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## Introduction

Fractal Creator (TM) displays various fractal types, most of which are based on the Mandelbrot set, named for Benoît Mandelbrot who "discovered" it. The program produces a visual representation of fractals by iterating a particular computation over each point of the complex plane and determining whether or not the magnitude of the resulting computation ever reaches a value of **2**. (The value of 2 is the cut-off for bounded versus unbounded points in Mandelbrot calculations - for other fractal types, its use is arbitrary. But heck, it works great.) Colors for the points are assigned based on two criteria: points for which the computation never reaches a value of 2 (for the given number of iterations) are generally displayed black, and points for which the computation reaches 2 are displayed in a color corresponding to the number of iterations needed to reach 2.

Fractal images have several characteristics that make them interesting. In addition to yielding an amazing variety of patterns, they have the fascinating quality of 'self-similarity', which means that a pattern displayed at a certain zoom level will be repeated seemingly endlessly at higher and higher zoom levels. Several fractal types in **Fractal Ecstasy** demonstrate this characteristic. (In reality, the zoom level is limited by the numerical resolution of the computer used to generate the image. **Fractal Ecstasy** contains some images which demonstrate what happens when this limit is approached. These images can be recognized by their grainy texture.)

With **Fractal Creator**, you can **zoom into the image, using either the mouse or the keyboard. Concentrate on areas that appear complicated or random on the display.**

**For certain fractal types, Fractal Creator** can use 32-bit fixed-point arithmetic to considerably speed the computations. This limits the depth at which the data can be zoomed. In general, the use of double floating point calculations allows full zooming. For this reason, a math co-processor is highly recommended.

**Fractal Creator** includes several color schemes (palettes) for displaying the images. For most palettes, a 256 color palette-based Super VGA display is required. For more interesting effects, colors may be rotated, sorted, shuffled and animated. Some of these options are available only on palette based displays.

**Fractal Creator** can create images larger than the window size, up to 2000 x 2000 pixels. You can set the size of the image and various other display options in the Display Options dialog box. **Fractal Creator** also supports a Full Screen mode, where no borders, captions or menu bar clutter the view. **Fractal Creator** images may be saved to disk files. If saved in the midst of computations, opening the saved file will continue right where they left off. **Fractal Creator** will save files as complete images (compressed), image descriptions (which will be completely recomputed when opened, but require much less disk space) or Windows bitmap files, which can be used as desktop wallpaper or as input to other graphics applications.

## **Menus**

**File**

**Edit**

**Colors**

**Options**

**Help**

## **File Menu**

**Open...**

**Save As...**

**Save**

## Open...

Brings up a standard Open dialog box to open a file.

**Fractal Creator** can open two file formats: .MND and .MNI. More information on these file types is provided in the [Save As...](#) section. **For both types of files, display, compute and color options are set to the values from the saved file.**

## Save As...

This dialog box allows you to save fractal images or descriptions.

**Fractal Creator** supports three file formats for saving:

- .MND** Fractal image files. Both the description of the current area (fractal type, coordinates, display and compute options, colors) and the computed data are written to the file. The data is run-length encoded to decrease disk usage.  
If a .MND file is saved while computing, it will pick up where it left off when opened.
- .MNI** Fractal description files. Only the description of the current area is written to the file. When opened, all points are re-computed from this description.
- .BMP** Writes a 256-color Windows bitmap file, which may be used as wallpaper or imported into various graphics programs.

## Save

## Ctrl+S

This selection saves the current area to the last file opened or saved, in the same format as that file.

## **Edit Menu**

**Select All**

**Zoom Out**



## Select All

Selects the entire image for spawning. See [Selecting and Zooming below](#).

## Shift+F2

## Zoom Out

Zooms image out by a factor of 2.

F7

## Colors Menu

PaletteRotate

Animate

Shuffle

Sort

## Rotate

**F3**

Rotates the current color scheme and re-displays the image.

## Animate

F4

Continuously rotates the current palette, producing interesting visual effects. Palette animation is available only on palette-based displays (generally 256 or more colors). You can change the animation speed and direction using the Display Options dialog box.

## Shuffle

F5

Shuffles the current color scheme and re-displays.

## Sort

## F6

Sorts the current color scheme from light to dark (**Shift+F6**), dark to light (**Ctrl+F6**), or by spectrum (**F6**).

## Options Menu

Palette

Display

Compute

Coordinates

Full Screen



## Palette

## Ctrl+P

Brings up the palette dialog box, which allows the selection of a color palette. The image does not have to be recalculated when changing palettes; each iteration count is simply assigned a new color. The available palettes are in the file **MANDEL.PAL**. The **Wrap Palette** check box indicates whether **Fractal Creator** should repeat the palette colors over the range of possible colors (up to 200).

The **Random** palette causes **Fractal Creator** to randomly select 200 colors.

Most of the color palettes are designed for 256-color displays; each color will be mapped to the nearest solid color on 16-color displays.

## Display

## Ctrl+D

This menu item shows the Display dialog box. Each field is described below.

### Grid Size

Defines the size grid to be computed. This will be the same as the window area if the **Adjust Grid to Window Size** box is checked. **Full Screen mode disables this field.**

### Adjust Grid to Window Size

Causes the computational area to be redefined if the window size is changed (and vice versa). Clearing this box allows you to generate images larger than the display area. In this case, scroll bars will appear in the window if it is smaller than the grid size and re-sizing the window will not cause computations to restart.

### Show Progress in Title Bar

When checked, the approximate percent complete and time remaining will display in the title bar and icon title.

### Animation Direction

Specifies the direction for palette animation. See [Colors-Animate](#) for more information on palette animation.

