

Fractal Lab Application Help

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1 Main Index

Fractal Lab Help Index

If you need additional help with any of the topics below, click on the underlined keyword.

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[FL Remote](#)

Commands

[File menu](#)

[Edit menu](#)

[Image menu](#)

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[View menu](#)

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1.1 Title Bar

Title Bar

The title bar is located along the top of a window. It contains the name of the application and drawing.

To move the window, drag the title bar. Note: You can also move dialog boxes by dragging their title bars.

A title bar may contain the following elements:

- Application Control-menu button
- Drawing Control-menu button
- Maximize button
- Minimize button
- Name of the application
- Name of the drawing
- Restore button

1.2 Scroll Bars

Scroll bars

Displayed at the right and bottom edges of the drawing window. The scroll boxes inside the scroll bars indicate your vertical and horizontal location in the drawing. You can use the mouse to scroll to other parts of the drawing.

<< Describe the actions of the various parts of the scrollbar, according to how they behave in your application. >>

1.3 Size

Size command (System menu)

Use this command to display a four-headed arrow so you can size the active window with the arrow keys.



After the pointer changes to the four-headed arrow:

1. Press one of the DIRECTION keys (left, right, up, or down arrow key) to move the pointer to the border you want to move.
2. Press a DIRECTION key to move the border.
3. Press ENTER when the window is the size you want.

Note: This command is unavailable if you maximize the window.

Shortcut

Mouse: Drag the size bars at the corners or edges of the window.

1.4 Move

Move command (Control menu)

Use this command to display a four-headed arrow so you can move the active window or dialog box with the arrow keys.



Note: This command is unavailable if you maximize the window.

Shortcut


Keys: CTRL+F7

1.5 Minimize Command

Minimize command (application Control menu)

Use this command to reduce the Fractal Lab window to an icon.

Shortcut


Mouse: Click the minimize icon  on the title bar.
Keys: ALT+F9

1.6 Maximize Command

Maximize command (System menu)

Use this command to enlarge the active window to fill the available space.

Shortcut

Mouse: Click the maximize icon  on the title bar; or double-click the title bar.
Keys: CTRL+F10 enlarges a drawing window.

1.7 Next Window

Next Window command (drawing Control menu)

Use this command to switch to the next open drawing window. Fractal Lab determines which window is next according to the order in which you opened the windows.

Shortcut

Keys: CTRL+F6

1.8 Previous Window

Previous Window command (drawing Control menu)

Use this command to switch to the previous open drawing window. Fractal Lab determines which window is previous according to the order in which you opened the windows.

Shortcut

Keys: SHIFT+CTRL+F6

1.9 Close

Close command (Control menus)

Use this command to close the active window or dialog box.

Double-clicking a Control-menu box is the same as choosing the Close command.



Shortcuts

Keys: CTRL+F4 closes a drawing window
ALT+F4 closes the application

1.10 Restore

Restore command (Control menu)

Use this command to return the active window to its size and position before you chose the Maximize or Minimize command.

1.11 Switch to

Switch to command (application Control menu)

Use this command to display a list of all open applications. Use this "Task List" to switch to or close an application on the list.

Shortcut

Keys: CTRL+ESC

Dialog Box Options

When you choose the Switch To command, you will be presented with a dialog box with the following options:

Task List

Select the application you want to switch to or close.

Switch To

Makes the selected application active.

End Task

Closes the selected application.

Cancel

Closes the Task List box.

Cascade

Arranges open applications so they overlap and you can see each title bar. This option does not affect applications reduced to icons.

Tile

Arranges open applications into windows that do not overlap. This option does not affect applications reduced to icons.

Arrange Icons

Arranges the icons of all minimized applications across the bottom of the screen.

2 Fractal Lab Remote

Fractal Lab Remote

The remote provides access to many of the most-used commands in Fractal Lab. Information about each button can be obtained by using the '?' located near the close box in the top right-hand corner of the remote.

2.1 New

New button

Use this button to create a new draw window in Fractal Lab. The default parameters for the new window will be the same as the startup drawing.

2.2 Undo

Undo button

Use this command to undo the last action. Color-cycling is disabled after using Undo.

2.3 Size

Size button

This allows you to set the drawing area for a picture, independent of the Windows screen size. It also shows which size is currently in use. The aspect for the drawing is based on the ratio of X (horizontal width) to Y (vertical height.) The custom setting allows for any size/aspect that system memory will permit. The minimum size for an image is 60X30. Note: the aspect of the figure is always 1/1 regardless of the draw window's aspect.

2.4 Color

Color button

Use the palette editor to modify the color palette. Note: one palette of 236 colors is used for all figures in a composite fractal, but the each segment in a generator may be a different color.

2.5 Text

Text button

Use this button to add text to the active drawing.

2.6 View

View button

Displays the entire plot, expanding or shrinking the image to fit in a maximized window without title bar, scroll bars or menu bar. At all other times, part of the picture may be hidden by the inclusion of the title bar, toolbar, scroll bars and menu bar. To exit full-screen mode, press any key or click the left-mouse button.

2.7 Draw button

Draw button

Use this button to draw or redraw the image for the current fractal variables. "Draw" invokes the Level window, then draws the current fractal at the specified level of recursion. Clears the screen before drawing (if autoclear is enabled). Click the left-mouse button to stop a drawing in progress. Select Draw to draw a new fractal, with a new random factor if the RANDOMSIDES flag is set. Select Redraw to keep the current random factor. Note: the current random factor may not produce the same image pattern if the depth of the picture is changed.

2.8 Help

Help button

Use this button to open the help index for Fractal Lab.

2.9 Generator

Generator button

Use this button to edit the current generator.

2.10 Initiator

Initiator button

Use this button to edit the current initiator.

2.11 Scale

Scale

Invokes the Scale window. The Scale Window scales the initiator length and screen positions to effectively reduce or expand the fractal image. A scale of .5 affects both X and Y coordinates, so the image is quartered. A scale of 2.0 would make the image four times as large. A range of .1 to 9.9 is allowed in the scale gadget, but the program checks that points do not exceed screen limits. A fractal may still attempt to draw itself off screen, and is then clipped. Points that would end off the screen are not drawn.

2.12 Scale Composite

Scale Composite

Invokes the Scale window to scale composite figures. The Scale Window scales the initiator length and screen positions to effectively reduce or expand the fractal image. A scale of .5 affects both X and Y coordinates, so the image is quartered. A scale of 2.0 would make the image four times as large. A range of .1 to 9.9 is allowed in the scale gadget, but the program

checks that points do not exceed screen limits. A fractal may still attempt to draw itself off screen, and is then clipped. Points that would end off the screen are not drawn.

2.13 Move

Move

"Move" changes the cursor to a cross to relocate the fractal's starting point anywhere on the screen, modifying the setting of the initiator. Click where you want the center of the fractal. The starting points of each initiator segment are adjusted to correspond with the shift in the first segment. Useful for tiling multiple fractals on the screen, or putting different fractals side by side. Does not change the random factor when the RANDOMSIDES flag is set. This enables random dragons to be moved.

2.14 Move Composite

Move Composite

"Move Composite" changes the cursor to a cross to relocate the fractal's starting point anywhere on the screen, modifying the setting of all the initiators in a composite fractal. Click where you want the center of the composite fractal. The starting points of each initiator segment are adjusted to correspond with the shift in the first segment. Useful for tiling composite fractals on the screen, or putting different fractals side by side. Does not change the random factor when the RANDOMSIDES flag is set. This enables random dragons to be moved.

