Name to "Fluid Type" 

Set the track to any existing track, but may be best to create a new track for this to plot in.

The scaling is ignored.

The Fluid Type in the Test point table for each test is filled for you as you create new Gradient lines. All test points in the selected interval are assigned the fluid name when

the line is created. The Gradient Range definition in effect at the time is used to determine the correct name of the fluid.

Test MD	Fluid type	Formation Pressure
m		kPa
1004.00		
1004.90		
1013.10		10300
1007.10		
1010.10		10111.12
1020.20	Gas	10128.32
1024.30	Oil	10157
1015.10		10281.42
1002.10	Gas	10100
1032.30	Oil	10218
1035.90		
1040.00	Water	10281.42
1050.00	Water	10391.02
1060.10	Water	10501.42

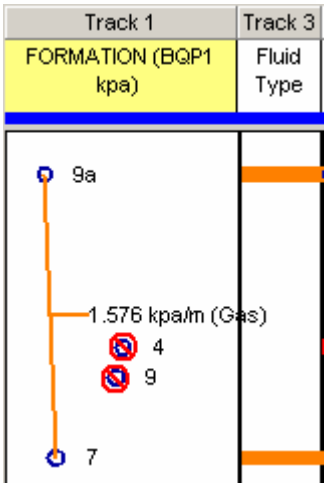
You can manually set the fluid type at any time. Click a cell, then select from the list, or type in the fluid name of your choice

Note. The fluid names used must exist in the current Gradient Range definition to be used in this plotting function.

Current Gradient Ranges

#	From this gradient (kpa/m)	To (kpa/m)	Fluid type will be identified as:	With this color
	0.000	2.500	Gas	
	2.500	9.980	Oil	
	9.980	12.500	Water	
	12.500	15.000	Mud	
	15.000	and higher	Invalid	

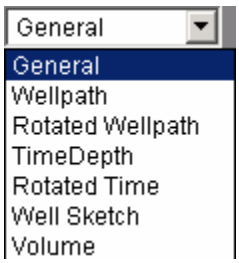
When the plot is redrawn, you will see color bars plotted across the track where the **Fluid Type** data item is placed. The colors are determined from the current Gradient Range Definition for the various fluid names.



There is one color bar for each test point. There need not be a gradient line present to show the fluid type color bars.

13.1.6. Track Table - Types Column

The **type** of track is used to help guide the correct usage for special data types. Most common data are plotted in Type = General

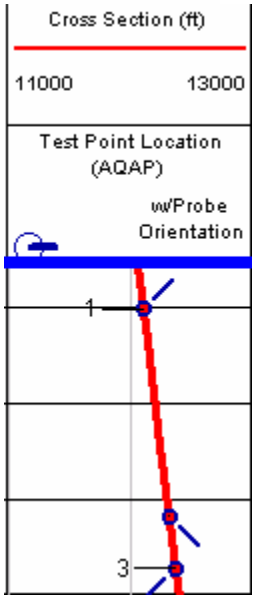


13.1.6.1. General

Plots all common pressure related test point data, LAS log data, Drilling data (depth index), Constants, Graphics, LFA/CFA, and generic Test point table items.

13.1.6.2. Well Path

Designed for Cross section plot of well path with plotted test points on the well path.

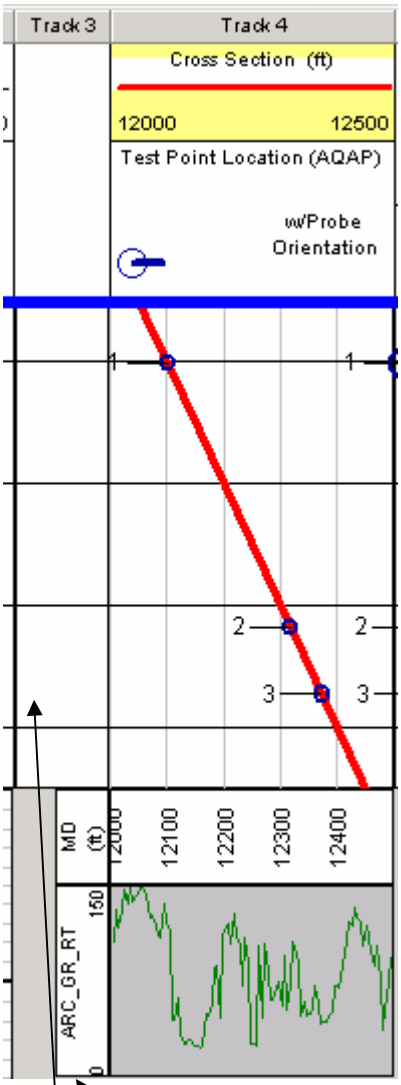


Scales are of the cross section distance from surface location along current projection axis. Projection axis is set on Well Information window, well survey tab.

13.1.6.3. Rotated Well Path tracks

This special track is used to plot drilling and log data horizontally beneath a Well Path track. There can be only one Well Path track, but there can be multiple **Rotated WellPath** tracks, all of which will appear below the Well Path track.

These two track types share the horizontal departure distance axis. The measured depth of the log or drilling data plotted in the **Rotated WellPath** track is converted to departure distance and plotted. This is especially effective in horizontal wells!



Standard Well Path track showing deviated well path cross section

Rotated Well Path track used as a Depth track

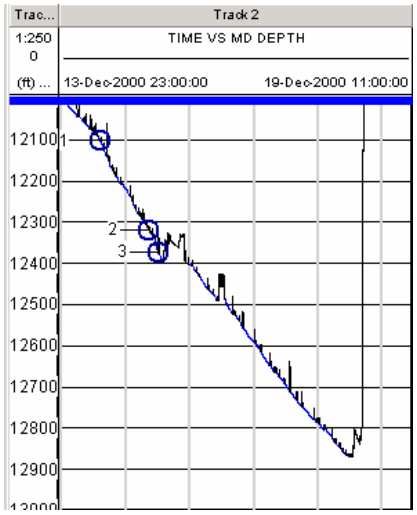
Rotated Well Path track used to plot depth index data trace.

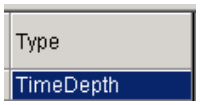
Notice Track 3 used as a buffer to give room for inserts of the two rotated tracks. Additional width for "track 3" may be needed if more than one item is plotted.

The track width specified on the Track table is now really track height for Rotated Well Path tracks.

13.1.6.4. Time Depth Tracks

Time Depth tracks display the special drilling history TimeDepth data. This data is loaded on the Well information, Time Index tab. Only one such track per template is required.

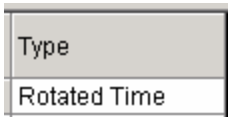




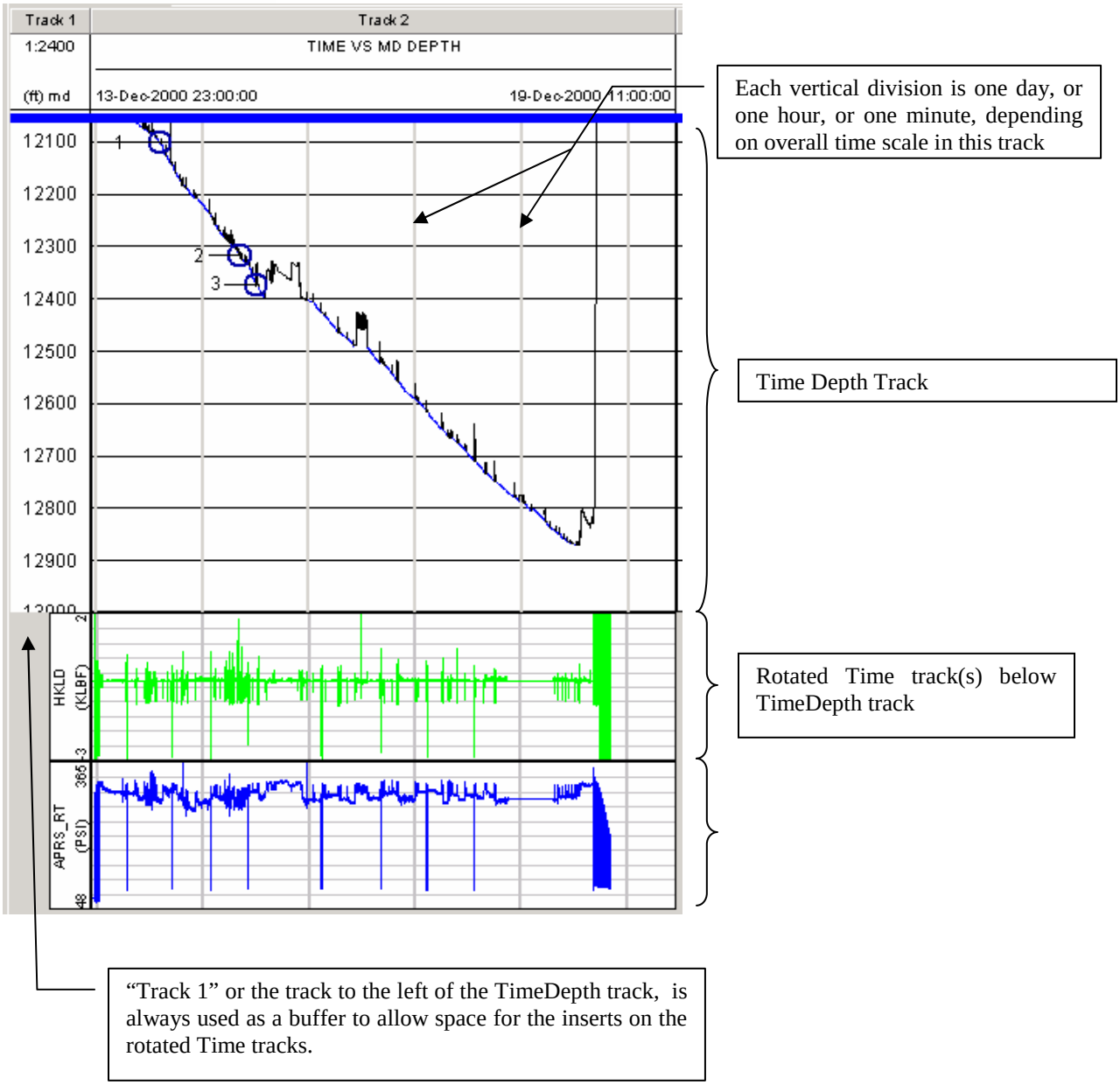
The scaling uses Date and Time formats, the depth is plotted in the current depth projection, MD, TVD or Subsea.

13.1.6.5. Rotated Time Tracks

To plot LWD or Drilling related data that is Time indexed, a special track can be placed beneath an existing TimeDepth track called a **Rotated Time** track. They share the horizontal Time axis.

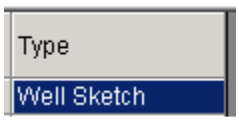


These tracks appear across the entire width of and below a single (required) TimeDepth track. Any number of Rotate Time tracks can be specified, each stacks below the previous.

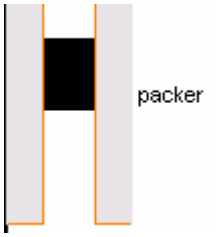


Any number of data items can be plotted in each Rotate Time track, but there must be sufficiently wide buffer track to the left of the TimeDepth track to accommodate the inserts for each item in the rotated tracks.

13.1.6.6. Well Sketch

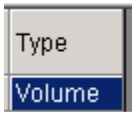


Causes the well sketch components entered on the Well Information window Well Sketch table to be drawn in this track.



When a well sketch the drawing of it should appear in a track by itself. Do not use the well sketch track for any other type of data (most will not plot).

13.1.6.7. Volume Track



A special Volume track is defined to assist in creating ELAN volume displays. Each LAS data channel specified in the track is added to the previous channels value to create the plotted value for each channel.

Plottable Data Items

#	Curve N	Data From	Units	Track
8	VILL	VILL	V/V	Track 7
9	VXBW	VXBW	V/V	Track 7
10	VCOA	VCOA	V/V	Track 7
11	VQUA	VQUA	V/V	Track 7
12	VSID	VSID	V/V	Track 7
13	PHIE	PIGN	V/V	Track 7

Area fills are then set up to shade between each to produce the ELAN pattern.

Area Fills

	Area Fill from	To (lesser)	Color	Pattern	Label
	10.0	VILL // track 7		Clay Medium	Illite
	VILL // track 7	VXBW // track 7		Checker Course	Bound Water
	VXBW // track	VCOA // track 7		<None>	Coal
	VCOA // track	VQUA // track 7		Sand Medium	Quartz
	VQUA // track	VSID // track 7		Heavy Mineral Extra Course	Heavy Mineral
	VSID // track 7	PIGN / PHIE / track 7		<None>	1.0 --------- PHIE---------0.0

There is perhaps an easier alternative to this technique. Convert the ELAN PDS file to TIF, then use the BlueView program to segment out the ELAN volume track to create a new image file, saved in BMP or JPG.

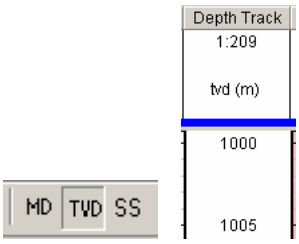
Define a new plotting data item that is source = “Graphic’ and specify to use that bmp file just saved. Scale it to the depth interval of the bmp image. Place it in the track of your choice.

Plottable Data Items

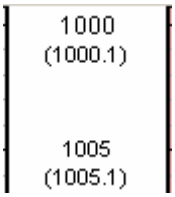
#	Curve Name	Data From...	Units	Track	Left Scale	Right Scale	Symbol	Thick	Color	WRAP mode	Source	Visible
8	ELAN	elan.bmp		Track 1	3400	3500					Graphic	Visible

13.1.7. Auxiliary Depth numbers

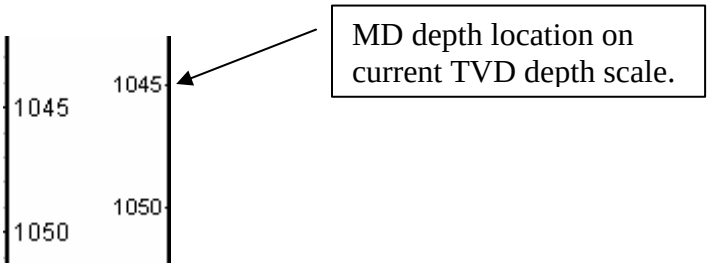
The main pressure vs depth plot is in either MD, TVD or Subsea depth, and the main depth numbers that appear in all depth tracks reflect this setting.



There may also be a need to display depth numbers from one of the other depth systems. These auxiliary depths can be displayed in two ways.

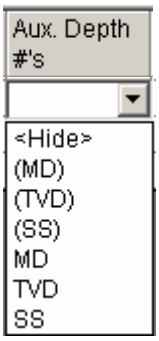


1. Auxiliary depth numbers (MD in this case) in brackets below each main TVD depth number



2. Auxiliary depth numbers (MD in this case) plotted as depth number justified to the right edge of the track, spaced and numbered at same interval as main depth numbers, with location tick marks.

This can be accomplished using the auxiliary depth numbers settings. Set the Aux Depth #'s column for any depth track to one of the available choices. (If main depth is in TVD, then MD and SS are valid choices)



Use the (MD), (TVD) (SS) choices for auxiliary numbers below the main numbers in () or use the MD, TVD or SS choices for auxiliary numbers right justified with location markers.

13.1.8. Well Column

Used only for multi-well projects, any track can be specified to have log data from only one well appear in this track.

Drop down the list and select from the well names.

If any LAS log data is set to plot in this track, only that LAS data with that channel name from THAT WELL will plot in this track.

As well, the formation tops from each well will appear only in the tracks designated for matching wells.

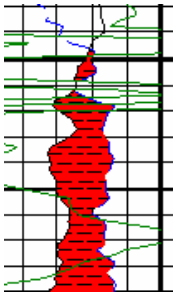
This is very useful to set up a multi-well display where the logs from all wells can be displayed next to each other with a Subsea reference, each showing their own logs and formation tops.

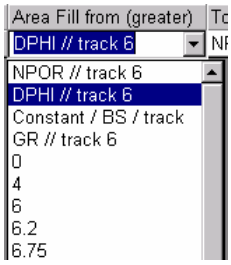
13.1.9. Area Fills

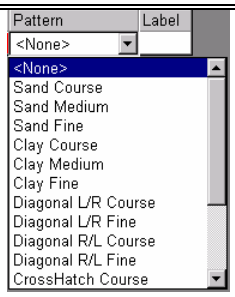
Area fill patterns between sets of any two LAS log data channels can be defined on this table.

Add all LAS channels to the **Test Point Data and Log Curve Table** and complete the Track table setup prior to defining Area Fills.

Area Fills can be placed between LAS channels, Constant curves and track edges, or any combination.



Column	Function
Area Fill From (greater)	The LAS channel at the starting edge of area fill with the GREATER value. For a track scaled from 60 - 0, this is the LEFT edge of the fill pattern. The list contains all currently used LAS channels, Constant curves, and the edges of all tracks 
To (lesser)	The LAS channel at the finishing edge of the area fill with the LESSER value. For a track scaled from 60-0, this is the RIGHT edge of the fill pattern. Only channels in the same track as the **Area Fill From** column are available on the drop down list.
Color	The color of the background of the fill pattern. The foreground is always black.
Pattern	The name of the pattern.

	
Label	The text used in the Insert area of the plot for this fill.

14. Pressure Vs. Depth Plot

14.1. Overview

The pressure depth plot display on the main window is the primary interpretation plot. It displays many types of pressure data (formation pressure, mobility, temperature) and allows many types of auxiliary data to plotted in a depth log arrangement.

Pressure Gradient interpretation (line fitting) can be performed on plotted formation and hydrostatic drilling mud pressure data.

14.2. Templates

Different templates can be loaded at any time for unique views of the current pressure related and auxiliary data.

Select a new template by opening the File menu, then select Open Template. A selection of templates (.grd extension) are shown.

Select template files that begin with the tool name (XPT_, MDT_ FPWD_etc)

Note: Do not select templates with names beginning with PTIM_. These are for Pressure vs Time display use only

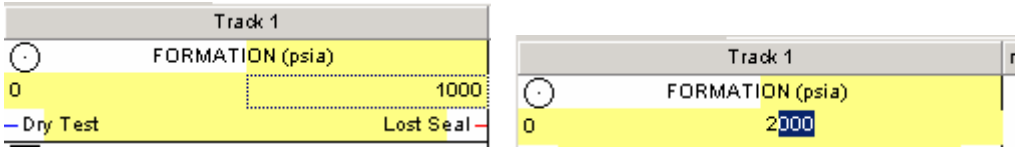
As you build templates using the Template editing window, you can create your own library of templates.

14.2.1. Templates and Views

The display templates currently in use are stored with Views (see section on Using Views). When a view is re-opened, the template stored with that view replaces the current template.

14.3. Scaling Displayed data

Each item in any track can be scaled directly in the insert area. Simple click on the current scale value, and type in the new value. The plot will be refreshed with the new scale value



To change the scales of many items once, open the **Template Editing** window from the **Tools** menu.

14.4. Edit Depth Scales and Intervals Window

The **Edit Scales and Intervals** window contains tables where the depth interval and depths scales for the plot area are set.

It also contains the specifications for the horizontal depth line and depth track number frequency used on the plot.

Access the window by clicking the **Edit Scales and Intervals** tool bar button 

The window can also be opened by double clicking any depth track on the log display.

14.4.1. Depth Scales and Intervals

The **Depth Scales and Interval table** on the **Edit Scales and Intervals** window sets the values used for the top, bottom, and depth scale to be used to draw the plot.

14.4.1.1. Depth Interval Table

Depth Scales and Intervals

Item	Value
TVD Top (ft)	3200
TVD Bottom (ft)	3450
Depth Scale	1:240
Width Zoom (%)	100

Edit the values as needed. The Top and Bottom depths show either the MD, TVD or Sub sea depth values, depending on the current depth system settings 

.

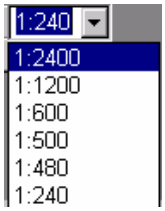
Each set of scales is kept separately. Only the scales for the current depth index are shown.

Click the **Min/Max** button to the right to fill in the min/max depth scales taken from the current test point table.

14.4.1.2. Setting the Depth Scale

The Depth Scale cell of the table has a list of common scaling factors. (1:240, 1:600 etc). Select one or type in the scale of your choice. If you don't begin the depth scale number with the **"1:"** to the depth scale number you enter, it will be added for you.

Depth scales are accurately used when the plot is printed, but is an approximation for the on-screen plots.

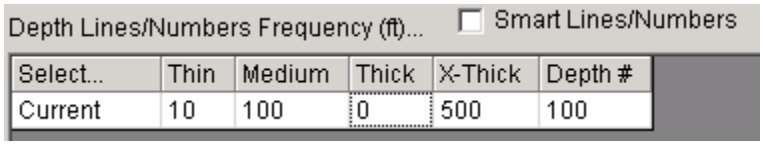


Fit to Page is also available at the bottom of the list, 

which computes a depth scale that forces the entire plotted depth to fit on one printed page or the height of the screen plot area.

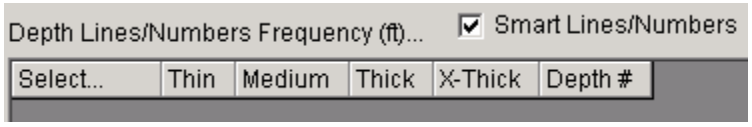
14.4.1.3. Depth Lines and Depth Number Frequency

The frequency and thickness of the horizontal depth (grid) lines can be controlled on this table.



The frequency with which grid lines of various thickness are placed are controlled by entering the frequency in the table cell. The above settings will produce a thin line every 10 ft, a medium line every 100 ft, etc and depth numbers every 100 ft..

You can have PD-Plot 7 compute the "best" arrangement of these lines based on the current amount of depth interval displayed by using the Smart Lines/Numbers check box.



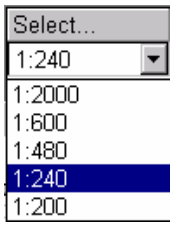
Depth Numbers frequency. Set the **Depth #** column as needed. Typically the depth numbers frequency should match the **Thick** depth line frequency value.

This is automatically handled in Smart mode, At least one depth number will always be displayed

14.4.1.4. Preset Depth Line and Number Frequencies

A list of common settings at various depth scales can be set on the Preferences window for English and Metric depth units.

To make a selection from these presets, click any cell in the Select row, then make a choice from the dropdown list.



The preset frequency settings will fill the table cells when the selection is made.

14.5. Working with Pressure Gradients

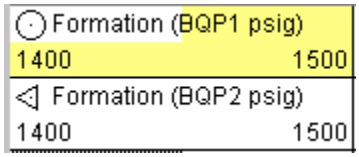
Gradient lines can be drawn on the plot to interpret trends or to indicate a possible fluid type associated with a range of gradient values.

Gradient lines can be drawn manually and fitted by eye, or you can use a simple regression technique to compute a best fit line of a selected group of points.

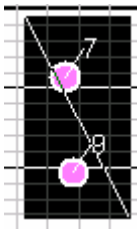
Gradient line properties are stored on the Fluid Gradients table.

14.5.1. Fitting a Gradient Line to Pressure Data

Select the pressure data item (click on the name) that will be fitted from the Insert area. Click on the insert cell for the data required to make it current.



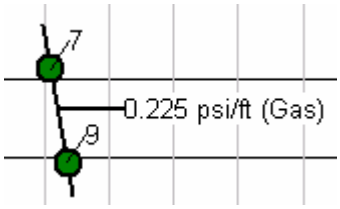
Drag a region around the selected pressure tests.



only points within the selected region will be used in the fit and only those data of the type selected by the insert are used.

Select **Fit to Points** from the popup menu

A new gradient line is created and drawn through your points.



A text comment is placed on the line indicating the gradient and a possible fluid based on the current Gradient Range definition.

A new row is added to the Fluid Gradients table. The properties of the line can be edited on the table, including deleting the line.

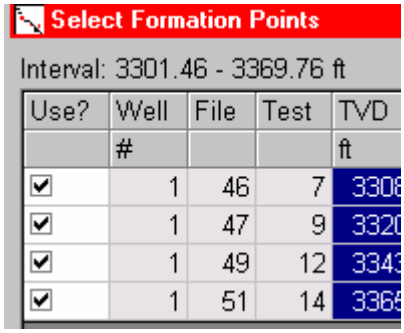
Specific pressure points can be selected from within your dragged region. See Selecting Points for Gradient Line Fit

14.5.2. Selecting Points for Gradient Line Fit

An interpretive game can be played as you attempt to fit a gradient line to a group of data points.

Rather than manually Excluding and Including pressure data points, then manually re-drawing gradient lines to see the result, drag a region around a group of pressure data points, then select **Select Points…** from the pop up menu.

The resulting window gives you a table of all data points in the selected region.



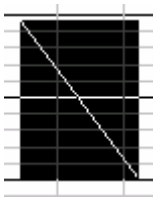
Check and un-check test points from the **Use?** column check boxes. As this is done, the plot will be up-dated as the line is recomputed using only the selected points.

The lower portion of this window shows the current gradient and fit statistics.

When you are done with the fitting, click the **OK** button to close the window. The last line fit in place when the window was closed is now completed.

14.5.3. Manually Placing and Moving a Gradient Line

Any gradient line can be manually placed on the plot. Simply drag a region of the plot as if you were selecting a group of points, but instead treat the diagonal corners of the dragged region as the line you are placing. No data points need be in the selected region.



When you have place the line in approximately the needed position, release the mouse and select **Drop It!** from the popup menu.

The line is placed where it was last positioned.

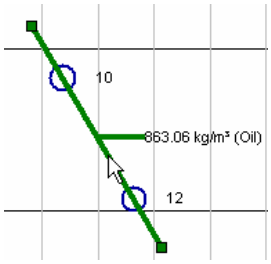
To set the slope to a particular gradient, locate this new line on the gradient line table, and edit the Gradient or Density cell to the needed value.

The set the top or bottom depth of the line, change the depths of the gradient line on the table.

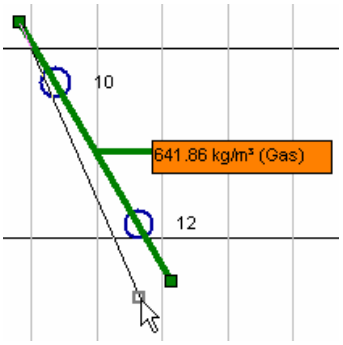
The line position can moved in one of three graphically ways as well

14.5.3.1. Freely move either end of the gradient line

Click on any gradient line to select it. It will be redraw as a thicker line and will be now shown with handles at each end.



Now click and drag either end of the line.

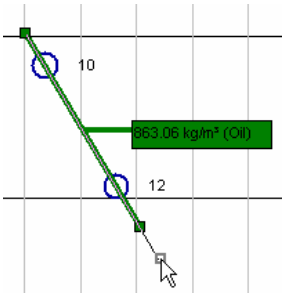


As you move the end of the line, the gradient of the line and its interpreted fluid type are shown in the gradient caption.

Release the mouse to leave the line at its last position.

14.5.3.2. Extend the gradient line keeping the slope

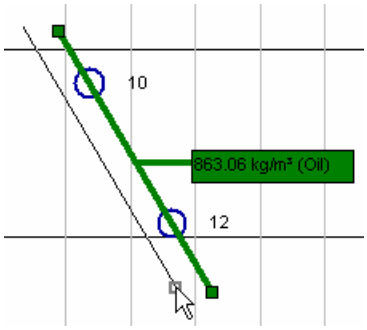
To maintain the slope of the gradient line, but extend it or shorten it, hold the **SHIFT** key down, while dragging either end of the line.



Release the mouse to leave the line at its last position. The slope of the line remains un-changed.

14.5.3.3. Move the line freely maintaining length and slope

The entire line can be dragged around intact. Hold down the **CTRL** key while dragging either end of the line.



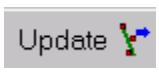
Release the mouse to leave the line at its last position. The slope and length of the line remain un-changed.

14.5.4. Re-computing a Gradient Line

If the underlying pressure data changes, gradient lines previously drawn do not immediately update. Gradient lines are considered interpretations and are not tied to the data or technique that was used to initially create them.

To re-compute an existing gradient line, you may either delete it and manually redraw it using the current data, or you may selectively re-compute gradient lines from the data that falls directly within their current depth and pressure boundaries, or from the current depth and pressure values of the original data used to compute this line.

To perform this re-computation, click on the row of the Gradient Lines table to select that needed gradient line. Click the **Update** button



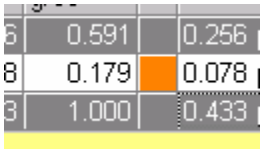
on the Gradient window tool bar.

If asked, select either to re-compute using the original data points (**Yes**) or using all data with the current depth and pressure boundaries of the current line (**No**).

14.5.5. Computing Gradient Line Contacts

To compute the contact depth between any two gradient lines, select any cells from exactly TWO adjacent gradient line table rows.

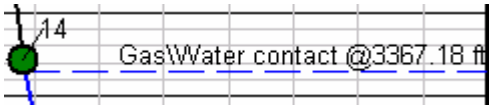
If the rows are not adjacent, hold down the **Ctrl** key while clicking any white cell on the two rows. When properly selected, both rows will show a dark gray band over the entire row.



When exactly two rows are correctly selected, the **Compute Contact** button will be enabled.  .

Click the **Compute Contact** button to compute the contact point.

The contact is now shown as horizontal line at the intersection. Both original lines are now truncated so their touching depths are set to the contact depth.

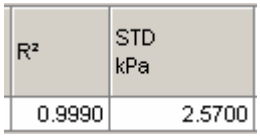


14.5.6. Gradient line Statistical Error

As gradient line slopes are computed, there is error in the gradient proportional to both the inherent error in the pressure measurement, as well as the depth measurement.

Estimates of these errors are available on the gradient table.

The **R2** and the **STD** columns give basic statistical least fit regression co-efficients of "Goodness of Fit" and "Standard Deviation"



A more rigorous method that estimates the gradient error based on the number of points and the total depth interval is now available in the **Gradient Error %** column.

