

# GeoSyn 1D

## User Guide

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# Contacting Customer Care

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Contact IHS Customer Care for assistance with any questions or problems not answered in this help system.

To forward your GeoSyn license file to Customer Care, from the **File** menu, click **Licence** to display the *Current Licence Status* dialog box and click **Email Licence File to IHS** to launch your native email program and automatically attach the licence file to a new message.

<b>Phone</b>	1 800 IHS-CARE (1 800 447-2273) 1 303 736-3001 Mon. to Fri. 8:00 AM to 6:00 PM
<b>Email</b>	<a href="mailto:support.cdn@ihs.com">support.cdn@ihs.com</a>
<b>Web site</b>	<a href="http://energy.ihs.com/Products/GeoSyn">energy.ihs.com/Products/GeoSyn</a>

When reporting a difficulty, please include any information that might help us diagnose the problem including the following:

- Version of GeoSyn (and AccuMap, if installed)
- Windows operating system
- Circumstances and steps that led to the problem
- Complete text from any error messages

## Related Topics



*See "Licensing GeoSyn," p. 2*

*See "Recommended System Specifications," p. 1*

# Recommended System Specifications

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We recommend the following system specifications:

- Windows 7, Windows XP with Service Pack 2, or Windows 2000 Professional with Service Pack 4
- 1 GHz Pentium 4 processor
- 1 GB RAM
- 200 MB disk space (for networked installations), 12 MB disk space for stand-alone installations
- Video card with 64 MB RAM and minimum 1024x768 resolution

## Related Topics



*See "Contacting Customer Care," p. 1*

# Licensing GeoSyn

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Licensing support is provided by AccuMap SAS License Manager. If you're already running a network version of AccuMap, all that's required to run GeoSyn is a special license file (*GeoSyLic.rac*) from IHS. If you're not running AccuMap, AccuMap SAS License Manager must be installed on a server on your network (or locally in some circumstances).

Once AccuMap SAS License Manager is installed and running, copy the license file received from IHS to the GeoSyn *Executables* directory. For details on configuring GeoSyn default directories, see *Related Topics* below.

AccuMap SAS License Manager is available from IHS for either NT or Novell.



## To license GeoSyn

1. From the **File** menu, select **Licence**.

The *Licence Status* dialog box appears.

If there's a licensing failure, the *Unable to find GeoSyn licence* dialog box appears instead.

The failure may be related to a configuration parameter.

2. Click **Edit program configuration parameters** to display the *Properties: Configuration* tab and verify that the *Executables* directory is the same directory where *GeoSyLic.rac* is located.

## Related Topics

• • •

*See "Configuring GeoSyn Defaults," p. 5*

*See "Contacting Customer Care," p. 1*

# About GeoSyn

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## About GeoSyn 1D

GeoSyn 1D enables you to create one-dimensional and offset synthetic models.

## Synthetics Creation

Open a synthetic in GeoSyn in several ways:

- Open a previously saved GeoSyn synthetic with a *.syn* extension.
- Import raw log data from LAS or GeoSyn synthetic files.
- Launch GeoSyn by right-clicking a well in PetraSeis.
- Download digitized logs from the IHS Information Hub either using the Online Data Search Wizard or by right-clicking the desired well in AccuMap and selecting **GeoSyn Viewer** from the popup menu.
- Create a blocked log suite.

Logs can be edited, stretched, squeezed, shifted, and more.

## Layout Templates

GeoSyn enables you to create multiple templates that control the display and placement of elements in the main synthetic display including color palettes, directory paths, and display presentations for logs, traces, and models.

As well, the main synthetic display includes drag and drop, and right-click functionality for working with individual synthetic elements.

## File Management

GeoSyn includes a Directory Browser that displays GeoSyn and LAS format files in either the current directory or the current directory and its subdirectories too. All files are displayed in one central view sorted by UWI. Filter the display by extension, UWI column, or geographic coordinates.

## **Export Capability**

Export tops, directional surveys, logs, synthetic models, and more into ASCII text, LAS, and SEG Y format as applicable. All exports are managed through a central export manager dialog box with each data type displayed on separate tabs.

As well, any element that appears in the main synthetic display can be copied to the Windows clipboard and pasted into other applications to create a montage.

GeoSyn includes batch printing and reformatting, which enables you to simultaneously convert or print multiple LAS or GeoSyn format files.

## **Tops Management**

When you create a new synthetic or launch an existing one, GeoSyn automatically downloads the latest system tops and user tops from your local AccuMap database. Configure top lithology and save various tops in different lists that you import, export, and display in a tops table in the main synthetic display.

Information in the tops table can be exported as ASCII text or as an image file for use with other applications.

## **Seismic**

Import and display single-trace and multi-trace seismic data saved in SEG Y format and display the file in a stand-alone SEG Y Viewer before importing to review file format and contents. Imported seismic can be tied to models for correlation.

## **IHS Kingdom Integration**

Create a GeoSyn synthetic using a well from IHS Kingdom. Read a time depth chart directly from the Kingdom database, apply the data to a GeoSyn model, and then save the time/depth data back to the Kingdom database. GeoSyn can be launched directly from Kingdom and the resulting GeoSyn files can be saved within the Kingdom Project directory.

## **Modelling (traces)**

Create zero-offset, multi-offset, or derived models. GeoSyn also enables you to create blocked log models to eliminate tuning effects that sometimes occur when using actual logs.

## Cross-Plotting

Create crossplots using data from logs, seismic, and models that appear in the synthetic for the X and Y axes.

Following are some of the more common crossplots you might create:

- offset trace along the x axis and an amplitude trace along the y axis.
- incident angle along the x axis and the amplitude from the seismic along the y axis.
- gradient on one axis and intercept on the other.

## Configuring GeoSyn Defaults

GeoSyn enables you to change basic configuration details that apply to all GeoSyn sessions, such as the directories where it looks for configuration, license, and template files. Changes you make affect the current and future GeoSyn sessions.

The Properties dialog box includes a separate tab to control how imported log, seismic, and tops files are interpreted and displayed. For details, see *Related Topics* below.

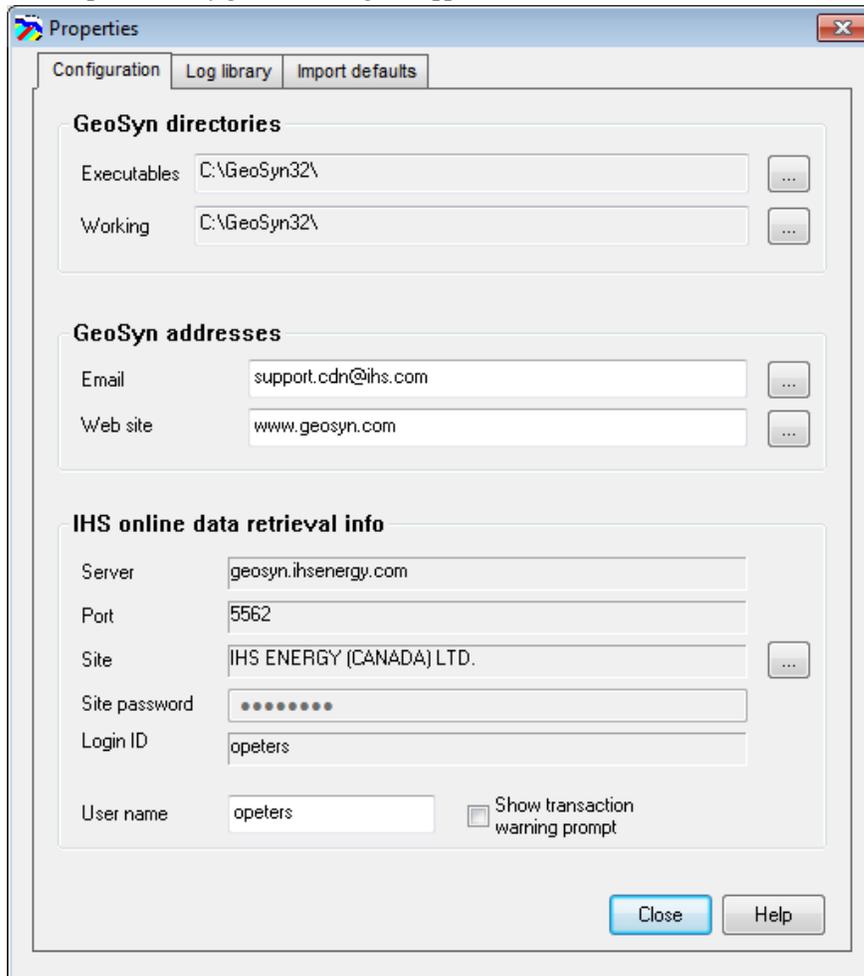
Several interface items can be toggled from the view menu as well: Tool Tips, Toolbar, and Status Bar.



### To configure GeoSyn defaults

1. From the **Edit** menu, select **Configuration properties**.

The *Properties: Configuration* dialog box appears.



2. Click the **Edit** button beside the **Working** box to specify a different location where GeoSyn looks for and saves synthetic layout templates, color palettes, and more.
  - ▶ If your subscription to the IHS Information Hub is charged by the transaction, select the **Show transaction warning prompt** checkbox to be notified before digits are downloaded and charges incurred.
3. Click **Close** to apply the changes or click a different tab.

Configuration changes are automatically applied to this and future GeoSyn sessions.

## Related Topics

• • •

See "Licensing GeoSyn," p. 2

See "Contacting Customer Care," p. 1

See "Changing Import Defaults," p. 11

# Loading Data

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## About Displaying Synthetics

Open a synthetic in GeoSyn in several ways:

- Open a previously saved GeoSyn synthetic with a *.syn* extension.
- Import raw log data from LAS or GeoSyn synthetic files.
- Download digitized logs from the IHS Information Hub either using the Online Data Search Wizard or by right-clicking the desired well in AccuMap and selecting **GeoSyn Viewer** from the popup menu.
- Creating a blocked sonic log.

GeoSyn generates synthetics in its own proprietary binary format. A GeoSyn synthetic can be the product of filtering and so on, and in this respect, differs from raw data used to create synthetics.

When importing LAS or GeoSyn files and when launching GeoSyn synthetics, you can launch the Directory Browser, which displays an index of LAS and GeoSyn files located in directories and subdirectories. Directory Browser enables you to sort and manage numerous files based on Unique Well Identifier (UWI) instead of file name.

## Related Topics

• • •

*See "Opening GeoSyn Synthetics," p. 7*

*See "Importing LAS or GeoSyn Files," p. 13*

*See "Using Directory Browser," p. 9*

*See "Downloading Logs from the IHS Information Hub," p. 38*

*See "Launching GeoSyn using AccuMap," p. 31*

*See "Creating Blocked Log Models," p. 61*

## Opening GeoSyn Synthetics

Open a synthetic created and previously saved in GeoSyn, which includes all of the formatting, display options, and customized settings. Before opening a file, you can display and sort them based on UWI using Directory Browser. For details, see *Related Topics* below.

Each time you open a synthetic, GeoSyn pulls the formation tops defined in the well from your local AccuMap system tops and AccuMap user tops databases.

To import basic log data from a log saved in LAS format, a GeoSyn synthetic file, AccuMap, or from the IHS Information Hub, see *Related Topics* below.



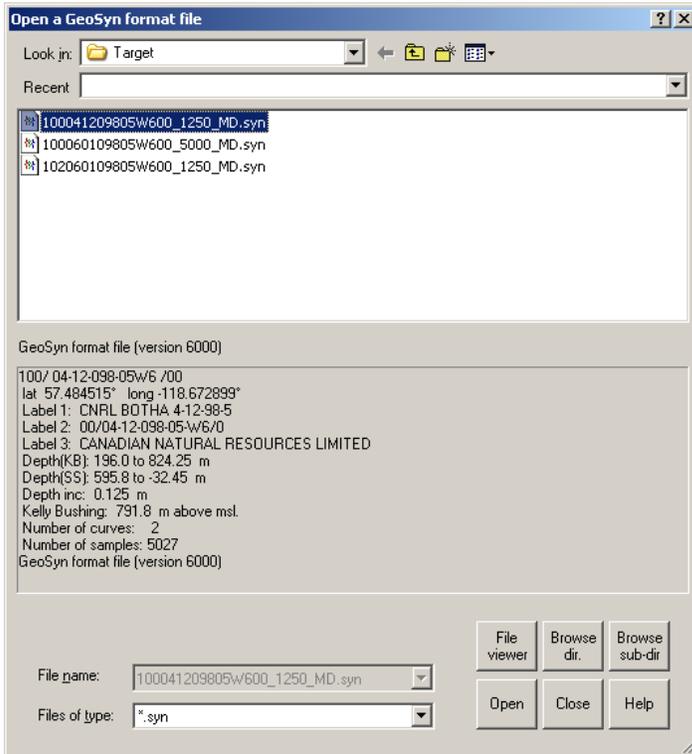
## To open a GeoSyn synthetic

1. From the **File** menu, select **Open**.

### OR

With GeoSyn open and a blank GeoSyn canvas displayed, simply drag the .syn file from a Windows location onto the canvas.

The *Open a GeoSyn format file* dialog box appears.



2. Either browse to the desired GeoSyn file using the **Look in** drop-down list and directory display pane or click **Browse dir.** or **Browse sub-dir.** to display the Directory Browser displaying GeoSyn files in the current directory or in the current directory and its subdirectories too.
3. View general statistics about the selected GeoSyn file in the **GeoSyn format file** pane then click **Open**.

The GeoSyn file with formatting and settings you previously applied appears in the main synthetic display.

## Related Topics

...

See *"Using Directory Browser," p. 9*

See *"Importing LAS or GeoSyn Files," p. 13*

See *"Launching GeoSyn using AccuMap," p. 31*

See *"Downloading Logs from the IHS Information Hub," p. 38*

## Using Directory Browser

Depending on whether you're opening a GeoSyn synthetic or creating one by importing an LAS or GeoSyn file, Directory Browser displays the relevant files in either the current directory or the current directory and its subdirectories too. All files are displayed in one central view sorted by UWI and if importing logs, both LAS and GeoSyn files are shown together.

Filter whether files are displayed by typing geographic coordinates, sort by clicking column headers for various UWI columns, and view basic details about each file before opening or importing it.

The first time it's run, Directory Browser creates a catalog file with a *.cat* extension in whichever directory it's launched. If you run Directory Browser for subdirectories as well, a *.cat* file is created in each subdirectory too. Depending on the volume of LAS and GeoSyn files in the selected directories, the catalog file creation process may initially take time as GeoSyn opens each file, searches for a valid UWI, and then writes a catalog entry with the information derived from each file. After the catalog file(s) is created though, GeoSyn only examines new files added to the directory.

Increase the speed at which Directory Browser processes files by ensuring only LAS files appear in the catalogued directories.

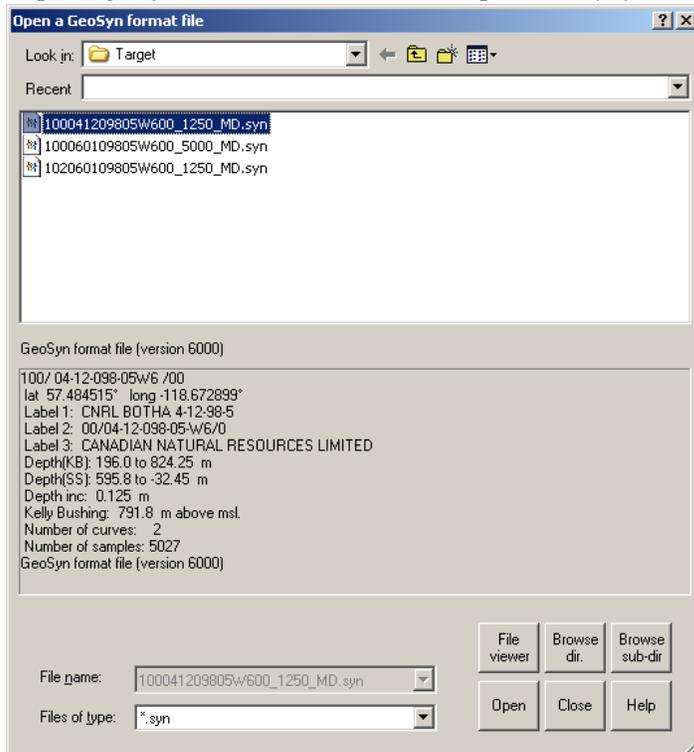
Corrupt GeoSyn files in the target directory may cause Directory Browser to crash.



### To use Directory Browser

1. Depending on whether you're opening an existing GeoSyn synthetic or creating a new one by importing either an LAS or GeoSyn file, do either of the following:
  - To open an existing synthetic, from the **File** menu, select **Open**.
  - To create a new synthetic from a log file, from the **File** menu, select **Import > Log Data**.

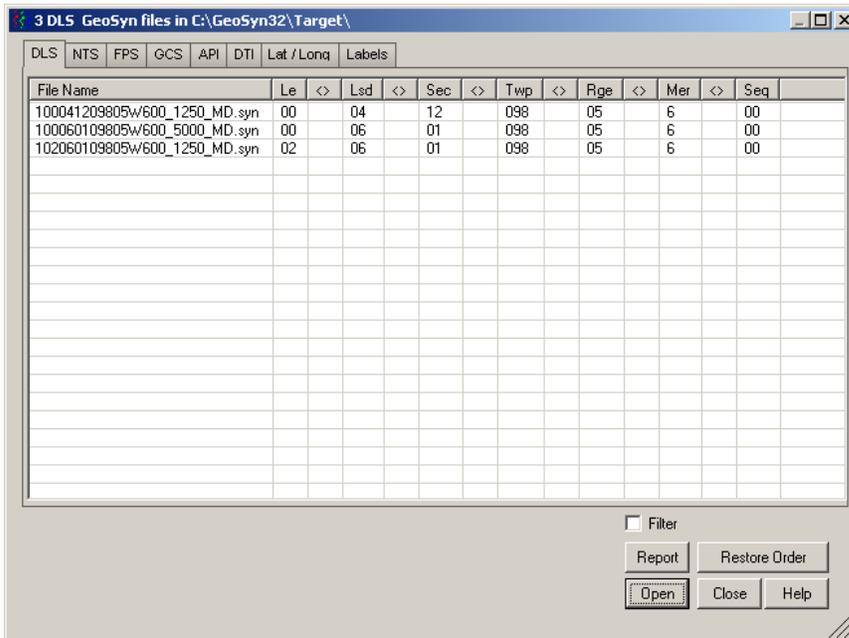
Depending on your selection above, either the *Open a GeoSyn format file* or the *Import log data* dialog box appears.



2. Select the root directory or drive from the **Look in** drop-down list then double-click folders in the file and folder display pane to browse to the directory that contains either the desired files or the subdirectories with those files.
3. Click either **Browse dir.** to catalog only the files in the current directory, or click **Browse sub-dir** to catalog all LAS and GeoSyn files in both the current directory and all subdirectories within the current directory.

The *Cataloging directories* dialog box appears as the catalog file(s) is created. If cataloging subdirectories, a *GeoSynvs2.cat* file is written to every subdirectory.

The *Directory Browser* dialog box appears listing UWIs in the appropriate survey system tab and separated into columns representing each coordinate group of the survey system. Log files with missing or invalid UWIs are only listed in the *Labels* tab.



4. Select the desired survey system tab and then click a column header to sort rows based on the values in that column or change the column order by clicking transpose (  ) between two columns to swap.
  5. To remove UWIs that appear outside of a certain geographic boundary, select **Filter** then click **Edit** to display the *Edit a UWI* dialog box and specify the coordinates for the pane within which to display UWIs.
  6. Right-click a row to view a popup window with basic log details.
  7. Select the row to open or import into GeoSyn then click **Open**.
- ▶ To write the current *Directory Browser* view to an ASCII format file, click **Report** to display the *Browser report* dialog box then click **Save Report**.

## Related Topics

...

See "Opening GeoSyn Synthetics," p. 7

See "Importing LAS or GeoSyn Files," p. 13

## Changing Import Defaults

Import the control path settings and display parameters for everything in a new synthetic except logs from a default file. Log default settings are instead controlled by a centralized log database with one exception: when you update a default file with settings from the current synthetic, settings for the logs in the current synthetic are also saved to the import defaults file and override, but don't overwrite settings in the log defaults database. For details on changing log display, see *Related Topics* below.

Create multiple import default files with a *.def* extension in the GeoSyn *Working* directory and then apply these defaults to a given synthetic when you launch it. For example, you could create unique default files for several different projects with differing criteria, or several default files for the same project that you switch between to view different scenarios.

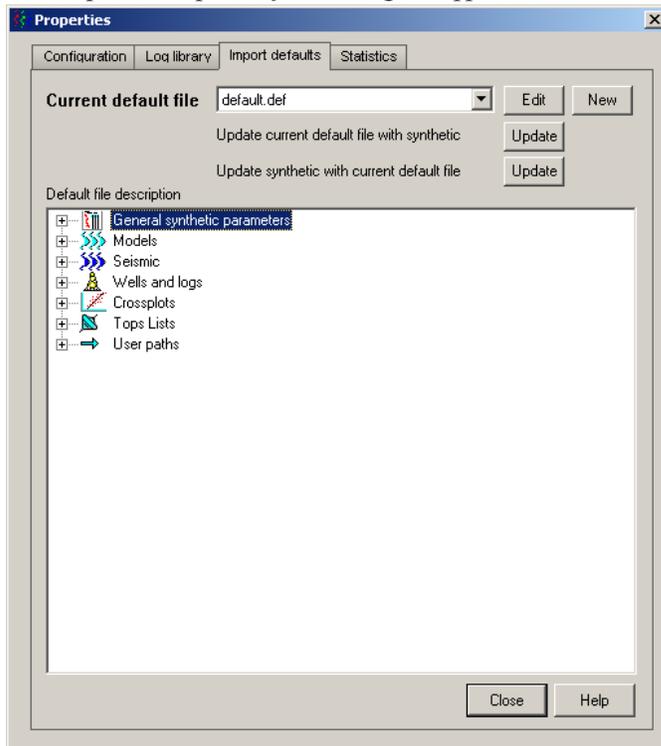
Defaults can either be applied to the current model, or the parameters set in the current model can be applied to a default file that you then save for future use.



## To change import defaults

1. From the **Edit** menu, select **Default synthetic properties (Def) > Import Defaults**.

The *Properties: Import Defaults* dialog box appears.



2. Select an import defaults file to modify in the *Current default file* drop-down list or click **New** to display the *New default file name* dialog box and type a name for the file you will create. The new import defaults file inherits the settings of the current synthetic.
  - ▶ To apply changes that you've made in the current synthetic to the default file that other GeoSyn synthetics use, select the file in the *Current default file* box, then click **Update** beside the *Update current default file with model* label.
  - ▶ To apply parameters from a default file to the current synthetic, select the default file in the *Current default file* box, then click **Update** beside the *Update synthetic with current default file* label.

The nodes in the import defaults file tree display settings from the selected file. Click to expand nodes and view their settings.

3. From the *Edit Specific parameters* drop-down list, select the synthetic properties to change (general synthetic, model, seismic, well, crossplot, tops, and user paths).

Depending on the selection above, either the *Synthetic properties* tab, *Model Properties* tab, *Seismic Properties* tab, *Well Properties* tab, *Crossplot Properties* dialog box, *Top Properties* dialog box, or *Set Source and Target directories* dialog box appears.

4. Configure the properties as desired then click **OK** to return to the *Properties: Import Defaults* tab.
5. Click **Close** to return to the main synthetic display with your changes applied.

The import defaults file listed in the *Current default file* drop-down list is automatically selected next time you launch GeoSyn and applies to all future synthetics derived from imported logs.

## Related Topics

• • •

See *"Configuring GeoSyn Defaults," p. 5*

See *"Changing Log Defaults," p. 48*

See *"Reformatting GeoSyn and LAS Files," p. 172*

## Importing LAS or GeoSyn Files

GeoSyn enables you to create a synthetic by importing raw log data from either LAS or GeoSyn files. Creating synthetics from GeoSyn files is different than simply opening a GeoSyn synthetic in that only fundamental log information and none of the formatting saved in the GeoSyn file is imported. For details on opening GeoSyn synthetics, see *Related Topics* below.

When you import a GeoSyn or LAS file, GeoSyn renders the file using the settings in the import defaults file and loads the formation tops defined in the well from your local AccuMap system tops and AccuMap user tops databases. For details on changing import default files, see *Related Topics* below.

To simultaneously reformat multiple LAS files to GeoSyn format, see *Related Topics* below.



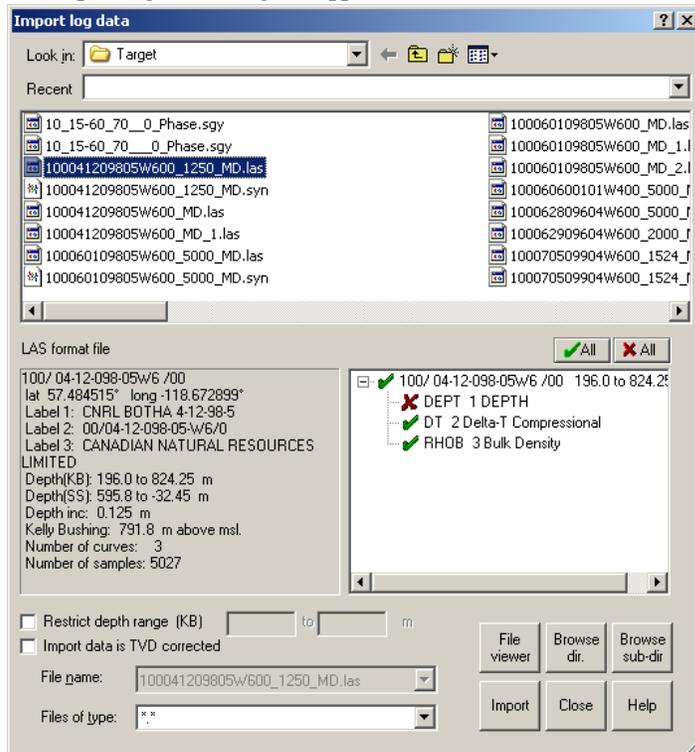
### To import LAS or GeoSyn files

1. From the **File** menu, select **Import > Log data**.

**OR**

with GeoSyn open and a blank GeoSyn canvas displayed, simply drag the .las file from a Windows location onto the canvas.

The *Import log data* dialog box appears.



2. Select the root directory or drive from the **Look in** drop-down list then double-click folders in the display pane and browse to the directory that contains either the desired files or the subdirectories with those files. To filter the type of files displayed, from the **File filter** drop-down list, select a file format extension.
3. Either click **Browse dir.** or **Browse sub-dir** to launch *Directory Browser*, or simply select the desired file in the display pane. For details on using *Directory Browser*, see *Related Topics* below.

► For LAS files, you can inspect the raw data in an ASCII text editor before importing the file by clicking **File Viewer**.

When you select the file, details appear in the *LAS* or *GeoSyn format file* pane.

4. In the well tree, select whether to import specific logs. A checkmark (✓) appears beside logs that will import, a cross (✗) beside those that won't. For wells with numerous logs, toggle the group by clicking **All** (✓ or ✗) depending on whether to import or ignore the majority of logs, then toggle the individual logs to import or ignore.
5. Specify whether the selected log(s) is in Measured Depth or True Vertical Depth units so that GeoSyn correctly places the formation tops from the AccuMap system tops and user tops databases, and then click **Import**.

If you ignore the sonic log or one isn't available, GeoSyn automatically creates a straight line (constant velocity) sonic log. For details on manually editing logs, see *Related Topics* below.

If the import file has missing or invalid data such as an invalid UWI or log alias, GeoSyn enables you to correct it during the import. For details, see *Related Topics* below.

## Related Topics

...

See "Opening GeoSyn Synthetics," p. 7

See "Changing Import Defaults," p. 11

See "Using Directory Browser," p. 9

See "Changing Log Display Properties," p. 50

See "Correcting Invalid Data when Importing," p. 24  
See "Drawing Straight Edge and Freehand Curves," p. 57  
See "Applying Math Equations to Logs," p. 75

See "Reformatting GeoSyn and LAS Files," p. 172  
See "Clipping or Filtering Logs," p. 72  
See "Cutting Logs," p. 78

## Importing Directional Surveys

Import and modify a directional survey saved in ASCII, GeoGraphix, or Open Works format, or create one from scratch by typing measured depth, dip, and azimuth values.

If a well from the IHS Information Hub has a directional survey available and you're licensed to access them, you can save it to disk while downloading the log and then import it into GeoSyn. For details, see *Related Topics* below.



### To import a directional survey

1. From the **File** menu, select **Import > Directional survey**.

The *Measured Depth to True Vertical Depth correction* dialog box appears.

#	Measured Depth	Dip	Azimuth	True Vertical Depth	N (-S)	E (-W)	Dog Leg x/30

Edit selected line			
#	MD	Dip	Azimuth
1	0.0	0.0	0.0

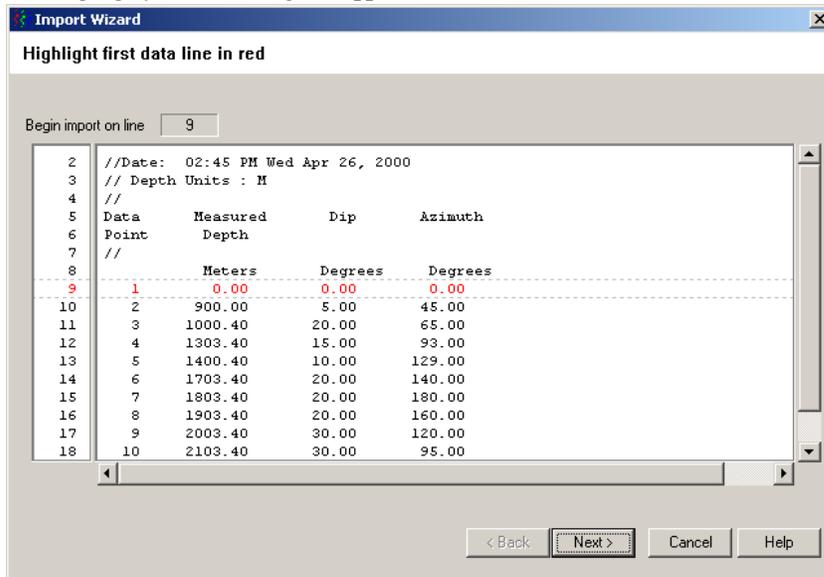
2. Either click **Import Survey** and browse for the desired directional survey file or type individual depth, dip, and azimuth values in the dialog box above and click **Insert**.

If importing a check shot file, complete the bulleted steps otherwise continue to **step 3**.

The *Import Directional Survey* dialog box appears. You can also launch this dialog box from the *Well Properties: Well properties* tab.

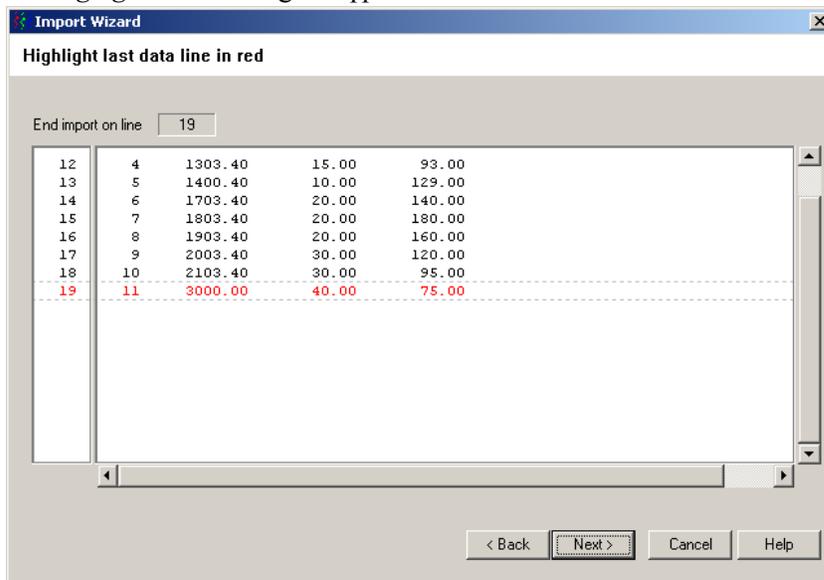
- Browse to the file to import then click **Open**.

The *Highlight first line* dialog box appears.



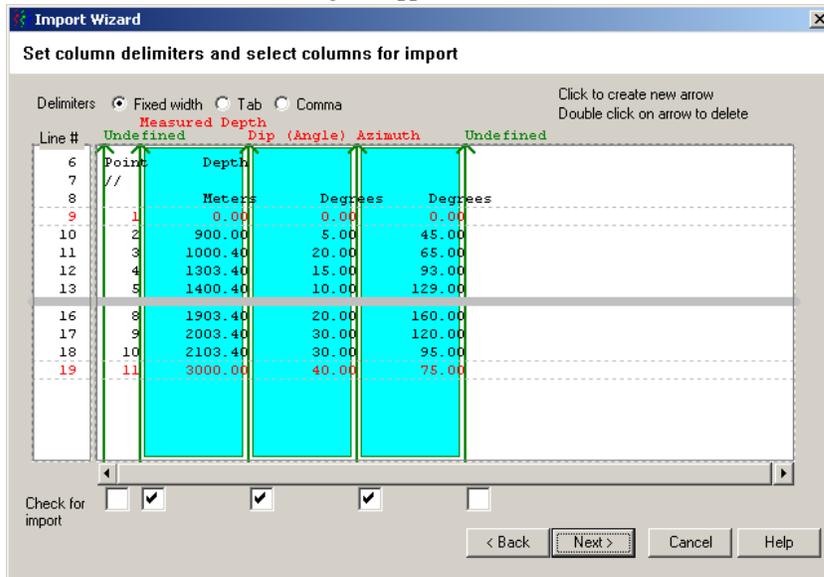
► Select the first line to import and click **Next**.

The *Highlight last line* dialog box appears.



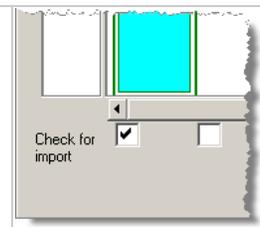
► Select the last line to import and click **Next**.

The *Set column delimiters* dialog box appears.

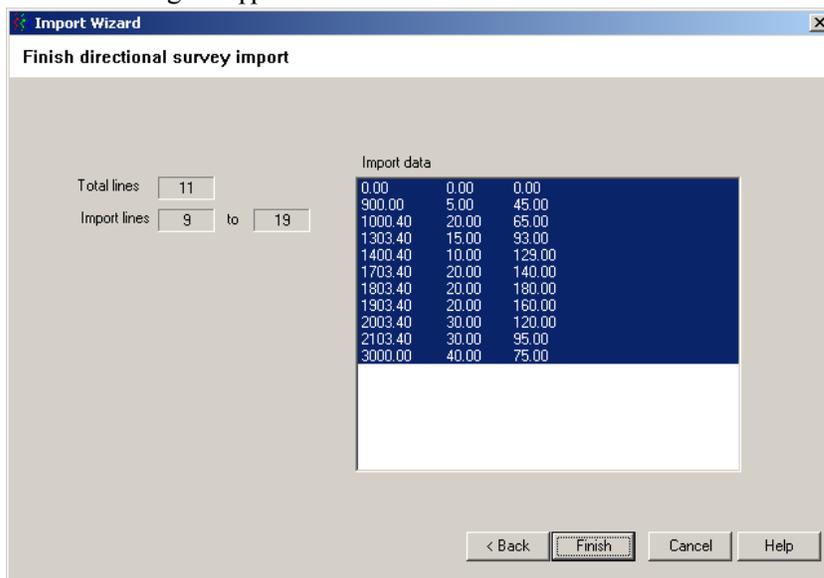


▶ Set the column delimiters (↑) by clicking in the display pane between required columns. The green line cannot bisect a data column. Double-click column delimiters to delete.

Click the box that appears below each delimiter to display the *Select from List* dialog box and identify the data type then click **Next**.



The *Finish* dialog box appears.



► Click **Finish**.

The *Measured Depth to True Vertical Depth correction* dialog box appears, populated with the typed or imported values.

#	Measured Depth	Dip	Azimuth	True Vertical Depth	N (-S)	E (-W)	Dog Leg x/30
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	900.00	5.00	45.00	898.86	35.33	14.64	0.17
3	1000.40	20.00	65.00	996.60	47.70	32.30	4.60
4	1303.40	15.00	93.00	1285.48	64.91	120.82	0.96
5	1400.40	10.00	129.00	1380.15	57.51	140.09	2.79
6	1703.40	20.00	140.00	1672.46	2.69	195.87	1.03
7	1803.40	20.00	180.00	1766.43	-28.80	207.33	4.03
8	1903.40	20.00	160.00	1860.40	-62.31	213.24	2.04
9	2003.40	30.00	120.00	1950.91	-93.99	239.82	5.74
10	2103.40	30.00	95.00	2037.51	-108.90	287.13	3.73
11	3000.00	40.00	75.00	2771.03	-64.37	796.20	0.51

Edit selected line

#	MD	Dip	Azimuth
11	3000.00	40.00	75.00

Input data set type:  MD, DIP, AZ  MD, TVD, dY, dX

Survey units are:  Imperial  Metric

Buttons: Update, Delete, Insert, Import Survey!, Save Report, Apply, Close, Help

3. Do any of the following:

- To modify or add values, select the row to replace, or type values in the **MD**, **Dip**, and **Azimuth** boxes, and then click either **Update** or **Insert**.
- To delete a row, select it in the display pane and click **Delete** or click **All** to clear the entire display pane.
- To save the display pane to an ASCII format file, click **Save Report**.

4. Click **Apply** and **Close** to complete the import.

GeoSyn imports the data and displays the deviated synthetic in the main synthetic display, where you can adjust the azimuth of the projection using the *Well Properties: Directional Survey* tab. For details see *Related Topics* below.

## Related Topics

...

See "Changing Deviated Well Properties," p. 47

See "Downloading Logs from the IHS Information Hub," p. 38

## Importing Check Shot Surveys and Vertical Seismic Profiles

Apply a check shot correction to a GeoSyn synthetic by importing an ASCII format file or create one from scratch by typing time and depth values for individual check shot pairs.

If the well to be check shot corrected also requires a directional survey correction, apply the directional survey first. For details, see *Related Topics* below.



## To import check shot surveys and VSPs

1. From the **File** menu, select **Import > Check Shot or VSP Survey**.

The *Import Data* dialog box appears.

The screenshot shows a dialog box titled "Check Shot Wizard" with the subtitle "Import or enter data". On the left is a large empty table with many rows. On the right, under "Edit Check Shots", there are input fields for "Time" (with "ms (1 way)" to its right) and "Depth" (with "m." to its right). There is an "Update" button next to the "Depth" field. Below these are buttons for "Insert", "Delete", and "All". At the bottom of this section are "Export..." and "Import..." buttons. At the very bottom of the dialog are "Close", "Help", "< Back", and "Next >" buttons.

2. Either click **Import** and browse for the desired check shot survey file or type individual time depth pairs in the **Time** and **Depth** boxes, and then click **Insert**.

If importing a check shot file, complete the bulleted steps otherwise continue to **step 3**.

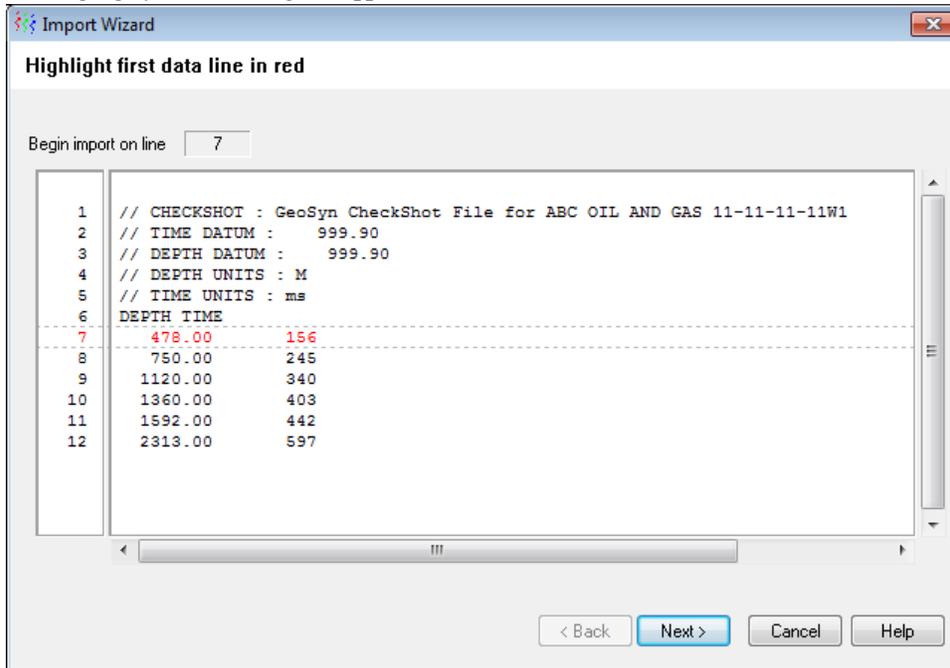
The *Import Check Shots* dialog box appears.

- Browse to the desired file.

To view and modify the contents of an ASCII file before importing, click **File Viewer** to display the file contents in an ASCII text editor.

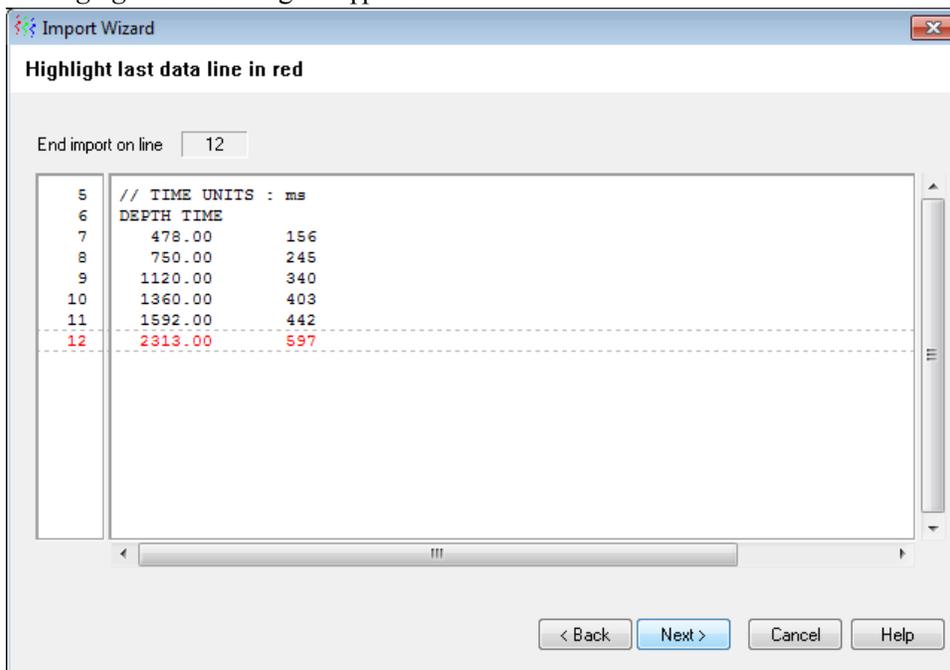
- Browse to the file to import then click **Open**.

The *Highlight first line* dialog box appears.



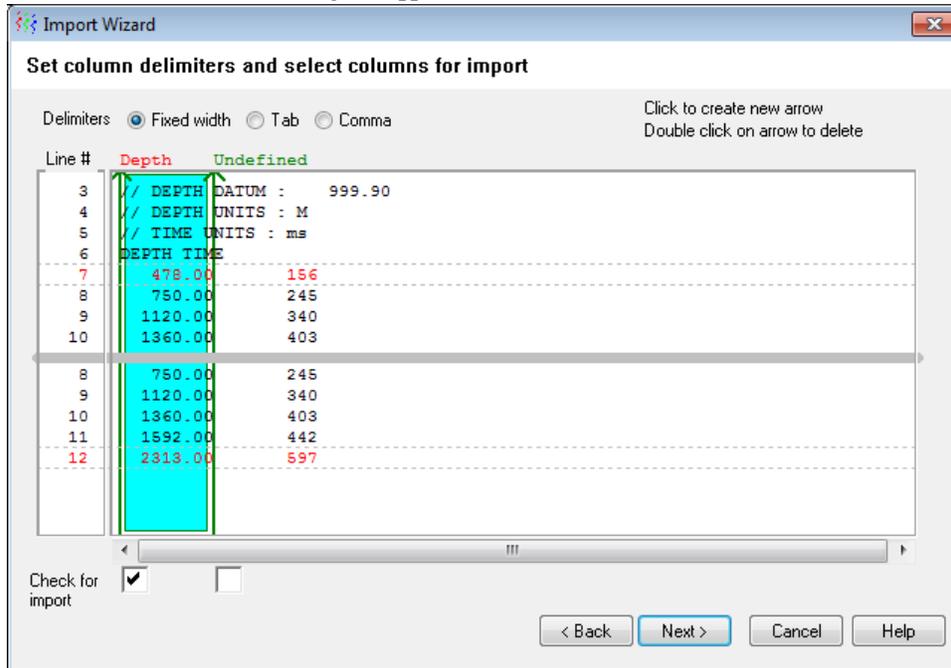
▶ Select the first line to import and click **Next**.

The *Highlight last line* dialog box appears.



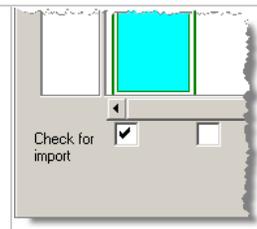
▶ Select the last line to import and click **Next**.

The *Set column delimiters* dialog box appears.



- ▶ Set the column delimiters (↑) by clicking in the display pane between required columns. The green line can't bisect a data column. Double-click column delimiters to delete.

Click the box that appears below each delimiter to display the *Select from List* dialog box and identify the data type then click **Next**.



The *Finish* dialog box appears.

The 'Import Wizard' dialog box is shown with the title 'Finish checkshot import'. It contains the following elements:

- Total lines: 6
- Import lines: 7 to 12
- Radio buttons for time data format:
  - Time data is one way
  - Time data is two way
  - Time data is in milliseconds
  - Time data is in seconds
- An 'Import data' table with the following values:

Time (ms)	Depth (m)
478.00	156
750.00	245
1120.00	340
1360.00	403
1592.00	442
2313.00	597
- Buttons at the bottom: < Back, Finish, Cancel, Help.

► Click **Back** to change any previous selections or click **Finish**.

The *Import Data* dialog box appears, populated with the typed or imported values.

The 'Check Shot Wizard' dialog box is shown with the title 'Import or enter data'. It contains the following elements:

- A table with the following data:

#	1 way ms	2 way ms	Depth	Velocity
1	156.0	312.0	478.0	
2	245.0	490.0	750.0	3056.18
3	340.0	680.0	1120.0	3894.74
4	403.0	806.0	1360.0	3809.52
5	442.0	884.0	1592.0	5948.72
6	597.0	1194.0	2313.0	4651.61
- An 'Edit Check Shots' section with:
  - Time: 156.0 ms (1 way)
  - Depth: 478.0 m
  - Buttons: Update, Insert, Delete, All, Export..., Import...
- Buttons at the bottom: Close, Help, < Back, Next >

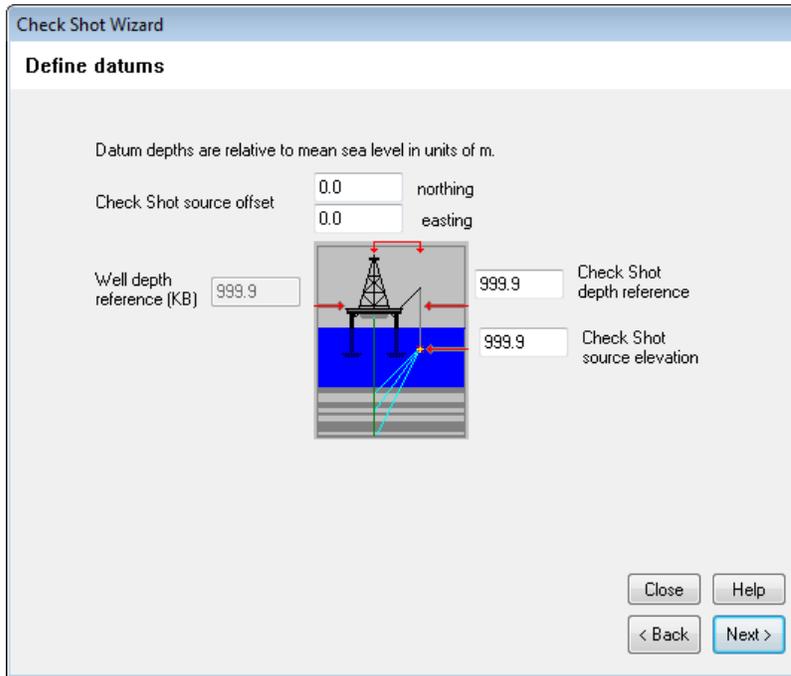
3. Do any of the following:

- To modify or add values, select the row to replace, or type values in the **Time** and **Depth** boxes, and then click either **Update** or **Insert**.

- To delete a row, select it in the display pane and click **Delete** or click **All** to clear the entire display pane.
- To save the display pane to an ASCII format file, click **Export**.

4. Click **Next**.

The *Define Datums* dialog box appears. It's very important to properly define the datum parameters of the check shot data.



5. Define the datum parameters then click **Next**.

The *Shift Time Zero* dialog box appears. If you don't change the datum, synthetic time zero will be at the check shot time datum.

The screenshot shows the 'Check Shot Wizard' dialog box with the title 'Set time datum and quality control output'. It contains the following text and controls:

To change zero time to a datum different than the check shot source depth (eg. seismic datum) provide a new time datum and a datum correction velocity for the section between the check shot source and the new datum.

The new time datum must be above the check shot time datum.

Time datum SS: 1500.0 m. (default is the check shot source elevation)

Correction velocity: 2000.0 m/sec    time added (ms): 500.1

Drift calculation: Spline curve

Quality control:

- Drift curve
- Check Shot transit curve
- Create new tops list for Check Shots

Buttons: Close, Help, Undo, Apply

6. Select the appropriate options then click **Apply** and **Close** to complete the import.



**TIP:** Click **Undo** in the above dialog box to go back and select different settings.

The changes applied above are also visible in the *Time Datum Properties* dialog box. If a layer was already added above the model using the *Time Datum Properties* dialog box, the check shot import process adds an additional zone to that dialog box. See *Related Topics* for details.

## Related Topics



See *"Importing Directional Surveys,"* p. 15

See *"Check Shot Computation,"* p. 257

See *"Changing Time Datum Properties,"* p. 112

## Correcting Invalid Data when Importing

When importing a file, warning messages appear if either the UWI is missing or invalid, specific logs are missing, log aliases are missing or unrecognized, the sonic and density log units don't match, or the kelly bushing or depth increment of the imported file and the current synthetic don't match.

GeoSyn enables you to correct these errors during the import.

Change general synthetic display properties if you don't want to be notified of missing or invalid UWIs or unrecognized log aliases. For details, see *Related Topics* below.

## The kelly bushing depth for an imported log is different than the kelly bushing for logs in the current synthetic

GeoSyn offers to automatically depth shift the imported log to match the kelly bushing depth of logs in the current synthetic. You can instead click **Cancel** and from the **Edit** menu, select **Well and log properties** (🔧) and change the kelly bushing depth for the current synthetic.

## The UWI is missing or invalid

The *Invalid Unique Well Identifier* dialog box appears.

Invalid Unique Well Identifier (UWI)

UWI: 0000803604w5000 Edit...

Label 1: BURLINGTON SYLVAN LAKE 1-24-38-4

Label 2: 0000803604w5000

Label 3: BURLINGTON RESOURCES CANADA LTD.

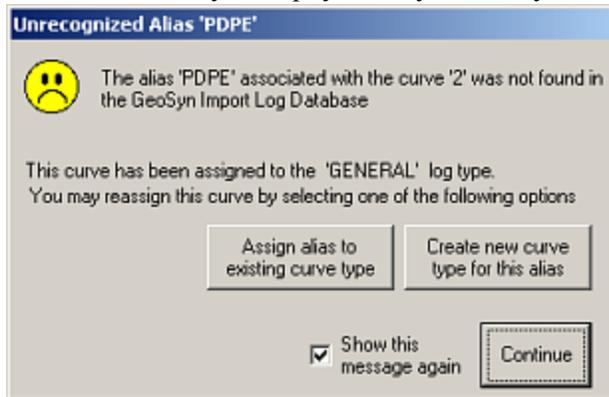
A valid UWI is not required. Data file management functionality is reduced without a valid UWI.

Show this message again Continue

- ▶ Click **Edit** and select the appropriate survey system then type the UWI for that system and click **Apply**, or click **Continue** to build the synthetic despite the missing or invalid UWI.

## The log alias is missing or unrecognized

The log is associated with the alias *GENERAL* and the *Unrecognized Alias* dialog box appears. Logs associated with the *GENERAL* alias may not display correctly and GeoSyn won't recognize them as logs of importance (sonic, density, etc).



▶ Select either of the following:

- To keep the current association with the alias *GENERAL* and associate the curve with another alias later, click **Continue**.
- If the log type already exists, click **Assign alias to existing curve type**.  
The *Select from list* dialog box appears where you select the log to which to assign the unknown alias.

- If the log type doesn't exist, click **Create new curve type for this alias**. The *Create New Curve Type* dialog box appears enabling you to add this alias to GeoSyn's database of logs. Once in the database, during future imports, GeoSyn automatically associates it with the log type you specify.

**Create New Curve Type**

Curve identification

Name: MT 11X      Alias: GEN

API number: 11 222 33 44

Buttons: Add, Delete

General properties

Curve inflill: Scaled color      Metric to Imperial conversion factor: 1.0

Infill orientation: Left      Track width (cm): 2.54

Infill palette: White

Trace: Color: Blue, Pattern: Dashed, Thickness: 2

Scale properties

Lines: Foreground      Type: Linear       Auto range

	Left	Right
Metric	1.0	500.0
Imperial	1.0	1700.0

Buttons: OK, Cancel, Help

- Type and select display properties to associate with the new log type then click **OK** to update the log defaults. Associate additional aliases with log types in the GeoSyn log database at any time using the *Well Properties: Log Properties* tab.

Problem	Resolution
The sonic log is missing	GeoSyn can create a constant velocity sonic log.
The sonic log has invalid data.	GeoSyn can either reduce the sample rate until the integrated sonic data falls below the program limits or abandon the import.
The sonic and density units don't match.	GeoSyn issues a warning and automatically corrects the problem.
Importing data into a pre-existing synthetic with different parameters (different KB, different depth increment, etc.) than the imported file.	GeoSyn issues a warning and can correct all the problems before you import the data.

## Related Topics

...

See *"Importing LAS or GeoSyn Files," p. 13*  
 See *"Changing Log Defaults," p. 48*

See *"Configuring GeoSyn Defaults," p. 5*  
 See *"Downloading Logs from the IHS Information Hub," p. 38*

## Launching GeoSyn from Kingdom

Launch GeoSyn from IHS Kingdom in order to create synthetic models based on Kingdom wells.

When launched from Kingdom, GeoSyn creates a *GeoSyn* directory under the Kingdom project directory. All GeoSyn data associated with the model you create is written to this location.

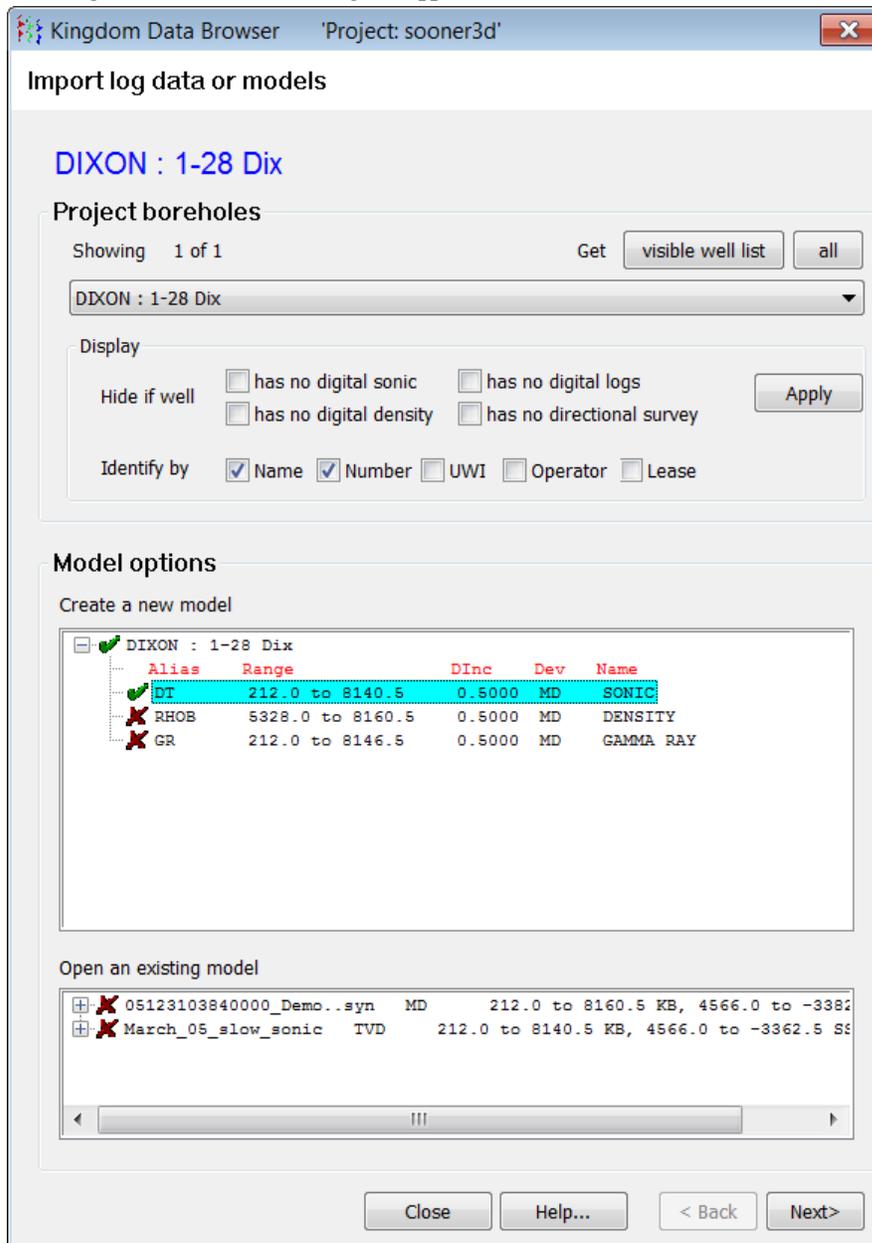


### To launch GeoSyn from Kingdom

1. With Kingdom running, launch GeoSyn from one of the following locations:
  - Right-click a single well using the **Wells > All Wells** node in the *Project Tree* tab of the *Tree* dialog box and select **GeoSyn**. This enables you to import data for only that particular well, but you can download the data for that entire project by clicking **Visible well list** to the right of the *Get* label that appears in the *Kingdom Data Browser* dialog box (below).
  -  **NOTE:** You must right-click precisely on the well, otherwise you retrieve the entire visible well list and must manually find the desired well.
  - From the **Project** menu, click **GeoSyn**.
  - From the **Wells** menu, click **GeoSyn**.

Unlike the first option in the list above, the last two options import data for all of the wells on the Kingdom project's visible well list. Some of the wells on the Kingdom base map may be hidden, but can still be retrieved using GeoSyn at any time.

The *Kingdom Data Browser* dialog box appears.



► Filter the results displayed in the drop-down list near the top of the dialog in which you select the wells by clicking check boxes to the right of the *Hide if well* label, and select the columns to display in the *Model Options* pane by clicking check boxes to the right of the *Identify by* label.

► Where the well includes a directional survey, select whether to convert it to true vertical depth.

If you selected a model above, an **Open** button appears in the bottom-right of the above dialog box and when clicked, immediately opens a new or existing GeoSyn synthetic.

If you selected **Log(s)** above, the **Next** button appears in the bottom-right of the above dialog box that when clicked, displays the *Kingdom Data Browser* dialog box, where you apply corrections to the data and select display options for the resulting model before launching GeoSyn.

Kingdom Data Browser 'Project: Teapot-Dome-2007'

### Import Directional Surveys and Time Depth charts

Seismic datum 5500.00 ft SS  
Well elev. ref. (KB) 5071.00 ft SS  
No deviation survey. Well is assumed to be vertical. View directional survey...

Apply time depth corrections to synthetic View and edit...

Hang synthetic from datum and tie to a single depth point

Correct synthetic using selected time depth chart

Shared RMOTC 48-X-2mmmmmmIntegrated\_Shared Set as default

	MD	TVD (Elev Ref)	TVD (Seismic)	Subsea	Time 2'
1	-1182.38	-1182.38	-753.38	6253.38	0.0000
2	-429.00	-429.00	0.00	5500.00	0.2196
3	405.60	405.60	834.60	4665.40	0.2495
4	409.60	409.60	838.60	4661.40	0.2497
5	424.60	424.60	853.60	4646.40	0.2505
6	428.10	428.10	857.10	4642.90	0.2507
7	442.10	442.10	871.10	4628.90	0.2513
8	445.60	445.60	874.60	4625.40	0.2515
9	452.60	452.60	881.60	4618.40	0.2517
10	466.10	466.10	895.10	4604.90	0.2520
11	470.10	470.10	899.10	4600.90	0.2521
12	473.10	473.10	902.10	4597.90	0.2521
13	479.60	479.60	908.60	4591.40	0.2522

Drift correction Spline curve

Add drift curve to display

Add the time depth chart to the display in velocity form

Add an uncorrected (by TD chart) sonic

Close Help... < Back Apply

▶ Make selections in the dialog box above and then click **Apply**. If you tie the synthetic to a single depth point, click **View and Edit** to display the *Time/Depth Quality Control* dialog boxes where you apply changes to the time depth curve before applying it to the sonic.

**Note:** In order for changes made using the *Time/Depth Quality Control* dialog boxes to be applied, upon exiting that dialog box, when the *Save Modified Time/Depth Chart* dialog box appears, you must click **Save**.

The synthetic is created based on the well imported above. The above dialog box remains visible and the **Apply** button changes to an **Undo** button in case you want to apply different data correction options or select a different depth chart. The **Back** button also remains active in the above dialog box so that you can add additional logs to the model. If importing additional logs, GeoSyn warns you so that you don't inadvertently apply the same time depth chart twice.

3. Tie the imported seismic section to a model (for details, see *Related Topics* below).
4. From the **File** menu, click **Save**.  
This option is only available in GeoSyn when it's launched from Kingdom.

The *Save Model Data* dialog box appears.

5. Specify the outputs to save that can be used by Kingdom, and then click **Save**.

## Related Topics

• • •

See *"Tying Seismic to Models," p. 150*

See *"Importing LAS or GeoSyn Files," p. 13*

See *"Importing Check Shot Surveys and Vertical Seismic Profiles," p. 18*

## Launching GeoSyn using AccuMap

Right-click a well that appears in AccuMap and launch GeoSyn. If the well you select doesn't have a sonic log, GeoSyn generates a constant velocity sonic log that you can manually edit later. For details, see *Related Topics* below.



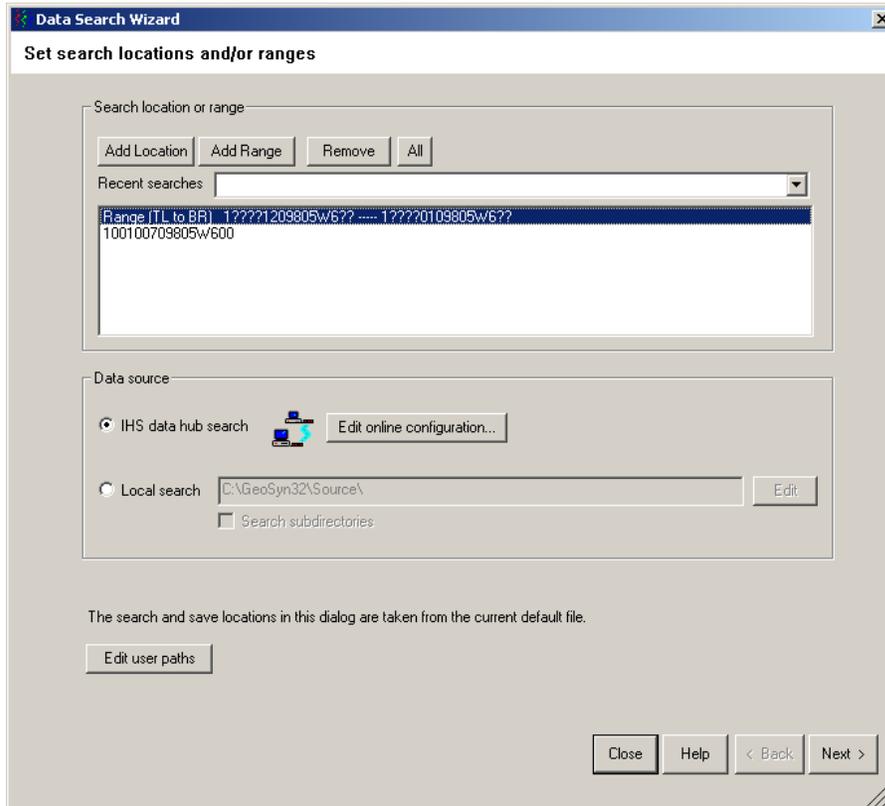
## To launch GeoSyn using AccuMap

1. In AccuMap, with the desired Detail Map and the Wells layer displayed, click the button below the **Inspect** tool and



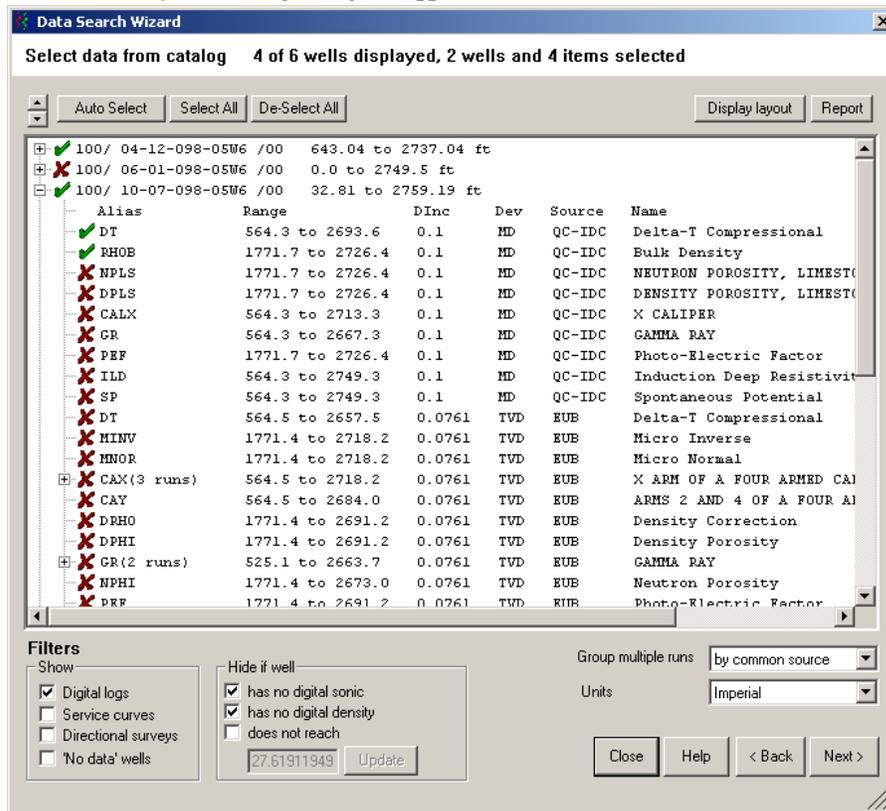
2. Click the **Inspect** tool to activate Inspect mode.  
The cursor changes to a magnifying glass (🔍).
3. Right-click the desired well and select **GeoSyn Launch** from the popup menu.