2.15 Center

Center

Use this command to re-center the current figure. Useful when you rotate a figure and it ends up off center.

2.16 Center Composite

Center Composite

Use this command to re-center all figures in the current composite figure. Useful when you rotate a figure and it ends up off center. Note: each figure can have a different center point, so using this command won't necessarily make all figures line up around the same center point. Use Move Composite to change the center point **for all figures** to the same point.

2.17 Alternate

Alternate

ALTERNATE tells the generate routine to reverse the side placement of the generator at each stage of recursion. Must be set to draw snowflakes, etc. ALTERNATE excludes the RANDOMSIDES and ALTFIRSTPOS flags and enables the RANDOMREVERSE flag to be

set or not.

2.18 Random Reverse

Random Reverse

RANDOMREVERSE reverses the generator without changing the side it is to be draw on. Used to create random snowflakes, etc.

2.19 Random Sides

Random Sides

RANDOMSIDES randomizes the side the generator is placed on at the first stage of each level of recursion after the first recursion. Must be set to draw random dragons. Excludes ALTERNATE, ALTFIRSTPOS and disables the RANDOMREVERSE item.

2.20 AltFirstPos

AltFirstPos

ALTFIRSTPOS alternates the generator every other level starting with the lowest level. Excludes ALTERNATE and RANDOMSIDES. Used for the Polya fractal.

2.21 RevRightSide

RevRightSide

REVRIGHTSIDE reverses the generator when it is drawn on the right side. Used for the Peano-Gosper fractal and Quartet fractal. Can be used with any of the other flags, for different effects.

2.22 No Flags

No Flags

NO FLAGS excludes all other flags and disables RANDOMREVERSE. Use to display the original dragon curve, or to eliminate the random factor from any curve that doesn't use ALTERNATE or RANDOMSIDES.

2.23 Save

Save button

Use this button to save and name the active drawing. Fractal Lab displays the Save As dialog box so you can name your drawing.

To save a drawing with its existing name and directory, use the File/Save command.

2.24 Load

Load button

Use this button to open an existing data/image file in a new window. Use the Window menu to switch among open images, if maximized, or click on a draw window to make it the active window.

2.25 Bmp

BMP button

Use this button to select the BMP format when loading and saving fractals. This is the default Windows bitmap format, readable by most Windows programs that use image files. This is also the fastest method of loading and saving fractals, but requires more disk space, since no compression is used. Windows keeps track of the last six BMP files saved or loaded (displayed in the Files menu.)

2.26 Png

PNG radio button

Use this button to select the PNG format when loading and saving fractals. This format uses medium compression without loss of image quality.

2.27 Jpg

JPG radio button

Use this button to select the JPEG format when loading and saving fractals. This format uses moderate compression but with some loss of image quality. Preferable for posting to the net, since most browsers can display jpeg files.

2.28 |||||

||||| button

Through a series of windows, this allows you to name and open an avi animation stream and choose a compression method. After choosing the frame rate (1-60 fps) and using the file requester to name the file, you are given a choice of compression methods. You can also choose no compression for optimum view quality. (Unless you are limited on disk space, it's best to create the video using no compression and save a copy of it later in compressed format. All compression methods degrade the original images, some more than others.) The first key frame in the stream is then drawn and written to the file.

Note: after the stream is opened, the size of the fractal that can be drawn is fixed at the size of the frame. No changes can be made to the size until the stream is closed.

2.29 >**> button**

With this option, frames are written to a stream based on the difference between the current key frame and the previous key frame. The first key frame is written when you open a stream. The next key frame is created each time you use this option. In between you can zoom or change fractal variables as much as necessary. The stream is only written to when this option is used. The last key frame is automatically saved after the 'tween' series is written. The number of frames may range from 1-1500 frames between keys. With a frame number of 1 only the key frames are written. This allows animation to be created that incorporate all scalable variables in Fractal Lab.

Use the Cancel button to exit this dialog without initializing a new series of frames.

Check the Log Scaling box if you want the frames to be written with logarithmic space between frames, else linear space is used.

2.30 []**[] button**

Closes any open avi stream file. You need to do this before viewing the file or creating a new avi file. The stream is also closed when you exit Fractal Lab.

2.31 V**V button**

Opens an avi file for viewing. You can preview any multimedia file by clicking on its file name. A multimedia box will appear to the right of the file list. Click on okay to open the main view window.

There are buttons to Play a file forwards or Backwards, or forward automatically with Auto rewind/repeat. Click on Slow to slow down a video. Each click on Slow halves the viewing speed. A click on Stop freezes viewing and restores the view speed to normal playback.

Use the Open button to view a different avi file. Use the Save button to save the file in a different compression format. You must use a different name to save the file than the name that was used to open it. Click on the left-mouse button or any key to abort a save operation.

3 File menu**File menu commands**

The File menu offers the following commands loading and saving drawings and exiting the

program:

New	Creates a new drawing.
Open	Opens an existing drawing.
Close	Closes an opened drawing.
Save	Saves an opened drawing using the same file name.
Save As	Saves an opened drawing to a specified file name.
Load Parameters	Load parameters from an existing drawing.
Open [JPEG]	Load jpeg.
Open [PNG]	Load png.
Save Parameters	Save parameters for an opened drawing to a specified file name.
Save As [JPEG]	Save in jpeg format.
Save As [PNG]	Save in png format.
Exit	Exits Fractal Lab.

3.1 File Open[JPG] command

Open [JPEG] command (File menu)

Use this command to load parameters and a bitmap file that were saved in jpeg format. There is an option in the file-type box to load only the bitmap too. This replaces the Open command for those who need a smaller sized bitmap file. Note: the last files list in the File menu doesn't keep track of images loaded in JPEG format.

3.2 File Save Bitmap As [JPG] command

Save As [JPEG] command (File menu)

Use this command to save the parameters and active bitmap in jpeg format. There is an option in the file-type box to save only the bitmap too. This replaces the Save and Save As command for those who need a smaller sized bitmap file. Note: the last files list in the File menu doesn't keep track of images saved in JPEG format.

3.3 File Open [PNG] command

Open [PNG] command (File menu)

Use this command to load parameters and a bitmap file that was saved in png format. There is an option in the file-type box to load only the bitmap too. This replaces the Open command for those who need a smaller sized bitmap file. Note: the last files list in the File menu doesn't keep track of images loaded in PNG format.

3.4 File Save Bitmap As [PNG] command

Save As [PNG] command (File menu)

Use this command to save the parameters and active bitmap in png format. There is an option in the file-type box to save only the bitmap too. This replaces the Save and Save As command for those who need a smaller sized bitmap file. Note: the last files list in the File menu doesn't keep track of images saved in PNG format.

3.5 File Load Parameters command

Load Parameters command (File menu)

Use this command to load a data file [.frl]. The data file contains all variables to recreate an image created previously with Fractal Lab.

3.6 File New command

New command (File menu)

Use this command to create a new drawing window in Fractal Lab. The image and data for the opening picture are used to create the new window.

You can open an existing data/image file with the [Open command](#).

Shortcuts

Keys: CTRL+N

3.7 File Open command

Open command (File menu)

Use this command to open an existing data/image file in a new window. You can open multiple image files at once. Use the Window menu to switch among the multiple open images. See [Window 1, 2, ... command](#).

You can create new images with the [New command](#).

Shortcuts

Toolbar: 
Keys: CTRL+O

3.8 AFX_HIDD_FILEOPEN

File Open dialog box

The following options allow you to specify which file to open:

File Name

Type or select the filename you want to open. This box lists files with the extension you select in the List Files of Type box.