Gradient kpa/m	Density kg/m³	Gradient Error %
7.940	809.63	3.3% (782.79 to 836.47 kg/m³)

The most important aspect is to note the min and max gradient error bar. Here the least squares fit is 809 kg/m3, but with error, it could range from 782 to 836 kg/m3, 3.3% either way. If either end of the min max suggests infringes on gradients appropriate for different fluids, then the gradient should be carefully considered before use.

These computations are only suited to SLB quartz and strain are considered estimates.

15. Views

15.1. Overview

Interpreting a large formation testing job often involves many test point, and several zones. Many pressure depth plots using a variety of template layouts may be required to complete the final report.

Views are a way of saving deferred "Snapshot" printed pages of the pressure depth plot as you create the plot for each zone or requirement. Later you can pick and choose amongst your saved views to create the final report.

Views can also be use as a way to save different pressure depth plot layouts for quick retrieval, as each view also saves the current template and depth scale settings with a user defined name, though not the underlying data, annotations, gradient fits etc. If the underlying data has changed, you may not get exactly the same display back when a view is retrieved.

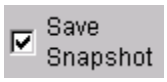
The deferred snapshot pressure depth plots do not change.

15.2. Saving Views

Open the **View** window. Do this by either click the **Views** tool bar button 

or select the **Views** item from the **Tools** menu. 

If you want the view to be saved as a deferred page for final report, check off the **Save Snapshot** checkbox.



Click the **Save As…** button on the **Views** window, enter a name for the view and click **OK**. The view save may take up to a few minutes if the interval is large, or a large amount of log curve data is present.

Click **OK** to close the Views window.

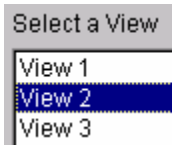
This view is now stored and ready to be included in the printed document.

Note that the printer used to create the deferred report page is set in the Preference window as the Default Snapshot printer, not the current default Window's printer.

15.2.1. Reverting To a Saved View

Open the **View** window. Either click the **Views** tool bar button  or select the **Views** item from the **Tools** menu. 

Select the name of the view from the **Select a Views** list,



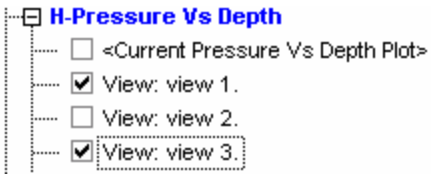
and click the **Apply** button.

The plot will be drawn with template and depth scales and depth interval saved with that view. The underlying data does not change.

Click the **OK** button to close the Views window.

15.3. Printing Views

Each saved view snapshot appears on the Print window **Select Pages** table in the **H-Pressure Vs Depth** section. Check off the required views to include them in the printed document.



16. General Plot Annotations

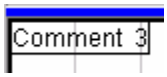
Simple text annotations can be added to the plot at any location. These annotations can be formatted with simple font properties.

Annotations are saved with Views, and are not global to the project.

16.1. Adding Annotations

Click the **Add Annotation** tool bar button  .

A new annotation is added to the plot in the upper left hand corner.

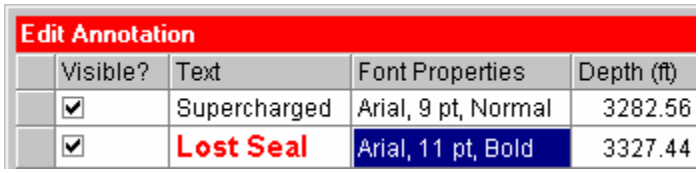


Drag it into position with the mouse.

Click on the text of the annotation to open the annotation editor to change the text and its properties.

16.2. Editing Annotations

Click on any existing annotation or click the **Edit Annotations** tool bar button  . The annotation editing window opens.

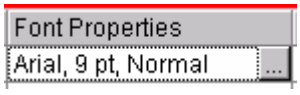


Edit the text as required. To force a carriage return within the text to force line wrapping, hold down the **Ctrl** key then press **Enter**.

Check the **Visible?** column to show the annotation, un-check it hide the annotation.

Setting Font Properties

Click the **Font Properties** cell of any annotation, then click the button that appears.



Select the font properties you require and click **OK**.

The text cell changes to reflect your new font settings.

Click **Apply** to see the changes on the plot annotations.

17. Working with Auxiliary Data

17.1. Overview

Many types of auxiliary data can be added to PD-Plot 7 projects. These data include

- Well Site Data
- Log Data in LAS format
- Well Survey Data
- Formation Tops
- Well Sketch
- Drilling Data (Time Index) in LAS format
- Drilling Data (Depth index)in LAS format
- Fluid Sampling results data

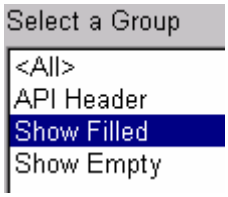
The Well Information window is used to load and organize this data. Access it from the Tools menu.

17.2. Well Site Data

A complete list of all standard API well site data items and other Schlumberger specific well site data is available. These can be used to construct a complete API header for inclusion in the report. The table contains a total of 135 items, with 54 required API items.

Some of the items are “critical”, i.e. the well name and reference elevation should always be entered as an absolute minimum

Logical, smaller groupings of these items can be selected from the **Select a Group** list to the right.



The Well site data can be loaded from these sources as well as by manually entry.

17.2.1. Well Site Data Loading

The Well site data can be loaded from these sources.

17.2.1.1. LAS files

Well site data can be loaded from any LAS file containing standard **~Well** and **~Parameter** sections using Schlumberger standard mnemonics.

With the Tab set to Well Site Data, select the **File** menu, then **Open**. Select the LAS file required. All current Well site data is replaced with that found in the LAS file.

The Well site data can also be loaded while LAS channels are loaded from the Log Data tab of this window. Check off the **Load WSD from** LAS checkbox while loading.

17.2.1.2. DLIS Files

Well site data can be read from DLIS files as well.

17.2.1.3. Schlumberger OP WFTI file import (wfi files)

When a wfi file is loaded to add test points to the project, all well site data items from that file are also read, replacing all current well site data.

17.3. LAS Log Data

Log data can be loaded from standard LAS version 1.2, 2.0 and 3.0 files. DLIS files can be opened by conversion to LAS if the Log Data Toolbox application is loaded.

All channels required must be in a single LAS file for each well. Load only the data channels you are going to display, and only over the interval to minimize plot re-draw time, project file size.

17.3.1. Loading LAS Log Data

Set the Well Information window tab to **Log Data**. Click the **Open** LAS button or select **Open** from the **File** menu. Navigate and find the required LAS file. Click **Open**.

The default location for well log LAS files is :

***Project Folder*\PD-Plot Well 1\Well and Log Data**

The properties of the LAS file are shown and certain options are presented prior to loading.

17.3.2. Options

You may set the following options

Option	Set
LAS File	D:\work\PD-Plot TST6\data\TST6\PDPlot W
From (3264.500 ft)	3264.5000
To (3493.50 ft)	3493.5000
Ref. Elev (ft)	2148.95
Apply TVD	☑ File's Depths are now Measured Depth
Load WSD from LAS	☐
Channels	Check Channels to load
DPHI.PU	☑
GR.GAPI	☑
PEF.	☑
RHOB.G/C3	☑
NPOR.PU	☑

Once all options are set, click the **Load!** button.

You are returned the Well Information window. The LAS Information and LAS Data table now show the loaded data.

The LAS Information window shows the depth interval where data is available and the reference elevation. The reference elevation can be changed if necessary.

The LAS Data table columns show the loaded data channels and units. The table can be filled with all loaded data if desired for review. Click the **FILL** button. This may take some time if there is a great deal of data. This is not necessary to use or plot the LAS data.

17.3.3. Deleting LAS Channels

Click the **Delete** button, and respond to the confirmation message. This removes ALL loaded LAS channels for this well.

17.4. Well Survey

Data that describes the well path can be entered. A full three dimensional description of the well path can be created. A full well Inclinometry table can be generated for printing,

containing All input data, TVD, North and East departures, and dog leg severity (in Deg/100 ft)

Once in place, this data can be used for

1. Conversion of the test point Measured depths (Test MD) to True Vertical depth (Test TVD)
2. Conversion of measured depth LAS channels to True Vertical depth as the LAS is loaded.
3. Plots of the well path in Map view (from above), from the side at any projection angle and on the log display in any track with test points plotted along the well bore

17.4.1. Entering Well Path Inclinometry Data

Open the Well Information window from the main tool bar button  or from the Tools menu. Click the **Well Path Inclinometry** tab.

Minimum requirements are one column of Measured depth and One column of TVD depth for each measured depth point. This will allow conversion of the test point Measured depths to True Vertical depth (Test TVD) only.

To compute TVD and the total 3D well path, you require Measured depth, well bore Deviation and well bore Azimuth, as well as accurate tie information for the first data point.

17.4.2. Data Loading

Data can be loaded from an ASCII file containing the columns of data with tab, space or comma delimiting.

Data can also be brought in from the clipboard with standard copy and paste commands, or manually entered.

17.4.3. Tie Point Information Entry

The Tie Point data is entered in the first row of the table with the yellow background.

	MD ft	TVD ft	Deviation Deg	Azimuth Deg	North ft	East ft
Tie	2952.76	2952.76	10.00	135.00	0.00	0.00

This defines the starting point of the well trajectory.

The TVD, Deviation and Azimuth must be entered. The North and East are optional and only apply if the well bore does not start from 0 MD and you want a complete accurate Well Bore Path diagram. Only TVD, DEVI and AZI tie points are required for simple TVD computation.

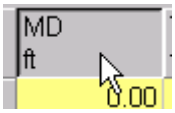
17.4.4. Loading From an ASCII file

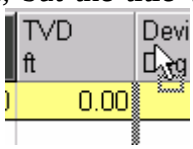
Open the **File** menu, then select **Open**. Find the ASCII file containing the data. Click **Open**. The file is parsed and it fills the table.

The default location for Inclinometry data files is :

***Project Folder*\PD-Plot Well 1\Well and Log Data**

These are the likely problems with data loading and the way to handle them.

1. **Wrong depth units**. This must be fixed in the file itself before loading, or switch the project depth units to the depth units of the ASCII file, load the file, then switch the project units back.
2. **Columns in wrong order**. Once loaded, the data columns can be dragged over the needed positions. The table column titles show which date must be in which column. Drag the columns by left- dragging the TOP title cell of the row to the new position. The data in the row will move, but the title will stay in the same position. 

then drag to the right, 

, place the dark gray bar between the columns where the moved column must go, and release the mouse.
3. **Some rows do not contain valid data**. Header rows can be removed by selecting any cell on that row, then clicking the **Delete** button. Totally blank rows can be ignored.
4. **Depths not sorted or duplicate depths**. PD-Plot 7 sorts the table when a data file is first open, and when the **Compute** button is used.

17.4.5. Well Path Inclinometry Plots

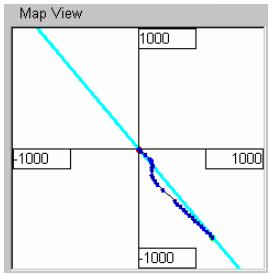
Once the well path TVD computation is complete, the results can be plotted to visualize the well path.

17.4.6. Map View

Open the Well Information window, and go to the Well Path Inclinometry tab.

The **Map View** plot is automatically generated. To re-compute the TVD and re-plot, click **Compute**.

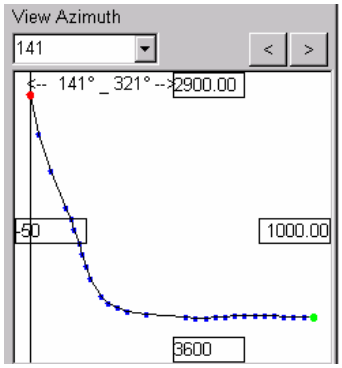
To scale the plot manually, edit the four scaling field boxes at the edges of the plot, press **Enter** after changing each to re-plot.



It is customary that the plot have the same East-West and North-South scales. As you change any one scale, the other axis scales are automatically changed such that this rule is maintained.

17.4.7. Well Cross Section Departure Side View

The well path can be plotted from the side with the TVD in the vertical and departure on the horizontal axis. The plane or "View Azimuth" on which this plot is made is controllable.



When the **Compute** button is used, the "View Azimuth" list is initially set along the angle to the farthest departure. Any angle can be entered in the list, and the list has several common options.

17.4.8. Well Departure side view on the main plot.

The well path departure plot can be shown on the main plot in any track.

Add a row to the Test Point and Log Data table, and set the **Source** to **Inclinometry**. Set the **Left** and **Right** scale to the departure distances required. Set the line **Thickness** and **Color**. Set the Track index where the well path will appear. Click **OK**.

When the well path is plotted, a symbol is placed on the well path at each of the test point locations.

17.5. Formation Tops

Formation tops can be added to each well. They can be added graphically or by filling in a table.

To add formation tops by editing a table, open the **Well Information** window, and go to the **Formation Tops** tab. To graphically add tops, double click the pressure depth display near the depth where the top will be placed, and enter a formation top name.

17.5.1. Working with the Formation Tops Table

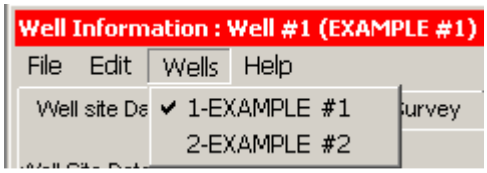
Tops can be added, edited, and deleted from the Formation Tops table.

Formation Tops List

MD ft	TVD ft	Subsea ft	Top Name	Color	Use?
12646.29	12100.00	-9850.00	Top 1		☑
12756.79	12200.00	-9950.00	Top2		☑

Multi-well note:

When the Well Information window is initially opened, it shows the well information for the current well (as chosen from the Wells list window). To switch to another well with the Well Information window open, Open the Wells menu and select the well you need.



If you have a ASCII file containing the Tops information, select the **File** menu, then **Open**. Select the file, and click **OK**. Its contents fill the table.

> Note: Move the columns of numbers under the correct headings if necessary. Drag the top column title cells left or right to rearrange rows.

Measured, TVD and Sub sea depths are shown for each top. Enter any one of the three depths, the others will be computed and filled in (correct Well Path Inclinometry data and reference elevation must be entered)

Delete any un-wanted rows by selecting any cell on those rows, then click the **Delete** button or press the **Delete** key.

17.5.2. Special Multi well feature!

If the ASCII you are loading has data from more than one well in the current project, you can load formation Tops data for all wells at once.

Place the exact well name as found in the project in another column next to each formation top line in the file.

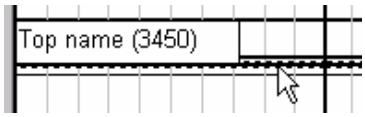
```
1010,formation Top 1, Example #1
1030,formation Top 2, Example #1
1040,formation Top 3, Example #1
1012,formation Top 1, Example #2
1032,formation Top 2, Example #2
1042,formation Top 3, Example #2
```

Re-arrange the columns (drag the top title cell) to get the right data in the right column.

When you click **OK** on the window, each formation top will be assigned to the well with the matching name.

17.5.3. Working with Formation Tops from the Pressure Depth Plot

Double click on the plot at the approximate depth of the top. A new top line is added. Enter the Top name in the edit field and press **Enter**.



To place the top at an exact depth, enter the exact depth. in brackets. at the end of the top name while editing the text. When you press enter, the top will be moved to the depth indicated.

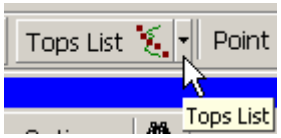
Double click on an existing formation top line to edit the formation name.

Click on any top line to select it. Press **Delete** key to remove it.

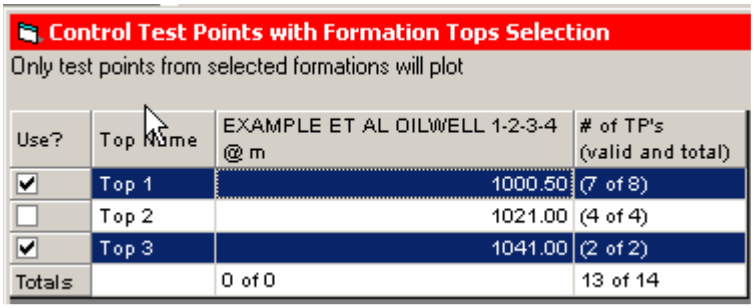
17.5.4. Viewing Pressure Points by Formation Tops

The user may wish to see only those test points from certain formations to simplify the view, or to concentrate on a certain region of the well.

For these cases, the Tops List is available. Click the **Tops List** dropdown button on the main tool bar. Be sure to click the arrow at the right edge.



A new window opens that list all available formation tops marked for all wells. The list is a unique list of all different formation tops. Each column represents each well. If any top exists in each well, the intersecting cell will have a depth. Wells where the top do not exist will contain nothing in the intersecting cell.

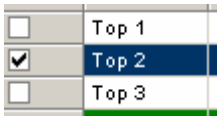


To select one or more tops, click on the rows for that top to select the entire row, or click the check boxes. Hold **Ctrl** to select non-adjacent rows, hold **Shift** to select groups of rows.

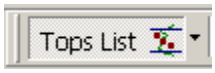
Click the **All** button to select all tops. This is the default.

Click **Apply** to see the result of your selections.

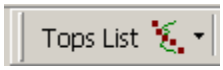
Only Test points in the selected formation tops will be plotted. All formation top markers will be plotted but the unselected tops will be plotted in light gray.



To indicate that only certain tops are selected or viewing the Tops List button will change appearance. When the Tops list is constraining the test points that are shown, the button will appear “pressed” and its icon will show formation tops with constrained test points.

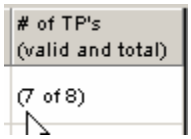


When all tops are selected (the default state, or if the Tops List window has not been opened at all) the tool button will appear “not pressed” and its icon will change to show no constraint.



There is also test point statistical information available for each zone, ie how many total test points verses how many “good” test points (none seal failure or dry tests).

The final column lists this information. For multi-well cases, each column will contain information for each zone in each well.



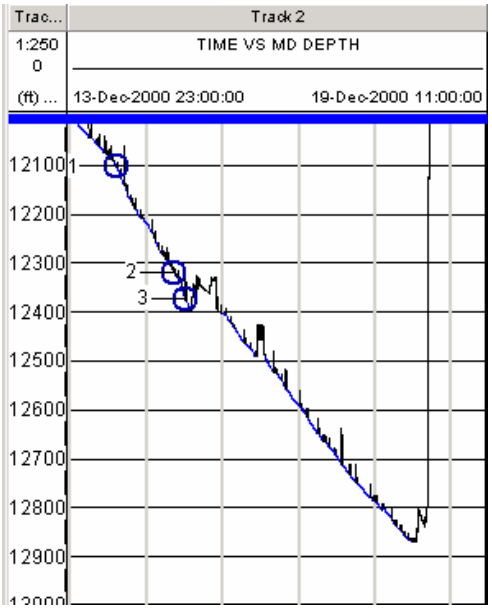
17.6. Time Index Data Loading

There are two Time index data sets that may be available for D&M LWD testing jobs using the StethoScope tool family.

Time/Depth Drilling Record

Specialized Time vs Depth data files are available that record the drilling history when D&M LWD jobs are performed. When interpreting StethoScope tests, it is often critical to know the drilling history and to compare this to the time test points are taken.,

PD-Plot 7 can load these specialized files, and display a Time/Date vs. Depth history plot..



Load this data file from the Time Index tab

Click the **Open** button on the LEFT side by the Time vs. Depth , the select the timedepth.txt file. 

Here a few lines from a representative Timedepth.txt file to be sure only this type of file is selected.

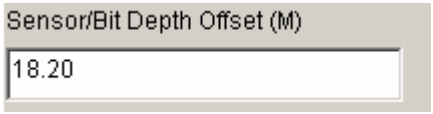
```
838.610   11023.50  23:17:41 13-Dec-00  D   S
838.630   11023.40  23:17:43 13-Dec-00  U
838.650   11023.30  23:17:45 13-Dec-00  U
838.670   11023.20  23:17:47 13-Dec-00  U
838.700   11023.30  23:17:50 13-Dec-00  D
```

You will asked if you want to reduce the data set (these files are often VERY large).

If you click **Yes** there are three parameters to enter. Skip Interval (while drilling only), max allowed depth change to save next point, and a minimum time interval between samples.

After entering values for each, the data is loaded, and you are told how many samples were loaded from the total. The table is filled.

You must also enter a Sensor/Bit Depth Offset value. The Time Depth file records the BIT depth, but the pressure sensor is higher in the string. To properly display the location of the test points on the Time depth display, you must know this offset.

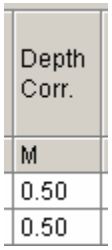


17.6.1. Handling multiple Time Depth data files.

When you need to load multiple Time depth files from a single job, they need to be manually spliced in a text editor before loading. Open the later file, place the entire contents on the clipboard, then open the earlier file, position the insertion point at the end of the document (at column one of a fresh empty line) and paste in the contents of the clipboard. Save the file with a new name.

Each time depth file may also need a unique Sensor/Bit Depth Offset, if the tool string changes.

Currently this must be handled by entering a value for tests the **Depth Corr**. column of the test point table.



Do this for all test points in the time/date range of the time vs depth data that you cannot enter a sensor/Bit Depth offset for.

Note: This column only affects the location of the test points on the Time Depth plot. No other plotted data or any depth related information is affected.

Time Index Logging Data

The other type of data that may be available in Time index is drilling related data, such things as hook load, torque, weight on bit etc. This data is available from D&M as LAS.

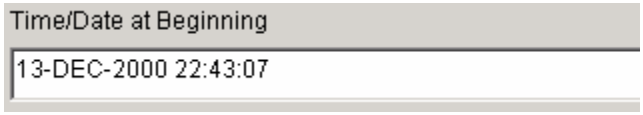
Click the **Open** button on the right half of the window, select the LAS file, and click **Open**. The table will be filled with the data

This is a representative ~Curve section for the LAS of this type of data.

```
~Curve Information Block
#MNEM.UNIT                    : Curve Description
#---------                    --------------------
```

```
TIME        .SEC            :
TIME        .hhmmss         :
DATE        .ddmmmyy        : SRF DATE 2hz
BVEL        .FT/S           : Block Velocity 2hz
HKLD        .KLBF           : Measured Hookload 2hz
HKLD30s     .KLBF           : SRF AVG_HKLD_30sec 2hz
APRS_RT     .PSI            : ARC Annulus Pressure, Real-Time
ATMP_RT     .DEGC           : ARC Annulus Temperature, Real-Time
SPPA        .PSI            : SRF PUMPRS 2hz
TFLO        .GPM             : HSPM Total Pump Flow 2hz
```

You need to then specify the DATE at the first time sample in the file.



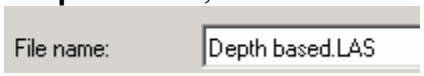
This allows correct alignment with the other TimeDepth records.

17.7. Drilling Data

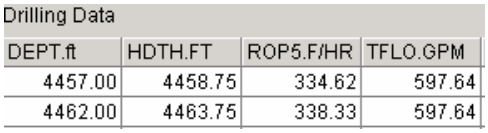
Drilling Data is depth indexed data acquired from LWD tool strings that record drilling (Rate of Penetration, circ rate etc) and LWD logging data acquired from the sensors on the tools.

These data's can be stored as LAS files and loaded into PD-Plot 7 on the Drilling Data tab of the Well Information window

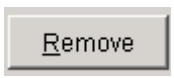
Click the **Open** button, then select the LAS file



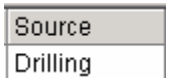
then click **Open**. Check that the expected data fills the table.



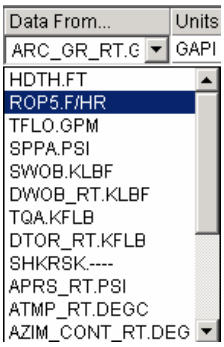
DEPT.ft	HDTH.FT	ROP5.F/HR	TFLO.GPM
4457.00	4458.75	334.62	597.64
4462.00	4463.75	338.33	597.64

Click the **Remove** button to remove the drilling data. 

This data can be selected to plot from the **Edit Display Template** table by setting the **Source** to **Drilling**,

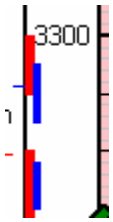


then selecting channels from the **Data From…** list, and setting display properties as required.



17.8. Interval Markers

Interval markers are small colored rectangular markers that can be drawn on the edges of any track to show regions of interest, or to mark other services that have occurred, such as frac job locations, perforations, test locations etc.



Single markers can be placed at multiple depths. If more than one marker in placed the same track they will stack up next to other, each taking 10% of the track width.

17.8.1. Adding Interval Markers

Interval markers are entered on a table. To edit the table, open the **Well Information** window, and go to **the Interval Markers** tab.

Click the **Add** button to add as many rows as desired.

Enter the data for each marker.

Interval Tables

Label	Depth List (ft-TVD)	Color	Side of Track	Track #
Perfs	12100 12200		Left	8

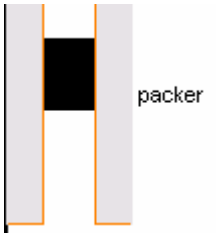
Interval Marker Data	Function
Label	The text that will placed next to the marker.

Depth List	Top and bottom depth of each marker. More than one set of depths can be entered. Depths must be entered in pairs. Enter each number, then place at least one space between each number.
Color	The color used to fill the marker
Side of Track	Left or right, determines which side of the assigned track to place the marker.
Track	The track where the marker will appear.

17.9. Well Sketches

Simple Well Sketches can be drawn of the basic well components.

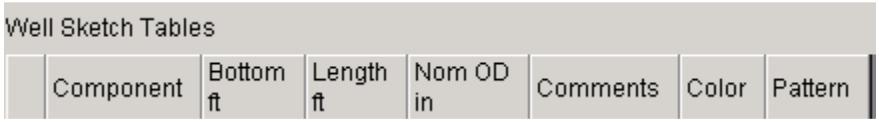
A simple table is built up of each components length, bottom depth, and OD, then each component is drawn across one half of the track while the text that may be present for each is placed in the other (right) half of the track

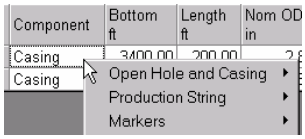


Well Sketches must be placed in a track by themselves. Add a track to the **Track table** on the **Log Presentation Editing** window, and set its **Type** to **Well Sketch**.

17.9.1. Adding Well Sketches

Well Sketch components are entered on a table. To edit the table, open the **Well Information** window, and go to the **Well Sketch** tab.



Column	Function
Component	The name of the component. Right click on the cell and select from the menu's 
Bottom	The bottom depth of the component, in current depth units (ft or m)

Length	The length of the component.
Nominal OD	The nominal outside diameter of the component in current short length units (in or mm)
Comments	The text that is printed next to the component.
Color	The color of the lines used to draw the component.
Pattern	The pattern to fill the component. Solid or Transparent. Some components fill automatically, such as packers.

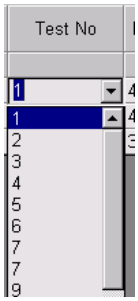
17.10. Sample Tables

17.10.1. Over view

The results and details of each fluid sample taken should be reported. The Sample Table in the Report Writer provides the table of necessary information.

Sample table rows can be generated from the Test point table. This creates a new row and fills all available test point information.

This can also be done by adding a row, then selecting the Test column, and selecting the test number from the dropdown list.

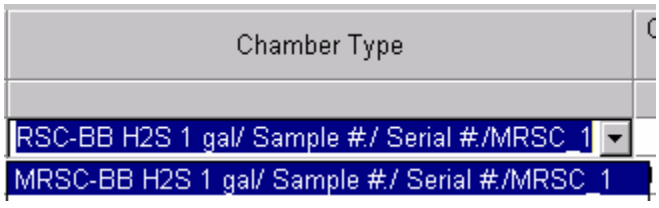


17.10.2. Using Tool String information

If a tool string has been previously built that contains the correct sample chamber descriptions, and properly assigned to each test point, then several details can be pulled from the saved tool to specify sample chamber information.

This requires that Test # and File No columns have a valid value that matches a test found on the test point table, and that those test point table entries have a Tool String entry which represents a present tool string definition.

Click on the **Chamber Type** cell on any sample row. Select the sample chamber from the drop down list.



The Serial number column is then filled in and the chamber description is completed.

17.10.3. Sample Table Printing

The sample table printing consists of several types of pages.

1. A summary table of all samples.
2. A detailed report of each sample. Each sample table row generates one page.
3. An optional one page detailed printout of the PVT results of each sample.

17.10.4. Sample Table Columns

Column	Function
Well	Well Number
Sample #	Assigned sample number. All must be unique
Test No	Test Point test number
File No	Test Point
Sample Depth	Test Point Measured depth (not TVD)
Sample Date	Date sample taken
Sample time	Time of day sample taken
Chamber type	Type of chamber. SLB tool code is best
Chamber Serial Number	Serial Number for positive ID
Formation Pressure	Test Point formation pressure
Formation Temperature	Test Point temperature
Mobility	Test Point drawdown mobility
Hydrostatic Pressure	Test Point Mud before value
Pump out time	Total time pump out engaged for this sample
Pump out volume	Total pump out volume prior to this sample
Sample Begin	Log elapse time in seconds when sample chamber first opened.
Sample End	Log elapse time in seconds when sample chamber last sealed
OCM Contamination	Contamination estimate from OCM modeling
Sample Remarks	Text remarks
Sample Pressure when sealed	Down hole sample pressure when chamber last sealed.
Minimum Pressure	Minimum pressure recorded while sample chamber open
Run Number	Run number
Formation Name	Formation top name
Resistivity and @ Temp	Resistivity of water sample and measurement temperature.
Oil Gravity	Measured Oil Gravity
PVT Analysis Data	**When a PVT company analyzes the samples, then results are placed in these cells.**
Bottle No.	The bottle number

Final Pressure	The final pressure after sample transfer
Initial Pressure	The initial pressure after sample transfer
Sample Nature	Short description of sample type
Sample Volume	The volume of the sample chamber
Transfer Date	
Transfer Time	
Transfer Volume	Amount of the sample transferred out
Transfer Pressure	Pressure during transfer
Sample Bottle Type	Type of bottle.
Gas Cap Created (cc)	
Sample Bottle Volume	
Fluid Remaining	
Field Bubble Point	
Heating and Agitation time (min)	
Temperature	
FFA Contamination Estimate (%)	
Lab Contamination Estimate (%)	
PVT Remarks	
Witness	

18. Project Comments

18.1. Over View

The Interpreter commonly writes a report that details in his or her words the results of the job and the key interpretation answers derived from the data measurements and sampling results.