The *Define search range* dialog box appears.



4. Click either **Add Location** or **Add Range** to display the *Edit a UWI* dialog box and specify the survey system and coordinates of the well(s) for which to retrieve logs.  
▶ To change your IHS Information Hub connectivity parameters or GeoSyn default directories, click **Edit online configuration** to display the *Configuration* tab. For network installations, hub connectivity parameters affect all GeoSyn users.
5. Click **Next**.

The *Select data from catalog* dialog box appears.

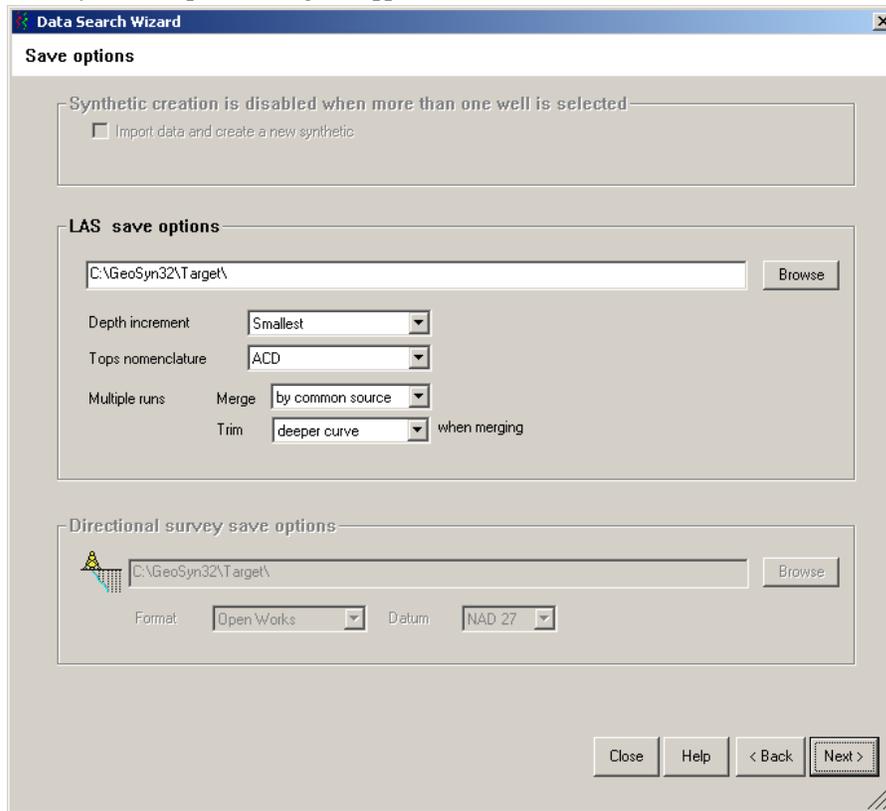


6. Click **Display layout** to configure the options with which to sort and filter the wells that appear above. For example, by column order, row order, by the presence of digital sonic and density logs, and by depth range.

A checkmark (✓) appears beside logs that will import, a cross (✗) beside those that won't. Logs with true vertical depths and measured depths can't be selected for the same import.

7. Click **Next**.

The *Define save options* dialog box appears.



8. Select the locations in which to save downloaded files and whether to convert downloaded logs into GeoSyn format using the import defaults options. These options are defined in the *Properties: Import Defaults* dialog box, which can be accessed by clicking **Edit Defaults** above.

9. Click **Next**.

The specified logs are downloaded from the IHS Information Hub and the results are listed in a summary report dialog box that can be saved to an ASCII format file to log downloads.

10. Click **Close**.

## Related Topics



*See "Changing Import Defaults," p. 11*

*See "Importing LAS or GeoSyn Files," p. 13*

## Launching GeoSyn using PetraSeis

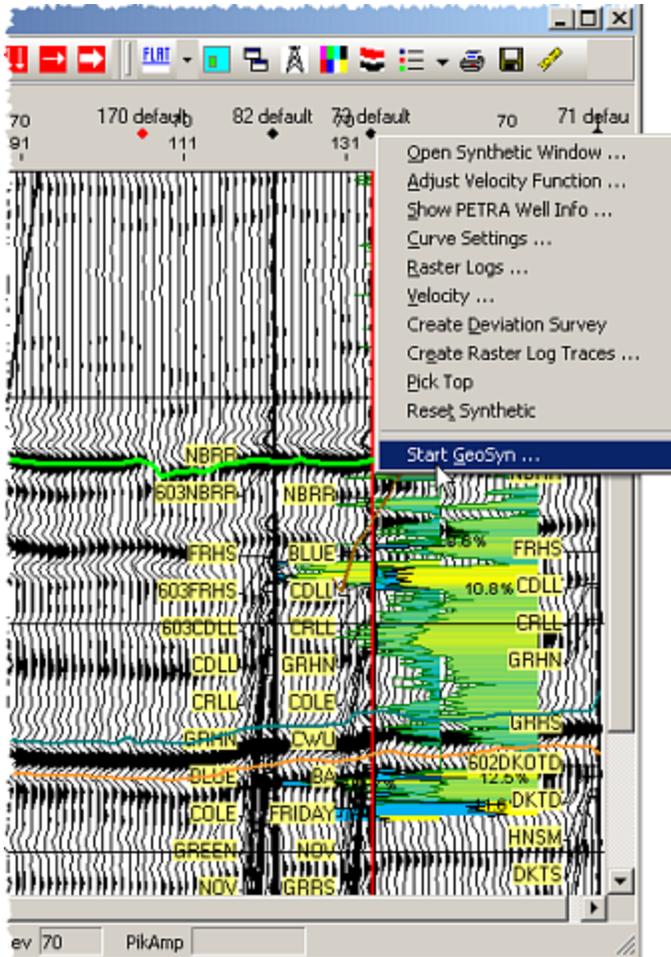
Right-click a well in PetraSeis for which to create a synthetic in GeoSyn. Using PetraSeis, you specify the curves and tops to include in your synthetic. You can also include a seismic line and a directional survey.

GeoSyn projects you launch using PetraSeis can be exported back to PetraSeis from GeoSyn. For details, see *Related Topics* below.

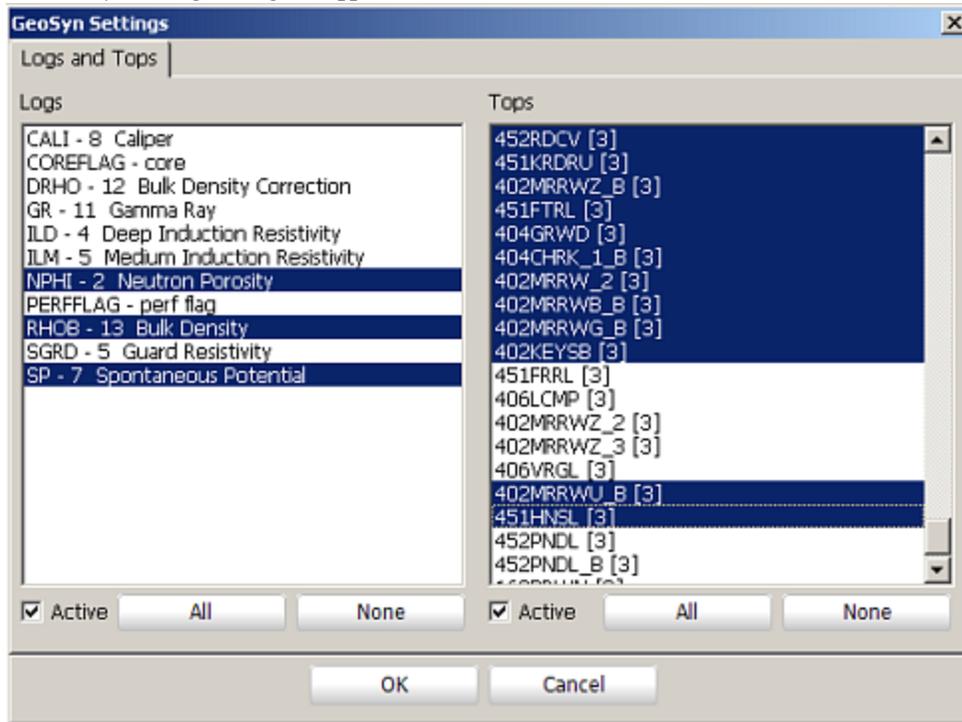


## To launch GeoSyn using PetraSeis

1. Using the PetraSeis application, right-click the well for which to launch GeoSyn and select **Start GeoSyn**.

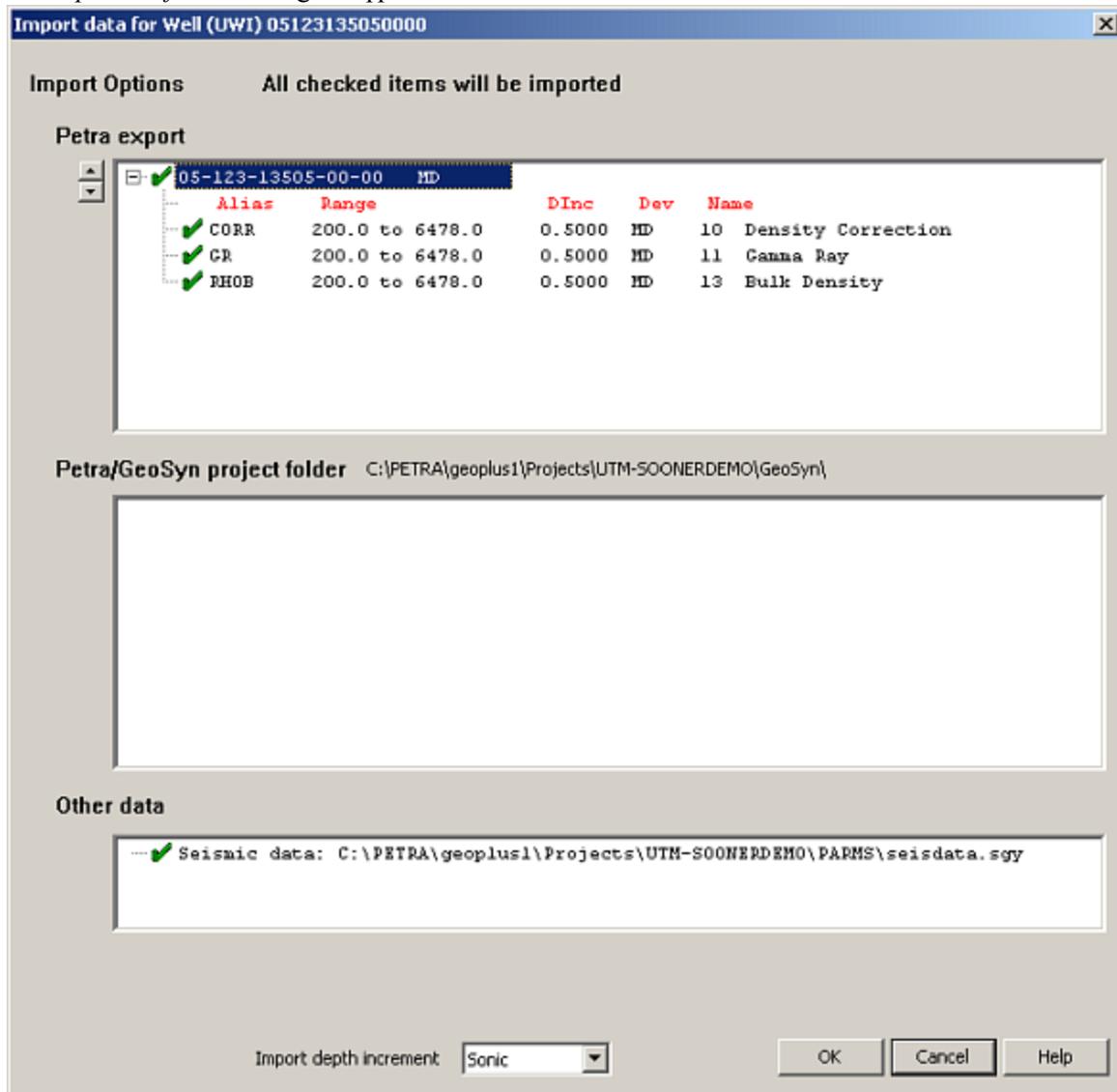


The *GeoSyn Settings* dialog box appears.



2. Select the desired log(s) and tops to import into GeoSyn, and then click **OK**.

The *Import data for Well* dialog box appears.



Any data that PetraSeis includes that can be used in GeoSyn appears in this dialog.

3. Verify the import options, select a log from which to use the depth increment, and then click **OK**.

► Depending on whether you're importing a seismic line or a directional survey, either the *Set time and range for* or the *directional survey* dialog box appears. For details on importing seismic or directional surveys, see *Related Topics* below.

## Related Topics

...

See "Importing Seismic Data," p. 147

See "Importing Directional Surveys," p. 15

See "Exporting to Petra," p. 180

## Downloading Logs from the IHS Information Hub

With a subscription to the IHS Information Hub, you can select a specific UWI or a range defined by NW and SE corners from which to download select logs. You can also download directional surveys (if you're licensed) and request IHS digitize service curves.

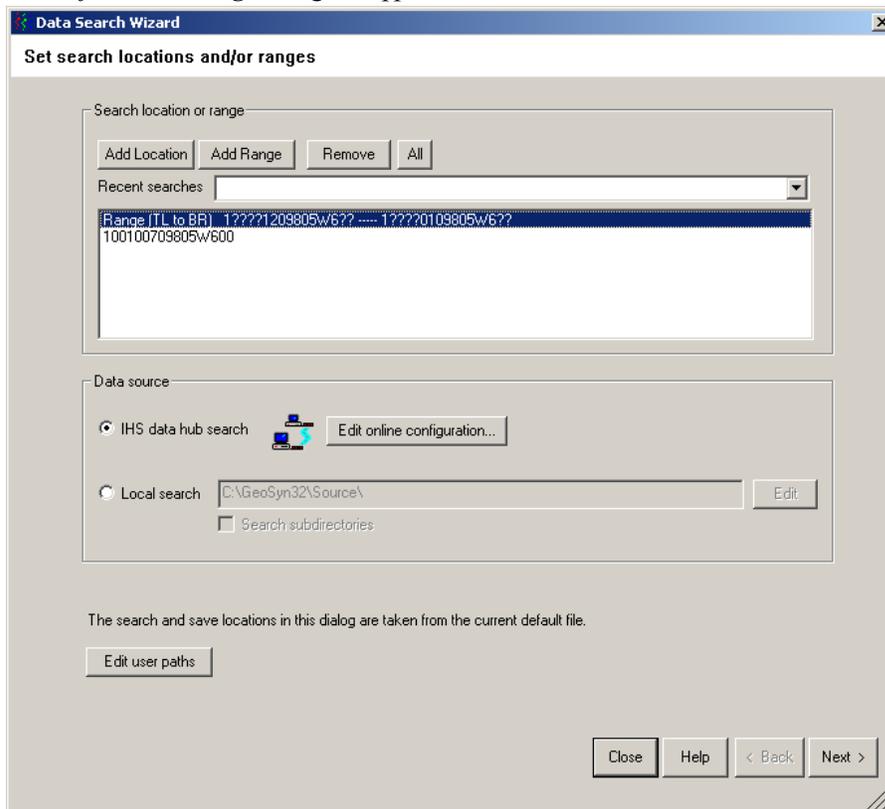
If your subscription is transactional, GeoSyn can warn you before downloading digits from the hub to eliminate unexpected charges.



### To download logs from the IHS Information Hub

1. From the **File** menu, select **Import > Data search wizard**.

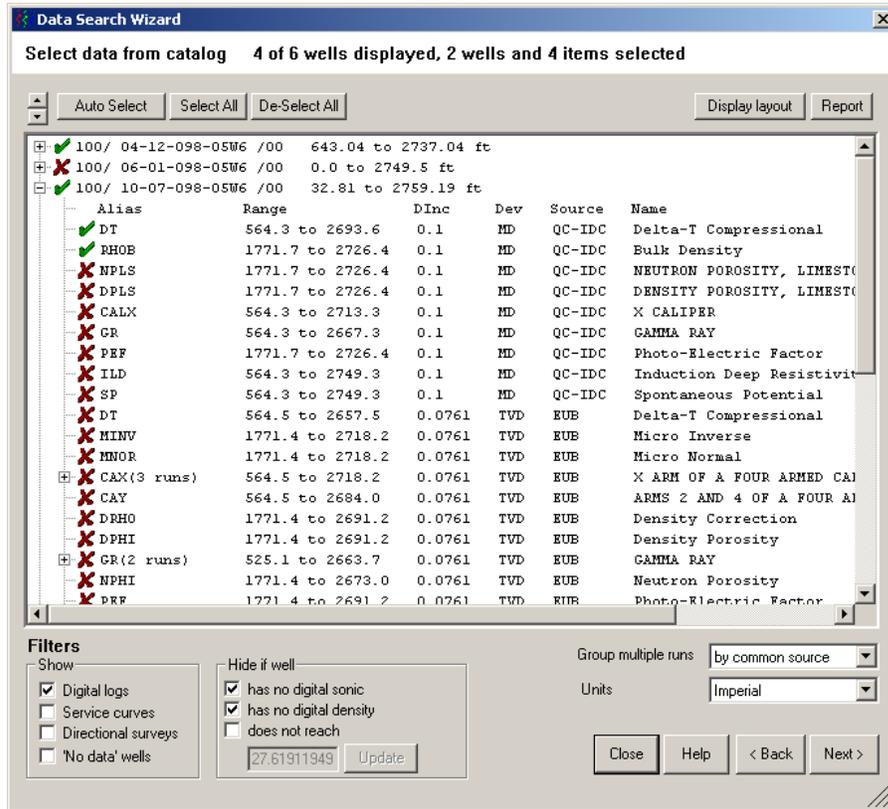
The *Define search range* dialog box appears.



2. Click either **Add Location** or **Add Range** to display the *Edit a UWI* dialog box and specify the survey system and coordinates of the well(s) for which to retrieve logs.
  - ▶ To change your IHS Information Hub connectivity parameters or GeoSyn default directories, click **Edit online configuration** to display the *Configuration* tab. For network installations, hub connectivity parameters affect all GeoSyn users.

3. Click **Next**.

The *Select data from catalog* dialog box appears.

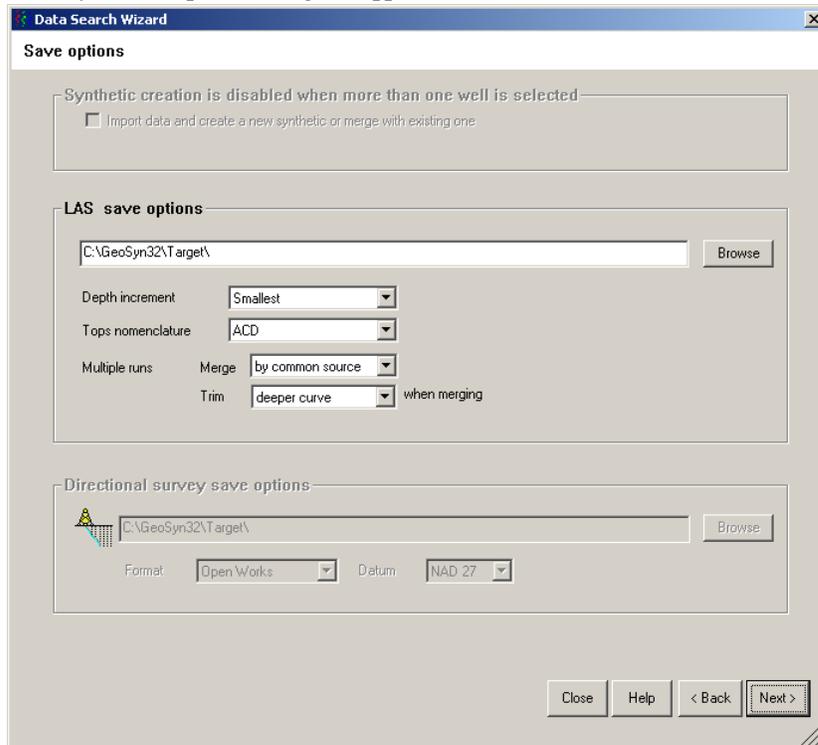


4. Click **Display Layout** to show the *Catalog display options* dialog box and configure the options with which to sort and filter the wells that appear in the above dialog box. Filter by column order (by dragging and dropping mnemonics in the display pane), row sorting, and whether wells without digital sonic and density logs or less than a certain depth appear.

A checkmark (✓) appears beside logs that will import, a cross (✗) beside those that won't. Logs with true vertical depths and measured depths can't be selected during the same import.

5. Click **Next**.

The *Define save options* dialog box appears.



6. Select the locations in which to save downloaded files and whether to convert downloaded logs into GeoSyn synthetic format during the download. The above options are defined in the *Properties: Import Defaults* dialog, which can be accessed by clicking **Edit Defaults** above.

 **NOTE:** If you save logs to disk and then import them into the model from disk, you can restrict the depth range.

7. Click **Next**.

The specified logs are downloaded from the IHS Information Hub and the results are listed in a summary report dialog box that you can save to an ASCII format file to log downloads.

8. Click **Close**.

## Related Topics



See *"Changing Import Defaults," p. 11*

See *"Importing LAS or GeoSyn Files," p. 13*

See *"Launching GeoSyn using AccuMap," p. 31*

## Viewing Synthetic Statistics

View statistics about imported logs including the original raw data and the resulting integrated data following import. The minimum and maximum raw values enable you to determine whether there are spikes in the imported log that influenced your synthetic that you can subsequently remove using the Log Editor.



## To view project statistics

1. From the **Edit** menu, select **Default properties (Def) > Statistics**.

The *Properties: Statistics* tab appears.

The screenshot shows the 'Properties' dialog box with the 'Statistics' tab selected. The dialog is divided into four main sections: 'Log info', 'Data ranges', 'Time info', and 'General'. Each section contains various input fields and a list of data series.

Section	Field	Value	Unit
Log info	UWI:	100/11-11-011-11w1 /00	
	Well:	ABC OIL AND GAS	
	Location:	00/11-11-011-11w1/0	
	Units:	Metric	
	Kelly bushing:	999.9	m
	Top (below KB)	456.2161	m
	Bottom (below KB)	2327.0162	m
Time info	Sample rate	0.5	ms
	Integrated samples	2717	
General	File version	7002.0	
	Number of tops	27	

The 'Data ranges' section contains a list of data series with their respective minimum and maximum values:

Series	Raw Minimum	Raw Maximum	Integrated Minimum	Integrated Maximum	Unit
SONIC *Active	0.0	1683.79	155.0	1680.77	usec/m

2. Click the appropriate log in the **Data Ranges** list and view the Raw and Integrated values.
3. Click **Close**.

## Related Topics

...

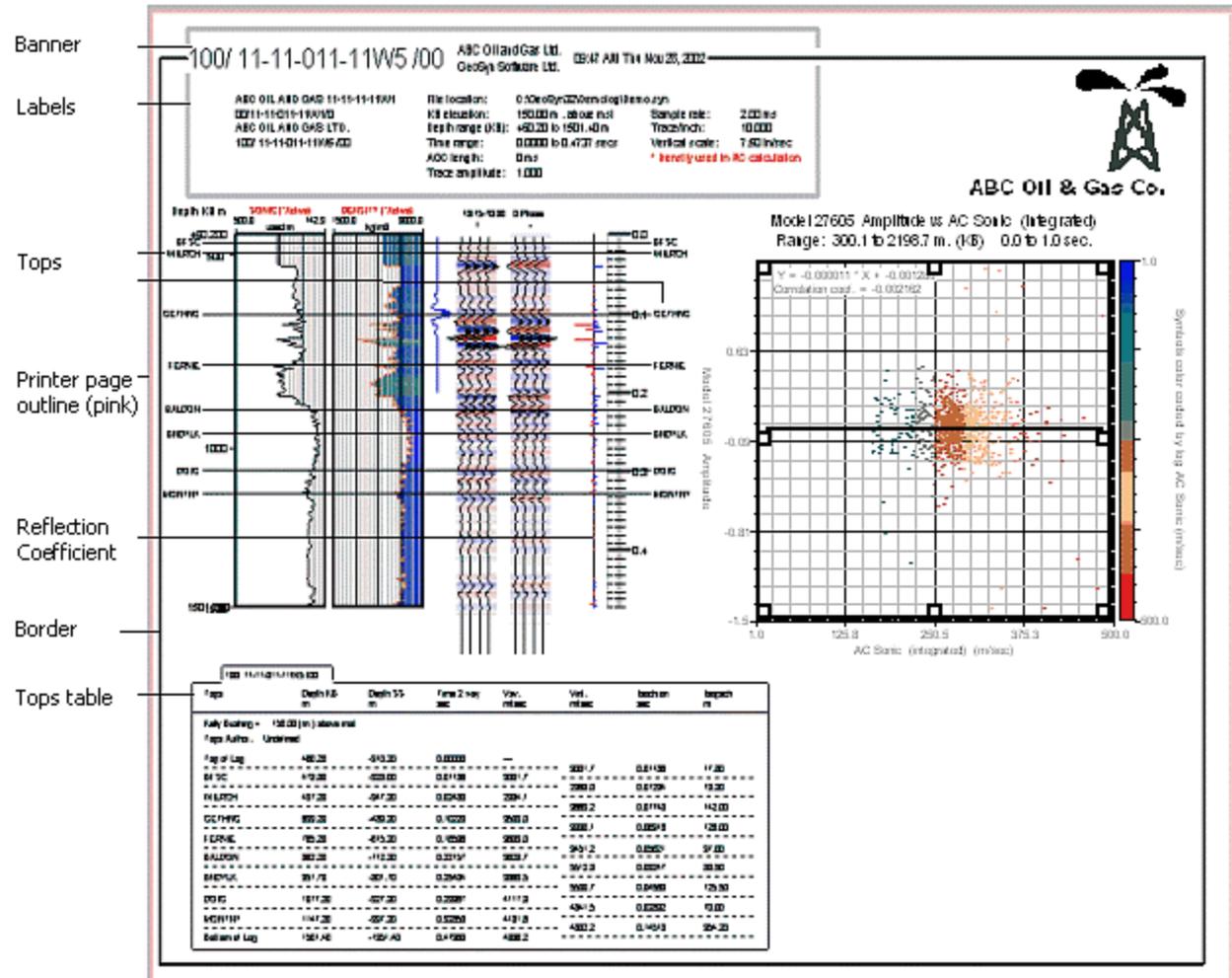
See *"Changing the Main Synthetic Display,"* p. 43  
See *"Opening GeoSyn Synthetics,"* p. 7

See *"Importing LAS or GeoSyn Files,"* p. 13  
See *"Launching GeoSyn using AccuMap,"* p. 31

# Working with the Main Display

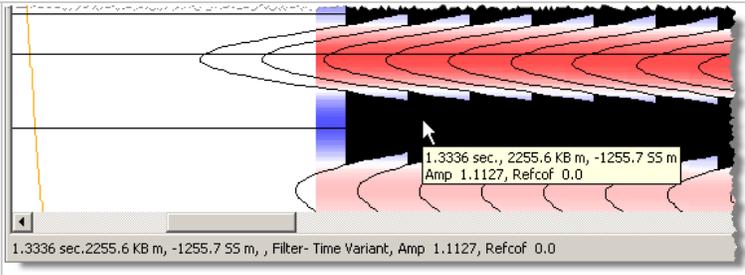
## About the Main Synthetic Display

The main synthetic display is where you do analysis. When you launch GeoSyn, the main synthetic display appears as a blank canvas. After you import a log image or launch an existing GeoSyn synthetic, labels, logs, a tops table, and traces appear as depicted below.



Elements in the main synthetic display can be moved, copied to and from the Windows clipboard, hidden, deleted, resized, and configured. Right-click, double-click, or use the main menu to configure individual elements. Drag and drop to reposition them on the canvas. If you resize an element larger than the canvas, the canvas automatically resizes to accommodate the new size.

The status bar beneath the main synthetic display shows time, both kelly bushing and subsea depth, and details about the synthetic element beneath the cursors current position. For example, if the cursor is over a top, the top name appears. If the cursor is over a trace, the filter and phase appears. To toggle the status bar, from the **View** menu, select **Status Bar**.



Any number of logs defined as sonic or density may be included in a synthetic, but GeoSyn only uses a single sonic and a single density to create the synthetic. These logs are called the active sonic and active density, and are clearly labelled on the main synthetic display. The active sonic and density logs control the generation of the synthetic.

Transfer the active status to any log (not just other sonic or density logs). Transferring the active status is ideal for modeling purposes, because it enables you to rapidly shift between sonic and density logs representing different geological scenarios.

## Related Topics



See "Changing Well Display Properties," p. 45

See "Changing the Main Synthetic Display," p. 43

## Changing the Main Synthetic Display

Configure general options in the main synthetic display including what elements to display, vertical scale properties, the zone of interest, and the number of undo levels.

Once the synthetic is configured as desired, you can save the current display options in an import default file that applies to all new synthetics. For details, see *Related Topics* below.



### To change the main synthetic display

1. From the **Edit** menu, select **Synthetic properties**  **OR**  
Right-click the well header and select **Synthetic properties**.

The *Synthetic Properties* dialog box appears.

- ▶ In the **Display elements** pane, select what informational elements appear in the main synthetic display. To import a company logo, beside the **Image banner** box, click **Edit**.
  - ▶ In the **General model parameters** pane, specify sample rates, up to 10 undo limits, and whether the import process prompts you when either missing or invalid UWIs or aliases are found in the import file.
  - ▶ In the **Vertical scale** pane, select either the time or depth and in the **Plot range** pane, type the top and bottom of the zone of interest to display.
2. Click **Close** to apply the changes to the main synthetic display. These changes only apply to the current synthetic.

## Related Topics

...

See "About the Main Synthetic Display," p. 42

See "Changing Import Defaults," p. 11

## Zooming

Draw the boundary upon which to zoom in the main synthetic display.



### To zoom

1. From the **View** menu, select **Zoom In** (.

The cursor changes to a magnifying glass (.

2. Click and hold one of the corners that will become your zoom extents then drag the zoom rectangle to the opposite corner and release the mouse button.
3. Either repeat the above steps to zoom in further or from the **View** menu, select **Zoom Out** () to return to the previous view. If you've zoomed in multiple times, each time you zoom out returns to the previous view. To return to the original unzoomed view, from the **Edit** menu, select **Undo** (.

### Related Topics



*See "About the Main Synthetic Display," p. 42*

*See "Changing the Main Synthetic Display," p. 43*

## Undoing and Redoing Changes

An operation can be undone even if you saved the synthetic after performing the operation that you now wish to undo. Undo () and redo () buttons appear both on the main toolbar and on the Log Editing toolbar. Note that the undo and redo buttons on the Log Editor toolbar affect any operation done throughout GeoSyn, not just those that were done using the Log Editor. To hone in on a specific change to either undo or redo, click Edit > Undo or Redo.

### Related Topics



*See "About the Main Synthetic Display," p. 42*

*See "Changing the Main Synthetic Display," p. 43*

## Changing Well Properties

### Changing Well Display Properties

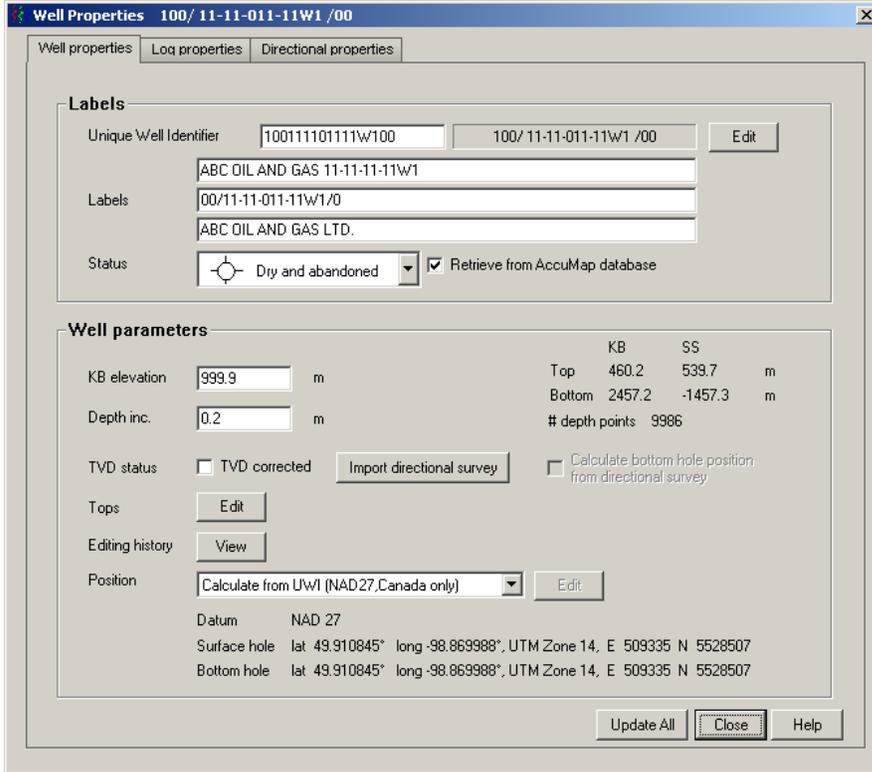
Change well display properties including the UWI, labels, and depth parameters.



## To adjust well display properties

1. From the **Edit** menu, select **Well and Log Properties** ()

The *Well Properties: Well properties* dialog box appears.



	KB	SS	
KB elevation	460.2	539.7	m
Bottom	2457.2	-1457.3	m
# depth points	9986		

- ▶ To change label text, simply type it in the adjacent field, click **Edit** to display the *Edit a UWI* dialog box, or select a different well symbol from the **Status** drop-down list.
- ▶ To import a directional survey in *.txt* format or to create one from scratch, click **Import directional survey**. For details, see *Related Topics* below.
- ▶ To change tops display properties, click **Edit** to display the *Tops Properties* dialog box. For details, see *Related Topics* below.

2. Select the desired options then click **Update All**.

## Related Topics

...

See *"Changing Deviated Well Properties,"* p. 47  
See *"Changing Tops Properties,"* p. 92

See *"Importing Directional Surveys,"* p. 15

## Changing Deviated Well Properties

Import a directional survey saved in GeoGraphix, Open Works, or ASCII format. When the directional survey is applied to the synthetic, you can display it showing deviation calculated from a projection of the wellbore onto a user-selected azimuth.

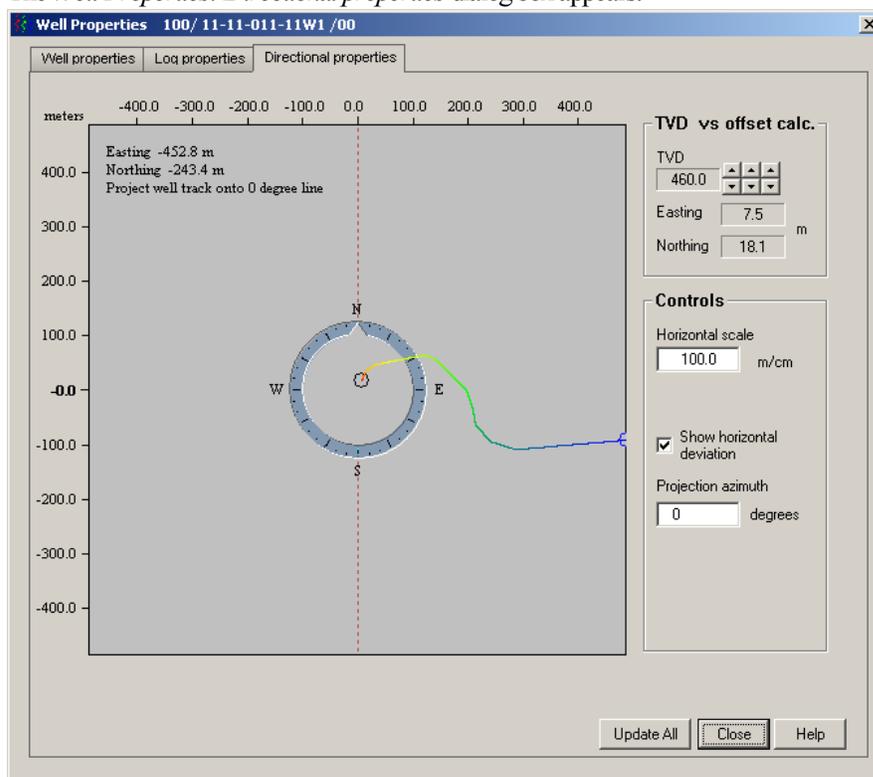
You can only modify directional properties after you import a directional survey. For details, see *Related Topics* below.



### To change deviated well properties

1. From the **Edit** menu, select **Well and Log Properties** () > **Directional properties**.

The *Well Properties: Directional properties* dialog box appears.



2. Hover the cursor () over the display pane and move it along the deviation line to view the Eastings and Northings.
3. Do either of the following:
  - Hover the cursor over the compass. The cursor becomes a hand (). Click and hold while dragging the dashed red projection line (oriented north-south by default), and release the mouse button to place the line.
  - Type a value in the *Projection azimuth* box.
4. Click **Update** to see the effects of your changes on the main synthetic display then click **Close**.

---

## Changing Log Properties

---

### Changing Log Defaults

GeoSyn maintains a centralized database of log defaults for all log types. Customize settings for track widths, scales, aliases, color fills, and more. These settings apply to new synthetics where log settings aren't already defined in the import defaults file.

The import defaults file generally contains all default settings except those that apply to logs, but when you update the import defaults file with settings from the current synthetic, settings for log types in the current synthetic are also written to it. Log settings in the import defaults file override, but don't overwrite settings in the log defaults database.

When GeoSyn creates a synthetic, it first checks whether display settings for the log upon which the synthetic will be based exist in the current import defaults file. If they do, GeoSyn uses them instead. For details on changing import defaults, see *Related Topics* below.

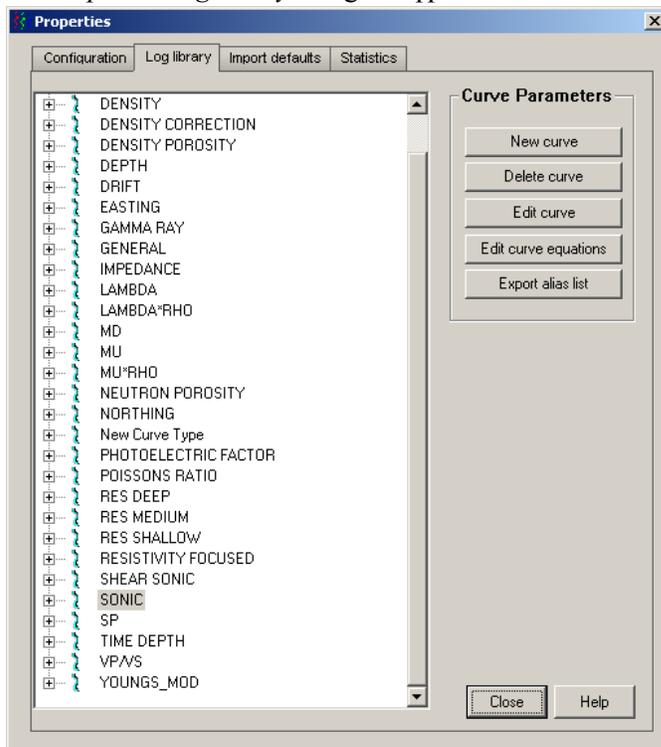
The log database is the *LogInit50.gld* file in the GeoSyn *Working* directory.



#### To change log defaults

1. From the **Edit** menu, select **Default log properties > Log Library**.

The *Properties: Log Library* dialog box appears.



2. In the tree display, click the plus sign (+) beside the appropriate node to expand it and view current configuration details.
3. Click **Edit curve**.

The *Edit Default Display Properties* dialog box appears.

4. Configure the curve properties then click **OK** to return to the *Properties: Log Definitions* tab.
5. Click **Close** to return to the main synthetic display. The changes you made are applied to future synthetics providing a different setting doesn't exist in the import defaults file for that synthetic.

## Related Topics

...

See "*Changing Import Defaults*," p. 11  
See "*Exporting Log Aliases*," p. 177

See "*Changing Log Display Properties*," p. 50

## Changing Log Display Properties

Change the display properties of logs in the current synthetic including label information, which logs are the active sonic and density, and other details. The term *Active* denotes the log upon which the synthetic is based. If you have several sonic logs with different geological scenarios in one synthetic, for example, you can switch which of the sonic logs is the active one to see what affect it has on the model.

You can also create new logs or duplicate and modify existing logs. For example, you can apply a mathematical equation to a log to derive a log that's useful for AVO modelling and that would otherwise not be available. Changes you apply affect only the current synthetic, not log defaults for new synthetics. For details on changing log defaults and import defaults, see *Related Topics* below.



## To change log display properties

1. From the **Edit** menu, select **Well and Log Properties** (A) > **Log Properties**.

The *Well Properties: Log properties* dialog box appears.

Show	Alias	Display name	Active	Derived	Scale range	Units	Raw data range	Intg.
<input checked="" type="checkbox"/>	AC	SONIC	Yes	No	Auto Range	usec/m	138.16 to 535.7	154.
<input checked="" type="checkbox"/>	DEN	DENSITY	Yes	No	1500.0 to 3000.0	kg/m3	1601.3 to 2992.1	1695
<input checked="" type="checkbox"/>	DTOS	SHEAR SONIC	Yes	Yes	600.0 to 100.0	usec/m	197.35 to 2289.2	226.
<input checked="" type="checkbox"/>	RILD	DEEP INDUCTION	Yes	No	0.2 to 2000.0	ohmm	0.757 to 6181.6	0.91
<input checked="" type="checkbox"/>	AC	SONIC	No	Yes	2000.0 to 7000.0	m/sec	8806.6 to 722.31	8445
<input checked="" type="checkbox"/>	DTOS	SHEAR SONIC	No	Yes	500.0 to 4000.0	m/sec	5067.1 to 436.83	4424

2. In the display pane, select the log(s) to modify using the controls below. SHIFT+CLICK or CTRL+CLICK for multiple selection.

Duplicate and modify selected logs, and also clear logs in the *Show* column to save them with the synthetic but hide them from the main synthetic display.

3. In the **Properties common to all logs** pane, specify label and scale information and whether multiple logs are combined in the same track. For details on combining logs in the same track, see *Related Topics* below.

If the synthetic layout is only a single log per track, specify track and infill colors. For details on editing color, see *Related Topics* below.

4. In the **Log properties** pane, specify log associations such as the type of log, whether it's the active sonic or density, and whether it measures transit time or velocity, and then click **Close**.

## Related Topics



See "Changing Log Defaults," p. 48  
See "Changing Color Palettes," p. 128

See "Changing Import Defaults," p. 11  
See "Combining Logs in Tracks," p. 52

## Combining Logs in Tracks

Logs can either occupy separate tracks in the main synthetic display or can share tracks to save work space. GeoSyn enables you to specify the logs to display in up to ten tracks and can display an unlimited number of logs in any track. The same log can be repeated in multiple tracks.

With a left and right log defined in the same track, select the *Show cross over* option and adjust the horizontal placement of the logs to infill areas where the two logs overlap, or where the curves exceed a given value.

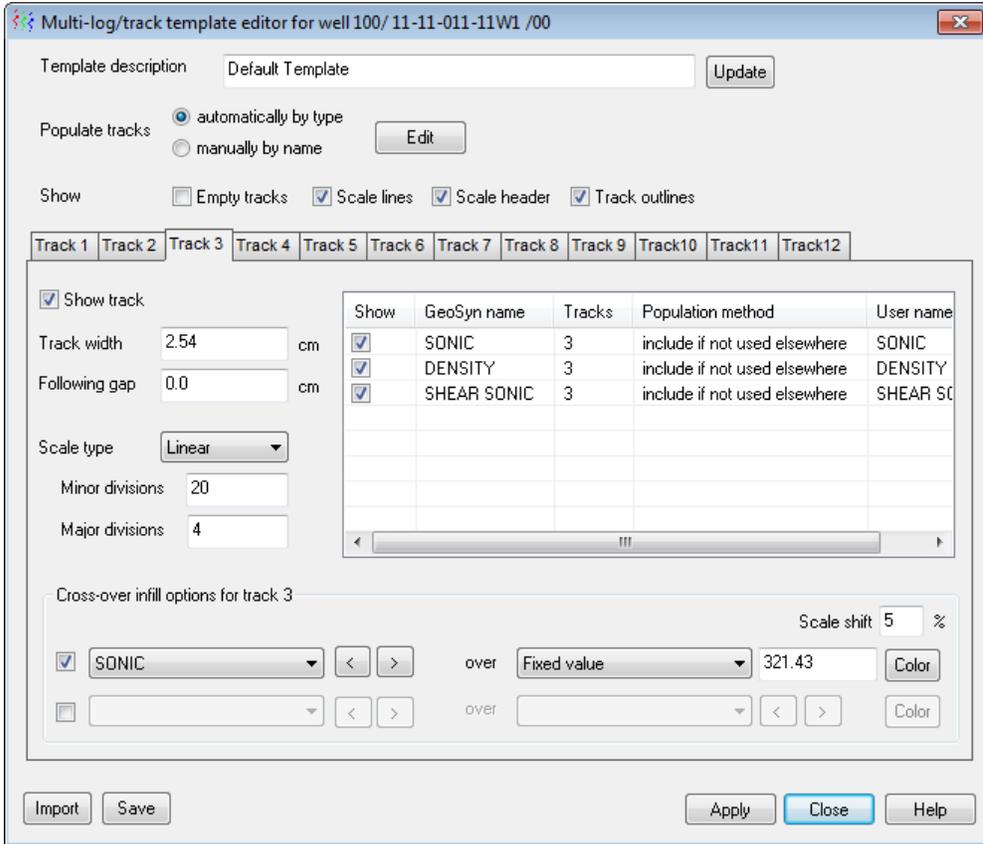
Save composite log layouts with different configurations as templates with a *.tpl* extension in the *GeoSyn Working* directory.



### To combine logs in tracks

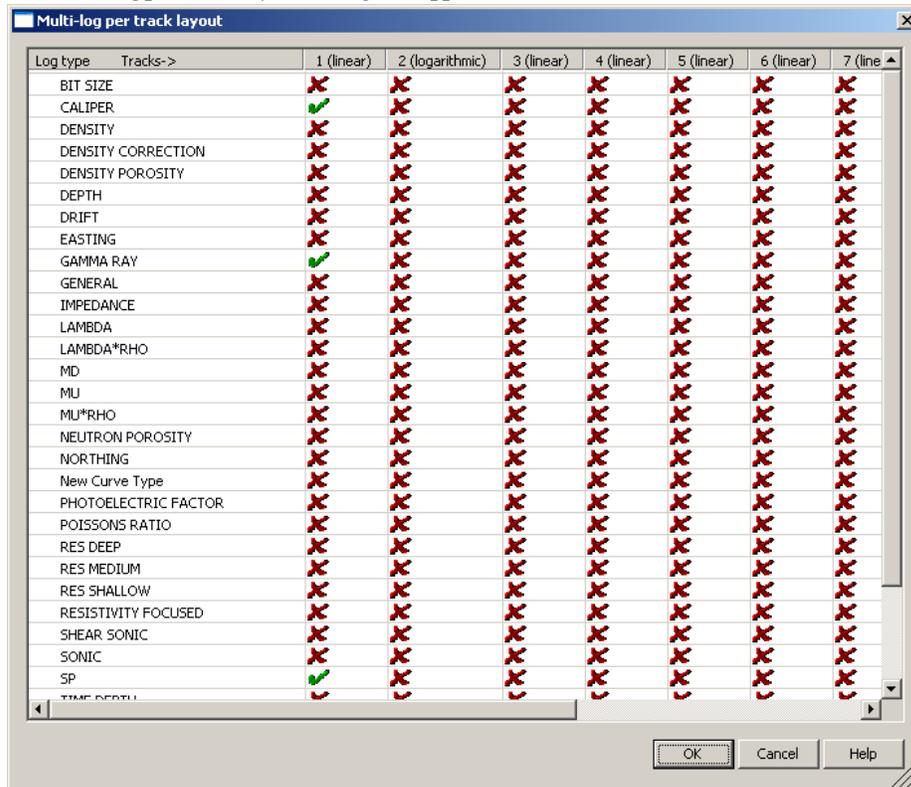
1. Do either of the following:
  - If your current synthetic displays multiple logs per track, right-click the track and select **Multi-log per track Template properties**.
  - If your current synthetic displays only single logs per track, from the **Edit** menu, select **Well and log properties** (🔧) > **Log properties** to display the *Log properties* tab and in the *Properties common to all logs* pane, select **Multiple logs / track** then click the adjacent **Edit** button.

The *Multi-log per Track Template* dialog box appears.



- For the Populate tracks radio buttons, select either **automatically by type** (sonic, density, etc), or **manually by name** (Delta-T, Bulk Density, etc.) depending on the degree of control you want over which logs appear, and then click **Edit**.

The *Multi-log per track layout* dialog box appears.



3. For each of the track columns, click the log type to display, and then click **OK**.

 **NOTE:** To ensure a log doesn't get dropped, click the *All unselected linear logs* and the *All unselected logarithmic logs* options.

The log types selected above are displayed in the various track tabs of the main *Multi-log per Track Edit* dialog box.

4. Using the *Multi-log per Track Edit* dialog box, for the tracks to display, click the **Track** tab, specify whether to show the track and select other criteria such as the track width, scale type, and so on.

5. In the log display pane click or clear **Show** as depicted below to display or hide a log in a given track.

Show	Log name	Tracks	Population method
<input checked="" type="checkbox"/>	SONIC	3	include if not used elsewhere
<input checked="" type="checkbox"/>	DENSITY	3	include if not used elsewhere
<input checked="" type="checkbox"/>	SHEAR SONIC	3	include if not used elsewhere
<input type="checkbox"/>	SONIC	3	include if not used elsewhere
<input checked="" type="checkbox"/>	SHEAR SONIC	3	include if not used elsewhere
<input type="checkbox"/>	EASTING	3	include if not used elsewhere
<input type="checkbox"/>	NORTHING	3	include if not used elsewhere
<input type="checkbox"/>	MD	3	include if not used elsewhere

The Tracks column above displays the tracks in which a log appears. In the example above, the density log can be displayed in track 1. It also appears in track 3. The column to the right of the Log name column specifies whether the log appears in a track by default or was deliberately designated to appear in that track.

To fill areas where curve readings for two or four curves intersect within the same track, select the checkbox to the left of the drop-down lists in the *Cross overs* section and then select either logs that appears in your model or select **fixed value** depending on whether you want to infill where curves intersect, or where a curve exceeds a given value.

Manually shift a curve by clicking   to the right of the curve drop-down list to enhance the cross over, or type a percentage by which to shift the log scales.



6. Type a descriptive name in the **Template name** box and click **Save** to write the file to the current GeoSyn *Working* directory with the name *GSTemplateX.tpl* where *X* is an incrementing number based on the number of template files already in the *Working* directory. When importing the template file in the future, whatever is typed in the **Template name** box appears as the file description.
7. Click **Apply** to update the current synthetic with your changes.

## Related Topics



See "Changing Log Display Properties," p. 50

## Building Equations using the Log Equation Library

A library of standard functions or equations ships with GeoSyn. While you can't overwrite the default equations in this library, you can copy them as user functions and then modify or delete them. Because the function library is centralized, any GeoSyn synthetic can access the equations you create.

GeoSyn users with their own equations created with versions of GeoSyn before the function library was introduced can open the synthetics that contain these equations and save the equations to the function library so that they're available to all synthetics.

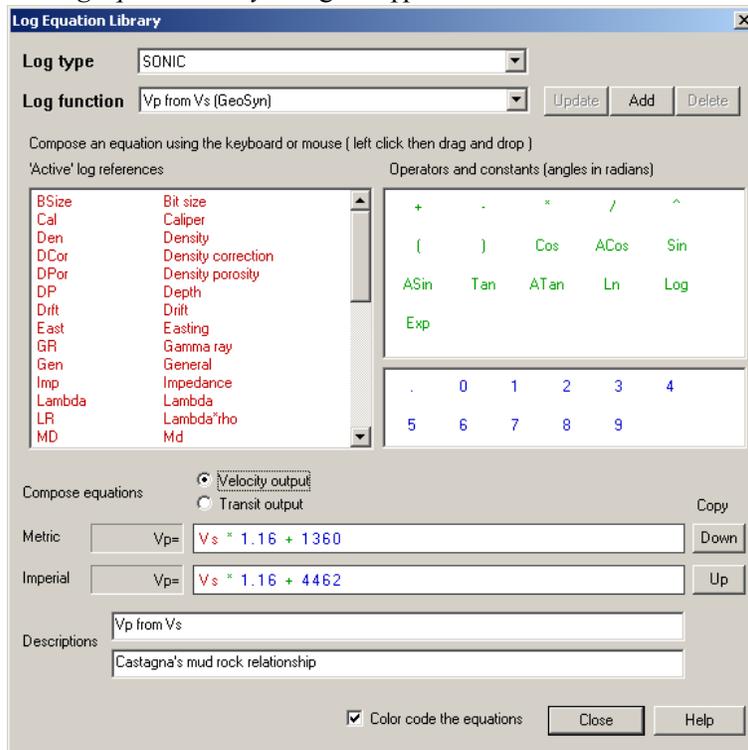
The general Log Equation Library dialog box, which is used to create equations for any log type, is accessed through several different dialog boxes available from the Edit menu. You can also invoke the Log Equation Library dialog box for only a specific log using the Well Properties > Log Properties dialog box.



### To create log equations

1. Launch the Log Equation Library dialog box by selecting one of the following:
  - **Edit > Log Editing > Log Math** ()**,** and then click **Edit**.
  - **Edit > Configuration Properties > Log Library,** and then click **Edit Curve Equations**.
  - **Edit > Default Synthetic > Log Library,** and then click **Edit Curve Equations**.
  - **Edit > Default Log Properties > Log Library,** and then click **Edit Curve Equations**.

The *Log Equation Library* dialog box appears.



2. From the Log type drop-down list, select the log type with which to associate the equation you create. The equation is grouped under this log type to facilitate selection from drop-down lists.
3. Do one of the following:
  - Select an existing equation upon which to base your new equation from the Log function drop-down list and then modify the equation parameters using either of the next two options.
  - Drag equation elements from the three equation panes into either the Metric or Imperial boxes.
  - Simply type your equation directly in the Metric or Imperial boxes.
4. Depending on whether you created your equation in the Metric or the Imperial box, click Down or Up to copy it to the adjacent box and then modify your equation with a conversion factor.
5. In the first box of the Descriptions, type a description of the equation function. You may even want to paste the equation from the Metric or Imperial box into here as a description. What you type here populates the Log function box when you click either Update or Add.
- ▶ You may want to type additional details in the second description box. Text you type here only appears in the Log Equation Library dialog box.
6. Click **Add** (if you're updating a previous user equation instead of creating a new one, you can click Update instead). And then click **Close** to exit the *Log Equation Library* dialog box.

## Related Topics

• • •

See "Applying Math Equations to Logs," p. 75

## Editing Logs

### Drawing Straight Edge and Freehand Curves

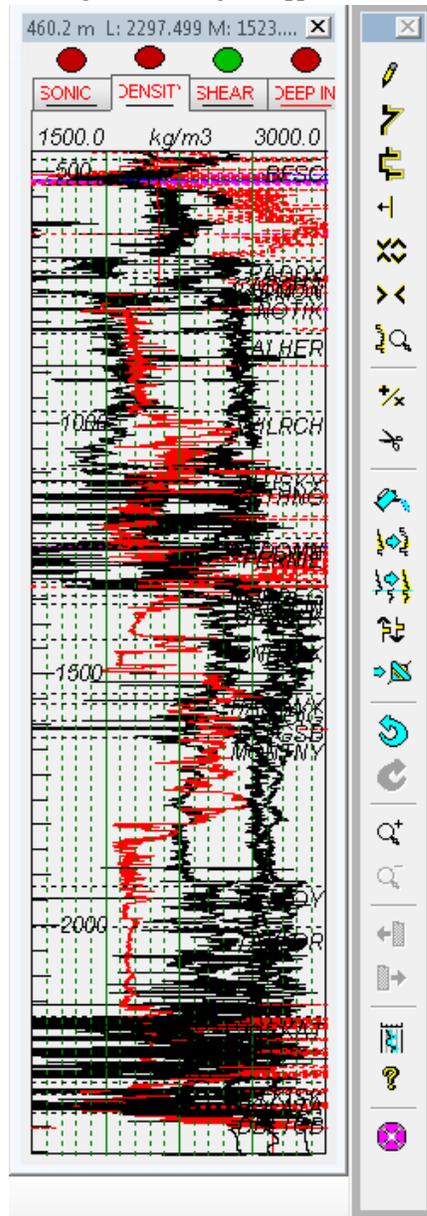
Draw a single segment straight line or multi-segment freehand line to replace a curve portion.



#### To draw straight edge and freehand curves

1. From the **Edit** menu, select **Log editing** ()  
**OR**  
Double-click the log  
**OR**  
Right-click the log and select **Log editing**.

The *Log Editor* dialog box appears.



2. Click either the straight line () or freehand tool ()
3. Hover the cursor ( or ) over the location at which to draw a line. The cursor position appears in the banner of the *Log Editor*.
4. Starting at the top or bottom of the log portion to change, drag to draw the line.
5. Click **End Draw** in the popup dialog box to complete the line.

See "Creating Blocked Log Models," p. 61

## Inserting Log Sections using Log Editor

Create a section of log with a constant value and insert it at a specific depth to provide a time datum shift or to provide room for new geological section. You can also specify whether to raise or lower the log start depth or stop depth to accommodate the insertion.

When you insert a section in any log, new data is inserted in all logs throughout the synthetic. Specify different constant values to insert in each of the individual logs. An option to doing the below process is to add one or more invisible zones above the log, the sum of which is recognized in all related GeoSyn calculations such as AVO analysis. Invisible zones are added using the Edit > Time Datum option. For details, see *Related Topics* below.



### To insert log sections using Log Editor

1. From the **Edit** menu, select **Log editing** ()  
**OR**  
Double-click the log  
**OR**  
Right-click the log and select **Log editing**.



The *Insert Constant Value Log Section* dialog box appears.

3. Hover the cursor (←) at the top of the zone at which to insert a log section. The cursor position appears in the banner of the *Log Editor*.
4. Drag to the bottom of the zone.
5. In the Insertion point pane, type a more precise depth at which to insert the log section or click **top** or **bottom** to select the absolute top or bottom of the log.
6. In the Insertion range box, type the thickness to insert. This section is inserted in every log throughout the synthetic.
7. In the Insertion values display pane, select a log to display the constant value that will be inserted in the Edit log insertion value box and each of the logs. Type a different constant value if desired.
8. Select whether to raise the start depth or lower the stop depth and click **Apply**.

## Related Topics

See *"Cutting Logs,"* p. 78

See *"Shifting Logs,"* p. 85

See *"Changing Time Datum Properties,"* p. 112

## Creating Blocked Log Models

Create log models consisting of simple blocked sections that may be useful when modelling complex, tuned geology using the Model Builder Wizard. Also block sections of existing logs using Log Editor so that GeoSyn, working within the highlighted zone, applies the mean, median, or RMS value between two tops to each set of tops.

Separate procedures for each appear below.



## To create blocked log models

1. From the **File** menu, select **Import > Make a blocked log well**.

An informational dialog box appears.

2. Click **Next**.

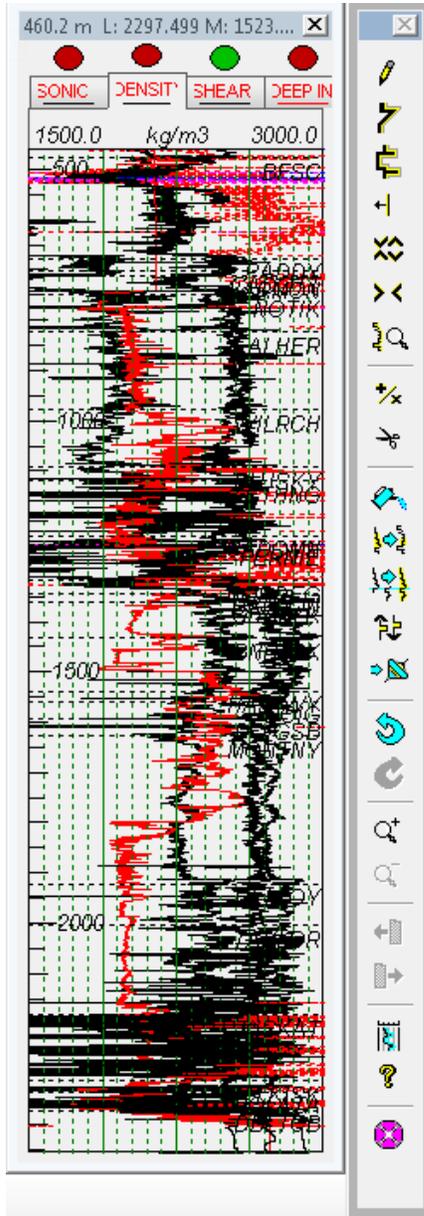
The *Description and Output Options* dialog box appears.

The screenshot shows the 'Blocked Log Wizard' dialog box, specifically the 'Description and output options' step. The dialog is titled 'Blocked Log Wizard' and has a subtitle 'Description and output options'. It is divided into two main sections: 'Well properties' and 'Output options'. In the 'Well properties' section, there are three text input fields for 'Labels' containing '1D Block Log Model', '00/11-11-011-11w1/0', and 'ABC OIL AND GAS LTD.'. Below these are four numerical input fields with units: 'KB elevation' (0.0 m), 'Depth inc.' (0.2 m), 'Top (KB)' (0.0 m), and 'Bottom (KB)' (1000.0 m). To the right of these fields are radio buttons for 'Units', with 'Imperial' unselected and 'Metric' selected. In the 'Output options' section, there are two checkboxes: 'Create an LAS format file from the model and save to disk' (unchecked) and 'Create a GeoSyn synthetic' (checked). At the bottom of the dialog are four buttons: 'Close', 'Help', '< Back', and 'Next >'. The 'Next >' button is highlighted with a dashed border.

3. Type any label changes for the log, specify depth and measurement details, and whether to write the blocked log to an LAS file or display it in a synthetic, and then click **Next**.

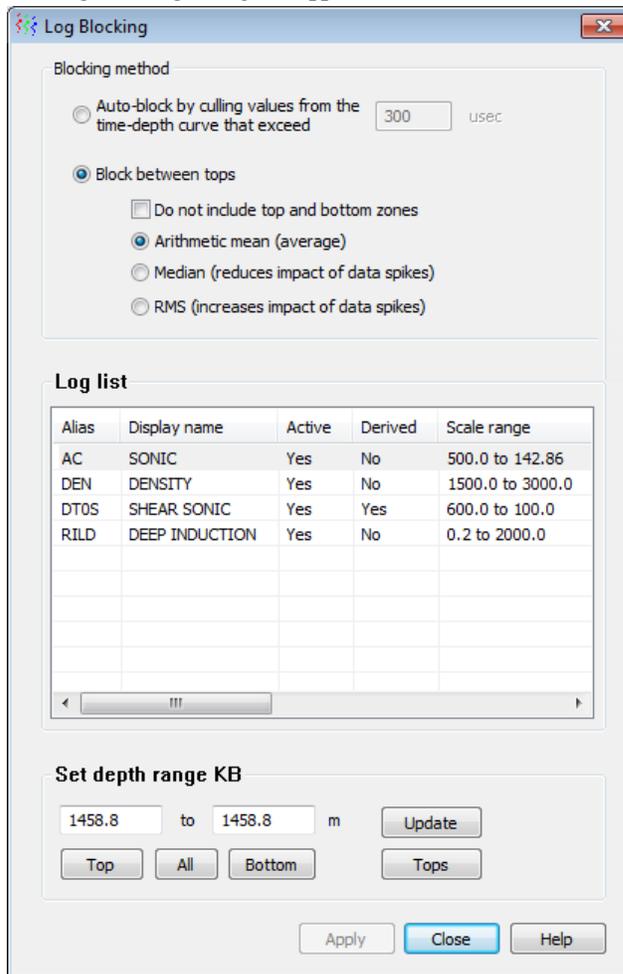


The *Log Editor* dialog box appears.



2. In the toolbar beside the Log Editor, click the **Blocking** tool ()

The *Log Blocking* dialog box appears.



3. Select the algorithm used to derive a constant value, which can be used across the log or to the zone between shallowest and deepest tops within your selection. GeoSyn automatically connects your selection to the nearest top.
4. Select the log(s) to block. CTRL+CLICK or SHIFT+CLICK for multiple selection.
5. Do one of the following:
  - Drag the cursor (  ) on the Log Editor log display pane to select a range to block.
  - Type values in the Depth range KB pane for the start and stop depth and click **Update**
  - Click either **Top** or **Bottom** to accept the absolute depth from the log or click **All** to accept both.
  - Click **Depths from tops** to display the *Depth Range from Tops* dialog box and then select the formation tops that signify your zone of interest from the drop-down lists and click **OK**.
6. Click **Apply**.

## Related Topics

...

See "Drawing Straight Edge and Freehand Curves," p. 57  
See "Clipping or Filtering Logs," p. 72

See "Inserting Log Sections using Log Editor," p. 59  
See "Applying Math Equations to Logs," p. 75

## Stretching and Squeezing Logs

Stretch and squeeze a selected log portion in either time or depth using the Log Editor, which displays the log view in depth, or stretch it in time using the Correlation Window, which enables you to hover the log over seismic.