List Files of Type

Select the type of file you want to open:

<< List your application's file types here. >>

Drives

Select the drive in which Fractal Lab stores the file that you want to open.

Directories

Select the directory in which Fractal Lab stores the file that you want to open.

Network...

Choose this button to connect to a network location, assigning it a new drive letter.

3.9 File Close command

Close command (File menu)

Use this command to close the window containing the active image. If you close a window without saving, you lose all changes made since the last time you saved it.

You can also close a drawing by using the Close icon on the drawing window, as shown below:



3.10 File Save command

Save command (File menu)

Use this command to save the active drawing to its current name and directory. When you save a drawing for the first time, Fractal Lab displays the [Save As dialog box](#) so you can name your drawing. If you want to change the name and directory of an existing drawing before you save it, choose the [Save As command](#).

Shortcuts

Toolbar: 
Keys: CTRL+S

3.11 File Save As command

Save As command (File menu)

Use this command to save and name the active drawing. Fractal Lab displays the [Save As dialog box](#) so you can name your drawing.

To save a drawing with its existing name and directory, use the [Save command](#).

3.12 AFX_HIDD_FILESAVE

File Save As dialog box

The following options allow you to specify the name and location of the file you're about to save:

File Name

Type a new filename to save a drawing with a different name. A filename can contain up to eight characters and an extension of up to three characters. Fractal Lab adds the extension you specify in the Save File As Type box.

Drives

Select the drive in which you want to store the drawing.

Directories

Select the directory in which you want to store the drawing.

Network...

Choose this button to connect to a network location, assigning it a new drive letter.

3.13 File 1, 2, 3, 4, 5, 6 command

1, 2, 3, 4, 5, 6 command (File menu)

Use the numbers and filenames listed at the bottom of the File menu to open the last six drawings you closed. Choose the number that corresponds with the drawing you want to open.

3.14 File Exit command

Exit command (File menu)

Use this command to end your Fractal Lab session. You can also use the Close command on the application Control menu. Note: if you choose to exit while plotting, the program does not terminate, but stops the plotting so the program can be safely exited.

Shortcuts

Mouse: Double-click the application's Control menu button.



Keys: ALT+F4

3.15 File Save Parameters command

Save Parameters command (File menu)

Use this command to save all data elements for the current image in a data file [.frl].

4 Edit menu

Edit menu commands

The Edit menu offers the following commands for editing fractal parameters:

Undo	Undo last edit, action or zoom.
Copy	Copy the active view and put it on the Clipboard.
Paste	Insert Clipboard contents.
Copy Data	Copy fractal data to buffer.
Paste Data	Copy data from copy buffer.
Generator	Edit generator.
Initiator	Edit initiator.
Size	Sets the image size.
Scale	Edit initiator scale.
Scale Composite	Edit initiator scale for composite figure.
Palette Editor	Edit palette.
Text	Edit and add text to drawing.
Preferences	Default directories for saving and loading drawings and videos.

4.1 Edit Undo command

Undo command (Edit menu)

Use this command to undo the last action. An image can be continued after an undo, if continue was enabled before the last action. Color-cycling is disabled after using Undo, though.

Shortcut

Keys: CTRL+Z

4.2 Edit Copy command

Copy command (Edit menu)

Use this command to copy the active view to the clipboard. The entire view is copied to the clipboard.

Shortcut

Keys: CTRL+C

4.3 Edit Paste command

Paste command (Edit menu)

Use this command to paste from the clipboard. The clipboard must contain a bitmap. If the bitmap is larger than the view, it is clipped. The zoom cursor is used to set the left/top corner in the view where the bitmap will be pasted. Click outside the view frame or press escape to exit this option.

Shortcut

Keys: CTRL+V

4.4 Edit Copy Data command

Copy Data command (Edit menu)

Use this command to copy the fractal data for the active view to the file "frlcopy.frl". The current palette for the view is also copied.

Shortcut

Keys: CTRL+F

4.5 Edit Paste Data command

Paste Data command (Edit menu)

Use this command to paste the data in the file "frlcopy.frl" to the active view. The palette stored in the file is pasted also.

Shortcut

Keys: CTRL+R

4.6 Generator Window

Generator Window

The Edit Generator window allows you to add and edit up to 100 segments for the fractal generator. The top row of boxes/buttons are the control boxes and the lower edit boxes are for entering data.

The Control boxes:

The # box is used to enter a number within the range of existing segments to insert or recall a segment for changing or deleting. You can also insert what you recall or add it back too.

The Add button adds a segment to the end of the list of generator segments. You must first enter a valid segment into the data boxes.

The Change and Delete buttons are enabled after "recalling" a segment, to edit or delete a previously added or inserted segment.

The Insert button works with the # box to add a segment in front of the previously added segment.

The Recall button enters a previously-added segment into the data boxes, to enable editing or deleting it. This prevents erasing or changing a segment, with the wrong number in the # box. You can also recall a segment with a click of the left mouse button when it is positioned over the displayed segment.

The Cancel button cancels a recall operation and re-enables the # and Recall buttons.

The Data edit boxes:

The Direction box defines the direction of the segment relative to the 0 degree position, (-90 is straight up), or full right. The direction for a generator segment ranges from -180 to 180 (degrees).

The Length box defines the length of the segment as a fraction of the total length of the initiator segment length. This ranges from -1.0 to 1.0. Enter a negative length if you want to move to a new segment location, instead of drawing the line there. This is useful for creating "island" fractals whose segments are not necessarily continuous. When you enter a negative length, also enter a direction 180 degrees from the direction you want to move, or the opposite direction (a move is computed as a negative direction.) All fractional input is rounded to nine decimal places. There are two shortcuts you can use when entering lengths that simplify entering square roots and reciprocals. Use 'i' with a whole number for a reciprocal and 's' for a square root. For example, enter 3i for "1/3" and 3s for "square root of 3".

The Side box determines which side the generator will appear at the next recursion level subject to the settings of the Flags menu, right (0) or left (1).

Choose the color of the segment by clicking on one of the 236 segments in the color bar. The current color is drawn below the word Colors. Index 0 is the same as the background color, so use this to hide a segment.

4.7 Initiator Window

Initiator Window

The Edit Initiator window is the editor for the fractal initiator. It has control buttons that work the same as those with the [generator](#) editor, and different data boxes. You can add or edit up to 100 segments for each initiator.

Use the Rotate button to rotate all the segments in the initiator by the degrees in the Direction box. Useful for creating smooth rotations in an animation (with one of the A/V "smooth rotation" options selected.) All segments are assumed to be connected, that is the end point of one segment is connected to the starting point of the next segment. Hint: this allows you to add segments (identical to the first segment) without computing their starting or ending points. Just enter the correct Direction for each additional segment before clicking on the rotate button. Rotate 0 will connect all the segments.

The Data edit boxes:

The Direction box defines the direction of the initiator segment relative to 0 degrees, or straight up. Acceptable angles are 0 to 359 degrees.

The Length box defines the length of the segment in screen pixels.

The Side box controls which side the generator is placed initially, left (1) or right (0). For a segment going right 90 degrees, this would place the first generator upright.

The Left, Right, LeftBottom, RightBottom boxes set the start and end positions on screen for each initiator segment. The Right and Right Bottom coordinates are calculated automatically according to the following formulas:

$$\text{Right} = \text{Left} + \text{Sine}(\text{degrees}) * \text{length}$$

$$\text{RightBottom} = \text{LeftBottom} - \text{Cosine}(\text{degrees}) * \text{length}$$

where degrees is the segment direction. These formulas are accurate plus or minus a pixel. Under some conditions, line misplacements will be noticed due to the limits of the floating point arithmetic used in Fractal Lab. You may want to experiment with the Directions and Lengths to get the most accurate results.