These comments are included in the report, and can be quite lengthy and complete. PD-Plot 7 provides a way to enter formatted text to create a complex set of comments.

18.2. Entering Formatted Comments

Open the **Tools** menu and select **Project Comments**.

This same button is on the tool bar.

Enter your comments in the editing field.

Note: While this editor has simple text formatting options, it may be easier for you to use a more powerful text editor such as Word. After writing your document in Word, just copy and paste the entire contents of the Word document into this editing field.

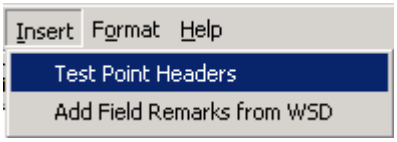
If you have trouble with this technique, create the Word document as usual, but save it as a PDF file. Incorporate this PDF document into the final assembled PD-Plot report.

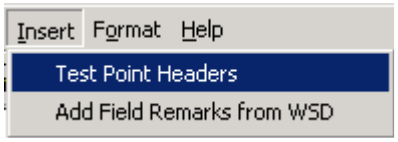
18.2.1. Tool bar

The main tool bar allows you to perform simple editing functions such as font selection, size and color, paragraph alignment and spacing.

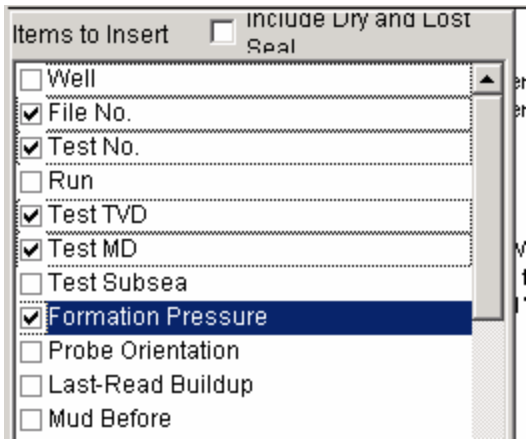
18.2.2. Insert Test Point Data blocks

The insert menu can be used to place formatted blocks of text contained selected test point data as a way to quickly allow the interpreter to add specific comments about each test.

Select the **Test Point Headers**  menu, then **Test Point Headers.**



Select the test point data items you want.



Click the **Insert** button  below the list to add the text to the editing area.

File No. = 1 / Test No. = 1 / Test TVD = 11600 ft / Test MD = 12101.59 ft / Formation Pressure = 1451 psig

File No. = 2 / Test No. = 2 / Test TVD = 11800 ft / Test MD = 12317.44 ft / Formation Pressure = 1500 psig

18.2.2.1. Field Remarks

The field entered remarks can be added as a new block of text instantly. Select the Insert menu, then select Add Field Remarks from WSD

19. PVT Estimation

Basic PVT properties of Oil, Gas and Water can be estimated using the PVT Estimation window. Remember these are for "standard" fluids and are intended for comparison purposes only.

You must enter the required surface properties of each fluid, and the down hole temperature and pressure. The down hole density and gradient, viscosity, compressibility and volume factor are then computed for each fluid at the down hole conditions.

Units are shown the current unit system.

19.1.1. Surface Oil Properties

The surface properties of the oil need to be entered to compute downhole properties.

	Oil
API	34
Density (kg/m³)	850.00
GOR (m³/m³)	300
Bubble Pt. (kPa)	10000

Enter the API or Density. One is computed from the other after either is edited.

Enter GOR and/or Bubble Point. One is computed from the other after either is edited.

Note: For the case where the GOR is not 0, the surface Gas properties refer to the evolved gas.

Surface Gas Properties

	Gas
Gravity	0.650
%H2S	0
%CO2	0
%N2	0

Enter the specific gas gravity and the percentage (0-100) of each impurity.

19.1.2. Surface Water Properties

Surface water properties need to be entered to compute downhole water properties.

	Water
Resistivity (ohmm)	1.000
@ (°C)	20.0
Salinity (ppm)	6400

You can also use the Surface properties to table to compute related surface properties.

To compute **Salinity from Resistivity** and temperature, edit the Resistivity first, then the temperature, then answer **No** to compute Resistivity from new temperature.

To compute **Resistivity from Salinity** and temperature, edit the salinity first, then the temperature, then answer **Yes** to compute Resistivity from new temperature.

To convert a **Resistivity at one Temperature to another Temperature**, enter the first Resistivity and temperature, answer **No**. Then change the temperature to second value and answer **Yes.** The Resistivity is computed at the new temperature.

19.1.3. Down hole Pressure and Temperature

Downhole Conditions	@ Pressure (kPa)	10100.03	@ Temperature (°C)	65.6

Enter the down hole pressure and temperature at which to compute the down hole properties.

19.1.4. Down Hole Properties

Density (g/cc)		0.830		0.047		0.988
Gradient (psi/ft)		0.360		0.021		0.428
Viscosity (cp)		3.601		0.014		0.463
Volume Factor		1.05	1/Bg	59.75		1.04
Comp (1/psi)		1.31E-05		1.01E-03		3.28E-06

These five properties are computed for Oil, Gas and Water as any surface property value is changed, or when down hole pressure and temperature are changed.

19.1.5. Saving/Restoring PVT Definitions

The current PVT properties can be saved for later retrieval. Open the **File** menu, then select **Save PVT File**. Enter a name for the file, then click **Save**.

To restore previously saved PVT inputs, Open the **File** menu, then select **Open PVT File**. Find the previously saved file, then click **Open**.

The PVT properties are also saved when the project is saved, and re-set when an project is opened.

20. Units Editor

20.1. Overview

PD-Plot 7 contains five fixed unit systems suiting most of the major world markets. As well you can define any number of user-defined unit systems to suit your individual needs.

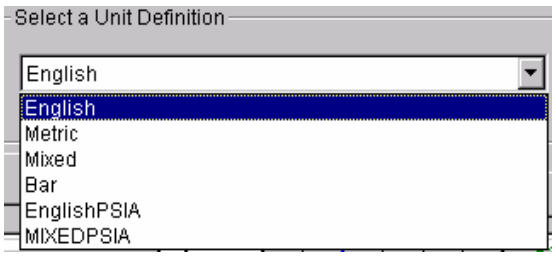
Unit systems can be changed at any time. Unit systems are saved with projects, so that anyone can open a project and see it in the original system of units.

Unit systems read from projects are added to the users local list of user-defined unit systems.

20.1.1. Selecting A Unit System

Open the Units Editor window from the tool bar button or from the **Tools** menu. 

Open the **Select a Unit Definition** list and select the unit system you require.



The first five systems (English, Metric, Mixed, Bar and EnglishPSIA) are predefined and fixed. Others are user defined systems that can be created by you.

Click **OK** to apply this new unit system.

20.1.2. Creating User Defined Units Systems

Open the **Units Editor** window from the tool bar button or from the **Tools** menu. 

Open the **Select a Unit Definition** list and select a unit system that is a close as possible to the unit system you are creating.

Click the **Save As…** button, and enter a new name for your unit system. Click **OK**.

The **Current Unit Settings** table opens (click the **Show Unit Table** button if it is not open). Each row represents one unit. You must edit four settings for each unit group.

Column	Function
User Unit	The name of the unit you are creating.
Gain	The multiplication factor to apply to the numbers in the internal unit system to convert them to the users selected unit (used with Offset).
Offset	The addition factor to apply to the numbers in the internal unit system to convert them to the users selected unit (used with Gain).
Number of decimals	The number of decimals used to display/Print numbers of this unit group.

The gain and offset must be carefully determined. As all internal data is stored in the indicated unit, you must supply correct conversions so that correct values appear in the program.

Common units for each group are available in the dropdown list of the User **Unit column**. When selected, appropriate Gain and Offset values are inserted.

To test if you have the correct gain and offset, use this equation on a sample value that you FAMILIAR and CONFIDENT with.

A value in internal unit * gain + offset = value in your new unit selection.

For example, to define a temp in Celsius, the gain must be 0.555555 and the offset must be –17.7777.

Test : 212 DEGF * 0.55555555 + (-17.777777) = 100 DEGC

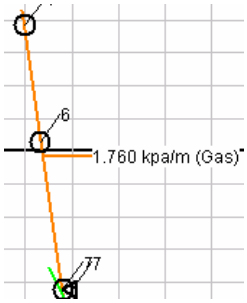
21. Gradient Range Definitions

21.1. Overview

PD-Plot 7 can assist in identifying possible fluid types when gradient lines are fitted to pressure vs. depth data.

You can set up an unlimited number of tables of fluid types with corresponding gradient ranges, names and colors associated with each fluid type.

As gradient lines are then drawn on the pressure vs. depth plot, the software can label the line according to the fluid type defined for a gradient of that magnitude using this pre-set definition.



In this example, the gradient line color, and the wording of the label were set such that a slope of 1.76 kpa/m would be interpreted as **GAS** and should have an **orange** color.

21.1.1. Creating A New Gradient Range Definition

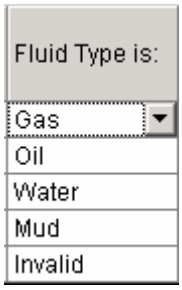
Open the Gradient Range window. Click the tool bar button or select it from the Tools menu. 

Select an existing saved gradient range from the list as a starting point, or use the **Add** and **Delete** buttons to add as many rows to the table as are needed.

Beginning from the lowest gradient in the top row to the highest in the bottom row, enter the gradient range starting point for each row in the first column.

From this value up to next: (psi/ft)
0.265
0.450
0.508
0.800
1.010

Enter a name for each range in **Fluid Type Is** column. Use the dropdown list to select common fluids. All must be unique.



Set the color for each gradient range by clicking the current color cell, then clicking the button that appears, select the color, then click **OK.**

After the table is built with your definitions, click the **Save As** button, enter a name for this definition, then click **OK**.

Build as many gradient range definitions as required.

21.1.2. Using Gradient Range Definitions

Click on the range name you wish to use from the **Saved Range Definitions** list. Review the table to confirm the ranges are as required, edit as necessary and re-save.

To immediately update ALL gradient lines (color and caption text) with the currently selected range definition, click the **Apply** button.

Click the **OK** button to close the window. New gradients now drawn will use the current definition

21.1.3. Deleting Gradient Range Definitions

Click on the range name you wish to delete from the **Saved Range Definitions** list. Click the **Delete** button below the list.

22. Preferences

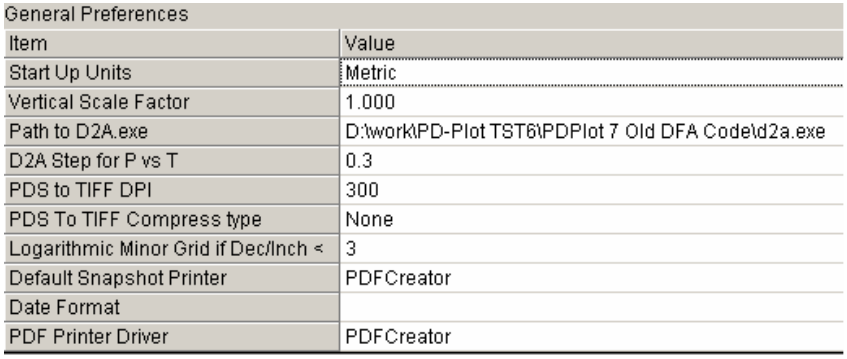
Common program Preferences are set from the Preferences window. These should be setup when the program is first installed.

22.1.1. Preferences Settings

Common program Preferences are set from the Preferences window. Each group of preferences is placed on a tab.

To access the Preferences window, select the **File** menu, then **Preferences**.

22.1.2. General Tab



General Preferences	
Item	Value
Start Up Units	Metric
Vertical Scale Factor	1.000
Path to D2A.exe	D:\work\PD-Plot TST6\PDPlot 7 Old DFA Code\d2a.exe
D2A Step for P vs T	0.3
PDS to TIFF DPI	300
PDS To TIFF Compress type	None
Logarithmic Minor Grid if Dec/Inch <	3
Default Snapshot Printer	PDFCreator
Date Format	
PDF Printer Driver	PDFCreator

Item	Setting
General Tab	* SLB users only
Startup Units	Unit system to use when creating a new project.
Vertical Scale Factor	Adjusts the screen plot depth scale to compensate for different monitor sizes to accurately scale the screen to log scales (if required)
Path to D2A.exe	Path to DLIS to ASCII application for automatic conversion of DLIS to LAS. This generally should be pointing to the D2A.exe in the same folder as the pdplot7.exe
D2A Step for D2A	*The default step size for LAS conversion of Time index DLIS. Do not change this without due cause. Many interpretation answers may be affected if the step size is too large.
PDS to TIFF DPI	*PDS to TIFF conversion option. Sets dots per inch for converted TIFF files (requires PDSView software).
PDS to TIFF Compression Type	*PDS to TIFF conversion option. Sets compression option (Packbits or G4 Fax B/W) for converted TIFF files (requires PDSView software)

Logarithmic Minor Grid if Dec/Inch <=	*Determines the decades/inch threshold when the minor grid lines of a logarithmic track are no longer shown. Defaults to 3 decades per inch.
Default Snap Shot Printer	*The system printer that will be used when saving deferred Snapshots of the pressure depth plot with Views. This should match the PDF Printer Driver below.
Date Format	The format used for Date and Time formatting throughout the program.
PDF Printer Driver	PDF Creator or Adobe PDF (from Acrobat 5 or later) are the only supported PDF printer drivers. This should match the Snap Shot Printer

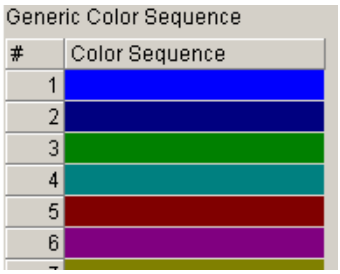
22.1.3. Depth Lines

The Depths line table sets defaults for the depth grid line frequency and thickness for various common depth scales.

22.1.4. Colors

22.1.4.1. Generic

The Generic color is used by functions which need to assign a color to a series. When wells are added to a project, they are initially assigned colors based on this list for example.



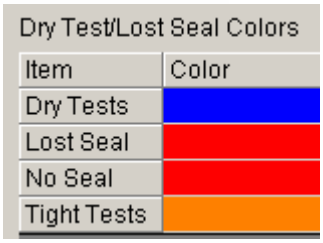
22.1.4.2. Quality Colors

The quality colors are assigned based on the users standards are quality from 1-10 and the colors they wish to associate to them.

The Default list does not change once set, but the user can set the Current Quality colors to suit the needs of each project.

22.1.4.3. Dry Test/Lost Seal Colors

The Dry Test/Lost Seal colors let the use control the colors of the small tick marks that can be used on the Pressure Depth display to show the location of Dry Tests, Lost Seal tests. This has been recently expanded to include two new test types, No Seal Tests and Tight Tests.



22.1.5. Fluid Analyzer

22.1.6. Plotting Symbols

22.1.7. Test Types

22.2. X-Y Plots

22.2.1. Overview

It may be useful to explore the relationship of formation pressure to hydrostatic mud pressure. It may also be useful to check before and after mud pressures to evaluation mud column stability. The X-Y plot window allows these plots to be performed.

22.2.2. Accessing the X-Y Plot

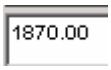
Open the X-Y plot window by clicking the **Formation vs. Mud** tab on the main plot window.

The plot has two main display modes. **Select Formation Pressure Vs Mud Pressures** or **Mud Before vs. Mud After** from the options button at the top of the window.

22.2.3. Formation Pressure Vs Mud Pressures

Select either **Before** or **After** from the option buttons on the side of the plot.

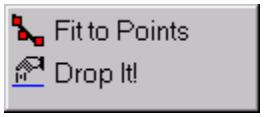
Click the **Scale All**  tool bar button to get an initial scaling that includes all points.

Scale the plot using the scale fields on the edges of the plot. 

22.2.4. Gradient Fits – Formation Vs. Mud Pressure Plots

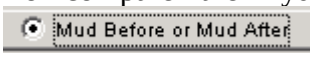
Any number of Gradients can be fitted to the plot in the same manner as doing so for Pressure vs. depth plots.

Drag the mouse over a region that includes the needed points. Select **Fit to points** or **Drop it!** from the pop up menu.



A gradient is fitted and drawn. An entry is made to the Fluid Gradients window table. Changes to the gradient lines can be made from this table.

22.2.5. Mud Before vs. Mud After Pressures

To compare the hydrostatic mud pressures before and after each test, select 

from the upper option buttons.

Click the **Scale All**  tool bar button to get an initial scaling that includes all points.

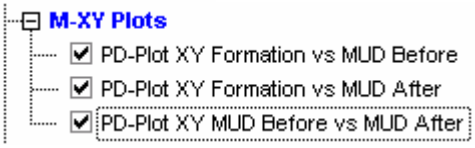
Scale the plot using the scale fields on the edges of the plot.

Scales on this plot are always kept the same on both axis. As one axis scale is changed, the other matching scale is changed.

The 45 degree line is for reference, as it represents the ideal behavior (before exactly equal to after pressure).

22.2.6. Printing X-Y plots

The print/report generator window has setting to plot any of the three types of plots.



Note that each of the selected plots must first be accessed and scaled on the main plot window before they will print properly.

23. STETHOSCOPE

23.1. Overview

Stethoscope tools including TST475, TST675 and TST825 acquire test data in a unique manner to other testing tools, and the recorded data structures are also unique to the service.

Real time access is limited by the band width that is available with mud telemetry systems, so the amount of data available from STETHOSCOPE in real time is small but very wisely arranged to convey exactly what is needed to just quality and obtain estimates of formation pressure and mobility.

23.2. Stethoscope Data Types

23.2.1. RM Recorded mode data

The data stream from all channels is recorded at a high sampling rate downhole and recorded in memory. Once accessible at surface post test, this data can be stored in a file that PD-Plot 7 can load and interpret in complete detail.

These files are named with this convention

RM_LAS_T011R001.LAS is then Test 11, Run 1

23.2.2. RT_LAS Phase data

During testing, in near real time, a several key data points recorded at critical events in the 6 phases of the test can be sent uphole.

Divided into Phases, this file contains discrete data points (time and pressure, or interpreted data computed downhole). PD-Plot 7 can read and display these discrete data point to clearly understand the overall success of the test.

These files are always called **RTRT_PhaseB.rta**

The file #, and depth and key well ID information is stored in the file.

```
!FPWD Phase B Input File for PD Plot
!Client=, Field=, RKB Elevation=, Perm Datum=MSL, Measure Point=RKB, Well Name=
!FPWD PHASE_B 24:00:00 01-Jan-2005 2000.00
```

23.2.3. RTRT.rta real time InterACT data

In true real time, a special file can be written that is constantly updating (building) as data is received fro the mud telemetry system. PD-Plot 7 can monitor this file, and plot the new data as it arrives. This file can also be posted on InterACT, where Clients and SLB consultants can review the simultaneously monitor this file in real time anywhere from within their running copy of PD-Plot.

23.3. Pressure vs. Depth –Special Displays for STETHOSCOPE

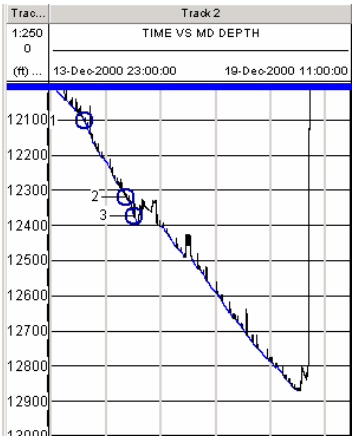
23.3.1. Overview

LWD and testing while drilling with STETHOSCOPE tools

Several special data types can be loaded and displayed that fully illustrate the environment in which the tests were taken

23.3.2. Drilling History: Time vs. Depth Data

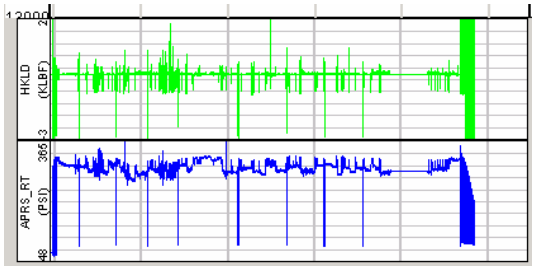
The drilling record of Time vs. Depth available to D&M during LWD operations can be plotted. The location in time and depth of each of the test points can be plotted on this history plot to help understand the relationship between drilling and testing.



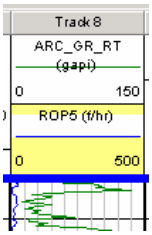
23.3.3. Drilling data

Data related to the drilling of the well is recorded both in time and depth. This data can be loaded and plotted in PD-Plot. (Well information window, Drilling data tab)

Time Index data (annulus pressures, temperatures, pump rates) are plotted in special tracks below the Time/Depth track so that they can share the Time (horizontal) axis



Depth index drilling data (Rate of Penetration, circulation rate, etc) can be plotted in any vertical track.

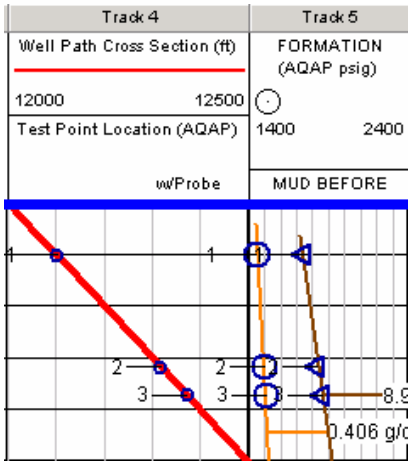


This includes LWD “logging” data such Gamma ray, resistivity, porosity etc. This can also be loaded in the Log Data loading area.

23.3.4. Well Path cross section plot

The well trajectory is often very important in understanding pressure measures, especially in highly deviated or horizontal wells.

PD-Plot 7 provides a way to enter survey data and compute full 3-D well trajectories, and then to be able to plot the well path cross section on any departure azimuth (TVD depth vs. departure distance). As well, the location of the tests point on the well path is plotted and labeled.



23.4. Test Point Table for STETHOSCOPE Data

STETHOSCOPE pressure tests are conducted in unique ways and record data that is not in common with other testing tools. The Test point table has several special columns that are only shown and populated for STETHOSCOPE tests.

Time After Drilling	Circ Rate	Probe Orientation	Temp After	1 Min DeltaP	Gauge Noise	Gauge Flatness	Mud Comp.	Pressure Corr.	Pres Diff	Last-Read Buildup Invest.	Drawdown Mob Invest.
hr	cc/sec	deg	°F		psig	psig	1/psi	psig	psig	psig	md/cp

Most must be manually entered. Some are automatically computed when the test is interpreted.

Time After Drilling can be computed from the Compute menu if Time/Depth data is loaded, and the time and date of each test point is entered on the table.

24. Multi-Well Projects

Multi-well projects are handled in much the same way as single well projects, except there is usually more data loaded.

Each well has its own list of test points, well site data, wellbore survey data, LAS log data, formation tops etc.

The pressure depth interface is constrained to Subsea depth when more than one well is "on" or "active", and gradient lines that may be drawn include all visible data points from all wells included in the selection field.

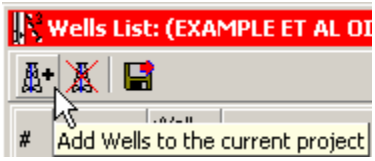
Note:

Access to multi-well features is restricted to the terms of the license. Some or all aspects of what is described may not be available to you.

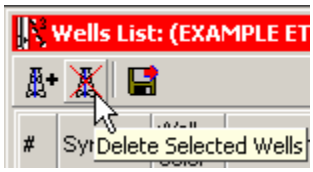
24.1. Adding and Deleting Wells from a Project

The Wells list window becomes more important.

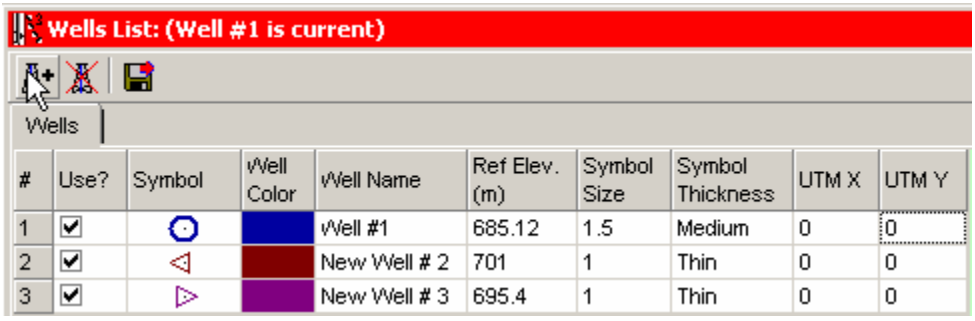
Click the **Add Wells** button to add wells. (Note: Not available for Viewer only licensing)



Click the **Delete Wells** button to delete wells. Selected rows are deleted, as well as the test points that go with them!



Display properties of each well should be kept different (symbol shape, color, thickness and size) to help identify test point data from the different wells.



#	Use?	Symbol	Well Color	Well Name	Ref Elev. (m)	Symbol Size	Symbol Thickness	UTM X	UTM Y
1	☑	○		Well #1	685.12	1.5	Medium	0	0
2	☑	◁		New Well # 2	701	1	Thin	0	0
3	☑	▷		New Well # 3	695.4	1	Thin	0	0

24.2. Adding Test Point data to multi-well projects

Test Points are added to the project in one of two ways. Either projects with single wells are created, then merged to form a multi-well project, or data can be imported to the projects, designating which well it belongs to as it is loaded.

ASCII data from multi-wells can be loaded from a single file if the well name is available as a unique data column for each test point. If the data is from a single well, the user just indicates the well the data belongs to.

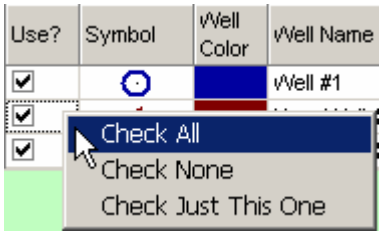
24.3. Controlling which wells are active

The Wells list table has a check box “Use” column that is used to control which wells are active.

Just click the rows that represent the wells you want to be active.

The test point table will only show rows from test points that belong to the active wells.

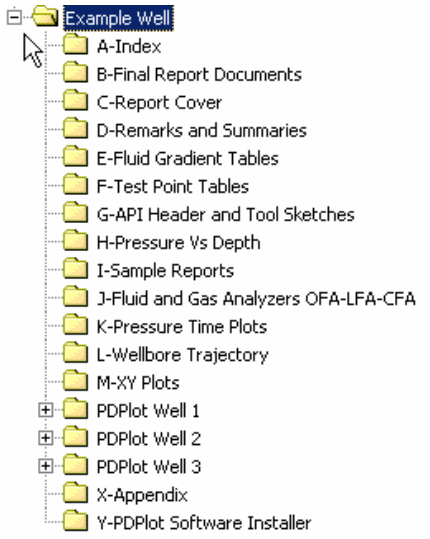
Right click on the row to select all, none, or just the row clicked.



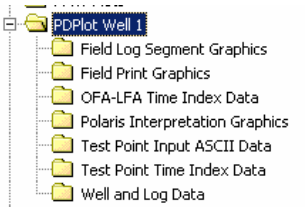
24.4. Data Storage Model and Project Folder Map

The folder system used under the main folder where the project file(s) are stored are used to organize the data.

Use the **Manage Project Folders** menu on the main **File** menu to generate the folder structure.



Each well has its set of sub folders where related data is stored.



25. Pressure Vs. Time Interpretation

25.1. Overview

The pressure vs. time window is used to display and interpret individual test data.

The results of each of these interpretations is used to populate the test point table.

The plots resulting from each interpretation can be printed or deferred and added to a customer report.

The data can be loaded from local disk files, or from “real time” files if the user is connected to the data files of an active InterACT job. All plots will be updated as the real time data files goes.

The Pressure time window is also used to display special MDT tool data for specialized interpretation. These include the LFA, and CFA tools. It also includes a special interpretation module for Oil base Mud contamination modeling using the LFA optical density data.

25.2. Supported File Types

Schlumberger DLIS files are the only data files that are recognized by PD-Plot 7 for Pressure vs. Time interpretation. The only exception are STETHOSCOPE data files. (RM_LAS, RT_LAS and RTRT_phaseb.rta)

DLIS files are converted to LAS prior to loading using the included D2A.exe application.

25.3. File naming convention

25.3.1. Overview

To assure ease of organizing and interpreting the pressure time data files, a naming convention is in effect.

Each test in PD-Plot 7 is defined as being unique by having these attributes:

- File number. A logically increasing number assigned to each DLIS file as it is opened.
- Test Number. Each DLIS file contains one or more tests. A test is the setting of the probe or packer at a single depth. These numbers are also sequential.
- Depth. The depth at which the probe is set.
- Gauge. More than one gauge can be attached to the flowline of MDT tool probes, and there can be multiple probes. The pressure response on each is different and can be individually used for pressure perm estimates

A file naming convention has been implemented to make it easy to find the data file that corresponds to each row of the test point table.

Since a single file contains one file number, 1to any test numbers, and all gauges, the file names need only File and Test number uniqueness.

FxxTaaTbbTcc.LAS

xx is the file number, aa, bb, cc etc are each test numbers. d

F11T1T2T3.las then is file 11, tests 1, 2 and 3.

PD-Plot 7 can create these file names by scanning your group of DLIS files, determining the File and test numbers from each, and doing the DLIS to LAS conversion with correct file naming.

25.3.2. File name exception for STETHOSCOPE Tool

STETHOSCOPE tests are not identified by Test and File, rather by Test and Run. Each RM real mode recorded data file or RT_LAS real time phase data file contains only one test. As a result the file naming is :

TxxRyy.LAS

xx is the Test number, yy is the Run number.

RM_LAS_T011R001.LAS is then Test 11, Run 1 (recorded mode)

RT_LAS_T011R001.LAS is then Test 11, Run 1 (real time phase data)

The STETHOSCOPE acquisition software names the files automatically with this convention. Internally the Test and Run number are recorded as parameters and can be visually inspected to check if the file names become changed.

