

**Chapter 3****Windows and Palette Manipulations**

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## Chapter Overview

## Working with Image and Palette Windows

Special Window Features

Palette Windows

Working with Multiple Image Windows

## Creating the Perfect Color Environment

Initializing the Color Table

Modifying Colors

Using Tools to Manipulate the Palette

## Copying a Palette

## Saving and Restoring Modified Palettes

## Chapter Overview

This chapter explains the procedures for performing palette manipulations in NCSA Image. It discusses, for example, how to work with windows, use palettes other than the program's default palette, and save changes to the color palette.

## Working with Image and Palette Windows

Each time you open a raw raster or HDF file that contains valid image or floating-point data, a new window is created to contain the image generated from the data. These windows are common to the Macintosh user interface—they have scroll bars that are active only when the window is smaller than is needed to display the entire image, a size box in the lower-right corner, and a close box in the upper-left corner to dispose of the image window and associated data.

**NOTE:** To save a raster image, use the Save As command from the File menu or press ⌘-S before you close the image window. When you click on the close box of a window, the unsaved image, image data, and associated storage are purged from the NCSA Image application.

### Special Window Features

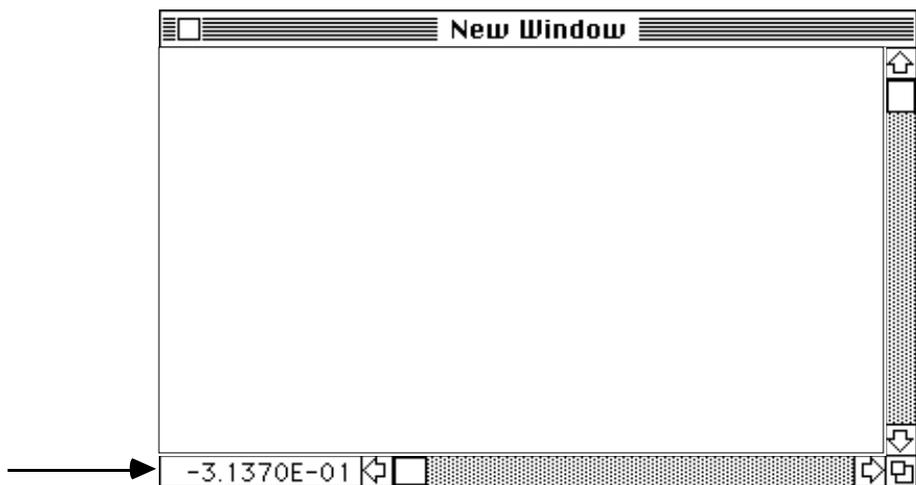
The windows in NCSA Image also have features tailored to the program. For instance, a window may not be enlarged beyond what is needed to display the representation of its dataset. In addition, image and palette windows contain a *text box* in the lower-left corner. This text box relays information relative to the operation being performed: in the clear, drag, fiddle, and rotation modes, the text box remains empty; in the scope mode, the text box reports the value on which the scope tool rests, either floating-point, raster, or palette; in XY graphing mode, the text box reflects the vertical offset for horizontal lines drawn and the horizontal offset for vertical lines drawn; and during an animation, the text box indicates the number of the frame being displayed.

The clear, drag, fiddle, and rotation modes are discussed in the following sections. The scope mode and XY graphing mode are described in Chapter 4, "Imaging Options for Data Analysis."

The location of the text box is shown in Figure 3.1.

Figure 3.1 Text Box

text box



### Palette Windows

The palette window is similar to an image window, but it displays only simple data of increasing values from left to right. The palette window reflects the meaning of the representation of your dataset that appears in the image window, indicating which colors represent which magnitudes of values in the image data. The color on the far left of the palette represents the lowest range of data values displayed in the image; that at the far right represents the highest.

**NOTE:** The palette window does not have a close box and is only removed from view when you choose Hide Palette from the Palette menu. To expose a palette that you have obstructed with another window, choose Expose Palette from the Palette menu.

### Working with Multiple Image Windows

The number of images you can load into NCSA Image is limited only by the amount of memory available. Each image is presented in a separate window. Any commands that you issue apply only to the active window or active color table.

**NOTE:** NCSA Image always has an active color table, or palette, even when there is no active image window. Each image window that you create has a distinct color palette associated with

it, even if the window is a black-and-white plot. The current image window is the foremost of all image windows on your screen. The color table associated with the current image window is the active palette; that is, the color table used by the color graphics hardware.

## Creating the Perfect Color Environment

NCSA Image initially uses a default palette to display images that you load. You may wish to use a different palette that has characteristics better suited to display your data.