Note: angles may appear a few degrees off on the finished fractal, if the screen pixel on your monitor is not exactly square. This shouldn't happen with a VGA monitor. Relative space between lines should still allow non-contacting fractals to remain non-contacting.

4.8 Size

Size (Edit menu)

This allows you to set the drawing area for a picture, independent of the Windows screen size. It also shows which size is currently in use. The aspect for the drawing is based on the ratio of X (horizontal width) to Y (vertical height.) The custom setting allows for any size/aspect that system memory will permit. The minimum size for an image is 60X30. Note: the aspect of the figure drawn is always 1/1 regardless of the drawing window aspect.

4.9 Scale

Scale

Invokes the Scale window. The Scale Window scales the initiator length and screen positions to effectively reduce or expand the fractal image. A scale of .5 affects both X and Y coordinates, so the image is quartered. A scale of 2.0 would make the image four times as large. A range of .1 to 9.9 is allowed in the scale gadget, but the program checks that points do not exceed screen limits. A fractal may still attempt to draw itself off screen, and is then clipped. Points that would end off the screen are not drawn.

4.10 Scale Composite

Scale Composite

Invokes the Scale window to scale composite figures. The Scale Window scales the initiator length and screen positions to effectively reduce or expand the fractal image. A scale of .5 affects both X and Y coordinates, so the image is quartered. A scale of 2.0 would make the image four times as large. A range of .1 to 9.9 is allowed in the scale gadget, but the program checks that points do not exceed screen limits. A fractal may still attempt to draw itself off screen, and is then clipped. Points that would end off the screen are not drawn.

4.11 Edit Palette

Edit Palette

Use the palette editor to modify the color palette in use.

Use the RGB-slider controls to edit any color in the palette. Select Copy to copy any color to another spot in the palette. Select Spread to define a smooth spread of colors from the current spot to another spot in the palette. Copy and Spread take effect immediately when you select another spot with the mouse button. You can cancel the operation with the Cancel button. The Map button is used to map color changes to an image after you are done adjusting the sliders. In the HSV mode, color spreads are based on HSV values instead of RGB values, which in some cases results in brighter color spreads.

Right-click on any point on the main window and the palette color for that pixel will be displayed in the palette editor. You can use any of the color-cycling keys (after clicking on

the main window) to see the effects of the cycling in the palette editor window. Note: color cycling and color-selection-from-pixel only works when the image has been drawn in the current session. If you load a pre-existing image file, you must redraw it to cycle colors, etc. Undoing an action also disables color cycling.

Use Reset to reset the colors of the palette to where it was before it was cycled or modified.

Use Reverse to reverse the order of the colors in the palette. This affects only those colors in the start-color to end-color range.

Use Neg to create a palette that is the complement of the current palette.

Use SRG to switch the red and green components of all palette colors.

Use SRB to switch the red and blue components of all palette colors. SRB and SRG are disabled in HSV mode. You can use these buttons to form eight different palettes by repeatedly switching red, green and blue components.

Use the Random palette buttons to randomize the current palette. Use Smooth to create a random palette that has continuous color spreads between indexes. Use Scramble to create a palette where each index is unrelated to the next. The Randomize variables, rmin, rmax, bmin, bmax, gmin, and gmax act as limits that are applied after the palette after initial randomizing, to make the palette conform to the desired spectrum of colors.

Note: unless you click on Reset before exiting the editor, changes are permanent to the palette, no matter which way you close the editor (Okay button or close box.)

4.11.1 Red Slider

Red slider

Use the RGB/HSV-slider controls to edit any color in the palette.

4.11.2 Green Slider

Green slider

Use the RGB/HSV-slider controls to edit any color in the palette.

4.11.3 Blue Slider

Blue slider

Use the RGB/HSV-slider controls to edit any color in the palette.

4.11.4 Reset Button

Reset button

Use Reset to reset the colors of the palette in use, to where it was before it was cycled or modified. Note: if you change palettes with one of the function keys, any modifications to a previous palette are unaffected by the Reset button.

4.11.5 Red edit box

Red edit box

Shows red/hue value of selected color index.

4.11.6 Green edit box

Green edit box

Shows green/saturation value of selected color index.

4.11.7 Blue edit box

Blue edit box

Shows blue/value magnitude of selected color index.

4.11.8 Cancel Button

Cancel button

You can cancel a copy or spread operation with the Cancel button.

4.11.9 Okay Button

Okay button

Click on Okay to exit the palette editor, applying unmapped color changes to picture (if color-cycling is enabled.)

4.11.10 Spread Button

Spread button

Select Spread to define a smooth spread of colors from the current spot to another spot in the palette.

4.11.11 Copy Button

Copy button

Select Copy to copy any color to another spot in the palette.

4.11.12 Neg Button

Neg button

Use Neg to create a palette that is the complement of the current palette.

4.11.13 H/R Button

H/R button

Change from HSV to RGB mode or back. In the HSV mode, color spreads are based on HSV values instead of RGB values, which in some cases results in brighter color spreads.

4.11.14 Rand Button

Smooth palette button

Use to create a smooth random palette. Color spreads move continuously from one color index to the next.

4.11.15 Scramble Button

Scramble palette button

Use to create a scrambled random palette. Color spreads are discontinuous from one color index to the next.

4.11.16 SRB Button

SRB button

Use SRG to switch the red and blue components of all palette colors. RGB mode only.

4.11.17 SRG Button

SRG button

Use SRG to switch the red and green components of all palette colors. RGB mode only.

4.11.18 Map Button

Map button

The Map button is used to map color changes to an image after you are done adjusting the sliders.

4.11.19 Reverse button

Reverse button

Use Reverse to reverse the order of the colors in the palette.

4.11.20 Help Button

Help button

Opens the help topic for the Palette editor.

4.11.21 Randomize variables

Randomize variables

The Randomize variables, rmin, rmax, bmin, bmax, gmin, and gmax act as limits that are applied after the palette after initial randomizing, to make the palette conform to the desired spectrum of colors.

4.12 Edit Text command

Text (Edit menu)

Allows you to edit text and font and apply it to a drawing. Select the font button to set the font style, size and color. In the text window click on Okay to add a line of text to the current image. (You can add multiple lines of text too, up to 80 characters.) The cursor will change to a crosshair. Position the cursor where you want the text to start and left-click the mouse. Note: font and text are saved in the file "prefs.txt" in Fractal Lab's startup directory.

4.13 Preferences

Preferences (Edit menu)

Use this option to view or change the default directories for saving and loading drawings and videos. Note: when you change directories and save a drawing in a directory different from the default directory, that directory becomes the default directory. Usually you won't have to change the default directory through the Preferences window unless the default directory is inaccessible for some reason. This could happen if you save a drawing in another computer, as in a home network, and the computer is not powered on at the next session.