25.4. Interaction with the Test Point Table

There are two common ways to populate the test point table.

1. The table is pre-filled with general File/Test/depth/Gauge information of all tests. This can be obtained from scanning the P vs. T DLIS files of the job, loading a Polaris dump file, or WFTI dump file. The user then loads the data and interprets each test, further filling in the details of each test.

2. The table can be left blank, then as each P vs. T DLIS file is loaded, and each test is recognized, marked, and interpreted, the user applies his results to the test point table which builds new rows as it goes.

Either work flow can be used, generally users prefer the first, as it gives them a starting point of knowing what is ahead.

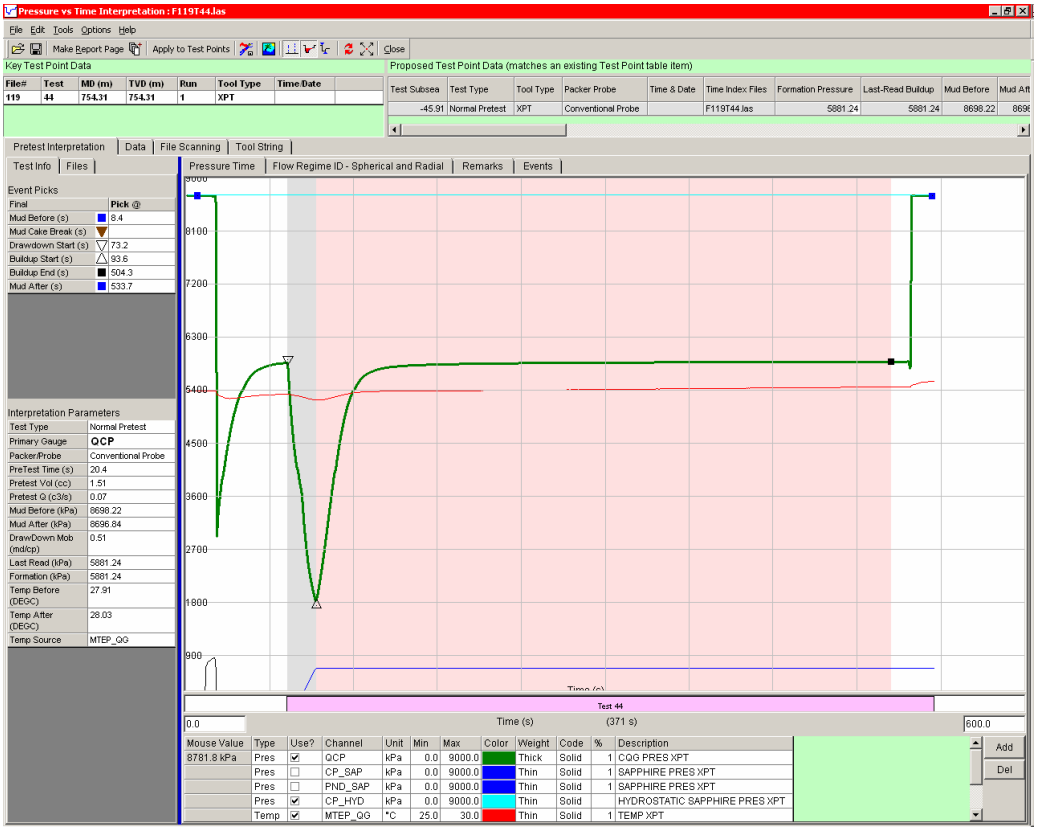
25.5. Pretest Interpretation Workflow

25.5.1. Over View

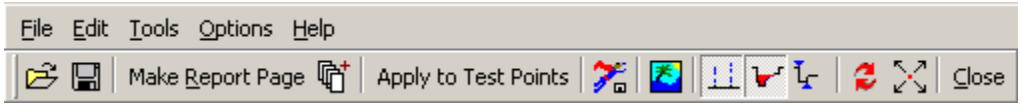
1. Use the file Scanning functions to build a test point table of all tests, and to convert all DLIS to LAS
2. Load each P vs. T LAS file, and interpret each test. Apply the results of each test back to the test point table, save the data file to save the picks and results of each test.
3. Generate the report pages for each test for later inclusion in the total report.
4. Move on to the next text in the file, or load the next file.

25.5.2. Interface Components

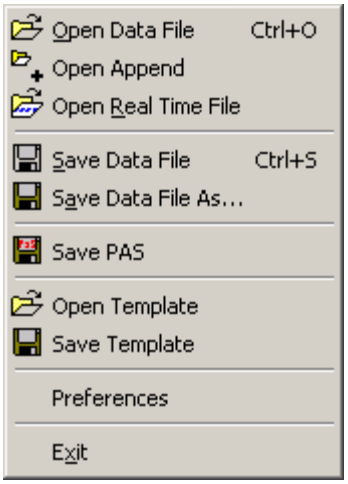
The P vs. T window



The tool bar grants access to all common functions available on the window. The individual tools that are visible vary depending on current function being performed.

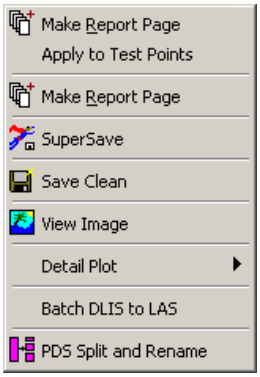


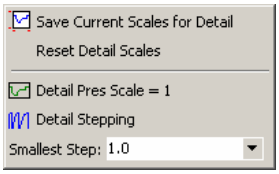
25.5.2.1. File menu



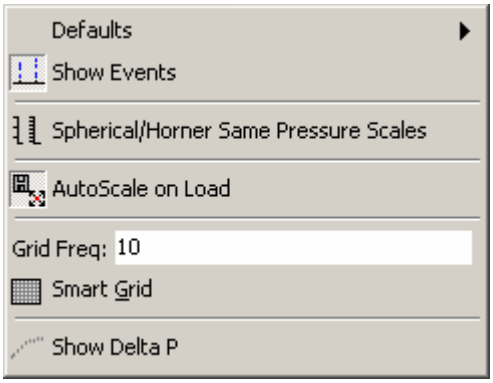
Menu Item	Function
Open Data File	Open any Pressure Time Data file; DLIS, LAS, rta
Open Append	Open any DLIS or LAS and append the data to the currently loaded data. Must have exact channels and time interval AFTER currently loaded data.
Open Real Time File	Specifically open Real Time data files, although Open Data files recognizes real time data without using this option.
Save Data File (As..)	Saves the current interpretation parameters to the currently loaded LAS file.
Save PAS	Open the PAS processing window. Canadian SLB use only.
Open Template	Opens a PTIM_*.grd template file
Save Template	Saves a template file.
Preferences	Opens the Preferences window.
Exit	Closes the Pressure vs Time interpretation window.

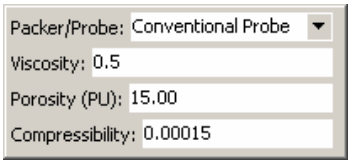
25.5.2.2. Tools Menu

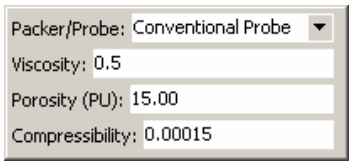


Menu Item	Function
Make Report Page	Creates a deferred report page of the current group of plots.
Apply to Test Points	Applies interpretation answers of current test to the test point table
Super Save	Does Make Report Page, Apply to Test points and Save Data File actions together.
Save Clean	Removes any saved information from the loaded LAS file.
View Image	Opens the Images Window to see PDS, deferred report pages or raster images associated with the current test.
Detail Plot	Opens a sub menu with Detail Plot options. 
Batch DLIS to LAS	Converts all DLIS files found in time Index Data Files folder to LAS.
PDS Split and Rename	Special function to help break field print into each test component and rename with File and Test number for use with View Image.

25.5.2.3. Options Menu





Menu Item	Function
Defaults	Sub menu of common interpretation defaults 
Show Events	Shows or hides the events on the pressure vs Time plot. These events are module status events, not the time picks.
Spherical Radial Same Pressure Scales	Forces the pressure scales of the Spherical and Radial time function plots to be the same.
Auto Scale on Load	When data file is first loaded, will optionally auto-scale all data channels.
Grid Freq: 5 Grid Frequency	Determines the number of divisions in X and Y for the background grid. Used with Smart Grid setting as well.
Smart Grid	Optionally uses a smart grid system where grids are placed at even time and pressure intervals rather than just dividing the plot into equal pieces. Grid frequency guides the general number of divisions.
Show Delta P	Shows or Adds a Delta P curve to the Flow Regime ID Plot. Menu only shows this item when Flow Regime Plot tab is current.

25.5.2.4. Key Test Point Data Table

The **Key Test Point Data** table lists the "unique" parameters for this test. It is filled from the loaded file's contents.

Key Test Point Data

File#	Test	MD (m)	TVD (m)	Run	Tool Type
119	44	754.31	754.31	1	XPT

The **Proposed Test Point Data** table contains the interpreted and information items that will be used to populate the test point table when **the Apply to Test Point** function is used. This table and the **Key Test Point Data** table, contains the same items as the test point table. The user can modify certain items with manual entry to populate the test point table result from within this window.

Proposed Test Point Data (matches an existing Test Point table item)

Test Subsea	Test Type	Tool Type	Packer Probe	Time & Date	Time Index Fil
-45.91	SMART	XPT	Conventional Probe		F119T44.las

The Event picks table show the symbols and time locations of the various event markers placed on the primary pressure gauge on the plot. This table's contents will be vary depending on the tool type being interpreted.

Event Picks

Final	Pick @
Mud Before (s)	8.4
Mud Cake Break (s)	
Drawdown Start (s)	73.2
Buildup Start (s)	93.6
Buildup End (s)	504.3
Mud After (s)	533.7

25.5.2.5. STETHOSCOPE Events Tables

STETHOSCOPE events are listed for both the Investigation and Final Phase.

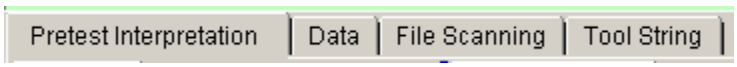
Event Picks	
Final	**Pick @**
Mud Before (s)	0.5
Drawdown Start Inv. (s)	102.1
Mud Cake Break (s)	
Buildup Start Inv. (s)	118.2
Buildup End Inv. (s)	219.1
Drawdown Start Final (s)	219.8
Buildup Start Final (s)	239.5
Buildup End Final (s)	399.9
Mud After (s)	434.3

When real time phase data file is loaded (RT_LAS_TxxRyy.las), a new table is shown above the Event and Interpretation Parameters table detailing the various time and pressure values at each key event in each phase.

FPWD Phase Data	Time (s)	Pressure (psig)
B_Mud Before	-20	9988.3
B_Invest. DD	2	8202.3
B_Invest. BU	132	8364.3
B_Final DD	136	8185.3
B_Final BU	300	8364.3
C_Mud Before	-20	9988.4
C_Invest_DD	6.4	8202.3
C_Invest_BU	130	8364.3
C_Final_DD	135	8185.4
C_Final_BU	300	8364.4
C_Delta 1	136	8190.4
C_Delta 2	137	8195.4
C_Delta 3	139	8217.4

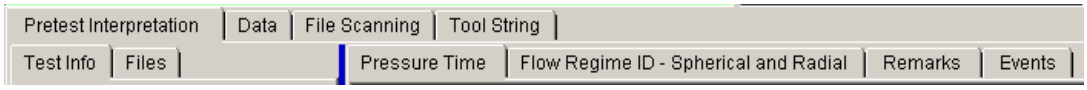
25.5.2.6. Main Tab Bar

The main tab bar allows access to each of the main plotting components on this window.



For MDT tools with LFA, CFA, AFA modules, additional tabs will be visible to allow access to exclusive plots and functions for those tools.

Each main tab may have its own set of sub- tabs to access plots and input relevant to the specific main tab. For example, the Pretest Interpretation tab contains four addition tabs where related plots and entry can be accessed.



Each plot on each tab will have tables and toolbars that control the display of data shown on those plots.

The data items plotting on the main pressure time plot are controlled by the table below the plot.

Each row represents the properties of one data item.

Mouse Value	Type	Use?	Channel	Unit	Min	Max	Color	Weight	Code
	Pres	☑	QCP	kPa	0.0	9000.0		Thick	Solid
	Temp	☑	MTEP_QG	°C	25.0	30.0		Thin	Solid
452.1 rps	Mspe	☑	HMS1	rps	0.0	4500.0		Thin	Solid
	VOL	☑	PTV1	C3	0.0	2.0		Thin	Solid

This template data can be edited, and templates can be saved for later retrieval.

The interpretation Parameters tables show the interpretation results of the current plot

Table for Pressure Time Plot

Interpretation Parameters	
Test Type	SMART
Primary Gauge	**QCP**
Packer/Probe	Conventional Probe
PreTest Time (s)	20.4
Pretest Vol (cc)	1.51
Pretest Q (c3/s)	0.07
Mud Before (kPa)	8698.22
Mud After (kPa)	8696.84
DrawDown Mob (md/cp)	0.52
Last Read (kPa)	5881.24
Formation (kPa)	5881.24
Temp Before (°C)	27.91
Temp After (°C)	28.03
Quality	
Temp Source	MTEP_QG

Table for Flow Regime ID plots

Interpretation Parameters	
Spher Mob (md/cp)	
Spher P* (kPa)	
Visc (mpa.s)	0.5
Poro (V/V)	0.13
Ct (1/kPa)	0.00015
Radial Mob (md.m\cp)	
Radial P* (kPa)	
Last Read (kPa)	5881.24

When STETHOSCOPE Recorded mode and Real time Phase data is loaded, a specialized tool bar above the Pressure time plot will be shown.

Each phase and type of data can be selectively turned on or off with this tool bar. It also indicates what types of data are available.

25.5.3. Templates

The various Pretest Pressure vs. Time displays are controlled by template files. The Pretest Interpretation window template is considered here.

The large variety of tools, and gauges available for each, and each users local preferences, requires that the user build a library of templates suitable to their needs.

When data files are loaded, the software looks for suitable templates based on a naming convention that includes the name of the tool (MDT, XPT etc) and the specific pressure gauge in the primary probe or packer module.

The expected template names use a combination of three elements.

PTIM The generic name of the template
<*toolname*> The tool name, MDT, XPT etc.
<*gaugename*> The name of the primary gauge

The file name isthen assembled in this manner.

PTIM_<*toolname*>_<*gaugename*>.grd

PTIM_MDT_BQP1.grd, PTIM_XPT_QCP.grd etc are common examples.

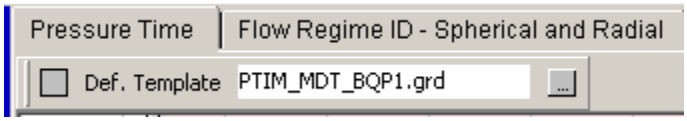
This naming convention is used to auto load matching templates as data files are loaded, or if the user selects different Primary gauges for use.

The software will create default templates based solely on the <*toolname*> parameter containing the most common gauge for that tool as a starting point. Other templates for other gauges must be created using these templates as a starting point to local preferences.

25.5.3.1. Default Templates

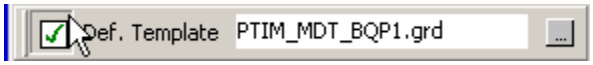
To help make the interpretation process more efficient, the user can specify a specific template to use rather than relying on the auto find feature.

The tool bar above the Pressure vs. Time plot has a control where the default template can be specified.



Click the  button to locate the require template file.

Once selected, the user can turn on the use of the template with the button on the left. When this button is 'on', each time a new data file loaded, this template will be used to display the data.



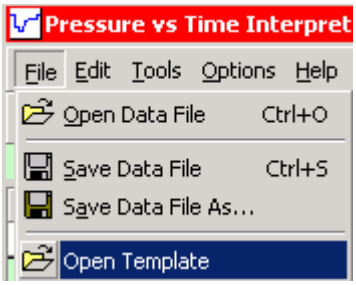
When a new template is selected, you will be asked if you want to apply it now to the currently loaded data.

Note: If the data file being loaded was previously saved, it will contain the template that was used at the time the file was saved, and THAT template will be used, not the default template.

Note: Be careful when loading data from different tools or when starting a new job. The default template in use may not be appropriate for the current tool or data.

25.5.4. Loading Templates

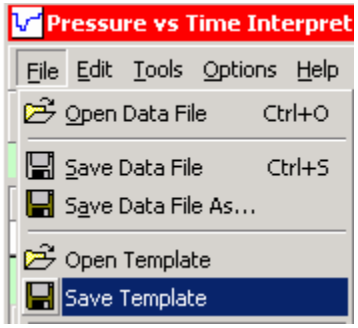
Open the **File** menu, and select **Open Template.**



Find the template file from the **Open** dialog

25.5.5. Saving Templates

Open the **File** menu, and select **Save Template** item.



Name the file and save it. Always retain the .grd extension, and keep the PTIM prefix to avoid later confusion.

25.5.6. Working with the Pressure Time display

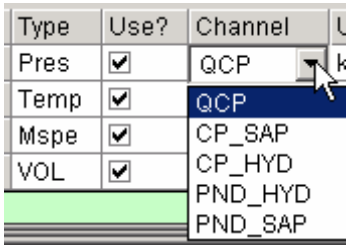
Template Editing Table

Mouse Value	Type	Use?	Channel	Unit	Min	Max	Color	Weight	Code	%	Description
4026.1 kPa	Pres	☑	QCP	kPa	4000.0	6228.1		Thick	Solid	1	CQG PRES XI
	Temp	☑	MTEP_QG	°C	25.0	30.0		Thin	Solid	1	TEMP XPT
	Mspe	☑	HMS1	rps	0.0	4500.0		Thin	Solid	0.1	MOTOR SPEE
	VOL	☑	PTV1	C3	0.0	2.0		Thin	Solid	0.1	XPT PRETES

Add
Del

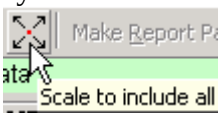
Edit the various columns are required. Add additional rows with the **Add** button, remove unwanted rows by first clicking on any cell on that row, then click the **Del** button.

When adding a new row, first set the **Type** column, then select the Channel. Channels of that type only will be available from the drop down list.

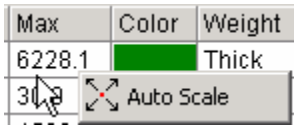


For example if Type is Pressure, then only pressure channels are available for selection in the Channel cell of that row.

Auto-Scale

All currently selected items on the table can auto scaled to fit using the Auto-scale tool bar button 

Any individual item can be scaled by right clicking on the scale value on the table, and select Auto-scale.



% Column

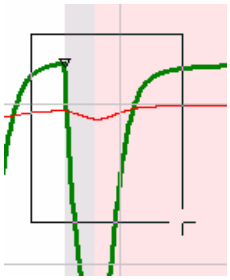
The % column determines the percentage of the total plot height used for that item. This helps constrain items such as volumes that look best when they occupy a small part of the track. This allows you to confine the item to a percentage of the track without resorting to artificial scales.

Note: Some line coding may not appear as indicated until the printed pages are created. This is a restriction of the interface.

When complete, save your template using the **Save Template** item on the **File** menu.

Zoom and Un-zoom

Drag the mouse with the left button held down over the plot to hi-light the zoom region. A rectangle shows you the region.



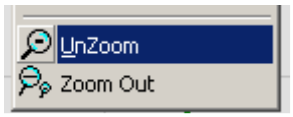
Release the mouse, the plot is re-drawn over the zoomed region. Repeat as many times are desired.

To Un-zoom one level, either right click and select un-zoom 

or click the same un-zoom button on the tool bar  .

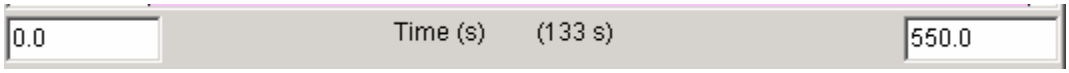
You can also touch the “U” key on the keyboard if you find that more convenient.

Each use of un-zoom brings back one un-zoom level. When none remain, the Un-zoom tool bar button becomes disabled. When zoomed in more than one time, you may return to the original scales by using the “Zoom Out” selection on the right click menu.



Time Scaling

To set the time scaling of the plot, click on and manually enter any time number in the time scale fields below the plot.



25.6. Pressure Interpretation Tasks

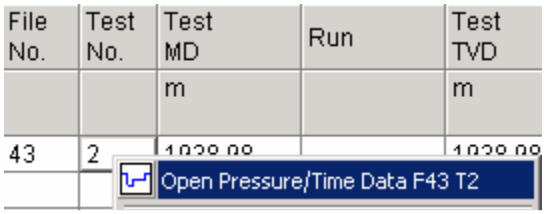
25.6.1. Loading Data

You may select either DLIS or LAS data files. If you select DLIS, it will converted to LAS for you. There is no need to select a DLIS once the corresponding LAS file exists.

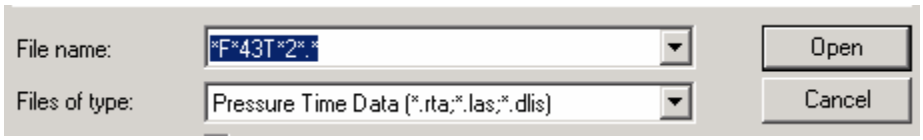
A pressure time data file can be opened in three ways.

1. Using an existing Test point table entry.

   Right click on the row, and select the Open Pressure/Time Data item

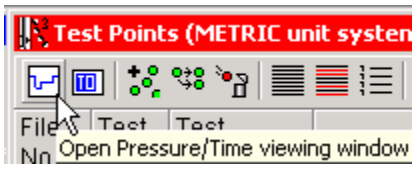


   This will then be looking for an LAS file with the **F*43T*2.las** pattern to help you find the correct file



2. Using general access from the Test Point table.

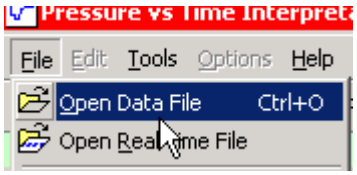
Click the **Open pressure time data** toolbar button.



Select the file you want to open.

3. From the **File** menu of the Pressure time interpretation window

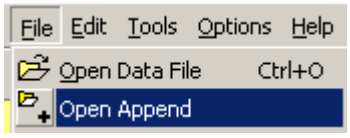
Once the Pressure Time Interpretation window is open, use the **File** menu, then **Open Data File** to select any available file.



25.6.2. Appending Data to the Current Data

There are situations where data acquisition circumstances resulted in a single test being broken into two or more DLIS files.

PD-Plot 7 can only load one DLIS file at a time, but if the **Open Append** function is used



after the initial open of the "first" file, each successive file is added to the currently loaded data, rather than replacing it.

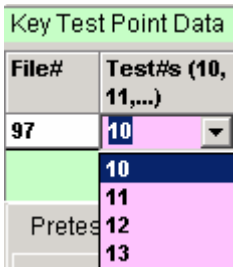
The following conditions apply.

1. The time order of the files. Determine exactly which files are first second, third in order, and load them that way. Load the first file with the normal **File – Open Data File**, then use **Open Append** for the remaining files, in time order.
2. All files must have exactly the same channels and sample rate. This is taken care of when you load each file from DLIS.

25.6.3. Identifying the Current Test

The loaded file may contain more than one test. Only one test can be interpreted at one time.

If more than one test is available, the Test #'s field of the Key Test Point data table will be colored, and the cell, if clicked will contain a list of all available tests. The cells title is also indicating the presence of multiple tests.



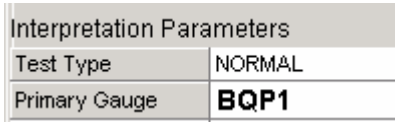
There is a graphic bar below the plot that shows the time interval for each test, and the test number.

The current test will show the colored background. Any picks you make should be made within the time boundaries of the current test (except mud before and after!)

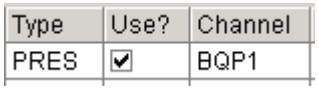
25.6.4. Making Event Picks

Each test has event picks which must be made. They can be placed manually or automatically place. When a data file is first loaded, the first test is identified, and the picks are automatically placed on that test.

Picks are made on and appear on the plotted pressure data of the PRIMARY gauge only.

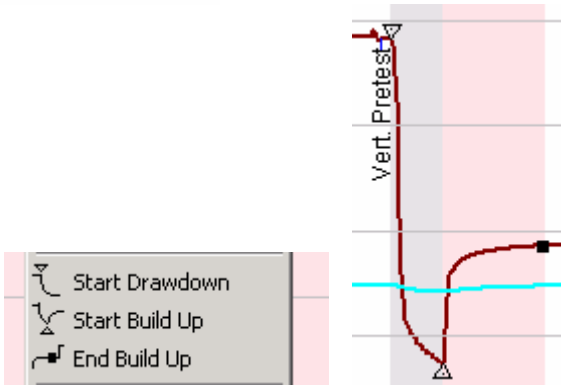


There must then be a matching pressure data item in the template.



Minimum picks required

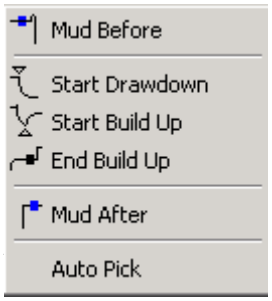
At least the Start of Drawdown, and Start and End of Build up must be marked before you move on to the flow regime identification and specialized plots tab.



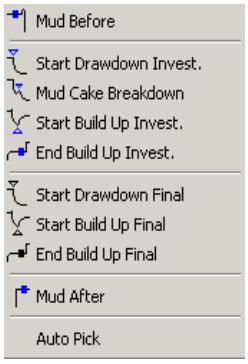
Manually placing picks

Right click on the plot at the time of the event you wish to mark. Select that event from the list that appears. The event is moved to that time.

General Picks



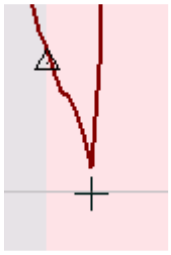
FPWD Picks



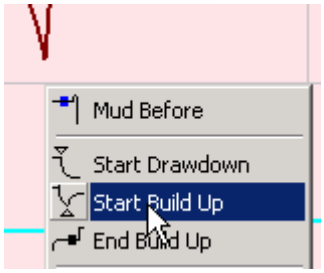
Marking Start of Buildup

In this example, the pick is incorrectly placed.

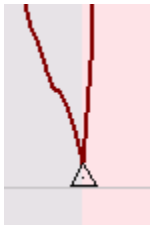
Line up the mouse in time (left/right) with the new desired location of the pick. Only the left/right position matters.



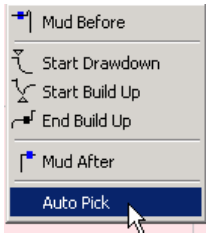
Right click without moving the mouse, and select **Start Build Up**.



The pick is now moved to the new time.

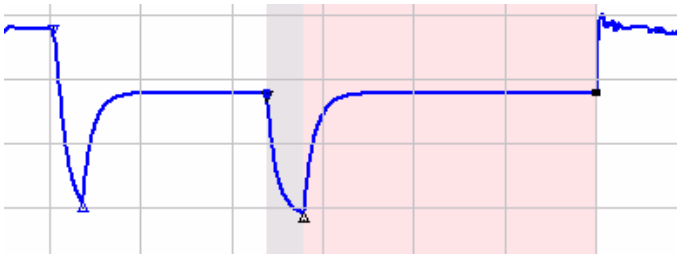


To re-generate the auto-picks, select the last item on the right click menu.



25.6.5. STETHOSCOPE Events Picks

STETHOSCOPE tools utilize two distinct drawdown and buildup sequences, termed “Investigation” and “Final”.



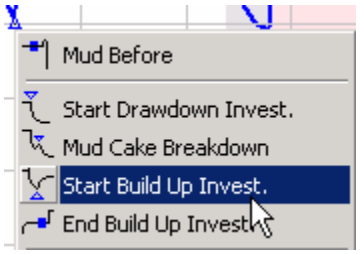
PD-Plot 7 allows you to interpret them separately. Picks for each sequence can be set separately.

The drawdown mobility and last read pressure from both tests are stored and reported for comparison. Formation pressure is the interpreters selection of the best of the interpretations from two sequences, though the final test usually provides the best estimate of formation pressure.

25.6.5.1. Making Picks for the Investigation phase

Set the tool bar above the plot to the **Investigation** selection.

Right click at the time of the event you wish to make.

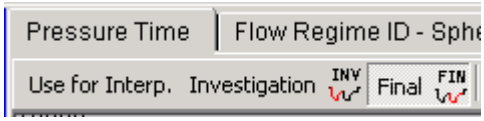


Select the corresponding event from the list, using the **Invest.** items

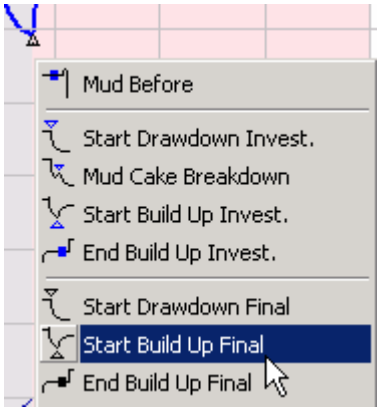
Repeat for all events.

25.6.5.2. Making Picks for the Final phase

Set the tool bar above the plot to the **Final** selection.



Right click at the time of the event you wish to make.



Select the corresponding event from the list, using the **Final** items

Repeat for all events.

25.6.6. Interpretation Parameters table

The Interpretation Parameters table is used to set key parameters related to the test, and to view the results of interpretation applied to the test.

Inputs

Test Type
Primary Gauge
Packer Probe
Temperature source

Interpretation Parameters	
Test Type	Normal Pretest
Primary Gauge	**BQP1**
Packer/Probe	Conventional Probe

…

Temp Source	BQT1

Outputs and related parameters

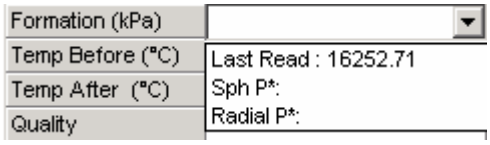
This table lists the pressure and mobility answers resulting of the picks and interpretations performed on the pressure time data.