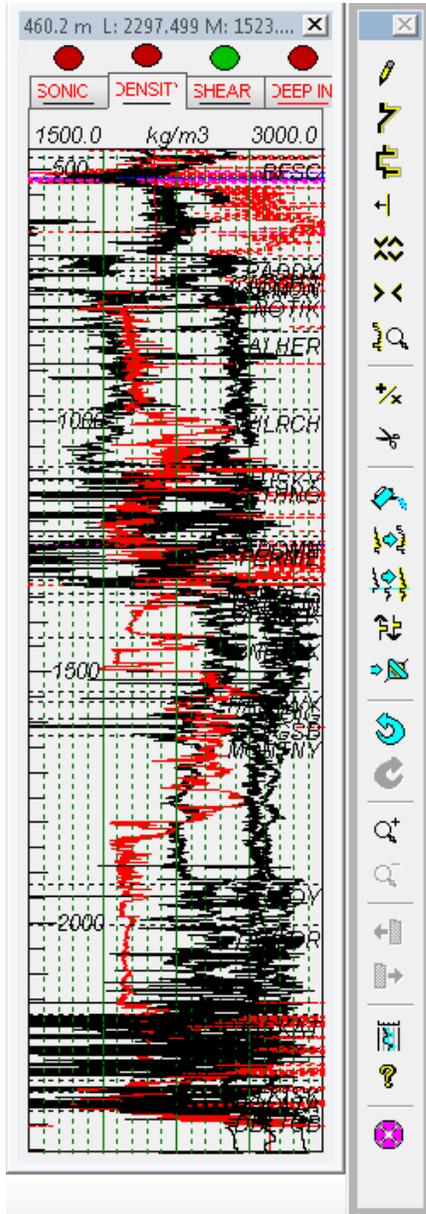
Stretch and squeeze functionality is also available when tying seismic to models or by specifying values when importing check shot surveys. For details, see *Related Topics* below.



### To stretch and squeeze logs

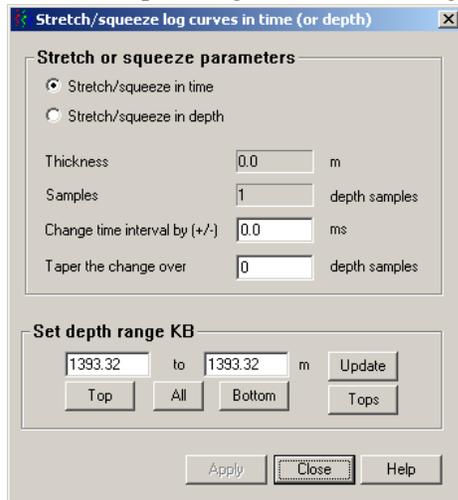
1. From the **Edit** menu, select **Log editing** ().
- OR**  
Double-click the log
- OR**  
Right-click the log and select **Log editing**.

The *Log Editor* dialog box appears.



2. Select the tab for the log to stretch or squeeze and in the Log Editor toolbar, click the **Stretch Squeeze** tool (🔍).

The *Stretch/squeeze log curves in time* dialog box appears.



3. Select whether to stretch or squeeze the log in time or depth.
4. Do one of the following:
  - Drag the cursor () on the Log Editor log display pane to select a range to stretch or squeeze. The cursor position appears in the banner of the *Log Editor*.
  - Type values in the Set depth range KB pane for the start and stop depth and click **Update**
  - Click either **Top** or **Bottom** to accept the absolute depth from the log or click **All** to accept both.
  - Click **Depths from tops** to display the *Depth Range from Tops* dialog box and then select the formation tops that signify your zone of interest from the drop-down lists and click **OK**.
5. Do one of the following:
  - If you selected depth above, type the desired thickness of the zone defined above after stretching or squeezing. If the value is less than the difference between the start and stop depth, the log will be squeezed. If more, the log will be stretched.
  - If you selected time above, type a value by which to adjust the transit times for the zone defined above and the number of samples over which to taper the change.
6. Click **Apply**.

## Related Topics

...

See "Changing Import Defaults," p. 11  
See "Exporting Log Aliases," p. 177

See "Changing Log Display Properties," p. 50

## Merging Logs

Merge an upper run with a lower run using the Merge Log Runs tool () on the Log Editor by importing

a log in either LAS or GeoSyn format. You can also use the Math tool or the Composite Log tool to merge runs; however, the Merge Log Runs tool is the simplest and quickest method.



## To merge logs

1. From the **Edit** menu, select **Log editing** (.

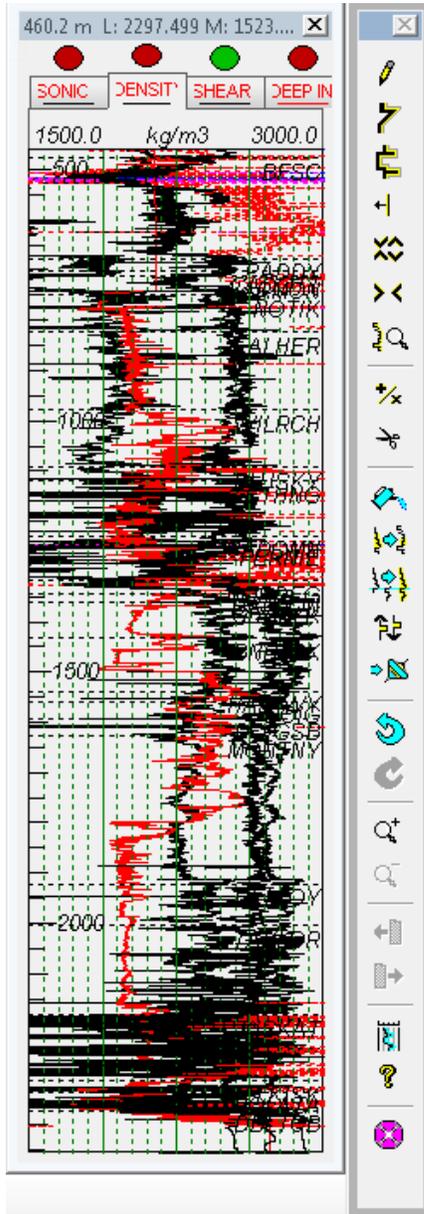
**OR**

Double-click the log

**OR**

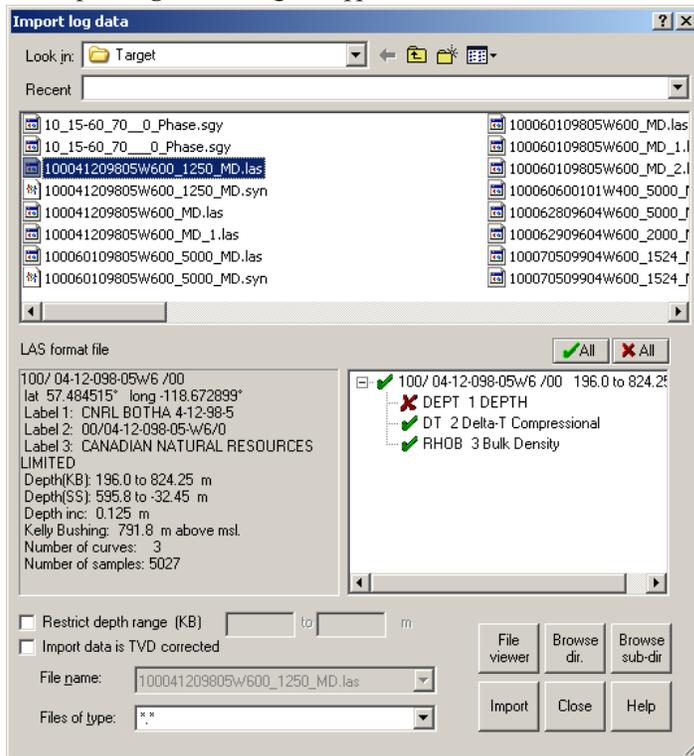
Right-click the log and select **Log editing**.

The *Log Editor* dialog box appears.



2. Using the Log Editor toolbar, click the **Merge Log Runs** tool (  ).

The *Import Log Data* dialog box appears.

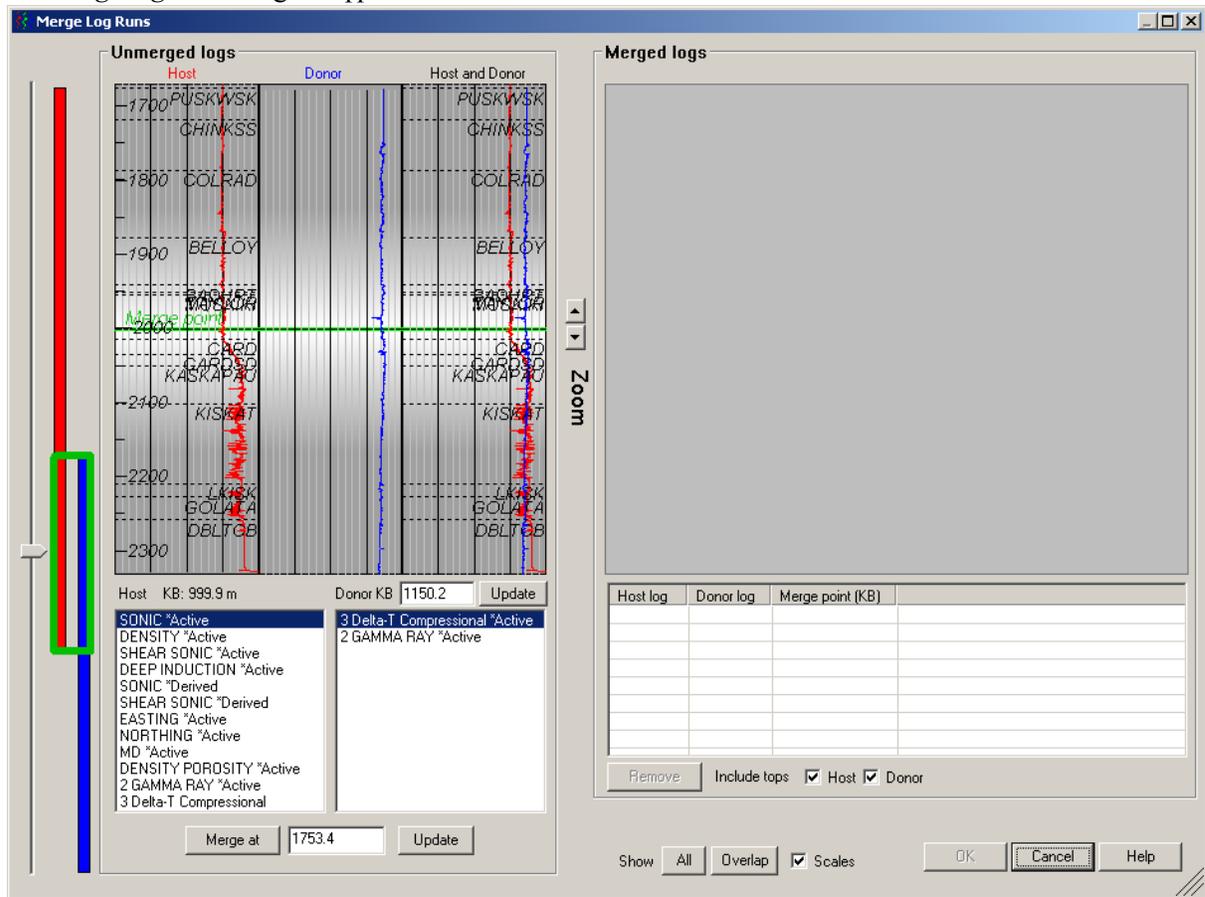


3. Select the log file to merge with the existing log, and then click **Import**.



**TIP:** A warning dialog may appear warning of a mismatching kelly bushing depth between the two logs. Continue to import the log file and change the kelly bushing depth of the imported well using the *Merge Log Runs* dialog box that appears below.

The *Merge Log Runs* dialog box appears.



- Using the Host and Donor panes that appear in the bottom-left of the *Merge Log Runs* dialog box, select the log to merge with and the imported log to merge in either pane.

The display in the Unmerged Logs display pane updates to reflect the relationship of the two selected logs.

- ▶ To set the area of interest, to the left of the *Show* label at the bottom of the *Merge Log Runs* dialog box, specify whether to show the entire depth of both log runs in the *Unmerged Logs* display pane, or just the depth where they overlap.
- ▶ To clarify the display, enable or disable the *Scales* checkbox to specify whether horizontal and vertical scale lines appear in the *Unmerged Logs* display pane. Click the *Zoom* buttons to the right of the Unmerged logs display pane to change the zoom resolution.
- ▶ To set the specific point at which to merge the logs, either drag the slider to the left of the *Unmerged Logs* pane (or drag the display pane), or type a specific depth in the box to the right of the **Merge at** button below the *Unmerged Logs* display pane and then click **Update**.
- ▶ Specify whether to include tops from either (or both) the host or donor well.

- Click **Merge at** to perform the actual log splice.

The spliced log appears in the Merged Logs pane in the right portion of the *Merge Log Runs* dialog box with merge details in the table below the Merged Logs display pane.

6. Either complete the above steps for additional logs to merge in the GeoSyn well,  
**OR**  
Click **OK** to return to the Log Editor.

## Related Topics



*See "Creating Log Composites," p. 81*

*See "Applying Math Equations to Logs," p. 75*

## Clipping or Filtering Logs

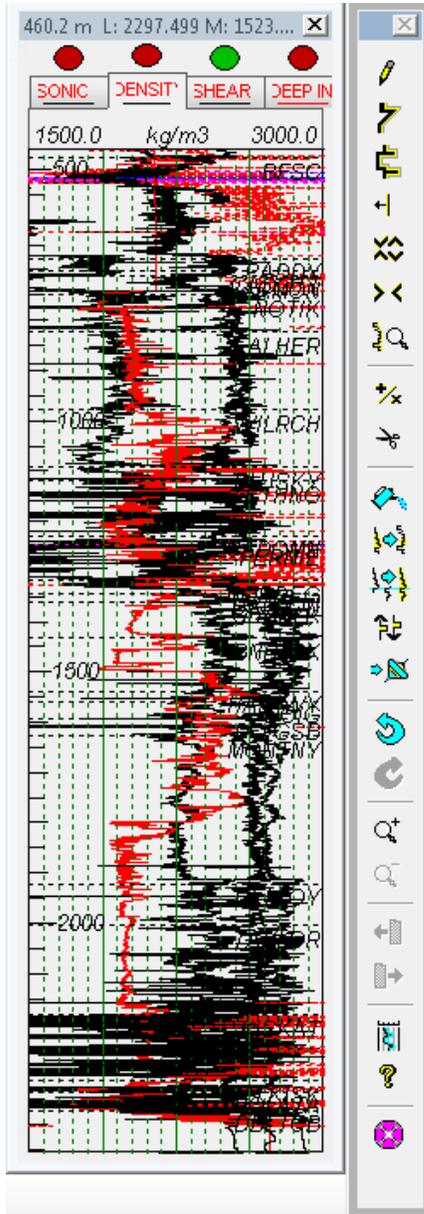
Clip the data of either an entire log or a zone of interest within that log to remove data spikes or incorrect data.



### To clip or filter logs

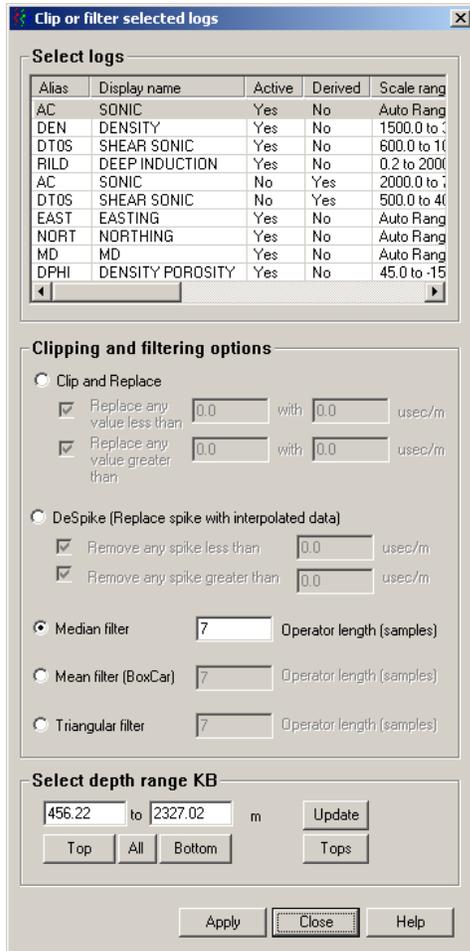
1. From the **Edit** menu, select **Log editing** ()  
**OR**  
Double-click the log  
**OR**  
Right-click the log and select **Log editing**.

The *Log Editor* dialog box appears.



2. In the toolbar beside the *Log Editor*, click the **Clip** tool (↔).

The *Clip or filter the log* dialog box appears.



3. Select whether to clip and filter by substituting values, removing spikes, or using averaging methods.
4. Do one of the following:
  - Drag the cursor on the Log Editor log display pane to select a range to clip or filter.
  - Type values in the Select depth range KB pane for the start and stop depth and click **Update**. Click either **Top** or **Bottom** to accept the absolute depth from the log or click **All** to accept both.
  - Click **Depths from tops** to display the *Depth Range from Tops* dialog box and then select the formation tops that signify your zone of interest from the drop-down lists and click **OK**.
5. Click **Apply**.

...

## Related Topics

See "Applying Math Equations to Logs," p. 75

See "Creating Blocked Log Models," p. 61

## Applying Math Equations to Logs

The Log Math dialog box enables you to generate derived logs based on readings from other logs as inputs. To derive these logs, you can use either industry-standard equations provided by GeoSyn in the Log Equation Library, or you can create your own customized equations that are then saved to the Log Equation Library.

Any log can be used as an input for the derived log equation. For example, you can use a common sonic log, or derive a log and then use that derived log as an input in the equation from which you derive yet another log. For details about merging log runs, see *Related Topics* below.

### About the Function Library

A library of standard functions or equations ships with GeoSyn. While you can't overwrite the default equations in this library, you can copy them as user functions and then modify or delete them. Because the function library is centralized, any GeoSyn synthetic can access the equations you create.

GeoSyn users with their own equations created with versions of GeoSyn before the function library was introduced can open the synthetics that contain these equations and save the equations to the function library so that they're available to all synthetics.

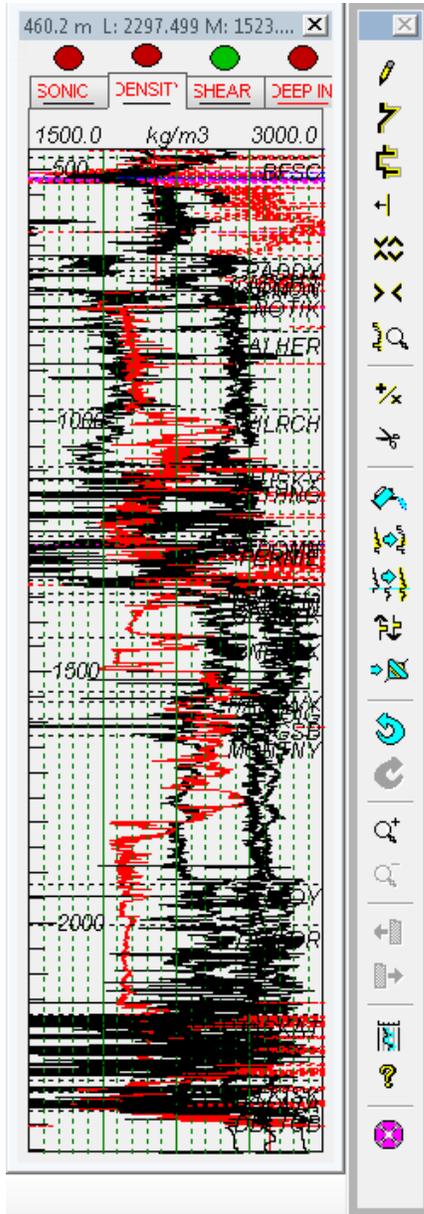
The general Log Equation Library dialog box, which is used to create equations for any log type, is accessed through several different dialog boxes available from the Edit menu. You can also invoke the Log Equation Library dialog box for only a specific log using the Well Properties > Log Properties dialog box.



### To apply math equations to logs

1. From the **Edit** menu, select **Log editing** ()  
**OR**  
Double-click the log  
**OR**  
Right-click the log and select **Log editing**.

The *Log Editor* dialog box appears.



2. In the toolbar beside the *Log Editor*, click the **Math** tool (+x).

The *Log Math* dialog box appears.

**Compose an equation**

vs=vp\*((.5-pois)/(1.0))<sup>-.5</sup> Update Clear

Add a log by Z number (log index) or by equation reference

add operators (angles in radians) add constants

Add a function from the library Edit

Compose an equation then resolve any unknown log references.  
Examples: Generically 'A=B+10' or 'Vs=Vp-1360/1.16' or explicitly by log index 'ZA=ZB+10'

**Log resolution**

ZC = ZA\*((.5-?) / (1.0))<sup>- .5</sup>

VS= ZC SHEAR SONIC \*Active velocity

VP= ZA SONIC \*Active velocity

POIS= ? Select a log

Create new log

**Depth range KB**

1391.62 to 1391.62 m Update 0 Samples

Top All Bottom Tops 0.0 Depth range

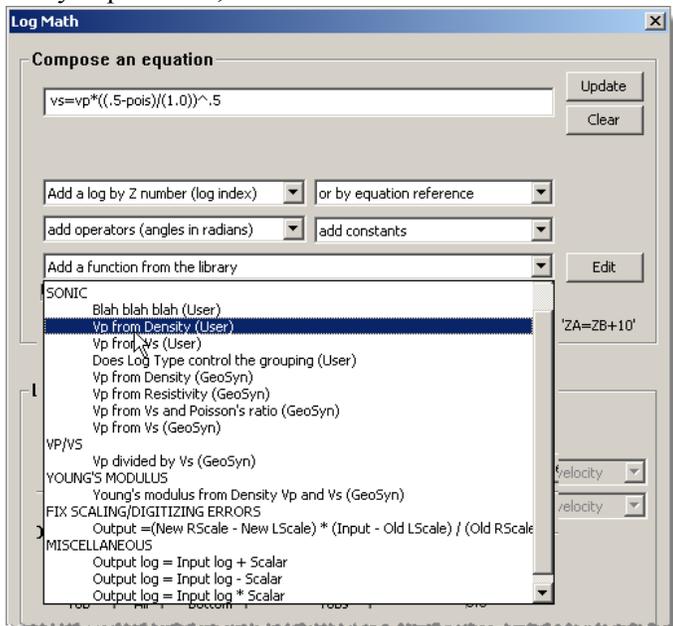
Reset output log scales Apply Close Help



**TIP:** To copy a portion of one log to another, enter the following equation  $XX=YY$ , (where  $XX$  is the recipient log and  $YY$  is the source log) drag the interval to copy in the source log, and then click **Apply**.

3. Do either of the following:

- To build an equation based on an equation in the function library, select the equation from the Add a function from the library drop-down list,



and then do either of the following to modify the equation. If the desired function doesn't appear, click Edit to the right of the drop-down list to launch the *Log Equation Editor* dialog box and create it.

- Type equation terms directly in the top box of the Compose an equation pane.
  - Select equation terms from the drop-down lists above the Add a function from the library drop-down list.
- Using the Log Resolution pane, select a log from each drop-down list to the right of each equation term to associate a log with each term.
  - Do one of the following:
    - Drag the cursor ( $\leftarrow \frac{+}{-}$ ) on the Log Editor log display pane to select a range to which to apply the mathematical equation.
    - Type more precise values in the Depth range KB pane for the start and stop depth and click **Update**. Click either **Top** or **Bottom** to accept the absolute depth from the log or click **All** to accept both.
    - Click **Depths from tops** to display the *Depth Range from Tops* dialog box and then select the formation tops that signify your zone of interest from the drop-down lists and click **OK**.
  - Click **Apply**.

## Related Topics

...

See *"Building Equations using the Log Equation Library,"* p. 55  
 See *"Creating Blocked Log Models,"* p. 61

See *"Clipping or Filtering Logs,"* p. 72  
 See *"Merging Logs,"* p. 68

## Cutting Logs

Cut a section from a log and then either lower the start depth or raise the stop depth so that either the tops below or above the cut maintain accurate depths.

You can also insert a constant value log section the same thickness as the section removed. For details, see *Related Topics* below.

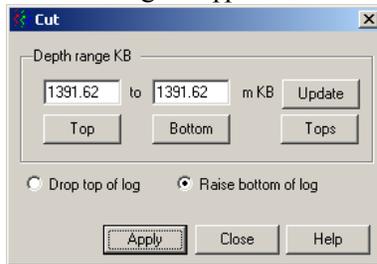


### To cut logs

1. From the **Edit** menu, select **Log editing** ()  
**OR**  
Double-click the log  
**OR**  
Right-click the log and select **Log editing**.



The *Cut* dialog box appears.



3. Do one of the following:

- Drag the cursor (→) on the Log Editor log display pane to select a range to cut.
- Type more precise values in the Depth range pane for the start and stop depth and click **Update**
- Click either **Top** or **Bottom** to accept the absolute depth from the log.
- Click **Depths from tops** to display the *Depth Range from Tops* dialog box and then select the formation tops that signify your zone of interest from the drop-down lists and click **OK**.

4. Click **Apply**.

## Related Topics

...

See "*Inserting Log Sections using Log Editor*," p. 59

See "*Shifting Logs*," p. 85

## Creating Log Composites

Take a range of data from a donor well and either insert it into or replace part of a host well.

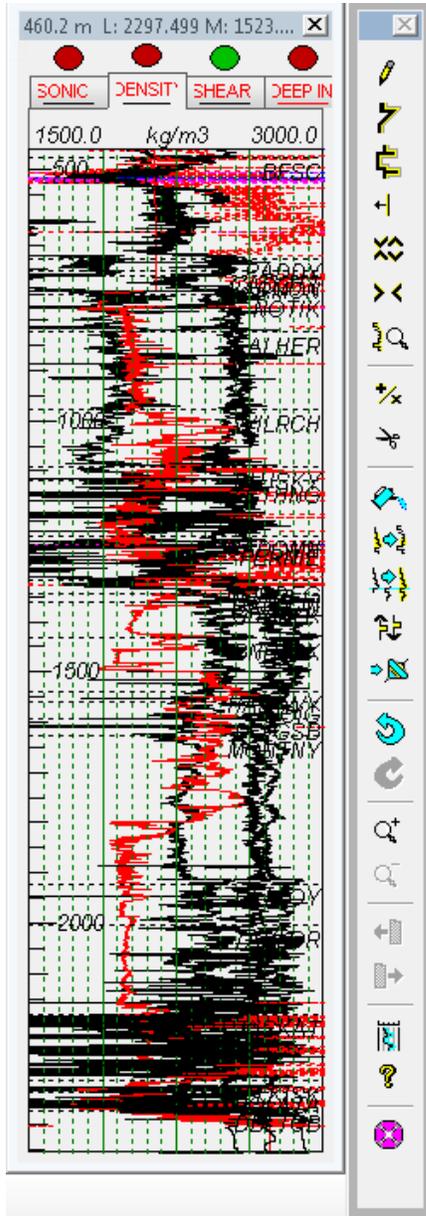
Log data from the specified depth range of the donor well is copied to the corresponding log type in the host well. Logs in the donor well without corresponding logs in the host well are ignored unless you manually associate them with logs in the host well. For details about merging log runs, see *Related Topics* below.



### To create log composites

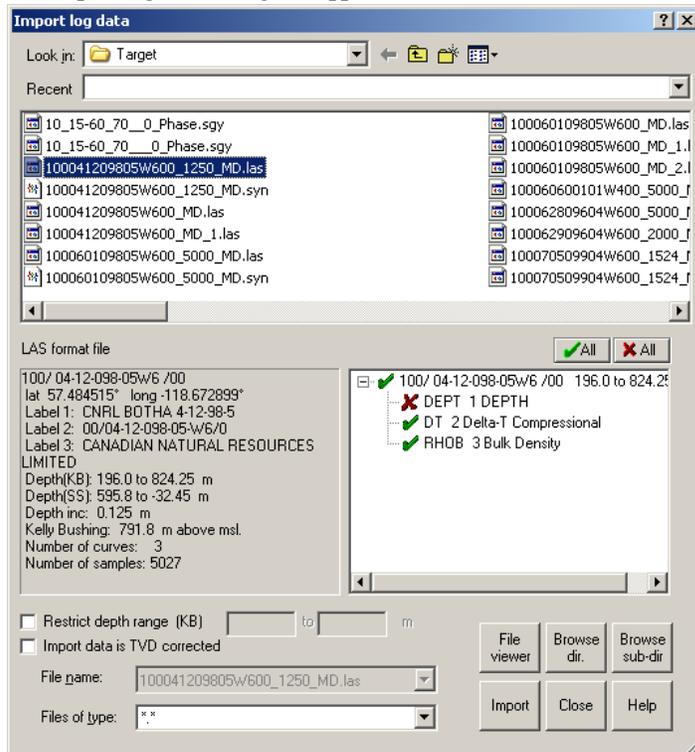
1. From the **Edit** menu, select **Log editing** (🔧).
- OR**  
Double-click the log
- OR**  
Right-click the log and select **Log editing**.

The *Log Editor* dialog box appears.



2. In the toolbar beside the *Log Editor*, click the **Composite** tool ()

The *Import log data* dialog box appears.

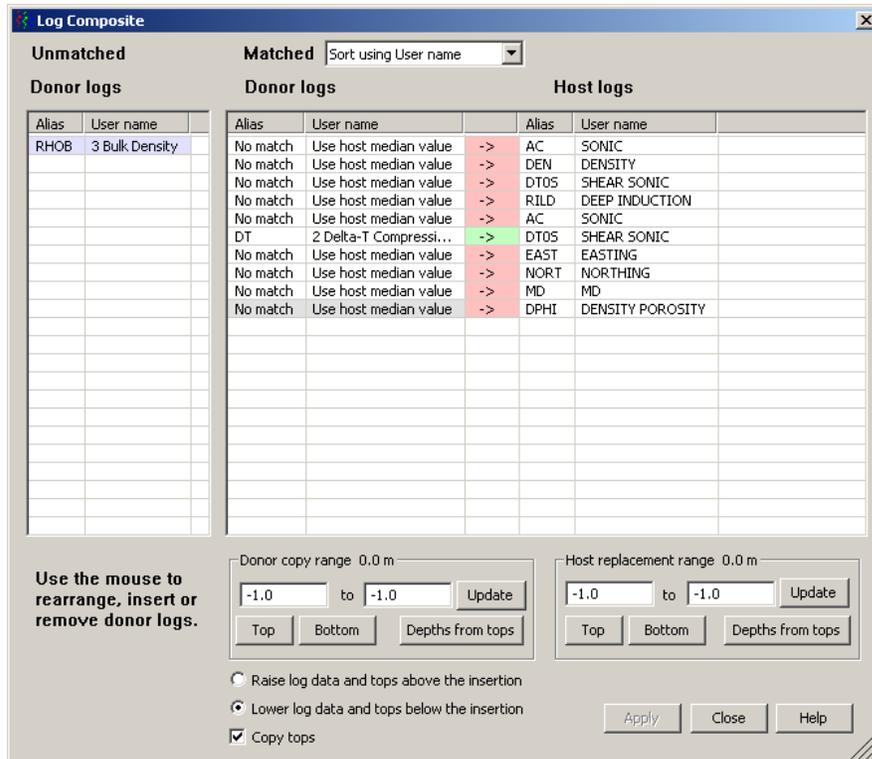


3. Select the root directory or drive from the **Look in** drop-down list then double-click folders in the display pane to browse to the directory that contains either the desired files or the subdirectory with those files. To filter the type of files displayed, from the **File filter** drop-down list, select a file format extension.
4. Either click **Browse dir.** or **Browse sub-dir** to launch *Directory Browser* displaying LAS and GeoSyn files sorted by UWI, or simply select the desired file in the display pane. For details on using *Directory Browser*, see *Related Topics* below.
- ▶ For LAS files, you can inspect and modify the raw data in an ASCII text editor before importing it by clicking **File Viewer**.

When you select the file, details appear in the *format file* pane.

5. In the well tree, select whether to import specific logs. A checkmark (✓) appears beside logs that will import, a cross (✗) beside those that won't. For wells with numerous logs, toggle the group by clicking **All** (✓, ✗) depending on whether to import or ignore the majority of logs then toggle the individual logs to import or ignore and click **Import**.

The *Log Composite* dialog box appears displaying which logs from the donor well will be inserted into logs of the host well.



6. Logs that match appear in the pane to the right. Logs that don't completely align and for which some constant values will need to be applied are colored red in the cell between the donor and recipient log.
  - ▶ Drag a log from the *Unmatched* pane into the *Matched* pane in the left-most cell of the row that lists the desired recipient log, or drag it from the *Matched* pane to the *Unmatched* pane if you don't want it to be a donor log.
  - ▶ Drag the alias in the left-most column of the *Matched* pane to change the default recipient log.
7. Do one of the following:
  - Type precise values in the Copy range and Replacement range boxes and then click **Update**.
  - Click **Top** and **Bottom** to accept the absolute depth from the log.
  - Click **Depths from tops** to display the *Depth Range from Tops* dialog box and then select the formation tops that signify your zone of interest from the drop-down lists and click **OK**.
8. Click **Apply** and then click **Close**.

## Related Topics

• • •

See "Clipping or Filtering Logs," p. 72

See "Inserting Log Sections using Log Editor," p. 59

See "Using Directory Browser," p. 9

See "Merging Logs," p. 68

## Shifting Logs

Correct log depths with cable stretch and other errors by adding a segment to the top or bottom of one or multiple logs in the current synthetic. New data points added to the top or bottom of logs are extrapolated using the last available data point. If the top or bottom value is anomalous, it will be propagated and may require further editing.

GeoSyn requires that all logs have the same top and bottom, so when one log is shifted in depth, GeoSyn adds data to the top or bottom of all logs to compensate.

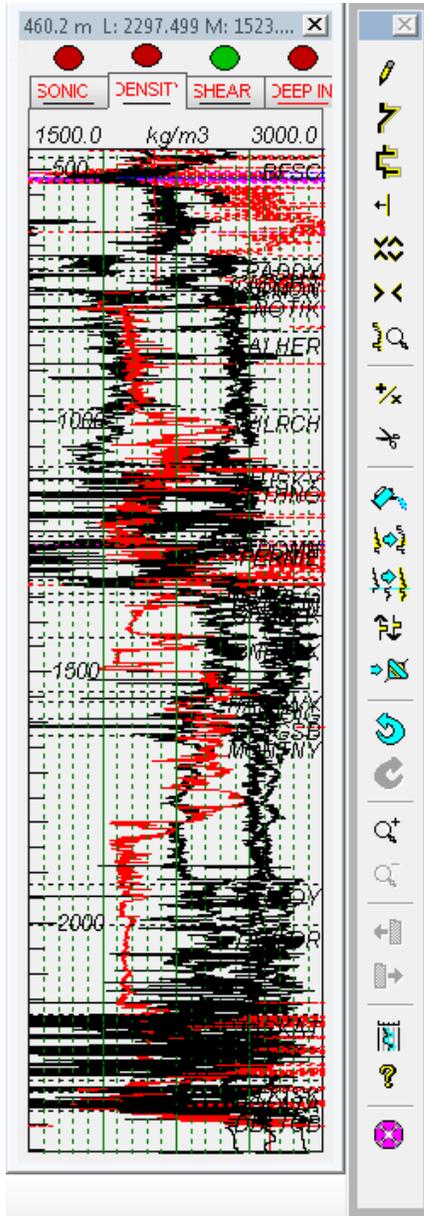
The time datum can also be changes using the Edit > Time Datum menu option. For details, see *Related Topics* below.



### To shift logs

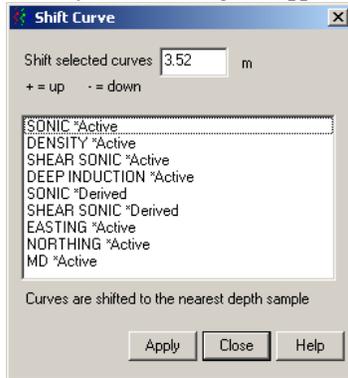
1. From the **Edit** menu, select **Log editing** ().
- OR**  
Double-click the log
- OR**  
Right-click the log and select **Log editing**.

The *Log Editor* dialog box appears.



2. In the toolbar beside the *Log Editor*, click the **Shift** tool ()

The *Shift Curve* dialog box appears.



3. In the display pane, select the logs to shift. SHIFT+CLICK or CTRL+CLICK for multiple selection.
4. Type a signed value to shift the log(s) in the **Shift selected curves** box then click **Apply**.

## Related Topics

...

See "Cutting Logs," p. 78

See "Drawing Straight Edge and Freehand Curves," p. 57

See "Inserting Log Sections using Log Editor," p. 59

See "Changing Time Datum Properties," p. 112

## Changing Log Editor Display

Change the minimum and maximum values that define the scale range for logs. Configure which logs appear in each track. The same log can be repeated in multiple tracks selected by log type.

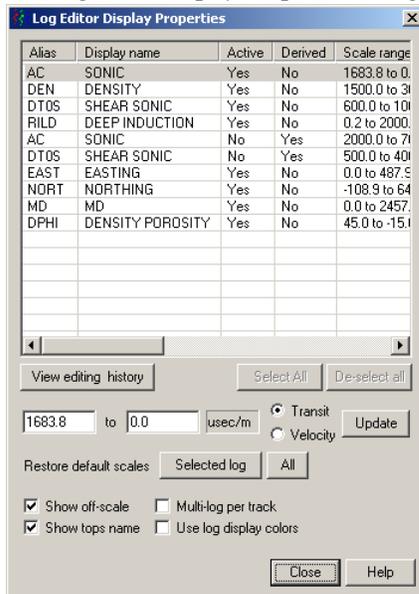


### To change log editor display

1. From the **Edit** menu, select **Log editing** ().
- OR**  
Double-click the log
- OR**  
Right-click the log and select **Log editing**.



The *Log Editor Display Properties* dialog box appears.



3. In the display pane, select the log and type minimum and maximum scale values in the boxes below the display pane then click **Close**.

These changes apply to only the current synthetic. To change the default scale for a log in all future synthetics, see *Related Topics* below.

## Related Topics

...

See "*Changing Log Defaults*," p. 48

## Inspecting Logs

View the range over which data falls in a given log and narrow the selected range by either depth and top. The narrowed range can be output to the Crossplot wizard.

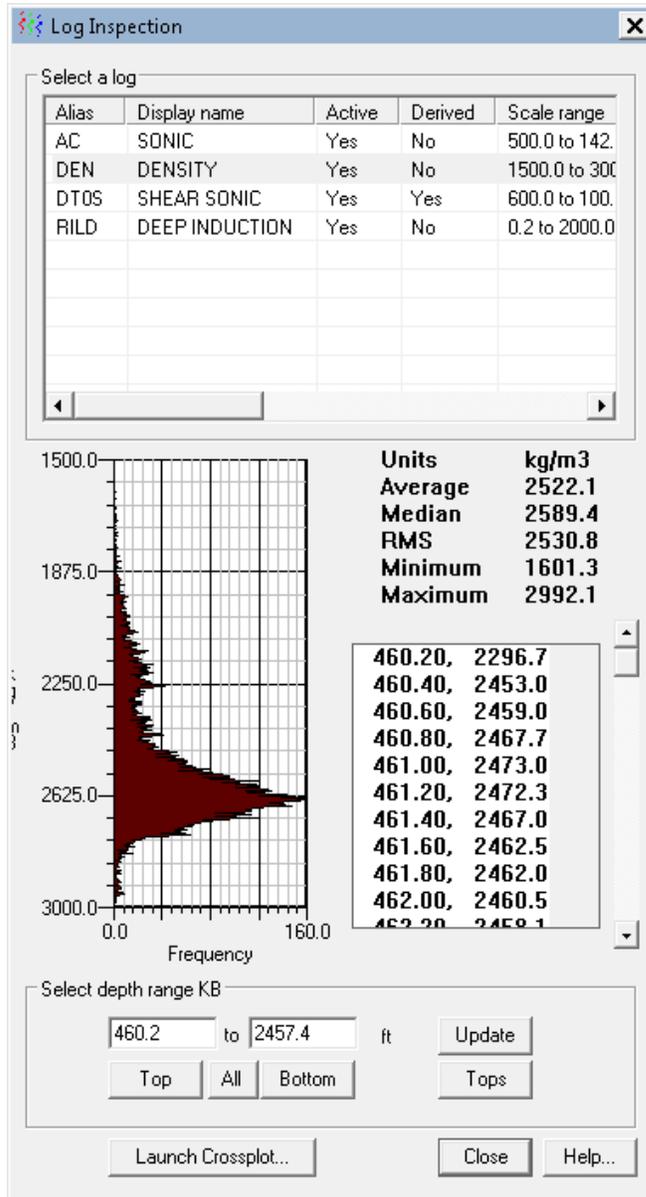


### To inspect logs

1. From the **Edit** menu, select **Log editing** ().
- OR**  
Double-click the log
- OR**  
Right-click the log and select **Log editing**



The *Log Inspection* dialog box appears.

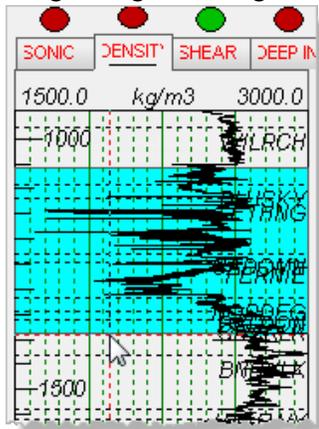


► Click different log tabs in the *Log Editor* to change the log that appears in the *Log Inspection* dialog box.

3. To set the data range to interrogate, do one of the following:

- Using the *Log Inspection* dialog box, in the *Select depth range* pane, type in the boxes, or click the **Tops** button to display the *Depth Range from Tops* dialog box and then select the upper and lower tops that bound the range in the model, and then click **Update**.

- Using the Log Editor, drag the interrogation range as depicted below.



- ▶ To reset the range, click either **Top** or **Bottom** (to move only one element of the range), or click **All**.
  - ▶ Click **Launch Crossplot** to display the *Crossplot wizard* with only the data range specified above.
4. Click **Close** to return to the model.

## Related Topics

...

See "Creating Crossplots," p. 156

# Managing Tops

## Using Tops Lists

GeoSyn includes three default lists for tops:

- **Generic**, which are the tops that appear in logs of the current synthetic.
- **AccuMap System Tops**, which are always loaded from your local AccuMap database when you create a new synthetic or launch an existing one. Information for these tops may change following AccuMap data loads.
- **AccuMap User Tops**, which are always loaded from your local AccuMap user tops database when you create a new synthetic or launch an existing one. Information for these tops changes based on your changes.

Create an unlimited number of tops lists with customized display properties that are hidden or shown in the main synthetic display, populate tops lists with check shot or directional survey values, copy tops amongst lists, and delete individual tops in lists. You can't delete the three default lists above, but you can delete the tops within.

## Changing Tops Properties

When you create a new synthetic or launch an existing one, GeoSyn automatically downloads the latest system tops and user tops from either the local AccuMap database or from the IHS Online Information Hub. If importing an LAS or GeoSyn file, you specify whether the well is in measured depth or true vertical depth units so the tops are placed at the correct depths.

Modify the display properties of tops including formation name, depth, marker attributes, and lithology. Customized tops can be copied to multiple tops lists and displayed in the main synthetic display.

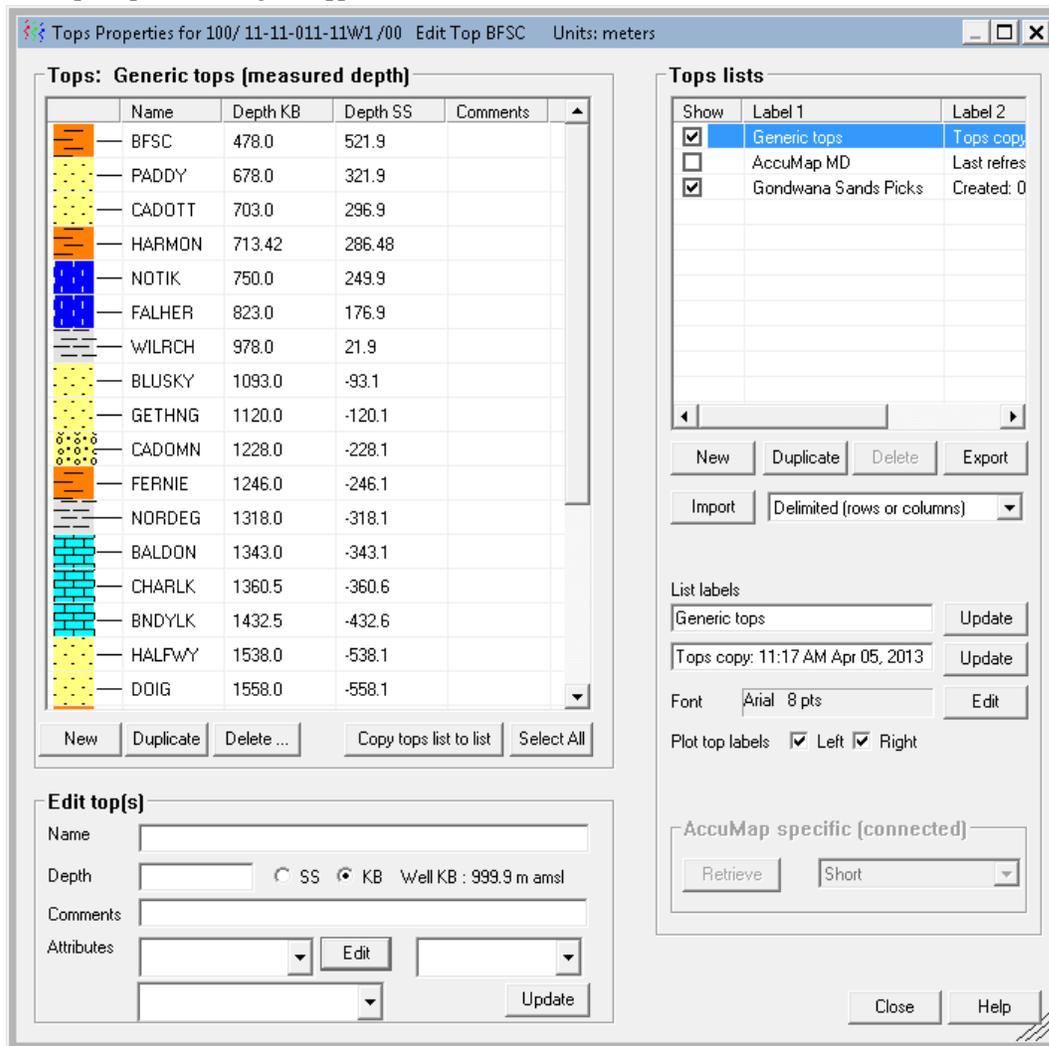
Changes you make in the User Tops list in GeoSyn aren't updated in the AccuMap user database and are overwritten by the AccuMap user database next time you launch the synthetic. To change the value in the AccuMap user database, use AccuMap Tops Manager. To prevent the changed depth from being overwritten without changing the depth in the AccuMap user database, copy the top to the *Generic tops* list.



### To change tops properties

1. From the **Edit** menu, select **Tops properties** ()  
**OR**  
Right-click the tops table in the main synthetic display and select **Tops properties**.
- ▶ To display the tops table in the main synthetic display, from the **Edit** menu, select **Synthetic properties** () and in the **Display elements** pane, select **Tops table**.

The *Top Properties* dialog box appears.



2. In the *Tops lists* pane, select the list with tops to display in the *Tops for list* pane.
3. In the *Tops for list* pane, either select a top to change its display properties, or click either **New** or **Duplicate** to add a row with the same information as the selected top below the selected top.
4. Below the *Tops for list* display pane, type the name, depth, and then select lithology and top marker attributes.
5. To change tops properties that apply to the entire list, in the *Tops lists* pane, select font and top plotting options.
6. Click **Close** to return to the main synthetic display with the changes applied.

## Related Topics

See *"Importing Tops from Delimited Files," p. 99*  
 See *"Using Tops Lists," p. 92*  
 See *"Importing Tops from GeoSyn Files," p. 99*

See *"Exporting Tops Lists," p. 183*  
 See *"Importing Tops from Fixed Width Files," p. 101*  
 See *"Importing Tops from LAS and ASCII Files," p. 106*

## Duplicating Tops Lists

Duplicate and then customize an entire list of tops or copy only select tops from one list to another. Tops copied from one list to another don't overwrite tops with the same name in the recipient list.



### To duplicate tops lists

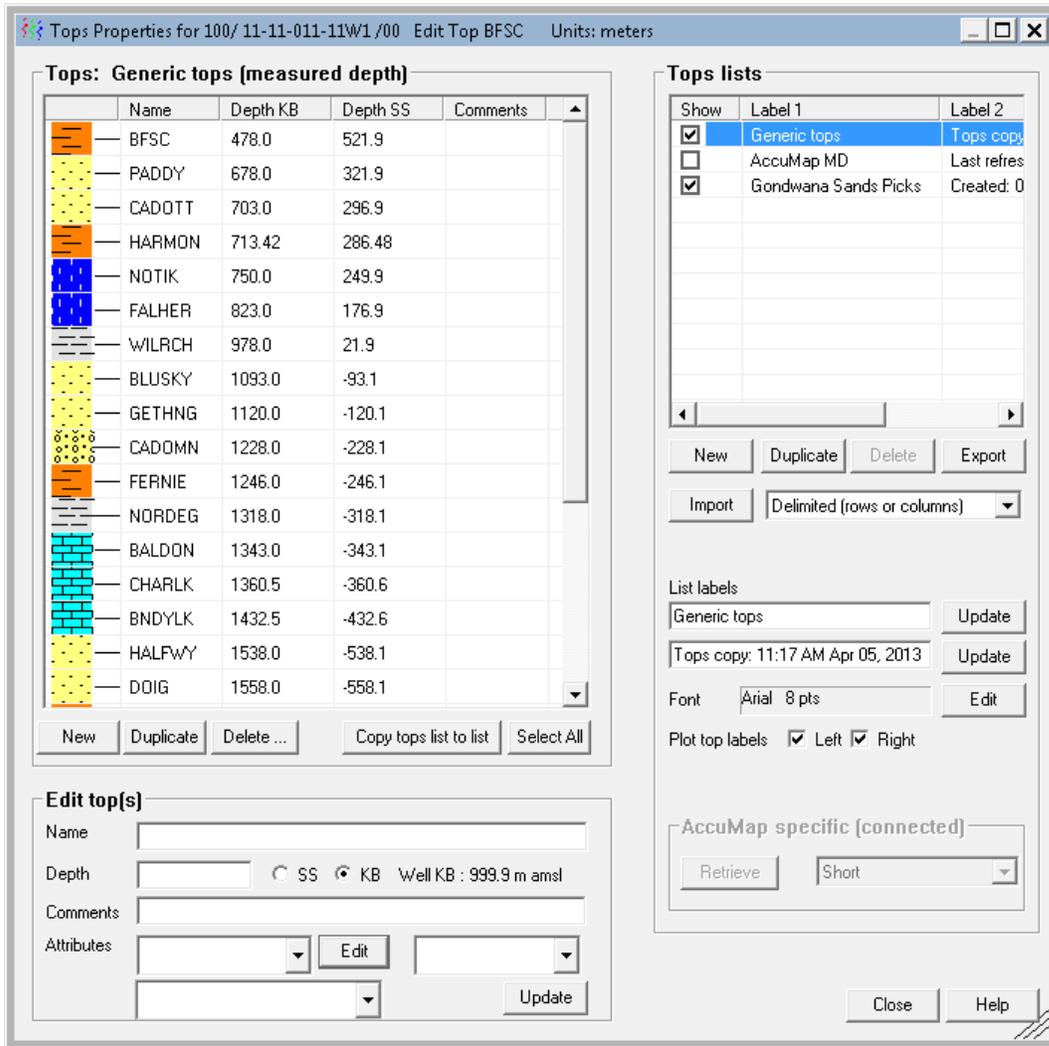
1. From the **Edit** menu, select **Tops properties** ()

**OR**

Right-click the tops table in the main synthetic display and select **Tops properties**.

- ▶ To display the tops table in the main synthetic display, from the **Edit** menu, select **Synthetic properties** () and in the **Display elements** pane, select **Tops table**.

The *Top Properties* dialog box appears.



2. In the *Tops lists* pane, select the tops list to copy then click **Duplicate**.

▶ To copy only select tops to an existing list instead, in the **Tops for list** display pane, select the tops to copy (SHIFT+CLICK or CTRL+CLICK for multiple selection) then click **Copy selected tops to another list** to display the *Select a recipient tops list* dialog box and select the receiving tops list.

The tops names, depths, and lithology are copied to a new file that appears below the existing tops lists in the **Tops lists** pane.

3. Select the duplicate tops list to display its tops in the **Tops for list** pane and select a row that contains a top to change, duplicate, or below which to add a new row and do one of the following in the boxes below the **Tops for list** display:

- To change an existing top, type and select the desired details then click **Update**.
- To make a copy of a top to modify, select the top below which to place the copy and click **Duplicate**.
- To add a blank row where you can type new top details, select the top below which to add a blank row, click **New**, type top details, then click **Update**.

## Related Topics



*Importing Tops from LAS Files*

*See "Importing Tops from Delimited Files," p. 99*

*See "Importing Tops from Fixed Width Files," p. 101*

*See "Importing Tops from LAS and ASCII Files," p. 106*

*See "Using Tops Lists," p. 92*

*See "Importing Tops from GeoSyn Files," p. 99*

## Inserting Tops

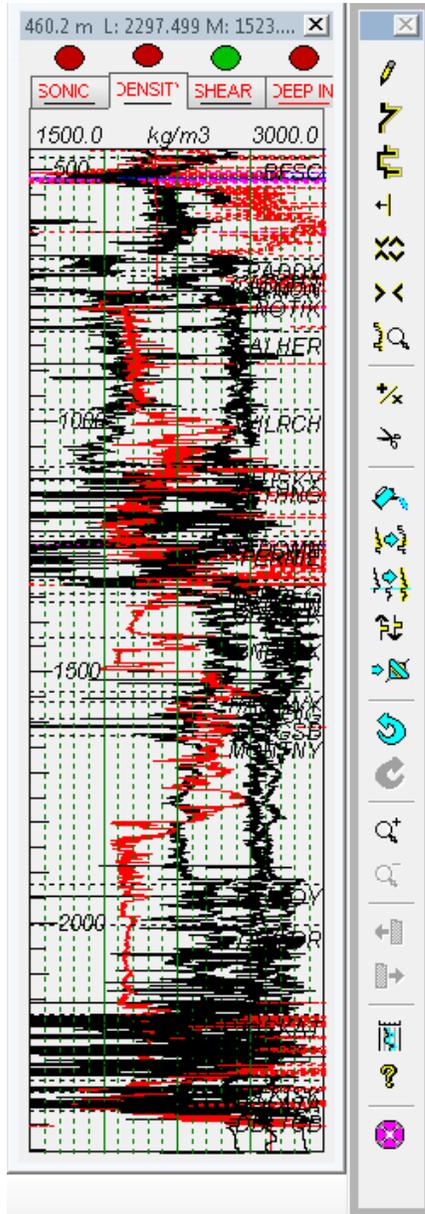
Insert a top at a location on a log you click. When inserting, you can specify the tops list to which to write the top information so that you can update it, correlate it, and so on.



### To insert tops

1. From the **Edit** menu, select **Log editing** ()  
**OR**  
Double-click the log  
**OR**  
Right-click the log and select **Log editing**.

The *Log Editor* dialog box appears.



2. Select the tab for the log in which to insert a top and in the Log Editor toolbar, click the **Insert a Top** tool ()
3. Click the cursor () at the location on the log at which to insert a top.  
The *Insert Top in Selected List* dialog box appears.
4. Select the list in which the name and depth of the top you insert will be saved, and then type a name for the top and click **OK**.

## Related Topics

...

See "Using Tops Lists," p. 92

See "Changing Tops Properties," p. 92



Delimited format is different than fixed width columns. All entries in fixed width columns align on the left-edge of the column. Delimited simply includes one or more delimiters between entries, but the items may not align neatly in columns.

When importing tops, you have the option of overwriting existing tops in the list. If you keep the current tops, imported tops with the same name appear alongside them.

To duplicate and then modify an existing tops list within GeoSyn, see *Related Topics* below.



## To import tops from delimited files

1. From the **File** menu, point to **Import**, click **Tops**, and then select **Delimited**.
2. Browse to the desired tops file, and then click **Open**.

The *Tops Import* dialog box appears.

	1	Names	Depths	4	5	6	7	8
65		are	used	in	this	output	file.	
66	~Curve	Information						
67	#	MNEM	.UNIT	API	CODE	:	Curve	Descripti
68	#-----	:-----						
69		DEPT	.FT	00	001	00	00	:
70		DT	.USEC/FT	60	520	00	00	:
71		RHOB	.G/CM3	45	350	01	00	:
72	~t	Tops						
73		BPSIC	1235.9					
74		PEACER	1884.8					
75		SPIRIT	1967.8					
76		ELKTON	2647.0					
77		SHUNDA	2676.8					
78	~A	DEPTH	DT	RHOB				
79		640.0000	128.7408	2.2036				
80		640.5000	130.0574	2.2218				
81		641.0000	130.8836	2.2536				
82		641.5000	131.6847	2.2817				
83		642.0000	131.4099	2.2890				
84		642.5000	131.4100	2.2891				

**Data selection**

Tops in  Columns  Rows

Names and depths in rows

Names in column: 2 |<|>|

Depths in column: 3 |<|>|

Search: 100111101111W100 | Update

**Top placement**

Locate at specified depths

Import units:  Imperial  Metric

Depths relative to:  KB  SS

Bulk shift top depths by +- 0.0 meters

Ignore depths and space evenly

Delete current tops before importing new tops

**Import**

Import another file | Delimiter: space |  Ignore adjacent spaces

Qualifier: quotation | Apply | Cancel | Help

GeoSyn automatically searches in the file you selected above for a UWI that matches the one in your GeoSyn file and highlights the row in which it appears in the tops source file.

3. Using the display pane, verify whether the tops in the source file are ordered in rows (formation top names run horizontally along a single row), or columns (formation top names run vertically down a single column). Your selection above is saved and applied the next time you launch the *Tops Import* dialog box.
4. Using the *Names in row* or *column* and the *Depths in row* or *column* (depending on whether you selected *Tops in rows* or *Tops in columns* above), specify the row or column in which the formation top names and depths appear.

5. In the *from* and *to* boxes, specify the range to import.

**OR**

Drag in the display pane to select the tops to import.

Rows are highlighted gray simply to show the columns and rows in which formation top names and depths appear.

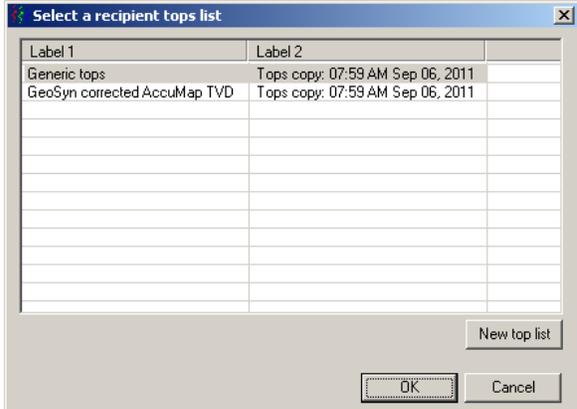
Rows and columns highlighted green are those that will be imported into GeoSyn.

► Verify the delimiter GeoSyn chose is correct. GeoSyn attempts to determine the correct delimiter by reading the source file.

► In the *Top placement* pane, select the desired processing options.

6. Click **Apply**.

The *Select a recipient tops list* dialog box appears.



9. Select the list to which to import the tops, or click **New top list**, define a new tops list, and then click **OK**. Shift+Click or Ctrl+Click to select more than one tops list into which to import into the tops.

## Related Topics

...

See *"Duplicating Tops Lists," p. 95*

See *"Importing Tops from Fixed Width Files," p. 101*

See *"Importing Tops from LAS and ASCII Files," p. 106*

See *"Using Tops Lists," p. 92*

See *"Importing Tops from GeoSyn Files," p. 99*

## Importing Tops from Fixed Width Files

Fixed width columns format is different than delimited format. All entries in fixed width columns align on the left-edge of the column. Delimited simply includes one or more delimiters between entries, but the items may not align neatly in columns.

When importing tops, you have the option of overwriting existing tops in the list, if you keep the current tops, imported tops with the same name appear alongside them.

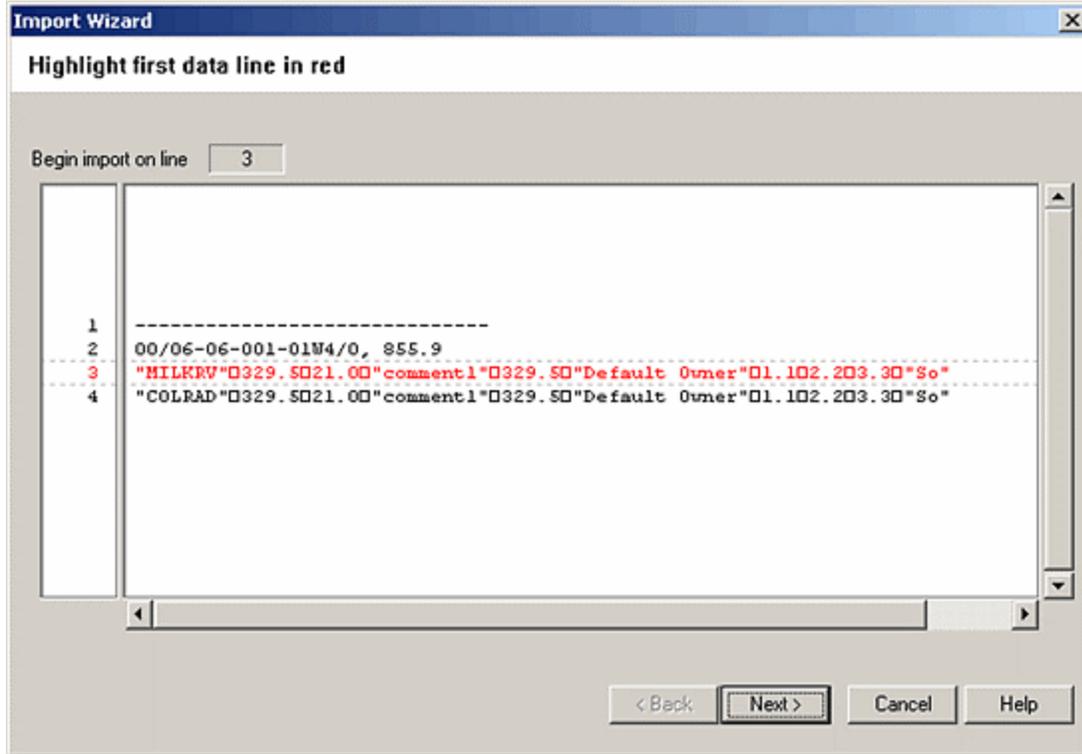
To duplicate and then modify an existing tops list within GeoSyn, see *Related Topics* below.



## To import tops from fixed width files

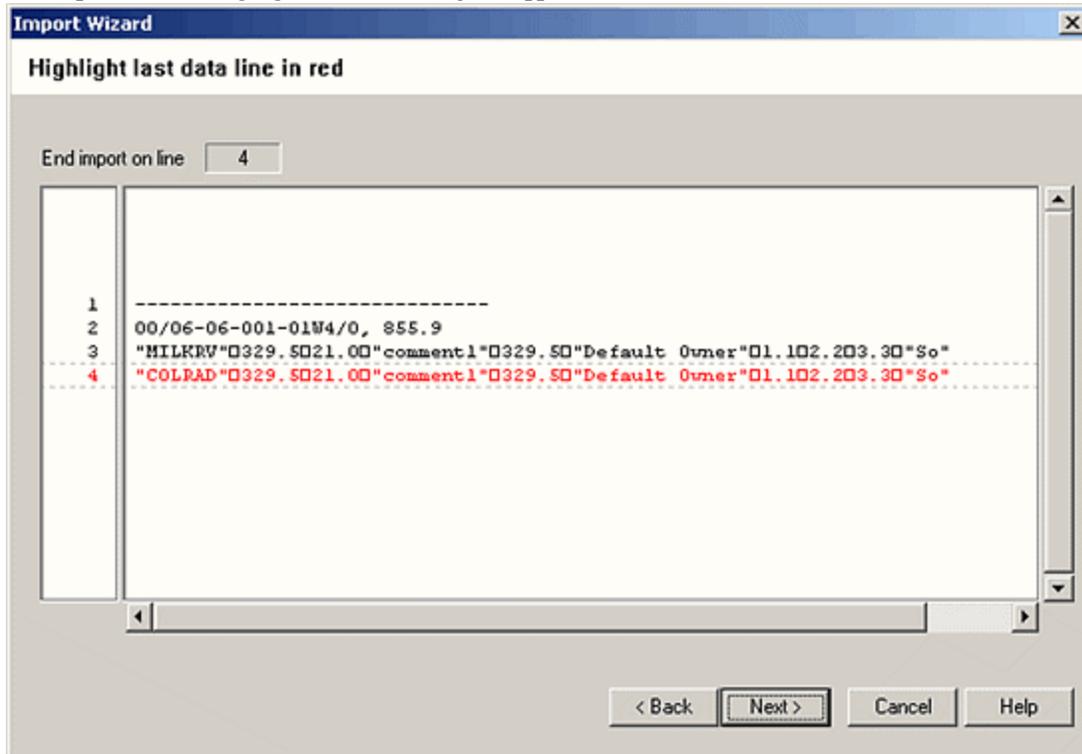
1. From the **File** menu, point to **Import**, click **Tops**, and then select **fixed width, delimited**.
2. Browse to the desired tops file and select the depth placement options, units, and whether to delete current tops if importing into a tops list that's already populated, and then click **OK**.

The *Highlight first line* dialog box appears.