5 Image menu

Image menu commands

The Image menu offers the following commands for plotting and processing images:

Draw	Draw the picture.
Draw Composite	Draw composite figures.
Auto Redraw	Redraw image on command.
Auto Clear	Clear drawing area before new plot.
Auto Sound Alert	Enable or turn off sound alerts.
Auto Remote	Open remote automatically at startup.
Auto Time	Show time used to plot image.
Merge Sum	Merge current pixel color with previous color summing colors.
Merge And	Merge current pixel color with previous color anding colors.
Merge Or	Merge current pixel color with previous color oring colors.
Merge High	Merge current pixel color with previous color by choosing highest
Merge Low	Merge current pixel color with previous color by choosing lowest
Merge Back	Merge current pixel color with previous color by excluding background
Merge Diff	Merge current pixel color with previous color by using difference of
Abort	Abort drawing.
Move	Move figure with mouse.
Move Composite	Move composite figure with mouse.
Center	Center figure.
Center Composite	Center composite figure
Reset	Reset Generator and Initiator for current view.
Clear	Erase active drawing window.
Cycle Colors	Cycle colors.
Full Screen	View image full-screen.
Figure 1-10	Switch to figure # (1-10).
Composite	Select figures to merge.

5.1 Image Draw command

Draw command (Image menu)

Use this command to draw or redraw the image for the current fractal variables. "Draw" invokes the Level window, then draws the current fractal at the specified level of recursion. Clears the screen before drawing (if autoclear is enabled). Click the left-mouse button to stop a drawing in progress. Select Draw to draw a new fractal, with a new random factor if the RANDOMSIDES flag is set. Select Redraw to keep the current random factor. Note: the current random factor may not produce the same image pattern if the depth of the picture is changed.

5.2 Image Draw Composite command

Draw Composite command (Image menu)

Use this command to draw or redraw an image defined in the Image/Composite command as a merging of figures 1-10. Clicking inside the draw window with the left-mouse button stops all plotting.

5.3 Image Redraw command

Auto Redraw command (Image menu)

With this command disabled (on by default), redraw does not occur except when the Draw command is executed. Most of the time you want to see the results of changing a parameter or mapping option, so redraw occurs automatically with parameter or mapping changes. Sometimes you want to change more than one parameter before redrawing the image. So you might need to turn this option off then to avoid drawing off screen, etc.

5.4 Image Auto Clear command

Auto Clear command (Image menu)

With this command enabled (on by default), the drawing area is cleared before starting a new plot. You can turn off this option when you want to see the effect of minor changes to parameters, as they affect the plot pixel by pixel, or when setting up a multiple-layered fractal. You can use the shift-c command ([hot keys](#)) to clear the drawing area at any time.

5.5 Image Auto Alert command

Auto Sound Alert command (Image menu)

With this command enabled (on by default), the user is notified by a sound clip when a drawing is completed or user-canceled. By disabling this command the completion exclamation is suppressed and also any alert that contains a message box. Note: some sound clips are automatically generated by Windows, or there is no text alert for a given error condition. In these cases the sound alert is unaffected by the Auto Alert command.

5.6 Image Auto Remote command

Auto Remote command (Image menu)

With this command enabled (on by default), the remote is opened immediately at program startup. Handy if you find the remote useful and don't want to click on the toolbar button each time the program starts up.

5.7 Image Auto Time command

Auto Time command (Image menu)

With this command enabled (on by default), the time that an image takes to plot is displayed when the plot is complete. Fractal Lab saves the condition of this option at session's end, so if you disable it and close the program, the option will be disabled when you restart Fractal Lab.

5.8 Image Merge Sum command

Merge Sum command (Image menu)

With this command enabled (off by default), current pixel color is not overwritten when a new image is drawn. Instead the colors are merged using a summing algorithm. The auto-clear option must be disabled and solid-guessing off to choose this option. Useful to merge two or more separate fractal images/types with the initial image(s) "bleeding" through.

5.9 Image Merge And command

Merge And command (Image menu)

With this command enabled (off by default), current pixel color is not overwritten when a new image is drawn. Instead the colors are merged using an anding algorithm. The auto-clear option must be disabled and solid-guessing off to choose this option. Useful to merge two or more separate fractal images/types with the initial image(s) "bleeding" through.

5.10 Image Merge Or command

Merge Or command (Image menu)

With this command enabled (off by default), current pixel color is not overwritten when a new image is drawn. Instead the colors are merged using an oring algorithm. The auto-clear option must be disabled and solid-guessing off to choose this option. Useful to merge two or more separate fractal images/types with the initial image(s) "bleeding" through.

5.11 Image Merge High command

Merge High command (Image menu)

With this command enabled (off by default), current pixel color is not overwritten when a new image is drawn. Instead the colors are merged using the highest rgb values of both

images. The auto-clear option must be disabled and solid-guessing off to choose this option. Useful to merge two or more separate fractal images/types with the initial image(s) "bleeding" through.

5.12 Image Merge Low command

Merge Low command (Image menu)

With this command enabled (off by default), current pixel color is not overwritten when a new image is drawn. Instead the colors are merged using the lowest rgb values of both images. The auto-clear option must be disabled and solid-guessing off to choose this option. Useful to merge two or more separate fractal images/types with the initial image(s) "bleeding" through.

5.13 Image Merge Back command

Merge Back command (Image menu)

With this command enabled (off by default), current pixel color is not overwritten when a new image is drawn. Instead the colors are merged using the rgb components of the new image if the new color index is not zero; else the old rgb values are retained. The auto-clear option must be disabled and solid-guessing off to choose this option. Useful to merge two or more separate fractal images/types with the initial image(s) "bleeding" through.

5.14 Image Merge Diff command

Merge Diff command (Image menu)

With this command enabled (off by default), current pixel color is not overwritten when a new image is drawn. Instead the colors are merged using the difference of the rgb values of both images. The auto-clear option must be disabled and solid-guessing off to choose this option. Useful to merge two or more separate fractal images/types with the initial image(s) "bleeding" through.

5.15 Image Abort command

Abort command (Image menu)

Use this command to stop drawing. Clicking inside a window's drawing area or close box (or the program close box) will also stop the drawing. Note: once a plot has started Fractal Lab continues to draw the image for that window regardless of which drawing window has the input focus, until done or aborted. You can open and close other drawing windows without affecting the current drawing, but only one drawing is active at any time.

5.16 Move

Move

"Move" changes the cursor to a cross to relocate the fractal's starting point anywhere on the

screen, modifying the setting of the initiator. Click where you want the center of the fractal. The starting points of each initiator segment are adjusted to correspond with the shift in the first segment. Useful for tiling multiple fractals on the screen, or putting different fractals side by side. Does not change the random factor when the RANDOMSIDES flag is set. This enables random dragons to be moved.

5.17 Move Composite

Move Composite

"Move Composite" changes the cursor to a cross to relocate the fractal's starting point anywhere on the screen, modifying the setting of all the initiators in a composite fractal. Click where you want the center of the composite fractal. The starting points of each initiator segment are adjusted to correspond with the shift in the first segment. Useful for tiling composite fractals on the screen, or putting different fractals side by side. Does not change the random factor when the RANDOMSIDES flag is set. This enables random dragons to be moved.

5.18 Center

Center

Use this command to re-center the current figure. Useful when you rotate a figure and it ends up off center.

5.19 Center Composite

Center Composite

Use this command to re-center all figures in the current composite figure. Useful when you rotate a figure and it ends up off center. Note: each figure can have a different center point, so using this command won't necessarily make all figures line up around the same center point. Use Move Composite to change the center point **for all figures** to the same point.

5.20 Reset

Reset

"Reset" erases the current generator and initiator from memory. The screen is not cleared or otherwise affected.

5.21 Color Cycle command

Cycle command (Color menu)

Use this command to cycle colors when not plotting. Undoing an action disables the cycle command until the image is redrawn.

5.22 Clear

Clear

The active draw window is erased and set to color index 0, the background color.