PreTest Time (s)	20
Pretest Vol (cc)	16.71
Pretest Q (c3/s)	0.84
Mud Before (kPa)	20678.53
Mud After (kPa)	20670.12
DrawDown Mob (md/cp)	0.25
Last Read (kPa)	16252.71
Formation (kPa)	16252.71
Temp Before (°C)	39.22
Temp After (°C)	55.08
Quality	

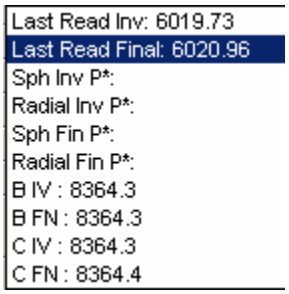
This information is transferred to the proposed test point table at the top of the window as the interpretation progresses.

The user can modify certain fields. The pretest volume, pretest time, temp before and after, and Quality can be edited as required.

The formation pressure item can have several potential sources. The user must determine which pressure answer is correct, and make that selection from the drop down list.

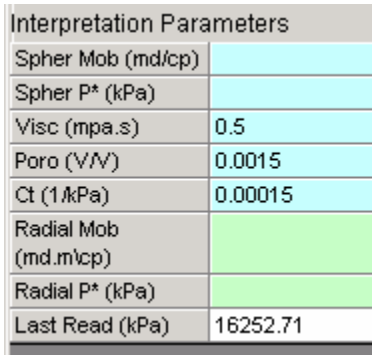


For STETHOSCOPE data with both RM_LAS and RT_LAS loaded, the list of potential formation pressure interpretation has several members.



Using established rules, the formation pressure default is radial extrapolated pressure (if present) , then spherical (if present), then finally last read buildup pressure.

The answers and input parameters for the flow Regime ID and specialized plots are available when the **Flow Regime ID – Spherical and Radial** tab is selected



These summarize the current answers based on the current regime start and end time picks, and the inputs (for spherical mobility) of Viscosity, porosity and total compressibility.

25.6.6.1. Drawdown Mobility Options

Note: These options are available to SLB users only

The Drawdown mobility is computed for all tools using a similar technique. There is an option available to compute the mobility using an historical simplified technique called the Steady State equation.

Note! Use this technique with appropriate caution and only when necessary. It should not be used routinely as a comparison to the values obtained with the normal technique. It is to be used when the normal technique is invalidated due to invalid pressure responses resulting from seal problems, plugging problems or other issues, and only as a last resort to get a drawdown mobility estimate.

The Steady state equation used with the Repeat Formation Tester uses the simple pressure drop and flow rate to compute mobility.

$$k_d = C * q * \mu / \Delta P$$

where

k_d = Drawdown Mobility (md)
C = Proportionality factor for each probe
q = Pretest Flow rate (cc/sec). Pretest volume withdrawn / time to do so.
μ = Viscosity of flowing fluid (cp). Usually drilling mud filtrate.
ΔP = Drawdown pressure (psi) Pressure at last read build up pressure minus the pressure at the start of the build up

This model assumes single phase, constant rate hemi-spherical flow. The lower the permeability becomes, and more the actual test differs from these basic assumptions, the answers accuracy degrades significantly.

To activate this option, click this tool bar button  , which is normally selected, so that it is in the un-selected state, like this,  .

The Drawdown mobility value in the Interpretation Parameters table will show that this is the SS (steady state) value.

DrawDown Mob (md/cp) (SS)	0.74

Notice in this example data set, the normal modern technique provides a very different answer. DrawDown Mob (md/cp) 0.07 highlighting the care that must be taken when using this technique.

25.6.7. Flow Regime ID Plot

25.6.7.1. Overview

The Flow regime ID plot provides a log/log picture of the derivative of the spherical (blue) and radial (green) time functions.

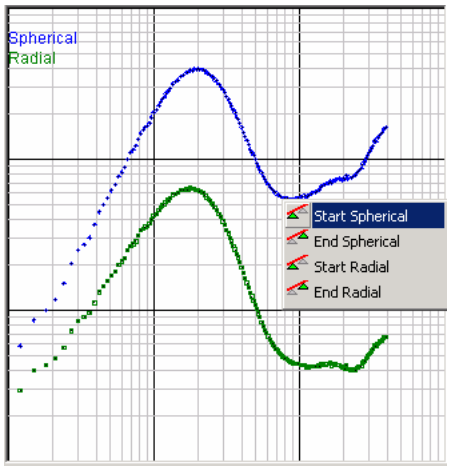
The user attempts to identify regions where each plotted data has 0 slope while the other function has +/- 0.5 slope

Spherical flow is occurring when:	Spherical time function derivative has 0 slope.	Radial time function derivative has –0.5 slope in same time interval.
Radial flow is occurring when:	Spherical time function derivative has +0.5 slope.	Radial time function derivative has 0 slope in same time interval.

25.6.7.2. Working with the Flow Regime ID Plot

The user marks the regions using the mouse position and right click menus.

Point to the plot when you wish to place the start or end of the region where the plotted data appears to be 0 slope. Press the right mouse button,



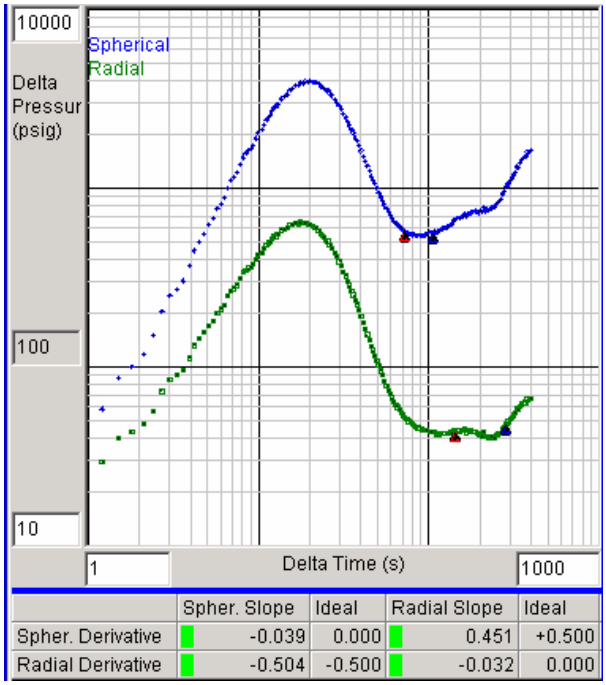
and select the pick you wish to make. A marker then appears on the corresponding plot.

Repeat for the end marker

Repeat for the other flow regime (if present)

Note: Either flow regime may not exist, it is up to the individual to make appropriate interpretations of the flow regimes.

As start and end pairs are placed, the summary table below the plot shows the slopes of the two time functions as a guide.



	Spher. Slope	Ideal	Radial Slope	Ideal
Spher. Derivative	-0.039	0.000	0.451	+0.500
Radial Derivative	-0.504	-0.500	-0.032	0.000

If the slopes are within spec in each of two regions (+/- 0.05 or ideal number for either), then the indicators will be green.

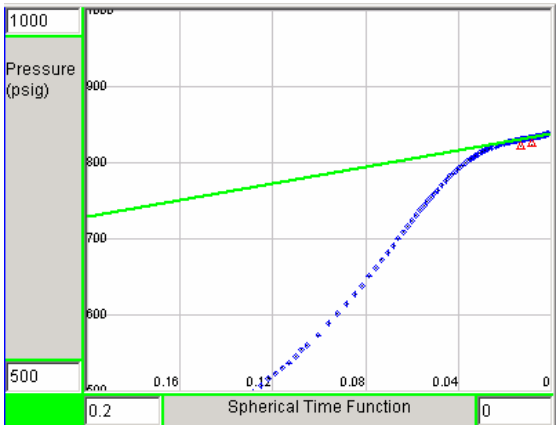
Yellow indictors show agreement with +/-0.1 of ideal, red indicators suggest poor tolerance with slopes > +/- 0.1

Radial Slope	Ideal
0.390	+0.500
-0.078	0.000

Note: The two marked regions must NOT overlap. It is impossible to have the two flow regimes occurring simultaneously.

25.6.7.3. Identifying Spherical Flow

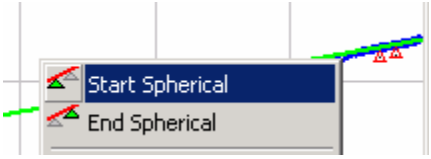
Once picks are made on the flow regime ID plot that indicate that Spherical flow is likely occurring, the Spherical time function plot upper right can be used to compute a spherical flow mobility from the slope of this plot.



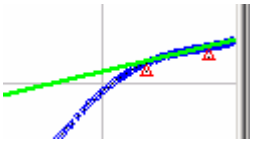
Zoom in by dragging the mouse over the plot, r scale the plot manually using the scale fields around the plot to highlight the selected region.

The picks where the slope is determined are at the location determined by the flow regime ID plot.

Move them by pointing with the mouse to the new location, then right click and select the start or End.



The pick will move, a new line slope is computed, and a new Spherical Mobility and Extrapolated Pressure are computed. The new picks are also reflected on the Flow Regime ID plot.



The **Interpretation Parameters** table to the left shows the new answers.

Interpretation Parameters	
Spher Mob (md/cp)	0.0089
Spher P* (psig)	839.7
Visc (cp)	0.5
Poro (PU)	13
Ct (1/psi)	0.00015

The mobility has input parameters of fluid properties of the formation fluid affected during the test. There are inputs for Viscosity, porosity and Total Compressibility, which the user can adjust as needed.

25.6.7.4. Identifying Radial Flow

See the Identifying Spherical flow section above.

The only exception is the answers for Radial flow are unique from those of the Spherical regime answers, found on the Interpretation Parameters table.

Radial Mob (md.ft\cp)	0.015
Radial P* (psig)	839.9

SLB Users only

When any interpretation plot or series of plots are complete, the user must save a report page for later inclusion in the final total report.

PD-Plot 7 allows you to save a deferred printed page (or pages, depending on the plots) as a file at any time. These files are then later compiled and printed (either hardcopy or to Acrobat PDF files) when the total report is generated.

25.6.8. Pretest Interpretation – Saving Report Pages

Pretest interpretation for each test is concluded by saving the report pages that will be included in the final report.

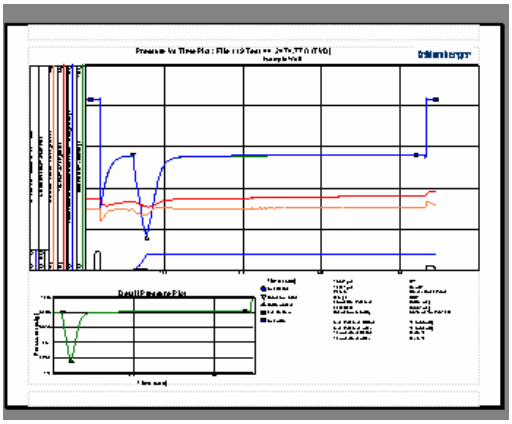
The Pressure vs. Time, Flow regime ID, Spherical and Radial time function plots and summary tables comprise one or two pages for each test

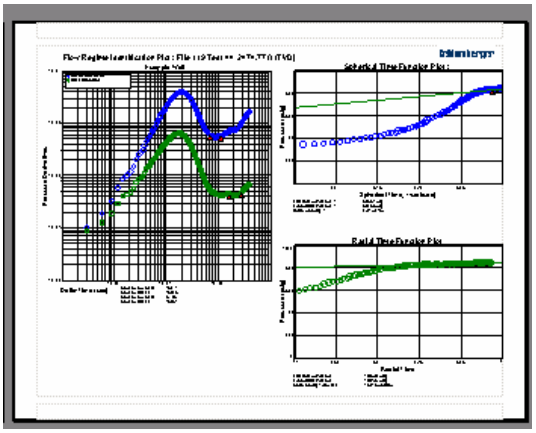
Click the **Make Report Page** button. 

A new window will open and a preview of the printed page(s) will appear.

The Select table on the left can be used to select the specific plot components required.

Select	
Page 1	
Pressure/Time	☑
Detail PTIM Plot	☑
Page 2	
Flow Regime ID / Derivative	☑
Spherical Time Function Plot	☑
Radial Time function Plot	☑





Press the **Print Preview** button 

to re-generate the pages after making changes.

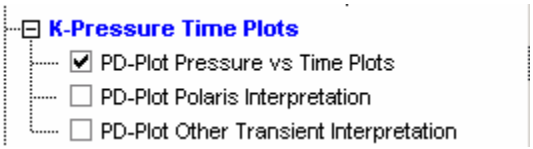
Press the **Save for Report** button 

when the preview is correct.

Retaining the default name is strongly suggested, as it assures all tests will have unique names. The path is also important, as the files must be in the correct folder;

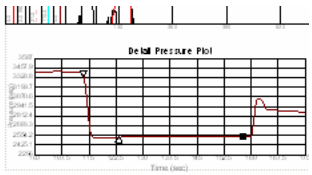
…<project folder>\PDPlot Well 1\Polaris Interpretation Graphics

so that they can be found when you print the entire report from the print window.
The print window select item to print these plots is



25.6.8.1. Detail Plot – Pressure vs. Time

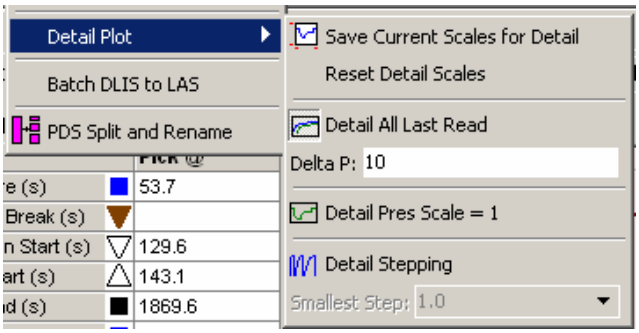
An small auxiliary “detail” plot can be added to the pressure time report page in the lower left corner.



It contains only the primary pressure gauge trace and the event picks.

This plot zooms in on certain regions of the drawdown and buildup to provide clearer understanding of the quality aspects fo the test.

There are several optional settings for the Detail plot are on the Tools menu, Detail Plot item.



1.1.1.1.1. Detail Plot Options

Actions

> **Save Current Scales for Detail**. Click this item to save the current pressure and time scales on the main plot to be used for the detail plot when the report page is created.
>
> **Reset Detail Scales**. Forget the current scales and use the selected options.

Optional settings

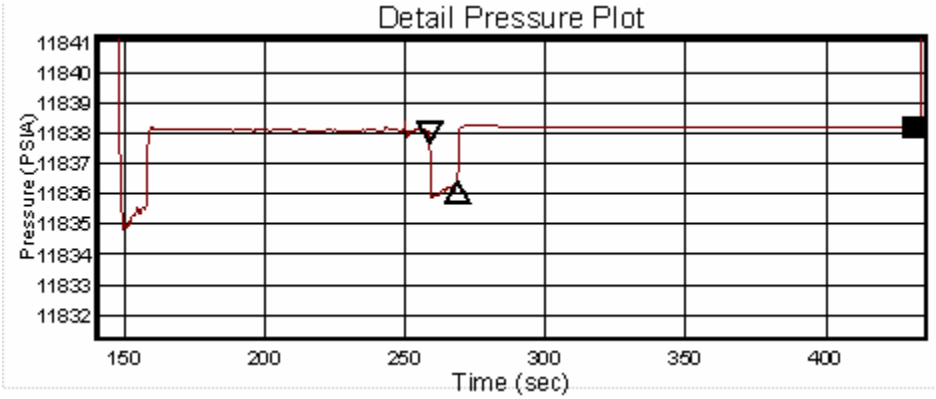
> There are three option buttons that can be toggled on or off, separately or together. There are four combinations.

Detail All Last Read

This setting allows you auto-scale the plot so that all Last Read buildup pressures (tests with more than one test) are displayed on an amplified scale for quality comparison.

The plot will be time scaled from slightly before the Start Drawdown pick of the first test to the just after the Last read buildup pressure pick of the last test.

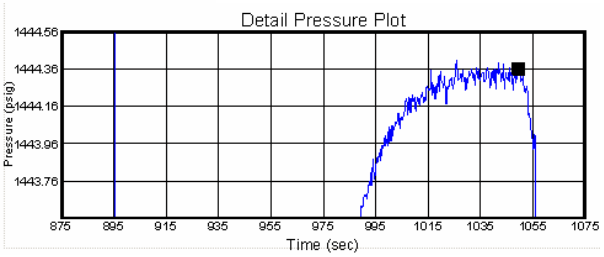
The pressure scales are determined by the setting of the Delta P edit field. The total pressure difference from the top to the bottom of the plot will be this value in the current pressure units. The actual scales are selected so that that the last read pressure is 70% of the way up the plot.



Detail Pres Scale = 1 is on 

This setting is used to magnify the end of the buildup by zooming in with a 1 psi delta scale on the last read buildup pressure pick.

Time scales: ~10 seconds before start Drawdown pick and ~20 seconds after End Buildup pick
Pressure scales: 1 psi (or current pressure unit) total top to bottom, with the last Read buildup Pressure at 80% of the pressure scale.



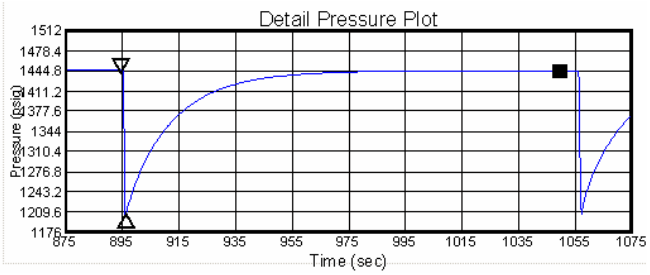
(Last read = 1444.35 psi)

Detail Pres Scale = 1 option is OFF

This setting is used to display just the drawdown and buildup portion of the test. Commonly used when the main pressure vs time plot is showing the entire test time interval, but the pretest is a small portion of that.

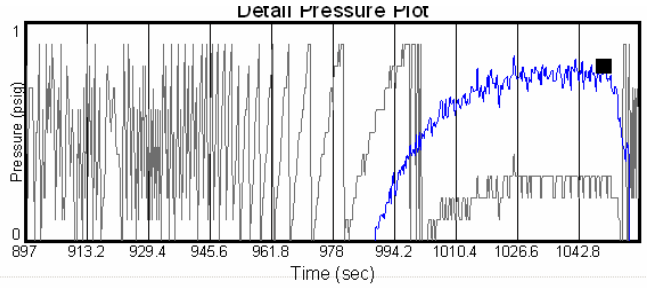
Time scales: ~10 seconds before start Drawdown pick and ~20 seconds after End Buildup pick.

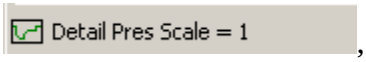
Pressure scales: Last read buildup pressure (typically the highest) the pressure at the start of the buildup (typically the lowest) are used to autoscale the plot to place the last read pressure at 80% of the plot height so that the drawdown and buildup are hi-lighted.



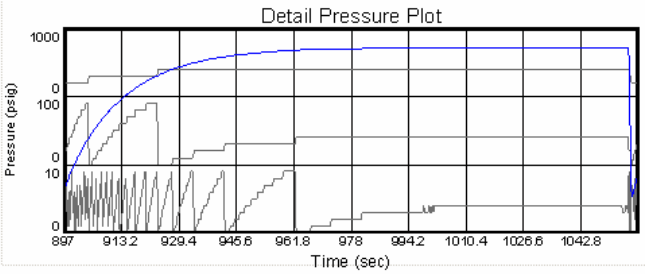
Detail Stepping option is ON

With this option on, a stepping curve with 0.1 psi (or current pressure unit) steps is added to the plot. This duplicates a portion of the field log that is familiar to some users to use for stability indication.



There is an interaction with the other option. If Detail Pres Scale = 1 option is OFF 

, then three tracks of stepping curves are added to duplicate the full field log display. Each set is scaled 10 times larger than the last.



Detail Stepping option is Off 

With this option off the stepping curves do not show.

Smallest Step size 

When the Detail Stepping Option is on, this sets the total scale of the smallest of the stepping curves.

1.1.1.1.2. Detail Plot Scaling Report Page Scaling Options

After the initial preview of the Pressure Time plot and the optional Detail plot report page (Make Report Page Option), the detail plot may require additional refinement.

The Detail Scales table allows control of plot scales and grid line properties.

Detail Scales

Item	Value
Pressure Max(PSIA)	5330.00
Pressure Min(PSIA)	4025.00
Time Max	1900
Time Min	100
Grid Y (PSIA)	500
Grid X (sec)	50
Gridding Option	Grid Every

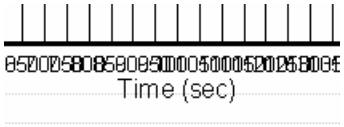
Scales

The current Pressure and Time Scales are shown. Change them to the desired values and click Print Preview to refresh the display using the new Detail plot scales.

Item	Value
Pressure Max(PSIA)	5000
Pressure Min(PSIA)	4000
Time Max	1950
Time Min	50

Grid Options

Grid line placement is often a matter of appearance and local preference. Enough lines need to be placed to allow clear scaling, but too many can result in overlapping numbers and a crowded display



The X and Y axis grid lines can be placed using two techniques.

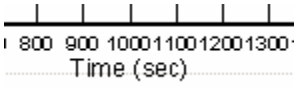
Grid using “Grid Every “

Gridding Option	Grid Every

“Grid Every” places a grid line at an even whole pressure or time value as indicated by the Grid Y (<*pres unit*>) or Grid X(sec) value.

For example, using a Grid X of 100, places grid lines and scale values every 100 seconds, at whole 100 seconds values.

Grid X (sec)	100
Gridding Option	Grid Every

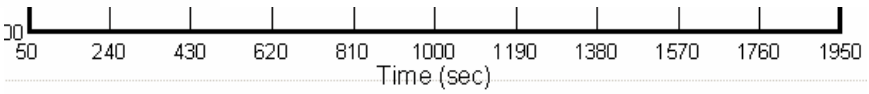


Grid Using “# of Divisions”

Gridding Option	# of Divisions

The “# of Divisions ” option simply divides the current X or Y scales into the number of indicated divisions.

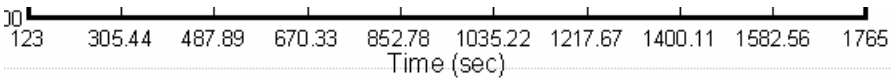
Grid X (div)	10
Gridding Option	# of Divisions



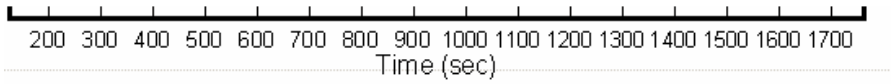
Scale number are placed at each grid line.

Scaling must be considered so that clear simple grid line scale values are maintained using this grid option. The following result is not visually appealing or useful to the user.

Time Max	1765
Time Min	123



If specific irregular time or pressure scales must be used, the “Grid Every” option is usually the preferred setting, at it places grid lines at regular whole number intervals regardless of scaling.



25.6.8.2. Creating Merged Report Pages

If the user creates more than a single deferred report page for each pretest interpretation, then several pti files will be created. This necessitates added complexity to printing the final report as individual pti files must be named uniquely, and many more pri files will need to be handled when creating the final report.

To assist this, it is possible to create a merged PDF document of all Pressure/Time pti files for a single test.

A table is shown on the Make Report preview window that shows all pti files from the current test. (no other pti files will be visible).

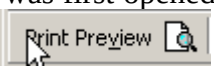
pti Files — Make PDF

Order	pti files
	Pretest_F24T15_CP_SAP.pti
	Pretest_F24T15_CP_SAP_2.pti
	Pretest_F24T15_CP_SAP_3.pti

The user can do several actions

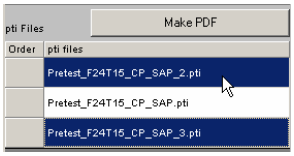
Previewing pti files

Click on any row of the table and the pti file will be shown.

Note: The original preview that was generated when the window was first opened can be re-generated anytime by clicking the Print Preview button 

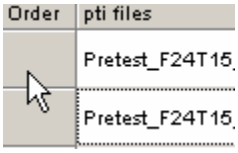
Selecting and Ordering specific pti files

Hold the Ctrl key down while clicking on each pti row to select that row. Any set of files can be selected.

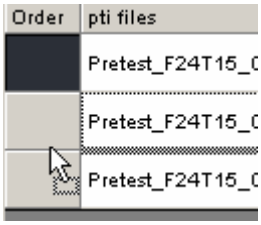


To order the files, drag the rows up or down using the gray left-hand cell of any row.

To move the top row down one row, click and hold the mouse down on the gray left hand cell of the first row;



then drag it down ward. The thick gray line between the rows shows the position of the row if the mouse were to be released now. Position this line between the second and third rows and release the mouse button



The rows are now re-ordered. Re-select if necessary.

Creating PDF of selected pti file contents (requires PDF Creator)

One or more of the pti files can be merged and printed to a single PDF document at any time.

The order of the pti files in the final documents is determined by the order of the rows, top to bottom. Order them as described above.

Click the Make PDF button to create the pdf document. You will asked for file name, but the file will ALWAYS be written to the *<project folder>*\B-Final Report Documents\pdf sections folder just as if you were creating them using the Report Generator window.

25.6.9. Saving Results

After interpretation of each test in a loaded data set is completed, the user should save the test information to the test point table, and to the LAS file.

25.6.9.1. Saving Results to the LAS file

Select File menu then Save Data File. This will write the current information to the current Pressure vs Time LAS file.

25.6.9.2. Removing results from an LAS file

If you want to removed all saved information from a LAS file, select the Tools menu, the Save Clean. 

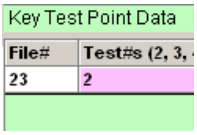
Provide a new file name if desired and click Save.

25.6.9.3. Saving Results to the Test Point Table

Use the Apply to Test Points button on the tool bar.

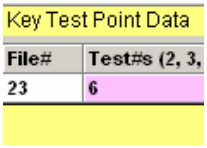
If the current File#, Test #, and Depth and Gauge (or Test#, Run# and Depth and Gauge) match an existing test point table row, then you will be asked to confirm an overwrite of an existing test point.

Note: The Key Test Point Data and Proposed Test Point Data tables will have a green background to indicate that they match an existing test point table entry.

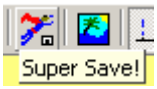


If the current File#, Test #, and Depth and Gauge (or Test#, Run# and Depth and Gauge) do NOT match an existing test point table row, then you will be asked to confirm the addition of a new test point.

Note: The Key Test Point Data and Proposed Test Point Data tables will have a light yellow background to indicate that they **do not** match an existing test point table entry.



25.6.9.4. Using the Super Save Function



As a time saving measure, the user can use the “Super Save” tool bar button to perform three common tasks when interpreting simple pressure tests.
Using this button is the equivalent of:

1. Clicking the Make Report button to create the deferred pti file of the pressure time, Flow Regime ID and Radial and Spherical plot (if viewed).
2. Click the Apply to Test Points button to save this interpretation answers to the test point table
3. Click the Save Data button to save the interpretation to the LAS file.

25.7. File Scanning

25.7.1. Overview

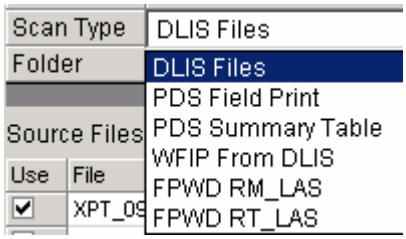
File scanning is a function that allows automated building of test point table information by extraction of this information from a group of or single data files.

Test #, File #, Depth, available gauges, and Run # are extracted, and a table is constructed. This table is then used for several functions discussed later, but primarily to build a “starting point” test point table and to condition files for subsequent interpretation.

This process is part of the Auto PD Plot process, where automated file scanning, LAS creation and renaming, population of the test point table, and subsequent guided test by test analysis is performed.

25.7.2. Supported File Types

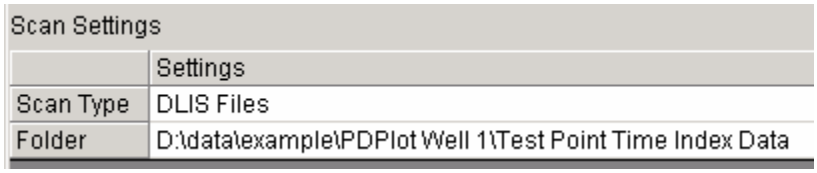
Several file types can be scanned to extract basic test information



DLIS	Time Index DLIS files of individual tests
PDS Field Print	The full PDS field print, OP ver 10-13. The entire print is split into its separate pieces, and each PDS file containing a test is parsed to read depth, and available gauges at least.
PDS Summary Table	The separate PDS file containing the OP Test summary table. The text of this table is parsed from a PDS file.
WFIP From DLIS	The WFIP test point table can be read from any time index DLIS file written AFTER the last test was taken.
FPWD RM_LAS	FPWD RM_LAS files.
FPWD RM_LAS	FPWD RT_LAS files

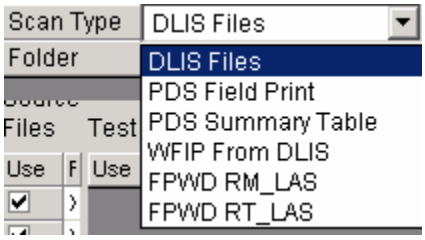
25.7.3. Interface Components

The **Scan Settings** table sets the details of what to scan and where to locate files.

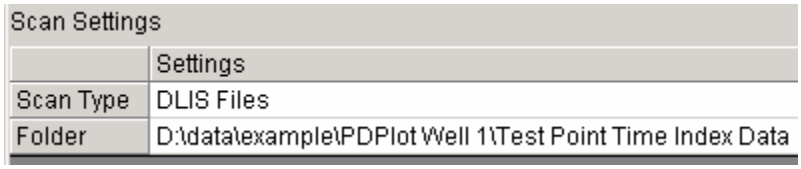


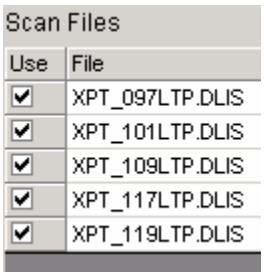
Types of Files to Scan

Selection of File types to scan from the ”Scan Type” cell. Click the cell, then select the scan type from the list



The files that match the type of scan selected in the indicated folder are then shown on the Scan Files table.