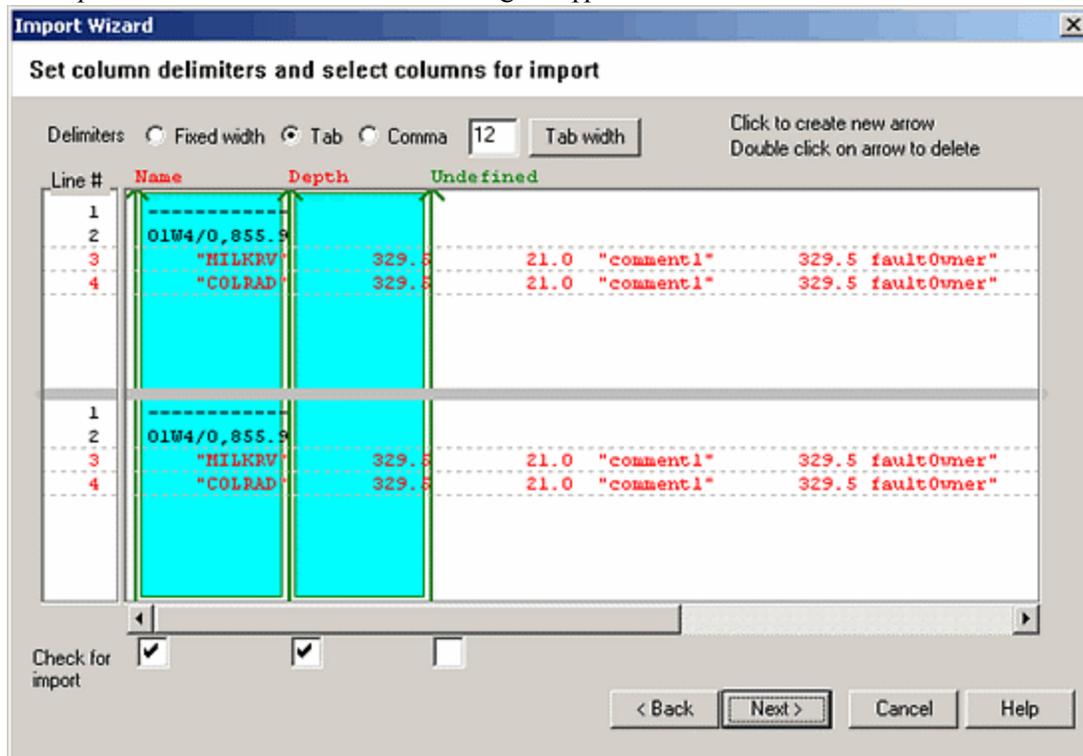
3. Select the row in which the first top appears, and then click **Next**.

The *Import Wizard: Highlight Last Line* dialog box appears.



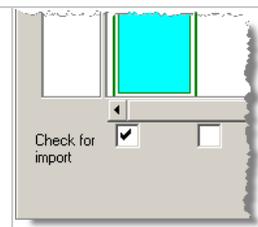
4. Select the row in which the last top appears, and then click **Next**.

The *Import Wizard: Set Column Delimiters* dialog box appears.

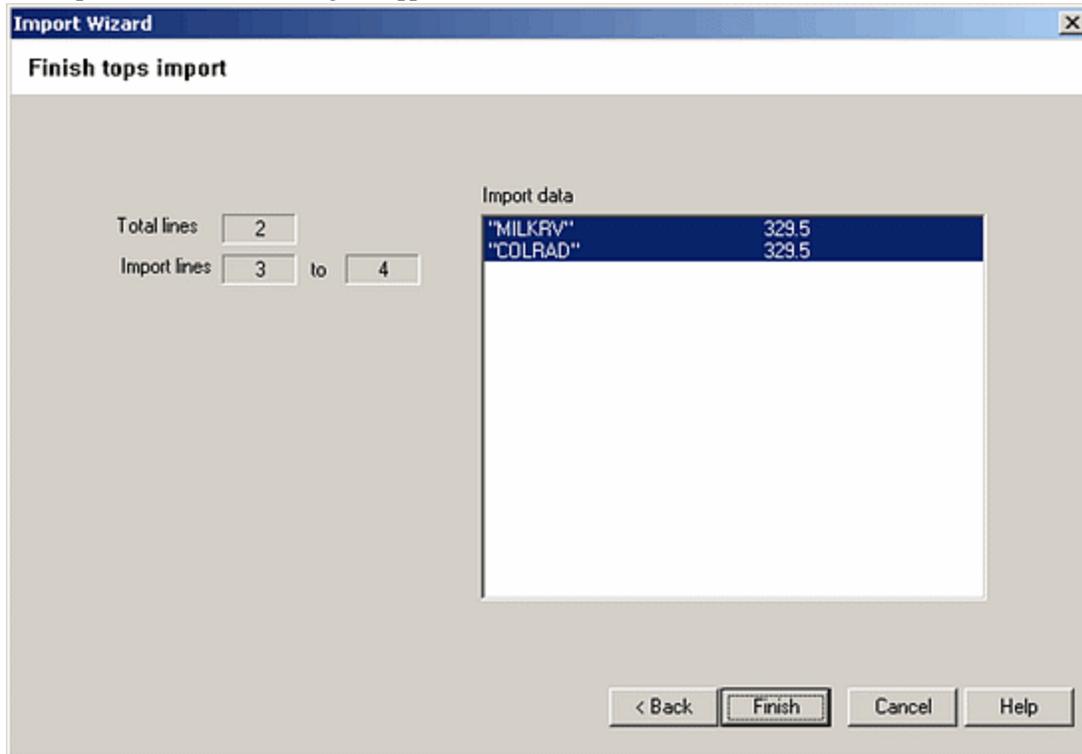


- ▶ Set the column delimiters (↑) by clicking in the display pane between required columns. The green line cannot bisect a data column. Double-click column delimiters to delete.

Click the box that appears below each delimiter to display the *Select from List* dialog box and identify the data type then click **Next**.

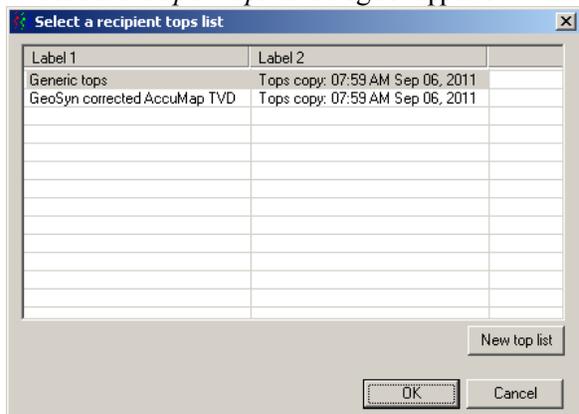


The *Import Wizard: Finish* dialog box appears.



5. Click **Finish**.

The *Select a recipient tops list* dialog box appears.



6. Select the list to which to import the tops or click **New top list** and define a new tops list, and then click **OK**. Shift+Click or Ctrl+Click to select more than one tops list to import into the list of tops.

## Related Topics

...

See *"Duplicating Tops Lists,"* p. 95

See *"Importing Tops from Delimited Files,"* p. 99

See *"Importing Tops from LAS and ASCII Files,"* p. 106

See *"Using Tops Lists,"* p. 92

See *"Importing Tops from GeoSyn Files,"* p. 99

## Importing Tops from LAS and ASCII Files

Import tops lists saved in LAS, or ASCII format into the GeoSyn tops list so that they're available to your current synthetic.

When importing tops, you have the option of overwriting existing tops in the list, if you keep the current tops, imported tops with the same name appear alongside them.

To duplicate and then modify an existing tops list within GeoSyn, see *Related Topics* below.



### To import tops from LAS and ASCII files

1. From the **File** menu, point to **Import**, click **Tops**, and then select **LAS file**.



3. Select the list to which to import the tops or click **New top list** and define a new tops list, and then click **OK**. Shift+Click or Ctrl+Click to select more than one tops list to import into the list of tops.

## Related Topics

• • •

*See "Duplicating Tops Lists," p. 95*

*See "Using Tops Lists," p. 92*

*See "Importing Tops from Delimited Files," p. 99*

*See "Importing Tops from GeoSyn Files," p. 99*

*See "Importing Tops from Fixed Width Files," p. 101*

# Modelling

## Creating Models

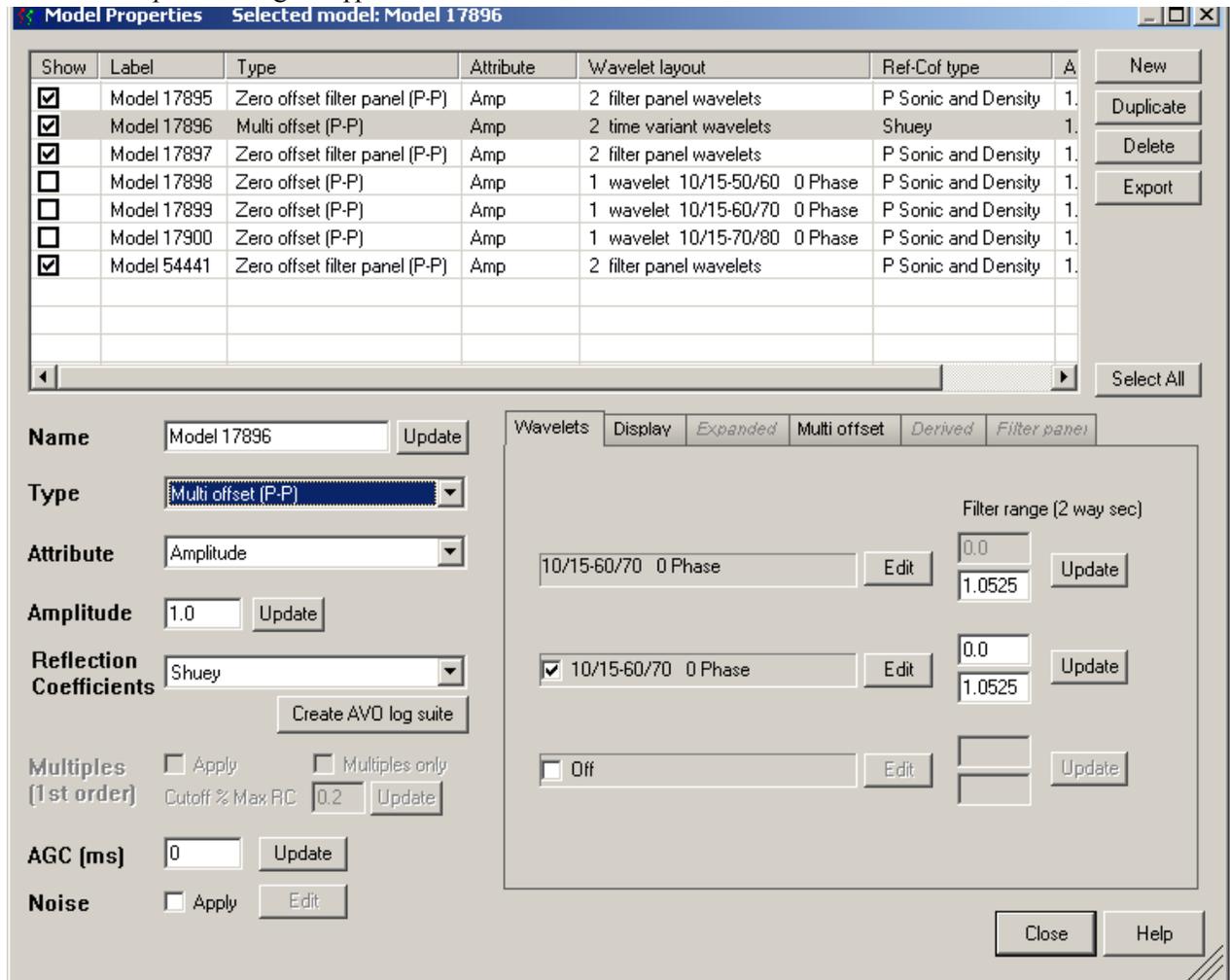
Create a synthetic model to investigate the seismic response to a given geological situation. The response may be studied in zero or multiple offset mode with several reflection coefficient dependency options.



### To create models

1. From the **Edit** menu, select **Model Properties** ()

The *Model Properties* dialog box appears.



2. In the display pane, either click an existing trace and click **Duplicate** or simply click **New**.

A new row appears as the last entry in the display pane with either a random number or a *copy of* identifier depending on your selection above.

3. In the box below the display pane, type a more descriptive name for the trace selected in the display pane above, and then click **Update**.

4. Select the model type and trace properties. Depending on the model type and attributes you select, corresponding tabs right of the model default properties become active and one of the following tab display: *Wavelets*, *Display*, *Expanded*, *Multi offset*, *Derived*, or *Filter Panel*.

For details on using the various tabs, see *Related Topics* below.

## Related Topics

...

See "Changing Wavelet Properties," p. 138

See "Creating AVO Logs," p. 113

See "Changing Wavelet Expansion Properties," p. 140

See "Changing Multi-Offset Properties," p. 126

See "Changing Derived Properties," p. 125

See "Changing Color Palettes," p. 128

## Applying Multiple Filters Across a Group of Traces

Filter the low and high frequency across a group of traces.

For zero offset models, apply one filter starting at the left-most trace of a group of traces and a second filter to starting at the right-most trace with both filters working towards the middle of the group of traces.

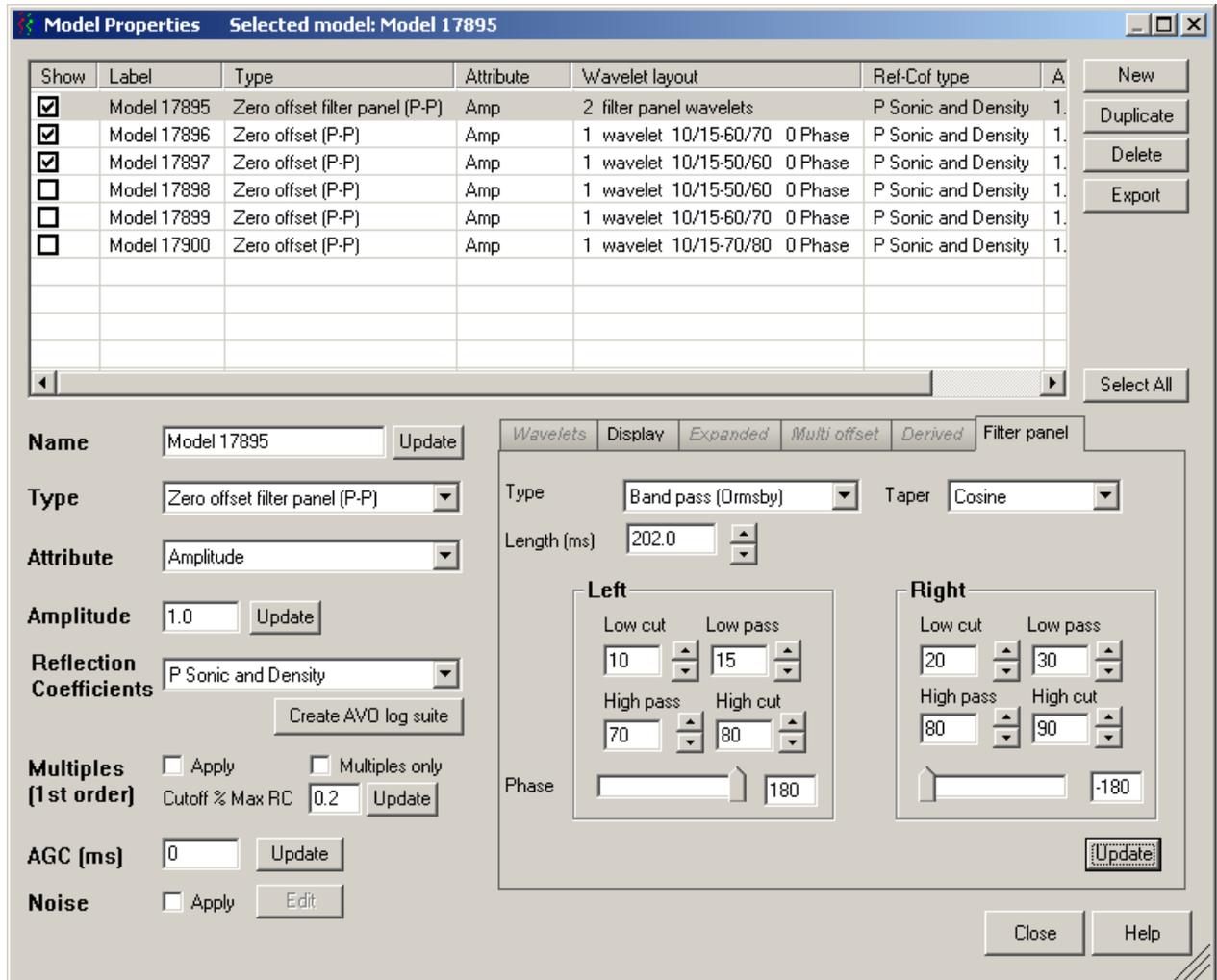
The two filters must share the same type, taper, and operator length, but the low and high cut and pass, and the phase can be unique for each.



### To apply multiple filters across a group of traces

1. From the **Edit** menu, select **Model Properties** ().

The *Model Properties* dialog box appears.



2. In the display pane, click a trace(s) with which to apply the filter. You can also duplicate or create a new curve by clicking **Duplicate** or **New**.
3. In the *Type* box to the left below the display pane, select **Zero offset filter panel (P-P)**.  
A default setting of 20 traces per group is applied. Trace settings can be changed using the *Display* tab.
4. Using the *Filter panel* tab, specify the type, taper, operator length, and then different filter settings for the left and right traces, which taper towards the middle of the group of traces. The phase can also be shifted separately for the left and right traces.

## Related Topics

...

See "Creating Models," p. 108



## Related Topics



See "Launching GeoSyn from Kingdom," p. 28

See "Creating AVO Logs," p. 113

See "Inserting Log Sections using Log Editor," p. 59

## Creating AVO Logs

Create an entire suite of logs that can be used for AVO analysis using reflection coefficients. Instead of creating each type of log individually, one selection from the Reflection Coefficients drop-down list enables you to create them with a single click.

Access more general log creation functionality from the *Well Properties: Log Properties* dialog box or create a new log populated with values from an equation that uses existing logs using the Math dialog box. For details, see *Related Topics* below.

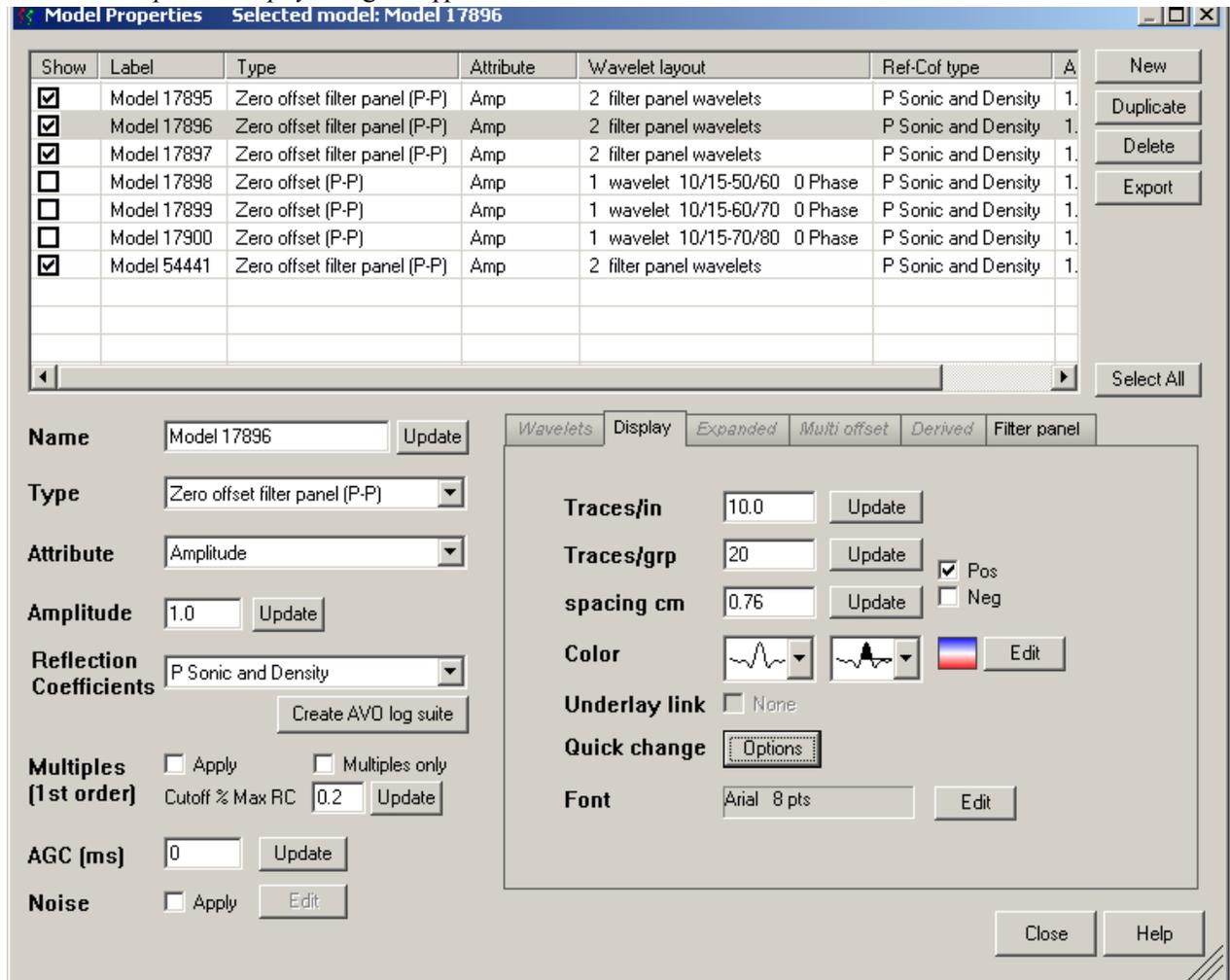
Use the Edit > Time Datum dialog box to add zones above the log to push the log down to time zero so that it matches the seismic. For details, see *Related Topics*.



### To create AVO logs

1. From the **Edit** menu, select **Model Properties** ()

The *Model Properties: Display* dialog box appears.



2. Select the desired model(s) in the display pane, and then select a reflection coefficient equation from the drop-down list.
3. Select the logs upon which to base your derived logs, and then click **Create AVO log suite**.

The *AVO log suite* dialog box appears.

4. Select the log types to create, and then click **OK**.
5. In the main *Model Properties* dialog, click **Close** to return to the main synthetic display with the changes applied.

## Related Topics

...

See "Creating Models," p. 108

See "Changing Log Display Properties," p. 50

See "Changing Time Datum Properties," p. 112

See "Changing Multi-Offset Properties," p. 126

See "Applying Math Equations to Logs," p. 75

## Modelling Fluid Replacement

In Amplitude vs. Offset modelling, as seismic waves reflect off an interface, the amplitude of the reflected wave is affected by the amount and type of fluid that occupies the pore space of the rock.

GeoSyn applies Gassman's equation to model this using a P sonic, shear sonic, and density log. You change the water saturation to apply different scenarios to your model. The available pore space not saturated with water is assumed to contain oil and gas.

Click for in-depth details on *how fluid replacement modelling is implemented in GeoSyn*.



### To model fluid replacement

1. From the **Edit** menu, select **Log editing** ().
- OR**  
Double-click the log
- OR**  
Right-click the log and select **Log editing**.



The *Fluid Replacement Wizard (Input and output logs, depth range)* dialog box appears.

The screenshot shows the 'Fluid Replacement Wizard (Gassman)' dialog box, specifically 'Setup 1: Input and output logs, depth range'. It features a 'Log tool kit' button at the top right. The 'Input logs' section contains dropdown menus for 'P Sonic' (SONIC \*Derived), 'S Sonic' (SHEAR SONIC \*Derived), 'Density', and 'Porosity' (Use constant porosity value, 6%), with a 'Porosity units' dropdown below. The 'Output logs' section includes a note 'Use 'Active' versions for instant model updates' and dropdowns for 'P Sonic' (SONIC \*Active), 'S Sonic' (SHEAR SONIC \*Active), and 'Density' (DENSITY \*Active). The 'Depth range KB' section has input fields for '1391.62 to 1391.62 ft' and an 'Update' button, along with 'Top', 'All', 'Bottom', and 'Tops' buttons. At the bottom are 'Close', 'Help', '< Back', and 'Next >' buttons.

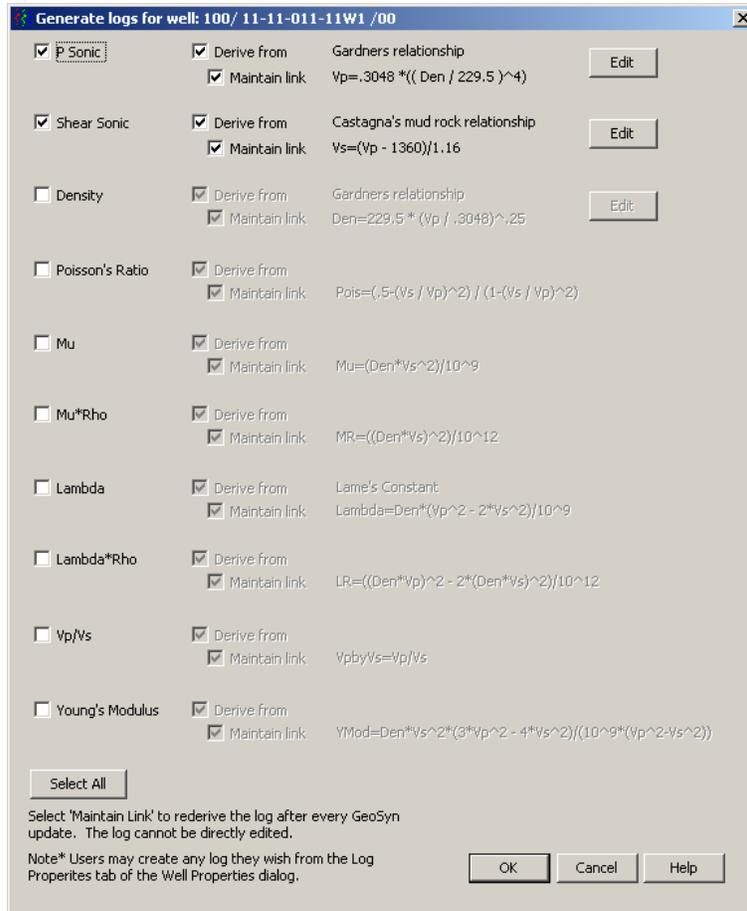
3. GeoSyn automatically populates the Input logs and Output logs drop-down lists if the required logs are available in your model; otherwise, click **Log tool kit** to display the *Fluid Replacement Tool Kit* dialog box and complete the three bullet steps below.

The *Fluid Replacement Tool Kit* dialog box appears.

The screenshot shows the 'Fluid Replacement Tool Kit' dialog box. It contains three options: 'Create missing log types' with a 'Create' button; 'Duplicate 'Active' logs to use as input logs' with a 'Duplicate' button and a checked 'Hide new input logs' checkbox; and 'Copy all data from input to output logs' with a 'Copy data' button. At the bottom are 'Close' and 'Help' buttons.

► Click **Create**.

The *AVO log suite* dialog box appears.



- ▶ Click the log types to create in the left column and ensure **Maintain link** is cleared so that changes you make to the derived log aren't overwritten by the parent log, and then click **OK**.
- ▶ Click **Edit** to the right of a log type to display the *Edit the Derivation Equation for Log* dialog box and modify the equation used to derive the log.
- ▶ Using the *Fluid Replacement Tool Kit* dialog box, click **Duplicate** to copy the created logs to the Output logs pane of the *Fluid Replacement Wizard (Input and output logs, depth range)* dialog box.
- ▶ If you want to undo fluid replacement changes made to the output logs, using the *Fluid Replacement Tool Kit* dialog box above, click **Copy data** to refresh the output logs with the original input logs data.

4. Click **Next**.

The *Fluid Replacement Wizard (In-situ reservoir properties)* dialog box appears.

**Fluid Replacement Wizard (Gassman)**

**Setup 2: In-situ reservoir properties**

**Rock matrix**

Sandstone (Quartz) Calculator

Bulk modulus: 37.000 GPa Vp= 6008 m/s  
 Shear modulus: 44.000 GPa Vs= 4075 m/s  
 Density: 2650.000 kg/m3 Poisson= 0.074

**Fluids**

Gas Calculator

Bulk modulus: 0.021 GPa Vp= 458 m/s  
 Density: 100.000 kg/m3 Poisson= 0.5

Brine 1000 ppm

Bulk modulus: 2.640 GPa Vp= 1635 m/s  
 Density: 987.000 kg/m3 Poisson= 0.5

Water saturation %: 100

Fluid average:  Reuss iso-stress  Voigt iso-strain (patchy saturation)

Bulk modulus: 2.640 GPa Vp= 1635 m/s  
 Density: 987.000 kg/m3 Poisson= 0.5

**Quality control**

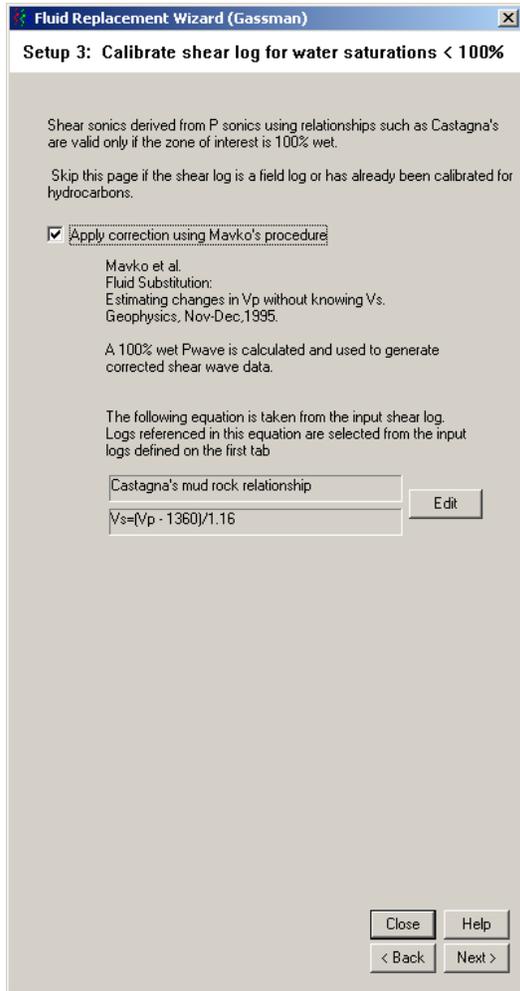
The following values, derived from the in situ rock properties defined above, should roughly match the input logs.  
 Average porosity over interval = 6%

Time average Vp= 5178 m/s  Shear vel = 4154 m/s  
 Velocity average Vp= 5746 m/s  Density = 2550 kg/m3  
 Raymer et al. Vp= 5407 m/s

Close Help  
 < Back Next >

5. Select default Rock matrix, Hydrocarbon, and Water/brine types from the drop-down lists in the Rock matrix and Fluids panes. For Water saturation, instead of typing a percentage in the field, you can drag the slider below it to change the value and note the effect it has on the Bulk modulus and density values in the bottom portion of the dialog box.
  - ▶ For detailed calculations, click **Calculator** in the Rock matrix and Fluids panes to display either the *Minerals Calculator* or the *Batzle and Wang Fluid Properties Calculator* dialog boxes and select values more specific to your zone of interest.
6. Click **Next**.

The *Fluid Replacement Wizard (Calibrate shear log for water saturations < 100%)* dialog box appears if the water saturation defined using the previous dialog box is less than 100%.



The above dialog box is used to compensate for the fact that the shear log is frequently derived from a sonic log using Castagna's formula. Castagna's formula requires a correction when gas is present in the zone of interest.

▶ Select the check box and click **Next**.

The *Fluid Replacement Wizard (FRM Modelling: Set new water saturation)* dialog box appears.



7. Ensure the above dialog box doesn't overlap the *Log Editor* displaying the well for which you're modifying water saturation, and then drag the slider while viewing the affect in the *Log Editor* dialog box and in the model.
8. Click **Apply** to save these changes to the log.

## Related Topics

...

See "*Changing Log Display Properties*," p. 50

See "*Notes on GeoSyn Fluid Replacement*," p. 121

## Notes on GeoSyn Fluid Replacement

### Introduction

GeoSyn uses the Biot-Gassman fluid substitution method.

There are other approaches to fluid substitution (empirical and heuristic) which avoid the porous frame calculations but often do not yield reliable results. GeoSyn provides some empirical Vp information (Wyllie's time average, Average Velocity and Raymers equation) as a check for consistency between the modelled log data and the in-situ rock parameters. In general, and in particular for Wyllie's equation, these empirical relationships fall down when substituting gas for water and cannot be used reliably for fluid substitution.

The following overview is based largely on the bible of the field "The Rock Physics Handbook."

## Some basic equations

The mechanics of fluid substitution on the density and shear logs is simple. For the density log, fluid substitution can be written:

$$\rho_{b2} = \rho_{b1} - (\phi\rho_{f1} - \phi\rho_{f2}) \quad (1)$$

where  $\rho_{b1}$  is the initial rock bulk density,  $\rho_{b2}$  is the bulk rock density after fluid substitution,  $\rho_{f1}$  is the initial fluid density,  $\rho_{f2}$  is the density of the substituting fluid, and  $\phi$  is the porosity. The substituted rock density  $\rho_{b2}$  is simply the fractional difference attributable to the fluid change in the pore space.

Given the fact that in Biot-Gassmann's model the shear modulus  $\mu$  is independent of the pore fill, the substituted Vs depends only on the change in density:

$$V_{s2} = \sqrt{\frac{\mu}{\rho_{b2}}} \quad (2)$$

This means, of course, that substitution of hydrocarbon for water will result in a lowering of bulk density and an increase in Vs.

Calculating the fluid substitution effect on the compressional wave velocity  $V_p$ , as measured by the sonic log, is not so straightforward because it depends not only on the substituted density and the shear modulus, but also on the saturated bulk modulus Ksat:

$$V_p = \sqrt{\frac{K + \frac{4\mu}{3}}{\rho}} \quad (3)$$

In turn, the bulk modulus of the new rock  $K_{sat}$  requires knowledge of the mineral modulus  $K_m$ , the fluid modulus  $K_{fl}$  and the bulk modulus of the unsaturated rock  $K_{dry}$  (Mavko and Mukerji, 1995; Avseth et al., 2005):

## The Biot-Gassman equations

$$K_{sat} = K_{dry} + \frac{(1 - \frac{K_{dry}}{K_m})^2}{\frac{\phi}{K_{fl}} + \frac{1 - \phi}{K_m} - \frac{K_{dry}}{K_m^2}} \quad (4)$$

Solving for  $K_{dry}$

$$K_{dry} = \frac{K_{sat} (\frac{\phi K_m}{K_{fl}} + 1 - \phi) - K_m}{\frac{\phi K_m}{K_{fl}} + \frac{K_{sat}}{K_m} - 1 - \phi} \quad (5)$$

$$\mu_{dry} \cong \mu_{sat}$$

The shear modulus is the same dry or saturated.

Where

$V_s$  = shear wave velocity

$V_p$  = compressional wave velocity

$K_{dry}$  = effective bulk modulus of dry rock

$K_{sat}$  = effective bulk modulus of the rock with pore fluid

$K_m$  = bulk modulus of mineral material making up rock

$K_{fl}$  = effective bulk modulus of pore fluid

$\phi$ =porosity (fractional)

$\mu_{dry}$ =effective shear modulus of dry rock

$\mu_{sat}$ =effective shear modulus of rock with pore fluid

## Performing the fluid substitution

In plain terms the Biot-Gassman relationship allows one to calculate the saturated bulk modulus and resultant  $V_p$  (equation 3) from a combination of the dry bulk modulus  $K_{dry}$ , the fluid bulk modulus  $K_{fl}$  and the mineral bulk modulus  $K_m$ .

Modeling the changes from one fluid type to another requires that the effects of the starting fluid first be removed prior to modeling the new fluid. i.e. calculate  $K_{dry}$ . In practice, the rock is drained of its initial pore fluid, and the moduli (bulk and shear) and bulk density of the porous frame are calculated. Once the porous frame properties are properly determined, the rock is saturated with the new pore fluid, and the new effective bulk modulus and density are calculated.

A direct result of Gassmann's equations is that the shear modulus for an isotropic material is independent of pore fluid, and therefore remains constant during the fluid substitution process. In the case of disconnected or crack like pores, however, this assumption may be violated. Once the values for the new effective bulk modulus and bulk density are calculated, it is possible to calculate the compressional and shear velocities for the new fluid conditions.

A two-step calculation is required. In-situ saturation to dry saturation followed by dry saturation to new fluid saturation.

1. Calculate the dry bulk modulus using the in-situ saturated bulk modulus  $K_{sat}$  and in-situ fluid modulus  $K_{fl}$ .  $K_{sat}$  is calculated using equation 3, which is where the original log data  $V_p$  is used.
2. Calculate the new saturated bulk modulus  $K_{sat}$  using the dry bulk modulus  $K_{dry}$  and a new fluid modulus  $K_{fl}$  reflecting the changes in gas/water saturation. With the new  $K_{sat}$  and using equation 3 a new  $V_p$  can be calculated.

## What can a GeoSyn user take from this?

The in-situ reservoir parameters for matrix bulk and shear modulus and density must be correct for the log section being analyzed.

For example you could incorrectly describe an extremely high modulus matrix then apply it to a log section of very slow velocity. In reality such a rock should be quite fast. The equations will fail.

GeoSyn provides several empirical relationships to give users a ball park theoretical  $V_p$  based on the reservoir parameters. The  $V_p$  calculated from one or all of these equations should roughly match the  $V_p$  of the log data or something is wrong and the Biot-Gassman equations will not work properly. Note that these empirical relationships are not reliable when gas is the pore fluid. If they were reliable then the trouble and trickiness of using the Biot-Gassman equations would be unnecessary.

$V_m$  is calculated using equation 3

### Wyllies time average equation

$$V_p = \frac{1}{\left(\frac{\phi}{V_{fl}} + \frac{(1-\phi)}{V_m}\right)}$$

### Velocity average equation

$$V_p = (1 - \phi) V_m + \phi V_{fl}$$

### Raymers equation

$$V_p = (1 - \phi)^2 V_m + \phi V_{fl}$$

## Changing Derived Properties

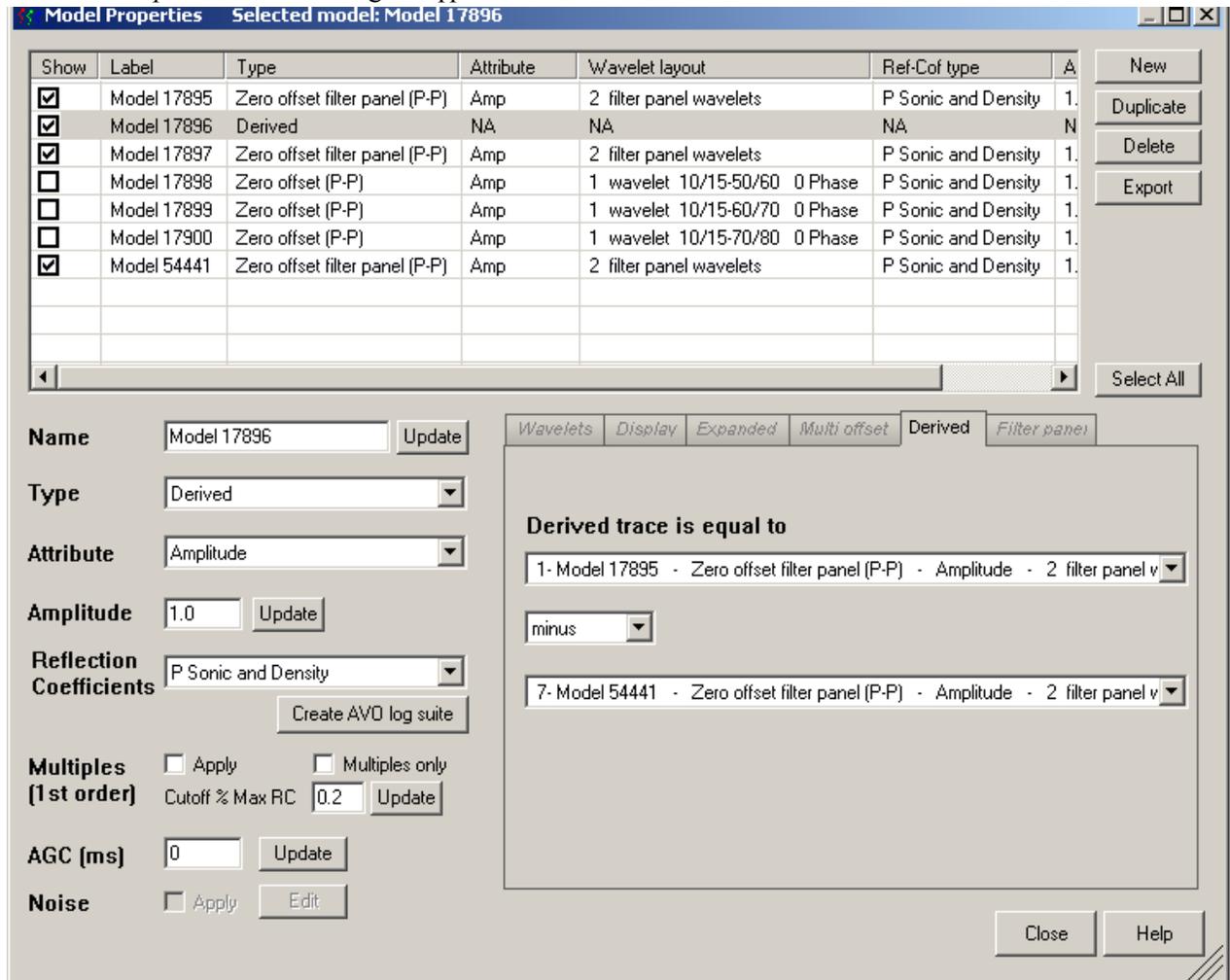
Generate a trace based on the results of a mathematical operation performed on two traces in the current synthetic.



### To change derived properties

1. From the **Edit** menu, select **Model Properties** (.

The *Model Properties: Derived* dialog box appears.



2. Select the desired model(s) in the display pane and select **Derived** from the Type drop-down list.
3. Using the drop-down lists in the Derived tab, select the trace and mathematical operator. The result of this equation becomes the derived trace.
4. In the main *Model Properties* dialog, click **Close** to return to the main synthetic display with the changes applied.

## Related Topics

See "Creating Models," p. 108

## Changing Multi-Offset Properties

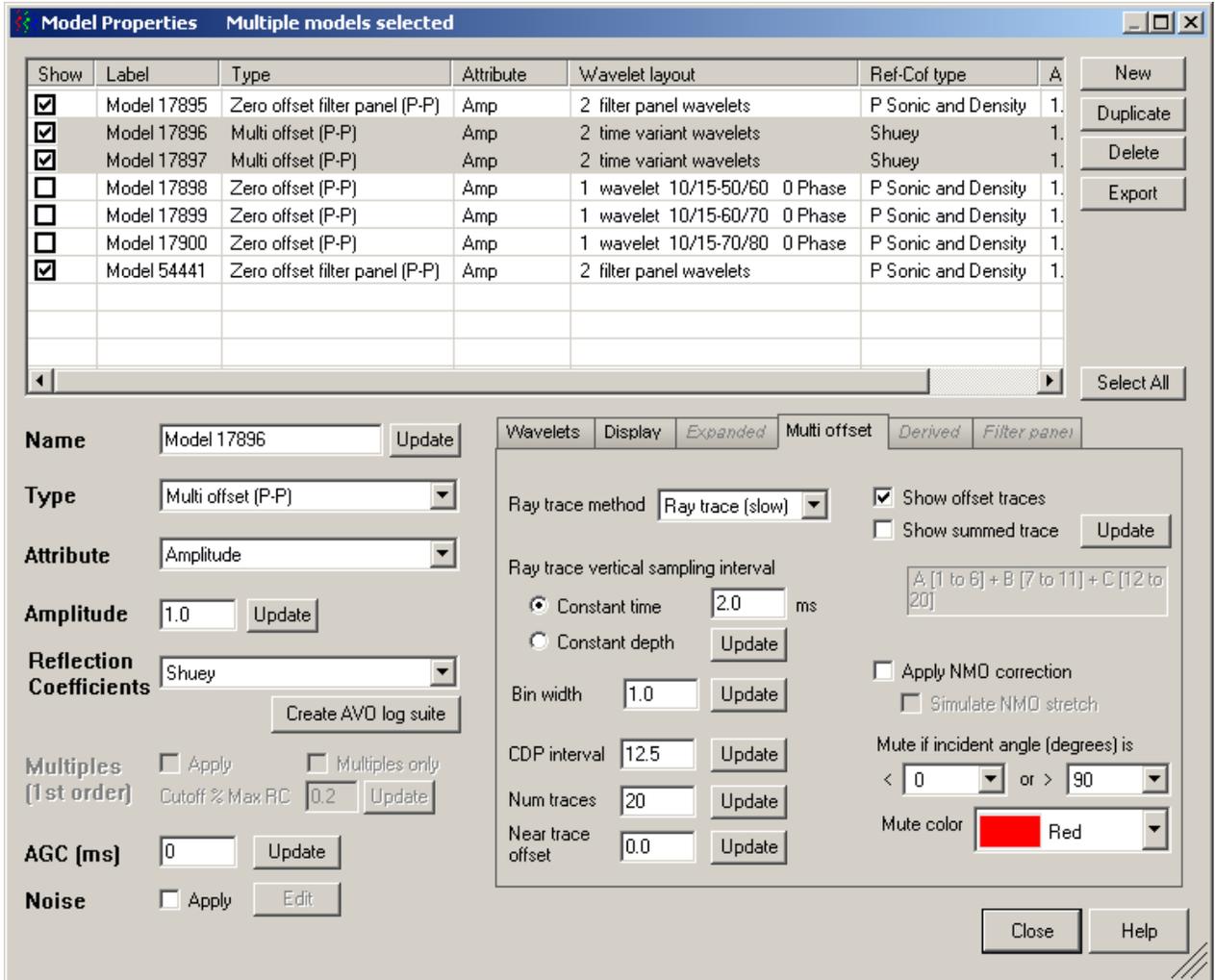
Create multi-offset models for amplitude offset analysis. If summing traces, you can define groups of traces (near, middle, far) and then do mathematical operations between the three groups, which enables you to filter or enhance certain portions of the offset trace. For example, you might subtract the far traces from the near traces and then multiply the difference by the far traces to enhance the far offset amplitude.



## To change multi-offset properties

1. From the **Edit** menu, select **Model properties** .

The *Model Properties: Multi offset* dialog box appears.



**Model Properties** Multiple models selected

Show	Label	Type	Attribute	Wavelet layout	Ref-Cof type	A
<input checked="" type="checkbox"/>	Model 17895	Zero offset filter panel (P-P)	Amp	2 filter panel wavelets	P Sonic and Density	1.
<input checked="" type="checkbox"/>	Model 17896	Multi offset (P-P)	Amp	2 time variant wavelets	Shuey	1.
<input checked="" type="checkbox"/>	Model 17897	Multi offset (P-P)	Amp	2 time variant wavelets	Shuey	1.
<input type="checkbox"/>	Model 17898	Zero offset (P-P)	Amp	1 wavelet 10/15-50/60 0 Phase	P Sonic and Density	1.
<input type="checkbox"/>	Model 17899	Zero offset (P-P)	Amp	1 wavelet 10/15-60/70 0 Phase	P Sonic and Density	1.
<input type="checkbox"/>	Model 17900	Zero offset (P-P)	Amp	1 wavelet 10/15-70/80 0 Phase	P Sonic and Density	1.
<input checked="" type="checkbox"/>	Model 54441	Zero offset filter panel (P-P)	Amp	2 filter panel wavelets	P Sonic and Density	1.

**Name** Model 17896

**Type** Multi offset (P-P)

**Attribute** Amplitude

**Amplitude** 1.0

**Reflection Coefficients** Shuey

**Multiples (1st order)**  Apply  Multiples only  
Cutoff % Max RC 0.2

**AGC (ms)** 0

**Noise**  Apply

**Wavelets**   **Multi offset**

Ray trace method Ray trace (slow)  Show offset traces  
 Show summed trace

Ray trace vertical sampling interval  
 Constant time 2.0 ms  
 Constant depth

Bin width 1.0

CDP interval 12.5

Num traces 20

Near trace offset 0.0

Apply NMO correction  
 Simulate NMO stretch

Mute if incident angle (degrees) is  
 < 0 or > 90

Mute color Red

2. Select the desired model in the display pane and select **Multi offset** from the **Type** drop-down list.
3. Click the **Multi offset** tab and select the criteria.

► If using summed traces, click **Edit** to display the *Sum Options* dialog box where you select the traces that make up the near, middle, and far group of traces, and then define an equation to process the groups.

4. In the main *Model Properties* dialog, click **Close** to return to the main synthetic display with the changes applied.

## Related Topics

• • •

See "*Creating Models*," p. 108

## Changing Color Palettes

Specify color fills for logs and traces in seismic, logs, cross plots, models, and more using the Color Palette dialog box. Color schemes can be loaded from stock color palettes that ship with GeoSyn, or from color templates you save in the GeoSyn *Working* directory with a *.pal* extension. Templates can be quickly applied to any synthetic and can be shared amongst GeoSyn users.

Color schemes can also be configured for the current synthetic without creating a template and can be automatically saved with individual GeoSyn files.

To automatically apply a color scheme to all new synthetics, apply it to the current synthetic then update the import defaults file with the current synthetic options. For details, see *Related Topics* below.

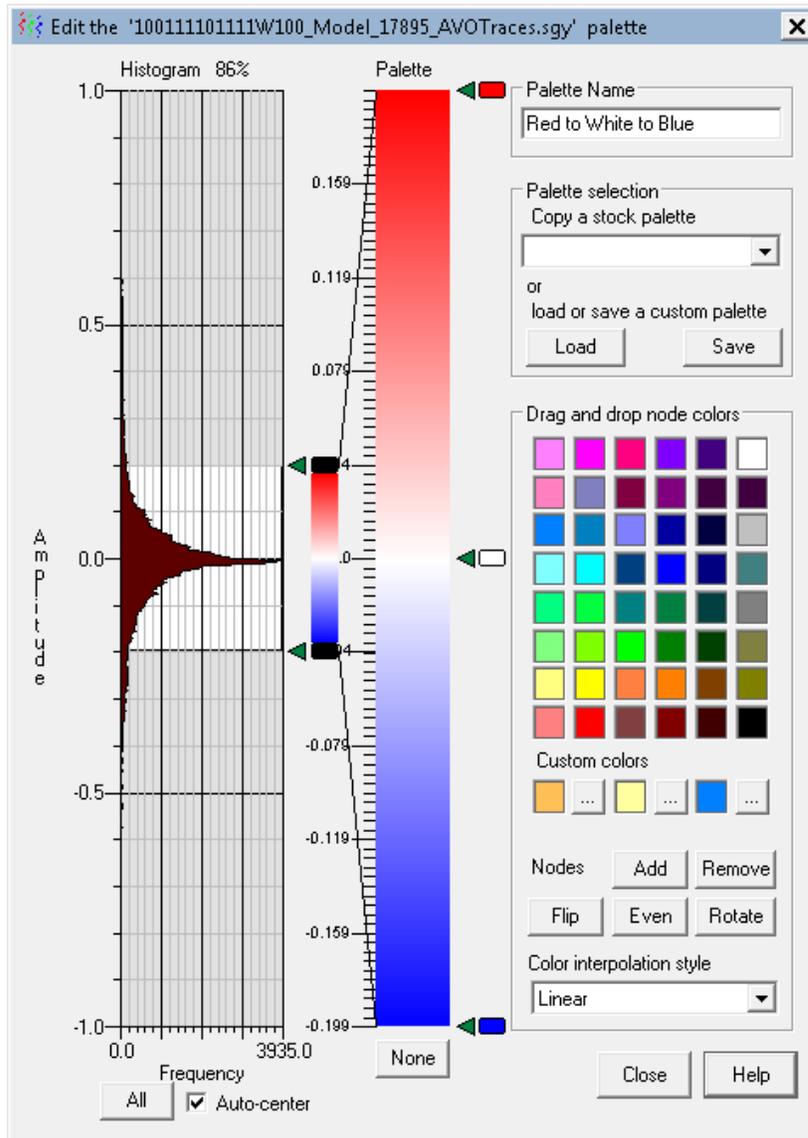
When working with models and certain types of crossplots, you can drag the min max color nodes that appear at the top and bottom of the histogram to tighten them to the desired amplitude range so that a fuller color spectrum is displayed in GeoSyn. This option isn't available for cross plot properties with a depth-based color reference type, or for logs, as typically a certain color represents a certain log value and is related to lithology.



### To change color palettes

1. From the *Well Properties: Log Properties* tab, *Seismic Properties* dialog box, or *Model Properties* dialog box, select **Edit color** adjacent to the color display ()

The *Edit color palette* dialog box appears. The top and bottom of the color bar represent the fixed extremes in the data values of the selected log or trace. Nodes along the display bar associate a color to a particular data value.



2. Either select a default GeoSyn palette to modify from the **Copy a stock palette** drop-down list or click **Load** to import a custom palette previously saved.

► To create a color palette from scratch, click **None** below the color bar to remove all colors from it then complete the following step:

3. To modify the color bar but still keep some of the existing colors, in the *Drag and drop node colors* pane, click and hold the mouse button while dragging the desired color onto either the color bar (at the location you want to apply it), or onto an existing node (to replace the current node color) then release the mouse button. Your cursor enlarges (🖱️) when directly above a node. When you place your cursor inside the color bar, the data value appears in the title bar of the dialog box and changes as you move the mouse.

4. Either click **Add** to place additional nodes beside the color bar on which you can drop colors, or simply drag and drop additional colors on the color bar and GeoSyn creates a corresponding node for each color you drop. Click **Remove** to delete the last node placed.
  - ▶ When working with models, to tighten the min/max color range values so that more of the color spectrum is expressed across a smaller set of amplitudes, drag the min and max color nodes closer to the majority of the data. Note that you can't change the position of the min max color nodes for a log.
    - Using the **Auto-Center** check box that appears below the histogram ensure the min max color nodes stay centered on the zero point of the histogram.
    - Click **All** to revert the min max color nodes to the bottom and top of the histogram.
  - ▶ Click **Rotate** to shift all the colors one node down or click **Flip** to flip the color bar on its center horizontal axis.
  - ▶ To evenly disperse the existing nodes, click **Even**.
  - ▶ To switch from blended color presentation to color blocks, select **Stepwise** in the **Color interpolation style** drop-down list.
  - ▶ Type a unique name for this color configuration in the **Palette Name** box then click **Save** to save it in the GeoSyn *Working* directory.

## Related Topics

...

*See "Changing Seismic Properties," p. 149*

*See "Changing Log Display Properties," p. 50*

*See "Creating Models," p. 108*

*See "Creating Models," p. 108*

*See "Changing Import Defaults," p. 11*

*See "Creating Crossplots," p. 156*

## Displaying Comments

Type comments about the processing applied to a synthetic that help clarify your interpretation. Actual operations that have been performed on a synthetic are stored in a GeoSyn file and can be automatically pasted into the Comments dialog box where you edit them.

The comments you create appear as an object in the main page of the synthetic anchored below the Tops table, or below where the Tops table would appear if the Tops table is hidden. When you move the Tops table, the Comments object moves too.

Once comments are displayed in the main synthetic, double-click (or right-click and select Edit) to change them.



### To display comments

1. From the **Edit** menu, select **Synthetic properties** 
  - OR**
  - Right-click the well header and select **Synthetic properties**.

The *Synthetic Properties* dialog box appears.

**Synthetic Properties**

**Display elements**

Show

Banner 1

Banner 2

Well status symbol

Image banner

Information banner

Depth scales 1     
 Depth scales 2    Annotate every  m

Time scales  100 ms  10 ms  1 ms  Left text  Right text

Border

Printer page outline

Rotate model and single track log labels 90 degrees

**Tables**

Tops  Bottom left  Right Orientation

Comments

**General model parameters**

Sample rate (ms)   Prompt for invalid UWI

Model units: **Metric**   Warn when importing unknown logs

**Vertical scale**

Linear with respect  Time  Depth

Scale  Imperial    
 Metric in/sec

**Plot range**

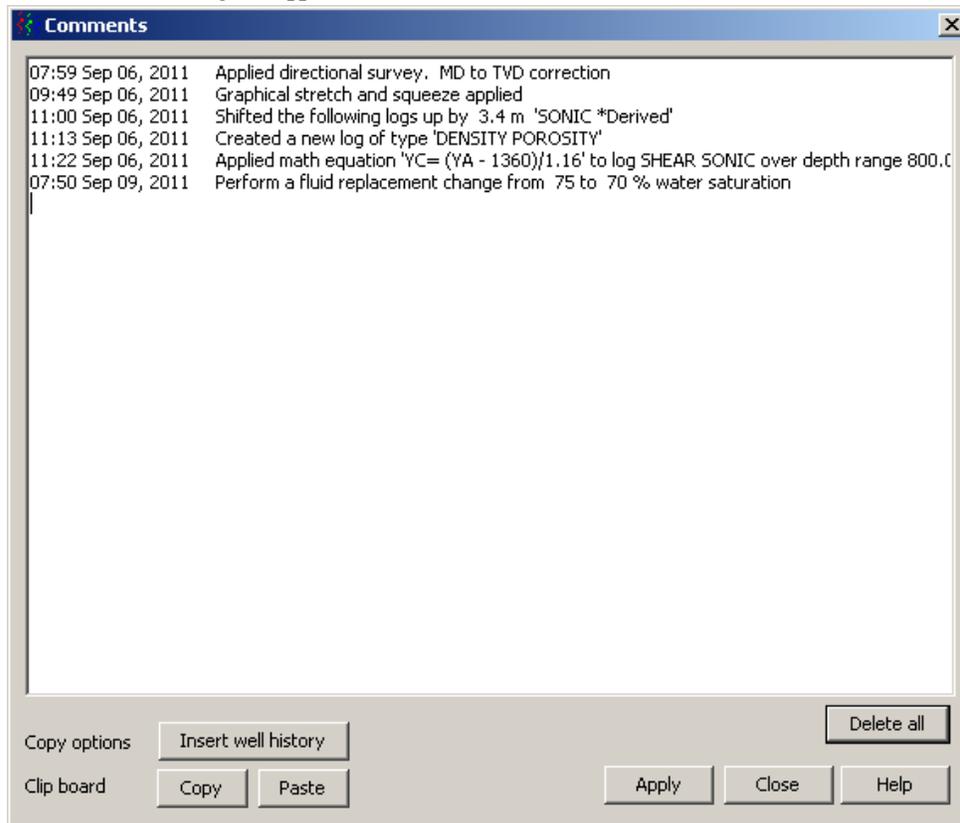
Time  to  sec

Depth  to  m

Required page size 9.1 by 8.4 in  
width by height 23.1 by 21.3 cm

2. Using the Tables pane, ensure the **Comments** check box is enabled, and then click **Edit**.

The *Comments* dialog box appears.



3. Do any of the following:

- Type directly in the display pane.
- Click **Insert Well History** to paste the operations performed on this synthetic into the display pane and then edit them.
- Select text that appears in the display pane and click **Copy**, and then paste it in another program.
- With text to paste copied to the Windows Clipboard from GeoSyn or a third-party application, click **Paste**.

4. Click **Apply** and then **Close** to display the Comments in the main synthetic immediately below the Tops table.

Like the Tops table, the Comments box that appears in the main display can be dragged to the desired location. The Tops table moves along with the comments box.

- ▶ To change the comments displayed, double-click the Comments box that appears on the main display (or launch it using the steps above).

## Related Topics

...

See "*Changing the Main Synthetic Display*," p. 43

## Working with Wavelets

### Importing Wavelets and Wavelet Sets

Import wavelets in ASCII or SEGY format and import wavelet sets in *.wav* format. Wavelets can be saved and imported using a centralized library of wavelets you create. The wavelet library is shared by all GeoSyn projects.

To avoid aliasing, GeoSyn doesn't extract frequency information higher than the Nyquist frequency of either the import data or the current synthetic, whichever is lowest.

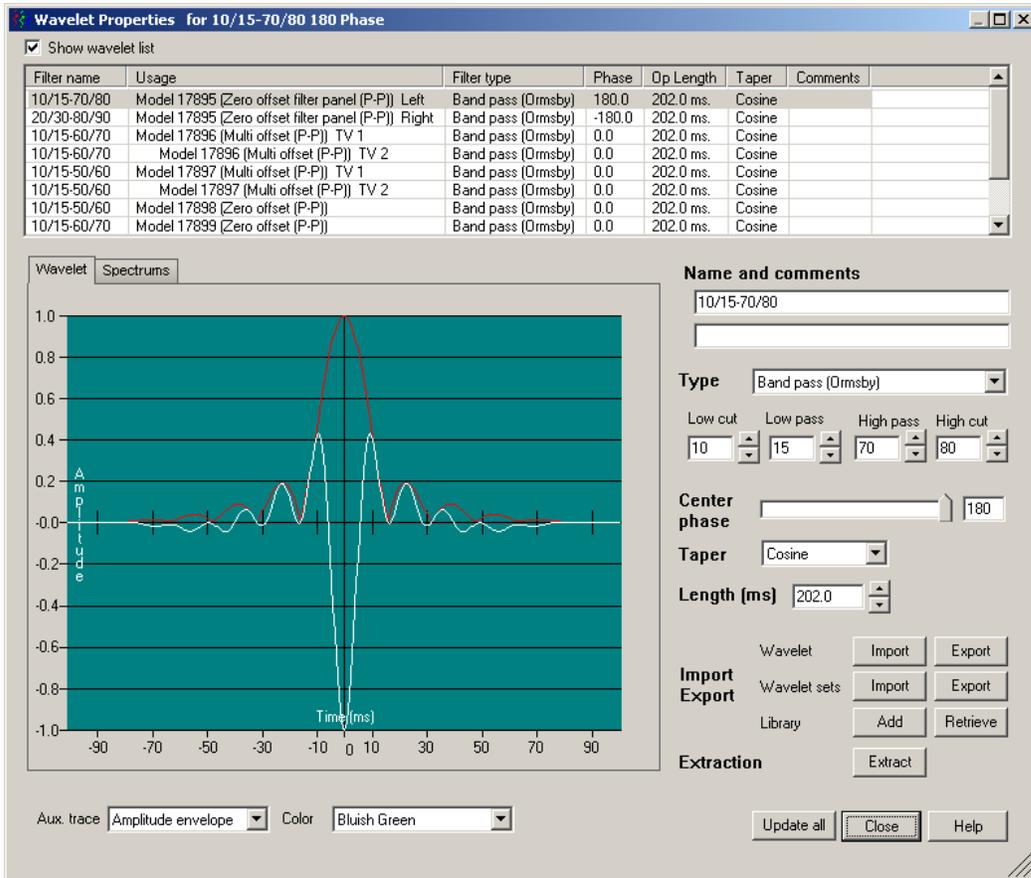
Separate procedures for importing wavelets and wavelet sets appear below.



#### To import wavelets

1. From the **Edit** menu, select **Wavelet properties** (.

The *Wavelet Properties* dialog box appears.

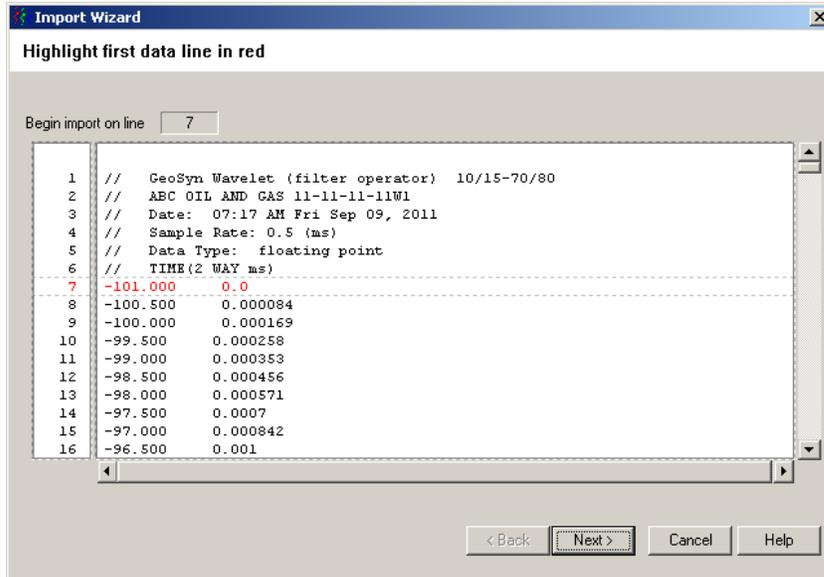


2. In the **Import/Export** pane, click **Import** to the right of the wavelet label to import a wavelet from disk. Alternately, import wavelets from a centralized wavelet library used by all GeoSyn models by clicking **Retrieve** to the right of the *Library* label to display the *Wavelet Library* dialog box, where you select the wavelet and then click **Import wavelet**; otherwise, continue with the below steps.

The *Import time data* dialog box appears.

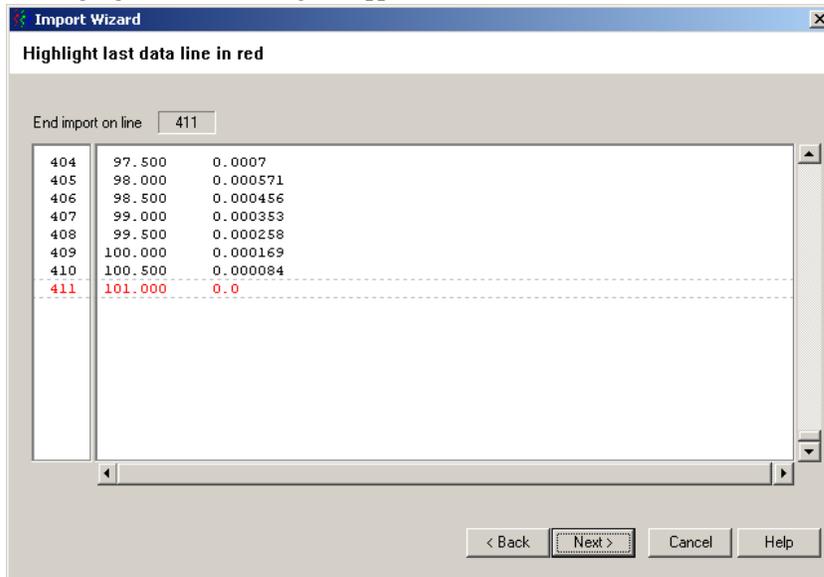
3. In the **Files of type** drop-down list, select whether to import SEGY or ASCII data then browse to and select the file.

If you select a SEGY file, the *Import Wavelet Processing Flow* dialog box appears; otherwise, if you select ASCII, the *Highlight First Line* dialog box appears.



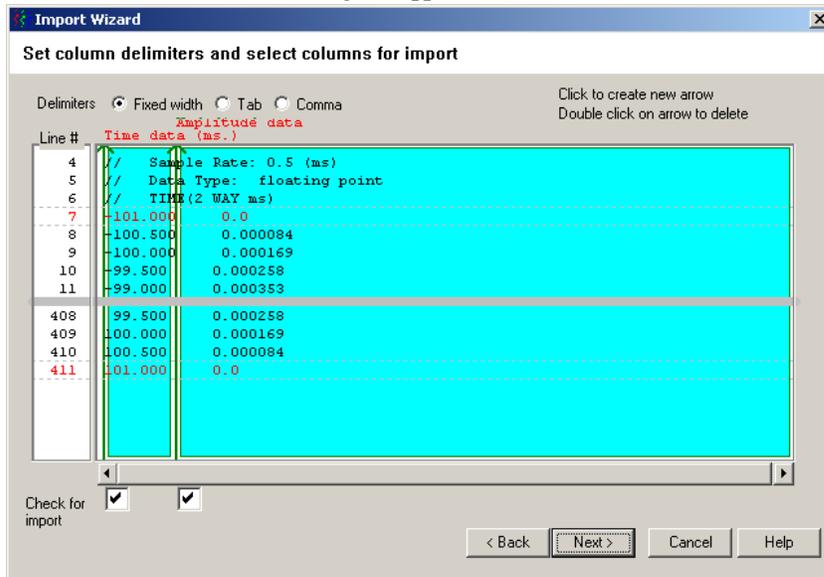
4. Select the first line to import then click **Next**.