5.23 Full Screen

Full Screen (Image menu)

Displays the entire plot, expanding or shrinking the image to fit in a maximized window without title bar, scroll bars or menu bar. At all other times, part of the picture may be hidden by the inclusion of the title bar, toolbar, scroll bars and menu bar. To exit full-screen mode, press any key or click the left-mouse button.

5.24 Figure

Figure

Switch to Figure # (1-10). Current settings are saved under the previous image. Fractal Lab supports up to 10 figures in the same data file. You can combine these figures into one image using the Image/Draw Composite and Image/Composite commands.

5.25 Image Composite command

Composite command (Image menu)

Opens the Composite Figure window, where you can define a set of figures to merge into one image. All the merging options in the Merge Color menu are supported, plus "ALL" which is usually used for the first figure to be drawn. The "ALL" option transfers all rgb information for a figure to the drawing area, without checking the rgb state of the pixel. You can define up to ten figures (layers), as part of the composite, but each figure should contain an image (if used in the composite.)

6 Flags menu

Flags menu commands

The Flags menu offers the following commands for positioning the generator during plotting:

<u>ALTERNATE</u>	Alternate generator at every level.
<u>RANDOMSIDES</u>	Random generator sides
<u>RANDOMREVERSE</u>	Random reverse generator.
<u>ALTFIRSTPOS</u>	Alternate generator at every other level.
<u>REVRIGHTSIDE</u>	Reverse generator on right side.
<u>NO FLAGS</u>	Clear all flags.

6.1 Alternate

Alternate

ALTERNATE tells the generate routine to reverse the side placement of the generator at each stage of recursion. Must be set to draw snowflakes, etc. ALTERNATE excludes the RANDOMSIDES and ALTFIRSTPOS flags and enables the RANDOMREVERSE flag to be set or not.

6.2 Random Sides

Random Sides

RANDOMSIDES randomizes the side the generator is placed on at the first stage of each level of recursion after the first recursion. Must be set to draw random dragons. Excludes ALTERNATE, ALTFIRSTPOS and disables the RANDOMREVERSE item.

6.3 Random Reverse

Random Reverse

RANDOMREVERSE reverses the generator without changing the side it is to be draw on. Used to create random snowflakes, etc.

6.4 AltFirstPos

AltFirstPos

ALTFIRSTPOS alternates the generator every other level starting with the lowest level. Excludes ALTERNATE and RANDOMSIDES. Used for the Polya fractal.

6.5 RevRightSide

RevRightSide

REVRIGHTSIDE reverses the generator when it is drawn on the right side. Used for the Peano-Gosper fractal and Quartet fractal. Can be used with any of the other flags, for different effects.

6.6 No Flags

No Flags

NO FLAGS excludes all other flags and disables RANDOMREVERSE. Use to display the original dragon curve, or to eliminate the random factor from any curve that doesn't use ALTERNATE or RANDOMSIDES.

7 View menu

View menu commands

The View menu offers the following commands:

- [Toolbar](#) Shows or hides the toolbar.
[Status Bar](#) Shows or hides the status bar.

7.1 View Toolbar command

Toolbar command (View menu)

Use this command to display and hide the Toolbar, which includes buttons for some of the most common commands in Fractal Lab, such as File Open. A check mark appears next to the menu item when the Toolbar is displayed.

See [Toolbar](#) for help on using the toolbar.

7.1.1 toolbar

Toolbar



The toolbar is displayed across the top of the application window, below the menu bar. The toolbar provides quick mouse access to many tools used in Fractal Lab,

To hide or display the Toolbar, choose Toolbar from the View menu (ALT, V, T).

Click



To

Open the Remote which contains shortcut buttons for many common tasks and options in Fractal Lab



Open a new drawing window in Fractal Lab.



Open an existing drawing. Fractal Lab displays the Open dialog box, in which you can locate and open the desired file.



Save the active drawing or template with a new name. Fractal Lab displays the Save As dialog box.



Set image size.



Edit palette.



Edit the current figure's generator.



Edit the current figure's initiator.



Draw image from current parameters.



Show picture full-screen.



Display info about Fractal Lab.

7.2 View Status Bar Command

Status Bar command (View menu)

Use this command to display and hide the Status Bar, which describes the action to be executed by the selected menu item or depressed toolbar button, and keyboard latch state. A check mark appears next to the menu item when the Status Bar is displayed.

See [Status Bar](#) for help on using the status bar.

7.2.1 status bar

Status Bar



The status bar is displayed at the bottom of the Fractal Lab window. To display or hide the status bar, use the Status Bar command in the View menu.

The left area of the status bar describes actions of menu items as you use the arrow keys to navigate through menus. This area similarly shows messages that describe the actions of toolbar buttons as you depress them, before releasing them. If after viewing the description of the toolbar button command you wish not to execute the command, then release the mouse button while the pointer is off the toolbar button.

The right areas of the status bar indicate which of the following keys are latched down:

Indicator	Description
CAP	The Caps Lock key is latched down.
NUM	The Num Lock key is latched down.
SCRL	The Scroll Lock key is latched down.

8 Window menu

Window menu commands

The Window menu offers the following commands, which enable you to arrange multiple images in the application window:

Cascade	Arranges windows in an overlapped fashion.
Tile	Arranges windows in non-overlapped tiles.
Arrange Icons	Arranges icons of closed windows.
Size Desktop	Size drawing area to window frame.
Window 1, 2, ...	Goes to specified window.

8.1 Cascade

Cascade command (Window menu)

Use this command to arrange multiple opened windows in an overlapped fashion.

8.2 Tile

Tile command (Window menu)

Use this command to arrange multiple opened windows in a non-overlapped fashion.

8.3 Arrange

Window Arrange Icons Command

Use this command to arrange the icons for minimized windows at the bottom of the main window. If there is an open drawing window at the bottom of the main window, then some or all of the icons may not be visible because they will be underneath this drawing window.

8.4 Size DeskTop

Window Size DeskTop Command

Use this command to size the active drawing window to its frame size. Use after Tile command to reduce white space around a drawing that is smaller than screen size.

8.5 1, 2, ...

1, 2, ... command (Window menu)

Fractal Lab displays a list of currently open drawing windows at the bottom of the Window menu. A check mark appears in front of the drawing name of the active window. Choose a drawing from this list to make its window active.

9 A/V menu

A/V menu commands

The A/V menu offers the following commands for creating and viewing AVI videos:

Open AVI Stream	Open AVI file for writing and draw initial frame.
Write Frames	Write frames to AVI file.
Close AVI Stream	Close an existing AVI stream.
View AVI	View an AVI animation file.

AVI Composite	Generate composite video.
Clockwise	Rotate in clockwise direction.
Counter-Clockwise	Rotate in counter-clockwise direction.

9.1 Open Avi Stream

Open Avi Stream...

Through a series of windows, this allows you to name and open an avi animation stream and choose a compression method. After choosing the frame rate (1-60 fps) and using the file requester to name the file, you are given a choice of compression methods. You can also choose no compression for optimum view quality. (Unless you are limited on disk space, it's best to create the video using no compression and save a copy of it later in compressed format. All compression methods degrade the original images, some more than others.) The first key frame in the stream is then drawn and written to the file.

Note: after the stream is opened, the size of the fractal that can be drawn is fixed at the size of the frame. No changes can be made to the size until the stream is closed.

9.2 Write Frames

Write Frames...