Scanned File Location

Select the folder where these files are found.

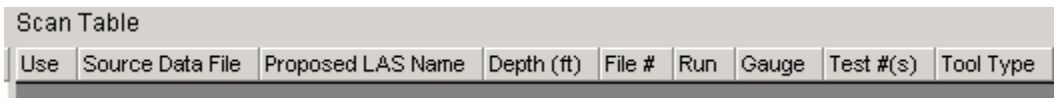
Click the cell, then the button that appears,  then move to the desired folder.

Note: If the user is using the standard PD Plot folder structure, then normal default is used.

…\<project folder>PDPlot Well 1\Test Point Time Index Data

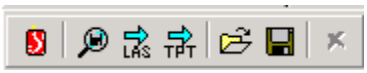
Scan Result Table

This table shows the results of the selected files after the scan function is activated.



Tool bar

The tool bar on this window controls the scan, rename and test point table population functions.



	Refresh
	Scan Files now
	Convert DLIS to LAS
	Write scan table to Test Point Table
	Open a saved scan table or write a file to save the current scan table.
	Stop the Scan in progress (only available during scan)

25.7.4. Scan Results Table

The Scan Table will contain as many details as can be read from the file(s) just scanned.

These columns contain the critical information .

Scan Table

Use	Source Data File	Proposed LAS Name	Depth (ft)	File #	Run	Gauge	Test #(s)	Tool Type
☑	XPT_097LTP.DLIS	☑F97T10T11T12T13.las	2165.28	97	1	CP_SAP	10	XPT

The scan produces one row for each unique combination of File, Test, Run and Gauge.

The table can be arrange to show merged rows to better visualize file contents verses individual test points. Use the Merge Cells option above the table to switch views.

Scan Table

Use	Source Data File	Proposed LAS Name	Depth (ft)	File #	Run	Gauge	Test #(s)	Tool T
☑	XPT_097LTP.DLIS	☑F97T10T11T12T13.las	2165.28	97	1	CP_SAP	10	XPT
☑	XPT_097LTP.DLIS	☑F97T10T11T12T13.las	2165.28	97	1	CP_SAP	11	XPT
☑	XPT_097LTP.DLIS	☑F97T10T11T12T13.las	2165.28	97	1	CP_SAP	12	XPT
☑	XPT_097LTP.DLIS	☑F97T10T11T12T13.las	2165.28	97	1	CP_SAP	13	XPT
☑	XPT_097LTP.DLIS	☑F97T10T11T12T13.las	2165.28	97	1	QCP	10	XPT
☑	XPT_097LTP.DLIS	☑F97T10T11T12T13.las	2165.28	97	1	QCP	11	XPT
☑	XPT_097LTP.DLIS	☑F97T10T11T12T13.las	2165.28	97	1	QCP	12	XPT
☑	XPT_097LTP.DLIS	☑F97T10T11T12T13.las	2165.28	97	1	QCP	13	XPT

Scan Table

Use	Source Data File	Proposed LAS	Depth (ft)	File #	Run	Gauge	Test #(s)	Tool Type
☑	XPT_097LTP.DLIS	☑ F97T10T11T12T13.las	2165.28	97	1	CP_SAP	10	XPT
☑							11	
☑							12	
☑							13	
☑						QCP	10	
☑							11	
☑							12	
☑							13	

The proposed LAS file name is based on the File and Test number found.

If the Depth, File, Test or Run data is incorrect, it can be changed at this time. Use the Un-merge view to edit, as it is done on a row by row basis.

25.7.5. DLIS to LAS conversion

Once the Scan table is complete, you may wish to perform a batch conversion of all DLIS files to the LAS file names indicated on the table.

Select the files to process using the check boxes on the side of the Scan table.

Click the **Convert TO LAS** button  on the tool bar. As the conversion progresses, Each LAS file name is checked off as it is created.

25.7.6. Populating the Test Point Table from Scan results

Once the scan and DLIS conversion is complete, the contents of the Scan table can be used to populate the Test Point table.

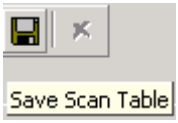
This will result in a seamless connection between the test points and the associated data files, critical when performing the test by test interpretation and Auto PD Plot functions.

Click the Fill Test Point table  button to perform this action

Note: This will replace all current test point table contents.

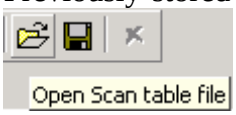
25.7.7. Saving the Scan table

Once a scan is complete, the scan table contents can be saved to a local file for later retrieval. This is very handy when the time required to perform the scan is lengthy.

Click the Save Scan Table button, 

and enter a file name of your choice.

25.7.8. Opening a previously save Scan table contents file

Previously stored scan file saves can be restored by using the Open Scan Table button 

. Select the previously stored file.

Note: The contents of the file are not checked against actual existing files referenced in the table.

25.8. Downhole Fluid Analysis (DFA) Plots

25.8.1. Over View

The DFA interpretation plot areas are intended to allow reproduction of displays of the key data types acquired from these tools in pre-defined templates. The following are supported.

LFA

Fluid Fraction (Water/Oil) interpretation

Fluid Optical Density Spectrum
Gas Detector Spectrum
GOR

CFA

Gas Partial Density
Gas Fraction Weight %
GOR
Fluorescence
Water Fraction WATF_CFA
Optical Density FAOD_CFA[0] and FAOD_CFA[1]
CO2 fraction
Quality

CFA has one specialized plot to display average light hydrocarbon percentages, Water fraction, and GOR estimations in a stable portion of a pumping sequence.

AFA

pH measurement
Quality

25.8.2. Supported Tools and Interpretation types

All LFA, OFA, CFA tools are supported. Two LFA and two CFA data sets can be displayed simultaneously.

25.8.3. Interface components

Display window

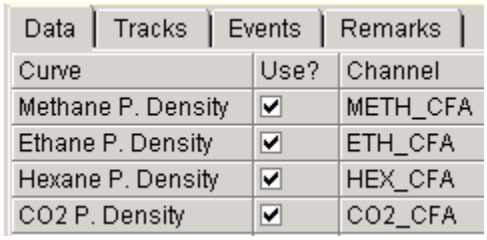
The second tab on the display, if visible, shows the DFA tools that are available for plotting.

The plot contains at least one track. This top track is a copy of the Pretest Interpretation tabs plot that shows the main pressure and flow rate channels. Additional tracks are added depending on specific selections of tool and data types made by the user.

Template

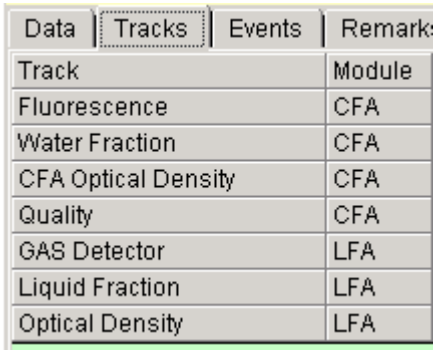
A separate display template is used to define what data and tracks are showing on the DFA plot. The data and track definitions

The data items are displayed on the Data Tab



Curve	Use?	Channel
Methane P. Density	☑	METH_CFA
Ethane P. Density	☑	ETH_CFA
Hexane P. Density	☑	HEX_CFA
CO2 P. Density	☑	CO2_CFA

The tracks where the data items are displayed are shown on the Tracks tab.



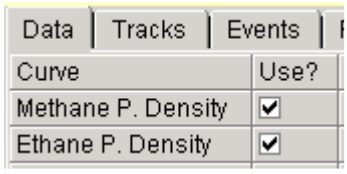
Track	Module
Fluorescence	CFA
Water Fraction	CFA
CFA Optical Density	CFA
Quality	CFA
GAS Detector	LFA
Liquid Fraction	LFA
Optical Density	LFA

25.8.4. Working with DFA Templates

The data types are available for plotting, and the tracks in which they appear are largely fixed to assure consistent and relevant interpretations of the DFA data, but you have control over several of the display attributes.

Data tab

You can control which specific data item's appear using the Use? column check boxes



Curve	Use?
Methane P. Density	☑
Ethane P. Density	☑

Scales for GOR, Fluorescence channels FLD[0] and Flor. Ratio FLRA_CFA and FCOL can be set by the user.

Data	Tracks	Events	Remarks			
Curve	Use?	Channel	Unit	Min	Max	
GOR	☑	GOR	m³/m³	0	7000	
FLD[0]	☑	FLD[0]	V	1	0	
Flor. Ratio	☑	FLRA_CFA		1	0	
FCOL	☑	FCOL		0	0.005	

Note: If any "user defined" items are added (see below), the scales of these can be selected as well.

The **Auto-scale** button on the tool bar  can be used to initial min/max values for these items.

Track Tab

The tracks are predefined. The first track, the Pressure/Temp/Resistivity track, is always part of the display, and shows the identical data currently defined on the Pressure interpretation display.
All tracks, though predefined, can be edited in these ways.

Visibility

Data	Tracks	Events	Remarl
Track	Modu	Show?	
Elapsed Time	All	☑	
Pressure/Temp/Res	All	☑	
Gas Partial Density	CFA	☑	

Height/Width

Data	Tracks	Events	Remarks	
Track	Modu	Show?	Height (in)	
Elapsed Time	All	☑	0.25	
Pressure/Temp/Res	All	☑	1.25	
Gas Partial Density	CFA	☑	0.75	

User defined tracks can be added

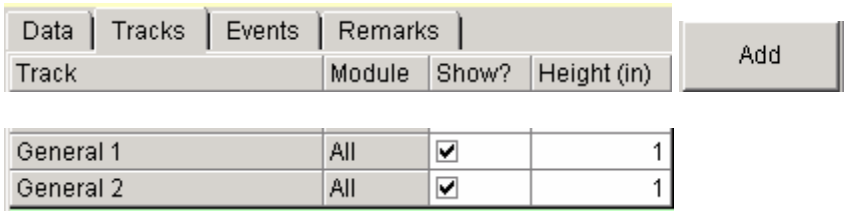
This is used to add one or two complimentary tracks to display data that is not part of the standard track arrangements.

Click the **Add** button to the right of the table to add such tracks.

Click the **Delete** button to delete user defined tracks you have added. No other tracks can be deleted. Use the Show check box column to hide pre-defined tracks you do not wish to show.

Adding User Defined data items

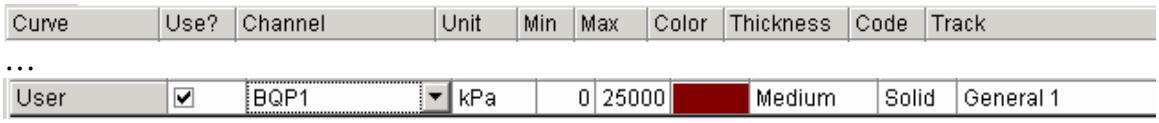
Additional user defined tracks can be added to display any of the available channels that you wish to display to compliment the predefined displays. You can add tracks from the Track Tab, each is called General 1, General 2 etc.



To now add data to the new “General” tracks, go to the Data tab,

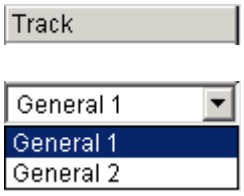
click the **Add** button to the right of the table. 

This adds a new row to the Data table



The specific channel to display is set first, drop down the list and select it. Set the other attributes, scale, color, line thickness and code.

The Track for this data item can be set any of the current “General” Tracks set on the Track tab.



You may wish to save your template to keep your customized options.
Note that each time a new data file is opened, the default predefined template is used to display the data. You can then use the Open Template item to re-load your custom template.

25.8.5. Preset Track Arrangements

Several common combinations of data's and tracks have been defined that provide the key interpretation answers for LFA CFA AFA.

There is a list of these pre-defined displays to choose from in lower right. Items that are grayed out indicate data that is not available.

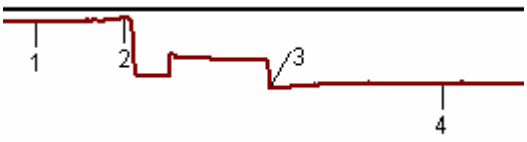
Plot Type
All Available Data
Dual LFA Analysis Plot
LFA Analysis Plot
LFA2 Analysis Plot
Dual CFA Analysis Plot
CFA Composition, GOR, and C02 Plot
CFA Water Fraction and Color Plot
CFA Fluorescence Plot
CFA2 Composition, GOR, and C02 Plot
CFA2 Water Fraction and Color Plot
CFA2 Fluorescence Plot
AFA pH Analysis Plot

The user can click on any table item to select a display that shows the data's associated with that data.

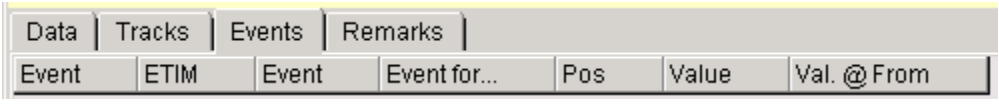
The corresponding tracks are turned on or off to match the selection.

25.8.6. Working with Event remarks

The DFA plot can be annotated by placing markers at specific times on specific channels.



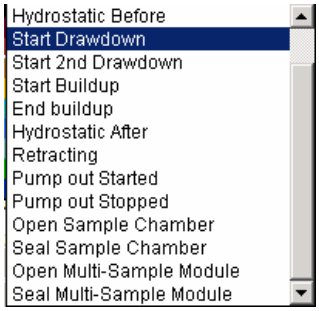
The Event tab on the template table below the plot



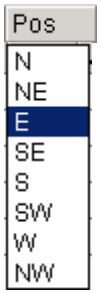
contains the list of current event markers

Each marker appears as a sequential number on the plot, and has associated text that appears in a separate table on a separate page of the report page when generated.

Enter any test you like, or select common items from the dropdown list.



The position of the numbers on the plot (orientation) can be controlled individually to separate the event numbers when they overlap. Select one of the eight orientations from the POS column.



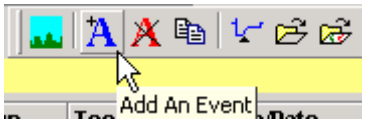
Enter

Adding Events

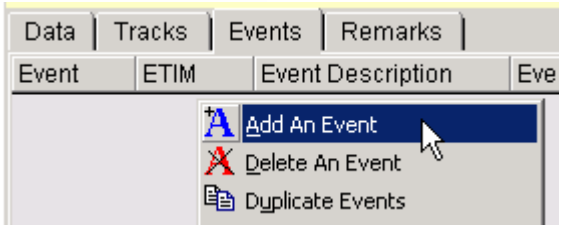
Events can be added in several ways

1. **Manually.**

   Using either the Events tool bar “Add An Event” button,



   or right click on the Events table, then select Add an Event



This will add a row to the Events table. Edit as required

Event	ETIM	Event Description	Event for...	Pos
1		New Event	Pressure	N

2. Dbl Click at the required time

Double click on the Pressure/Temperature/Resistivity track (only) at the position where you want the event to be located. Edit the new item that then appears on the Events table as required.

Data | Tracks | Events | Remarks

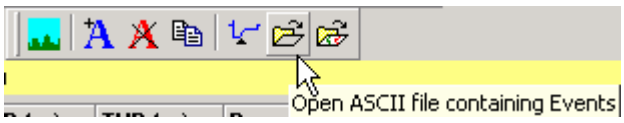
Event	ETIM	Event Description	Event for...	Pos
1	310.5	New Event	Pressure	N
	406.5	New Event	Pressure	N

3. Opening a pre-prepared text file

Any text file containing sequential lines delimited by a single tab, space or comma character between the time (in seconds) and proceeding event text can be read. An example is provided.

```
100,Probe set
200,Open sample chamber
300,Retract
```

Click the **Open Events** file button on the tool bar



or from the right click menu on the Events table.

Select the ASCII text file containing the events from the file dialog.

All events read from the file will replace all existing events.

4. Read Events from a PDS file

The PDS files of each test contain an Event summary which can be read

Elapsed Time (s)	Event Summary
12882.3	Retract Single Probe Module (MRPS) 1
12384.9	Pumping Stopped 35685.0 C3 Dual Pumpout Module (MRPO)
12223.5	Seal Multi-Sample Module (MRMS) 1, bottle 1
12147.9	Open Multi-Sample Module (MRMS) 1, bottle 1, sample number = 1
11479.8	Pump Out Started Dual Pumpout Module (MRPO)

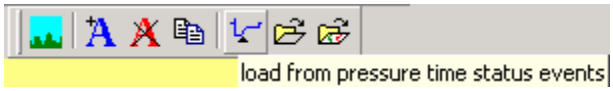
Click the Open Events file button on the tool bar

or from the right click menu on the Events table.

Select the PDS file from the file dialog. All events read replace all existing events.

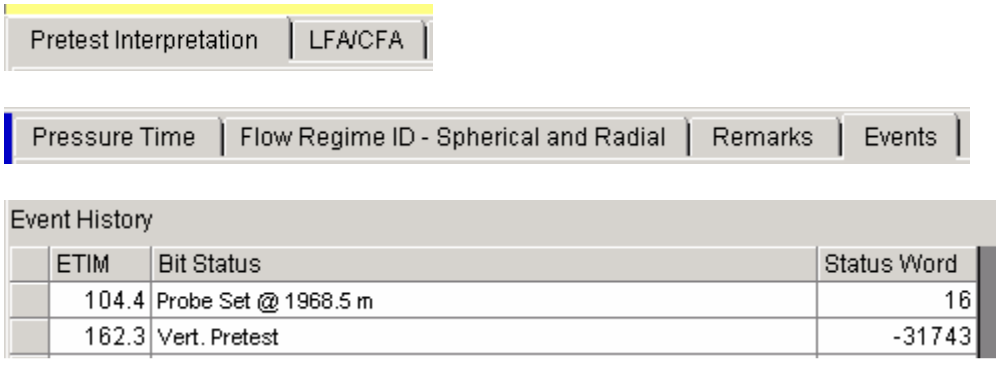
5. Using the Status Channel events to populate the table

Use the Load from Status events button on the tool bar.



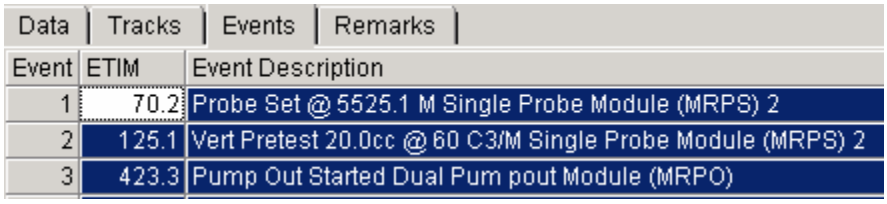
This will use the status channels from the probe(s), pump out and sampling modules to populate the important events.

The list of status channel events can be seen on the Pretest interpretation tab, Events sub tab.



Deleting Events

Select one or more events from the Events table by hi-lighting the rows with the mouse.



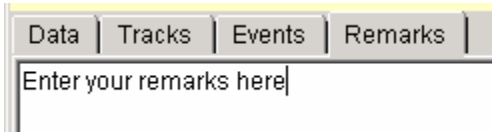
Click the **Delete Even**t button on the tool bar or use the Right click menu to select the same function.

Confirm the delete. Selected rows are removed.

25.8.7. Adding Remarks

The printed report pages can contain a block of text on a separate page after the main plot page (below the event summary if used).

Enter this text on the Remarks tab edit field (below the DFA plot area).



25.8.8. Saving DFA Report pages

Click the **Make Report** page tool bar button to create a print preview of the report page for the current plotted data tracks. Click **Save for Report** on that window to save a deferred report page. Each of these will be available for PDF document creation at the printing stage.

25.8.9. DFA Data Averaging, Saving and Specialized Reports

The end result of a DFA tool run at any depth is to determine representative values for many of the measured qualities that are used to build the final interpretation. Common measurements such as Oil/Water fraction, GOR, Gas Detection, pH measurements etc

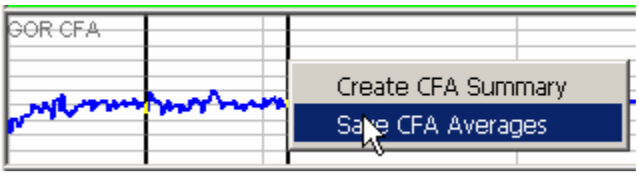
require that a single representative value for each be selected from a region where these measurements are stable.

These stable measurements can be saved and reported in two ways.

1. Select a time region where the user believes the values are stable and representative.
2. Save the average values of all applicable data in that region.
3. Repeat this select and save process for up to three regions.
4. Select one of the regions as the most representative and
    - Present these averages on a specialized report, or
    - Save them for later display along with the results of other DFA measurements at other levels on the Pressure Depth plot.

25.8.10. Selecting the Averaging Intervals

When any CFA plot type is displayed, choose one of CFA tracks, then drag an interval while holding down the RIGHT mouse button.

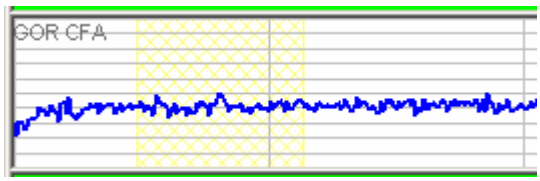


When released, you will see a menu. Select Save CFA Averages

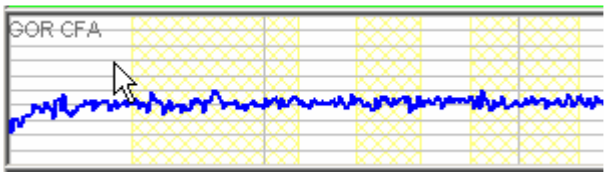
This computes averages of all related data channels, and adds a new entry to the CFA/LFA averages Intervals tab table.

Averaged Intervals	1	2	3
Start (s)	3074.4		
End (s)	3175.8		
METHR (wt%)	0.0018		
ETHR (wt%)	0.0000		
HEXR (wt%)	0.9982		
CO2 (wt%)	0.0000		
GOR (m³/m³)	2.05		
WATF_CFA	-0.0012		
WATF LFA	0.0000		

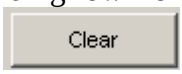
The display now shows a yellow background under this region.



Additional regions, up to a max of three, can be defined in this way.



25.8.10.1. Removing Selections

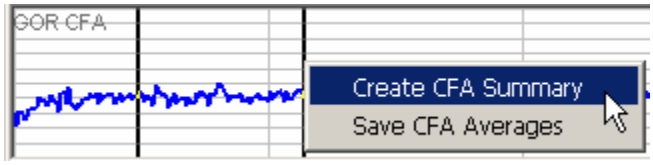
Clear any one selections by selecting the corresponding row from the table, or click in the yellow region in any track. Click the **Clear** button 

or select **Clear Average**

from the popup menu after the right click.

25.8.10.2. Creating the Specialized CFA Summary Report Page

Perform the same mouse selection as for Saving an averaging interval, but select **Create CFA Summary** instead.



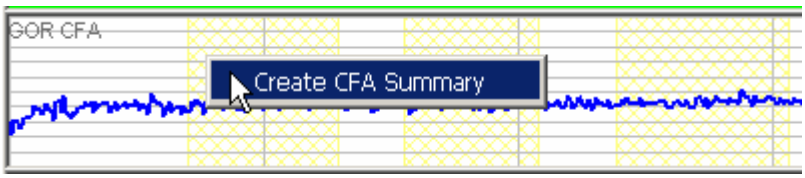
A preview of the report page is created that shows the relevant CFA data in the selected interval.

Click 

Save for Report to create a saved file for later printing and inclusion in the report.

25.8.10.3. Selecting Averaging Intervals for use

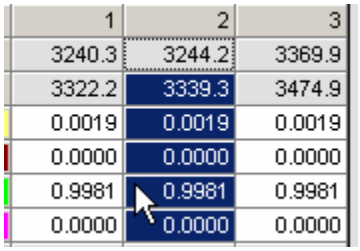
Once more than one of the averaging intervals have been created, the user can choose to create the summary report page for any interval by right clicking within any hi-lighted region. Select Create CFA Summary from the pop up menu.



25.8.10.4. Saving Results to the Test Point Table

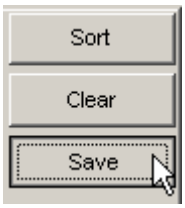
Once more than one Averaging interval is chosen, the user must select the most representative interval to save for this test point.

Select any cell from the column of the table that contains the results you want to save,



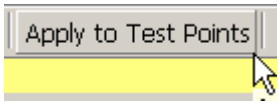
1	2	3
3240.3	3244.2	3369.9
3322.2	3339.3	3474.9
0.0019	0.0019	0.0019
0.0000	0.0000	0.0000
0.9981	0.9981	0.9981
0.0000	0.0000	0.0000

then click the Save button to the right



The averaged data for all applicable DFA channels will be saved to the LAS file when the user saves before exiting or loading another test.

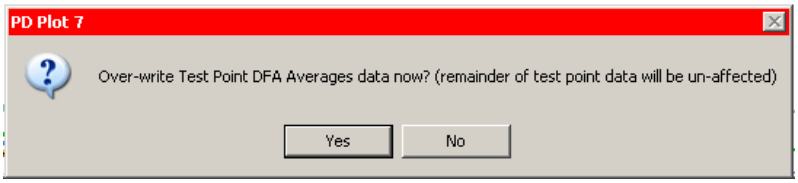
This data can be plotted on the pressure depth plot to form a very useful comparison of fluid analysis between all tested intervals. To save these averages to the test point table, click the **Apply to Test Point** button as you would to save all other types of results.



A cell test point table for the just saved test will now contain averaged data that can be later plotted.

Note: The **Apply to Test Point** button will perform in a specialized manner when on the DFA display window. If a test point already exists for the current test, Apply to Test Points will only overwrite the DFA averages data of the matching test point table row.

You will be informed of this action if it is applicable.

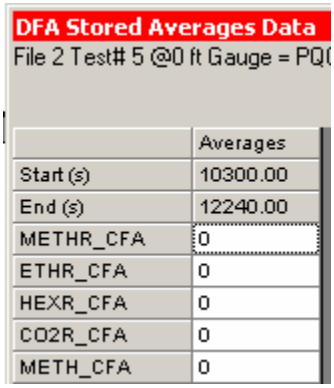


25.8.10.5. Editing Saved DFA data from the Test Point Table

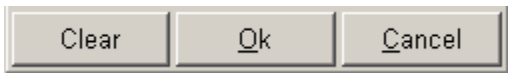
You may edit the saved averaged DFA data associated to any test point, providing that test point has a tool type set to MDT.

Right click on any test point table row, and select the Edit DFA Averages pop up menu item.

This opens the editing window.



Review and make changes are required.



Click **Ok** to save the changes and close the window, click **Cancel** to do exit the window without saving changes, or click **Clear** to remove stored data from all items.

Note: Be sure the Pressure Time Plot window is closed during this action.

25.8.11. Plotting LFA and CFA results on the Pressure Depth plot

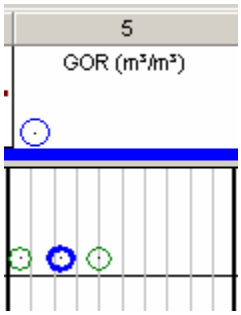
Once DFA averaging computations are completed on a test, and saved to the test point table representing that test, this data is available for plotting vs. depth.

Each type of stored data can be plotted in a predetermined manner according to the standards set for report of this data

Single value data items that plot as a symbol

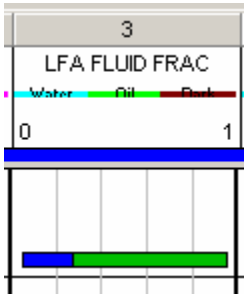
GOR, Water Fraction (CFA) pH, Apparent Hydrocarbon Density, Insitu-Density

Plotted as discrete data points. The Shape is user controlled.



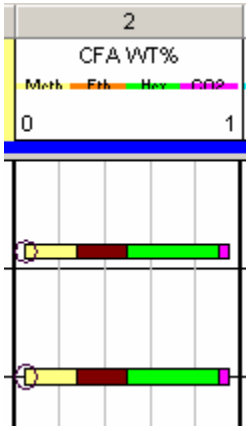
Liquid Fractions (Water and Oil Fraction)

For LFA Water and Oil fraction, a three-color filled bar across the track, representing the Water and Oil Fraction and where applicable, the Highly Absorbing



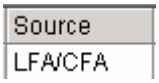
Gas Weight Percents

The Methane/Ethane/Hexane/CO2 proportions are shown as a four color filled bar across the track.

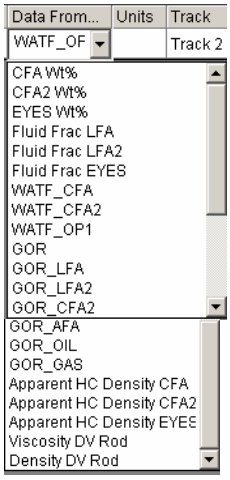


25.8.11.1. Adding CFA/LFA Data types to the display Template

Add a new template item, and set the **Source** column to **LFA/CFA (**applies to all DFA tools)



Set the **Data From** column to one of the available data types.

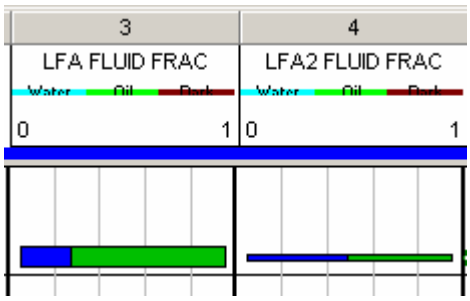


Set the track where the data will appear, set the scale for discrete items. Set the plotting symbol shape and color. Other items are fixed in appearance and appear as a spectrum across the track.

For items that plot as spectrum bars across the tracks, the “thickness” or height of the bar is controlled from the THICK column settings.