The *Highlight Last Line* dialog box appears.



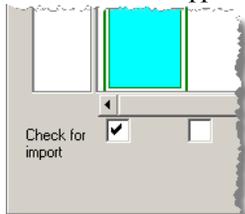
5. Select the last line to import the click **Next**.

The *Set Column Delimiters* dialog box appears.



6. Set the column delimiters (↑) by clicking in the display pane between required columns. The green line can't bisect a data column. Double-click column delimiters to delete.

7. Click the box that appears below each delimiter to display the *Select from List* dialog box and identify the data type.



8. Click **Next**.

The *Finish* dialog box appears.

Import Wizard

Finish wavelet import

	Start time	Line number	Total lines
	-101.000	7	405
	101.000	411	
	0.5000000		

< Back Finish Cancel Help

9. Click **Back** to change any previous selections or click **Finish**.

The *Import Wavelet Processing Flow* dialog box appears.

Import Wavelet Processing Flow

- 1 Import Wavelet Sample rate 0.5 ms Nyquist 1000 hz  
Operator length 202.0 ms
- 2 Apply taper during import None
- 3 Calculate phase and amplitude spectrums
- 4 Create wavelet from phase and amplitude spectrums  
GeoSyn sample rate 0.5 ms Nyquist 1000 hz  
Wavelet name ABC\_OIL\_AND\_GAS\_11-11-11  
Operator length 202.0 ms  
Taper Cosine

Note\* Maximum extracted frequency is the lesser of the import and GeoSyn nyquist frequencies.

OK Cancel Help

10. Specify whether to taper the file on import, the name by which to identify the wavelet, the length of the operator, and then click **OK**.



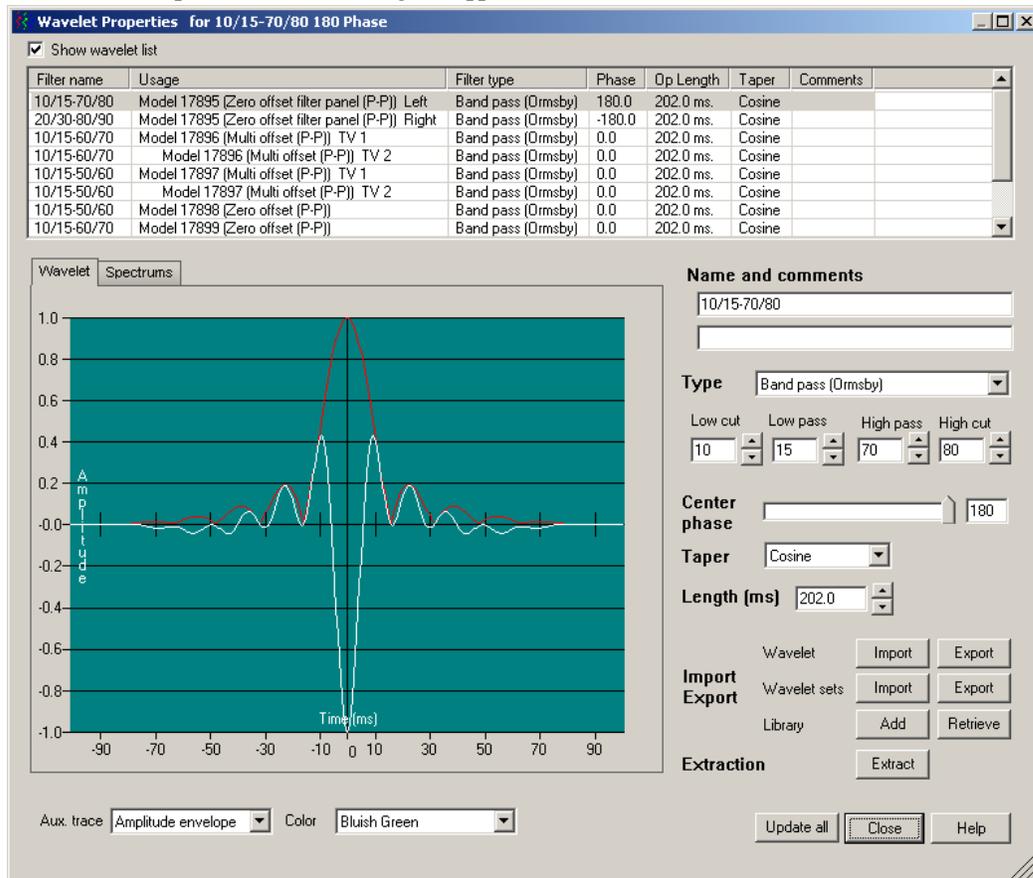
## To import wavelet sets

1. From the **Edit** menu, select **Wavelet properties** 

**OR**

Right-click a wavelet and select **Wavelet properties** from the popup menu.

The *Wavelet Properties*: *Wavelet* dialog box appears.



2. In the **Import/Export** pane, click **Import** to the right of the *Wavelet Sets* label. Alternately, import wavelets from a centralized wavelet library used by all GeoSyn models by clicking **Retrieve** to the right of the *Library* label to display the *Wavelet Library* dialog box, where you select the wavelet and then click **Import wavelet**; otherwise, continue with the below steps.

The *Import a wavelet set* dialog box appears.

3. Browse to and select the wavelet file in *.wav* format then click **OK**.

The *Import Wavelet Groups from Wavelet Set* dialog box appears.

4. Select the wavelet group(s) to import then click **OK**.

## Related Topics

...

See "*Changing Wavelet Properties*," p. 138

## Changing Wavelet Properties

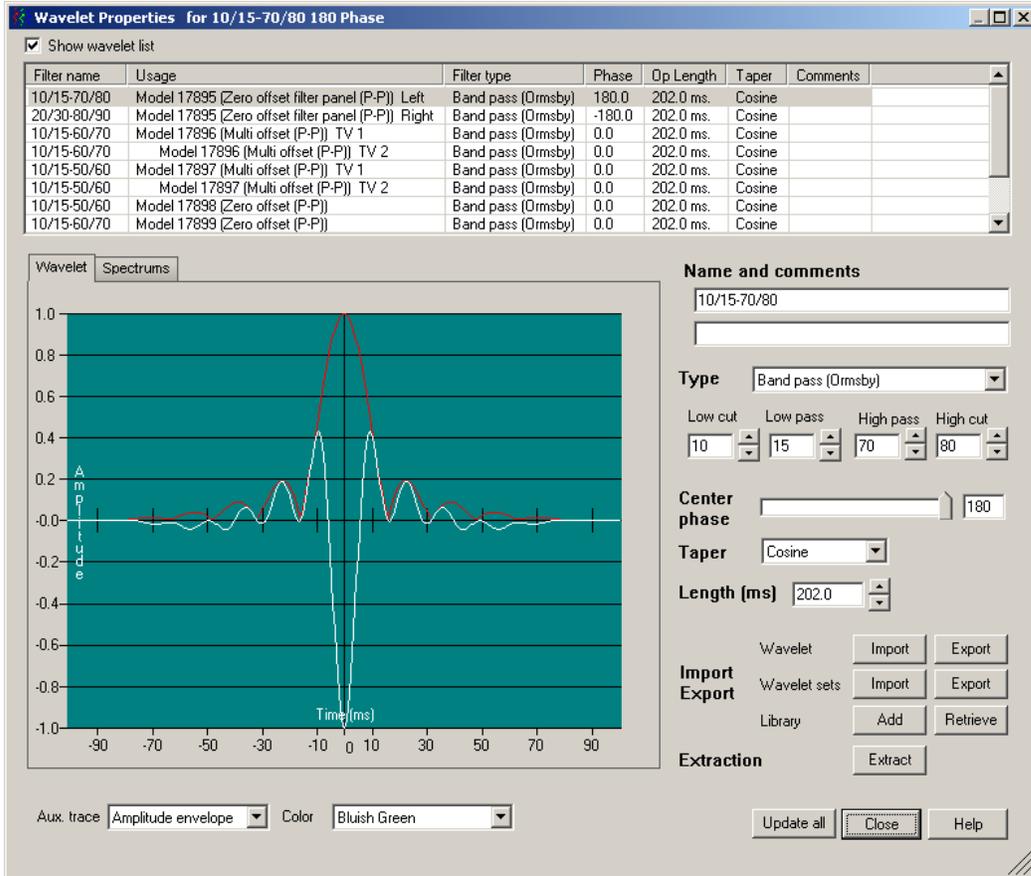
Apply up to three filters to different segments of a model and specify the amount of overlap between filters. Wavelets can be saved and imported using a centralized library of wavelets you create. The wavelet library is shared by all GeoSyn projects.



## To change wavelet properties

1. From the **Edit** menu, select **Wavelet properties** ()

The *Wavelet* dialog box appears.



**Wavelet Properties for 10/15-70/80 180 Phase**

Show wavelet list

Filter name	Usage	Filter type	Phase	Op Length	Taper	Comments
10/15-70/80	Model 17895 (Zero offset filter panel (P-P)) Left	Band pass (Ormsby)	180.0	202.0 ms.	Cosine	
20/30-80/90	Model 17895 (Zero offset filter panel (P-P)) Right	Band pass (Ormsby)	-180.0	202.0 ms.	Cosine	
10/15-60/70	Model 17896 (Multi offset (P-P)) TV 1	Band pass (Ormsby)	0.0	202.0 ms.	Cosine	
10/15-60/70	Model 17896 (Multi offset (P-P)) TV 2	Band pass (Ormsby)	0.0	202.0 ms.	Cosine	
10/15-50/60	Model 17897 (Multi offset (P-P)) TV 1	Band pass (Ormsby)	0.0	202.0 ms.	Cosine	
10/15-50/60	Model 17897 (Multi offset (P-P)) TV 2	Band pass (Ormsby)	0.0	202.0 ms.	Cosine	
10/15-50/60	Model 17898 (Zero offset (P-P))	Band pass (Ormsby)	0.0	202.0 ms.	Cosine	
10/15-60/70	Model 17899 (Zero offset (P-P))	Band pass (Ormsby)	0.0	202.0 ms.	Cosine	

**Wavelet** | Spectrums

**Name and comments**  
10/15-70/80

**Type**: Band pass (Ormsby)

Low cut: 10 | Low pass: 15 | High pass: 70 | High cut: 80

**Center phase**: 180

**Taper**: Cosine

**Length (ms)**: 202.0

**Import Export**  
Wavelet: Import Export  
Wavelet sets: Import Export  
Library: Add Retrieve

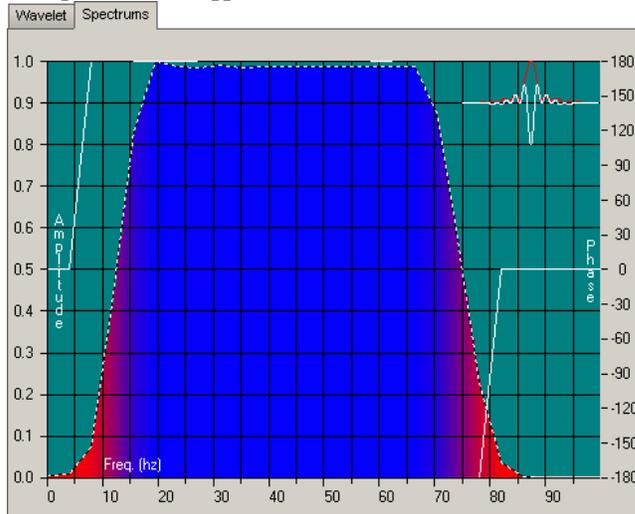
**Extraction**: Extract

Aux. trace: Amplitude envelope | Color: Bluish Green

Update all | Close | Help

2. From the **Aux. trace** drop-down list, select whether to display a background trace to which to correlate the displayed trace and from the **Background** drop-down list, select whether to display a different color scheme.
3. Type a value in the **center phase** box or drag the slider below it.
4. Type a length for the operator, which controls the sample size displayed in the window.
5. To customize the amplitude or phase spectrum of the selected wavelet, click the **Spectrums** tab.

The *Spectrums* tab appears.



6. Hover your cursor over the amplitude display then click to define points that describe the modified spectrum.
7. Click either **Amp** or **Phase** to apply the defined points to either, or click **Clear** (or press **ESC**) to exit drawing mode without applying changes.
8. Click the horizontal arrows at the bottom of the view window to change the amount of frequency shown.
9. Click the **Wavelet** tab to review how the changes will appear then click **Close** to apply them to the main display.

## Related Topics

...

See "Exporting Wavelets," p. 182

See "Importing Wavelets and Wavelet Sets," p. 133

## Changing Wavelet Expansion Properties

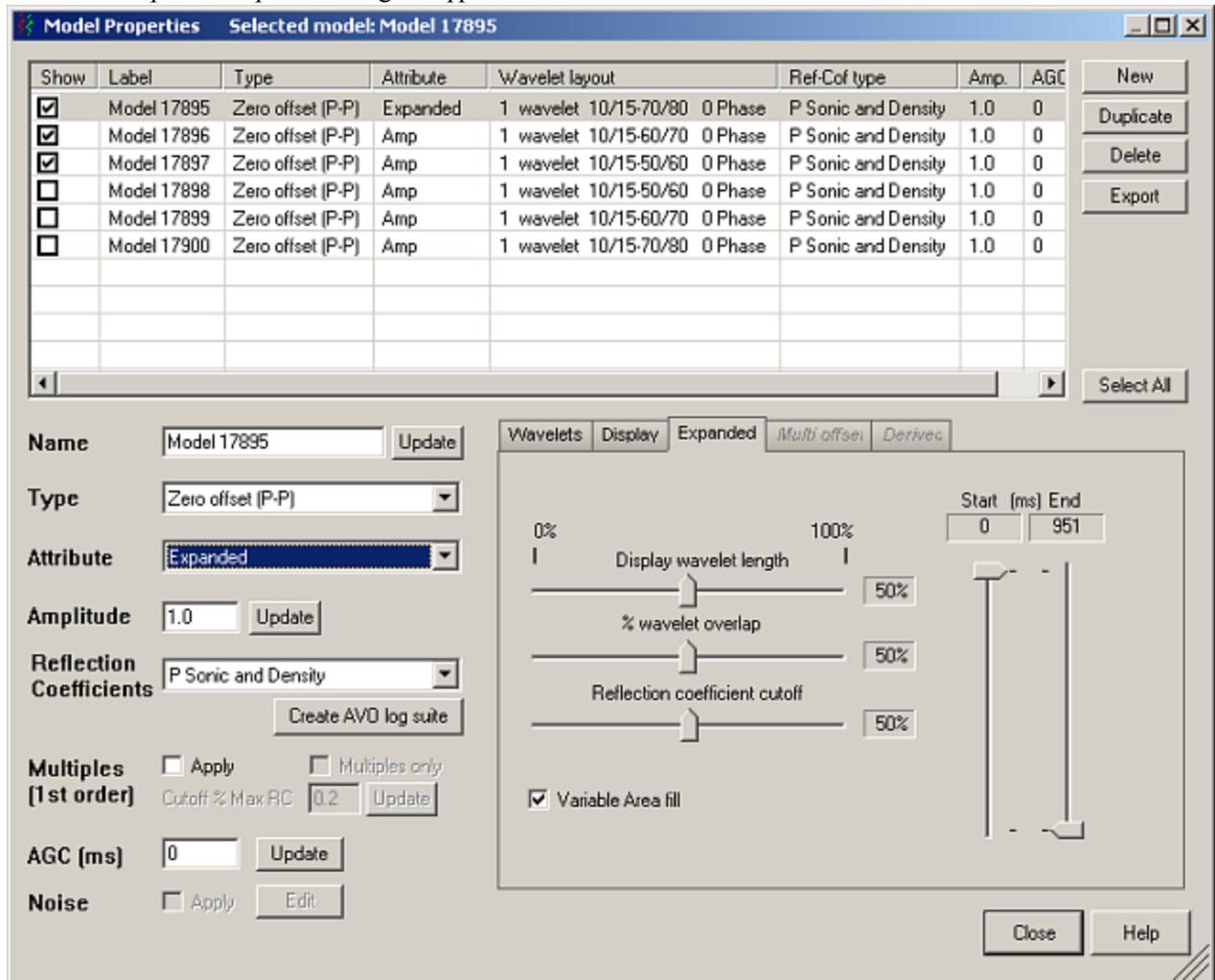
Change the lengths, percentage of overlap, and reflection coefficient of individual wavelets.



### To change wavelet expansion properties

1. From the **Edit** menu, select **Model Properties** (  ).

The *Model Properties: Expanded* dialog box appears.



2. Select the desired wavelet(s) in the display pane, Derived from the Type drop-down list, and then select **Expanded** from the *Attribute* drop-down list.
3. Modify the parameters that control wavelet generation and placement then in the main *Model Properties* dialog box, click **Close**.

## Related Topics

...

See "*Changing Wavelet Properties*," p. 138

## Extracting Wavelets

Import seismic data and extract a wavelet from it. Apply this wavelet to a model to improve the tie between the seismic and the model.



## To extract wavelets

1. From the **Edit** menu, select **Wavelet** (📡).

The *Wavelet* dialog box appears.

**Wavelet Properties for 10/15-70/80 180 Phase**

Show wavelet list

Filter name	Usage	Filter type	Phase	Op Length	Taper	Comments
10/15-70/80	Model 17895 (Zero offset filter panel (P-P)) Left	Band pass (Ormsby)	180.0	202.0 ms.	Cosine	
20/30-80/90	Model 17895 (Zero offset filter panel (P-P)) Right	Band pass (Ormsby)	-180.0	202.0 ms.	Cosine	
10/15-60/70	Model 17896 (Multi offset (P-P)) TV 1	Band pass (Ormsby)	0.0	202.0 ms.	Cosine	
10/15-60/70	Model 17896 (Multi offset (P-P)) TV 2	Band pass (Ormsby)	0.0	202.0 ms.	Cosine	
10/15-50/60	Model 17897 (Multi offset (P-P)) TV 1	Band pass (Ormsby)	0.0	202.0 ms.	Cosine	
10/15-50/60	Model 17897 (Multi offset (P-P)) TV 2	Band pass (Ormsby)	0.0	202.0 ms.	Cosine	
10/15-50/60	Model 17898 (Zero offset (P-P))	Band pass (Ormsby)	0.0	202.0 ms.	Cosine	
10/15-60/70	Model 17899 (Zero offset (P-P))	Band pass (Ormsby)	0.0	202.0 ms.	Cosine	

**Wavelet** | Spectrums

**Name and comments**  
10/15-70/80

**Type** Band pass (Ormsby)

Low cut: 10 | Low pass: 15 | High pass: 70 | High cut: 80

**Center phase** 180

**Taper** Cosine

**Length (ms)** 202.0

**Import Export**  
Wavelet: Import Export  
Wavelet sets: Import Export  
Library: Add Retrieve

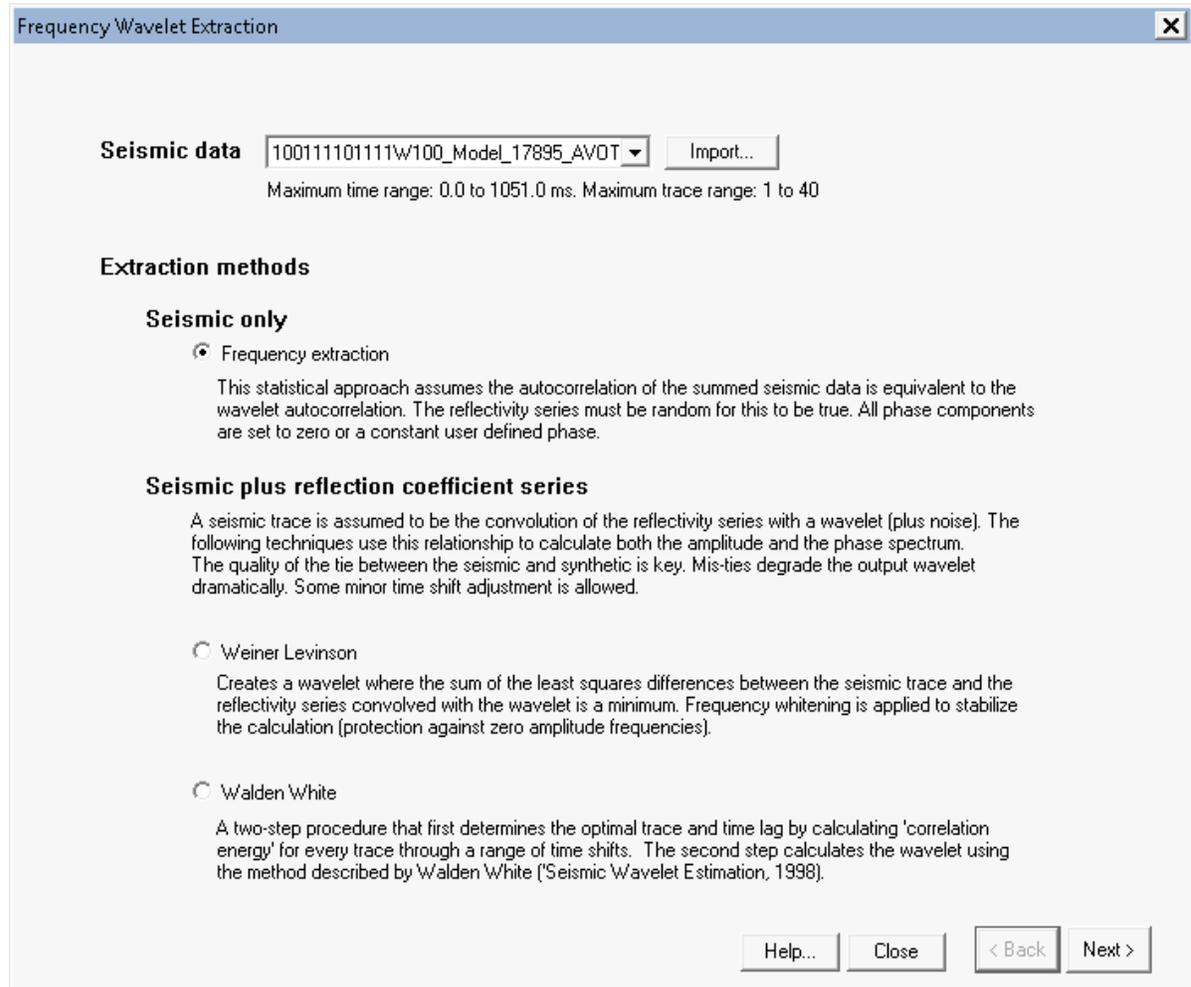
**Extraction**  
Extract

Aux. trace: Amplitude envelope | Color: Bluish Green

Update all | Close | Help

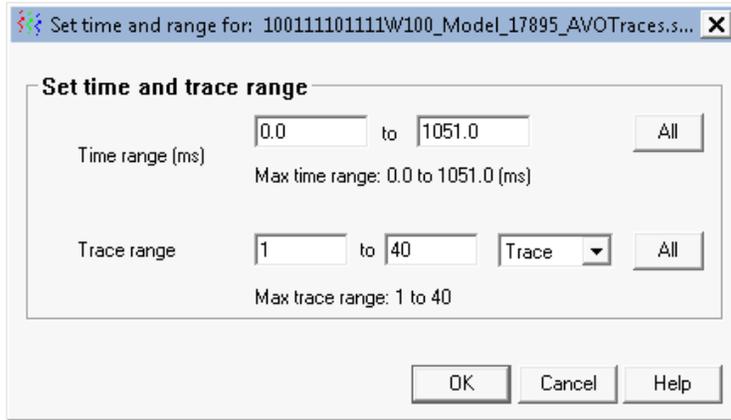
2. Beside the *Extraction* label, click **Extract**.

The *Wavelet Extraction* dialog box appears.

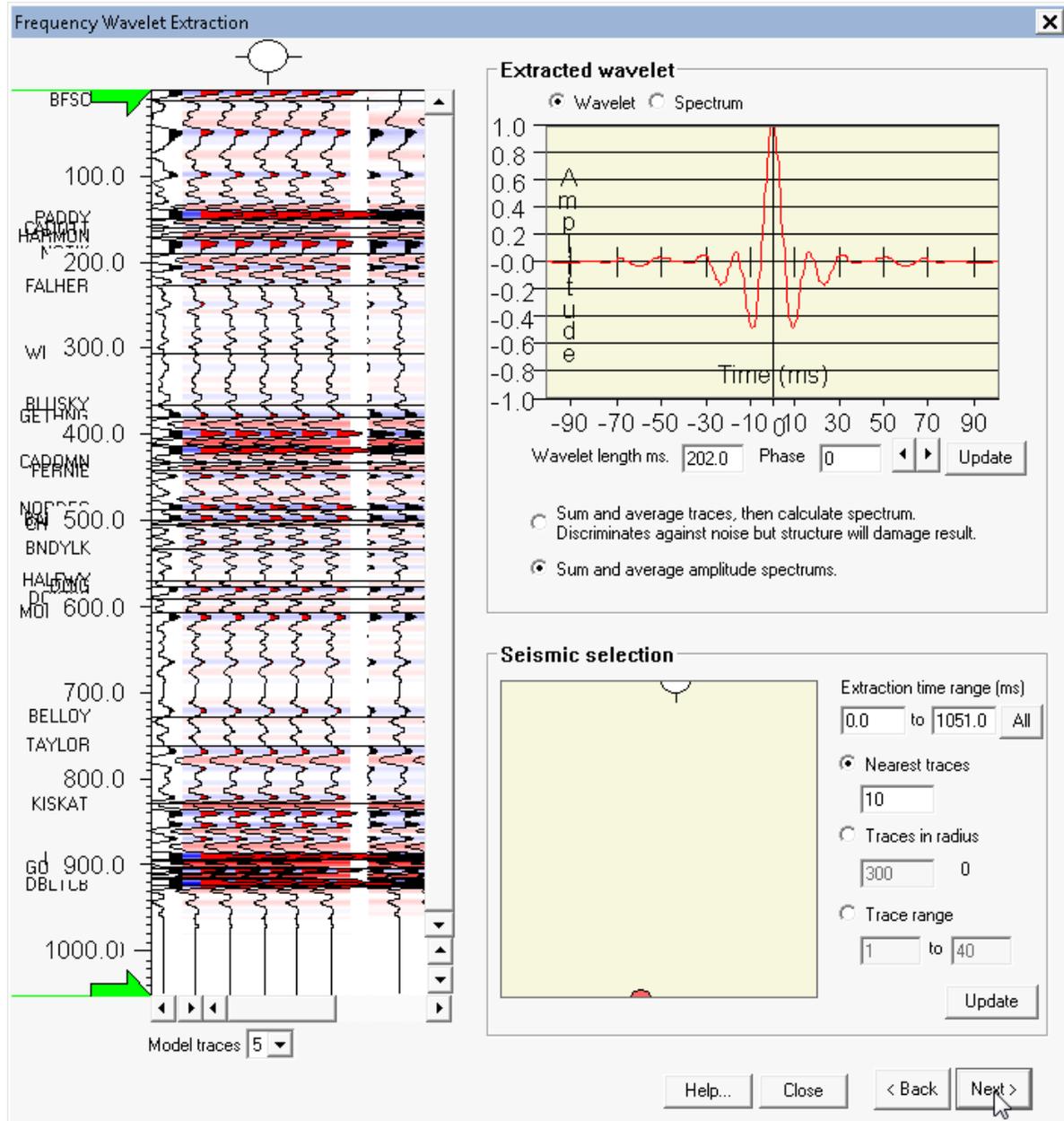


3. Click **Import** and navigate to the seismic section upon which to base the extracted wavelet. If you launch the above dialog box from the *Seismic Properties* dialog box or there are already seismic lines in the model, the *Seismic Data* drop-down list is already populated.

The *Set Time Range* dialog box appears, where you specify the time range and number of traces to sum, and then click **OK**.



4. Using the *Frequency Wavelet Extraction* dialog box, specify the extraction method, and then click **Next** to display the *Extracted Wavelets* panes.



In the above dialog box, in the pane to the left, the GeoSyn model trace is displayed with a portion of the seismic section on either side. In the Seismic Selection pane, a bird's eye view of the well header with respect to the seismic is displayed. In the Extracted Wavelet pane in the top-right, the wavelet that will be extracted is displayed.

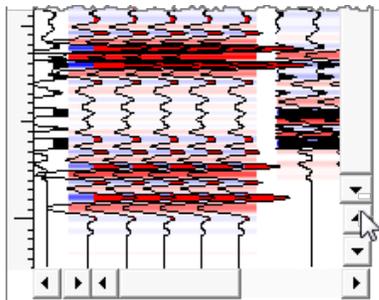
5. Modify the processing options as follows:

- To restrict the extracted range, using the left pane, drag the green arrows (  ) up from the bottom or down from the top of the range.

**OR**

Type the top and bottom of the extraction range in the *Seismic Selection* pane in the bottom-right of the *Frequency Wavelet Extraction* dialog box.

- Click the arrows in the bottom-left of the model display pane to zoom.



6. Click **Next** to display the *Save Options* dialog box.

Frequency Wavelet Extraction ✕

---

**Save options**

Wavelet name

Wavelet comment

Replace model wavelet(s)

Wavelet name	Usage	Wavelet type	Phase	Op Length
10/15-70/80	Model 17895 (Multi offset (P-P))	Band pass (Ormsby)	0.0	202.0 ms.
10/15-60/70	Model 17896 (Zero offset (P-P))	Band pass (Ormsby)	0.0	202.0 ms.
10/15-50/60	Model 17897 (Zero offset (P-P))	Band pass (Ormsby)	0.0	202.0 ms.
10/15-50/60	Model 17898 (Zero offset (P-P))	Band pass (Ormsby)	0.0	202.0 ms.
10/15-60/70	Model 17899 (Zero offset (P-P))	Band pass (Ormsby)	0.0	202.0 ms.
10/15-70/80	Model 17900 (Zero offset (P-P))	Band pass (Ormsby)	0.0	202.0 ms.

7. Select from the following options:

- Select a current model(s) in the display pane, and then click **Replace Model Wavelet** to overwrite its wavelets. CTRL+Click or SHIFT+Click for multiple selection.

- Add to Library to save wavelets that can then be imported using a centralized library of wavelets you create. The wavelet library is shared by all GeoSyn projects.
- Export to a SEGY file.

## Related Topics

...

See "Changing Wavelet Properties," p. 138  
See "Exporting Wavelets," p. 182

See "Importing Wavelets and Wavelet Sets," p. 133  
See "Tying Seismic to Models," p. 150

## Working with Seismic

### Importing Seismic Data

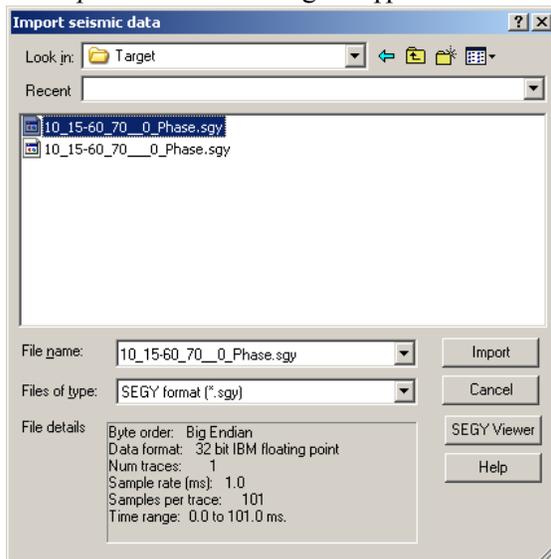
Import and display single-trace and multi-trace seismic data saved in SEGY format. Before importing the file, display it in a stand-alone SEGY Viewer to review its format and contents.



#### To import seismic data

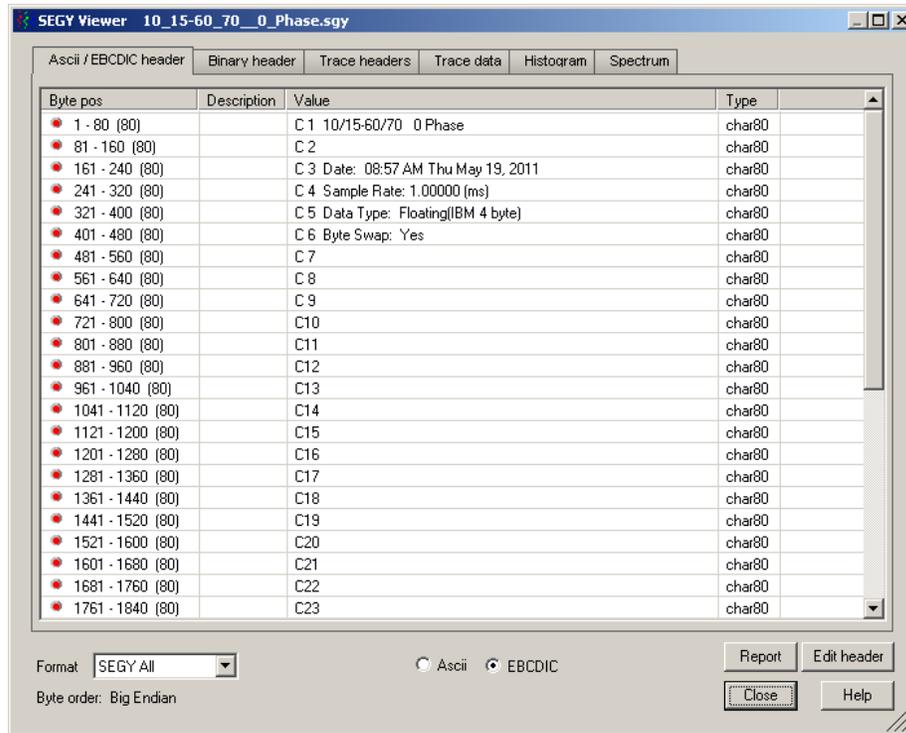
1. From the **File** menu, select **Import > Seismic**.

The *Import seismic data* dialog box appears.

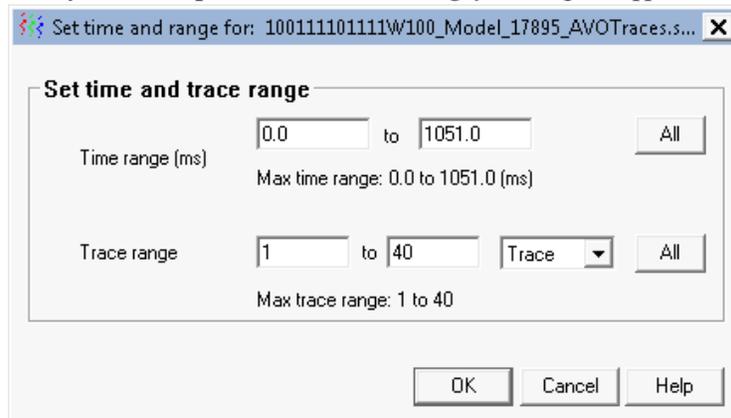


2. Browse to and select the desired SEGY file.
  - ▶ General file information appears in the *File details* pane. Click either **Import** or **SEGY Viewer** to review more file details before importing.

- ▶ If you click **SEGY Viewer**, the *SEGY Viewer* dialog box appears. Click various tabs to view the file data and select various formats in which to display the data in the viewer.



- 3. When you click **Import**, the *Set time and range for* dialog box appears.



- 4. Type a time and trace range then click **OK**.  
 The trace(s) appears in the main synthetic display.

## Related Topics

...

See "Changing Seismic Properties," p. 149



See "Importing Seismic Data," p. 147  
See "Changing Color Palettes," p. 128

See "Tying Seismic to Models," p. 150

## Tying Seismic to Models

Tie seismic to a model in the current synthetic for correlation purposes and for reverse AVO modelling.

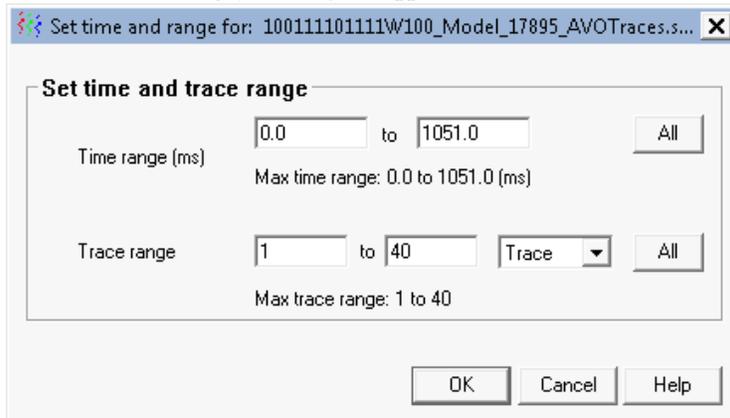
Kingdom users tie the seismic using GeoSyn, and then save the resulting time/depth chart back to Kingdom to assist with the creation of future synthetics.



### To tie seismic to models

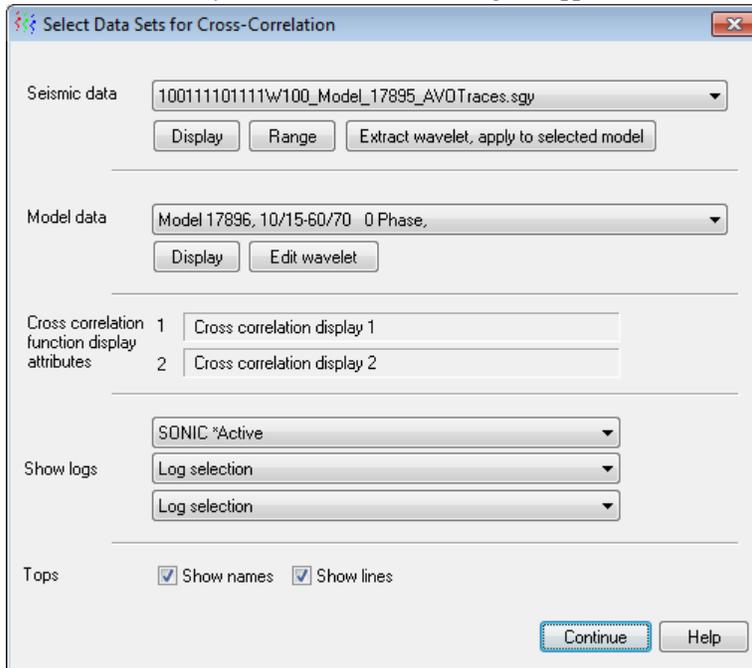
1. Right-click the seismic trace and select **Tie Seismic to a Model** from the popup menu.

The *Set time and range for* dialog box appears.



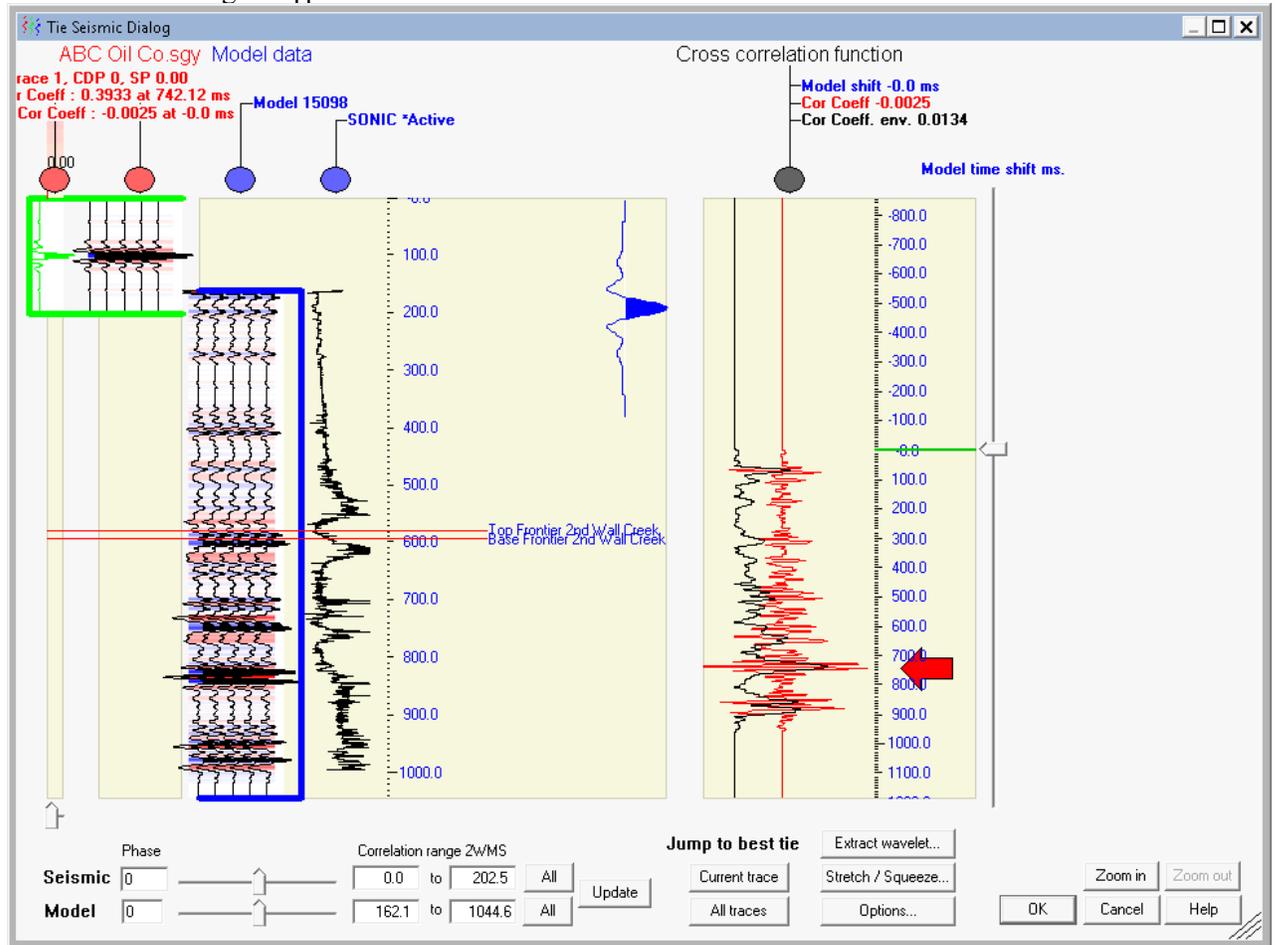
2. Select the time and trace range that includes the well from which the synthetic is created, and then click **OK**.

The *Select Data Sets for Cross-Correlation* dialog box appears.



3. In the **Model Data** drop-down list, select a model to which to tie the seismic trace, and then click **Continue**.

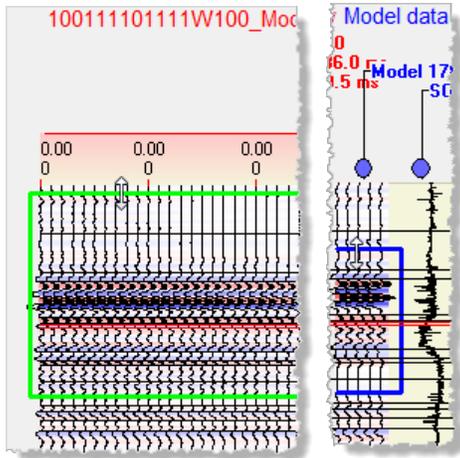
The *Tie Seismic* dialog box appears.



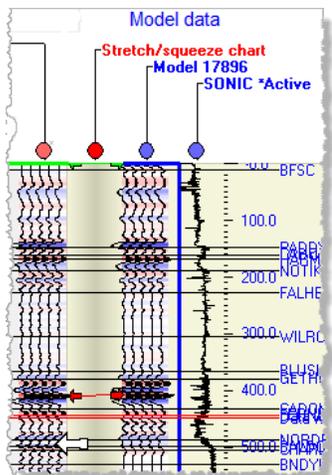
4. Select from the following options:

- GeoSyn automatically aligns the seismic trace and model trace at the point of best fit. To move the point of best fit to another seismic trace, drag the slider at the bottom of the seismic sample left or right.
- To move the seismic trace up or down in relation to the model trace, in the *Cross correlation function* pane, drag the vertical slider up or down. The amplitude values for the Amplitude and the Amplitude Envelope appear to the right of the slider.

- Drag the green and the blue horizontal lines that limit the data range to exclude unwanted data that appears at the top or bottom of the model or the seismic, which may interfere with the selection of the best tie.

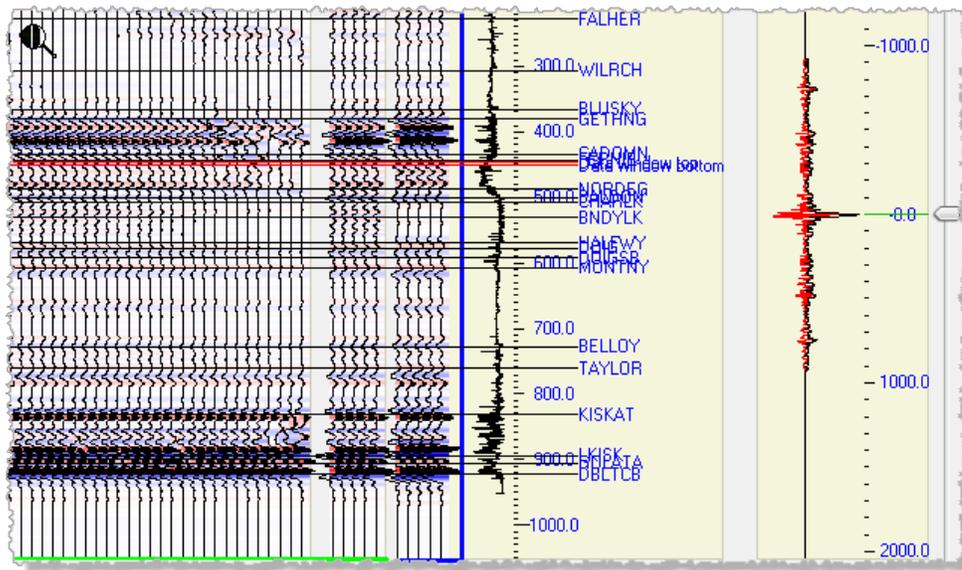


- To change the seismic phase or the model phase, drag the sliders or type values in the boxes below the *Phase* label in the bottom-left of the dialog box. The results appear in the *Cross Correlation Function* area of the dialog box where the red signal represents the seismic pulse and the black signal represents the amplitude envelope.
- To stretch and squeeze the sonic to improve the tie with the sonic, click **Stretch/Squeeze** to display the *Stretch and Squeeze* dialog box. Hover the cursor over the seismic at the point to tie. Click to set the first tie anchor, and then hover the cursor over the correlating tie point on the model. Click to place the second anchor, which ties the seismic to the model.



Select multiple points using the above process. For details on stretching and squeezing traces, see *Correlating Logs and Traces* below.

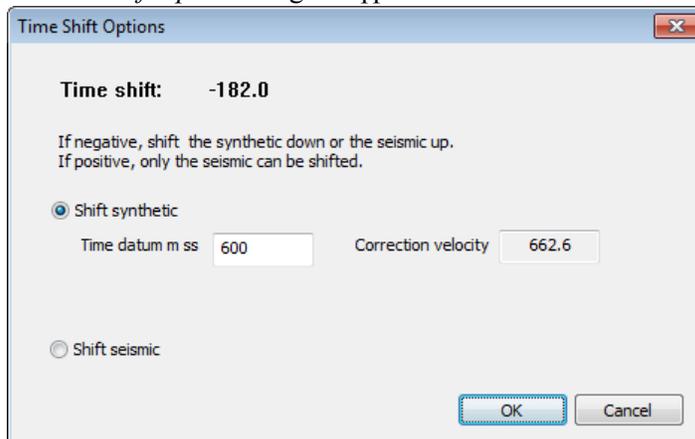
- To zoom the seismic pane, click **Zoom In** and then move the cursor over the seismic section (the cursor changes to a magnifying glass (🔍)), and then drag the extents to zoom. Once you've zoomed in, use the **Zoom Out** option to restore the original screen extents.



- ▶ To change the trace pane displayed in the *Tie Seismic* dialog box in either the **Model data** or the **Cross correlation function** pane, hover the cursor (🖱️) over the display to move then click and hold while dragging the display pane up or down.

5. Click **OK** to close the *Tie Seismic* dialog box.

The *Time Shift Options* dialog box appears.



- 6. Select whether to shift the synthetic or the seismic (bulk shift) and then click **OK**.  
If shifting the synthetic, you can further specify whether to shift the time datum or apply a correction velocity.

## Related Topics

...

See "Changing Seismic Properties," p. 149  
See "Correlating Logs and Traces," p. 166

See "Stretching and Squeezing Logs," p. 66

## Analyzing Models

### Analyzing Velocity and Depth

Analyze time depth relationships in a well.

Contained in the chart are the time depth log in blue, the sonic transit log in red, and tops in black. By default, time is two-way, though you can change it to one-way.

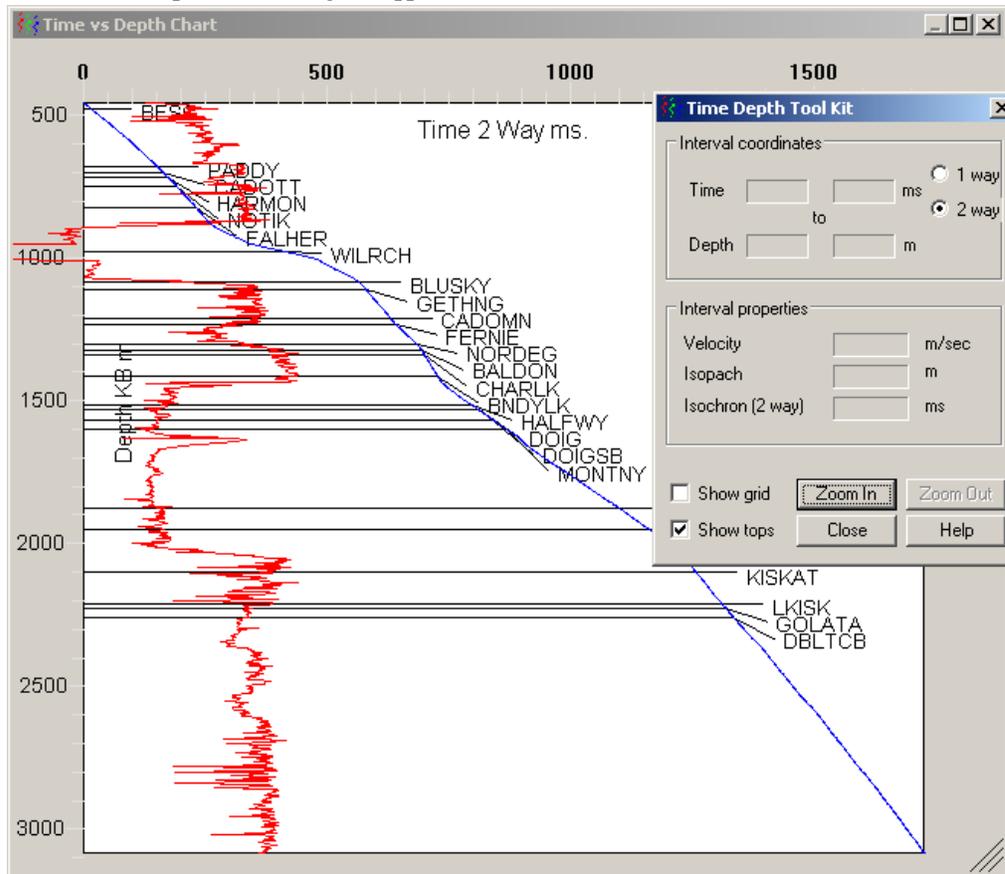
As you move your cursor time depth, isochron, isopach, and interval velocity information appears in a corresponding dialog box.



#### To analyze velocity and depth

1. From the **Utilities** menu, select **Time vs. Depth**.

The *Time vs. Depth Chart* dialog box appears.



2. Click **Zoom In** then click and hold the mouse button on the chart where you want to begin zooming, drag a zoom rectangle around the area of interest, then release the mouse button.
- ▶ Click the checkboxes in the lower-left of the Time Depth Toolkit dialog box to select whether to display a basic depth/time grid and the tops in the Time vs. Depth Chart.

## Related Topics

...

See *"Drawing Straight Edge and Freehand Curves,"* p. 57  
 See *"Applying Math Equations to Logs,"* p. 75

See *"Clipping or Filtering Logs,"* p. 72

## Creating Crossplots

Create crossplots using data from logs, seismic, and models.

Following are some of the more common crossplots you might create:

- offset trace along the x axis and an amplitude trace along the y axis.
- incident angle along the x axis and the amplitude from the seismic along the y axis.

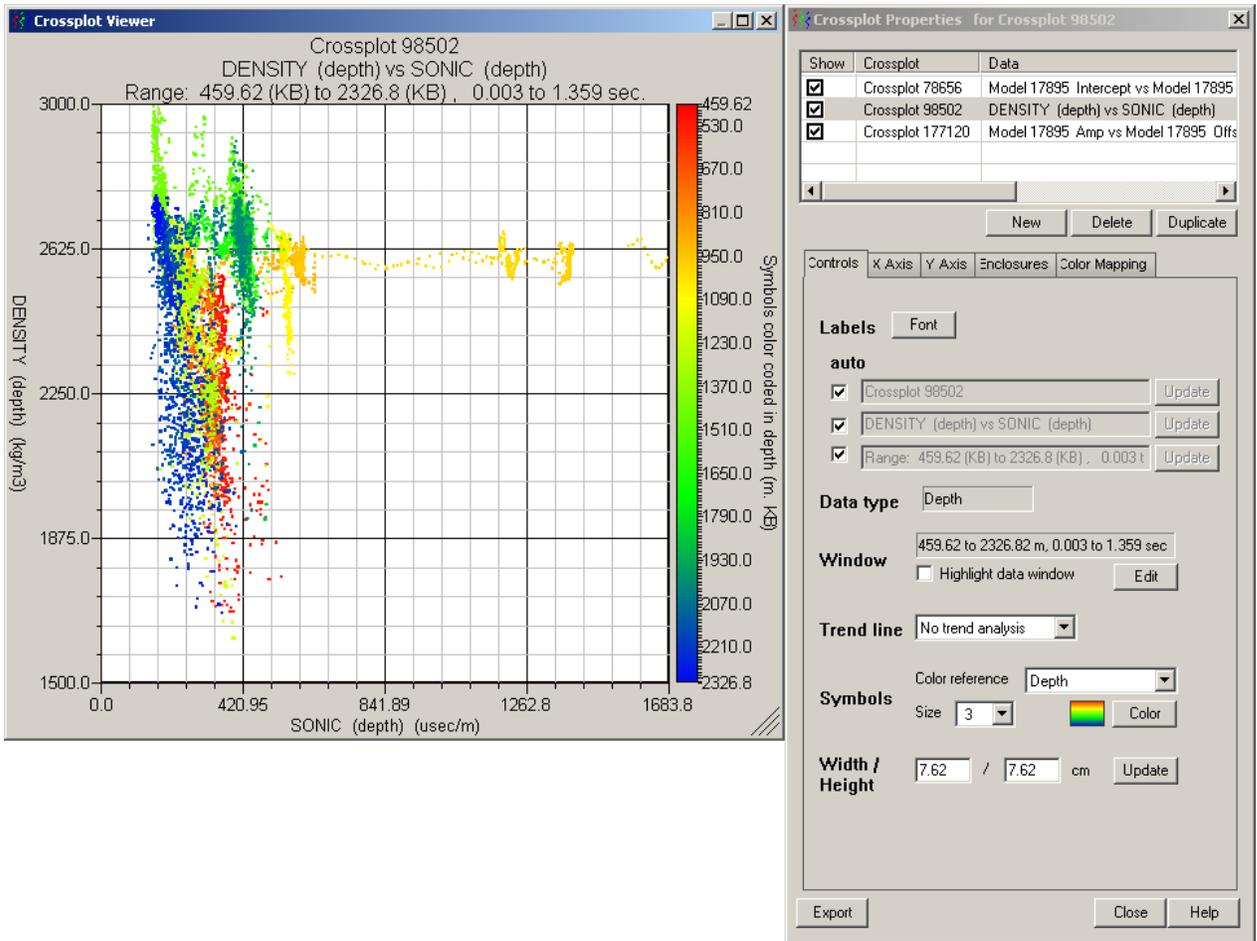
- gradient on one axis and intercept on the other.



### To create crossplots

1. From the **Edit** menu, select **Cross Plots** ()



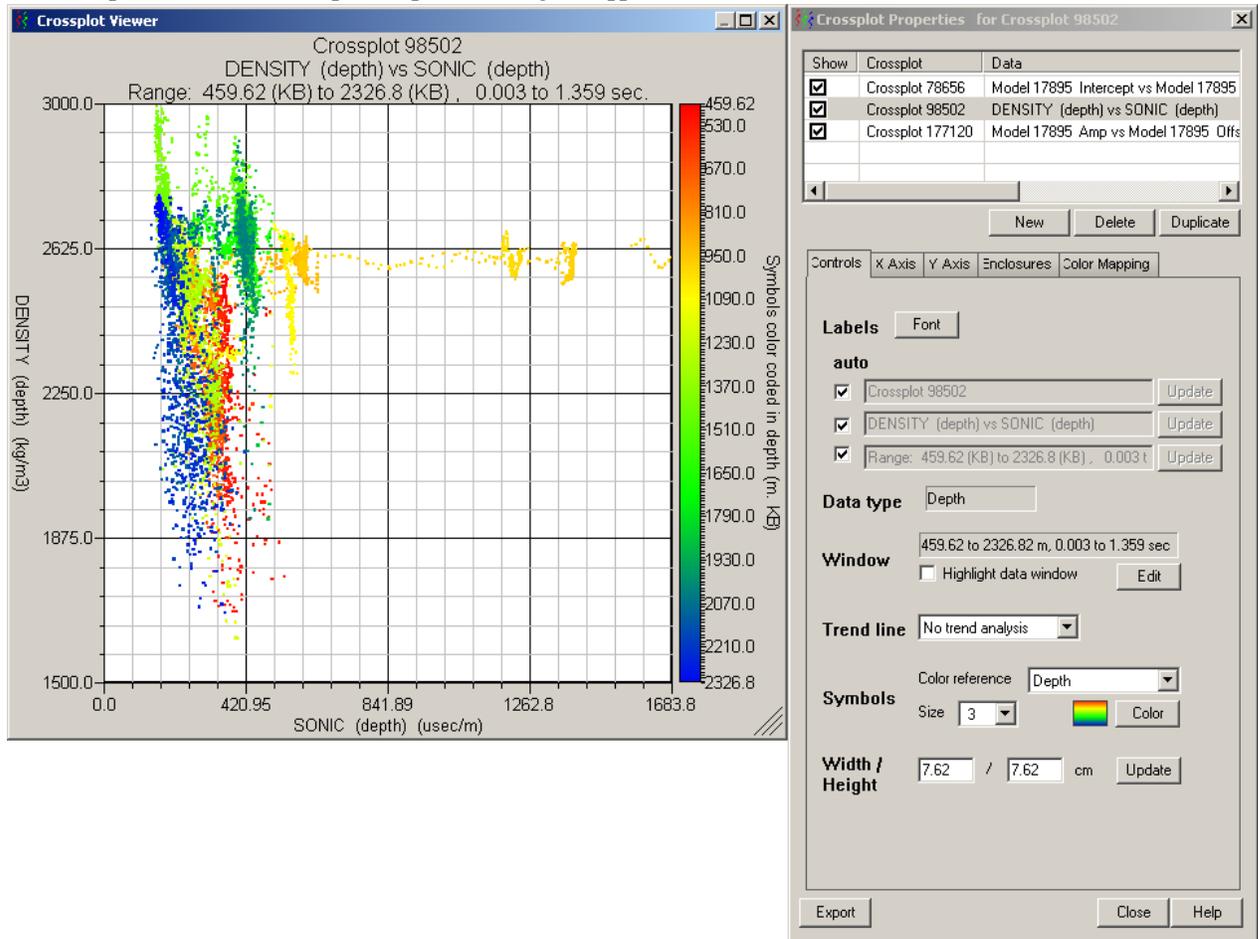


2. Select whether to base the crossplot on time or depth.





The *Crossplot Viewer* and *Crossplot Properties* dialog box appears.



5. Configure display options using the *Crossplot Properties: Controls*, *Crossplot Properties: X and Y Axis*, *Crossplot Properties: Enclosures*, and *Crossplot Properties: Color Mapping* tabs.

## Related Topics

...

See "Annotating Crossplots," p. 162  
 See "Exporting Crossplots," p. 175  
 See "Inspecting Logs," p. 89

See "Color Mapping Crossplots," p. 164  
 See "Changing Color Palettes," p. 128

## Annotating Crossplots

Highlight crossplot features by drawing either a polygon or ellipse in the Crossplot Viewer and then changing the default annotation display properties. The data points that fall within the polygon you draw are highlighted on the synthetic. This enables you to see where data points of interest that are on the crossplot come from. For details on creating a crossplot, see *Related Topics* below.

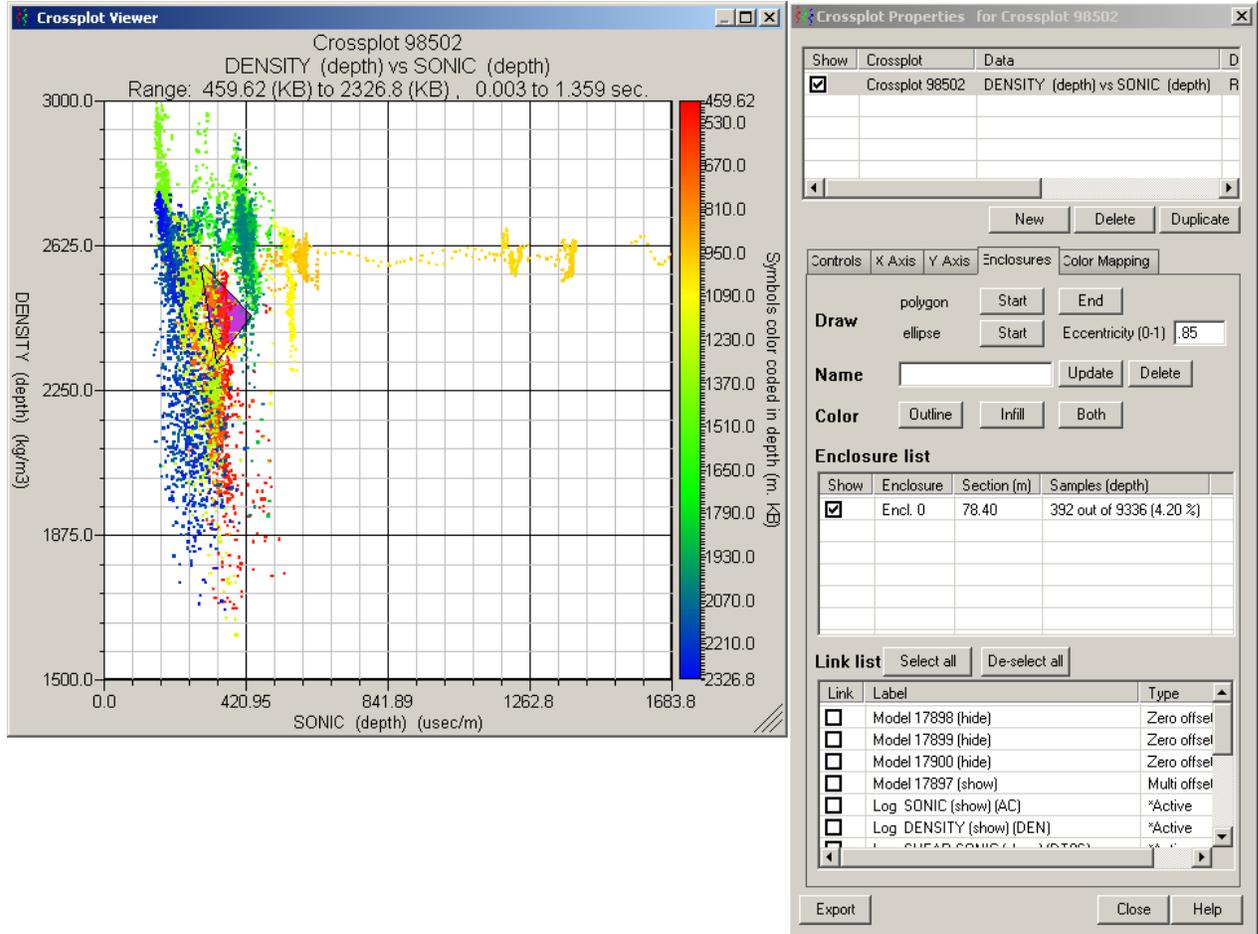
When drawing an ellipse, you can specify an eccentricity of 0 to 0.99 where 0 represents a circle and 0.99 represents the narrowest (most eccentric) ellipse. Typing 1 draws a line instead of an ellipse.



## To annotate crossplots

1. With at least one crossplot created in the main synthetic display, from the **Edit** menu, select **Crossplot properties** (  ).

The *Crossplot Viewer* and *Crossplot Properties: Enclosures* dialog box appears.



2. Click the **Enclosures** tab.
3. Do either of the following:
  - **To draw a polygon**, click **Start**, and then click to define the anchor points for the polygon segments in the Crossplot Viewer. Click **End** to complete and automatically enclose the polygon.
  - **To draw an ellipse**, type a decimal value from 0 to 0.99 in the eccentricity box. Click **Start** and then click to anchor one end of the ellipse. Move your mouse across from the start anchor point to the desired end point and then click to anchor that point.

As you draw polygons and ellipses, they're added to the Enclosure list below the drawing controls. Draw multiple annotations to encompass different features.

4. In the Enclosure List, select the annotation with which to work (SHIFT+CLICK or CTRL+CLICK for multiple selection).
  - In the Name box, type a descriptive name for the annotation(s) selected above.
  5. Select from the following display properties:
    - **Outline** to specify the annotation border color.
    - **Infill** to specify the annotation fill color within the annotation border.
    - **Both** to select one color for both the annotation border and fill.
  6. In the Link List pane, click the synthetic or log on which to display the data point highlighting.
- ▶ To hide an annotation from the Crossplot Viewer, clear the checkbox in the Show column of the Enclosure list. You can also select the enclosure and then press **Delete**.

## Related Topics

...

*See "Creating Crossplots," p. 156*

*See "Color Mapping Crossplots," p. 164*

## Color Mapping Crossplots

Select areas of the crossplot to color. Either work with a color gradient to change the default palette, or use a block fill to change the color of desired cells on the grid. The color you apply is also displayed for the data points on the log or synthetic that also fall within that cell.