With this option, frames are written to a stream based on the difference between the current key frame and the previous key frame. The first key frame is written when you open a stream. The next key frame is created each time you use this option. In between you can zoom or change Avi variables as much as necessary. The stream is only written to when this option is used. The last key frame is automatically saved after the 'tween' series is written. The number of frames may range from 1-1500 frames between keys. With a frame number of 1 only the key frames are written. This allows animation to be created that incorporates all scalable variables in Fractal Lab.

Use the Cancel button to exit this dialog without initializing a new series of frames.

Check the Log Scaling box if you want the frames to be written with logarithmic space between frames, else linear space is used.

Notes: key frames are saved in parameter files (frl), with filenames of "bvf_image#_title.frl", where '#' is the number of the keyframe and 'title' is the name of the working fractal file.

9.3 Close Avi Stream

Close Avi Stream

Closes any open avi stream file. You need to do this before viewing the file or creating a new avi file. The stream is also closed when you exit Fractal Lab.

9.4 View Avi

View Avi...

Opens an avi file for viewing. You can preview any multimedia file by clicking on its file name. A multimedia box will appear to the right of the file list. Click on okay to open the main view window.

There are buttons to Play a file forwards or Backwards, or forward automatically with Auto rewind/repeat. Click on Slow to slow down a video. Each click on Slow halves the viewing speed. A click on Stop freezes viewing and restores the view speed to normal playback.

Use the Open button to view a different avi file. Use the Save button to save the file in a different compression format. You must use a different name to save the file than the name that was used to open it. Click on the left-mouse button or any key to abort a save operation.

9.5 Avi Composite

AVI Composite

When this flag is set, Fractal Lab generates composite figures for a video according to the settings in the Image/Composite window. Each frame may then consist of a merging of up to 4 figures (1-4). You must set this flag and the composite options before beginning a video. After an avi stream has been opened, you can then use variations of any figure in the composite to produce tweens while using the Write Frames option. As usual, you vary data in the figure(s) before writing frames.

9.6 Smooth Rotations -> Clockwise

Rotations -> Clockwise

Select this when you want a figure to rotate clockwise (after rotating the initiator by n degrees.)

9.7 Smooth Rotations -> Counter-clockwise

Rotations -> Counter-clockwise

Select this when you want a figure to rotate counter-clockwise (after rotating the initiator by n degrees.)

10 Demo menu

Demo menu commands

The Demo menu offers the following commands, which illustrate various features of Fractal Lab:

Snowflake	Generate random or original snowflake curve.
Snowflake 13	Generate random or original 13-segment snowflake curve.
Monkey	Generate random or original monkey curve.
Koch	Generate random or original Koch curve.
Quadric Koch	Generate random or original Quadric Koch curve.
Quartet Koch	Generate random or original Quartet Koch curve.
Cesaro	Generate random or original Cesaro curve.
Fudgeflake	Generate random or original fudgeflake curve.
Gosper	Generate random or original Peano-Gosper curve.
Dragon	Generate random or original dragon curve.
Sierpinski Gasket	Generate random or original Sierpinski Gasket.
Sierpinski Carpet	Generate random or original Sierpinski Carpet.
Polya Sweep	Generate random or original Polya Sweep.
Original Curves Only	Demo original curves only.
Random Curves	Demo random curves.

10.1 Snowflake

Snowflake (Demo menu)

A snowflake curve is generated, either random or original, depending on the demo option chosen.

10.2 Snowflake 13

Snowflake 13 (Demo menu)

A 13-segment snowflake curve is generated, either random or original, depending on the demo option chosen.

10.3 Monkey

Monkey (Demo menu)

A monkey snowflake curve is generated, either random or original, depending on the demo option chosen.

10.4 Koch

Koch (Demo menu)

A Koch curve is generated, either random or original, depending on the demo option chosen.

10.5 Quadric Koch

Quadric Koch (Demo menu)

A Quadric Koch curve is generated, either random or original, depending on the demo option chosen.

10.6 Quartet Koch

Quartet Koch (Demo menu)

A Quartet Koch curve is generated, either random or original, depending on the demo option chosen.

10.7 Cesaro

Cesaro (Demo menu)

A Cesaro curve is generated, either random or original, depending on the demo option chosen.

10.8 Fudgeflake

Fudgeflake (Demo menu)

A fudgeflake curve is generated, either random or original, depending on the demo option chosen.

10.9 Gosper

Gosper (Demo menu)

A Peano-Gosper curve is generated, either random or original, depending on the demo option chosen.

10.10 Dragon

Dragon (Demo menu)

A dragon curve is generated, either random or original, depending on the demo option chosen.

10.11 Sierpinski gasket

Sierpinski Gasket (Demo menu)

A Sierpinski gasket is generated, either random or original, depending on the demo option chosen.

10.12 Sierpinski carpet

Sierpinski Carpet (Demo menu)

A Sierpinski carpet is generated, either random or original, depending on the demo option chosen.

10.13 Polya sweep

Polya Sweep (Demo menu)

A Polya sweep curve is generated, either random or original, depending on the demo option chosen.

10.14 Original Curves only

Original Curves only (Demo menu)

The original curve is drawn for each demo figure.

10.15 Random curves

Random Curves (Demo menu)

A random curve is drawn for each demo figure, using the RANDOMSIDES and REVRIGHTSIDE flags.

11 Help menu

Help menu commands

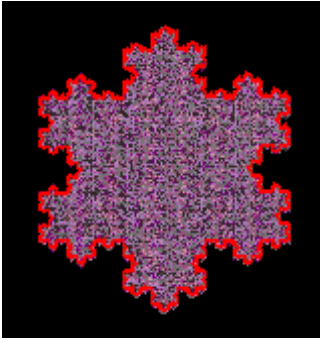
The Help menu offers the following commands, which provide you assistance with this application:

Getting Started	Tutorial for new users of Fractal Lab.
Index	Offers you an index to topics on which you can get help.
Hot Keys	Quick reference to Fractal Lab's hot keys.
Bibliography	Sources for fractal information and complex numbers.
About Fractal Lab	Displays the version number and author info for this application.

11.1 Getting Started

Getting Started

Welcome to Fractal Lab!



For help on any menu command, press F1 while the command is highlighted. For help on the Generator or Initiator windows, click on the Help button inside those windows.

Many examples of the kinds of fractals that can be created in Fractal Lab are included in the Demo menu. Select one of the fractal types like Snowflake, and Fractal Lab will draw it for you, either with a random twist (the default setting) or the original curve. To increase the resolution of a fractal, select the Remote's Draw button or menu command Image/Draw (or the toolbar draw button) and increase the "Level of recursion" in the Drawing Level box. Use "redraw" to maintain the current random factor.

You can study how it is created by scanning the generator and initiator lists in their respective windows. To see the fractal as it originally appeared in Mandelbrot's *The Fractal Geometry of Nature*, select the "Original Curves only" option in the Demo menu. To follow along with Mandelbrot's text, it helps to have a protractor and ruler, to measure lengths and angles of the fractal's generator. Mandelbrot provides mostly visual clues to how the Koch curves are generated, and does not always include the exact angles or lengths of the generator. Hint: if you see " $r = 1/3$ " in the generator's illustration, that is the same as the generator's average "length" in Fractal Lab. In this case, start with .3333333 for a segment length and adjust each segment's length in the generator according to its length relative to other segments in the generator. If a segment is twice as long as the average length, try using .666667 for that segment's length.

All of the lengths or directions for a fractal generator usually have exact measurements to reproduce the original fractal, but they can be changed for special effects or animations. Try playing with the Flags menu to create variations of the example fractals and any others you might create. One of the most interesting of the sample fractals to randomize is the Dragon fractal.