Here LFA Liquid Frac is **Medium_Heavy**, while LFA1 Liquid Frac is set to **Thin**

#	Curve Name	Thick
2	LFA FLUID FRAC	Medium_Heavy
3	LFA2 FLUID FRAC	Thin



25.9. Oil Base Mud Contamination Estimate

25.9.1. Over view

The OCM module is a specialized interpretation to estimate oil base mud contamination while flowing formation oil, prior to committing to sampling. The LFA spectrum is used to distinguish the uniqueness to the color of the two oils.

It uses a graphical technique of analyzing the changing LFA spectrum that occurs when formation oil gradually replaces oil base mud during a pump out (formation to Borehole) sequence.

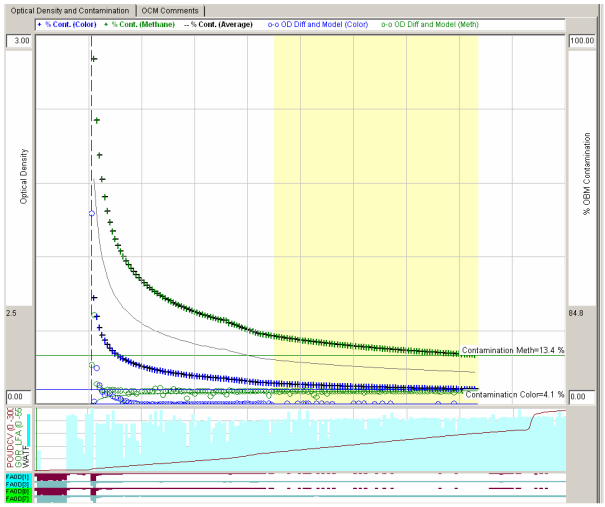
25.9.2. Interface components

The Contamination Estimate tab contains the plots and parameters tables.

The Parameters table

Channels	Color	Methane
OD Main	FAOD[1]	FAOD[0]
OD Base	FAOD[3]	FAOD[7]
Pumpout Vol. Channel	POUDCV	59117 cc
GOR Channel	GOR_LFA	
Picks	**<Click here...>**	
Start Pumpout	4380.00	
End Pumpout	7100.00	
Start Fit	4380	
End Fit	7100	
Results		
% Contamination	**100**	**22.8**
Alpha (Def=5/12)	0.41667	0.41667
C	0.0009	0.0925
D	-0.1170	-2.0554
Compute		
Time/Vol to %OCM	<Enter % Value>	
Flags		
Too Much Water?	>10% Water	
Too Short?	>100 sec	
OD Too High?	OD > 2.5	
Report		
Select for Report	Color	

The Optical Density and Contamination estimate plot.



25.9.3. Work flow

Open an LAS data file containing LFA data. If the necessary LFA channels are present, the Contamination Estimate tab will be visible.

Switch to the Contamination Estimate tab

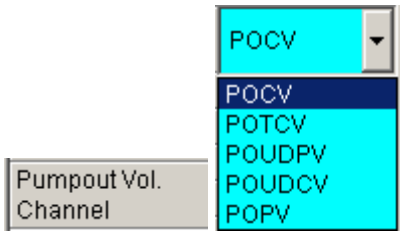
If more than one tool exists in the string that can do OCM estimation, then select one iof them from the list

Click the Auto-Pick button as a starting point. 

This will search for applicable channels and the longest pumpout interval.

25.9.4. Selecting a Pump Out volume channel

Drop down the list and select an appropriate channel



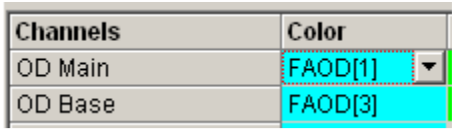
This is very important selection. Review the Tool String drawing on the Tool String tab and make sure it is clear which pumpout module is drawing fluid through the fluid analyzer before making manual selections.

Always select the Continuous volume channel (contains a C in the name) when possible. POTCV or POUTCV are total volumes of all pump out module continuous volume channels, and should not be used unless necessary.

25.9.5. Selecting Optical Density channels

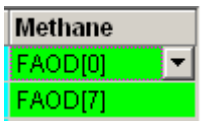
Color

Select a OD Main channel from the drop down list. A matching OD Base will be automatically determined. You can manual select it if you wish.

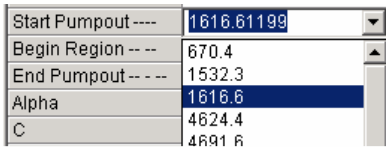


Methane

These channels are “fixed” as only channels [0] and [7] (LFA) are appropriate.



Pumping Interval



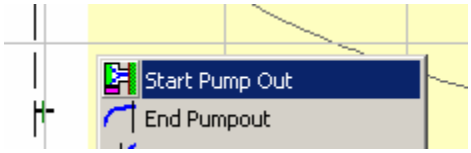
25.9.6. Selecting a GOR Channel

This is only used for display in the auxiliary track below the contamination track.

25.9.7. Select a Time Interval

It is common for the pumpout process to occur over more than one region of time. Each Valid region, where the selected pumpout channel steadily increases from a base value until it plateaus at a new constant value, each at least 100 seconds in length, is available on the Picks drop down list.

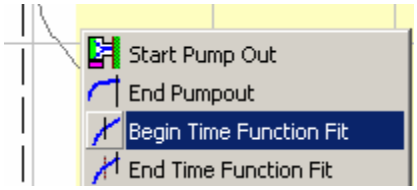
Start and Stop Pumpout picks can also be manually set by right clicking on the plot,



Select Start or End Pumpout as appropriate.

25.9.8. Setting the Fitting Interval

The interval of the optical density data used to compute the fit can be set by the user. After setting Start or End Pumpout, right click on the plot and select the Beginning then End Time Function fit within the current Start or End Pumpout picks.



Note: This is an interpretive action that requires understanding of the underlying theory.

25.9.9. Scaling the plot

The plot has three axis and entry fields where the user can enter any value.

Left : Optical Density. Valid values are between 0 and 5
Bottom : Time
Right :Contamination % valid values are between 0 and 100

You can also zoom the plot by left-mouse dragging a rectangle across the plot and releasing the mouse.

25.9.10. Creating a OCM Report Page

Click the **Make Report Page** 

button to generate the deferred report page. This gives a summary of the inputs and results.

You can optionally show the Color results and/or Methane results, or the Average results

Select **Color, Methane, Both, or Average** from the **Select for Report** list

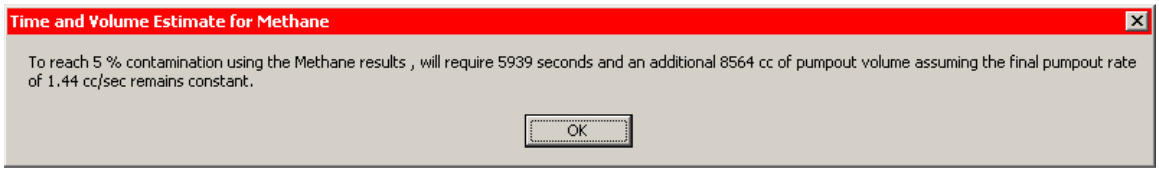
then click Make Report page to create that report.

25.9.11. Computing Projected Contamination at Any Time

An estimate of the additional time and pumpout volume required to reach a certain contamination level can be computed given the current time function fit and parameters.

Enter a % contamination value less than the computed value into then **Time to % OCM** field, for Color or Methane.

When Enter is pressed, you will see a dialog explaining the details,



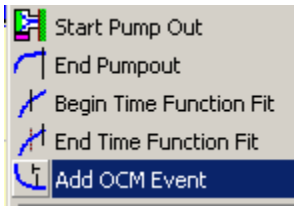
then the entered value changes to reflect the compute time and volume to reach the users entered percentage.

Compute		
Time/Vol to %OCM	16538 sec (276 min) + another	5939 sec (99 min) + another 8564cc

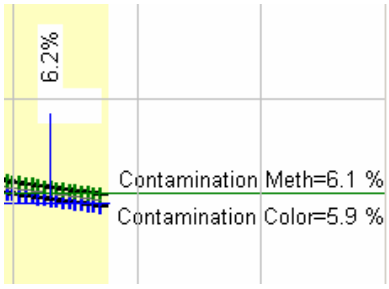
25.9.12. Marking Special Events

The user can place markers at any point along the contamination estimate curve to mark the amount of contamination at that point. User text can be added.

Point to the plot where you wish the marker to be placed, then right click and select Add OCM Event.



When complete, the plot has a new marker, and the table to the left contains a new entry.



% Cont. Color	% Cont. Methane	Time (s)	Comments
6.0	6.2	6906	Enter User comments here

You may now edit the comments, or the time on the table. If the time is changed, a new contamination % is computed. As many of these events as are required can be added as needed.

To delete any of these events, highlight any of the cells on the table for that event, and press the Delete key.

25.10. SuperFlow Permeability Estimation

This techniques the process of filling a sample chamber to estimate permeability

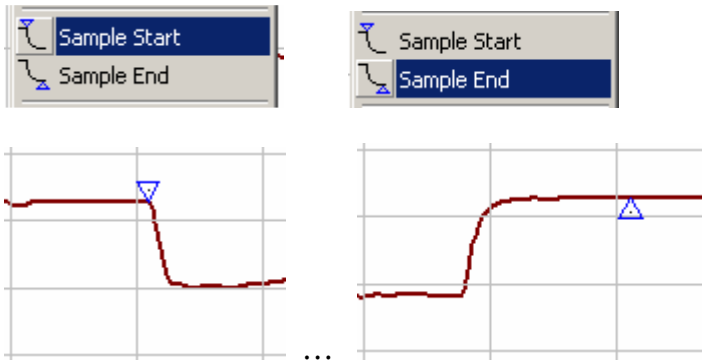
The Superflow analysis assumes that the flow pattern around the probe corresponds to hemispherical flow in an infinite reservoir. Assuming a value of formation permeability, the sampling process is modeled as a succession of constant pressure steps.

The permeability is adjusted iteratively until the calculated volume of fluid produced equals the known volume of liquid produced. This is determined from the sample when drained or estimated as the total sample chamber volume.

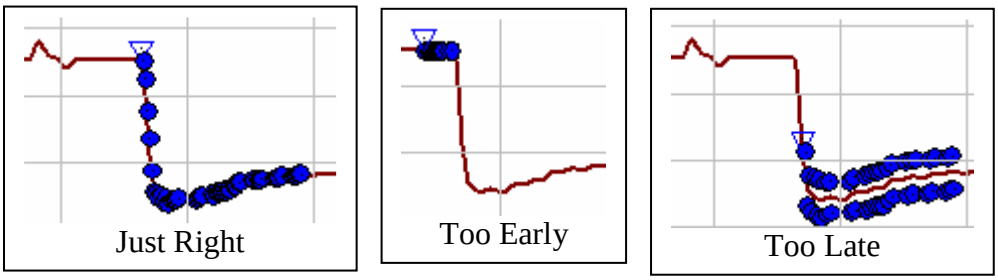
The process requires that you make picks, set some parameters, then produce

25.10.1. Setting SuperFlow Picks

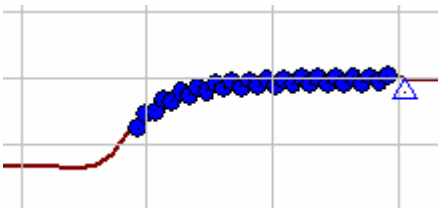
Determine a suitable sampling interval. Right click at the start and end of the sample, and select the appropriate pick as you go.



Note that the location of the picks can be very sensitive. The Start Sample pick must be at the exact time of the initial drop when the chamber is opened. These examples illustrate the point.

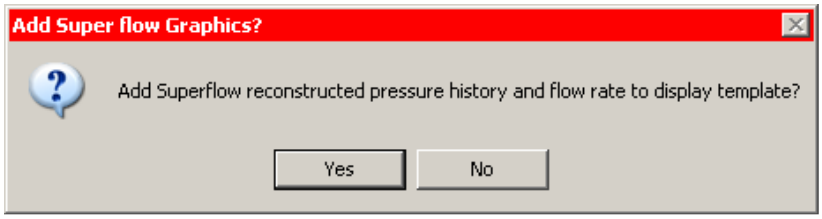


The Sample End pick is less sensitive, just be sure its well into the stable pressure region at the end of the sample filling build up.



25.10.1.1. Template Requirements for SuperFlow

When you place the Sample End pick, you will be asked, one time, if you want to add the reconstructed pressure history and flow rate to the current temple. Click Yes.



Two new items will be added to the template table.

Type	Use?	Channel	Unit	Min	Max	Color	Weight	Code	%	Description
Pres	☑	SF_Pres	kPa	0.0	40000.0		Medium	Circle		Superflow Pressure History Match
Other	☑	SF_Q	c3/s	0	100		Medium	Square		Superflow Flow Rate

These allow you to see the pressure history match and computed flow rate being used in the Superflow computation. Use these to judge the quality of the answer and the location of the your picks!

25.10.2. Setting Superflow Inputs

After the super flow time picks are made, the Interpretation Parameter table will show several related rows.

Interpretation Parameters	
Ct (1/psi)	0.00015
Initial Pressure (psig)	4777.21
Probe Radius (in)	0.51
Chamber Vol (cc)	10410
SF Permeability (md)	207.52
SF Q Max (c3/s)	19.07

The two critical items are Sample Chamber volume and Initial Pressure. The Start Sample pick determines the Initial pressure. You can manually change it

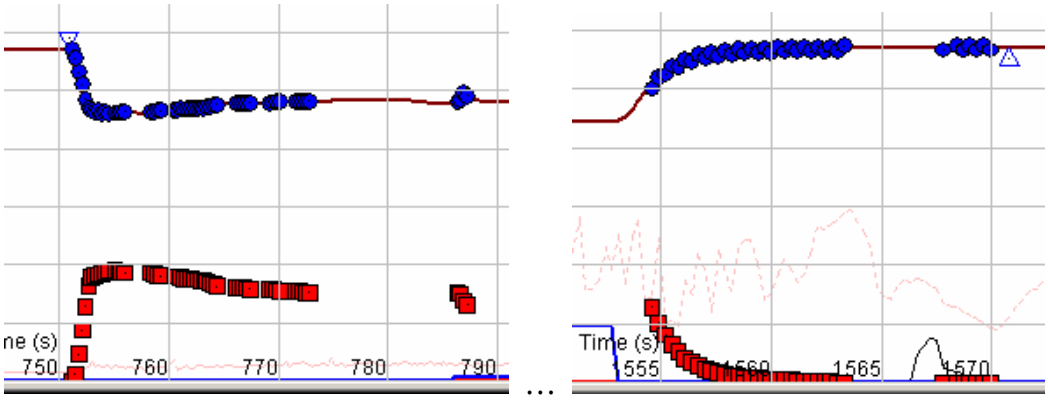
The chamber must be filled, and the volume of the acquired fluid (under downhole conditions) must be known. Use the full sample chamber volume as a starting point.

The user must set the Ct (total compressibility). This is the sampling fluid compressibility plus the rock compressibility.

Probe inner radius is determined by the probe in use.

The SF Permeability and SF Q Max cells are the computed anwers.

25.10.3. Viewing Results

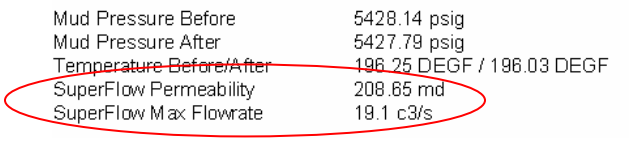


25.10.4. Creating the Report Page

Click the Make Report Page button. A preview of the Pressure Time plot appears including the Superflow data and answers.

The reconstructed flow rate and pressure history are shown along with the other plotted data.

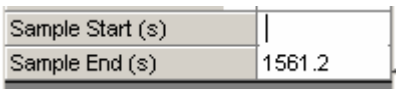
The table of results shows the computed Superflow permeability estimate and the maximum flow rate achieved during sampling.



25.10.5. Removing Superflow from the Display.

To remove the superflow items from the template, select their rows, then click the Delete button to the right of the table.

Remove the values from the Sample Start and End picks.



This will remove the computations, hide the cells on the interpretation tables again, and prevent them from appearing on the report page.

25.11. Image Viewing

25.11.1. Overview

PD-Plot 7 can allow the user to look at image files related to the current test being interpreted. These images include the field PDS log segments for this test (if available), any deferred report pages of any interpretation performed (pti files), or any TIF, JPG or BMP file the user may prepare or SLB may create to include.

25.11.2. Working with Images

Access to the window where these image files can be viewed is provided in two ways

1. Test Point Table

   Right click on the selected test point table row, and select View Images <*file and test number pattern*>

2. Pressure vs Time Interpretation window

Open the Pressure vs. Time window and load a LAS or DLIS data file. Click the View Images tool bar button 

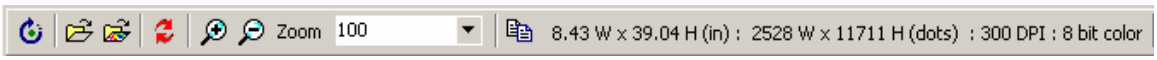
The Images preview window will open and display all relevant files with a matching File and Test number (or Test and Run number for StethoScope)

25.11.3. Image Selection list

Potential image files in all folders where image data may be located are shown in a tree organized list.

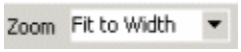
Click on any italicized file name to view that file in the preview area to the right

25.11.4. Image Adjustment



 **Rotate** – Rotates the image 90 degrees with each click. Applies only to raster image files (tif, bmp, jpg)

 **Zoom in or Out** - Zooms in or out on the image. Double left and right clicking on the image does the same thing.



Zoom setting – Specific zoom sizes can be selected from this list.

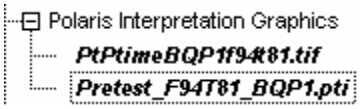
 **Copy to clipboard** – Copy the previewed image to the clipboard for transfer to another program

 **Print** – Print the current image

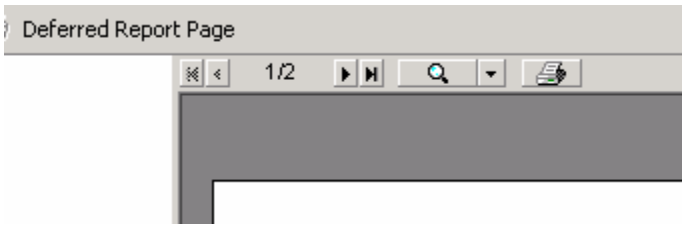
Image Properties – Gives the dimensions and image properties./

25.11.5. *.pti Deferred Report Page viewing

When a pti file is previewed,



the display controls above the preview area indicate how many pages are available, and give zoom and printing ability

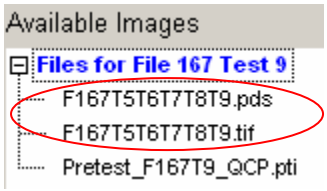


You may double click with the left or right mouse directly on the image to zoom in or out as well.

25.11.6. PDS File Viewing requirements

PDS files are only supported by Schlumberger's PDSView software, which must be installed to be able to preview PDS files.

To view PDS in PD-Plot 7, PDS is converted to TIF through a function exposed by the PDSView software, then the tif image is shown. Notice that after selecting a PDS file to view for the first time, it takes a few seconds to do the conversion as the TIF is created. After the initial conversion, the PDS or TIF can be found and selected for viewing.



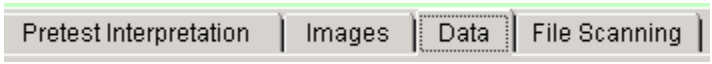
25.12. Data Viewing

25.12.1. Overview

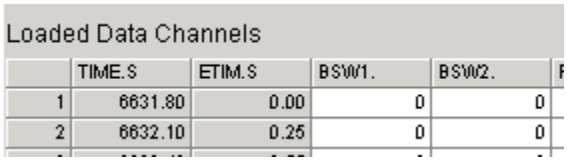
The currently loaded P vs. T DLIS data can be inspected in a table

25.12.2. Data Table

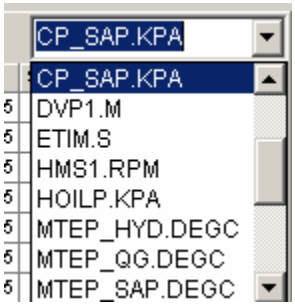
Show the data table by clicking the Data tab.



Every channel in the LAS file is shown.



A alphabetized list of channels is available in the upper right corner. Select any channel, and the table will make that channel's column visible.



To help home in on a particular channel or time, first select a channel from the Pressure vs Time plot template editing table, and click on the plot itself at the time of interest. When the data table is accessed, you will be taken to the selected channel column and time.

Note: The units of each channel are those of the LAS file itself, not the current project units. Typically the LAS file is made with project units for pressure, depth, length and temperature channels, but other channels are written to the LAS in DLIS units.

25.13. Tool String Diagram

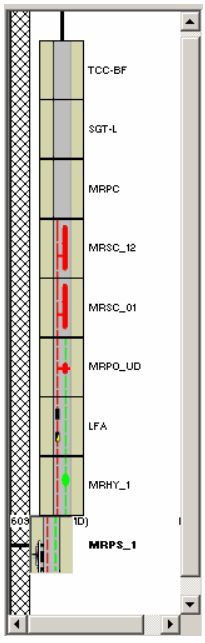
A simplified drawing of each of the toolstring components is available for all tools except StethoScope.

This is most useful when a complex MDT Fluid Analysis and Sampling tool string has been run, to understand the location and flow paths of the various probes, pumps and fluid analyzers.

If a Tool string is available, click the Tool String tab

You will see a table and drawing of the component modules.

Tool String		
Tool	Module	Description
TCCBF	CTS Telemetry Tool	TCC-BF
SGTL	Scintillation Gamma-Ray - L	SGT-L
PC	Power Cartridge	MRPC
SC_12	Sample Chamber Module (MRSC) 12	MRSC_12
SC_1	Sample Chamber Module (MRSC) 01	MRSC_01
POUD	Dual Up-down Pumpout Module (MRPOUD)	MRPO_UD
LFA	Live Fluid Analyzer	LFA
HY_1	Hydraulic Module (MRHY) 1	MRHY_1
PS_1	Single Probe Module (MRPS) 1	MRPS_1



Note that only data files converted from DLIS using 7.0.91 and later will have the tool string drawing available.

25.13.1. Printing Tool String Report Page

You may generate a report page of the tool string picture. Click the Make Report Page tool bar button to see the preview, then click Save for Report  button on the preview window to save the pti file for later printing.

26. Real Time

26.1. Overview

PD-Plot 7 can load and display real time continuously downloading DLIS files from Schlumberger's data access site (InterACT)

You can both view the graphical progress of any pretest or sampling operation or perform any interpretation with the data available up to that point. This includes pretest, LFA, CFA, OCM and STETHOSCOPE jobs.

26.2. Supported Tools and Data types

All tools are supported.

STETHOSCOPE has a special file type designed for true real time acquisition monitoring. These remarkable compact files are generated through mud telemetry and contain only key time and pressure data at key events in the pressure history of the test. This is enough to judge the quality of the test, and to obtain an estimate of the formation pressure and mobility.

The files have a set file name.

RTRT_PhaseB.rta

STETHOSCOPE has other file types that can be sent via InterACT, but neither are available in true real time.

Real Time LAS containing more key data and course sampling of the buildups is available in near real time. Files all have the RT_LAS etc name such as

RT_LAS_T003R002.LAS

This also identifies the Test# (T) and Run# (R) as well.

Full 16 samples per second data files of all tool channels are available after the tools are retrieved and memory is offloaded. These files use this naming convention.

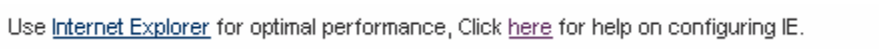
RM_LAS_T003R002.LAS

26.2.1. Required Software

The Log Data Tool box must be installed to enable DLIS to LAS conversions. If you do not have the software it can be obtained here.

http://www.oilfield.slb.com/content/services/resources/software/index.asp

Your web browser must be compatible with InterACT. Check the https://www.interact.slb.com site and click where indicated



26.2.2. InterACT download

Instructions for usage of InterACT to gain access to downloadable files are not included here.

Once you have access and begin downloading DLIS files, place them in the same folder where you have started and are saving your PD-Plot 7 project. This will ensure they are accessible easily from within PD-Plot 7 .

26.2.3. Quick Access to Real Time Files

To speed the process of viewing Real time Pressure Vs. Time data files, you may drag and drop any DLIS file onto a shortcut to the PD-Plot 7 executable. This will open PD-Plot, in that folder, create a default project and automatically open the Pressure time viewing window

If the display pressure or depth units are not correct for your area, start PD-Plot 7 manually, set the start up units from the Preferences window (accessible from the File menu). Exit the program and re-do the drag and drop of the file.

26.2.4. Real Time Monitoring Work Flow

26.2.4.1. Setting up your project.

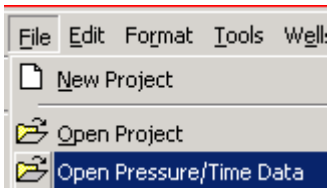
Create a new folder on your PC. Start **PD-Plot 7** and start a new project (File menu, New Project), set the details are required (well name, unit system), then select the previously created new folder as your project folder when prompted.

When you begin the download from InterACT, set the destination folder for the DLIS file to be the same folder where your new project file is located.

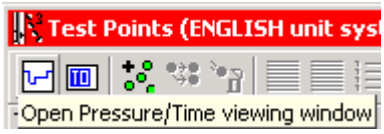
26.2.4.2. Opening the Real Time file for viewing

Once PD-Plot 7 is running with your new project loaded, you can open your real time DLIS file for viewing in two ways.

1. Open the File menu., and select **Open Pressure/Time Data**



2. Go to the Test Point table, and click the **Open Pressure Time data** tool bar button.



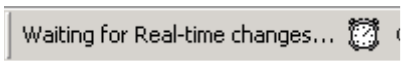
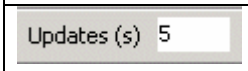
When the Pressure Time window opens, it will automatically recognize that a real time DLIS file download is in progress, and begin the loading of that file.

If it does not recognize this, open the file directly from the File menu on that window.

26.2.4.3. The Real Time Tool bar

PD-Plots pressure time window will show a special tool bar when real time file loading and monitoring is in progress..

Real Time Tool bar description

Tool Bar Item	Description
 	Progress Message. Shows text that tells you what is happening.
	Cancel button. Stops the monitoring and loading in progress. Does not stop the InterACT download.
	Update interval. The time in seconds between checks to the monitored file to see if it has grown. 5 seconds is the minimum.
	Pause. Press down to stop the file monitoring. Press again to resume monitoring.
	Causes an immediate re-load of the current data file and re-plots it without waiting for next update.
	Determines if the time scales are increased each time the file is re-read. Makes sure the entire test interval stays on screen.

26.2.4.4. Working with Pretest Interpretation window

The pretest interpretation window plot can be used in the same way as with non-real time data.

The plot time scales may automatically be adjusted at each update point. To prevent this while zooming or using your own time scales, turn off the Auto-Update button  on the real time tool bar.

To change templates, pause the real time monitoring, open the new template file, then re-start the monitoring.

26.2.4.5. Working with LFA and CFA display window in Real Time

All functions work the same except the display may redraw and re-time scale if an update to the Real Time file is detected while on this window.

Use the PAUSE button on the Real time tool bar  to stop real time file checking and updates. You can then zoom in, rescale or perform printing operations without interference.

26.2.4.6. With Oil Base mud contamination (OCM) display window in Real Time

The OCM window is an interpretation that requires that the underlying data be stable.

Use the PAUSE button on the Real Time tool bar  is automatically engaged when the Contamination Estimate tab is accessed to allow an interpretation to proceed.

27. Printing

27.1. Overview

PD-Plot 7 has an extensive range of functions to build customer reports of all testing jobs. Predefined report sections can be printed, include pressure depth plots, tables of all data, pressure time interpretation plots, and extensive comments.

Considerable flexibility is achieved if the user wants to add additional information

Use of Adobe Acrobat Writer is integrated within PD-Plot 7 to enable very flexible report creation.

Report Generating functions are only available to SLB users with appropriate licensing.

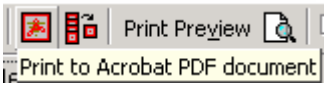
27.2. Printing – Report Generation - SLB Only

27.2.1. Print Selection Table

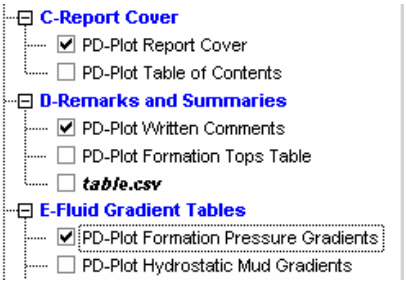
The print selection table is a tree structure showing the major groupings of the various plot types.

The sections reflect the standard folder naming conventions and logical divisions of a PD-Plot 7 report. Each section contains one or more sub-items that can print a single report section. Sections can contain 1 or more pages.

The user checks off the sections he needs to print, then either prints them immediately or turns on the **Print to Acrobat PDF** option button,



then prints, which creates a PDF document of the pages (Acrobat writer 5 or later required.)



27.2.2. Section Reference

A-Index

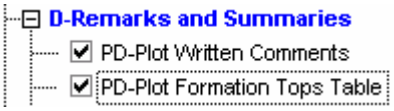
B-Final Report Documents

C-Report Cover

PD-Plot 7 Report Cover – Prints the standard PD-Plot 7 report cover using details from the Report Writing – Cover page settings

PD-Plot 7 Table of Contents – Can generate simple table of contents page(s) from the currently selected items.

D-Remarks and Summaries



PD-Plot 7 Written Comments – Generates page(s) of formatted text from what is currently entered on the Report Writer window, Written comments tab.

PD-Plot 7 Formation Tops Table – Generates a table of the current formation tops from each well in the project..

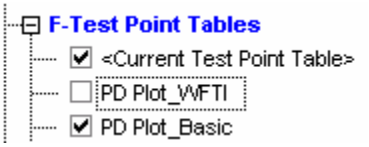
E-Fluid Gradient Tables

PD-Plot 7 Formation Pressure Gradients – Generates a printed table using the currently visible rows and columns of the formation gradients table.

PD-Plot 7 Hydrostatic Mud Gradients – Generates a printed table using the currently visible rows and columns of the Hydrostatic Mud gradients table.