The methods by which you may switch between palettes are described in the following subsections.

### Initializing the Color Table

NCSA Image provides three ways to initialize the color table: by (1) loading a color palette, (2) choosing one of seven built-in palettes, or (3) pasting a palette from the Clipboard. These options are described in the following sections.

**NOTE:** Each dataset loaded into NCSA Image has its own color table, reflected in the palette window. The color palette associated with an image window is the active palette only when that window is current, that is, when that image window is the foremost of all other image windows. When you initialize the color table—by loading in a new palette, choosing a palette from the Palette menu, or pasting a palette from the Clipboard—it becomes linked to the current image window.

#### Loading a Palette

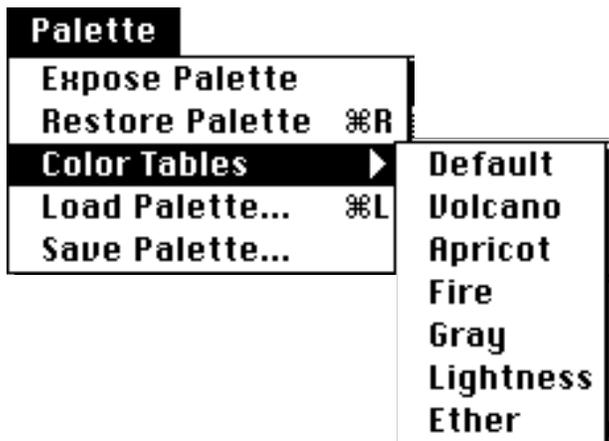
To load in a palette that has been saved in a raw palette or HDF file, such as those created in NCSA PalEdit:

1. Activate the image window whose color table you wish to initialize by clicking on it.
2. Select Load Palette from the Palette menu. A directory dialog box appears and prompts you to locate the file in which the palette is stored.
3. Select and open the palette file you wish to load.
4. Click OK. The color table associated with the active image window is initialized according to the information stored in the palette file.

### Choosing a Built-In Palette

You may also initialize the color table according to one of a group of palettes that have been built into the program. To do so, select one of the palettes from the Color Tables submenu under the Palette menu, shown in Figure 3.2.

Figure 3.2 Palette Menu



### Pasting a Palette

You can paste into NCSA Image palettes that have been copied from within the application or other NCSA software, such as NCSA DataScope, NCSA Layout, or NCSA PalEdit.

To initialize the color table according to the palette currently on the Clipboard, choose Paste from the Edit menu or press ⌘-V. The palette becomes linked to the current image.

### Modifying Colors

NCSA Image also allows you to modify the current palette in various ways using different tools from the tool chest. The *tool chest* is a window that displays icons that represent the various mouse action modes available. A *mouse action mode* is a mode that determines the effects of clicking the mouse in an image window.

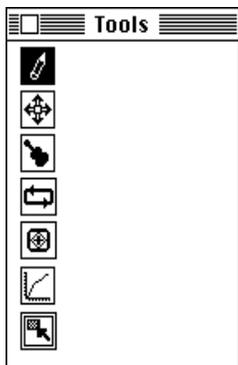
### Using Tools to Manipulate the Palette

To modify the colors that represent your image data:

1. Choose Show Tool Chest from the Tools menu or press ⌘-T. This brings up the tool chest, shown in Figure 3.3.
2. Select the appropriate tool from the tool chest. This activates the mouse action mode associated with the selected tool.
3. Activate an image or palette window by clicking within it.
4. Use the selected tool as instructed in the following sections.

The tools that allow you to manipulate the color environment are described below.

Figure 3.3 Tool Chest



To remove the tool chest from view, select Hide Tool Chest from the Tools menu or press  $\mathbb{H}$ -T; to show the tool chest choose Show Tool Chest from the Tools menu or press  $\mathbb{H}$ -T; to expose the tool chest when it is hidden behind another window, select Expose Tool Chest from the Tools menu or press  $\mathbb{H}$ -T.

#### Using the Pencil Tool

Selecting the pencil tool from the tool chest puts you in clear mode. When you click and drag within an active window in clear mode, you cause color entries in the palette to be replaced by the base color. The pencil tool is depicted in Figure 3.4.

**NOTE:** The *hot spot*—the area on the tool which points to the pixel to be affected—is at the eraser end of the pencil tool.

To operate in clear mode:

Figure 3.4 Pencil Tool



1. Click and hold down the mouse button within the active window.
2. Drag across the color entries you wish to replace with the base color.
3. Release the mouse button.

When you depress the mouse button on a color entry in an active window in clear mode, all instantiations of the color entry on which the mouse rests are represented by the *base color* as you drag the mouse from it. The actual data values are not changed.