Fractal Lab allows you to Undo the last command in most cases.

Be sure to read the [Generator](#) and [Initiator](#) sections and the [hot keys](#) section for additional info. The [Bibliography](#) lists additional reference material for a better understanding of the fractal types and functions contained in Fractal Lab.

11.2 Index

Index command (Help menu)

Use this command to display the opening screen of Help. From the opening screen, you can jump to step-by-step instructions for using Fractal Lab and various types of reference information.

Once you open Help, you can click the Contents button whenever you want to return to the opening screen.

11.3 Hot Keys

Hot keys

Shift-C -- clear the screen to the current background color.

Shift-T -- annotate a picture with text. Cursor changes to a crosshatch, which you position over the area where you want the text to start. Then click the left-mouse button to transfer any text (from the Edit/Text window) to the picture. Can be used with Undo. Use the Edit/Text command to change font, text color or format text into multiple lines. This is useful for adding copyright/author info to a finished picture.

11.4 Bibliography

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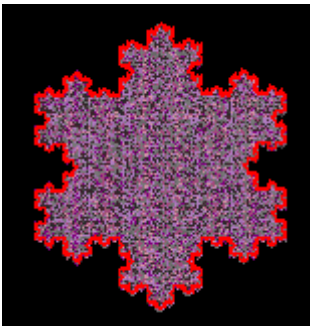
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11.5 About Fractal Lab

About Fractal Lab

>>>> Fractal Lab 1.03, ©1991-2004 by Terry W. Gintz <<<<<



The original Fractal Lab was designed on an Amiga 2000 in 1989.

The science of Fractals was formally introduced by Benoit Mandelbrot in The Fractal Geometry of Nature. While being very descriptive of various recursive fractal curves, such as the Koch and Peano curves, this book says very little on the art of generating such curves with a computer. Fractal Lab was written to enable a generalized creation of what Mandelbrot

terms self-similar and self-contacting/non-contacting recursive curves. Most of the "uniform" curves appearing in *The Fractal Geometry of Nature* can be produced using Fractal Lab. And these can be done in color, using a 236 color palette (out of 16 million possible colors.) Mandelbrot illustrated these only in black, white and gray scale. No attempt is made to draw the Mandelbrot set or other complex-number sets. Fractal landscapes and scaling fractals (such as trees) are also outside the scope of this program.

Mandelbrot uses the terms "generator" and "initiator" to describe the basic building blocks of self-similar curves. The generator describes the way a curve is broken down into smaller images of itself. The initiator describes how the generator is used. The generator for a Koch curve would resemble a line split into three sections, the middle section being replaced with the upper two legs of an equilateral triangle. The initiator would be a triangle to form a "Koch island". There are various rules for randomizing the generator and placement of the generator. These will be explained in the menu command descriptions.

Fractal Lab does more than emulate parts of *The Fractal Geometry of Nature*, because it allows one to generate other curves not shown there, with up to 100 generator and initiator segments. At the higher levels of recursion, some of these curves take on three-dimensional qualities like molecular models.

Fractal Lab requires a true-color or high-color (16-bit) video adapter for best results.

For a short history of the programs that led up to the current version of Fractal Lab, see [Chronology](#).

11.5.1 Chronology

Chronology

In September 1989, I first had the idea for a fractal program that allowed plotting all complex functions and formulas while attending a course on College Algebra at Lane College in Eugene, Oregon. In November 1989, ZPlot 1.0 was done. This Amiga program supported up to 32 colors, 640X400 resolution, and included about 30 built-in formulas and a simple formula parser.

May 1990 -- ZPlot 1.3d -- added 3D projections for all formulas in the form of height fields.

May 1991 -- ZPlot 2.0 -- first 236-color version of ZPlot for Windows 3.0. (Fractal Lab was also ported to Windows, along with a few other fractal programs)

May 1995 -- ZPlot 3.1 -- ZPlot for Windows 3.1 -- 60 built-in formulas. Added hypercomplex support for most built-in formulas.

May 1997 -- ZPlot 24.02 -- first true color version of ZPlot -- 91 built-in formulas. Included support for 3D quaternion plots, Fractint par/frm files, Steve Ferguson's filters, anti-aliasing and Paul Carlson's orbit-trap routines.

June 1997 -- ZPlot 24.03 -- added Earl Hinrichs Torus method.

July 1997 -- ZPlot 24.08 -- added HSV filtering.

December 1997 -- Fractal Elite 1.14 -- 100 built-in formulas; added avi and midi support. Name change due to trademark issues.

March 1998 -- Split Fractal Elite into two programs, Dreamer and Medusa(multimedia.)

April 1998 -- Dofo 1.0 – (unreleased version) supports new Ferguson/Gintz plug-in spec.

June 1998 -- Dofo-Zon –(unreleased version) redesigned multi-window interface by Steve Ferguson, and includes Steve's 2D coloring methods.

August 1998 --Dofo-Zon Elite -- combination of Fractal Elite and Dofo-Zon

October 1998 -- Dofo-Zon Elite v1.07 -- added orbital fractals and IFS slide show.

November 1998 -- Dofo-Zon Elite v1.08 -- added lsystems.

April 1999 -- Split Dofo-Zon Elite into two programs: Fractal Zplot v1.15 using built-in formulas and rendering methods, and Dofo-Zon (unreleased version) to support only plug-in formulas and rendering methods. (Dofo-Zon was later abandoned in favor of the original Dofo-Zon Elite. Last freeware version of DZE : May 2002 v1.22)

May 1999 -- Fractal Zplot 1.18 -- added Phong highlights, color-formula mapping and random fractal methods.

June 1999 -- completed Fractal ViZion -- first version with automatic selection of variables/options for all fractal types.

July 1999 -- Fractal Zplot 1.19 -- added cubic Mandelbrot support to quaternion option; first pc fractal program to render true 3D Mandelbrots.

September 2000 -- Fractal Zplot 1.22 -- added support for full-screen AVI video, and extended quaternion design options.

October 2000 -- QuaSZ (Quaternion System Z) 1.00 -- stand alone quaternion/hypernion/cubic Mandelbrot generator

November 2000 -- Added octonion fractals to QuaSZ 1.01.

March 2001 -- Cubics 1.0 -- my first totally-3D fractal generator.

May 2001 -- QuaSZ 1.03 -- added Perlin noise and improved texture mapping so texture tracks with animations.

June 2001 -- Fractal Zplot 1.23 -- added Perlin noise and quat-trap method.

July 2001 -- QuaSZ 1.05 -- improved performance by converting many often-used dialogs to non-modal type.

October 2001 -- FraSZle 1.0, QuaSZ formula and algebra compatible version of Fractal Zplot

November 2001 -- DynaMaSZ 1.0, the world's first Dynamic Matrix Systems fractal generator

January 2002 -- MiSZle 1.1 -- generalized fractal generator with matrix algebra extensions

May 2002 -- DynaMaSZ SE 1.04 (unreleased version)-- scientific edition of DMZ, includes support for user-variable matrix dimensions (3X3 to 12X12)

January 2003 -- Pod ME 1.0 -- first stand-alone 3-D loxodromic generator, Hydra 1.0 -- first 3-D generator with user-defined quad types and Fractal Projector a Fractal ViZion-like version of DMZ SE limited to 3X3 matrices

May 2003 -- FraSZle and Fractal Zplot 3.052 -- added random 3D orbital fractals, new 3D export methods, upgraded most frequently-used dialogs to non-modal type and added genetic-style function type. FZ now based on FraSZle except for built-in formula list and Newton support.

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