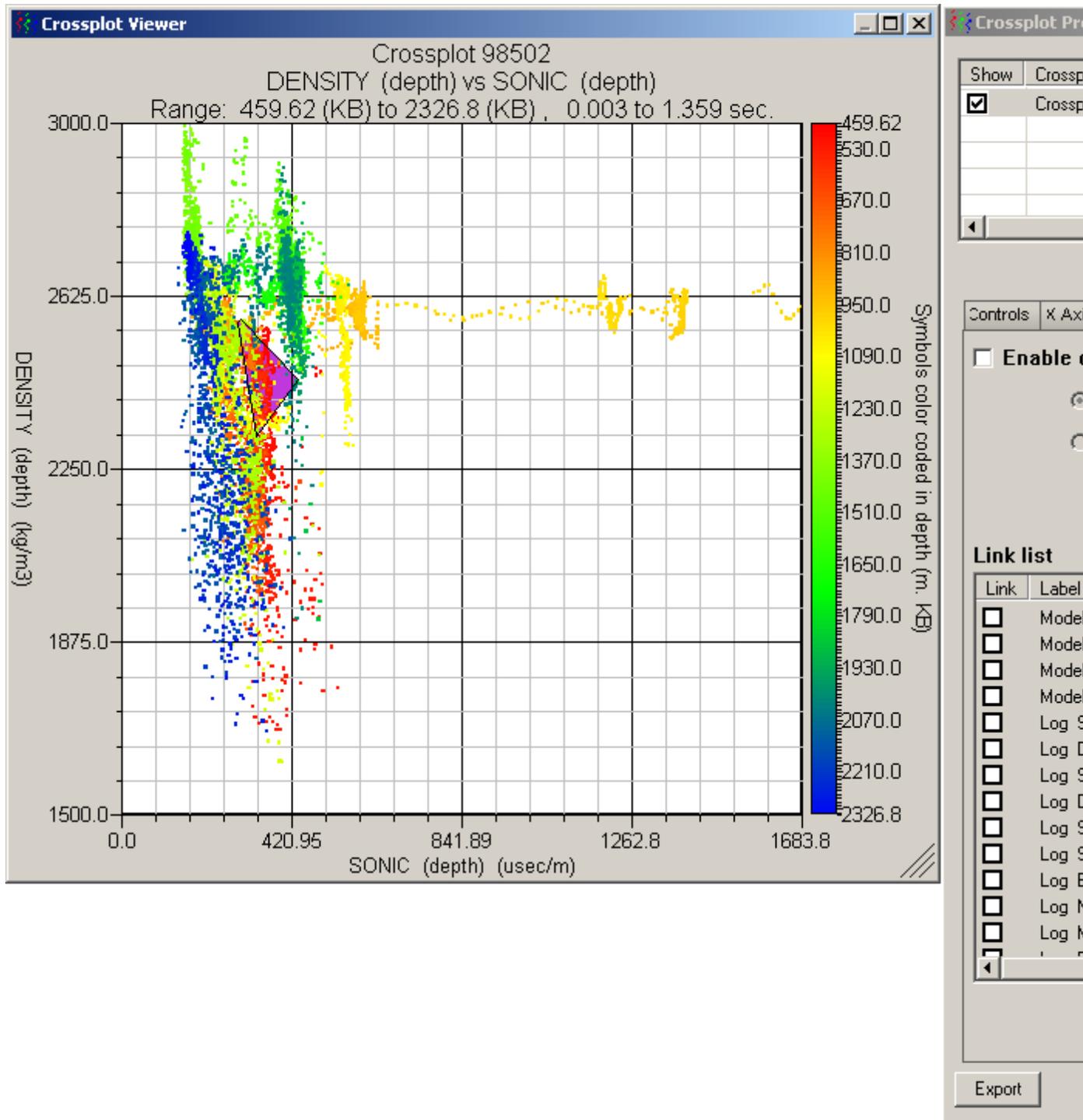
This functionality is similar to drawing annotations that encompass desired data points. For details, see *Related Topics* below.



### To color map crossplots

1. With at least one crossplot created in the main synthetic display, from the **Edit** menu, select **Crossplot properties** ().

The *Crossplot Viewer* and *Crossplot Properties: Color Mapping* dialog box appears.



2. Click the **Color Mapping** tab.
3. Select either of the following:

- **Gradational**, to apply a color to one of the four quadrants that blends with the colors from the surrounding three quadrants.
- **Blocked**, to fill individual cells you click with a solid color. In the Columns and Rows boxes, type the number of segments into which to divide the overall Crossplot Viewer canvas size. For example, if you type 2 in both boxes, the Crossplot viewer canvas is divided into four quadrants. If you type 100 in both boxes, the Crossplot viewer canvas is divided into a 100 x 100 grid.

4. Click **Brush** to select the desired color.

5. In the Link List pane, click the synthetic or log on which to display the data point highlighting.

▶ To hide color coding from the Crossplot Viewer, clear the **Enable color coding** checkbox.

## Related Topics

• • •

See "*Creating Crossplots*," p. 156

See "*Annotating Crossplots*," p. 162

## Correlating Logs and Traces

Overlay a GeoSyn correlation on a seismic section displayed on a seismic workstation.

Correlation windows and all dialog boxes opened from them float above all application windows, not just those in GeoSyn. You can drag them over a seismic display in any program for comparison.

Open any number of correlation windows. Multiple correlation windows open locked together, and some operations such as zooming or scrolling affect them all.

To maximize clarity and minimize clutter, obvious controls in correlation windows are only available when you right-click the correlation window.

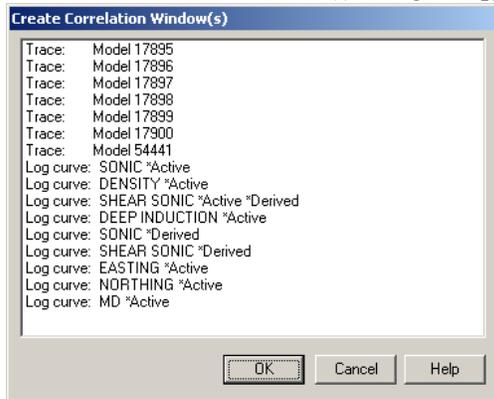
Using the *Vertical Scale* pane that appears in the *Synthetic Properties* dialog box, select whether the linear scale displayed in the Correlation window is based on time or depth. Viewing synthetics in depth can be useful to verify the velocity functions upon which a synthetic is derived are accurate.



### To correlate logs and traces

1. To open a single correlation window, right-click a log (displayed in a single track) or a trace and select **Correlation window** from the pop-up menu  
**OR**  
To open multiple correlation windows, from the **Utilities** menu, select **Create correlation window(s)**.

The *Create Correlation Window(s)* dialog box appears.



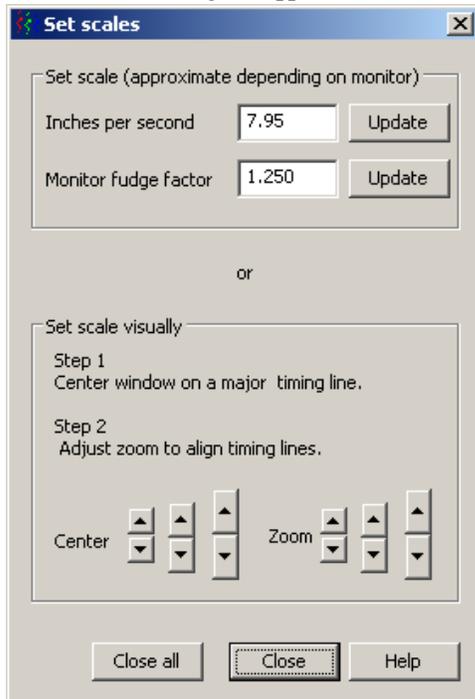
- ▶ Select the traces or logs for which to create correlation windows then click **OK**. SHIFT+CLICK or CTRL+CLICK for multiple selection.

If you selected more than one Correlation window, they open locked together. A red horizontal line with yellow triangles at either end indicates the center of the correlation window.



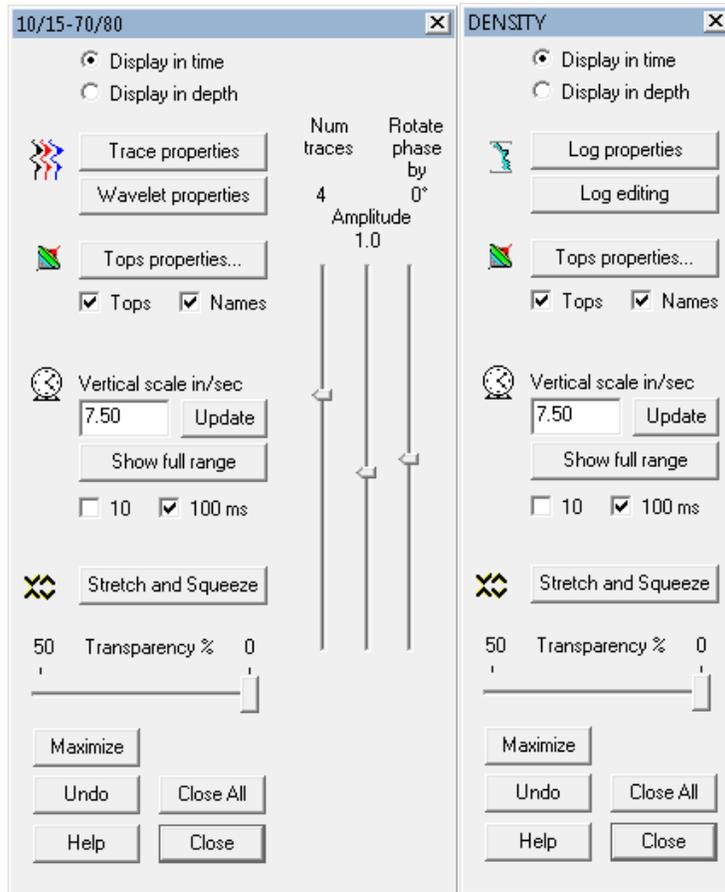
2. Drag the Correlation window alongside the trace or log to match.
3. Right-click the window and click **Set vertical scale** from the shortcut menu.

The *Set Scales* dialog box appears.



4. Do either of the following, and then click **Close**:
  - Type a specific increment in the *Inches per second* box. This distance may not equal physical measured distances because online display is defined in pixels and varies for different monitor resolutions, but the onscreen display should match the same setting defined in other seismic interpretation software.
  - Click the **Center** buttons to raise or lower the correlation on a pixel basis.
  - Click the **Zoom** buttons to change the distance between the timing lines in the Correlation window. The larger buttons move and zoom the correlation in larger pixel increments.
5. Right-click the Correlation window and click **Controls** from the shortcut menu.

Depending on whether you displayed the correlation window for a log or trace, either the *Log* or the *Trace* toolbar appears.



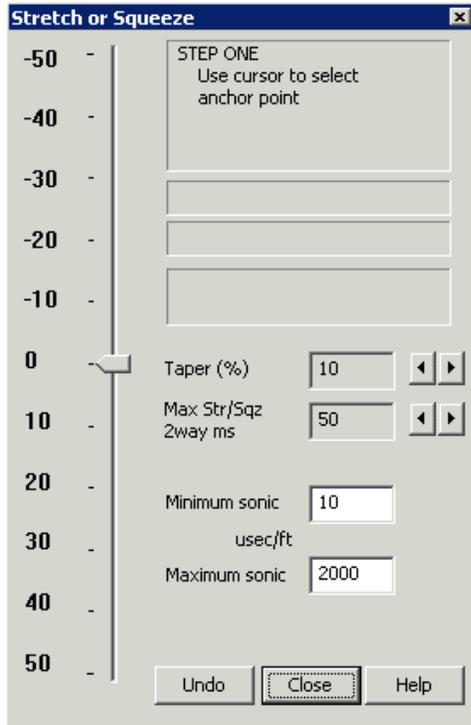
Use the log or trace Toolbar to access a number of dialog boxes, including *Log Properties*, *Display Properties*, *Tops Properties*, *Wavelet Properties*, and more. The available controls depend on whether a log or trace is selected. Change the controls by clicking a correlation window for either a log or trace.

6. Do any of the following:

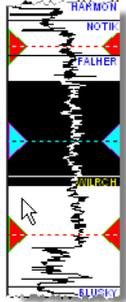
- To move the log or trace vertically, click and hold the mouse button inside the correlation window and drag up or down.
- To match the scale in the correlation window with that of the seismic display program, SHIFT+CLICK inside the correlation window and drag.
- To change the trace amplitude, drag the sliders on the Toolbar.

7. Click **Stretch and Squeeze**.

The *Stretch or Squeeze* dialog box appears.



- Using the model trace, click to define the top of the area on the model to stretch and squeeze, and then click the bottom of the area on the model to stretch and squeeze.



- Using the *Stretch or Squeeze* dialog box, drag the slider to elongate or compress the trace within the window defined above.

## Related Topics

...

See *"Stretching and Squeezing Logs,"* p. 66

See *"Tying Seismic to Models,"* p. 150

See *"Importing Check Shot Surveys and Vertical Seismic Profiles,"* p. 18

# Outputting GeoSyn Data

---

## Printing Synthetics

By default, a printed page outline appears on the main synthetic display bounding the pane that will fit on the paper size selected for the default printer. Because most printers don't print right to the edge of the page, an additional three-quarters of an inch of image inside the print margin won't be printed.

Toggle whether the page outline appears in the main synthetic display using the Synthetic Properties dialog box.

If you change the paper size using the File > Print Setup dialog box, the page outline in the main synthetic display changes too.

Print either the current synthetic or select a group of GeoSyn synthetics saved to disk and print them in one batch. Separate procedures for each appear below.



### To print current synthetics

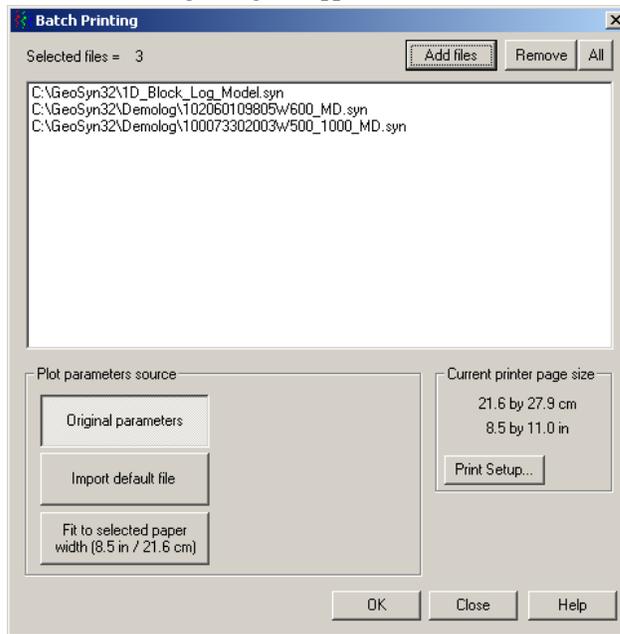
1. Verify how the current synthetic will appear when printed by selecting **File > Print Preview**.  
The *Print Preview* dialog box appears.
2. From the **File** menu, select **Print** (🖨️), or click **Print** in the **Print Preview** dialog box above.  
The *Print* dialog box appears.
3. Select the desired print options then click **OK**.



### To print multiple GeoSyn files

1. From the **File** menu, select **Printing**.

The *Batch Printing* dialog box appears.



2. Click **Add files**, browse to and select the desired file(s). SHIFT+CLICK or CTRL+CLICK for multiple selection.
  - ▶ To sort files by UWI, click either **Browse dir.** or **Browse sub-dir.** to launch Directory Browser. For details on using Directory Browser, see *Related Topics* below.
3. In the *Open a ... format file* dialog box, click **Open**.
4. Select either **Original parameters** to print each file using display parameters specified in its own file, or **Import default file** to select a default file from the current GeoSyn *Working* directory from which to use parameters.
  - ▶ Either click **Print > Properties > Paper** to select a different size of paper, or click **Fit to selected paper width** to automatically turn off synthetic elements until the synthetic fits on the default page size.
5. Click **OK**.

## Related Topics

...

See "*Using Directory Browser*," p. 9

See "*Reformatting GeoSyn and LAS Files*," p. 172

## Reformatting GeoSyn and LAS Files

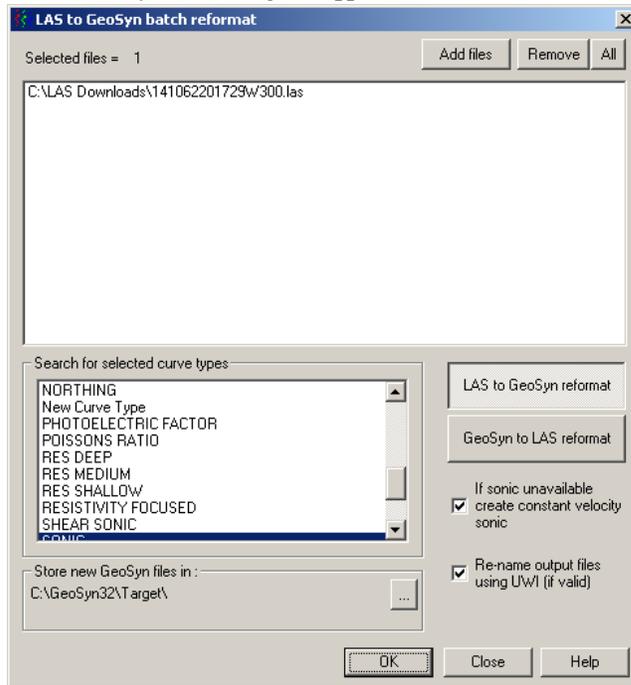
Convert batches of LAS files to GeoSyn format or vice versa.



### To reformat GeoSyn and LAS files

1. From the **File** menu, select **Batch Reformat**.

The *Batch Reformat* dialog box appears.



2. Click either **LAS to GeoSyn reformat** or **GeoSyn to LAS reformat** then click **Add files**.
3. Browse to and select the desired file(s). SHIFT+CLICK or CTRL+CLICK for multiple selection.
  - ▶ To sort files by UWI, click either **Browse dir.** or **Browse sub-dir.** to launch Directory Browser. For details on using Directory Browser, see *Related Topics* below.
  - ▶ If converting LAS to GeoSyn format, ensure you specify that GeoSyn create a constant velocity sonic if none is available, otherwise it ignores LAS files without sonic logs.
4. In the *Open a ... format file* dialog box, click **Open**
5. In the *Batch Reformat* dialog box, verify the target directory listed in the bottom-left is correct or click  to select another then click **OK**.

## Related Topics

...

See *"Importing LAS or GeoSyn Files,"* p. 13  
See *"Printing Synthetics,"* p. 171

See *"Using Directory Browser,"* p. 9

## Importing and Exporting Images

Copy any individual element that appears in the main synthetic display (or the entire synthetic display) to the Windows clipboard then paste it into other applications to create a montage.

GeoSyn also enables you to paste *.emf* files from disk or from your Windows clipboard into the main synthetic display and control the placement, size, and visibility of all pasted images from one dialog box.

Images that appear in the above dialog box are saved with the synthetic file, even if they're hidden from the main synthetic display, and can be shown in the future.

Separate procedures for pasting Windows clipboard images and importing *.emf* images appear below.



### To paste images from the Windows clipboard into GeoSyn

▶ With the desired image copied to the Windows clipboard, from the **Edit** menu, select **Paste**.

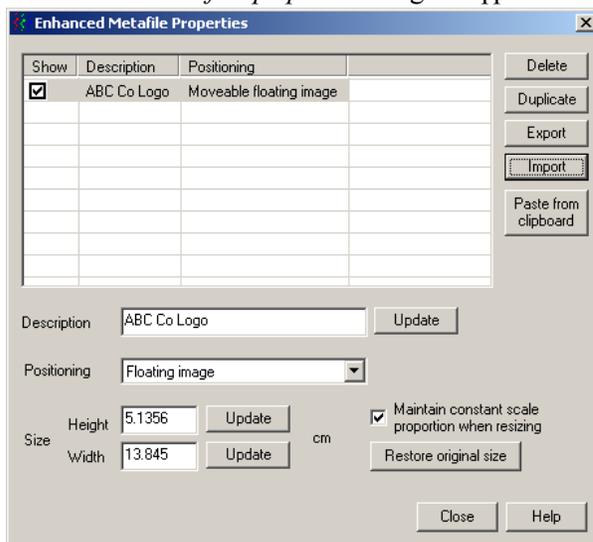
The image appears in both the main synthetic display and in the *Enhanced Metafiles properties* dialog box detailed below.



### To import *.emf* files into GeoSyn

1. From the **Edit** menu, select **Metafile properties**.

The *Enhanced Metafiles properties* dialog box appears.



2. Click **Import from file**.

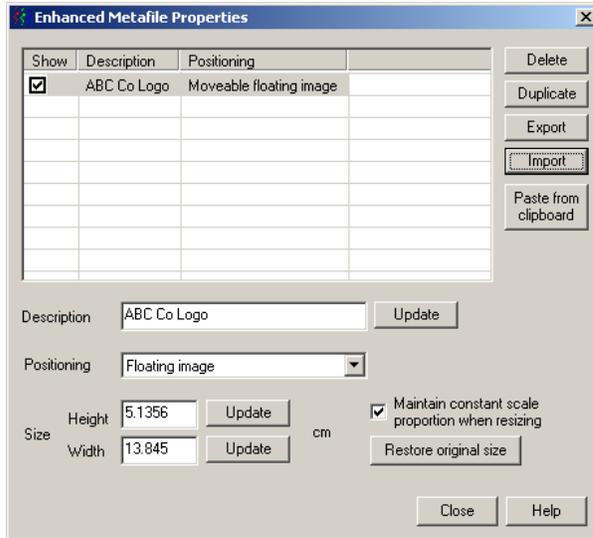
The image appears both in the main synthetic display and in the above dialog box display pane with an automatically generated ID.



## To modify images pasted into GeoSyn

1. From the **Edit** menu, select **Metafile properties**.

The *Enhanced Metafiles properties* dialog box appears.



2. To change the image ID to something more descriptive, select the row in which the image appears in the above display pane, then type a different name in the **Label** box and click **Update**.
3. From the **Positioning** drop-down list, specify whether the image appears in the top-right corner, can be dragged to a location where it offsets existing synthetic elements, or floats over synthetic elements without offsetting them.
4. In the **Show** column of the display pane, select whether the image is displayed in the synthetic or saved along with it for display in the future.

GeoSyn only imports files saved in *.emf* format. If the above image is pasted from the Windows clipboard and you want to use it in other synthetics without having to open this synthetic and copy it to the Windows clipboard, click **Export** and save it to disk with a *.emf* extension.

## Related Topics

...

See "About the Main Synthetic Display," p. 42

See "Changing the Main Synthetic Display," p. 43

## Exporting Crossplots

Export X and Y coordinates in *.csv* format. Export a crossplot either using the Crossplot properties dialog box or the Export Manager: Crossplot dialog box. Procedures for both appear below.



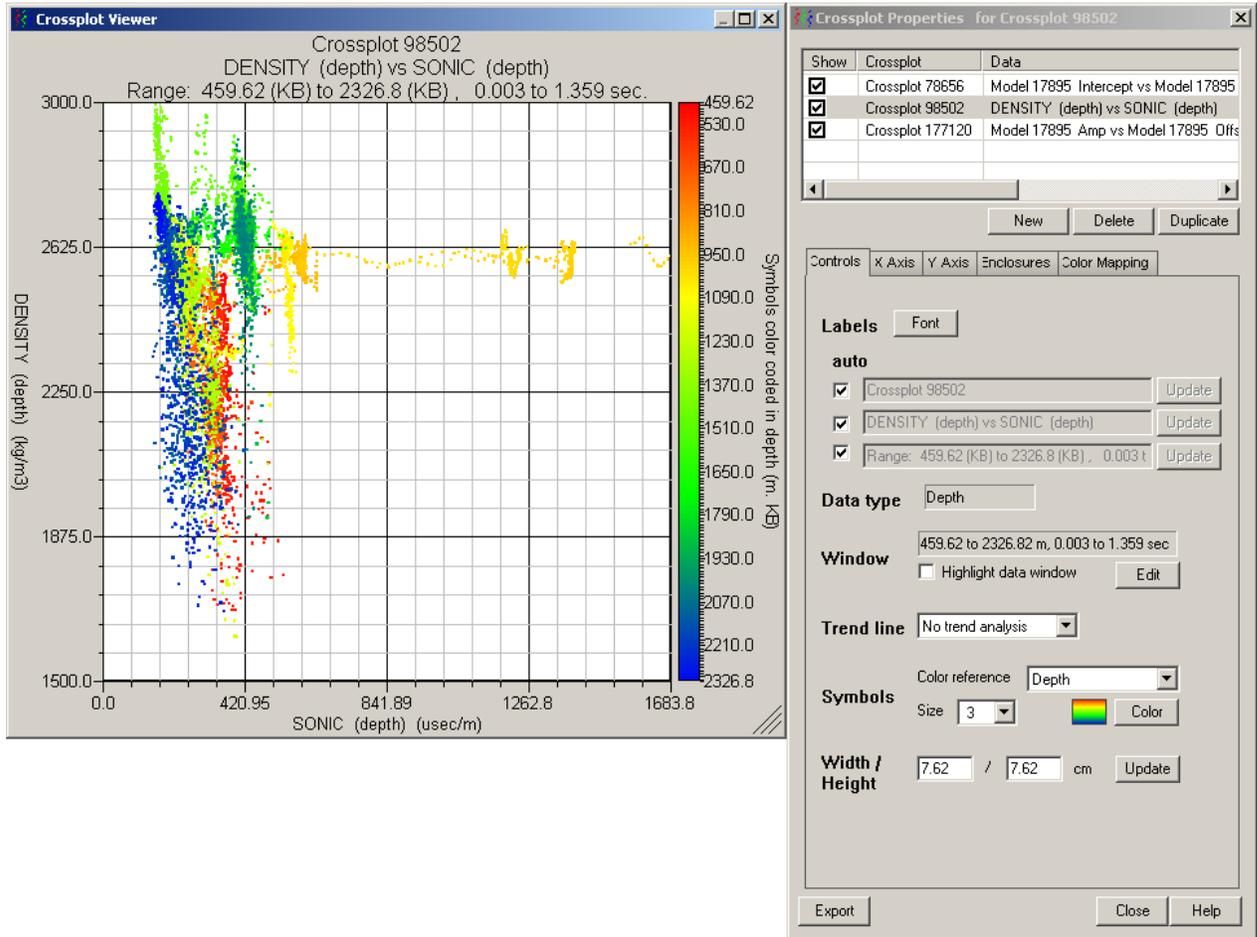
## To export crossplots using the Crossplot Properties dialog box

1. From the **Edit** menu, select **Crossplot properties**.

**OR**

Right-click the crossplot and select **Crossplot Properties**.

The *Crossplot properties* dialog box appears.



2. Click **Export**, select a location, and then click **Save**.

3. Click **Close** to exit the *Crossplot Properties* dialog box.

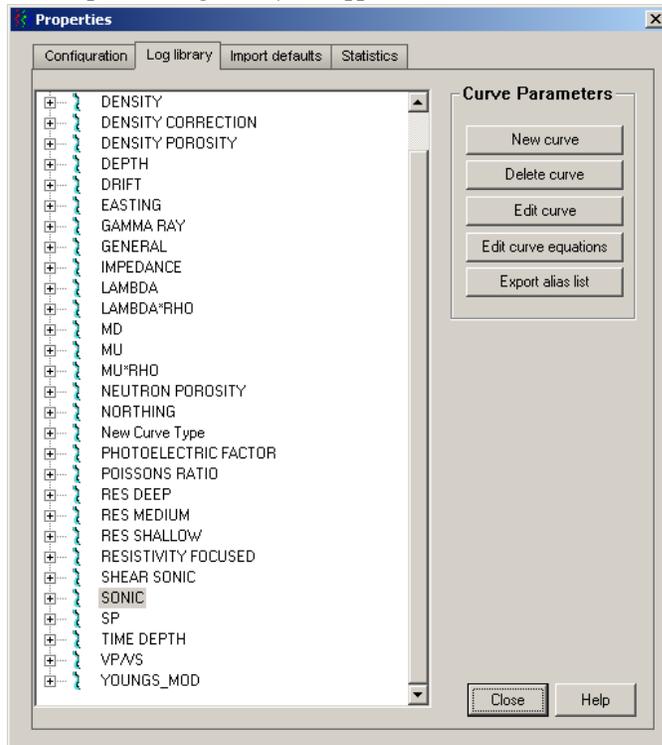


## To export crossplots using the Export Manager dialog box

1. From the **File** menu, select **Export**.



The *Properties: Log Library* tab appears.



2. Click **Export alias list**.
3. Browse to a location in which to save the file, and then click **Save**.

Now open the file using a third-party application such as Microsoft Excel or Windows Notepad.

## Related Topics

...

See "Changing Log Defaults," p. 48

## Exporting Logs

Export depth logs in either SEG-Y binary format (for importing in geophysical workstations) or LAS format, and time logs in either SEG-Y or column-ordered ASCII format (for importing in spreadsheets).

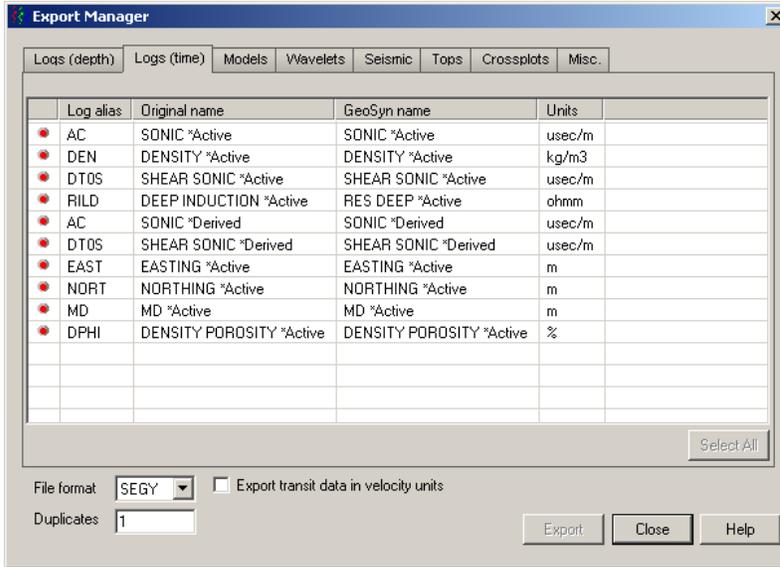
Depth logs are the original logs imported into GeoSyn. GeoSyn creates time logs when importing a sonic log. The time log can be used by other seismic applications.



### To export logs

1. From the **File** menu, select **Export** then click either the **Logs (depth)** or **Logs (time)** tab.

Depending on your selection, either the *Export Manager: Logs (Time)* or *Export Manager: Logs (Depth)* dialog box appears.



2. Select the row to export and from the **File format** drop-down list, select the file format for the exported file and click **Export**.

If exporting depth logs, you can further select whether to convert uncommon aliases to something more common to facilitate importing the log into other applications and whether to include a list of tops in the log file.

3. Browse to a disk location in which to save the file then click **Save**.

## Related Topics



See *"Importing LAS or GeoSyn Files," p. 13*

See *"Exporting to Petra," p. 180*

## Exporting Models

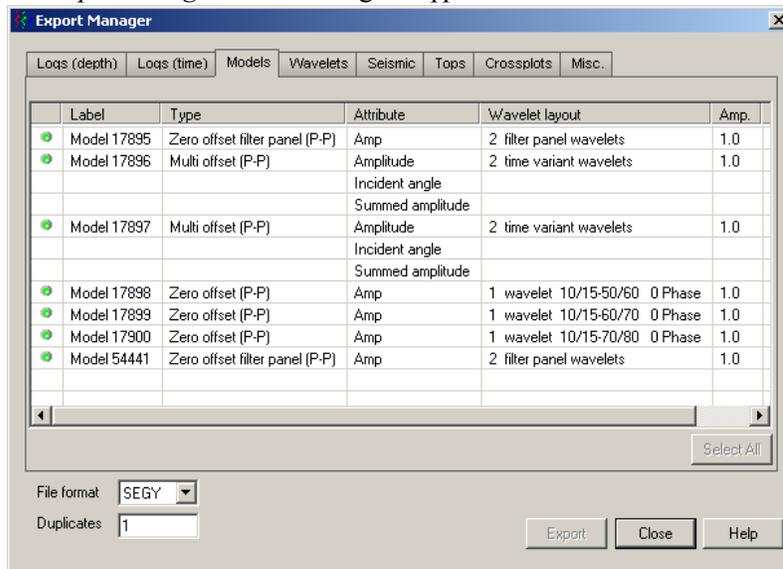
Export models are saved in either SEGY or ASCII format. Time depth information added using the Edit > Time Datum dialog box is preserved in the exported SEGY file.



### To export models

1. From the **File** menu, select either **Export > Models**  
**OR**  
 From the **Edit** menu, select **Model properties** () > **Export**.

The *Export Manager: Models* dialog box appears.



2. Select the row with the model to export and from the **File format** drop-down list, select the file format for the exported file and click **Export**.
3. Browse to a disk location in which to save the file then click **Save**.

## Related Topics



See "Creating Models," p. 108

## Exporting to Petra

Export GeoSyn data to Petra in various formats including .syn, .emf, LAS, and SEGY format. For LAS format, specify the logs to include in the LAS file. For SEGY format, specify the GeoSyn models to include.

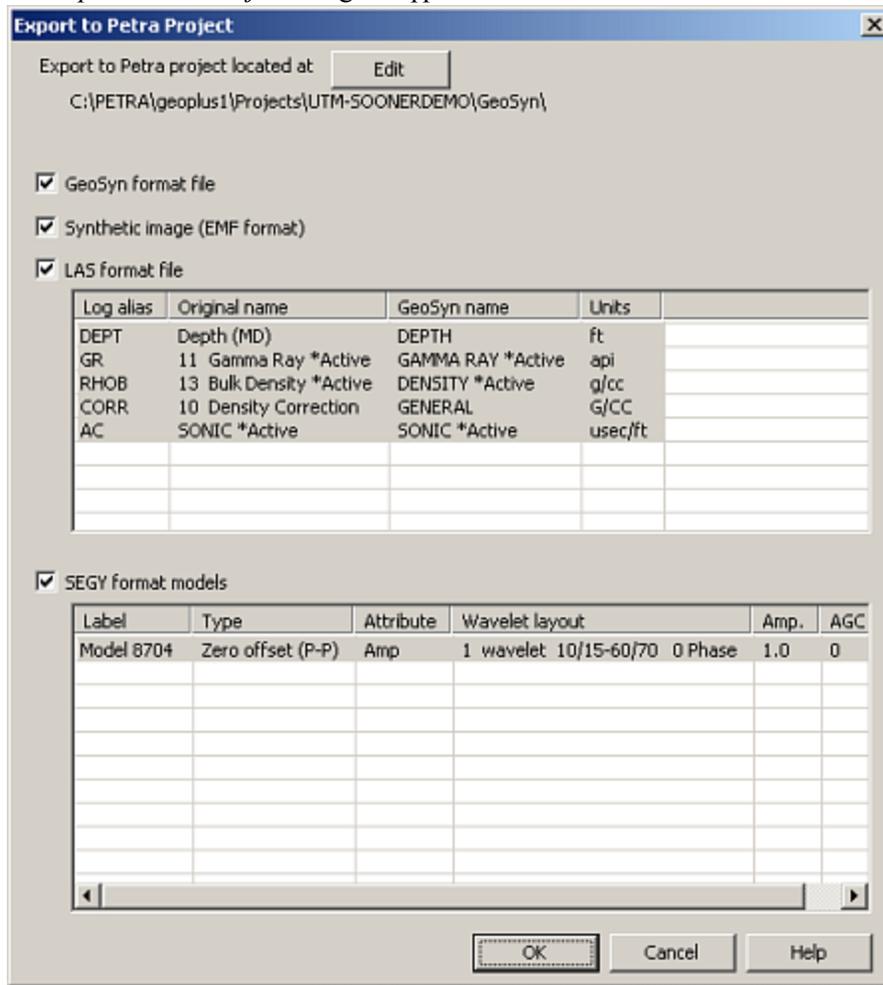
The Petra export option is only available if you created a GeoSyn project using PetraSeis. For details, see *Related Topics* below.



### To Export to Petra

1. From the **File** menu, select **Petra Export**.

The *Export to Petra Project* dialog box appears.



2. Verify the location where to export the file, the format to include (Syn, EMF, LAS, SEGY), and then click **OK**.

## Related Topics

• • •

*See "Exporting Seismic," p. 181*

*See "Exporting Logs," p. 178*

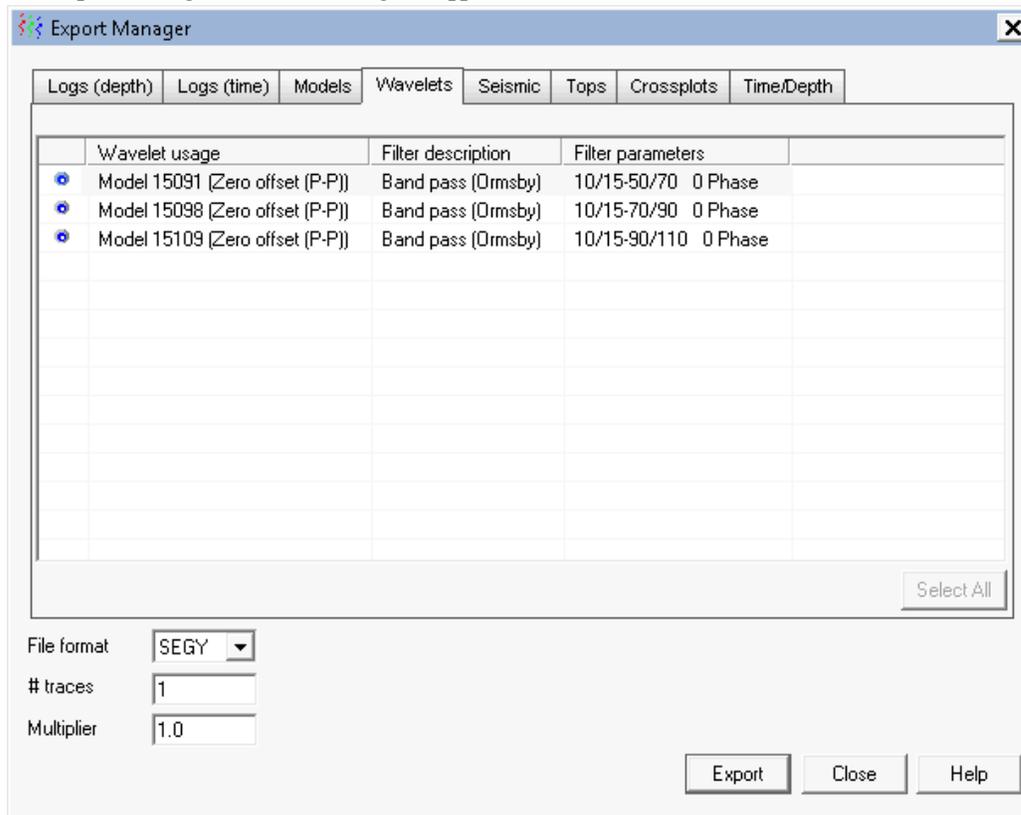
*See "Launching GeoSyn using PetraSeis," p. 34*

## Exporting Seismic

Export seismic files in SEGY format. Time depth information added using the Edit > Time Datum dialog box is preserved in the exported SEGY file.



The *Export Manager: Wavelets* dialog box appears.



2. Select the row with the wavelet to export and from the **File format** drop-down list, select the file format for the exported file and click **Export**.
3. Browse to a disk location in which to save the file then click **Save**.

## Related Topics

• • •

See *"Creating Models," p. 108*

See *"Extracting Wavelets," p. 141*

## Exporting Tops Lists

Save tops lists to disk in ASCII format. This file contains tops names, tops depths KB, a units flag, and the Kelly Bushing depth.

To merge tops from multiple lists into one list, either export each individual list to disk and then concatenate them using an ASCII text editor, or show all the tops in the tops table in the main synthetic display and copy this data to the Windows clipboard, then paste it into a spreadsheet application or ASCII text editor. For details, see *Related Topics* below.



## To export tops lists

1. From the **File** menu, select either **Export > Tops**

**OR**

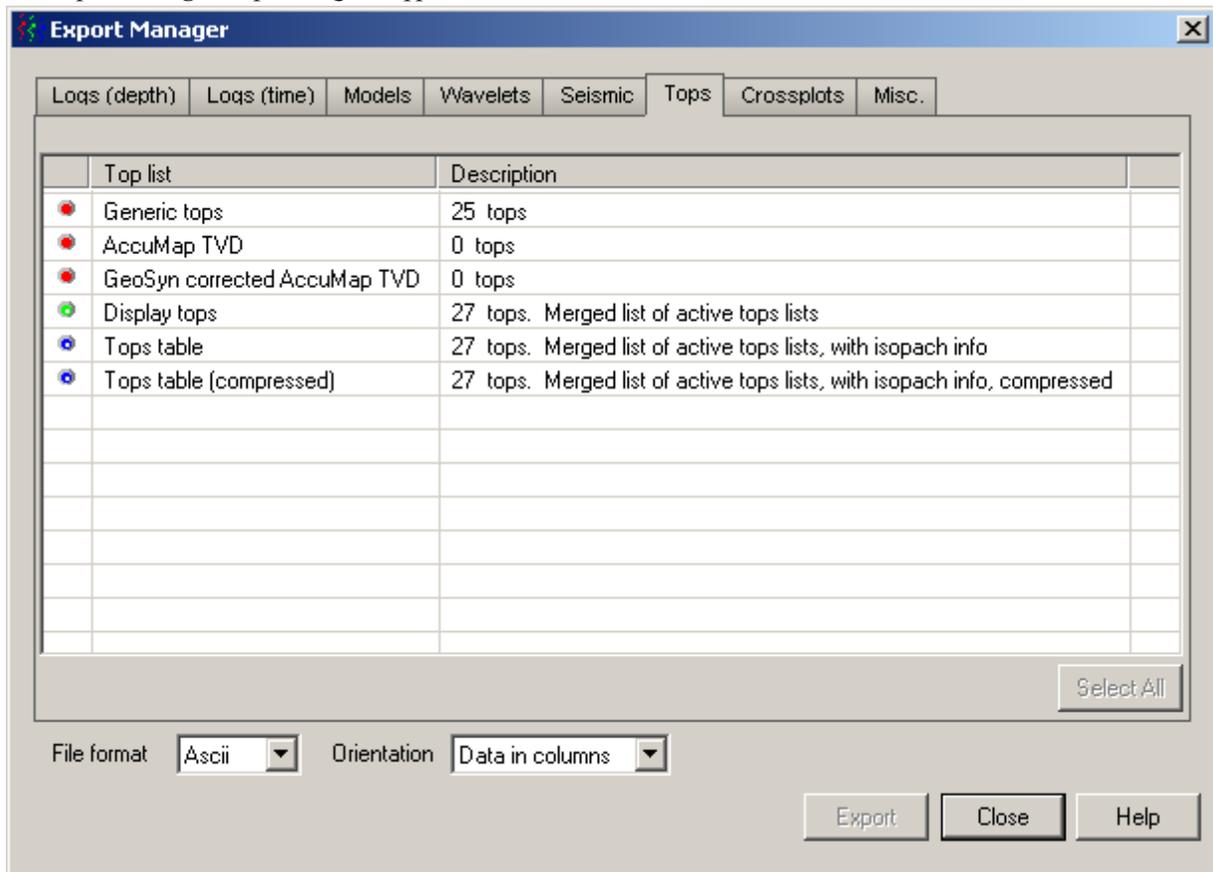
From the **Edit** menu, select **Tops properties**  > **Export**

**OR**

Right-click the tops table and select **Tops properties > Export tops**.

▶ To display the tops table in the main synthetic display, from the **Edit** menu, select **Synthetic properties**  and in the **Display elements** pane, select **Tops table**.

The *Export Manager: Tops* dialog box appears.



2. Select the row with the list to export then click **Export**.

3. Browse to a disk location in which to save the file then click **Save**.

## Related Topics



See *"Using Tops Lists,"* p. 92

See *"Importing Tops from GeoSyn Files,"* p. 99

See *"Importing Tops from LAS and ASCII Files,"* p. 106

See *"Importing Tops from Delimited Files,"* p. 99

See *"Importing Tops from Fixed Width Files,"* p. 101

## Exporting Tops Tables

GeoSyn displays a list of tops in a tops table that can be exported in either *.emf* or ASCII text for other applications. When multiple tops lists are shown in the main synthetic, all tops are grouped in one tops list. To display lists separately in the main synthetic display (such as a list of check shot values and a list of tops), show one of the lists in the main synthetic display and copy and paste it into GeoSyn, then hide the original list –not the pasted one, and show the other list.

Copy the data that appears in the tops table as either a static image or as ASCII text.

Tops tables copied as ASCII text can be pasted into other applications for modification including AccuMap Tops Manager, with which you update the AccuMap user tops database.

When the tops table is shown in the main synthetic display, it offsets other synthetic elements instead of floating over them. Tops tables copied as images can be pasted back into the main synthetic display as floating images without offsetting other synthetic elements or pasted into other applications to create a montage.



### To export tops tables

1. To display the tops table, from the **Edit** menu, select **Synthetic properties** () and in the *Synthetic Properties* dialog box, select the **Tops table** checkbox and the adjacent position radio button.
2. Right-click the tops table and from the popup menu, select one of the following:
  - **Copy tops table image** to load an image in the Windows clipboard that can be pasted into other applications or pasted back into GeoSyn.
  - **Copy name and md depth** to load only top names and measured depth values into the Windows clipboard as ASCII text to paste into a text editor or spreadsheet application.
  - **Copy all tops info** to load all information that appears in the tops table into the Windows clipboard as ASCII text to paste into a text editor or spreadsheet application.
  - **Export tops** to display the *Export Manager* and write tops data to disk in ASCII format.

### Related Topics

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See "Duplicating Tops Lists," p. 95

See "Importing Check Shot Surveys and Vertical Seismic Profiles," p. 18

See "Importing Directional Surveys," p. 15

See "Exporting Tops Lists," p. 183

## Exporting Time/Depth

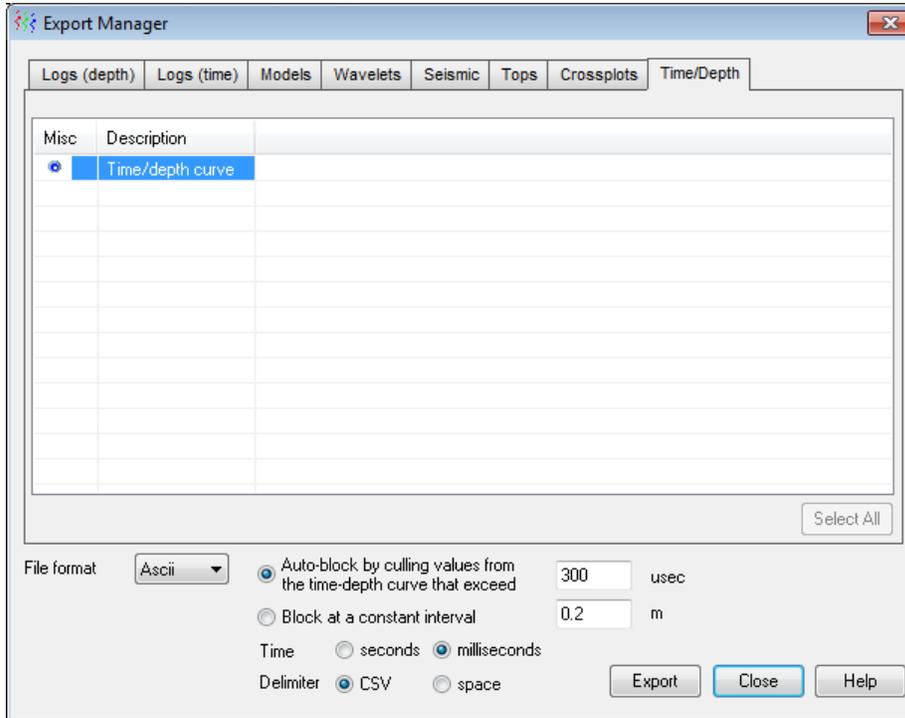
Export as ASCII file showing times and equivalent depths. The time depth chart can be imported into third-party applications; however, for Kingdom, you can save the time depth chart directly to the Kingdom database using GeoSyn. For details, see *Related Topics* below.



## To export time/depth

1. From the **File** menu, select **Export > Time/Depth**.

The *Export Manager* dialog box appears.



2. Select the row with the time/depth curve to export then click **Export**.
3. Browse to a disk location in which to save the file then click **Save**.

## Related Topics

...

See *"Importing Seismic Data," p. 147*

See *"Exporting to Petra," p. 180*

See *"Launching GeoSyn from Kingdom," p. 28*

## Dialog Boxes

### Wizards

### Blocked Log Wizard: Create New Layers and Logs

With this feature...	Do this...
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Display pane	Select a formation top to change or remove or above which to insert a new formation.
Edit	Type the value to place in the cell selected in the display pane above. The depth is a positive value (kelly bushing).
Layers	Click one of the following: <b>Add</b> to insert a generic formation top row above the row selected in the display pane above. <b>Delete</b> to remove the row selected in the display pane above, or <b>All</b> to remove all tops columns.
Logs	Click one of the following: <b>Add</b> to display the <b>Select from list</b> dialog box and select a blocked log type to create. <b>Delete</b> to remove the column selected in the display pane above, or <b>All</b> to remove all logs columns.
Enter transit log values	Select the depth and time units for converting depth to time.

## Parent Topics

*See "Creating Blocked Log Models," p. 61*

## Blocked Log Wizard: Description and Output Options

With this feature...	Do this...
Labels	Type the labels that appear in the main synthetic display.
KB elevation Depth inc.	Type values for the kelly bushing elevation, the depth increment, and the top and bottom of the zone.
Top Bottom	Type the top and bottom depth of the log
Create an LAS format file from the model and save to disk	Toggle whether to create an LAS file for the blocked log that you can subsequently import into GeoSyn and other applications.
Create a GeoSyn synthetic	Toggle whether to automatically create a synthetic or select the option above instead and then import the LAS file.

## Parent Topics

*See "Creating Blocked Log Models," p. 61*      *See "Blocked Log Wizard: Create New Layers and Logs," p. 186*

## Check Shot Wizard: Import Data

With this feature...	Do this...
Display pane	Select the check shot time depth pair to modify.
Time Depth	Type a time and depth pair for a new or existing row.
Insert Update Delete All	Select a check shot in the display pane above and click one of the following: <b>Insert</b> to add a new row with the time depth values typed in the Time and Depth boxes. Regardless of the row selected, the inserted row is placed according to its depth. <b>Update</b> to apply the values typed to the selected row. <b>Delete</b> to remove the row or <b>All</b> to clear the entire display pane.
Export Import	Click to save or load a file in ASCII format.

## Parent Topics

See "Importing Check Shot Surveys and Vertical Seismic Profiles," p. 18 See "Check Shot Wizard: Define Datums," p. 188

### Check Shot Wizard: Define Datums

With this feature...	Do this...
Check shot source offset	Type the check shot offset coordinates.
Check shot depth reference	Type the subsea depth from which the check shot depths are measured (typically the same as the log KB).
Check shot source elevation	Type the subsea depth at which the check shot energy source is located. Typically it's deeper than the log KB. In a marine setting, the air guns are a few meters below sea level.

## Parent Topics

See "Importing Check Shot Surveys and Vertical Seismic Profiles," p. 18 See "Check Shot Wizard: Shift time zero," p. 188  
See "Check Shot Wizard: Import Data," p. 187

### Check Shot Wizard: Shift time zero

With this feature...	Do this...
Time Datum SS	Change the default check shot source elevation, which by default is the top of the sonic log, to align with the seismic time zero. The check shot data is typically at the KB whereas seismic data is at the highest elevation above the seismic survey to account for variations in surface topography.
Correction Velocity	Specify a velocity that matches the speed of the subsurface material found in the surface elevations. This correction is applied to surface valleys to correct the subsurface readings for distortions caused by varying surface topography. The change in time is the difference between the check shot time datum and the value in the <b>Time Datum</b> box divided by the datum velocity. GeoSyn calculates a check shot correction without reference to this value, then as a final step, adds or subtracts section to correct the new time datum.
Drift Calculation	Select either a <b>Spline curve</b> or <b>Linear</b> correction type.
Quality control	Select from the following: <b>Drift Curve</b> A record of the transit correction applied to each sample of the original active sonic. Inspect this log for large drift corrections. <b>Check Shot Transit Curve</b> A record of the velocity field observed by the check shot. This log should be a rough approximation of the sonic log and is particularly useful for spotting datum errors, such as an incorrect well KB or check shot depth datum. <b>Create New Tops List for Check Shots</b> to import the check shot depth time pairs as tops. You can then check the position of these tops in time on the synthetic against the check shot time values. These times differ if the synthetic is moved to a new datum.

## Parent Topics

*See "Importing Check Shot Surveys and Vertical Seismic Profiles," p. 18* *See "Check Shot Wizard: Define Datums," p. 188*

### Crossplot Wizard: Select data type

With this feature...	Do this...
Depth data Time data	Select whether to base the crossplot on depth or time readings.

## Parent Topics

*See "Creating Crossplots," p. 156*

*See "Crossplot Wizard: Select axis data," p. 189*

### Crossplot Wizard: Select axis data

With this feature...	Do this...
Display pane	Click the log upon which to base first the X and then the Y axis.

## Parent Topics

*See "Creating Crossplots," p. 156*

*See "Crossplot Wizard: Set the data range," p. 189*

*See "Crossplot Wizard: Select data type," p. 189*

### Crossplot Wizard: Set the data range

With this feature...	Do this...
Display pane	Click the data upon which to base the crossplot based on the following: <b>Select all</b> to select the entire log depth. <b>Define a data range</b> to display the <b>Define Data Window</b> dialog box and specify the portion of the log. <b>Pre-selected Data Range</b> to use the depth range specified in the <i>Log Inspection</i> dialog box, which is launched from the Log Editor.

## Parent Topics

*See "Creating Crossplots," p. 156*

*See "Crossplot Wizard: Select axis data," p. 189*

*See "Define Data Window," p. 206*

### Data Search Wizard: Search locations and ranges

With this feature...	Do this...
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Add Location   Add Range	Click to display the <b>Edit a UWI</b> dialog box and select the survey system then type coordinates within which to retrieve logs.
Remove All	Select the specific location or range in the display pane and click <b>Remove</b> , or click <b>All</b> to clear all locations and ranges from the list.
Recent Searches	Select a search you previously conducted from the drop-down list.
Data Source	Select whether to retrieve logs from the IHS Information Hub or from a local or networked drive. Click <b>Edit online configuration</b> to display the <b>Properties: Configuration</b> dialog box and change folders in which downloaded logs are saved and your connectivity parameters for the IHS Information Hub. For GeoSyn network installations, connectivity parameters (except user name) affect all GeoSyn users.
Edit user paths	Click to display the <b>Set Source and Target directories</b> dialog box where you select the source to search for data and the location in which to save downloaded files.

## Parent Topics

See "Downloading Logs from the IHS Information Hub," p. 38      See "Launching GeoSyn using AccuMap," p. 31

## Data Search Wizard: Select data from catalog

With this feature...	Do this...
Node expansion buttons 	Click to expand or contract all well nodes in the display pane.
Auto Select	Click to display the <i>Auto Curve Selection dialog</i> where you specify the curve type, author, and other details with which to select rows. To select all logs for a well, simply click the well.
Select all   Deselect all	Select all   Deselect all
Display Layout	Before specifying the <b>Selection criteria</b> above, click to display the <b>Catalog display options</b> dialog box and specify the parameters under which wells appear in the display pane.
Report	Click to output the information that currently appears in the display pane to an ASCII text file.
Display pane	Click + and - to expand or contract individual nodes and select the desired logs. To select all logs for a well, simply click the well.
Show	Toggle whether wells with digital sonic, digital density, and a specific depth appear in the display pane. GeoSyn automatically creates a constant velocity sonic log if none is available in the downloaded log. Specify whether undigitized logs and directional surveys appear in the display pane. If you try to download an undigitized log, an online digitization request form appears that you submit to IHS. Showing wells without data enables you to at least determine that a well UWI exists in the data.
Hide if well	Click whether wells with digital sonic or density, or that don't reach a certain depth appear in the display pane.

Group multiple runs	Select whether to merge the overlapping portions of curves. Further merge options such as whether to merge only curves from a common source and whether to trim the shallower or deeper curve appear in the <b>Data Search Wizard: Save Options</b> dialog box, which appears after you click <b>Next</b> . By default, data on the IHS Information Hub is metric, but it can be converted to Imperial.
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## Parent Topics

<i>See "Downloading Logs from the IHS Information Hub," p. 38</i>	<i>See "Launching GeoSyn using AccuMap," p. 31</i>
<i>See "Data Search Wizard: Define save options," p. 191</i>	<i>See "Data Search Wizard: Search locations and ranges," p. 189</i>

## Data Search Wizard: Define save options

With this feature...	Do this...
Import data and create a new synthetic...	When importing logs from a single well, toggle whether to automatically create and launch a synthetic.
LAS save options	Specify whether downloaded curves are saved to the default target directory. <b>Depth increment</b> - select the depth increment with which curves will be resampled. If you select <b>User defined</b> a second drop-down list appears where you type the desired depth increment. Using a larger depth increment may mute some curve details in curves with a small depth increment. Using a smaller depth increment may add some undue influences in curves with a large depth increment. <b>Tops nomenclature</b> - select the naming terminology for your tops. <b>Multiple runs</b> - select whether to merge only curves from the same source and for curves that are merged, whether to use the portion from the shallower curve (trim deep) or use the portion from the deeper curve (trim shallow).
Directional survey save options	When you select a directional survey in the <b>Online Data Search Wizard: Select Data from Catalog</b> dialog box, specify the folder and format in which to save it. For directional surveys to be visible in <b>Data Search Wizard: Select Data from Catalog</b> dialog box, ensure <b>Service curves</b> is selected in the Show pane.

## Parent Topics

<i>See "Downloading Logs from the IHS Information Hub," p. 38</i>	<i>See "Launching GeoSyn using AccuMap," p. 31</i>
<i>See "Data Search Wizard: Select data from catalog," p. 190</i>	<i>See "Properties: Import Defaults," p. 233</i>

## Fluid Replacement Wizard (Input and output logs, depth range)

With this feature...	Do this...
Log tool kit	Click to display the <b>Fluid Replacement Tool Kit</b> dialog box to populate the input and output logs.

Input logs (P Sonic, S Sonic, Density)	GeoSyn automatically populates these boxes with P wave, shear sonic, and density logs if they're present in your model. Otherwise, click <b>Log Took Kit</b> above to derive them from other logs. The input logs are the source logs for Gassman's equation.
Porosity	Select either a constant porosity percent (most common), or derive the porosity percent from a density log. Note that a porosity log derived from a density log may not be accurate for zones in which gas is present.
Porosity units	Select a scale of either 0-10 or 0-100. GeoSyn analyses the data extents and picks the units that seem most likely, but you can override them if some aberrant data values cause GeoSyn to select the wrong units.
Output logs	Initially, these are copies of the input logs, to which you then apply fluid replacement changes. Specify <b>*Active</b> logs in the drop-down lists so that fluid replacement changes are automatically reflected in the current model.
Depth range KB	Do one of the following: Type start and stop depths and click <b>Update</b> . Click either <b>Top</b> or <b>Bottom</b> to select an absolute depth from the log, or click <b>All</b> to select both. Click <b>Range from tops</b> to select a zone of interest using the formation top names that also appear in the tops list selected in the <b>Top Properties</b> dialog box. <b>Tip:</b> You can also use your mouse pointer to drag a specific zone on the <i>Log Editor</i> to specify a zone of interest.

## Parent Topics

See "Modelling Fluid Replacement," p. 115

See "Fluid Replacement Tool Kit," p. 214

## Fluid Replacement Wizard (In-situ reservoir properties)

With this feature...	Do this...
Rock Matrix	Select the reservoir rock from the drop-down list to populate the Bulk modulus, Shear modulus, and Density fields with typical values, which you can change. When you change a value, the drop-down list above the Bulk modulus field displays <b>Custom</b> . For detailed derivations, click <b>Calculator</b> to display the <i>Minerals Calculator</i> dialog box and specify the mineral composition in your zone of interest.
Hydrocarbon	Select the hydrocarbon to populate the Bulk modulus and Density fields, which you can change. When you change a value, the drop-down list above the Bulk modulus field displays <b>Custom</b> . For detailed derivations, click <b>Calculator</b> to display the <i>Batzle and Wang Fluid Properties Calculator</i> dialog box and specify more precise values for your zone of interest.
Water/Brine	Select the reservoir fluid to populate the Bulk modulus, Density, and Water saturation fields, which you can change. When you change a value, the drop-down list above the Bulk modulus field displays <b>Custom</b> . For detailed derivations, click <b>Calculator</b> to display the <i>Batzle and Wang Fluid Properties Calculator</i> dialog box and specify values specific to your zone of interest. For the Water saturation value, instead of typing a value, you can instead drag the slider below the field. Note that the fluid average at the bottom of the dialog box changes as you change the water saturation percentage.
Fluid Average	Select <b>Reuss iso-stress</b> if fluid ratios are consistent in pores throughout the zone of interest; otherwise, select <b>Voight iso-strain</b> .

## Parent Topics

See "Modelling Fluid Replacement," p. 115

See "Minerals Calculator," p. 224

See "Batzle and Wang Fluid Properties Calculator," p. 199

See "Fluid Replacement Wizard (Input and output logs, depth range)," p. 191

## Fluid Replacement Wizard (Calibrate shear log for water saturations < 100%)

This dialog box only appears if the water saturation defined using the previous dialog box is less than 100%.

With this feature...	Do this...
Apply correction using Mavko's Procedure	It's recommended that you select this to compensate for the fact that the shear log is frequently derived from a sonic log using Castagna's formula. Castagna's formula requires a correction when gas is present in the zone of interest.
Edit	Click to display the <b>Edit the Derivation Equation for log</b> dialog box and change the formula.

### Parent Topics

*See "Modelling Fluid Replacement," p. 115*

*See "Edit the Derivation Equation for Log," p. 211*

## Fluid Replacement Wizard (FRM Modelling: Set new water saturation)

With this feature...	Do this...
New Water Saturation %	Drag the slider while viewing the effect in the <b>Log Editor</b> dialog box and in the model. Click <b>Apply</b> to save these changes to the log.

### Parent Topics

*See "Modelling Fluid Replacement," p. 115*

*See "Fluid Replacement Wizard (Calibrate shear log for water saturations < 100%)," p. 193*

*See "Fluid Replacement Wizard (In-situ reservoir properties)," p. 192*

## Import Wizard: Highlight first data line in red

With this feature...	Do this...
Display pane	Click the first line of data (not column headers) to import.

### Parent Topics

*See "Importing Tops from Fixed Width Files," p. 101*

*See "Importing Directional Surveys," p. 15*

*See "Import Wizard: Highlight last data line in red," p. 193*

*See "Importing Wavelets and Wavelet Sets," p. 133*

## Import Wizard: Highlight last data line in red

With this feature...	Do this...
Display pane	Click to define the last line of data to import.

## Parent Topics

See "Import Wizard: Highlight first data line in red," p. 193  
See "Import Wizard: Set column delimiters," p. 194

See "Importing Directional Surveys," p. 15  
See "Importing Wavelets and Wavelet Sets," p. 133

## Import Wizard: Set column delimiters

With this feature...	Do this...
Fixed width Tab Comma	Select the character used to separate values in the file being imported.
Display pane	Click to place a column delimiter (↑) before a column of data to import or double-click to remove an existing delimiter. Delimiters need to be placed on both the left and right of columns to import.
Identify for Import	Click and select the column type from the <b>Select from list</b> dialog box. Columns without headers aren't imported.

## Parent Topics

See "Import Wizard: Highlight last data line in red," p. 193  
See "Import Wizard: Finish," p. 194

See "Importing Directional Surveys," p. 15  
See "Importing Wavelets and Wavelet Sets," p. 133

## Import Wizard: Finish

With this feature...	Do this...
Display pane (for tops, check shot, and directional survey imports)	Review the data that will be imported and click <b>Back</b> to make any changes.
Start time End time Sample rate (for wavelet imports) Time data...	Type the interval time and sample frequency.

## Parent Topics

See "Importing Tops from Fixed Width Files," p. 101  
See "Importing Check Shot Surveys and Vertical Seismic Profiles," p. 18

See "Importing Directional Surveys," p. 15  
See "Import Wizard: Set column delimiters," p. 194

## Kingdom Data Browser (Import Log Data or Models)

With this feature...	Do this...
Get	<b>visible well list</b> - wells that appear on the Kingdom base map. Wells may be hidden from the Kingdom base map using Kingdom. <b>all</b> - all wells in the project database. Note that a large volume of wells may be associated with a given project.

Hide if Well	Filter the wells displayed in the well drop-down list above using the data associated with each well, and then click <b>Apply</b> .
Identify by	Select the columns to display in the <i>Model Options: Create a new model</i> box, and then click <b>Apply</b> . The order in which the columns appear can't be changed; however, to display a column as the left most column, clear the check box for all other columns so that only the desired column remains.
Create a New Model	Select the log to import into GeoSyn and upon which to base the synthetic.
Open an Existing Model	View models you've already created in GeoSyn for the existing well.

## Parent Topics

See "Launching GeoSyn from Kingdom," p. 28

## Kingdom Data Browser (Import Directional Surveys and Time Depth Charts)

With this feature...	Do this...
View Directional Survey	Click to view the directional survey that's automatically applied to the well (if available in the data).
Apply Time Depth Corrections to Synthetic	Apply a time depth chart that is created when working in a given area by tying logs to seismic using Kingdom. The time depth chart corrects the sonic log automatically created by GeoSyn by adjusting the sonic's time depth points. Click <b>View and Edit</b> to display the <i>Time Datum</i> dialog where you add an invisible log section above the synthetic. Alternatively, select <b>Hang synthetic...</b> and then click <b>Edit</b> to select a single depth on the wellbore to tie to the time on the seismic section. Selecting this option requires that you add an invisible log section above the synthetic in order to move it down, as logs don't typically run to surface where time zero is marked.
Set as Default	Select a well from the drop-down list from which to create the model and whether to use this well for future models.
Drift Correction	Correct the sonic by applying the variation between the time depth curve vs. the actual sonic and apply this to the synthetic using one of several methods.
Add Drift Curve to Display	For quality control, select whether to show the drift curve in the main synthetic window; otherwise it only exists temporarily in the computer's RAM.
Add the Time Depth Chart..	For quality control, select whether to convert the time depth points to depth vs. velocity and display the results in the main synthetic window. The resulting chart can be overlaid on the sonic to detect discrepancies between the two.