### Animation Speed

Specifies the delay, in milliseconds, between subsequent palette animation rotations. Use large delays for rotating palettes to select a desired configuration; use small delays for a mind-bending affect.

## Compute

## Ctrl+C

Displays a dialog box which allows you to specify computation options. These options determine the accuracy, speed and valid range of computations used to compute the current fractal type.

### Compute Method

Determines the computational method **Fractal Creator** uses to compute the image. Your system may not be capable of all methods; for example, systems without a math co-processor cannot run the in-line double method. In addition, certain fractal types (e.g., those requiring trigonometric functions) have no fixed point implementation. Only those methods which are available on your system for the given fractal type will display in the combo box.

<b>32-bit Fixed Point</b>	Computes points of the image using 32-bit fixed-point math. The actual format uses 24 bits for the fractional part, 7 bits for the integral part and 1 bit for the sign.
<b>Double Floating(Library)</b>	Uses library routines for double-precision floating point math. This can be extremely slow but allows you to delve deep into the image.
<b>Double Floating(Inline)</b>	Uses the 80x87 math co-processor to perform the math. Math co-processor required.

### Iteration Limit

The iteration limit is the maximum number of times **Fractal Creator** will carry out the set of computations for each pixel. A value of 50 to 100 is a reasonable start - most of the images in **Fractal Ecstasy** use 250 or more iterations.

The effect of increasing iterations is to make certain pixels that had been displayed in black at the lower iteration limit now display in colors (since they are finally allowed to reach a value of 2). Other pixels will stay black regardless of the iteration limit. Of course, more computations are performed as the iteration limit is increased, and the display is slower.

## Coordinates

## Ctrl+O

Displays and allows changes to the current image center X and Y, and width.

### X Center

Selects the center x coordinate used in the computation.

### Size

Selects the width (delta x) of the region being computed.

### Y center

Selects the center y coordinate used in the computation.

## Full Screen

## F9

This option causes Fractal Creator to use the entire display for the set. It expands the window to fill the screen and removes all window ornamentation, including the menu bar, scroll bars and borders. The grid size is set to the size of the screen. See the [Display Options dialog box](#) for more information on grid size.

**The menu bar is unavailable in full screen mode, but you can get floating menus** by pressing **F10** or the right mouse button anywhere in the window. You will see the same options as available on the menu bar.

## Help Menu

Displays Windows Help for Fractal Creator.

**F1**

## Keyboard

There are two keyboard modes: *Selection* and *Scrolling*. The general function of keys remains the same between the two modes, but in *Selection* mode, the keystrokes generally apply to the selection area, while in *Scrolling* mode, keystrokes apply to the currently displayed window into the set. Scrolling mode is only available when the size of the set is larger than the size of the window. (See *Automatic Window Adjustment* in the **Display Options dialog box**).

### Scrolling Mode

<b>F2</b>	Create a selection area and enter <i>Selection mode</i> .
←	Move the viewing window to the left.
→	Move the viewing window to the right.
↑	Move the viewing window up.
↓	Move the viewing window down.

### Selection Mode

<b>ESC</b>	Cancel selection mode
←	Move the selection area to the left.
→	Move the selection area to the right.
↑	Move the selection area up.
↓	Move the selection area down.
<b>PAGE UP</b>	Expand the selection area
<b>PAGE DOWN</b>	Contract the selection area
<b>ENTER</b>	Selection complete - shows the <b>Selection Buttons</b> .

### Modifiers

In both *Selection* and *Scrolling* mode, the **CTRL** and **SHIFT** keys modify the action of any arrow or page key.

<b>SHIFT</b>	Moves or sizes by a larger increment (one-third the width or height).
<b>CTRL</b>	Moves or sizes by a smaller increment (a single pixel).

### Accelerators

The following keys are menu accelerators. Descriptions of each item are in the **Menus section**:

<b>Ctrl C</b>	Display the <b>Compute Options dialog box</b> .
<b>Ctrl D</b>	Show the <b>Display Options dialog box</b> .
<b>Ctrl O</b>	Show the <b>Coordinates dialog box</b> .
<b>Ctrl P</b>	Show the <b>Palette dialog box</b> .
<b>Ctrl S</b>	<b>Save current image</b> .
<b>F1</b>	Show Help Contents.
<b>F3</b>	<b>Rotate the current palette</b> .
<b>F4</b>	Toggle palette <b>animation</b> .
<b>F5</b>	<b>Shuffle the colors in the current palette</b> .
<b>F6</b>	<b>Sort current palette by spectrum value</b> .
<b>Shift F6</b>	<b>Sort current palette entries by intensity, lightest to darkest</b> .

**Ctrl F6**      **Sort current palette entries by intensity, darkest to lightest**

**F7**            Zoom out by a factor of 2.

**F9**            Toggle **Full-Screen mode.**



## Selecting and Zooming

A portion of the image may be selecting by dragging the mouse or via the Keyboard. **The shape of the selected area is constrained by the dimensions of the current window. Once an area is selected, a set of buttons will appear:**

### Zoom

Zooms in, in the current window, to the selected area and re-computes for that area.

### Spawn

Zooms in, in a new window, to the selected area and computes for that area. Current options, such as selected palette, are passed to the new window.

### Cancel

Cancels the select operation and removes the selection rectangle.

## Restrictions

**Sorting colors after animating or rotating with Wrap Palette off (in the Palette dialog box) may result in the loss of some colors.**

**Palette Animation is extremely slow on ATI Wonder Super VGA cards using the Windows™ 3.1 drivers. The Windows™ 3.0 drivers animate properly, even under 3.1.**

**In the Coordinates dialog box, if the current window lies wholly or partially outside the representation of the set, the box or hairline indicator is not accurate.**