For example, when you click within an active image or palette window with the pencil tool on a value that happens to be represented by the 244th entry in the current color table, every value that is represented by the 244th color entry is changed to the base color when you move the mouse across that pixel. If you continue to

hold down the mouse button and drag, the color entries over which you pass are changed to the base color.

Releasing the mouse button now will not cause the affected colors to revert to their original states. After releasing the mouse button, you may move the pencil tool around the image without effect.

To revert these values back to their original color representations, click where you previously changed an entry to the base color. The pencil tool turns over, so that the eraser is at the top. Now the hot spot is at the lead end of the pencil tool. All of the values that were originally represented by the same color entry as the value on which you just clicked revert to that original color. If you hold the mouse button down and drag over the image with the pencil tool, the areas over which you pass revert to their original color representations.

**NOTE:** It may take you some time to become acquainted with the mouse action modes. You may expect, for example, that if you click on a red pixel in an image window in clear mode, all red areas in the image will be changed to the base color; however, because a color entry is distinct from a color, only a few of the red areas will actually be changed to the base color. For example, the 244th and 249th color entries in a palette may both be assigned the same color, say red. However, different data values may be represented by each of these color entries. Consequently, changing the 249th color entry to the base color affects only those red regions of the image which represent the data values assigned to the 249th color entry; the others remain red.

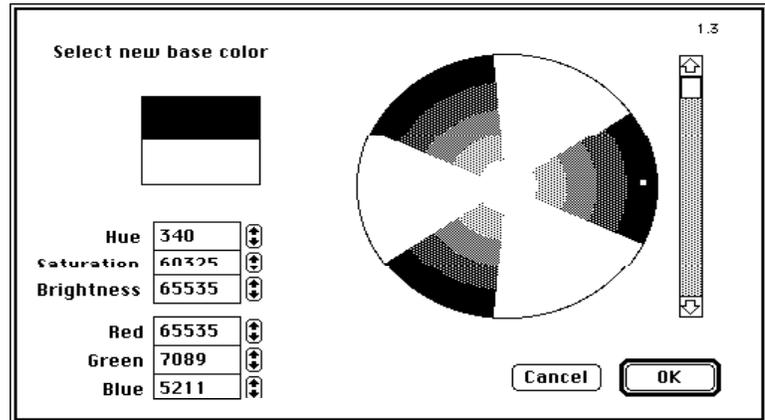
### Setting the Base Color

Initially, the base color is white. To change the base color:

1. Choose Base Color from the Tools menu. A *color wheel dialog box*, shown in Figure 3.5, appears on the screen.
2. Scroll up or down, respectively, to increase or decrease the brightness of the colors in the color wheel.
3. Select a color by clicking in the color wheel. The color you select appears in the top rectangle under the heading *Select new base color*.
4. Click OK.

For additional information on using the color wheel dialog box, refer to your *Macintosh System Software User's Guide*.

Figure 3.5 Color Wheel Dialog Box



### Drag

The drag tool, shown in Figure 3.6, corresponds to *drag mode*. In this mode, mouse actions within active image or palette windows cause color entries in the palette to be replaced by a selected color.

To operate in drag mode:

Figure 3.6 Drag Tool



1. Depress the mouse button on the color entry that you wish to use to replace another color within the active window.
2. Drag to the color entry you wish to replace with the selected color.
3. Release the mouse button.

When you click and hold down the mouse button within an active image window in drag mode, you select the color entry on which the drag tool rests to replace the next color entry that the mouse passes over as you drag within the window. That is, all values currently mapped to the color entry on which the drag tool rests are represented by the color entry that you selected by first depressing the mouse button.

Only the entry on which the drag tool rests when you release the mouse button is permanently replaced by the selected color. When you drag over a color entry, that entry is represented by the selected color only for the time that the drag tool rests on it; as you move the drag tool to a new location, the previous color is restored and the color now under the drag tool is replaced by the selected color. In other words, by clicking on a spot within the image you are, in essence, selecting a color to *drag* to another color entry. When you release the mouse button, the color entry on which the drag tool rests is replaced by the selected color entry.

### Fiddle

The fiddle tool represents the *fiddle mode*. Fiddle mode allows you to compress or expand the spectrum within the active color palette. This allows you to determine which regions or ranges of values in your image are represented with the greatest detail. The fiddle tool is shown in Figure 3.7.

To operate in fiddle mode:

Figure 3.7 Fiddle Tool



1. Drag the fiddle tool in the window vertically to expand or reduce the spectrum of colors to a larger or smaller range of entries in the palette.
2. Drag the fiddle tool horizontally in the window to shift the palette entries in either direction.
3. Release the mouse button.