PD-Plot 7 Gradient Range Definitions – Generates a printed table of the currently defined gradient ranges. These ranges defined the cutoff and colors for formation gradient line colors and naming.

F-Test Point Tables



<Current Test Point Table> - Generates a printed table using the currently visible rows and columns of the Test point table.

The next 6 rows reflect standardized internally defined test point table arrangements suggested for use for each of the indicated tools or functions

PD Plot_WFTI
PD Plot_Basic
PD Plot_Simple
PD Plot_XPT
PD Plot_FPWD

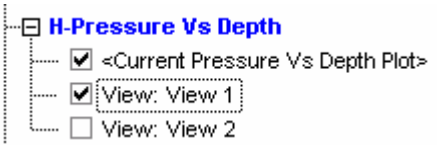
The remaining rows (if any) reflect saved user named test point table arrangements.

G-API Header and Tool Sketches

PD-Plot 7 Header – Prints a page with a standard API header using well site data found on Well Information window.

PD-Plot 7 Tool Sketch – Prints a tools sketch defined on tool builder window.

H-Pressure Vs Depth



<Current Pressure Vs Depth Plot> - Prints a one page pressure depth plot of the current plot.

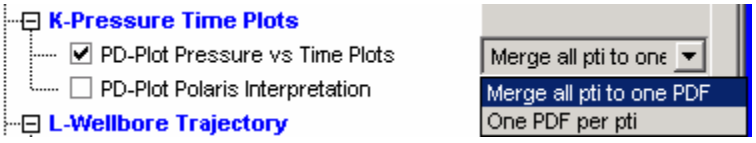
All saved Views are then listed for individual selection

View 1 – Prints the deferred View called "View 1"
View 2 – Prints the deferred View called "View 1"

K-Pressure Time Plots

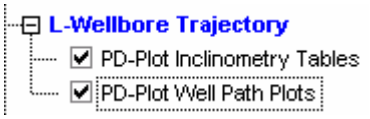
PD-Plot 7 Pressure vs Time Plots – Prints all deferred report pages from the Pressure vs. Time interpretation window.

There is an option to print one PDF of all, or one PDF for each deferred (pti) file.



PD-Plot 7 Polaris Interpretation – If Polaris PDS files are included, they will converted to TIF and printed 2 per page. This function supports old functionality only.

L-Wellbore Trajectory



PD-Plot 7 Inclinometry Tables – Generates a table of the current Inclinometry data for each well.

There is an option to print every 5th or 10th depending on the size of the table to preserve paper.

PD-Plot 7 Well Path Plots – Generates the Map view and Cross section view of each well path in the project using the current scales. Plots can be scaled from the Well Information window, Well Survey tab.

M-XY Plots

Note: All X-Y plots must have been previously viewed and scaled on screen before printing.

PD-Plot 7 XY Formation vs. MUD Before – Generates a page with a simple X-Y plot of all formation and Mud Pressures (before). Includes any gradient lines that were placed.

PD-Plot 7 XY Formation vs. MUD After – Generates a page with a simple X-Y plot of all formation and Mud Pressures (after). Includes any gradient lines that were placed.

PD-Plot 7 XY MUD Before vs. MUD After – Generates a page with a simple X-Y plot of Mud Pressures (before) vs. Mud Pressures (after). Includes a plotted diagonal line of equal mud before/after pressure.

X-Appendix

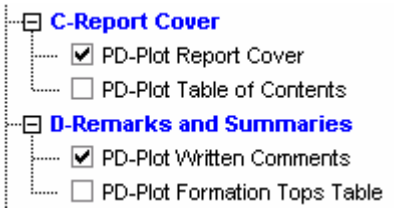
There are no pre-defined plots. Intended for the user to place reference documents generally applicable to formation testing.

Only acceptable files (see above) that the user places in the folder are available for printing.

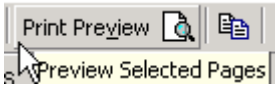
27.2.3. Previewing Report pages

The individual report sections or entire report document can be previewed at any time.

Select the report section(s) you want to preview by clicking on the check box next to the name(s)



Then click the Print Preview button on the tool bar or from the File menu.



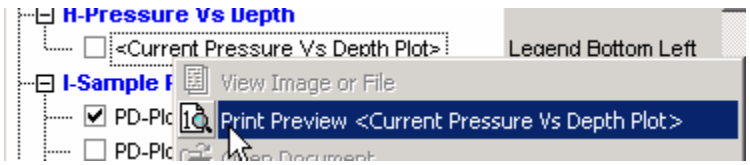
The preview pages appear on the right pane.

Navigate the preview pages using the tool bar above the preview, 

or use page up and down keys.

Zoom in and out by double clicking with right (zoom out) or left (zoom in) mouse buttons

An immediate preview of any single report section, checked or not, can be had by right click on the text and selecting **Print Preview** from the menu.



27.2.4. Transferring Preview Images to Other Applications

Once a preview of any page has been performed, the preview image of the single current preview screen can be placed on the clipboard and pasted into many application such as Word or PowerPoint. The quality and scalability is excellent. It is not a bit map or screen capture quality image.

Preview, then make the page you want to transfer current, then select the **Edit** menu, then choose **Copy Page Image to Clipboard**.

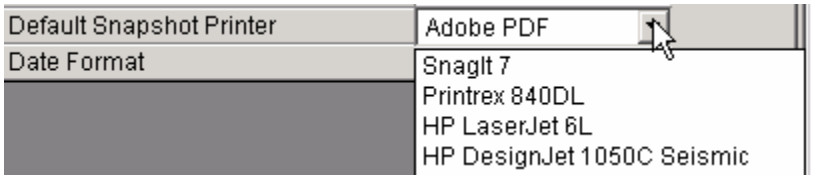
Finally open the other application and do a Paste operation.

27.2.5. Default Snapshot printer

The default snap shot printer is defined separately to assure that deferred report pages are made with the same printer driver and page size to assure correct scaling in the final report.

All deferred pressure depth plot page saved as “Views” are saved using the current page properties of the default snapshot printer.

Open the Preference window and select the default snapshot printer from the list of available printers.



The correct choice is the same printer you eventually will use to create the document. Select the Adobe PDF printer if you are using PDF.

Set the page size defaults for this printer from your Windows > Settings > Printers window.

27.2.6. Page Ordering

Note: Page Ordering and document assembly is best handled with the PDF Assembler application if you are using the PDF document creation functions in PD-Plot. The Page

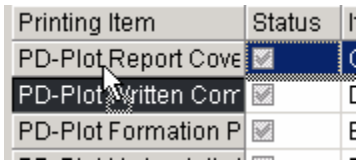
Order functions in PD-Plot 7 are only effective if you are printing more than one report section directly to a printer.

The printing order for the checked items on the main Print selection tree list is determined from the **Page Order** tab

Note: Select all required report pages first, then set the order. Any change to the selected items will reset the Order table.

The list is initially filled with all selected (checked) items from The Select page tree list.

Arrange the order by either dragging the left hand grey cell of the row you want to move to a new position,

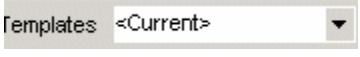


Or user the up and down arrow  tool bar buttons to move the selected row to the desired new position

Tool bar

 Save and Open Template,

 Fill Order from currently checked items



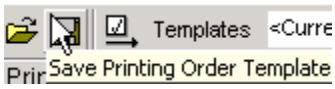
Select from saved templates list

 Refresh list

 Move selected table row up or down

Saving the order

Once the table is in the order you need, save the order for later use by using the Save Template tool bar button



The order can be instantly restored by using Open Template button and selecting a previously stored file.

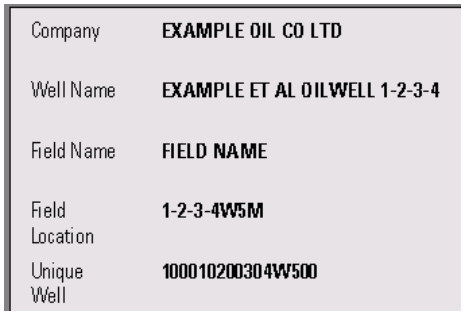
27.2.7. Report Cover Contents

The report cover contents are set on this tab.

This determines the contents of the **PD-Plot 7 Report Cover** page in the C-Report Cover section.

The cover page of the report contains two blocks of text.

The upper portion identifies the well with five possible items (table items **Well ID 1-5**),



and the lower portion contains up to five related details (table items **Report 1-5** etc).

Engineer's Name	LOGGING ENGINEER
Date	5/31/2005
Report Date	5/29/2005

The contents of these two sections are set in the Cover Page Contents table.

Well Identification

Item	Title	Fill With
Well ID 1	Company	CN (Company name)
Well ID 2	Well Name	WN (Well name)
Well ID 3	Field Name	FN (Field name)
Well ID 4	Field Location	FL (Field Location)
Well ID 5	Country	CTRY (Country)

Related Details

Report 1	Engineer's Name	ENGI (Engineer's Name)
Report 2	Date	DATE (Date as Month-Day-Year)
Report 3	Report Date	5/29/2005
Report 4		
Report 5		

27.2.7.1. Title and Fill With Column

The **Title** and **Fill With** column determines what is printed on the report cover for well and other identification.

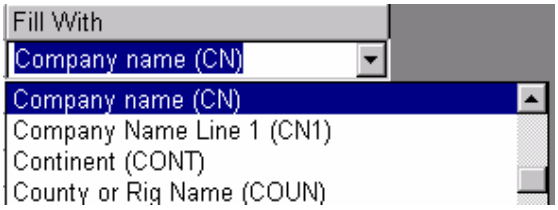
Each of the ten text rows that will be printed in the upper left portion of the report cover, are treated as two columns. A Title on the left and specific contents on the right

Item	Title	Fill With
Well ID 1	Company	CN (Company name)

The Title column determines the left side, the Fill With column determines what appears on the right.

Since most of this data is commonly filled from the wellsite data, you can specify the wellsite data item you wish to use the value of, rather than the full text of that item.

Drop down the Fill With column list, and select the wellsite data item you need.



When then report cover is generated, the value of each well site data item is read and printed.

You may also simply type in the text you want to use. Do not use either of the bracket ( ) characters when entering your own text.

The remainder of the table has three additional entry fields

27.2.7.2. Tool Used

This item controls the bitmap and text placed on the report cover that indicates logging tools used. Drop down the list to set the tool type.

27.2.7.3. Report Type

The Report type is critical. For a report generated at the field, set to Field Report. For a report generated as a subsequent or more detailed report use one of the other options.

27.2.7.4. Comment

A general text comment can be added that appears in the lower left cover block. Enter any text as required.

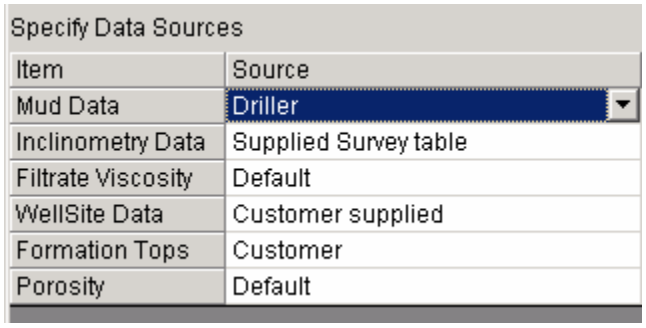
Click the **Defaults** button to quickly fill in the standard report writer defaults

27.3. Source Data

27.3.1. Overview

It is often important to indicate the source of several types of auxiliary data used in the report.

The Source tab contains a table that can be included in the report to record this information



Several common sources are available on drop down lists for each item although you may just type in any text.

This same information is available to be filled in on the windows where these data types are located, but are presented here as central location.

27.3.2. Adding Other Types of Report Pages

If the user has placed certain types of raster files in the folder structure, they may be available for selection and printing from the print selection tree. In this way the user can insert any picture for inclusion in the report.

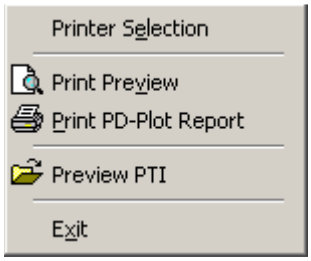
The following types of files are recognized.

Raster Images	***.jpg, *.bmp *.tif**	A full page of the image is created.
ASCII tables	***.csv**	A table is built from each comma delimited field
ASCII text	***.txt**	A page of simple text is created using the contents.

Any files that have this extension will appear on the list of items to print in that folder.

Each item if checked will generate one report page by it self, and the image will be expanded to fill the printable area of the page

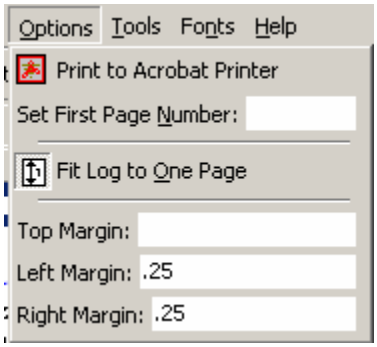
27.3.3. File Menu



Menu Item	Function
	Printer Selection. If printing directly to a printer, the user can select the printer he wishes if the Windows default is not appropriate.
	Print Preview. Previews all selected Report pages.
	Sends all selected report pages to be either created as PDF Documents or to the current windows printer.
	Preview PTI. Special deferred report document files are made during several interpretation stages in PD-Plot. These files have the .pti extension. This option allows you open any pti file and see a preview of its contents.
Exit	Close the Printing Window. Close button on tool bar does the same thing.

27.3.4. Options Menu

The Options menu gives control of several printing functions. These control all printed pages.



Menu Item	Function
	Print to Acrobat Printer. Option to print to PDF documents rather than directly to the current printer.
	Set First Page Number. Seldom used, as page numbering is now done in PDF Assembler when the report document is created, but if used, this is the first page number on the first PDF document page.
	Fit Log to One Page. Applies only to H-Pressure Vs Depth plot items. Controls if the depth scale is used (possibly using more than one page) or if it is changed to force the entire depth interval to fit on one page.
	Top Margin (in inches). Controls the top margin for printing on all pages
	Left Margin (in inches). Sets the left margin as needed for binding.
	Right Margin (in inches). Sets the right margin as needed for binding when two sided printing is used.

27.4. Creating Adobe PDF Report Documents

27.4.1. Advantages

Adobe PDF documents have the distinct advantage that anyone can open, print and share documents. PD-Plot 7 reporting is designed to take full advantage of PDF document creation.

PD-Plot 7 makes creating large complex interpretation reports easy. Each part of a report is created as separate PDF files, which can be later quickly ordered, page numbered, bookmarked and assembled into a single final document.

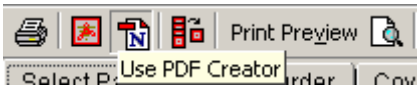
Since PDF Files are universal, users may add any content they wish into the basic PD-Plot report to create a document tailored to their needs.

The basic requirement to use this functionality is a PDF printer driver. The Adobe Acrobat Writer (ver 5, 6 or 7) and PDF Creator printer drivers are supported by PD-Plot 7.

27.4.2. Printing to PDF

Make report page selections as required from the Select Pages table.

Turn on either the **Use PDF Creator** or **Print to Acrobat PDF** option button.



Select the File menu then Print PD-Plot 7 report 

(or same button on tool bar). The PDF creation begins.

Each report item selected generates one or more pdf documents. These documents are moved into the 

folder as it is made. These individual documents then are assembled into the final report using PDF Assembler.

Note: If using Adobe Acrobat Writers printer driver, printing Preferences and Properties MUST be set as described elsewhere in this document in the section “Acrobat Printer Driver Setup” for this technique to work correctly. PDF Creator requires no initial setup.

27.4.3. PDF Creator Driver Setup

Schlumberger users can download and install PDF Creator from their Radia Software Manager. None Schlumberger users can obtain PDF Creator from the world wide web. PDF Creator requires no setup specific to PD-Plot 7 other than installation.

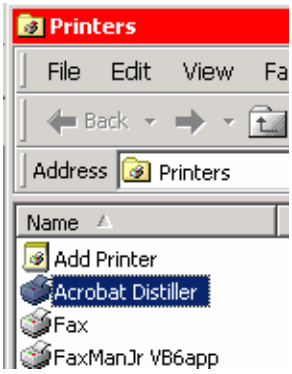
27.4.4. Acrobat Printer Driver Setup

Several critical settings must be made to the Adobe Acrobat printer driver for PDF generation from PD-Plot. The settings are similar for Acrobat 5 and 6, and 7, only the interface locations and appearance of the options varies.

27.4.4.1. Step 1. Adobe Printer Driver must be installed

After installing Adobe 5 or 6, a printer driver is usually installed along with it.
To confirm, open you list of printers, and confirm that either "Acrobat Distiller" (5.0) or "Adobe PDF" is an installed printer on your system.

for Acrobat 6.0

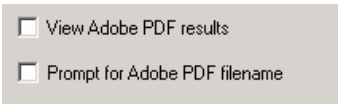


for Acrobat 5.0

27.4.4.2. Step 2. Printer Driver Preferences settings

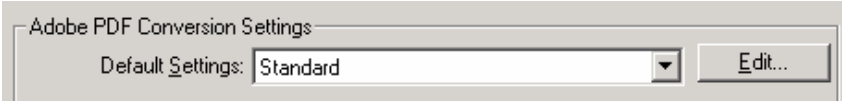
Right click on the Adobe or Acrobat printer driver and select **Preferences** (not Properties)

In the **Adobe PDF Conversion Settings** area, make sure these two items are UNCHECKED.



(Ver 6.0 dialog, Ver 5.0 similar.)

Click the **Edit** button (ver 6.0) or **Edit Conversion Setting** button (ver 5.0)



On the General Tab, change the **Resolution** field to no more than **300**. You can experiment later, but little is gained above 300 dpi except large times to process and large files…

Set the **Compatibility** field the Acrobat 4.0. This will assure good chance that most end-users will be able to open the documents.

Click **Ok** or **Save As**. **Save As** creates a settings file that you can later select to quickly set these options.

27.4.4.3. Step 3. PDF Port Setting on Printer Properties

Right click on the Adobe or Acrobat printer driver and select **Properties** (not Preferences). Select the **Port** tab.

The Acrobat printer driver uses a PORT setting that is actually a folder on your PC. This is the location where PDF files are placed as they are "printed" from within any application. The Acrobat printer driver does send any print jobs to any printer, it just captures the printed output into a PDF file.

The default PORT folder that Acrobat initially creates upon installation may be the Desktop or "My Documents" folder.

For control and simplicity, you must create a custom folder elsewhere on your disk. This ensures that the folder can be found and managed by PD-Plot and Acrobat.

To change the Port folder location to a more manageable folder, follow these steps

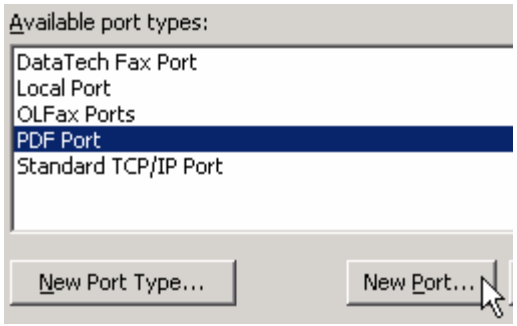
1. Using any Windows Explorer window, create a new folder on your D: drive called D:\pdf (anywhere is fine, just remember where).
2. Open the list of printers (Open the Start menu then select Settings, then Printers)
3. Right click on the Acrobat printer driver (Adobe PDF or Acrobat Distiller), and select Properties (not Printing Preferences)
4. Click on the Ports tab.

5. Scroll down the port list and find the PDF Port line. The Port column will show the

current folder for PDF files.

6. Click the Add Port button below the list.

7. Select PDF Port from the list, then click New Port. Browse and find the D:\pdf



folder you created above, click OK. Click Close on the Printer Ports window

8. The new PDF port entry should now appear on the Ports list, and it should be the

selected (checked off) port. The original port(s) should be un-checked.

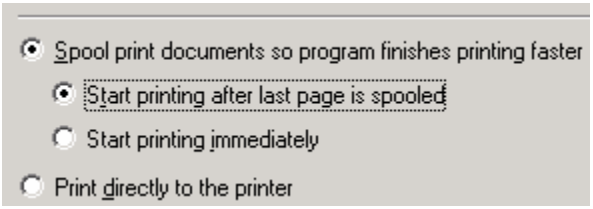
9. With the list highlighted to show the NEW port, click the **Apply** button.

10. Click **Ok** on the window to complete the port assignment. PDF files written by the Acrobat printer driver will appear in this folder.

27.4.4.4. Step 4. Spooling Setting on Printer Properties

Right click on the Adobe or Acrobat printer driver and select **Properties** (not Preferences). Select the **Advanced** tab.

The spooling settings for the Adobe/Acrobat printer driver **must** be the following settings. Select to **Spool print documents**, rather than Print directly to the printer.



Select either **Start printing immediately** or **after last page is spooled**. Both settings work well.

27.5. PDF Assembler

27.5.1. Over View

PDF Assembler is a separate companion application to PD-Plot 7. Its purpose is to make the assembly of a complete PDF report from many separate pdf documents easy and controllable. It can also add page numbering, build a table of contents, and with Acrobat 5, add bookmarks.

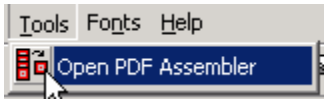
It is accessible from the **PD-Plot 7** print window. It is opened automatically after using the Acrobat document creation options on the print window.

27.5.2. Starting PDF Assembler

It can be opened from within PD-Plot 7 in two ways.

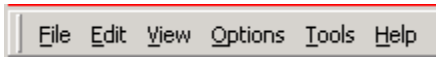
1. After printing a document using the Acrobat PDF option, PDF Assembler opens on it own, showing the pdf files just created.

2. You can open the Tools menu on the print window, and select **Open PDF Assembler** (same button on tool bar as well)

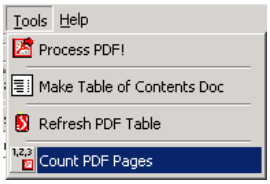


PDF Assembler is a stand alone application, and is found in the same folder as pdplot7.exe. You can open it directly by selecting the pdfass.exe and running it or making your own shortcut to the desktop or start menus.

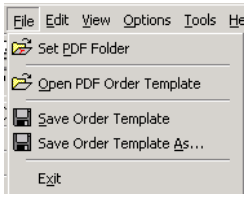
27.5.3. PDF Assembler Interface Components



Tools menu



File menu



Tool bar

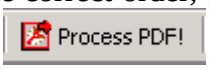
Most of the items found in the menus are also on the tool bar for easy access.

Working Folder

The location where all pdf files are located.

If PDF Assembler is opened from PD-Plot 7, the above folder is focused to the current project folder.

27.5.4. Processing the Selected Documents.

Once the documents table is in the correct order, are checked off, and the options are set as desired, click the Process PDF 

button on the tool bar. Enter a name of the new document and click Save

A single pdf document is shortly generated that contains all selected documents in the selected order, with the selected ordering, page numbering and bookmarks

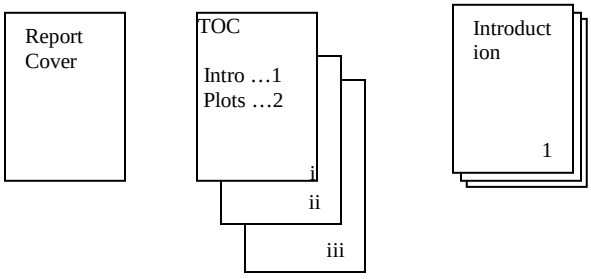
27.5.5. Creating a Table of Contents.

PDF Assembler can, as a separate step, generate a PDF document containing a Table of Contents (TOC) for the complete report.

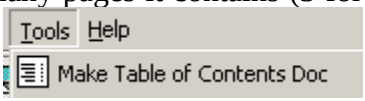
This is accomplished by scanning the current table of PDF files to determine the order and number of pages in each document, then using the name of each document and a starting page number, the TOC is created.

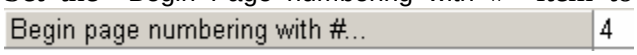
Once created, this table of contents document just becomes another PDF document on the list, which can then be included with the total document.

Thought be must be given to the page numbering scheme. It is usually easiest to begin page numbering with “1” on the first page of the report that begins AFTER the table of contents, and to leave the TOC without page numbering. In this way, the TOC can be created with the instruction to begin page numbering with “1”. Then no matter how many pages the TOC itself occupies, even though the main report begins at perhaps the 5th page into the report, the TOC page numbers for the various parts of the report line up

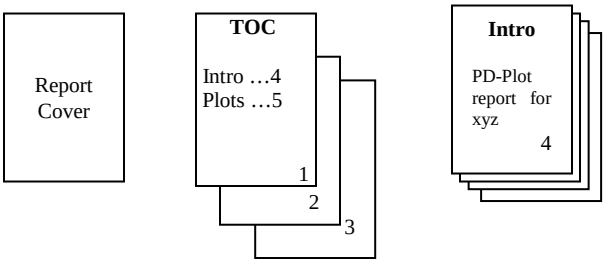


If you want to apply page numbers to the TOC pages themselves, then you must do a two step approach.

- Create the TOC document one time and count how many pages it contains (3 for example). Click the **Make Table of Contents** 

items on the **Tools** menu.
- Set the "Begin Page numbering with #" item to # of TOC pages + 1, or "4" 

- Re-create the TOC. Now the first line item on the TOC will say "Page 4".
- Set the order of the TOC document just created to come before all other pages in the document, but after the Report Cover.
- Change the "Begin Page numbering with #" item to 1, and set the "Pages to Skip" item to 1 (the number of pages in the report cover) so that page number is applied beginning with the 2nd page in the document, which is the first page of the TOC.
- Assemble the entire document. This is the result.

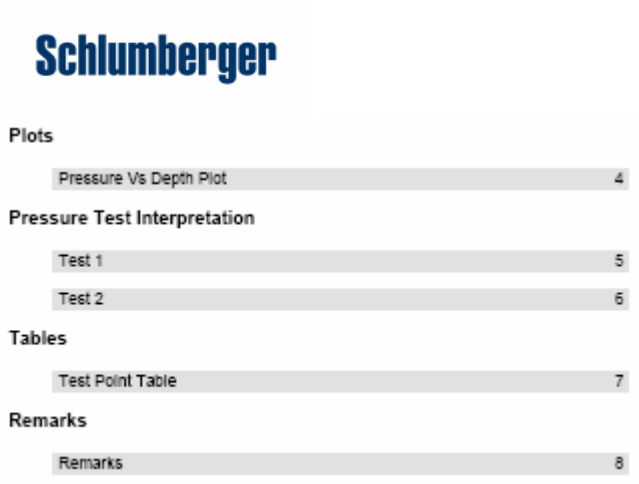


27.5.5.1. TOC Section Headers

To assist in building a more useful table of contents, TOC section headers can be entered.

PDF Files	# of I	TOC Section Header
Report Cover.pdf	1	TOC
Table Of Contents.pdf	1	
Pressure Vs Depth Plot.pdf	1	Plots
Test 1.pdf	1	Pressure Test Interpretation
Test 2.pdf	1	
Test Point Table.pdf	1	Tables
Remarks.pdf	1	Remarks

This is the resulting appearance of the TOC document using Section Headers

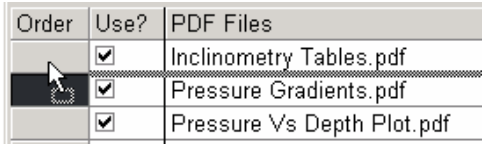


Note that the section headers over-ride the Folder structure names that may be present. Section headers are an alternative to folder use for organization. They cannot both be used together.

27.5.6. Setting the Document Order

Drag the first left hand grey border cell of the row you want to move up or down to the new position and release the mouse.

The table shows where the row being dragged will be placed if the mouse were released by showing the dark grey bar between rows.



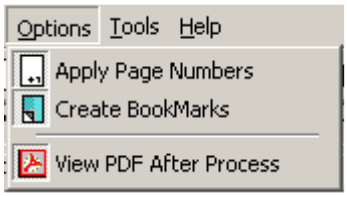
27.5.7. Page Numbering Setup

The Page Numbering Options table at the bottom of the window controls the page numbering. There is control for first number number, pages to skip before first page number is applied, and the format of the text used, text size and position

Page Numbering Settings	
Begin page numbering with #...	4
Pages to skip before starting numbering (1,2,3-5)	
Page # format	1,2,3 etc
Position from Left (in)	<Auto>
Position from Top (in)	<Auto>
Page # font size	10

27.5.8. Create Bookmarks

To create bookmarks at the same time as the document is being assembled, turn on the **Create BookMarks** option from the Options menu.



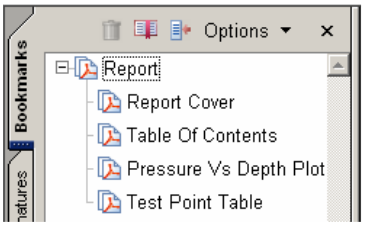
This same item is available on the main tool bar.

When this option is on, the assembled document will have bookmarks for each individual document in the assembly list.

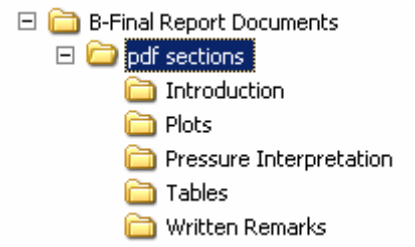
Document table in PDF Assembly

Order	Use?	PDF Files
	☑	Report Cover.pdf
	☑	Table Of Contents.pdf
	☑	Pressure Vs Depth Plot.pdf
	☑	Test Point Table.pdf

Matching bookmarks in assembled document in Adobe Writer.



More complex book mark structures can be created by using a set of a single level of sub folders under the main report documents folder (pdf sections) and placing various PDF documents in the folders to organize them



PDF Assembly then shows the folders and their contents

Use?	Folder	PDF Files
☑	Introduction	Report Cover.pdf
☑		Table Of Contents.pdf
☑	Plots	Pressure Vs Depth Plot.pdf
☑	Pressure Interpretation	Test 1.pdf
☑		Test 2.pdf
☑	Tables	Test Point Table.pdf
☑	Written Remarks	Remarks.pdf

the resulting assembled document book marks reflect this folder based organization.