## Parent Topics

See "Launching GeoSyn from Kingdom," p. 28      See "Kingdom Data Browser (Import Log Data or Models)," p. 194

## Service Log Wizard: digitizing order information

With this feature...	Do this...
Contact Details	Type your contact information in the related fields.

### Parent Topics

## Service Log Wizard: Comments and curve selection

With this feature...	Do this...
Select curve type	Select the desired mnemonic from the drop-down list.
Additional curves, remarks	Type any special instructions.

### Parent Topics

See "Downloading Logs from the IHS Information Hub," p. 38

## Service Log Wizard: Select curves and digitizing range

With this feature...	Do this...
Digitizing range	Type the depth to digitize.
Digitize all curves on this service log	Click to digitize every curve on the service log.

### Parent Topics

See "Downloading Logs from the IHS Information Hub," p. 38

## Wavelet Extraction (Extraction Methods)

With this feature...	Do this...
Import	Click to launch the <i>Import Seismic Data</i> dialog box and navigate to a SEGY file to import. Once you select the SEGY file and click OK, the <i>Set Time Range</i> dialog box appears where you specify the time range and number of traces to sum.
Extraction Methods	Seismic Only - this is the default method that has historically been available in GeoSyn. Seismic Plus Reflection Coefficient Series - the tie between the seismic and the synthetic, which is created using the <i>Tie Seismic</i> dialog box, must be accurate before selecting either of these options.
Next	Click to display the <i>Wavelet Extraction (Processing Display)</i> dialog box.

### Parent Topics

See "Extracting Wavelets," p. 141

See "Wavelet Properties: Wavelet," p. 252

## Wavelet Extraction (Processing Display)

With this feature...	Do this...
Trace pane	View the model displayed in between a section of seismic on its left and right. Drag the green arrows (  ) up from the bottom or down from the top of the range.  For Walden White method, a bird's-eye view of the well surrounded by the seismic velocity appears above the model.
Model Traces	Select the number of traces to include from the model. For either of the Seismic Plus Reflection Coefficient Series options, use the check box to specify whether to include the optimum shift determined by GeoSyn.
Extracted Wavelet pane	Display the wavelet or a spectrum. Select the length of the wavelet to display. Phase can be changed for <i>Frequency Extraction</i> method only. Select whether to use both the Sonic and Density logs to derive the wavelet. Clear one of these check boxes where the resulting log is inaccurate.  For Seismic Only method, select how to sum and average traces.  For Weiner Levinson method, drag the <i>Time Shift...</i> slider to shift the log relative to the seismic in order to improve the tie. As you drag the slider, the model shifts in relation to the seismic in the left-most display pane of the Frequency Wavelet Extraction dialog box.
Seismic Selection pane	Type a range in the <i>Extraction Time Range</i> boxes to change the length of the wavelet to extract. This same functionality is available by dragging the green arrows (  ) up or down in the <i>Trace</i> pane above.  Select whether the seismic traces that are used from the seismic section are those that appear closest to the well of all the traces in the seismic, and then type the number of traces to use. Specify a specific radius from which to accept traces to omit traces that are too far away. This is the most common option. A number appears to the left of the box where you typed that indicates how many traces fall within that range. Or click <i>Trace Range</i> and search in a range that does not necessarily include the nearest traces.
Next	Click to display the <i>Wavelet Extraction (Save Options)</i> dialog box.

## Parent Topics

See "Extracting Wavelets," p. 141

See "Wavelet Properties: Wavelet," p. 252

See "Wavelet Extraction (Extraction Methods)," p. 196

## Wavelet Extraction (Save Options)

With this feature...	Do this...
Wavelet Name and Comment	Type the name and comment associated with this wavelet in various places throughout GeoSyn.

Replace Model Wavelet(s)	Select a current model(s) in the display pane below, and then click to overwrite its wavelets. CTRL+Click or SHIFT+Click for multiple selection.
Add to Library	Add to the <i>wavelet library</i> .
Export to File	Export to a SEGY file.
Apply time shift	This option appears when the model is moved in relation to the seismic using the slider at the bottom of <i>Extracted Wavelet</i> pane in the prior dialog box. This shift can be permanently applied to the synthetic or simply used to extract the wavelet and then abandoned.

## Parent Topics

<i>See "Extracting Wavelets," p. 141</i>	<i>See "Exporting Wavelets," p. 182</i>
<i>See "Wavelet Extraction (Processing Display)," p. 197</i>	<i>See "Wavelet Properties: Wavelet," p. 252</i>
<i>See "Importing Wavelets and Wavelet Sets," p. 133</i>	

## AVO log suite

With this feature...	Do this...
Log type	Select the log type to create.
Derive from	Select to derive the log using industry standard formulas, which you can modify by clicking <b>Edit</b> to display the <b>Edit the Derivation Equation for log</b> dialog box. Clearing both the <b>Derive from</b> and <b>Maintain link</b> checkboxes, creates a straight line log.
Maintain link	Ensure this checkbox is cleared so that the parent log doesn't overwrite changes you make to the derived log.

## Parent Topics

<i>See "Modelling Fluid Replacement," p. 115</i>	<i>See "Fluid Replacement Tool Kit," p. 214</i>
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## Batch Printing

With this feature...	Do this...
Add files	Click to browse for GeoSyn files to print.
Remove All	In the display pane, select files to delete and click <b>Remove</b> , or click <b>All</b> to clear the entire display pane.
Display pane	Click <b>Add files</b> to populate this pane and if required, select files to remove then click <b>Remove</b> . SHIFT+CLICK or CTRL+CLICK for multiple selection.
Original parameters	Click to print the synthetic using the default file that was automatically saved along with the synthetic. The default file includes key parameters such as layout, sample rate, vertical plotting scale, and more.
Import default file	Click to display a list of default files in the GeoSyn <i>Working</i> directory and select one to apply to the entire batch of files while printing to ensure consistent presentation. This file won't alter the saved GeoSyn files.

Fit to selected paper width	Click to cause a step-by-step reduction in the size of the synthetic (by turning off display options and switching to composite log display) until the synthetic is scaled down to match the selected printer page. Left to right printer page pagination is cleared.
Print Setup	Click to display the <i>Print Setup</i> dialog box and select printing options.

## Parent Topics

<i>See "Printing Synthetics," p. 171</i>	<i>See "Print Setup," p. 232</i>
<i>See "Open a GeoSyn format file," p. 230</i>	<i>See "Open an LAS format file," p. 231</i>
<i>See "Directory Browser," p. 206</i>	

## Batch reformat

With this feature...	Do this...
Add files	Click to display the <b>Open an LAS format file</b> or <b>Open a GeoSyn format file</b> dialog box and browse for the files to reformat.
Remove All	Either select individual files in the display pane and click <b>Remove</b> , or click <b>All</b> to clear the entire display pane.
Display pane	Click <b>Add files</b> to populate this pane and if required, select files to remove then click <b>Remove</b> . SHIFT+CLICK or CTRL+CLICK for multiple selection.
Search for selected curve types	If you selected <b>LAS to GeoSyn reformat</b> , select the log type(s) to include in the final GeoSyn file. SHIFT+CLICK or CTRL+CLICK for multiple selection.
LAS to GeoSyn reformat	Select whether to convert LAS files to GeoSyn format or to convert GeoSyn files to LAS format.
GeoSyn to LAS reformat	LAS files contain raw log data and no formatting information.
If sonic unavailable create constant velocity sonic	If you selected <b>LAS to GeoSyn reformat</b> , select to create a constant velocity sonic log. If GeoSyn can't find a sonic log in a selected file and this option is cleared, it ignores the entire file.
Rename output files using UWI	Select whether to replace the file name with the UWI. To determine which UWI formats GeoSyn converts, select <b>Edit &gt; Well and log properties</b> , and then click <b>Edit</b> beside the UWI box.
Store new GeoSyn files in	Accept the default directory or click browse (  ) to select a different location to write the reformatted files.

## Parent Topics

<i>See "Reformatting GeoSyn and LAS Files," p. 172</i>	<i>See "Open an LAS format file," p. 231</i>
<i>See "Open a GeoSyn format file," p. 230</i>	

## Batzle and Wang Fluid Properties Calculator

With this feature...	Do this...
Top portion of dialog box	Specify the pressure, temperature, and salinity of the reservoir.

Hydrocarbon	Specify whether the reservoir includes gas (most common), and the specific gravity for the hydrocarbons. To simulate dead oil (oil without the presence of gas), reduce the GOR to zero. <b>Note:</b> Click <b>Close</b> to preserve the values you've specified, or click <b>Cancel</b> to restore the previous values.
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## Parent Topics

See "Modelling Fluid Replacement," p. 115    See "Fluid Replacement Wizard (In-situ reservoir properties)," p. 192

## Catalog display options

With this feature...	Do this...
Curve Information Options	Toggle the data type to display.
Well Sorting Order	Toggle whether to sort the <i>Online Data Search Wizard: Select Data from Catalog</i> display pane by UWI (and click $\diamond$ to transpose columns on either side of the $\diamond$ ), or by subsurface or kelly bushing depth.

## Parent Topics

See "Downloading Logs from the IHS Information Hub," p. 38    See "Data Search Wizard: Select data from catalog," p. 190

## Clip or filter the log

With this feature...	Do this...
Select Logs	Select the log to clip or filter.
Clip and Replace	Select to replace values outside of a defined range with specified minimum and maximum values.
DeSpike	Select to replace spikes outside of a defined range with data values interpolated from the last good data point.
Median Mean Triangular filter	Select to average the number of samples defined in the <b>Operator length</b> box by the value that appears exactly in the middle of all the values within that group when sorted from smallest to largest (median), the value derived from the sum of all values within a group and divided by the number of values within that group (mean), or the value between three points (triangular). Type a small Operator length (7 to 15 samples) for de-spiking and a large Operator length (>100) to achieve an approximation of a blocked log.
Select depth range KB	Do one of the following: Type start and stop depths and click <b>Update</b> . Click either <b>Top</b> or <b>Bottom</b> to select an absolute depth from the log or click <b>All</b> to select both. Click <b>Depths from tops</b> to select a range using the formation top names that also appear in the tops list selected in the <b>Top Properties</b> dialog box.

## Parent Topics

*See "Clipping or Filtering Logs," p. 72*

## Comments

With this feature...	Do this...
Insert Well History	Click to place a listing of the historic operations that have been performed on a well into the display pane. Modify, supplement, and remove details as required using the display pane.
Copy   Paste	Pasted items saved to the Windows Clipboard or select text in the display pane and press Copy to then paste them into a third-party application.
Delete All	Clear the display pane.

## Parent Topics

*See "Displaying Comments," p. 130*

## Common Offset Stack

With this feature...	Do this...
Time range	Type the start and stop time range to import.
Trace range	Type the trace range to import. For example, to include traces in a specific pane such as near a well. You may need a shot point map to determine the range to include.
Offsets	Select whether to move in positive, negative, or both directions when summing the traces. Instead of summing traces with matching sub-surface points, GeoSyn sums traces with matching offsets.

## Parent Topics

*See "Importing Seismic Data," p. 147*

*See "Changing Seismic Properties," p. 149*

## Correlation window stretch and squeeze

With this feature...	Do this...
Slider	After defining the top and bottom of the area to stretch or squeeze by clicking on the correlation display window, drag the slider to elongate or compress the selected area by time or depth.
Taper	Select the percentage of samples over which to apply a taper. This prevents the creation of a new reflection coefficient (and therefore reflection) at the top and bottom of the window. The number of samples is defined by the start and stop depth selected.
Max Str/Sqz 2way ms	Increase the amount that the correlation can be stretched and squeezed.

Minimum Sonic   Maximum sonic	Type limits the sonic transit value should not exceed while stretching or squeezing.
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## Parent Topics

See "Correlating Logs and Traces," p. 166

## Correlation Window: Log

With this feature...	Do this...
Display in Time   Display in Depth	Select whether to display in time or depth regardless of the mode selected in the main display.
Log properties	Click to display the <i>Well Properties: Log Properties</i> dialog box and adjust log display properties.
Log editing	Click to display the <b>Log Editing</b> dialog box and modify log readings.
Tops properties	Click to display the <b>Top Properties</b> dialog box and adjust tops properties.
Names   Tops	Click whether formation top names and markers appear in the <b>Correlation window</b> . After clicking once to display the top name, you can click the button a second time to highlight the names so they're easier to see.
Vertical scale   Show full time range	Type the amount by which to expand or contract the trace to fit the current <b>Correlation window</b> height, and whether to use a scale of 10 or 100 milliseconds. You can control whether the linear scale is based on time or depth using the <i>Vertical Scale</i> pane of the <i>Synthetic Properties</i> dialog box.
Stretch and Squeeze	Click to display the <b>Stretch and Squeeze</b> dialog box and adjust the log length and width.
Transparency	Drag the slider to change the opacity of the Correlation window to control whether details underlying the Correlation window are visible.
Maximize	Set the Correlation window to the full size allowed by the monitor.

## Parent Topics

See "Correlating Logs and Traces," p. 166

See "Synthetic Properties," p. 243

## Correlation Window: Trace

With this feature...	Do this...
Display in Time   Display in Depth	Select whether to display in time or depth regardless of the mode selected in the main display.

Trace properties	Click to display the <b>Model Properties</b> dialog box and adjust model display properties.
Wavelet properties	Click to display the <b>Wavelet Properties</b> dialog box and adjust wavelet display properties.
Tops properties	Click to display the <b>Top Properties</b> dialog box and adjust tops properties.
Names   Tops	Click whether formation top names and markers appear in the <b>Correlation window</b> . After clicking once to display the top name, you can click the button a second time to highlight the names so they're easier to see.
Vertical scale   Show full time range	Type the amount by which to expand or contract the trace to fit the current <b>Correlation window</b> height, and whether to use a scale of 10 or 100 milliseconds. You can control whether the linear scale is based on time or depth using the <i>Vertical Scale</i> pane of the <i>Synthetic Properties</i> dialog box.
Stretch and Squeeze	Click to display the <b>Stretch and Squeeze</b> dialog box and adjust the trace length and width.
Transparency	Drag the slider to change the opacity of the Correlation window to control whether details underlying the Correlation window are visible.
Maximize	Set the Correlation window to the full size allowed by the monitor.
Phase sliders	Click and hold a slider while dragging to change the amplitude and phase.

## Parent Topics

See "Correlating Logs and Traces," p. 166  
See "Synthetic Properties," p. 243

See "Stretch/squeeze log curves in time," p. 241

## Create Correlation Window(s)

With this feature...	Do this...
Display pane	Select the traces or logs to display in a correlation window. SHIFT+CLICK or CTRL+CLICK for multiple selection. Multiple correlation windows are locked and some operations performed on one affect all.

## Parent Topics

See "Correlating Logs and Traces," p. 166

## Create New Curve Type

With this feature...	Do this...
Name	Type a descriptive name that appears above the log in the main synthetic display.
API number	Type the API number.
Alias	Either type a name in the adjacent box and click <b>Add</b> to include it in the list of aliases associated with the log type or select an alias to remove from the associated aliases and click <b>Delete</b> . Generally, it's best to have as many aliases associated with a log type as possible so they don't have to be added when importing a GeoSyn or LAS file.

Curve infill	Select whether to display a scaled color or lithology. For lithology to appear in the main synthetic display, formation lithologies must also be configured in the <b>Top Properties</b> dialog box.
Infill orientation Infill palette Trace	Select whether to fill the left or right side of the log, the color palette to use (if scaled color is selected instead of lithology above), and display properties for the trace line itself.
Metric to Imperial conversion factor	Type a conversion factor.
Track width	Type the desired track width to display in the main synthetic display.
Lines Type	Select the line type to display and whether to display them in the foreground, background, or not at all.
Auto range	Select to automatically adjust scales to actual data limits.

## Parent Topics

*See "Correcting Invalid Data when Importing," p. 24*

*See "Well Properties: Log properties," p. 253*

## Crossplot Properties: Controls

With this feature...	Do this...
Labels	Clear the check box and type different text you want to appear in the main display.
Highlight data window	Select whether an outline in the main display shows the portion of the synthetic on which the crossplot is based. Click <b>Edit</b> to display the <i>Define Data Window</i> dialog box and specify the depth or time upon which to base the crossplot.
Trend line	Select whether to display a linear regression trend line on the crossplot.
Symbols	Select the symbol size, color scheme, and data to which to link scatter points. Depending on the Color Reference type selected, when you click <b>Color</b> to display the <i>Edit Color Palette</i> dialog box, a Histogram pane in the <i>Edit Color Palette</i> dialog box enables you to set the min max color nodes and thus control how much of the color spectrum is used across the data. When <i>Depth</i> is specified as the <i>Color reference</i> , the histogram doesn't appear in the <i>Edit Color Palette</i> dialog box.
Width/Height	Type the crossplot dimensions and click <b>Update</b> .

## Parent Topics

*See "Creating Crossplots," p. 156*

*See "Exporting Crossplots," p. 175*

*See "Edit color palette," p. 208*

## Crossplot Properties: Color Mapping

With this feature...	Do this...
Enable color mapping	Select whether to display the Gradational or Blocked color coding in the Crossplot Viewer.
Brush	Click to display a dialog box from which you select the desired color for either the gradational or block fill (depending on your selection above).
Columns Rows	Type the number of segments into which to divide the canvas horizontally and vertically.
Link list	Click the synthetic or log on which to display the data point highlighting.

## Parent Topics

*See "Creating Crossplots," p. 156*

### Crossplot Properties: Enclosures

With this feature...	Do this...
polygon	Click <b>Start</b> and then click to define the anchor points of your polygon on the crossplot canvas. Click <b>End</b> to complete and automatically enclose the polygon.
ellipse	Type a value in the eccentricity box below then click <b>Start</b> and click to anchor one end of the ellipse. Move your mouse to the other desired end of the ellipse and click to anchor that point.
Eccentricity	Type a decimal value from 0.01 to 0.99 where 0 represents a circle and 0.99 represents an ellipse. Typing 1 draws a line instead of an ellipse.
Name	Type a meaningful name for the selected annotation(s), and then click <b>Update</b> .
Color	Click <b>Outline</b> , <b>Infill</b> , or <b>Both</b> and select the desired color for the selected annotation(s).
Enclosure list	Click <b>Show</b> to display the selected annotation in the Crossplot Viewer.
Link list	Click the synthetic or log on which to highlight the data points encompassed by an annotation.

## Parent Topics

*See "Annotating Crossplots," p. 162*

*See "Creating Crossplots," p. 156*

### Crossplot Properties: X and Y Axis

With this feature...	Do this...
Data	Click Edit to select different series data for the X or Y axis.
Swap axis	Click to switch the X and Y axis.
Auto	Clear to specify a axis label, units, values, grid options, and scale type other than that automatically calculated by GeoSyn based on the crossplot data.

## Parent Topics

*See "Creating Crossplots," p. 156*

### Cut

With this feature...	Do this...
Depth range	Type the start and stop depth to remove from the log, click <b>Top</b> or <b>Bottom</b> to select either the absolute top or bottom of the log, or click <b>Depths from tops</b> to specify a zone of interest using tops selected for display in the <b>Tops Properties</b> dialog box.

Drop top of log	Select whether to lower the start depth or raise the stop depth to compensate for the cut portion. Depending on your selection, all log data either above or below the cut portion is shifted.
Raise bottom of log	

## Parent Topics

See "Cutting Logs," p. 78

## Define Data Window

With this feature...	Do this...
Sample	Select a sample range to plot. Time samples are used for time plots and depth samples are used for depth plots.
Time	Select a time range to plot.
Depth	Select a depth range to plot based on Kelly Bushing depth.
Top	Select a depth range to plot based on formation tops.

## Parent Topics

See "Creating Crossplots," p. 156

See "Crossplot Properties: Controls," p. 204

## Directory Browser

With this feature...	Do this...
Survey system tabs	Click to select the appropriate survey system. All files with either a <i>.syn</i> or <i>.las</i> extension (depending on how you launched this dialog box) appear in the <i>Labels</i> tab, regardless of whether they include a valid UWI.
Display pane	Click a column header to sort rows based on the values in that column. Click  to transpose the columns on either side of it. Right-click a file to view basic log details in a popup window.
Filter	Select then click <b>Edit</b> , which appears beside the <b>Filter</b> box, to display the <i>Edit a UWI</i> dialog box and specify the geographic coordinates within which to display UWIs in the <i>Directory Browser</i> display pane.
Report	Click to display the <i>Browser report</i> dialog box then click <b>Save Report</b> to save the above display to an ASCII format file.
Restore order	Click to restore the original horizontal and vertical column order.
Open	Click to open the file selected in the display pane above. If <i>Directory Browser</i> is opened from the <i>Import log data</i> or <i>Open a GeoSyn format file</i> dialog boxes, you can only select one file. If it's launched from the <i>Batch printing</i> or <i>Batch reformat</i> dialog boxes, you can select multiple files. SHIFT+CLICK or CTRL+CLICK for multiple selection.

## Parent Topics

See "Using Directory Browser," p. 9  
See "Importing LAS or GeoSyn Files," p. 13

See "Opening GeoSyn Synthetics," p. 7  
See "Import log data," p. 215

## Edit a UWI

With this feature...	Do this...
Survey system pane	Click the desired survey system tab and then type coordinates for either a UWI or UWI range (depending on how you launched this dialog box). Type ?? as a wildcard when a specific value is unknown.

## Parent Topics

See "Changing Well Display Properties," p. 45  
See "Launching GeoSyn using AccuMap," p. 31  
See "Directory Browser," p. 206  
See "Synthetic Properties," p. 243

See "Using Directory Browser," p. 9  
See "Downloading Logs from the IHS Information Hub," p. 38  
See "Data Search Wizard: Search locations and ranges," p. 189  
See "Well Properties: Well properties," p. 254

## Log Equation Library

With this feature...	Do this...
API number	Type the API number.
Alias	Either type an alias in the box above the Add button and then click <b>Add</b> to include it in the <b>Alias</b> list, or select an alias in the <b>Alias</b> list and click <b>Delete</b> . Deleting aliases may prevent GeoSyn from recognizing the aliases of imported logs in the future.
Curve infill	Select whether the log is colored with a scaled gradient or based on lithology. Even with lithology selected, the lithology of formation tops must be configured in the <i>Top Properties</i> dialog box before it appears in the main synthetic display.
Infill orientation Infill palette	Select whether the positive or negative portion of the log is colored. Custom color palettes aren't available for default curve types.
Trace	Select the display properties.
Metric to Imperial conversion factor	Type the factor with which to convert Metric to Imperial.
Track width	Type the desired track display width.
Lines Type	Select whether lines appear on the log and whether they're logarithmic or linear.
Auto range	Select to automatically adjust scales to data limits or clear and type custom minimum and maximum values.
Display in velocity units (for sonic logs)	Select whether to display the log in velocity units and type the range.

## Parent Topics

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### Edit color palette

With this feature...	Do this...
Histogram (appears for models and some cross plots)	View where amplitudes in the selected model fall. A histogram is a density graph, with amplitude range along the vertical scale and bins along the horizontal scale. Seeing where the amplitudes cluster enables you to tailor the color display accordingly so that a fuller color spectrum is expressed in the model or cross plot. This is done by dragging the min max colors closer to the bottom and top of where most of the amplitude data falls. Note that for cross plots, the color reference type specified in the cross plot dialog box determines whether the histogram pane appears. For logs, colors are typically associated with particular values based on lithology so it's not possible to override this by dragging the min max color nodes for logs.
Palette	Hover the cursor over an adjacent node until the cursor becomes a square then click and hold the mouse button while dragging the color node up or down to move the corresponding color.
Palette Name	Type a unique name by which to save the current palette configuration in the GeoSyn <i>Working</i> directory then click <b>Save</b> .
Palette selection	Either select a default palette that shipped with GeoSyn or click <b>Load</b> to browse to and select a custom palette you previously created.
Drag and drop node colors	Click and hold the mouse button on a color then drag it onto either the color bar or onto a node adjacent to the color bar and release the mouse button. If you release the color on the color bar, a new corresponding node for that color appears beside the color bar.
Custom colors	Click  to display the <i>Custom Colors</i> dialog box where you click the color to set as a custom color, and then drag the color to the desired location on the Palette strip to apply it. Custom colors are set in the registry so that they persist across GeoSyn sessions.
Nodes	Select from the following: <b>Add</b> to place additional nodes beside the color bar on which you can drop colors. <b>Remove</b> to delete the last node placed. <b>Flip</b> to flip the color bar on its center horizontal axis. <b>Even</b> to evenly disperse the existing nodes along the color bar. <b>Rotate</b> to shift all the colors one node down. The bottom node becomes the top node.
Color Interpolation style	Select whether to display a color gradient or solid color blocks.
Frequency	Select so that the center of the palette is anchored to the center of the amplitude data. Clear to skew the coloring of the amplitude points. You might choose to skew the coloring for logs, but not likely for models. Click <b>All</b> to return the min max colors to the bottom and top of the histogram.
None	Click to remove all color from the color bar.

## Parent Topics

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See "Changing Color Palettes," p. 128  
See "Creating Models," p. 108

See "Changing Log Display Properties," p. 50  
See "Creating Crossplots," p. 156

## Edit Default Display Properties

With this feature...	Do this...
API number	Type the API number.
Equation log reference	Displays the log reference. It's this name that you select when building equations using the Log Equation library.
Edit equations	Click to launch the <i>Log Equation Library</i> dialog box where you can apply mathematical equations to the current curve type.
Alias	Either type an alias in the box above the Add button and then click <b>Add</b> to include it in the <b>Alias</b> list, or select an alias in the <b>Alias</b> list and click <b>Delete</b> . Deleting aliases may prevent GeoSyn from recognizing the aliases of imported logs in the future.
Curve infill	Select whether the log is colored with a scaled gradient or based on lithology. Even with lithology selected, the lithology of formation tops must be configured in the <b>Top Properties</b> dialog box before it appears in the main synthetic display.
Infill orientation Infill palette	Select whether the positive or negative portion of the log is colored. Custom color palettes aren't available for default curve types.
Trace	Select the display properties.
Metric to Imperial conversion factor	Type the factor with which to convert Metric to Imperial.
Track width	Type the desired track display width.
Lines Type	Select whether lines appear on the log and whether they're logarithmic or linear.
Auto range	Select to automatically adjust scales to data limits or clear and type custom minimum and maximum values.
Display in velocity units (for sonic logs)	Select whether to display the log in velocity units and type the range.

## Parent Topics

See *"Changing Log Defaults,"* p. 48  
See *"Log Equation Library,"* p. 220

See *"Properties: Log Library,"* p. 234

## Edit EBCDIC Header

With this feature...	Do this...
Display pane	Select a value to change and then click <b>Update</b> .

## Parent Topics

See *"Importing Seismic Data,"* p. 147

See *"SEG Y Viewer,"* p. 235

## Edit Lithology

With this feature...	Do this...
Display pane	Select the lithology for which to change the color.
Edit color	Click to display the <i>Color</i> palette and using the <i>Color</i> palette, click the desired color for the lithology selected in the Edit Lithology display pane above. You can also click <b>Define Custom Colors</b> to create a color that doesn't already appear in the <i>Basic colors</i> options. The new color is applied to the lithology type throughout this and future cross sections.

## Parent Topics

<i>See "Changing Tops Properties," p. 92</i>	<i>See "Top Properties," p. 248</i>
<i>See "Duplicating Tops Lists," p. 95</i>	<i>See "Importing Tops from Delimited Files," p. 99</i>
<i>See "Importing Tops from Fixed Width Files," p. 101</i>	<i>See "Importing Tops from GeoSyn Files," p. 99</i>
<i>See "Importing Tops from LAS and ASCII Files," p. 106</i>	

## Edit the Derivation Equation

With this feature...	Do this...
Equation options panes	Drag terms into the Metric or Imperial equation box or simply use the panes for reference as you type directly in the Metric and Imperial boxes.
Velocity   Transit output (only appears for Sonic and Shear sonic curve types)	Select the output type. Internally, GeoSyn interprets sonic logs in transit format.
Metric   Imperial	Drag terms from the equation options panes or simply type in these boxes. You must define each of these, although they can be identical. Click <b>Down</b> or <b>Up</b> under the Copy option to quickly copy a created equation into the blank box so that you can modify it.
Description	Type a description for the equation.
Equation library reference	Select a function from the library to modify. The first drop-down list box is relevant to the current log. The second drop-down list box includes all equations in the library, which may not be relevant to the current log.
Edit library	Click to display the <i>Log Equation Library</i> dialog box.
Add to library	Click to add this equation as a user equation in the function library. This is particularly helpful to add equations you've created in the past to the function library without having to retype the entire equation from scratch.
Color code the equations	Select whether equation terms are colored red, green, and blue. If selected, when you type terms in the Metric or Imperial boxes, GeoSyn applies the default colors to what you type.

## Parent Topics

<i>See "Applying Math Equations to Logs," p. 75</i>	<i>See "Log Equation Library," p. 220</i>
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## Edit the Derivation Equation for Log

With this feature...	Do this...
Equation	Modify the formula.
Function library	Select a different library to display a different formula, or if you've modified the equation, select a library to revert to the original formula.

## Parent Topics

See "Modelling Fluid Replacement," p. 115

See "AVO log suite," p. 198

See "Fluid Replacement Wizard (Calibrate shear log for water saturations < 100%)," p. 193

## Enhanced Metafiles properties

With this feature...	Do this...
Display pane	Click the <b>Show</b> column to toggle whether an image appears in the current synthetic or is merely saved along with it for future use. Select a row to change, delete, duplicate, or export the corresponding image. SHIFT+CLICK or CTRL+CLICK to select multiple rows.
Duplicate	Click to make a second copy of the image selected in the display pane in the current synthetic.
Export	Click to output the image selected in the display pane to disk in .emf format.
Import Paste from clipboard	Click to import a file from disk saved in .emf format, or to paste a metafile image copied to your Windows clipboard from any application when you pressed ALT+PRINT SCRN.
Label	Type a more descriptive reference for the image selected in the display pane above.
Positioning	Select whether the image is fixed in the upper right corner (banner), movable but wrapped by adjacent items, or movable and layered over other synthetic elements.
Size	Toggle whether to maintain the image proportions then type a desired height or width, or click and hold the mouse button while dragging one of the image's handles in the main synthetic display. You can click <b>Restore original size</b> even after resizing an image multiple times to restore it to the originally imported size.

## Parent Topics

See "Importing and Exporting Images," p. 173

See "Changing the Main Synthetic Display," p. 43

See "Synthetic Properties," p. 243

## Export Manager: Crossplots

With this feature...	Do this...
Display pane	Select the crossplot to write to a .csv file of X Y coordinates. You can only export one crossplot at a time.

## Parent Topics

*See "Exporting Crossplots," p. 175*

### Export Manager: Logs depth

With this feature...	Do this...
Display pane	Select the log to write to an ASCII LAS or SEGY format file. You can only export one log at a time.
Export transit data in velocity units	Select whether to display units in microseconds per meter for a velocity curve or meters per second for standard LAS format.
Reset log aliases to workstation friendly	Select to set the alias for exported sonic, density, and gamma ray logs to DT, RHOB, and GR to facilitate importing those logs into other applications. For example, if the alias for a sonic in GeoSyn is DTXY, selecting <b>Workstation friendly</b> converts it to DT on export.
Include tops list in file	Select whether to write the current top names and depths to the export file.
Include GeoSyn well editing history (LAS export only)	Select whether the date, time, and description of changes made to a log using the Log Editor are written in the non-standard section of the exported LAS file below the header.

## Parent Topics

*See "Exporting Logs," p. 178*

### Export Manager: Logs time

With this feature...	Do this...
Display pane	Select the log to write to an LAS or SEGY format file. You can only export one log at a time.
File format	Select whether to export the log as a fixed format, column-ordered, ASCII format file for importing into spreadsheets, or as a SEGY binary file for importing into a geophysical workstations.
Duplicates	Type a value greater than one to export a number of traces to a SEGY file that you then import into GeoSyn.
Export transit data in velocity units	Select whether to display units in microseconds per meter for a velocity curve or meters per second for standard LAS format.

## Parent Topics

*See "Exporting Logs," p. 178*

### Export Manager: Time/Depth

With this feature...	Do this...
Display pane	Select the row with the time/depth log to write to an ASCII format file.

Depth Increment	Type the depth increment along which readings are plotted.
Auto-block by Culling Values from the Time-Depth Curve that Exceed	Type the sonic log values above which to block when creating the time/depth chart. This function is based on sonic transit time calculations and uses the time depth log generated from the main sonic log. Culling works as follows: GeoSyn first works down the log to determine the average velocity, and then working down the log again, sums the time. While drawing the log as blocks, where the actual time minus the calculated time over a given depth range using the average velocity exceeds the culling value, the current log block is ended and a new block is started.
Block at a Constant Interval	Type a depth interval increment at which to ignore values in order to create a coarser time depth chart.
Time	Specify whether the time scale is seconds or milliseconds.
Delimiter	Select whether a comma or space defines individual data items in the file.

## Parent Topics

*See "Exporting Time/Depth," p. 185*

## Export Manager: Models

With this feature...	Do this...
Display pane	Select the model to write to an ASCII or SEG-Y format file. You can only export one model at a time.
File format	Select whether to export the model as a fixed format, column-ordered, ASCII format file for importing into spreadsheets, or as a SEG-Y binary file for import into a geophysical workstation.

## Parent Topics

*See "Exporting Models," p. 179*

## Export Manager: Seismic

With this feature...	Do this...
Display pane	Select the seismic trace to write to a SEG-Y format file. You can only export one seismic trace at a time.

## Parent Topics

*See "Exporting Seismic," p. 181*

## Export Manager: Tops

With this feature...	Do this...
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Display pane	Select the row with the list of tops to write to an ASCII format file. You can only export one tops list at a time.
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## Parent Topics

*See "Exporting Tops Lists," p. 183*

## Export Manager: Wavelets

With this feature...	Do this...
Display pane	Select the wavelet to write to an ASCII or SEG Y format file. You can only export one wavelet at a time.
File format	Select whether to export the wavelet as a fixed format, column-ordered, ASCII format file for importing into spreadsheets, or as a SEG Y binary file for import into a geophysical workstation.

## Parent Topics

*See "Exporting Wavelets," p. 182*

## Export to Petra Project

With this feature...	Do this...
Export to Petra project located at	Click <b>Edit</b> and select the directory to which to export the project. The default project is the project directory specified by PetraSeis when you used PetraSeis to create a synthetic in GeoSyn.
GeoSyn format file	Select whether to export a .syn file.
Synthetic image	Select whether to export an .emf file.
LAS format file	Select whether to export an LAS file , and if so, select the logs to include in the LAS file using the LAS display pane.
SEG Y format models	Select whether to include a SEG Y file, and if so, select the model to include in the SEG Y file using the SEG Y display pane.

## Parent Topics

*See "Exporting to Petra," p. 180*

## Fluid Replacement Tool Kit

With this feature...	Do this...
Create	Click to display the <b>AVO log suite</b> dialog box and derive the logs required as input logs for fluid replacement modelling from other logs in your model. For example, the shear log is typically derived from the sonic log.
Duplicate	Click to create exact copies of existing logs in your model for the input logs.

Hide new input logs	Click this to prevent the newly created input logs from appearing on your model.
Copy data	Click to synchronize the output logs with the original input logs. For example, if you've substantially changed data such as the depth range. This button is the equivalent to Undo.

## Parent Topics

*See "Modelling Fluid Replacement," p. 115*    *See "Fluid Replacement Wizard (Input and output logs, depth range)," p. 191*  
*See "AVO log suite," p. 198*                      *See "Notes on GeoSyn Fluid Replacement," p. 121*

## GeoSyn Settings

With this feature...	Do this...
Logs	Select the Log(s) to export to GeoSyn. SHIFT+Click and CTRL+Click for multiple selection.
Tops	Select the tops to export to GeoSyn. SHIFT+Click and CTRL+Click for multiple selection.
Active	Select whether to include only the active curves and horizons, providing they are already defined in Petra.

## Parent Topics

*See "Launching GeoSyn using PetraSeis," p. 34*

## Import data for Well

With this feature...	Do this...
Petra export	Select the well and logs to import into GeoSyn.
Petra/GeoSyn project folder	Select any data included in the PetraSeis folder that may be used in GeoSyn.
Other data	Select data such as seismic lines, and directional surveys.
Import depth increment	Select the imported log from which to use the desired depth increment.

## Parent Topics

*See "Launching GeoSyn using PetraSeis," p. 34*

## Import log data

With this feature...	Do this...
Recent	Displays the last five logs imported.
Display pane	Select the LAS or GeoSyn file with data to import.
GeoSyn/LAS format file	View basic log details about the file selected in the display pane above.

Restrict depth range	Click to display the actual depth specified in the file and then type different values in the adjacent boxes to change the zone of interest.
Import data is TVD corrected	Select whether the log is recorded in Measured Depth or True Vertical Depth so GeoSyn places the tops loaded from the local AccuMap system and user databases at the correct depth.
File filter	To limit the file types in the display pane above, from the drop-down list select either <b>*.syn</b> or <b>*.las</b> .
File viewer	If importing data from an LAS file, click to launch the file selected in the display pane above in an ASCII text editor to verify or modify its contents before importing.
Browse dir. Browse sub-dir	Click to display Directory Browser displaying LAS and GeoSyn files in either the current directory or in the current directory and all its subdirectories too.
Import	Create a synthetic using the file selected in the display pane above and based on the import defaults file settings.

## Parent Topics

*See "Using Directory Browser," p. 9*  
*See "Creating Log Composites," p. 81*

*See "Importing LAS or GeoSyn Files," p. 13*

## Import seismic data

With this feature...	Do this...
Recent	Displays the last five seismic files imported.
Display pane	Select the <i>.sgy</i> file to import.
File details	Basic file information appears for the file selected in the display pane above.
Import	Click to import the file selected in the display pane above.
SEGY Viewer	Click to launch a SEGY Viewer to view header, trace, and format data for the file before importing, or to locate problems that affected a previous import. Seismic file data can't be modified using this viewer.

## Parent Topics

*See "Importing Seismic Data," p. 147*

## Import Tops

With this feature...	Do this...
Recent	Displays the last five Tops files imported.
Top depth placement	Select whether to space tops evenly or according to the Kelly bushing or subsea. If based on depth, tops outside of the depth range of the model aren't placed.
Bulk shift top depths by + -	Type a negative or positive value by which to shift the top depth.
Import top depths units	Select the measurement system GeoSyn is using.
Delete current tops before importing new tops	Select to delete all tops in the tops list to which tops will be imported. If this checkbox is cleared, tops with the same name in the donor and recipient list appear twice in the recipient list.

File viewer	If importing an ASCII format file, select the file and then click to display the file contents in an ASCII text editor.
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## Parent Topics

See *"Importing Tops from LAS and ASCII Files," p. 106*

See *"Importing Tops from GeoSyn Files," p. 99*

## Import Wavelet Processing Flow

With this feature...	Do this...
Apply taper during import	Select whether to apply tapering during import. Although optional, if non-zero data is encountered near the end of an imported trace, spurious high-frequency energy may appear in the wavelet.
Wavelet name	Type the name by which to identify the wavelet in the main display.
Operator length	Type the operator length (longer operators include more detail) at which to extract wavelets. Extracting wavelets using a long operator enables you to shorten the wavelet length later without damaging the detail of the amplitude spectrum. GeoSyn saves only the amplitude and phase spectrums, and calculates time wavelets as required.
Taper	Select the taper method to apply to the operator that's extracted from the import trace after it's auto-correlated.

## Parent Topics

See *"Importing Wavelets and Wavelet Sets," p. 133*

## Insert Constant Value Log Section

With this feature...	Do this...
Insert at	Select either depth or time and then either type a depth below or above which to insert a log section or click <b>Top</b> or <b>Bottom</b> to select the absolute top or bottom of the log.
Insertion range	Select either depth or time and then type a depth thickness to insert.
Insertion values	To adjust the value inserted in various logs, select the desired row and type a constant value to insert in the <b>Edit log insertion value</b> box.
Resetting top or bottom of well	Select whether to raise the start depth or lower the stop depth to accommodate the insertion.

## Parent Topics

See *"Inserting Log Sections using Log Editor," p. 59*

## Log Blocking

With this feature...	Do this...
Auto-Block by Culling...	Cull values that exceed the reading specified in the adjacent box. Culling works as follows: GeoSyn first works down the log to determine the average velocity, and then working down the log again, sums the time. While drawing the log as blocks, where the actual time minus the calculated time over a given depth range using the average velocity exceeds the culling value, the current log block is ended and a new block is started. This option faithfully reproduces the velocity field, but more coarsely, which can be useful for AVO analysis when you want to simplify the geologic model by removing tuning effects.
Block Between Tops	Select whether to apply a mean, median, or RMS constant average to the log portion between the shallowest and deepest top within your selection.
Log list	Select the log to block.
Set depth range KB	Do one of the following: Type start and stop depths and click <b>Update</b> . Click either <b>Top</b> or <b>Bottom</b> to select an absolute depth from the log or click <b>All</b> to select both. Click <b>Get range from tops</b> to select a range using the formation top names that also appear in the tops list selected in the <b>Top Properties</b> dialog box.

## Parent Topics

See "Creating Blocked Log Models," p. 61

## Log Composite

With this feature...	Do this...
Unmatched	Drag logs that weren't automatically matched to the desired host log in the Matched pane or drag matched logs from the Matched pane into the Unmatched pane to remove the association.
Matched	Drag the left-most cell up or down to a different log to change an association.
Resort	Select either Alias or GeoSyn name. Typically the most accurate option is GeoSyn name.
Range	Do one of the following: Type start and stop depths and click <b>Update</b> . Click either <b>Top</b> or <b>Bottom</b> to select an absolute depth from the log. Click <b>Depths from tops</b> to select a range using the formation top names that also appear in the tops list selected in the <b>Top Properties</b> dialog box. The selected donor depth range must fall within the host depth range. To add the donor log section to the base of the host well, in the <b>Host replacement depth range</b> , click <b>Bottom</b> to display the exact base of the host well and then type this value in the donor well <b>Top</b> box.
Raise log data and tops above the insertion   Lower log data and tops below the insertion	Select whether to move overlapping data in the host log above or below the insertion.

Copy tops	Select whether to copy tops from the donor well to the host well. These tops are copied to the <i>Generic</i> tops list.
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## Parent Topics

See *"Creating Log Composites," p. 81*

## Log Editor

With this feature...	Do this...
Log tabs	Click to view and work with different logs. Drag tabs left or right of other tabs to change the order in which they're stacked.
Log Editor toolbar	<p>Select tools to work with logs in the log editor based on the following:</p> <ul style="list-style-type: none"> <li> Draw a free-hand line.</li> <li> Draw a straight line.</li> <li> Redraw all or some of the log as blocks using an averaging or a culling method.</li> <li> Insert a log section.</li> <li> Stretch or squeeze a log.</li> <li> Clip or filter a log.</li> <li> Apply a math equation to a log.</li> <li> Remove a segment from a log.</li> <li> Model different water saturation effects on the log.</li> <li> Create a log composite by inserting log data from another well.</li> <li> Merge two logs.</li> <li> Shift a log relative to other logs by depth.</li> <li> Insert a top at a location you click on the log.</li> <li> Undo and redo previous changes.</li> <li> Zoom a log portion in or out.</li> <li> Expand or contract the Log Editor tab display.</li> <li> Change the minimum maximum values of the log scale.</li> <li> Close the <i>Log Editor</i>.</li> </ul>

## Parent Topics

See *"Drawing Straight Edge and Freehand Curves," p. 57*  
 See *"Creating Blocked Log Models," p. 61*  
 See *"Stretching and Squeezing Logs," p. 66*  
 See *"Applying Math Equations to Logs," p. 75*  
 See *"Modelling Fluid Replacement," p. 115*  
 See *"Creating Log Composites," p. 81*  
 See *"Changing Log Editor Display," p. 87*

See *"Inserting Log Sections using Log Editor," p. 59*  
 See *"Inserting Tops," p. 97*  
 See *"Clipping or Filtering Logs," p. 72*  
 See *"Cutting Logs," p. 78*  
 See *"Shifting Logs," p. 85*  
 See *"Log Editor Display Properties," p. 220*

## Log Editor Display Properties

With this feature...	Do this...
Show	Select a row to modify its scale. You can't modify multiple log scales simultaneously.
View editing history	Click to display a list of all changes made to the curve. Saved changes span multiple GeoSyn sessions.
Restore Defaults	Restore one or more logs using the main synthetic.
Scale range	Type minimum and maximum values for the log scale and then click <b>Update</b> .
Velocity Transit	If a sonic log is selected in the display pane above, select whether it displays velocity or transit units.
Restore default scales	Reapply the default scales with which GeoSyn ships to either the current log or to all log types.
Show off-scale	Select whether red lines appear in Log Editor beside amplitudes that exceed the minimum and maximum scale values.
Show tops name	Select whether to display formation top names in the <b>Log Editing</b> dialog box. The <b>Show</b> checkbox must also be selected in the <b>Top Properties</b> dialog box for the tops to appear.
Multi-log per track	Select whether to display multiple logs per track based on the log types defined in the <b>Well Properties: Log Properties</b> dialog box.
Use log display colors	Select whether to display the colors defined using the settings in the <b>Well Properties: Log Properties</b> dialog box.

## Parent Topics

See "Changing Log Editor Display," p. 87

## Log Equation Library

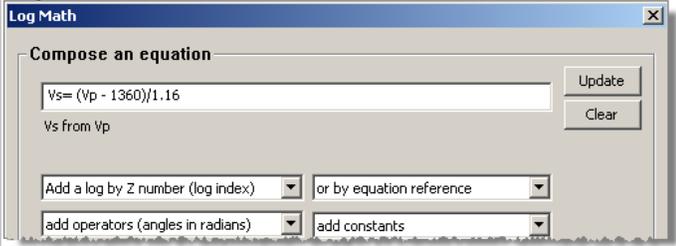
With this feature...	Do this...
Log type	Select the log type under which the equation will be grouped in the Log Equation Library.
Log function	Displays the name of the equation with which you're currently working. If you've already clicked <b>Add</b> , the term (User) follows the equation name. User equations appear first in this drop-down list.
Update   Add   Delete	GeoSyn prevents you from overwriting default library equations, thus <b>Update</b> and <b>Delete</b> are inactive until you click <b>Add</b> to create a copy of a modified default equation. Once the copy is made, Update and Delete become available. When you click <b>Add</b> , GeoSyn verifies your equation is valid.
Equation options panes	Drag terms into the <b>Metric</b> or <b>Imperial</b> equation box or simply use the panes for reference as you type directly in the <b>Metric</b> and <b>Imperial</b> boxes.
Velocity   Transit output (only appears for Sonic and Shear sonic curve types)	Select the output type. Internally, GeoSyn interprets sonic logs in transit format.

Metric   Imperial	Drag terms from the equation options panes or simply type in these boxes. You must define each of these, although they can be identical. Click <b>Down</b> or <b>Up</b> under the Copy option to quickly copy a created equation into the blank box so that you can modify it.
Descriptions	In the first box, type a description to differentiate this equation from other similar equations. The description you type appears in the Log function box when you click <b>Update</b> or <b>Add</b> and it is this description that you use to select the equation from others in a drop-down list when applying the equation to a log.
Color code the equations	Select whether equation terms are colored red, green, and blue. If selected, when you type terms in the Metric or Imperial boxes, GeoSyn applies the default colors to what you type.

## Parent Topics

See "Applying Math Equations to Logs," p. 75      See "Building Equations using the Log Equation Library," p. 55

## Log Math

With this feature...	Do this...
Compose an equation	Type directly in the box and then click <b>Update</b> , or add terms to the equation by selecting them in the following drop-down lists: 
Equation terms	Select terms to add to the equation, which appears in the top box of the Compose an Equation pane, by selecting terms from the drop-down lists.
Function Library	Either select a function to modify from the Log Equation Library, or click <b>Edit</b> to launch the <i>Log Equation Library</i> dialog box with which you compose the desired equation.
Log resolution	Associate logs with equation variables defined above and after selecting the desired depth range below, click <b>Create New Log</b> .
Log Type	Variables you typed in your equation above that haven't been defined yet appear here.
Depth Range KB	Do one of the following: Type start and stop depths and click <b>Update</b> . Click either <b>Top</b> or <b>Bottom</b> to select an absolute depth from the log or click <b>All</b> to select both. Click <b>Depths from tops</b> to select a range using the formation top names that also appear in the tops list selected in the <i>Top Properties</i> dialog box.
Reset Output Log Scales	Select to reset the log scales based on the resulting data range. This will reset the log scale so that the resulting display isn't blank. Clear this option to maintain a preferred or industry-standard log scales as you might with sonic logs, for example.

## Parent Topics

See "Applying Math Equations to Logs," p. 75      See "Log Equation Library," p. 220

## Log Inspection

With this feature...	Do this...
Select a Log	Click to select the log to display in the Log Inspection dialog box.
Histogram	View the where the log data falls. The individual data values are listed in the pane to the right, and a statistical summary appears above the data range pane.
Select a Depth Range	select the depth range to interrogate. This can be done by typing in the boxes, or by clicking the <b>Tops</b> button to display the <i>Depth Range from Tops</i> dialog box and then selecting the upper and lower tops that bound the range in the model, and then click <b>Update</b> . You can also drag the desired range using the Log Editor dialog box and the Log Inspection dialog box is automatically updated. To reset the range, click either <b>Top</b> or <b>Bottom</b> (to move only one element of the range), or click <b>All</b> .
Launch Crossplot	Click to display the <i>Crossplot wizard</i> , which only uses the data range specified above.

## Parent Topics

See *"Inspecting Logs," p. 89*

See *"Creating Crossplots," p. 156*

## Measured Depth to True Vertical Depth correction

With this feature...	Do this...
Display pane	Select the row to adjust.
Insert Update Delete	Select a row in the display pane above and click one of the following: <b>Insert</b> to add a new row with the values typed in the MD, Dip, and Azimuth boxes. Regardless of the row selected, the inserted row is placed according to its depth. <b>Update</b> to apply the values typed in the MD, Dip, and Azimuth boxes to the selected row. <b>Delete</b> to remove the row.
Delete	Click to remove the row selected in the display pane.
Input data set type	Select from the following: <b>MD, AZ, DIP</b> for data that includes azimuth and dip data <b>MD, TVD, dX, dY</b> for data that includes True Vertical Depth, Delta X, and Delta Y. Delta X and Delta Y values are optional.
Survey units are	Select the units used in the import file. The default is the unit type in which the synthetic is displayed.
Import survey	Click to display the <b>Import a Directional Survey</b> dialog box and browse to the file to import. Imported files overwrite values in the display pane above.
Save report	Save the display pane as an ASCII text file.

## Parent Topics

See *"Importing Directional Surveys," p. 15*

## Merge Log Runs

With this feature...	Do this...
Unmerged Logs	This pane is divided into three vertical portions: the host, donor, and spliced views. Preview the host, donor log relationship as you click host and donor curves in the <i>Host</i> and <i>Donor</i> panes below this pane. Either drag the display or drag the slider to the left of the <i>Unmerged Logs</i> display pane to change where the merge point (indicated by the green line running horizontally through the <i>Unmerged Logs</i> pane) appears. Click the <b>Zoom</b> buttons to the right of the pane to increase or decrease the zoom scale.
Host pane   Donor pane	Click the logs to merge. Based on the host or donor log you click, GeoSyn attempts to match the most likely prospect in the opposite pane.
Donor KB	Type a kelly bushing that matches the kelly bushing of the host log.
Merge at	Either drag the <i>Unmerged Logs</i> pane to change the depth at which the two log runs are merged, or type a value and then click <b>Update</b> . To complete the merge operation, click <b>Merge at</b> .
Merged Logs	After <b>Merge at</b> in the bottom left of the <i>Merge Log Runs</i> dialog is clicked, the resulting merged log appears in this pane.
Include Tops checkbox	Select whether to keep or import (or both) tops from the host and donor log. GeoSyn enables you to show multiple instances of the same top in a well, so if tops from both logs are included and the same top exists in both the donor and the host log, the merged log will include both.
Show	Select whether to display the entire log runs or just the portion of the logs that overlap in the <i>Unmerged Logs</i> and <i>Merged Logs</i> panes.
Scales	Select whether horizontal and vertical scale lines appear in the <i>Unmerged Logs</i> and <i>Merged Logs</i> panes.

## Parent Topics

See "*Merging Logs*," p. 68

## Mineral Selector

With this feature...	Do this...
Rock Properties	Click the mineral with which to populate the selected field in the <i>Minerals Calculator</i> dialog box.
References	If uncertain why to pick one member over another in the Rock Properties tab, note the number for each in the Reference column and then click the References tab and scroll to the corresponding number for a text and page reference that describes the unique properties of each.

## Parent Topics

See "*Modelling Fluid Replacement*," p. 115

See "*Minerals Calculator*," p. 224

## Minerals Calculator

With this feature...	Do this...
Mineral	Click <b>Select</b> to display the <b>Mineral Selector</b> dialog box for up to five minerals for which GeoSyn calculates an average using either the Voight-Reuss-Hill or Hashin-Shtrikman formulas specified.
Volume	Type the percentage of pore volume this mineral occupies. Note that you can't proceed beyond this dialog box until the combined volume of the minerals you've selected equals 100%.
Matrix Averaging Formula	Select <b>Voight-Reuss-Hill</b> if the matrix is fairly homogenous for a straight arithmetic averaging formula, or select <b>Hashin-Shtrikman</b> if the matrix is more complex.

## Parent Topics

See "Modelling Fluid Replacement," p. 115    See "Fluid Replacement Wizard (In-situ reservoir properties)," p. 192  
 See "Mineral Selector," p. 223

## Model Properties: Derived

With this feature...	Do this...
Display pane	Select a model(s) to modify (SHIFT+CLICK or CTRL+CLICK for multiple selection), then click either <b>New</b> or <b>Duplicate</b> .
Name	Type a more descriptive name for the model.
Type	Select from the following: <b>Zero offset</b> <b>Multi offset</b> <b>Derived</b> based on a mathematical operation performed on two other models in the current synthetic.
Attribute	Select the mathematical transformation used to explain the data.
Amplitude	Type the display amplitude of the trace data.
Reflection Coefficients	Select the source curve and method to use when creating the AVO logs. Click <b>Create AVO Log suite</b> to create numerous types of logs to use in AVO analysis.
Multiples	Select whether to display simulated first order multiples alongside primary reflections, or to just display multiples and not the primary reflection. First order multiples are the first reflection of a primary reflection.
Cutoff% Max RC	Type the maximum percent for the reflection coefficient below which multiples are not shown. GeoSyn calculates the maximum reflection coefficient in the model, uses a percentage of that, and ignores all reflection coefficients less than that.
AGC	Type a value for the automatic gain control.
Noise	Select the <b>Apply</b> check box and then click <b>Edit</b> to display the <b>Noise Parameters</b> dialog box, where you apply noise type.
Derived trace is equal to	From the drop down lists select the traces and mathematical operator for the equation. The result of which is the derived trace.

## Parent Topics

See "Changing Derived Properties," p. 125  
See "Creating AVO Logs," p. 113

See "Creating Models," p. 108

## Model Properties: Display

With this feature...	Do this...
Display pane	Select a model(s) to modify (SHIFT+CLICK or CTRL+CLICK for multiple selection), then click either <b>New</b> or <b>Duplicate</b> .
Name	Type a more descriptive name for the model.
Type	Select from the following: <b>Zero offset</b> <b>Multi offset</b> <b>Derived</b> based on a mathematical operation performed on two other models in the current synthetic.
Attribute	Select the mathematical transformation used to explain the data.
Amplitude	Type the display amplitude of the trace data.
Reflection Coefficients	Select the source curve and method to use when creating the AVO logs. Click <b>Create AVO Log suite</b> to create numerous types of logs to use in AVO analysis.
Multiples	Select whether to display simulated first order multiples alongside primary reflections, or to just display multiples and not the primary reflection. First order multiples are the first reflection of a primary reflection.
Cutoff% Max RC	Type the maximum percent for the reflection coefficient below which multiples are not shown. GeoSyn calculates the maximum reflection coefficient in the model, uses a percentage of that, and ignores all reflection coefficients less than that.
AGC	Type a value in milliseconds for the automatic gain control.
Noise	Select the <b>Apply</b> check box and then click <b>Edit</b> to display the <i>Noise Parameters</i> dialog box, where you apply noise type.
Display tab	Specify the following: <b>Traces/in</b> - The number of traces to display per inch in the main window. <b>Traces/grp</b> - The number of traces to display in a group and whether to display both positive and negative groups. <b>Spacing</b> - The amount of space between groups of traces. <b>Color</b> - A line style and color and then click <b>Edit</b> to display the <i>Edit Color Palette</i> dialog box. <b>Underlay link</b> - Shows whether the current trace displays highlights from a crossplot using the <i>Crossplot Viewer: Color Mapping</i> tab. <b>Quick change</b> - Apply multiple changes simultaneously. These options are groups of individual options that also appear in the Attribute drop down list above. <b>Font</b> - Click <b>Edit</b> and specify a font for model labels.

## Parent Topics

See "Changing Wavelet Expansion Properties," p. 140  
See "Creating AVO Logs," p. 113  
See "Edit color palette," p. 208

See "Creating Models," p. 108  
See "Noise Parameters," p. 230

## Model Properties: Expanded

With this feature...	Do this...
Display pane	Select a model(s) to modify (SHIFT+CLICK or CTRL+CLICK for multiple selection), then click either <b>New</b> or <b>Duplicate</b> .
Name	Type a more descriptive name for the model.
Type	Select from the following: <b>Zero offset</b> <b>Multi offset</b> <b>Derived</b> based on a mathematical operation performed on two other models in the current synthetic.
Attribute	Select the mathematical transformation used to explain the data.
Amplitude	Type the display amplitude of the trace data.
Reflection coefficients	Select the source curve and method to use when creating the AVO logs. Click <b>Create AVO Log suite</b> to create numerous types of logs to use in AVO analysis.
Multiples	Select whether to display simulated first order multiples alongside primary reflections, or to just display multiples and not the primary reflection. First order multiples are the first reflection of a primary reflection.
Cutoff% Max RC	Type the maximum percent for the reflection coefficient below which multiples are not shown. GeoSyn calculates the maximum reflection coefficient in the model, uses a percentage of that, and ignores all reflection coefficients less than that.
AGC	Type a value in milliseconds for the automatic gain control.
Noise	Select the <b>Apply</b> check box and then click <b>Edit</b> to display the <b>Noise Parameters</b> dialog box, where you apply noise type.
Expanded tab	Drag the sliders to select the width of the desired display size, the reflection coefficient cutoff, and the wavelet fill pane.

## Parent Topics

See *"Changing Wavelet Expansion Properties," p. 140*  
 See *"Creating AVO Logs," p. 113*

See *"Creating Models," p. 108*

## Model Properties: Filter Panel

With this feature...	Do this...
Display pane	Select a model(s) to modify (SHIFT+CLICK or CTRL+CLICK for multiple selection), then click either <b>New</b> or <b>Duplicate</b> .
Name	Type a more descriptive name for the model.
Type	Select from the following: <b>Zero offset</b> <b>Zero Offset Filter Panel</b> to enable the Filter Panel tab where you apply filters to the left and right edges of a group of traces that resolve (average out) in the middle trace of the group. <b>Multi offset</b> <b>Derived</b> based on a mathematical operation performed on two other models in the current synthetic.
Attribute	Select the mathematical transformation used to explain the data.

Amplitude	Type the display amplitude of the trace data.
Reflection Coefficients	Select the source curve and method to use when creating the AVO logs. Click <b>Create AVO Log suite</b> to create numerous types of logs to use in AVO analysis.
Multiples	Select whether to display simulated first order multiples alongside primary reflections, or to just display multiples and not the primary reflection. First order multiples are the first reflection of a primary reflection.
Cutoff % Max RC	Type the maximum percent for the reflection coefficient below which multiples are not shown. GeoSyn calculates the maximum reflection coefficient in the model, uses a percentage of that, and ignores all reflection coefficients less than that.
AGC	Type a value for the automatic gain control.
Noise	Select the <b>Apply</b> check box and then click <b>Edit</b> to display the <b>Noise Parameters</b> dialog box, where you apply noise type.
Type	Select the type of trace, which applies to the entire group of traces.
Taper	Select the method by which to taper the operator extracted from the center of the summed and tapered traces.
Length	Select the longest operator possible to ensure the amplitude spectrum retains as much detail as possible.
Low cut   Low pass   High pass   High cut	Modify the energy shape either by typing the actual source values provided with the seismic data or by modifying the wavelet shape to visually match the seismic data.
Phase	Drag the slider or type a value for the phase.

## Parent Topics

See "Creating Models," p. 108

See "Applying Multiple Filters Across a Group of Traces," p. 110

## Model Properties: Multi offset

With this feature...	Do this...
Display pane	Select a model(s) to modify (SHIFT+CLICK or CTRL+CLICK for multiple selection), then click either <b>New</b> or <b>Duplicate</b> .
Name	Type a more descriptive name for the model.
Type	Select from the following: <b>Zero offset</b> <b>Multi offset</b> <b>Derived</b> based on a mathematical operation performed on two other models in the current synthetic.
Attribute	Select the mathematical transformation used to explain the data.
Amplitude	Type the display amplitude of the trace data.
Multiples	Select whether to display simulated first order multiples alongside primary reflections, or to just display multiples and not the primary reflection. First order multiples are the first reflection of a primary reflection.
Cutoff % Max RC	Type the maximum percent for the reflection coefficient below which multiples are not shown. GeoSyn calculates the maximum reflection coefficient in the model, uses a percentage of that, and ignores all reflection coefficients less than that.
AGC	Type a value for the automatic gain control.
Noise	Select the <b>Apply</b> check box and then click <b>Edit</b> to display the <b>Noise Parameters</b> dialog box, where you apply noise type.

Ray trace method	Select <b>Dix NMO</b> for a preliminary fast view, or <b>Ray trace</b> for improved accuracy using a full Snell's law ray-tracing algorithm.
Ray trace vertical sampling interval	Select whether sampling frequency is based on time (constant time) or depth (constant depth) and type an increment.
Bin Width	Set the threshold within which reflecting seismic rays will be included in a trace. A larger bin number will include more rays but the resulting trace will be less accurate.
CDP interval	Type a value that matches the common depth point interval of the seismic to which the model will be compared. CDP is half of the surface offset.
Num traces	Type the total number of traces to display in the model.
Near trace offset	Type the distance from the source at which the nearest receiver appears. The distance to other receivers is calculated using this value, the CDP interval, and the Num traces values above.
Show offset traces Show summed trace	Select whether to show individual traces for each receiver and whether to sum all the traces into one trace displayed to the left of the model. Click <b>Edit</b> to display the <b>Sum Options</b> dialog box where you define groups of traces (near, middle, far) and then do mathematical operations between the three groups, which enables you to filter or enhance certain portions of the offset trace. For example, you might subtract the far traces from the near traces and then multiple the result by the far traces to enhance the far offset amplitude.
Apply NMO correction	Simulate the normal move-out stretch.
Mute if incident angle is	Apply an inside or outside angle outside of which data won't be included in the trace. The incident angle is calculated at each sample. The mute line is drawn on your synthetic to show where data is being cutoff. Select the color in which this line is drawn using the Mute color drop-down list.

## Parent Topics

See "Changing Multi-Offset Properties," p. 126  
See "Creating AVO Logs," p. 113

See "Creating Models," p. 108  
See "Sum Options," p. 243

## Model Properties: Wavelets

With this feature...	Do this...
Display pane	Select the wavelet with which to work. Clear <b>Show all wavelets</b> if you're already working with the desired wavelet to increase the work space in this dialog box.
Name	Type a name with which the wavelet is identified in the main synthetic display.
Type	Select a predefined filter to apply to the wavelet selected in the display pane. Controls to specify the cut and pass frequencies appear below based on your selection.
Attribute	Select the mathematical transformation used to explain the data.
Amplitude	Type the display amplitude of the trace data.
Reflection Coefficients	Select the source curve and method to use when creating the AVO logs. Click <b>Create AVO Log suite</b> to create numerous types of logs to use in AVO analysis.

Multiples	Select whether to display simulated first order multiples alongside primary reflections, or to just display multiples and not the primary reflection. First order multiples are the first reflection of a primary reflection.
Cutoff% Max RC	Type the maximum percent for the reflection coefficient below which multiples are not shown. GeoSyn calculates the maximum reflection coefficient in the model, uses a percentage of that, and ignores all reflection coefficients less than that.
AGC	Type a value for the automatic gain control.
Noise	Select the <b>Apply</b> check box and then click <b>Edit</b> to display the <b>Noise Parameters</b> dialog box, where you apply noise type.
Wavelets	Click <b>Edit</b> to display the <b>Wavelet Properties</b> dialog box, where you change wavelet and spectrum properties.

## Parent Topics

<i>See "Changing Wavelet Properties," p. 138</i>	<i>See "Exporting Wavelets," p. 182</i>
<i>See "Extracting Wavelets," p. 141</i>	<i>See "Importing Wavelets and Wavelet Sets," p. 133</i>
<i>See "Wavelet Properties: Spectrums," p. 251</i>	<i>See "Creating AVO Logs," p. 113</i>
<i>See "Creating Models," p. 108</i>	

## Multi-Log per Track Layout

With this feature...	Do this...
Log name	Select the name or type of log to display in a given track. Click <b>All unselected linear logs</b> or <b>All unselected logarithmic logs</b> to ensure none of the available logs are dropped.

## Parent Topics

<i>See "Combining Logs in Tracks," p. 52</i>	<i>See "Multi-log per Track Template," p. 229</i>
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## Multi-log per Track Template

With this feature...	Do this...
Template name	Type a descriptive name for the template to distinguish it from others you create. The template file is saved in the GeoSyn <i>Working</i> directory with the associated description you type.
Populate tracks	Select whether to populate tracks of a given log type by type (sonic, density, etc.) or by log name (delta-T, Bulk Density, etc.). Even if <b>manually by name</b> is selected as your method by which to populate tracks, when GeoSyn saves your track population preferences to the default file for the first time, it saves the log type, not the log name, as logs can have numerous esoteric names which are difficult for GeoSyn to correlate back to a log type.  Click <b>Edit</b> to display the <i>Multi-log per track layout</i> dialog box where you select the log types or log names to display in a given track.
Show empty tracks	Select to display tracks regardless of whether they contain logs and provided that <b>Show Track</b> is also selected on each individual tab below.

Show track	Select to display the selected track provided it contains a log. To ensure the selected track appears regardless of whether it contains a log, also select <b>Show empty tracks</b> above.
Track width   Following gap	Type the width of the track and the space between tracks.
Scale type	Select either <b>Linear</b> or <b>Logarithmic</b> scale display types.
Minor divisions   Major divisions	Depending on the scale type selected above, type either the minor and major scale increments, or the left and right scale.
Cross overs	Click the check box to the left of the drop-down list and then select either a log that appears in the model or select <b>Fixed value</b> , depending on whether to infill curves where the two intersect or to infill where a curve exceeds a given value. Shift the log scales by either typing a value directly in the <i>shift scales by</i> box or by clicking   .
Color	Click to display the <i>Edit Color Palette</i> dialog box and select either a solid color or color gradient with which to highlight the cross over.
Import Save	Click to either load a template from the GeoSyn <i>Working</i> directory or to save the existing template.