To practice modifying the color palette using the fiddle mode, select the fiddle tool, activate the image window, and position the fiddle tool at the center of the image.

First, compress the spectrum to give greater distinctiveness to those values that correspond to the lower entries in the color palette. To do so, while holding down the mouse button, drag the fiddle tool vertically to the bottom of the image window. You will notice that the full spectrum becomes concentrated near the center of the color palette. Now, drag the fiddle tool to the lower-left corner of the image window. Your image data is represented by colors from the new palette, which should show the greater range of the spectrum concentrated in the lower color entries of the palette.

In a similar manner, when you drag the fiddle tool vertically upward, the spectrum is expanded across a wider range of color palette entries; and when you drag the fiddle tool horizontally to the right, the palette is shifted to the right.

If you reduce the spectrum to less than the full range of 256 distinct entries, the rest of the palette color entries are filled by the end entries (1 and 254), which are blue and red for the default palette.

### Rotate

Figure 3.8 Rotation Tool

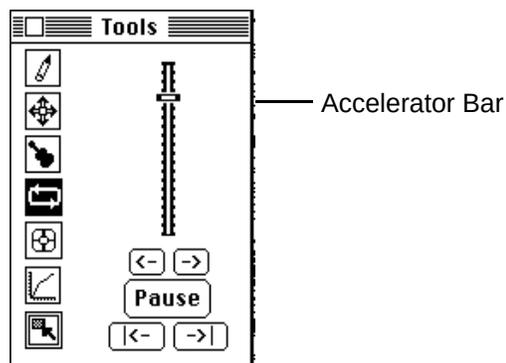


Select the rotation tool from the tool chest to enter *rotation mode*. In this mode, mouse actions such as clicking and dragging in an image window have no effect. Instead, rotation is governed by mouse actions within the tool chest.

Notice that several new controls appear in the tool chest when you select the rotation tool, depicted in Figure 3.8. These special rotation controls are shown in Figure 3.9. They only appear when you are in rotation mode. During rotation, each entry of the color

palette is replaced by its neighboring color to the right or left, depending upon the direction of the rotation.

Figure 3.9 **Tool Chest Showing Rotation Buttons and Accelerator Bar**



To rotate the active color table:

1. Click <- or -> to initiate continuous palette rotation to the left or right, respectively.
2. Drag the accelerator bar up or down, respectively, to increase or decrease the speed of rotation.
3. Click |<- or ->| to rotate the palette a single entry in either direction, left or right, respectively.
4. Click Pause to discontinue the rotation, or to switch from continuous to incremental rotation.

**NOTE:** The graphing, scope, and selection tools are discussed in Chapter 4, "Imaging Options for Data Analysis."

## Copying a Palette

To copy the current palette:

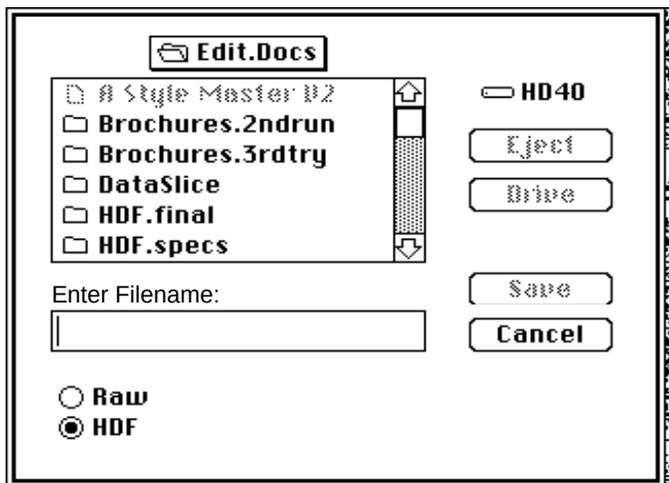
1. Select the palette window.
2. Choose Copy from the Edit menu or press ⌘-C.

Now you have a palette, or 'clut' resource, on the Clipboard. The palette may be pasted into NCSA Image or other NCSA software, such as NCSA DataScope, NCSA Layout, or NCSA PalEdit.

## Saving and Restoring Modified Palettes

To save your modifications to a palette, activate the palette and select Save Palette from the Palette menu. The directory dialog box shown in Figure 3.10 appears on the screen and prompts you to name the palette.

Figure 3.10 Save Palette Dialog Box



You can also specify that the palette be saved in a raw palette or HDF file. After you have done so, click Save and the current color table is saved.

To restore the palette to its initial state, for example, when you decide that you prefer the original palette to the one you have just created, select Restore Palette from the Palette menu or press ⌘-R. This reverts the palette to its last saved state.