## Parent Topics

See "Combining Logs in Tracks," p. 52

See "Well Properties: Log properties," p. 253

## Noise Parameters

With this feature...	Do this...
Signal to Noise	Adjust the signal to noise ratio.
Noise Type	Select the noise type to apply to the model. Select from White or Gaussian.
Band Limiting	Select a predefined filter to apply to the model.

## Parent Topics

See "Creating AVO Logs," p. 113

See "Creating Models," p. 108

## Open a GeoSyn format file

With this feature...	Do this...
Display pane	Select a GeoSyn file to display general file information in the <i>GeoSyn format file</i> pane below.
GeoSyn format file pane	View basic location, label, depth, and log details for the file selected in the display pane above.
Browse dir.   Browse sub-dir	Click to display Directory Browser displaying LAS and GeoSyn files in either the current directory or the current directory and its subdirectories too.
Open	Create a synthetic using the file selected in the display pane above.

## Parent Topics

*See "Reformatting GeoSyn and LAS Files," p. 172*  
*See "Using Directory Browser," p. 9*  
*See "Batch reformat," p. 199*

*See "Opening GeoSyn Synthetics," p. 7*  
*See "Directory Browser," p. 206*

## Open an LAS format file

With this feature...	Do this...
Display pane	Select the LAS file with data to import.
LAS format file	View basic log details about the file selected in the display pane above.
Restrict depth range	Click to display the actual depth specified in the file and then type different values in the adjacent boxes to change the zone of interest.
Import data is TVD corrected	Select whether the log is recorded in Measured Depth or True Vertical Depth so GeoSyn places the tops loaded from the local AccuMap system and user databases at the correct depth.
File filter	To limit the file types in the display pane above, from the drop-down list select <b>*.las</b> .
File viewer	Click to launch the file selected in the display pane above in an ASCII text editor to verify or modify its contents before importing.
Browse dir. Browse sub-dir	Click to display Directory Browser displaying LAS and GeoSyn files in either the current directory or in the current directory and all its subdirectories too.
Import	Create a synthetic using the file selected in the display pane above and based on the import defaults file settings.

## Parent Topics

*See "Reformatting GeoSyn and LAS Files," p. 172*  
*See "Directory Browser," p. 206*

*See "Batch reformat," p. 199*

## Print

With this feature...	Do this...
Name	Select a printer or plotter.
Properties	Click to set print properties. Options in the <b>Properties</b> dialog box are unique to various printers, so we don't discuss them here. Refer to the printer documentation for details. If using a plotter, to customize the page size, click the <b>Paper Size</b> tab then click <b>Properties &gt; More Sizes</b> .
Print range	Type the page number range to print.
Copies	Select the number of copies to print.

## Parent Topics

*See "Printing Synthetics," p. 171*

## Print Preview

With this feature...	Do this...
Print	Click to display the <b>Print</b> dialog box and print directly from the current dialog box.
Next page prev (previous) page	If printing a multi-page layout, click to navigate through the pages.
Zoom in Zoom out	Click to zoom. <b>Zoom Out</b> is grayed out until you zoom in one level.
Two Page   One Page	Click to specify whether this dialog box displays one or two pages at a time.

## Parent Topics

See "Printing Synthetics," p. 171

See "Print," p. 231

## Print Setup

With this feature...	Do this...
Name	Select the printer model.
Properties	Click to display the <b>Properties</b> dialog box where you select options unique to your printer. Note that if you are using a plotter, you are not limited to the paper sizes shown in the <b>Size</b> box of the <i>Print Setup</i> dialog box. To customize your page size, click the <b>Paper Size</b> tab then click <b>Properties &gt; More Sizes</b> .
Paper	Select the <b>Size</b> and <b>Source</b> options specific to your printer. For example, if you select a plotter, you will see some large paper sizes in the <b>Size</b> list. If you are printing Letter size paper, you can also select which paper tray you want to print from in <b>Source</b> .
Orientation	Select <b>Portrait</b> or <b>Landscape</b> orientation.
Network	This function is not discussed as it is specific to your computer network.

## Parent Topics

See "Printing Synthetics," p. 171

## Properties: Configuration

With this feature...	Do this...
Executables	View the directory where GeoSyn operational files are located. For standalone installations, the <i>Executables</i> and <i>Working</i> directories are the same. For networked configurations, the <i>Executables</i> directory is shared. Changing this directory may prevent GeoSyn from locating both the licensing file it requires to launch, and the IHS Information Hub download parameters.
Working	View the directory where customizable files such as color palette, log import defaults, and user default files are located or click browse ( <input type="button" value="..."/> ) to change it. To maintain the integrity of each users' custom settings, it's recommended that the <i>Working</i> directory not be shared.

Email Web site	View GeoSyn contact information and click browse (  ) to write an email message or launch the IHS web site.
IHS Online Data Retrieval Info	View information required to connect to the IHS Online Data Hub. For network installations, these settings affect all users. If you don't have a subscription to download online digits, leave these boxes blank. Changing this connectivity information may prevent GeoSyn from downloading online digits.
User name Show transaction warning prompt	View or type your user name and toggle whether to display a warning message when downloading digits may incur a charge.

## Parent Topics

See "Configuring GeoSyn Defaults," p. 5	See "Downloading Logs from the IHS Information Hub," p. 38
See "Launching GeoSyn using AccuMap," p. 31	See "Data Search Wizard: Search locations and ranges," p. 189
See "Properties: Import Defaults," p. 233	

## Properties: Import Defaults

With this feature...	Do this...
Current default file	From the drop-down list, select a default file to either modify or apply to the current synthetic, or click <b>New</b> to display the <b>New default file name</b> dialog box and type the name of the default file to create that inherits settings from the current synthetic. Default files are saved in the GeoSyn <i>Working</i> directory and as part of the current synthetic configuration.
Update current default file with synthetic	Write the configuration settings in the synthetic to the default file selected in the <i>Current default file</i> drop-down list above.
Update synthetic with current default file	Apply the configuration settings from the default file selected in the <i>Current default file</i> drop-down list above to the synthetic , overwriting any configurations you may have made in the current file.
Default file description	Double-click each heading or click + and - to expand and contract related properties beneath each node. The parameters in the default file tree display the settings of the default file selected above.

## Parent Topics

See "Changing Import Defaults," p. 11	See "Import log data," p. 215
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## Properties: Log Library

With this feature...	Do this...
Display pane	To view current default settings, double-click node text or click + and -.
New curve	Click to display the <b>Create New Curve Type</b> dialog box and specify default parameters for a new curve.
Delete curve	Click to delete the selected curve type. Curves that can be used as active logs (sonic, shear sonic, time depth, density, and poisson's ratio) can't be deleted. Deleting logs may prevent GeoSyn from recognizing imported log aliases.
Edit curve	Click to display the <i>Edit Default Display Properties</i> dialog box where you change curve display properties and create curve equations for only the current curve type. To change properties for any curve type, click <b>Edit Curve Equations</b> below.
Edit Curve Equations	Click to display the <i>Log Equation Library</i> dialog box where you change curve display properties and create curve equations for any curve type.
Export alias list	Click to export a list of all the aliases GeoSyn uses to recognize imported logs.

## Parent Topics

See *"Changing Log Defaults,"* p. 48  
 See *"Log Equation Library,"* p. 220

See *"Exporting Log Aliases,"* p. 177  
 See *"Edit Default Display Properties,"* p. 209

## Properties: Statistics

With this feature...	Do this...
Data ranges	Select the log and view its original raw data and the resulting converted values in GeoSyn following import.

## Parent Topics

See *"Viewing Synthetic Statistics,"* p. 40

## Save Model Data

With this feature...	Do this...
Save Location	By default, this is the location automatically created in the Kingdom project folder when GeoSyn was launched from Kingdom. It's best to use this location for simplicity and synchronization.

Save GeoSyn File	Select whether to save the GeoSyn file along with the other data used by Kingdom. This is the model that's tied to the imported Kingdom seismic section.
Save SEGY Model	Select whether to save a single trace from the seismic file in SEGY format. This file is required by Kingdom in order to stay synchronized with the original GeoSyn model.
Zero Offset Model	Select the model tied to the seismic section.
Multiplier	Type a function of the amplitudes that occur in the seismic line, which is typically around 12,000. This enables the amplitudes in the model to match those found in the original seismic section.
Start Time 2way	Type the shift that occurred in GeoSyn when you tied the seismic section to the model.
Save Time/Depth Chart...	Select whether to save the time depth chart directly to the Kingdom database. If <b>Save As Default</b> is enabled, this time depth chart is associated with future wells you import from Kingdom into GeoSyn. This same file that can be saved from GeoSyn using the File > Export > Time/Depth option.
Cull Time/Depth Values...	Type the sonic log values above which to block when creating the time depth chart.
Local   Shared	Select whether the time depth chart is only available to a specific well (local), or all wells (shared).

## Parent Topics

See "*Launching GeoSyn from Kingdom*," p. 28

## Save Modified Time Depth Chart

With this feature...	Do this...
Name	Specify a name for the modified time-depth curve.
Chart Type	Select whether the time-depth curve is available to only this well or to all Kingdom wells in the current project.
Set As Default	Select whether the time-depth curve is available to all logs in the GeoSyn project.

## Parent Topics

See "*Launching GeoSyn from Kingdom*," p. 28

## SEG Y Viewer

With this feature...	Do this...
Format	Select a format in which to display data in the viewer then click various tabs to view the following: ASCII/EBCDIC - basic processing information. Binary header - which values appear at specific byte positions. Trace header - trace information. GeoSyn looks here for offsets, CDP intervals, and location. Trace data - the specific data readings. Histogram - the graphical display of frequency variation. Spectrum - the array of amplitude and frequency variations.
Byte order	Select whether the file was saved in PC (ASCII) or mainframe (EBCDIC) format.

Edit EBCDIC Header	Click to display the Edit EBCDIC Header dialog box and change SEG Y values in the file.
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## Parent Topics

<i>See "Importing Seismic Data," p. 147</i>	<i>See "Seismic Properties: Annotations," p. 236</i>
<i>See "Seismic Properties: Trace layout," p. 238</i>	<i>See "Edit EBCDIC Header," p. 209</i>

## Seismic Properties: Annotations

With this feature...	Do this...
Display pane	Select the seismic trace(s) with which to work. SHIFT+CLICK or CTRL+CLICK for multiple selection.
Import   Export	Click to import or export a seismic file in SEG Y format.
Duplicate	Click to create a second trace with the same values as the trace selected in the display pane above.
SEG Y Viewer	Click to display the SEG Y Viewer and view header, trace, and file format details.
Labels	Type a title and description that appear in the main synthetic display above the seismic data.
Annotations	Select the frequency and content of annotations on the wavelet, and whether to include the first and last traces.
Font	Click <b>Edit</b> to configure the label and trace display font.

## Parent Topics

<i>See "Changing Seismic Properties," p. 149</i>	<i>See "Changing Import Defaults," p. 11</i>
<i>See "Exporting Seismic," p. 181</i>	

## Seismic Properties: Display

With this feature...	Do this...
Display pane	Select the seismic trace(s) with which to work. SHIFT+CLICK or CTRL+CLICK for multiple selection.
Import Export	Click to import or export a seismic file in SEG Y format.
Duplicate	Click to create a second trace with the same values as the trace selected in the display pane above.
SEG Y Viewer	Click to display the SEG Y Viewer and view header, trace, and file format details.
Trace Overlay	Select the mathematical transformation to use to explain the data, the color and fill, and the extent of the trace.
Color Underlay	Select the mathematical transformation to use to explain the data, click <b>Edit</b> to display the <b>Edit Color Palette</b> dialog box, and either select auto range to base the scale on the data or clear that option and specify your own range.

Show well tie	Select and then spot the well in the seismic section based on one of the following: <b>Auto tie if within</b> - Automatically tie to a trace where a trace comes within the specified number of meters. This option relies upon the header data in the SEGY file being properly formatted. <b>Tie manually to</b> - If the header date in the SEGY file isn't properly formatted, select this option, and then from the drop-down list to the right of it, select the desired trace number, surface position, or common depth point to which to tie the well.
Overlay/Underlay quick change	Select multiple changes to apply simultaneously. These options are groups of individual options that also appear in the Trace Overlay drop-down list above.
Overlay/Underlay normalization	Select a trace normalization option. <b>None</b> and <b>Peak</b> divide all values by the highest amplitude. <b>RMS</b> divides all values by the root-mean-square of the data.
Noise	Select the <b>Apply</b> check box and then click <b>Edit</b> to display the <b>Noise Parameters</b> dialog box, where you apply noise type.

## Parent Topics

See "Changing Seismic Properties," p. 149  
See "Exporting Seismic," p. 181

See "Changing Import Defaults," p. 11

## Seismic Properties: Histogram

With this feature...	Do this...
Display pane	Select the seismic trace(s) with which to work. SHIFT+CLICK or CTRL+CLICK for multiple selection.
Import   Export	Click to import or export a seismic file in SEGY format.
Duplicate	Click to create a second trace with the same values as the trace selected in the display pane above.
SEGY Viewer	Click to display the SEGY Viewer and view header, trace, and file format details.
Amplitude histogram	Select the type of data to be used. Select from Raw data or Display data.
Linear, Logarithmic	Select whether lines appear on the log and whether they're logarithmic or linear.
Include zeros	Click to include zeros within frequency.

## Parent Topics

See "Changing Seismic Properties," p. 149  
See "Exporting Seismic," p. 181

See "Changing Import Defaults," p. 11

## Seismic Properties: Spectrum

With this feature...	Do this...
Display pane	Select the seismic trace(s) with which to work. SHIFT+CLICK or CTRL+CLICK for multiple selection.
Import   Export	Click to import or export a seismic file in SEGY format.
Duplicate	Click to create a second trace with the same values as the trace selected in the display pane above.
SEGY Viewer	Click to display the SEGY Viewer and view header, trace, and file format details.

Amplitude Spectrum	Select the type of data to be used. Select from Raw data or display Data.
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## Parent Topics

See "Changing Seismic Properties," p. 149  
See "Exporting Seismic," p. 181

See "Changing Import Defaults," p. 11

## Seismic Properties: Processing

With this feature...	Do this...
Display pane	Select the seismic trace(s) with which to work. SHIFT+CLICK or CTRL+CLICK for multiple selection.
Import   Export	Click to import or export a seismic file in SEG Y format.
Duplicate	Click to create a second trace with the same values as the trace selected in the display pane above.
SEG Y Viewer	Click to display the SEG Y Viewer and view header, trace, and file format details.
Filter	Select the mathematical transformation to use to explain the data.
Rotate phase	Drag the slider to rotate the centre phase of the seismic.
Common offset stack	If the seismic selected in the display pane above is unstacked data, click <b>Create</b> to display the <i>Common Offset Stack</i> dialog box where you generate a seismic trace in which the unstacked data is collated and summed.
Wavelet extraction	Click to extract a zero phase wavelet from the selected wavelet.
Tie to a model	Click to display the <b>Set time and range for</b> dialog box and specify the location at which to anchor the trace.
Link to AVO trace model	Select a model to link to the seismic for AVO analysis.
AGC	Type a value for the automatic gain control.
Sample rate	Select the frequency at which to sample the data when building the model.

## Parent Topics

See "Changing Seismic Properties," p. 149  
See "Exporting Seismic," p. 181

See "Changing Import Defaults," p. 11

## Seismic Properties: Trace layout

With this feature...	Do this...
Display pane	Select the seismic trace(s) with which to work. SHIFT+CLICK or CTRL+CLICK for multiple selection.

Import   Export	Click to import or export a seismic file in SEGY format.
Duplicate	Click to create a second trace with the same values as the trace selected in the display pane above.
SEG Y Viewer	Click to display the SEG Y Viewer and view header, trace, and file format details.
Bulk shift	Type a signed the amount to move the trace up or down.
Time	Type the start and stop depths for the sample interval.
Show traces	Select the range of samples to display in the main synthetic. For example, to exclude the first and last few samples.
Show	Select whether to display every sample.
Flip left to right	Select whether to invert the sample locations so that the sample furthest from the source becomes closest.
Duplicates	Type the number of duplicate traces to display.
Traces/in	Select the number of traces to display per inch.

## Parent Topics

*See "Changing Seismic Properties," p. 149*  
*See "Exporting Seismic," p. 181*

*See "Changing Import Defaults," p. 11*

## Seismic Tie Data Properties

With this feature...	Do this...
Seismic data	From the drop-down list, select from the imported seismic. Click <b>Display</b> to show the <b>Display Properties</b> dialog box and <b>Range</b> to display the <b>Set time and range for</b> dialog box.
Model data	Select the model in your synthetic to which to tie the seismic trace.
Cross correlation function display attributes	Click <b>Display</b> to show the <b>Display Properties</b> dialog box.
Show logs	Select up to three logs from the synthetic to display alongside the tie in the <b>Tie seismic</b> dialog box.
Tops	Select whether to display names and lines in the <b>Select data sets for cross correlation</b> dialog box.

## Parent Topics

*See "Creating Crossplots," p. 156*  
*See "Tie Seismic," p. 244*

*See "Tying Seismic to Models," p. 150*

## Select Data Sets for Cross-Correlation

With this feature...	Do this...
Seismic Data	From the drop-down list, select the seismic data to tie to a model. Click <b>Display</b> to show the <i>Display Properties</i> dialog box to configure the display the same as the model, and the cross correlation data. Click <b>Range</b> to display the <i>Set time and range for</i> dialog box and reduce the number of traces.
Model Data	Select the model in your synthetic to which to tie the seismic data. Click <b>Display</b> to show the <i>Display Properties</i> dialog box to configure the display the same as the seismic and cross correlation data.

Cross Correlation Function...	Click <b>Display</b> to show the <i>Display Properties</i> dialog box to configure the display the same as the seismic and correlation model data.
Show logs	Select up to three logs from the synthetic to display alongside the tie in the <i>Tie seismic</i> dialog box.
Tops	Select whether to display names and top markers in the <i>Tie seismic</i> dialog box.

## Parent Topics

*See "Creating Crossplots," p. 156*

*See "Tying Seismic to Models," p. 150*

## Set Location

With this feature...	Do this...
Datum	Select the desired datum from the drop-down list and specify either Lat / Long or UTM coordinates below.
Latitude / Longitude	Type specific lat/long coordinates or click <b>Copy bottom position</b> and <b>Copy surface position</b> to copy them directly from the well, and then click <b>Update</b> .
UTM Coordinates	Type UTM coordinates and select a zone, and then click <b>Update</b> .

## Parent Topics

*Changing Well Display Properties*

*Well Properties: Well Properties dialog box*

## Set Scales

With this feature...	Do this...
Inches per second	Type an increment that matches the increment on the seismic section to which you're correlating.
Monitor fudge factor	Type the percentage by which to multiply the monitor resolution. Ideally, you need to compare the changes that appear on screen to a fixed measurement by holding a ruler, for example, up to the monitor.
Center	Click the arrow buttons to move the correlation up or down until it aligns with a timing line on the seismic section. The larger arrow buttons move the correlation in larger increments.
Zoom	Click the arrow buttons to expand or condense the correlation. The larger arrow buttons zoom or unzoom the correlation in larger increments.

## Parent Topics

*See "Correlating Logs and Traces," p. 166*

## Set time and range for

With this feature...	Do this...
Time range	Type the start and stop time range to import.
Trace range	Type the trace range to import. For example, to include traces in a specific pane such as near a well. You may need a shot point map to determine the range to include.

## Parent Topics

<i>See "Importing Seismic Data," p. 147</i>	<i>See "Seismic Tie Data Properties," p. 239</i>
<i>See "Select Data Sets for Cross-Correlation," p. 239</i>	<i>See "Seismic Properties: Annotations," p. 236</i>
<i>See "Seismic Properties: Trace layout," p. 238</i>	

## Shift Curve

With this feature...	Do this...
Shift selected curves	Type the amount by which to raise or lower the selected logs. A positive value raises the log and a negative value lowers it.
Display pane	Select the logs to shift. GeoSyn automatically shifts all logs in the synthetic when one log is shifted. SHIFT+CLICK or CTRL+CLICK for multiple selection.

## Parent Topics

<i>See "Shifting Logs," p. 85</i>
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## Stretch/squeeze log curves in time

With this feature...	Do this...
Stretch/squeeze in time	Select either time or depth based on the following: <b>Time</b> to modify the transit values through the selected depth zone. The change in the sum of all the transit time changes must equal the desired stretch/squeeze value. <b>Depth</b> to stretch or squeeze the selected depth range to the thickness defined.
Stretch/squeeze in depth	
Thickness (when Stretch/squeeze in depth selected)	Type the desired thickness of the zone defined above after stretching or squeezing. If the value is less than the difference between the start and stop depth, the log will be squeezed. If more, the log will be stretched.

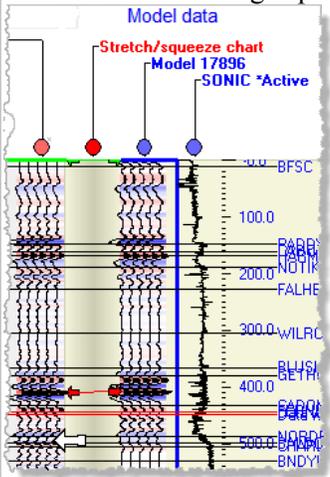
Change time interval by (when Stretch/squeeze in time selected)	Type a value by which to adjust the transit times for the zone defined above.
Taper the change over (when Stretch/squeeze in time selected)	Type the distance over which to taper the change. A transit modification must be tapered to avoid creating new reflection coefficients at the top and bottom of the stretch/squeeze zone. GeoSyn uses a linear taper at the top and bottom of the zone where the correction starts at zero and tapers up to a calculated value, then tapers down to zero again. The length of the taper is reported in depth samples and is the sum of the top and bottom tapers.
Set depth range	Do one of the following: Type a depth range over which to taper the change and click <b>Update</b> . Click either <b>Top</b> or <b>Bottom</b> to select the absolute top or bottom of the log, or click <b>All</b> to select both. Click <b>Depths from Tops</b> and select the top and bottom of your zone of interest using formation names.

## Parent Topics

See "Stretching and Squeezing Logs," p. 66  
See "Correlation Window: Log," p. 202

See "Correlation Window: Trace," p. 202

## Stretch and Squeeze (Seismic)

With this feature...	Do this...
Add	After adding at least one row to the display pane, click to place the times in the two boxes, type different times, and then click <b>Add</b> .
Display pane	<p>In the <b>Tie Seismic</b> dialog box, hover the cursor over the seismic at the point to tie and click, and then hover the cursor over the correlating tie point on the model and click to tie the two.</p>  <p>Using the <i>Stretch and Squeeze</i> dialog box, click <b>Apply</b> to update the <b>Tie Seismic</b> dialog box.</p>

Restore Original	Undo the above activity.
Snap to	Select the feature closest to the cursor at which to place the tie anchor. In this way, the cursor only has to be near, but not directly over one of the following features in order for GeoSyn to select it: <b>Peak</b> - the highest amplitude point. <b>Trough</b> - the lowest amplitude point. <b>Zero Crossing</b> - the point exactly between the peak and the trough. <b>None</b> - the tie anchor is not snapped to a feature, but is placed directly below the location of the cursor.

## Parent Topics

*See "Tying Seismic to Models," p. 150*

*See "Tie Seismic," p. 244*

## Sum Options

With this feature...	Do this...
Range definition	Either select <b>Auto</b> or specify the trace numbers to include in the near, middle, and far groups.
Range relationships	Using the drop-down lists, create mathematical expressions to filter or enhance traces.

## Parent Topics

*See "Changing Multi-Offset Properties," p. 126*

*See "Model Properties: Multi offset," p. 227*

## Synthetic Properties

With this feature...	Do this...
Banner	Select whether the UWI or only a banner you type appears as the first banner. To modify the UWI, click <b>Edit</b> to display the <b>Edit a UWI</b> dialog box then select a survey system and type survey coordinates. There are additional options available from the drop-down list to the right of the <i>Banner 1</i> box for the well header such as <b>Well Label</b> , which can be one of three labels defined using the <i>Well Properties</i> tab of the <i>Well Properties</i> dialog box, or <b>User Defined</b> , with which you specify alphanumeric characters.
Well status symbol	Select whether the well status symbol appears. Click <i>Well Symbol Legend</i> for details.
Image banner	Select whether an image in enhanced metafile format appears. Click <b>Edit</b> to display the <b>Enhanced Metafiles Properties</b> dialog box then browse to and select the image, or with the image copied into the Windows Clipboard, click <b>Paste</b> .
Information banner	Select whether the banner that lists detailed synthetic information appears.
Depth scales	Select whether to display kelly bushing and subsea depths and on which side of the synthetic to display them.
Time scales	Select whether to display time scales, their measurement, and where to display them on the synthetic.
Border	Select whether a black border encompasses the synthetic display.

Printer page outline	Select whether to display a pink border that shows the portion of the synthetic that will print on a single page. This outline is based on the current settings of the default printer. To change the outline, change the default printer configuration.
Rotate model and single track log labels 90 degrees	Flip labels for models and logs so the lettering runs vertical instead of horizontal.
Tables	Select whether the tops table appears in the main synthetic display and where. You can also rotate it 90 or 270 degrees depending on how you will orient the printed model. To display a text box on the main display in which you type details about operations you've performed on the synthetic and so on, with the Comments check box selected, click Edit to display the Comments box.
General model parameters	Select general properties based on the following: <b>Sample rate</b> The frequency at which to sample the data when building the model. <b>Model units</b> Click <b>Change</b> to display the <b>Unit conversion table</b> dialog box and specify the conversion factors to use when converting metric and Imperial units. <b>Prompts</b> Select whether GeoSyn notifies you when importing logs with either invalid UWIs or unknown aliases.
Vertical scale	Select whether the linear scale is based on time or depth. Depth is helpful when comparing a synthetic to a log, which is also depth-based. This option affects the <i>Correlation</i> window. Select the scale units and inches per second or feet per inch depending on whether the linear scale is based on time or depth.
Plot range	Based on whether <b>Time</b> or <b>Depth</b> is selected in the <b>Vertical scale</b> pane, type the start and end measurements of the zone of interest to display.

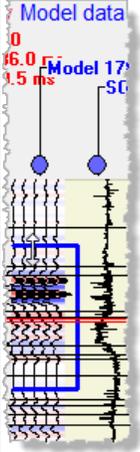
## Parent Topics

See "Changing the Main Synthetic Display," p. 43  
 See "Undoing and Redoing Changes," p. 45

See "Changing Import Defaults," p. 11  
 See "Displaying Comments," p. 130

## Tie Seismic

With this feature...	Do this...
Seismic display pane	GeoSyn automatically picks the best tie on the trace closest to the well by default, but you can override this by dragging the slider left or right to move the green correlation line to a more similar seismic sample. Drag the green and the blue horizontal lines that control the data range to exclude unwanted data that appears in the model or in the seismic.
Cross correlation function	Drag the slider to the right of the display up or down to move the seismic trace along the model trace so the highest value for both are correlated. GeoSyn does this automatically, but you can change it.
Phase	Drag the sliders to the right of the Seismic and the Model boxes (or type directly in the boxes) to manually align the phase between the seismic phase or the model phase and the amplitude area. The outcome of the signals you adjust appears in the Cross Correlation Function area. The red signal is the seismic and model phase. The black signal is the amplitude envelope. Generally, the seismic phase should be changed to match the model instead of the model phase being changed to match the seismic.

Correlation Range	<p>Select the range of data points to include in the active envelope. The active envelope is the vertical range that appears within the two horizontal green lines on the seismic section and within the two horizontal blue lines on the model. Note that instead of typing values in these two boxes, you can also simply drag the horizontal lines as depicted.</p>  <p>Data that falls outside of the active envelope is ignored when detecting the best tie point.</p>
Jump to Best Tie	<p>Move the tie to the best point in either of the following:</p> <p><b>Current Trace</b> - a vertical point along the existing trace that's colored green and within the active correlation range specified above.</p> <p><b>All Traces</b> - a vertical location amongst all of the traces that appear in the seismic section and within the correlation range specified.</p>
Extract Wavelet	Click to display the <i>Frequency Extraction Wavelet</i> dialog box where you extract a wavelet using a seismic section in conjunction with a model.
Stretch/Squeeze	Click then select the top of the seismic zone to tie and the corresponding location on the model. Next, click the bottom of the seismic zone to tie and the corresponding location on the model. The <i>Stretch and Squeeze</i> dialog box appears where you can type more precise values for the tie points and click <b>Apply</b> .
Options	Click to display the <i>Select Data Sets for Cross-Correlation</i> dialog box.
Zoom in   Zoom out	Click <b>Zoom In</b> and then move the cursor over the seismic section (the cursor changes to a magnifying glass  ) and then drag the extents to zoom to zoom the overall dialog box.

## Parent Topics

See "Tying Seismic to Models," p. 150

See "Select Data Sets for Cross-Correlation," p. 239

## Tie to Datum

With this feature...	Do this...
Time Datum	Specify a depth that is above the top of the log so that the synthetic is pushed deeper. For Kingdom users, the datum is imported from Kingdom and applies to the entire project, so instead of changing the datum itself, change the time at a given depth point, which inserts the appropriate velocities in the log section added.
Well Tie Point	Specify a depth point on the sonic log to tie to time zero on the seismic section. The range from the top of the well to the new datum must be greater than zero.

Uncorrected Time Tie	Correlate the depth point tie to time using the top of the sonic log as time zero.
New Time Tie	Type a time that's greater than zero.
Time Units	Select the time units and time measurement system to use when making the tie. The units shown in the boxes above reflect the current selection.
Depth Datum	Select the depth units to use when making the tie. The units shown in the boxes above reflect the current selection.

## Parent Topics

See "Launching GeoSyn from Kingdom," See "Changing Time Datum Properties," p. 112 p. 28  
 See "Time Datum Properties," p. 246 See "Kingdom Data Browser (Import Directional Surveys and Time Depth Charts)," p. 195

## Time Datum

With this feature...	Do this...
Apply Time Depth Corrections to Synthetic	Apply a time depth chart that is created when working in a given area by tying logs to seismic using Kingdom. The time depth chart corrects the sonic log automatically created by GeoSyn by adjusting the sonic's time depth points. Alternatively, select <b>Tie synthetic to a depth point</b> and then click <b>Edit</b> to select a single depth on the wellbore to tie to the time on the seismic section. Selecting this option requires that you add an invisible log section above the synthetic in order to move it down, as logs don't typically run to surface where time zero is marked. Use the Time Datum dialog to add an invisible log section above the synthetic.

## Parent Topics

See "Launching GeoSyn from Kingdom," p. 28

## Time Datum Properties

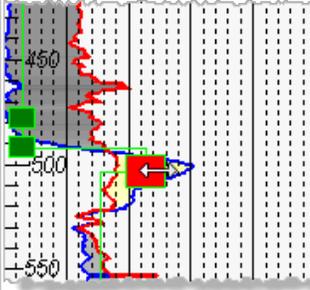
With this feature...	Do this...
Add Layered Section...	Click <b>Add</b> to the right of the <i>Layers</i> label and then type details associated with section to add above the log. Note that multiple zones with different parameters can be added above the log.
Units	Specify the seismic units.
Options	Click either of the following: <b>Tie Depth Point to Time</b> - to display the <i>Tie to Datum</i> dialog box where you specify the point at which to tie the sonic log to the seismic section, which differs from the <i>Time Datum Properties</i> dialog box where you merely push the sonic log deeper. <b>Convert to Log Data</b> - to display the otherwise invisible log data at the top of the log in the main display.

Layers	Click either of the following: <b>Add</b> - to create a row where you add zone details in the layer display pane at the top of the dialog box. <b>Delete</b>   <b>All</b> - to remove the layers from the layer pane.
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## Parent Topics

See "Changing Time Datum Properties," p. 112

## Time Depth Quality Control

With this feature...	Do this...
Curve display pane	<p>View the original (red) sonic curve, the correcting (green) time depth curve, and the corrected (blue) sonic curve that results from the time depth curve being applied to the original sonic curve.</p> <p>Drag a time-depth reading by velocity or depth, or type the desired values in the <i>Edit Options</i> pane.</p>  <p>Right-click to insert a new time-depth reading.</p> <p>Drag to select multiple time depth readings.</p>
Chart: Grid	Select the time depth curve to use above the chart and select time depth readings to adjust in the <i>Edit Options</i> pane. CTRL+Click or SHIFT+Click for multiple selection.
Edit Options	Modify a reading selected in the grid (or clicked in the Curve Display pane), and then click <b>Update</b> , or click <b>New</b> to add an additional time depth reading.
Mouse Node Drag Options	Select whether to affect the velocity or the depth of the time-depth curve when you drag it using the <i>Curve Display</i> pane.
Single or Multi-Node Time Changes	Select whether to change the velocity above and below the selected node point or only above the selected node. The default option, <i>Lock all but selected node times</i> constrains the changes to the nodes immediately above and below the selected node preventing the remaining depths from changing. Generally, this is the preferred option.
Drift Correction Options	Select the method by which to apply the drift correction. <i>Spline curve</i> is the preferred method, as the correction is applied more gradually across the entire zone. Linear applies more drastic changes, which may cause additional reflection coefficients.
Display Options	Select the depth or velocity range to display and the preferred view that appears in the <i>Curve Display</i> pane.

## Parent Topics

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*See "Launching GeoSyn from Kingdom," p. 28*

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## Time Shift Options

This dialog appears when you close the Tie Seismic dialog box after specifying tie points.

With this feature...	Do this...
Shift Synthetic	Select whether to shift the synthetic relative to the seismic. This option is available where the slider control in the Cross Correlation Function of the Tie Seismic dialog box is dragged above the zero to a negative value.
Time Datum	If the Shift Synthetic option (described above) is active, specify the datum depth to add a zone above the seismic.
Correction Velocity	This value is automatically created based on the time datum and shift applied above, but you can change it.
Shift Seismic	Specify that the seismic shift relative to the synthetic.

## Parent Topics

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*See "Tying Seismic to Models," p. 150*

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## Time vs. depth chart

With this feature...	Do this...
1 Way   2 Way	Select either one or two-way time.
Zoom In	Click and then draw a bounding box around the pane for which you want to zoom. You can only zoom in once so to zoom more, draw a smaller box.
Zoom Out	Click to undo the current zoom view.
Show Grid	Select whether to display a basic depth / time grid.
Show Tops	Select whether to display formation tops.

## Parent Topics

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*See "Analyzing Velocity and Depth," p. 155*

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## Top Properties

With this feature...	Do this...
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Tops for list	Select a top to modify, delete, or below which to insert either a blank or duplicate row. To copy tops to another list, select the list with the desired tops in the <i>Tops lists</i> pane then select the tops to copy here (SHIFT+CLICK or CTRL+CLICK for multiple selection) and click <b>Copy selected tops to another list</b> .
New	Click <b>New</b> to create either a blank top or empty tops list in the <i>Tops for list</i> or <i>Tops lists</i> display panes.
Duplicate	Click to create a new list with the same tops as those in the tops list selected in the <i>Tops list</i> display pane.
Delete	Click <b>Delete</b> to delete only top selected above or click <b>All</b> to delete all of the tops displayed in the pane above.
Copy tops list to list	Select the tops in the <i>Tops for list</i> pane and then click this button and select the destination list from the <b>Select a recipient tops list</b> dialog box.
Select All	Click to select all of the tops above.
Edit tops	Type and select the display properties for the top selected above and then click <b>Update</b> . Attributes aren't visible in GeoSyn 2D yet. To display lithology in the main synthetic display, from the <b>Edit</b> menu, select <b>Well and log properties &gt; Log Properties</b> and in the <b>Infill</b> box, select <b>Lithology</b> .
Tops lists	<i>Select a list to display tops within it in the adjacent Tops for list pane.</i> <i>In the Use column of the Tops lists display pane, select the checkbox for lists with tops to display in the main display. All tops in lists with Use selected appear in the same tops table.</i>
Export	Click to output the tops with the <i>Use</i> column selected to an ASCII format file.
Import	Select the format of the source tops file from the drop-down list, and then click <b>Import</b> .
List Labels	Type label information that appears in both the <i>Tops lists</i> display pane and in the tops table in the main display.
Plot tops labels	Select whether top names appear on the left and right of logs in the main display.
AccuMap specific	These controls will be active in a future release.

## Parent Topics

<i>See "Changing Tops Properties," p. 92</i>	<i>See "Changing Import Defaults," p. 11</i>
<i>See "Exporting Tops Lists," p. 183</i>	<i>See "Duplicating Tops Lists," p. 95</i>
<i>See "Create New Curve Type," p. 203</i>	<i>See "Well Properties: Well properties," p. 254</i>
<i>See "Edit Default Display Properties," p. 209</i>	<i>See "Importing Tops from Fixed Width Files," p. 101</i>
<i>See "Importing Tops from GeoSyn Files," p. 99</i>	

## Tops Import

With this feature...	Do this...
Display Pane	Drag to select the tops to import into GeoSyn.
Tops in	Select whether the tops in the source file are ordered in rows (formation top names run horizontally along a single row), or columns (formation top names run vertically down a single column).
Names in row/column Depths in row/column	Depending on your selection above, this field changes to support either rows or columns. Specify the row or column in which the formation names and depths appear. Click the directional arrows to either move forward or backward by one column or to move to the first or last column.
Search	GeoSyn automatically searches the formation tops import file for a UWI that matches the well currently displayed in GeoSyn and highlights it in red. Override this selection by typing a different UWI.
Import	Click to import the tops selected above into GeoSyn.

Delimiter Qualifier	GeoSyn automatically interprets this information from the source file. Override GeoSyn's comma, tab, or space selection. Delimiter is the character that denotes each individual item to import. Qualifiers are symbols that enclose items to ignore.
Locate at specified depths Ignore depths and space evenly	Select whether to space tops evenly or according to the Kelly bushing or subsea. If based on depth, tops outside of the depth range of the model aren't placed.
Import units	Select the measurement system used in the file from which you're importing tops. GeoSyn will convert them to the unit system GeoSyn is using if required. The unit system GeoSyn is using appears after the <i>Bulk shift top depths by</i> option below.
Depths are relative to KB SS	Select whether to space tops according to the Kelly bushing or subsea.
Bulk shift top depths by	Type a negative or positive value by which to shift the top's depths in GeoSyn.
Delete current tops before importing new tops	Select to delete all tops in the tops list to which tops will be imported. If this checkbox is cleared, tops with the same name in the donor and recipient list appear twice in the recipient list.

## Parent Topics

<i>See "Importing Tops from Delimited Files," p. 99</i>	<i>See "Importing Tops from GeoSyn Files," p. 99</i>
<i>See "Importing Tops from Fixed Width Files," p. 101</i>	<i>See "Importing Tops from LAS and ASCII Files," p. 106</i>
<i>See "Import Tops," p. 216</i>	<i>See "Top Properties," p. 248</i>

## Unit conversion table

With this feature...	Do this...
Curves	Select the log for which you want to change the conversion factor.
Unit conversion	Review the conversion factor for the selected log, and if desired, type a new conversion factor in the box below.
New units	Review the units to output for the selected log, and if desired, type a new output unit in the box below.

## Parent Topics

<i>See "Changing the Main Synthetic Display," p. 43</i>	<i>See "Synthetic Properties," p. 243</i>
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## Wavelet Library

With this feature...	Do this...
Display pane	Select the wavelet to apply to the current model or to delete.
Show all	Click to automatically select all of the individual check boxes that control display options in the above grid, or click the individual check boxes.
Replace	Click to apply the wavelet selected above to the existing model.
Create	Create a new model based on the wavelet selected above.
Delete	Click to remove the wavelets selected above from the centralized wavelet library.

## Parent Topics

See *"Importing Wavelets and Wavelet Sets,"* p. 133  
 See *"Wavelet Properties: Spectrums,"* p. 251

See *"Exporting Wavelets,"* p. 182  
 See *"Wavelet Properties: Wavelet,"* p. 252

## Wavelet Properties: Spectrums

With this feature...	Do this...
Display pane	Select the wavelet with which to work. Clear <b>Show all wavelets</b> if you're already working with the desired wavelet to increase the work space in this dialog box.
Name	Type a name with which the wavelet is identified in the main synthetic display.
Type	Select a predefined filter to apply to the wavelet selected in the display pane. Controls to specify the cut and pass frequencies appear below based on your selection.
Low cut Low pass High cut High pass	Modify the energy shape either by typing the actual source values provided with the seismic data or by modifying the wavelet shape to visually match the seismic data.
Center phase	Type a value or drag the slider to move the wavelet relative to the center point displayed in the <i>Wavelet</i> tab.
Taper	Select whether to taper using an equation.
Operator length	Type the overall length of the sample to display in the adjacent window.
Import/Export	Beside either <i>Wavelet</i> or <i>Wavelet sets</i> (depending on whether to save a single wavelet or group of wavelets), click <b>Import</b> or <b>Export</b> to read or write the wavelet or wavelet set that appears in the display pane to or from disk. To save or import a wavelet(s) from a centralized wavelet library used by all GeoSyn models, beside the <i>Library</i> label select either <b>Add</b> to save the current wavelet to the library, or <b>Retrieve</b> to display the <i>Wavelet Library</i> dialog box where you apply one or more wavelets to the current synthetic.
Import Wavelet	Select either of the following and then click: <b>Replace wavelets in selected models</b> - overwrites the wavelets selected in the Show wavelet list pane of the Wavelet Properties dialog box with those selected in the <i>Wavelet Library</i> dialog box. Create new models - adds the selected wavelet alongside other wavelets available in the synthetic.
Extraction	Click <b>Extract</b> to load a wavelet saved in ASCII or SEGY format.
Left right arrows (  )	Click to expand or compress the spectrum.
Show	Select whether to display the spectrum for power, amplitude, and phase.

## Parent Topics

See *"Changing Wavelet Properties,"* p. 138  
 See *"Exporting Wavelets,"* p. 182  
 See *"Wavelet Properties: Wavelet,"* p. 252

See *"Importing Wavelets and Wavelet Sets,"* p. 133  
 See *"Extracting Wavelets,"* p. 141  
 See *"Model Properties: Wavelets,"* p. 228

## Wavelet Properties: Wavelet

With this feature...	Do this...
Display pane	Select the wavelet with which to work. Clear <b>Show all wavelets</b> if you're already working with the desired wavelet to increase the work space in this dialog box.
Name and Comments	Type a name with which the wavelet is identified in the main synthetic display.
Type	Select a predefined filter to apply to the wavelet selected in the display pane. Controls to specify the cut and pass frequencies appear below based on your selection.
Low cut Low pass High cut High pass	Modify the energy shape either by typing the actual source values provided with the seismic data or by modifying the wavelet shape to visually match the seismic data.
Center phase	Type a value or drag the slider to move the wavelet relative to the center point displayed in the <i>Wavelet</i> tab.
Taper	Select whether to taper using an equation.
Length	Type the overall length of the sample to display in the adjacent window.
Import   Export	Beside either <i>Wavelet</i> or <i>Wavelet sets</i> (depending on whether to save a single wavelet or group of wavelets), click <b>Import</b> or <b>Export</b> to read or write the wavelet or wavelet set that appears in the display pane to or from disk.  To save or import a wavelet(s) from a centralized wavelet library used by all GeoSyn models, beside the <i>Library</i> label select either <b>Add</b> to save the current wavelet to the library, or <b>Retrieve</b> to display the <i>Wavelet Library</i> dialog box where you apply one or more wavelets to the current synthetic.
Extraction	Click <b>Extract</b> to open the <i>Frequency Wavelet Extraction</i> dialog box where you select the seismic trace and extraction method to load.
Aux. trace	Select an additional trace to display in the trace display pane and a color format. For example, the Amplitude Envelope shows where the wavelet energy is and helps you to align the wavelet phase.
Color	Select a background color for the display pane.

## Parent Topics

<p><i>Changing Wavelet Properties</i></p> <p><i>Extracting Wavelets</i></p> <p><i>Wavelet Properties: Spectrums dialog box</i></p> <p>See "<i>Changing Wavelet Properties</i>," p. 138</p> <p>See "<i>Extracting Wavelets</i>," p. 141</p> <p>See "<i>Wavelet Properties: Spectrums</i>," p. 251</p>	<p><i>Exporting Wavelets</i></p> <p><i>Importing Wavelets and Wavelet Sets</i></p> <p><i>Model Properties: Wavelets dialog box</i></p> <p>See "<i>Exporting Wavelets</i>," p. 182</p> <p>See "<i>Importing Wavelets and Wavelet Sets</i>," p. 133</p>
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## Well Properties: Directional properties

With this feature...	Do this...
TVD vs. offset calculator	Click the arrows to adjust the depth and offset values by 1, 10, and 100 respectively.
Horizontal scale	Type a value for a horizontal scale to bridge the real world and the display world. For example 100 m = 1 cm.

Show horizontal deviation	Toggle whether to display the horizontal deviation in the main synthetic display.
Projection azimuth	Type a value or hover the cursor over the compass then click and drag to change the projection azimuth.

## Parent Topics

See *"Changing Deviated Well Properties," p. 47*

## Well Properties: Log properties

With this feature...	Do this...
Display pane	Select the log to modify and either change its display properties or click <b>Duplicate</b> then change the display properties of the copied log. Click <b>New</b> to create a blank log type. SHIFT+CLICK or CTRL+CLICK for multiple selection, or click Select All.
Name	Type a descriptive name with which to overwrite the original log name.
Type	Select a log type from the drop-down list and whether to make it the active log upon which your synthetic is derived.
Alias / API	Select an alias and then type the API number.
Units	Type the unit suffix and for sonic logs either transit or velocity units.
Scales	Select whether to automatically adjust scales to data limits or type custom minimum and maximum values.
Show offscale	Select whether portions of a log that over-run the horizontal width of the track are drawn on the other side of the track in a different color and different line style. Log portions that over-run more than one track are colored differently than logs that over-run only a single track.
Infill	If displaying a single log per track, click Edit to display the <i>Color Palette</i> dialog box where you specify a lithology fill and whether to fill the left or right portion of the trace.
XPlot underlay link	Select whether the color infill for the log is derived from a crossplot. This option is enabled using the <i>Crossplot Properties: Color Mapping</i> tab.
Derive using..	Select to apply a constant mathematical formula to the selected curves that persists despite changes to the log. Click <b>Edit</b> to specify different variables. Note that selecting this option will prevent you from doing some log editing functions.
Edit	Click to launch the <i>Edit the derivation equation</i> dialog box.
Trace	Select display properties for the logs selected in the display pane above.
Track Width	Specify the width at which the track will be printed.
Description Options	Select whether to use the log name that appears in the imported file, the GeoSyn log name, or the alias. To reduce the width of the overall synthetic, display the alias.
Depth Markers	Select the increments for major and minor depth markers.
Track Layout	Select whether to use one log per track or multiple logs per track. For single logs per track, configure the track display using the Infill options listed above. For multiple logs per track, click <b>Edit</b> to display the <i>Edit Multi-log per Track Template</i> dialog box and specify track criteria that can also be saved as template files.

## Parent Topics

See *"Changing Log Display Properties," p. 50*  
See *"Edit color palette," p. 208*

See *"Combining Logs in Tracks," p. 52*

## Well Properties: Well properties

With this feature...	Do this...
Unique Well Identifier	Click <b>Edit</b> to display the <i>Edit a UWI</i> dialog box then specify a survey system and survey coordinates. Both UWI labels update.
Labels	Type any log header information to show in the main synthetic display. Select which of the labels appear in the main synthetic using the drop-down list that appears to the right of the <i>Banner 1</i> box in the <i>Synthetic Properties</i> dialog box.
Status	Select a well status from the drop-down list and whether to update this status if it's changed in the AccuMap database. Click <i>Well Symbol Legend</i> for details.
KB elevation	Type the Kelly bushing elevation.
Depth inc.	Type the depth increment.
TVD status	Select whether the well is measured in True Vertical Depth or Measured Depth. If Measured Depth, you can import an ASCII format directional survey file by clicking the adjacent button.
Import Directional Survey	Click to launch the <i>Measured Depth to True Vertical Depth correction</i> dialog box. Also select whether to calculate the bottom hole position based on the directional survey imported.
Tops	Click <b>Edit</b> to launch the <i>Top Properties</i> dialog box and configure tops lists and individual tops.
Editing History	Click <b>View</b> to display a list of the date, time, and description of changes made to the curve using Log Editor. Saved changes span multiple GeoSyn sessions.
Position	Select whether to use the default datum, the datum specified in the AccuMap database, or one based on another standard datum you select or coordinates that you type using the <i>Set Location</i> dialog box.

## Parent Topics

See <i>"Changing Well Display Properties," p. 45</i>	See <i>"Changing Import Defaults," p. 11</i>
See <i>"Importing Directional Surveys," p. 15</i>	See <i>"Changing Wavelet Expansion Properties," p. 140</i>

## Zero Phase Extraction Processing Flow

With this feature...	Do this...
Time range Sum traces	Select the time range and number of traces to sum.
Taper Apply taper to	Select the taper method and percentage of the summed traces to taper.
Wavelet name	Type the name by which the resulting wavelet is identified in GeoSyn.
Operator length	Select the longest operator possible to ensure the amplitude spectrum retains as much detail as possible.
Taper	Select the method by which to taper the operator extracted from the center of the summed and tapered traces.

See "Extracting Wavelets," p. 141

# Appendices

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## Basic AVO Workflow

The following is a very basic guide for the use of the AVO functionality in the new GeoSyn 1D program. This functionality is capable of both reverse and forward modeling. Reverse modeling requires seismic data of the common offset type.

## Forward Modeling

1. Import well logs, P Sonic, Density and Shear sonic if available.
2. Re-datum the synthetic by adding new section at the top. This critical step is necessary to ensure that the incident angle for any given interface calculated within the GeoSyn ray tracing algorithm matches the seismic section. Ray tracing must be done from close to the surface where the seismic was acquired.

Two methods may be used to accomplish this. The older method, using the *Insert Section* dialog box in the *Log Editor*, is no longer recommended. A new dialog box, *Time Datum properties*, handles the problem much better.

### Using the Time Datum properties dialog box

Open the *Time Datum Properties* dialog box, *Edit/Time Datum...* (T<sup>o</sup>). A single entry typically indicates that the top of the log suite is time zero. Click **Add a layer**, to create a new layer with zero thickness. Next change the *KB* or *SS* value of the top of the new layer and set it to near the elevation of the ground surface or seismic datum.

Update the velocity of the new zone to create enough time delay to push the GeoSyn models down in time to the correct position in time relative to observed seismic or checkshot data. Notice that the top of the visible model now has a time matching the bottom of this new layer. GeoSyn's AVO calculation honours this new zone (or zones) as if it were genuine log section added to the top of the log suite (as in the older method below).

### Using the Insert Section dialog box

Calculating the amount of section to add: The depth datum of the seismic section should not be used to calculate this value, as the incident angle field in the seismic is a function of the shot point and receiver elevations, in other words, the ground surface. In the idealized case of flat stratigraphy and flat ground surface, the depth value of the first log sample (relative to the KB) is a decent value to use. Using the *Insert Section* dialog box, add this section to the top of the log suite.

Calculating the velocity of the new section: The velocity/transit value of the new section is also an issue. It must match the average velocity of the section from the top of the well log to the surface. Calculate this value before adding section to the well log.

Correlate the synthetic to the seismic and determine the difference, the time shift, between seismic zero and synthetic zero. Calculate the seismic time datum shift applied by the processor and remove this from the value. Divide the Time Shift by two to change from 2-way to 1-way.

Calculate the required average velocity or transit value by dividing the required amount of depth section by the Time Shift.

3. Assign AVO parameters to a model. Right click over a model and select the Model Parameters dialog. Set the model type to 'Multi Offset' and adjust the following parameters:

- **Ray trace method** - Ray trace (slow). ( Full Snell's law calculation).
- **Vertical sampling interval** - Use 'Constant time'.
- **Geometry** - CDP interval, Num traces and Near trace offset.

Adjust the three parameters, adding or subtracting traces, adjusting the CDP interval and offset until the required maximum offset is reached. Remember that the CDP interval is half the surface offset.

- **Apply NMO correction** - Set to yes.
- **Mute** - Something around 28 degrees or so will work.

4. Apply an offset dependency formula. By default when a multi-offset model is created the offset dependency for reflection coefficient calculation is set to none. To apply a dependency select the Reflection Coefficient (Ref Coef) tab of the Model Properties dialog and select one of the three options, Aki Richards 2 or 3 term or Shuey. If a shear sonic is unavailable GeoSyn will prompt you to create one based on Castagna's well known relationship between shear and p sonic curves.

Step 4 completes the basic setup for forward AVO modeling. The model is ready for cross plot analysis.

5. Cross Plot analysis. While some information may be gleaned from visual analysis of the model the best way to analyze the data is with a cross plot.

Cross plots of interest fall into two categories:

- Analysis of a single or at most 2 or three sample points involving amplitude plotted against one of the following: offset, incident angle, sine incident angle or sine squared incident angle. This method is most appropriate for detailed analysis of an AVO response at a particular interface of interest.
- Analysis of the entire data set, or significant portion of it, by using the gradient vs. intercept method. This method is convenient in a reconnaissance sense as the entire data set may be analyzed at once with a view toward identifying zones of interest.

## Reverse Modeling

Reverse modeling is defined as a modeling effort involving real data.

1. Import well logs. P Sonic, Density and Shear sonic if available.
2. Import seismic offset data. A common offset stacked panel, sorted to display near trace on the left and far trace on the right, works well. Set the synthetic sampling rate to match the sample rate of the seismic.
3. Re-datum the synthetic by adding new section at the top. Please refer to step 2 in the Forward modeling section.
4. Tie seismic to synthetic. This critical step adjusts the time datum of the seismic section to tie the synthetic. Open the 'Tie seismic to model dialog by right clicking over the seismic or selecting from the Seismic properties dialog. This dialog initially requests a model to tie against then automatically calculates a best fit time shift.
5. Creating an AVO model using parameters from the seismic. Select an unused model using the 'Link to AVO trace model' list box in the Seismic properties dialog. The model will have its AVO properties automatically adjusted to match the seismic offset panel. If there is a problem reading the seismic headers the model properties must be set manually.

Step 5 completes the basic steps required to prepare a reverse model for analysis. The model is ready for cross plot analysis.

6. Cross Plot analysis. Please refer to step five in the Forward modeling section for instructions on cross plot usage. The cross plotting effort is identical except that all offset and angle selections must come from the model and all amplitude selections must come from the seismic.

## Check Shot Computation

The application of check shots to a synthetic is, in theory, relatively straightforward. In practice, it involves complicated datums and datum corrections. The following describes the basic check shot computation in GeoSyn:

- A series of check shot time depth pairs are input to the program. The sonic log is integrated (i.e., converted to a time depth log), and a second set of time depth pairs that correspond in depth to the check shot time depth pairs are selected from it. A third set of time depth pairs are created by subtracting the sonic time depth pairs from the corresponding check shot time depth pairs. This third set represents the difference and therefore the correction between the sonic and the check shot at the depths defined by the check shots.
- The next step is to calculate a best-fit cubic spline through the correction points. A cubic spline is a third-order polynomial log, with the added constraint that the second derivative of the log be continuous and smooth. Cubic splines tend to be more stable than polynomials, with less possibility of wild oscillation between the tabulated points. Future releases of GeoSyn will contain provision for polynomial fits of greater than 3 degrees.
- The cubic spline function is used to calculate interpolated points corresponding to every depth sample from the integrated sonic log. These points are added to the integrated time at each integrated sonic depth point. A new sonic transit log is calculated by subtracting consecutive points from the corrected integrated log.
- The final step involves adding new section at the top of the log to account for the difference between the top of the sonic log and the source datum elevation of the check shot survey. Check shots above the limits of the original log create block velocity zones in the newly expanded log.

## GeoSyn Format

After you have created and saved a new synthetic, the synthetic is saved to disk as a binary file with the optional extension *.syn*. This file contains all the information necessary to re-create the state of the synthetic as well as the raw log data.

## Glossary

Here, we provide definitions of some technical terms:

Data aliasing is a consequence of the undersampling of data. Where there are fewer than two samples per cycle, an input signal at one frequency yields the same sample values as (and hence appears to be) another frequency at the output of the system. Half of the frequency of sampling is called the "folding" or Nyquist frequency  $f_n$ .

Nyquist frequency is the frequency equal to half the sampling frequency. Frequencies greater than the Nyquist frequency will alias as lower frequencies, from which they will be indistinguishable.

Sample Rate is the time between successive samples of a digital time series. The sample rate, as defined in GeoSyn, is in two-way time. Current GeoSyn limits vary from 0.25 ms to 4 ms. The sample rate is intimately associated with another concept, the Nyquist frequency, which determines the maximum frequency that may be presumed to be present in a digital time series.

## IHS File Format

The following is a truncated example of an IHS formatted ASCII file. One header card is required. It must contain an identifier string, the first depth, the last depth, the depth increment, and the units. If the units are missing, GeoSyn prompts you to select them. GeoSyn currently only supports single log files.

Test Well 204.0 1463.8 0.2000 M SONIC

204.0 364.76 361.88 360.86 363.92 369.15 374.39 379.62 382.22 381.31 379.54 10

206.0 377.76 375.93 373.71 371.16 368.62 366.78 367.17 369.08 370.99 372.90 10

208.0 374.99 377.58 380.46 383.34 386.22 389.10 393.41 399.86 407.72 414.99 10

210.0 415.48 410.51 405.55 400.58 396.70 394.32 392.52 390.89 389.36 388.62 10

212.0 388.59 388.57 388.54 388.51 388.49 388.41 388.18 387.87 387.56 387.25 10

...

1454.0 161.02 158.81 156.61 155.50 155.54 155.64 155.74 155.68 155.45 155.21 10

1456.0 155.12 155.99 157.66 159.33 161.00 162.67 164.10 165.21 166.24 167.27 10

1458.0 168.30 169.37 170.59 171.92 173.26 174.60 176.01 174.26 168.08 162.26 10

1460.0 161.92 165.63 169.59 173.82 178.37 183.10 187.84 182.83 168.57 160.55 10

1462.0 161.62 166.09 170.56 174.93 179.11 183.22 187.65 190.07 190.10 190.09 10

#TOPS# 5

Top1 258.0

Top2 348.0

Top3 481.0

Top4 599.5

Top5 684.0

KB 900.9

No special end of file characters are required.

## LAS Format

The Canadian Well Logging Society's Floppy Disk Committee has designed a standard format for log data on floppy disks. It is known as the LAS format (Log ASCII Standard). LAS consists of files written in ASCII and containing minimal header information. The LAS format has evolved over the years. GeoSyn currently supports the import of two versions, 1.2 and 2.0.

GeoSyn will read an attached tops file, although strictly speaking tops are not included in the official LAS format. Two styles of tops formats are supported in Version 2.0, and one format is supported in Version 1.2.

<b>Truncated Example of LAS Version 2.0</b>	<b>Truncated Example of LAS Version 1.2</b>
---	---

~VERSION INFORMATIONVERS. 2.00:CWLS LOG ASCII STANDARD - VERSION 2.00WRAP. NO :One Line per depth step#~WELL INFORMATION#MNEM.UNIT DATA DESCRIPTION#----- -----STRT.M 249.7836 :START DEPTHSTOP.M 1254.2520 :STOP DEPTHSTEP.M 0.1520 :STEP LENGTHNULL. -999.2500 :NULL VALUECOMP. AnyCompany OIL & GAS LIMITED :COMPANYWELL. AnyCompany etal AnyWhere :WELLLOC . AnyWhere :LOCATION#~CURVE INFORMATION#MNEM.UNIT DATA DESCRIPTION#----- -----DEPT.M :1 DepthDT .USM 7 520 80 00 :2 Sonic Travel TimeRHOB.G/C3 31 350 02 00 :3 Bulk Density#~PARAMETER INFORMATION#MNEM.UNIT DATA DESCRIPTION#----- -----EKB .M 300.0000 :Kelly bushing#~T 7 Tops //or ~T 7 TopsT0 647.98T1 800.89T2 1011.86Wabamun 1132.40Ireton 1536.64Slave Point 1812.01Pre Cambrian 1841.80#~A DEPT DT RHOB249.7836 410.825 1819.972249.9356 410.752 1791.029250.0876 410.679 1802.005250.2396 410.607 1869.852250.3916 410.534 1908.247250.5436 410.461 1958.225250.6956 410.388 1987.873250.8476 410.316 2014.986250.9996 410.249 2022.811...1253.4396 169.758 2730.6461253.5916 169.758 2730.6461253.7436 169.758 2730.6461253.8956 169.758 2730.6461254.0476 169.758 2730.6461254.1996 58.382 939.106No special end of file characters are required.**alternate tops format~Formation Tops Information#TOPS NAME . DEPTH:BR . 7221.0410:WPBI . 8034.6790:COLO . 8539.9220:CARD . 9553.6900:CARD . 9671.7980:L CA . 9743.9760:BKST . 9799.7500:	~Version : LASOUT vs 1.20VERS. 1.20: CWLS Log ASCII Standard-VERSION 1.20WRAP. NO: One line per depth step~Well Information Block#MNEM.UNIT Data Type Information#-----:-----STRT.M 250.0000: Start DepthSTOP.M 2413.0000: End DepthSTEP.M .2000: Depth IncrementNULL. -999.25:COMP. COMPANY:WELL. WELL: Dog Patch LAKE 5-4FLD . FIELD: Dog PatchLOC . LOCATION: 10-10-99-1w6PROV. PROVINCE: ALBERTASRVC. SERVICE COMPANY: FlyByNight LoggersDATE. LOG DATE: 1889/12/29UWI . UNIQUE WELL ID: 0101010101010~Parameter Information Block#MNEM.UNIT Value Description#-----:----- -----BHT .DEGF .0000: Bottom Hole TemperatureBS .MM .0000: Bit SizeDFD .0000: Mud Weight (Density)DFV .0000: Mud ViscosityDFL . .0000: Mud Fluid LossDFPH .0000: Mud pHRM .OHMM .0000: Mud ResistivityRMT .DEGF .0000: Mud Resistivity TemperatureRMFS.OHMM .0000: Mud Filtrate ResistivityRMFT.DEGF .0000: RMF TemperatureRMC .OHMM .0000: Mud Cake ResistivityRMCT.DEGF .0000: RMC TemperatureEKB .M 987.5000: Elevation Kelly BushingEGL .M 982.3000: Elevation Ground Level~Curve Information Block#MNEM.UNIT API CODE Curve Description#-----:-----DEPT.M : 1 DEPTHDT .USM 60 520 0 1: 2RHOB.KM3 42 350 1 1: 3~A Depth DT RHOB250.0000 376.4800 1922.6000250.2000 345.2000 1998.4000250.4000 313.9200 2363.4000250.6000 282.6400 2512.2000250.8000 254.4400 2463.2000251.0000 275.8800 2392.0000..2411.2000 -999.2500 2715.90002411.4000 - 999.2500 2713.90002411.6000 -999.2500 2712.40002411.8000 - 999.2500 2707.20002412.0000 -999.2500 2691.00002412.2000 - 999.2500 2674.80002412.4000 -999.2500 2658.60002412.6000 - 999.2500 2640.70002412.8000 -999.2500 2683.40002413.0000 - 999.2500 2730.9000No special end of file characters are required.
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## SEGY Format

GeoSyn can export integrated time data (traces, wavelets, wells, rocs, etc.) in SEG Y format. The format specification discussed here is a derivative of the SEG Y 9-track standard. Because there is no official MS DOS standard, some liberties have been taken with respect to the original specifications. For a discussion of the 9-track SEG Y format, refer to "Recommended Standards for Digital Tape Formats" K.M. Barry, D.A. Cavers, C.W. Kneale: *Geophysics*, Vol. 40 No. 2, p. 344-352.

## SEGY Format

A SEG Y file consists of three sections or blocks.

## ASCII File Identification Header

The first 3600 bytes of the file is the File Identification Header and consists of a 3200-byte ASCII card image block followed by a 400-byte binary block. The 3200-byte ASCII section represents a deviation from the 9-track SEG Y standard, which specifies that this section be in EBCDIC format. Both are text formats, but use of the ASCII format enables a user to read this portion of the SEG Y file in any PC-based text editor. This deviation from the standard has no detrimental effects because most programs rely on the binary data for hard information.

The ASCII section consists of 40 lines of 80 characters each. Each line starts with a C and the line number. The following is an abridged example of the 3200-byte ASCII header for a typical GeoSyn SEG Y file and describes the well name, sample rate, data type, and byte order. This same information is encoded in the 400-byte binary section.

C1 GeoSyn Synthetic Seismogram

C2 ABC OIL AND GAS 11-11-11-11W1

C3 Date: 11:35 AM Fri Dec 01, 1995

C4 Sample Rate: 2.00 (ms)

C5 Data Type: Integer(2 byte)

C6 Byte Swap: Yes

C7

.....

C36

C37

C38

C39

C40

## Binary File Header

The 400-byte binary file header follows the ASCII file header and is situated on bytes 3201 to 3600. GeoSyn does not require or make use of most of the space.

The following bytes are used:

3213 to 3214 Number of byte traces per record =1

3217 to 3218 Sample interval in microseconds

3221 to 3222 Number of samples per data trace

3225 to 3226 Data sample format code (will be either 1 or 3)

1=floating point (4bytes)

2=fixed point (4 bytes)

3=fixed point (2 bytes)

4=fixed point with gain code (4 bytes)

3261 to 3262 Total number of traces per line =1

3269 to 3270 Start time of data trace (can be negative in the case of a wavelet)

## Trace Header

The trace header is a 240-byte binary section that precedes each section of trace data. GeoSyn only writes one data curve, so there is one trace header in the file. The trace header occupies bytes 3601 to 3840. The bytes used by GeoSyn are tabulated below. Note that some values are 4 bytes long instead of 2-byte integer.

The following bytes are used:

3601 to 3604 Trace Number.

3629 to 3630 Trace identification code 1=seismic data, 2=dead trace.

3715 to 3716 Number of samples.

3717 to 3718 Sample interval in microseconds.

## Trace Data

Trace data is stored in binary format and follows the 240-byte trace header. The binary data may be stored in one of two formats, 16-bit integer or IEEE floating point. The 16-bit integer format requires 2 bytes per amplitude value, whereas the floating point format requires 4 bytes.

## Data Area

The data area follows the trace header and consists of a number of 2- or 4-byte numbers representing the amplitude data of the trace or wavelet. Note that the number of samples in this record will exceed the number of samples in the synthetic if a trace is being saved, because the roll out portion of the trace below the bottom of the log is included. The number of extra samples will equal the length of the trace plus half the length of the wavelet operator.

## Well Symbol Legend

	Location		Suspended
	Service or Drain		Oil
	Gas		Dry and Abandoned
	Heavy Oil		Suspended Oil
	Abandoned Oil		Suspended Gas
	Abandoned Gas		Abandoned Service
	Oil and Gas		Suspended Heavy Oil
	Abandoned Heavy Oil		Suspended Oil and Gas
	Abandoned Oil and Gas		Injection

