Chapter 3 CompositeTool Frames

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Chapter Overview

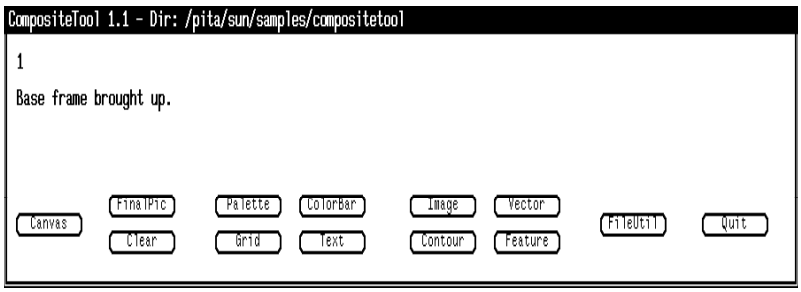
This chapter discusses the options available in the CompositeTool frames: Base, Canvas, Grid, Palette, Colorbar, Text, Images, Contours, Vectors, Features, and Utilities.

Base Frame

The Base frame (Figure 3.1) appears on the screen when CompositeTool

is invoked, and remains up for as long as you run the program. The frame includes 13 options as displayed below: Canvas, FinalPic, Clear Palette, Grid, ColorBar, Text, Image, Contour, Vector, Feature, FileUtil, and Quit. Notice that when you choose a Base frame button option that displays new windows, the selected button disappears from the Base frame. This feature prevents you from opening more than one window of the same type. The buttons reappear on the Base frame when their corresponding windows are closed.

Figure 3.1 Base Frame



Canvas

The canvas button opens up a new canvas. (See Chapter 1, “CompositeTool Basics.”)

Final Pic

The Final Pic button erases the canvas and draws everything that has a FinalPic toggle setting of ON. This button applies to stored data, not to the currently displayed data.

Clear

The Clear button erases the displayed contents of the canvas, but not the canvas itself.

Palette

The Palette button opens the palette frame.

Grid

The Grid button opens the grid frame.

ColorBar

The ColorBar button opens the colorbar frame.

Text

The Text button opens the text frame.

Image

The Image button opens the image frame.

Contour
The Contour button opens the contour frame.

Vector
The Vector button opens the vector frame.

Feature
The Feature button opens the image, contour, and vector features frame.

FileUtil
The FileUtil button opens the file utility frame.

Quit
The Quit button closes the CompositeTool application.

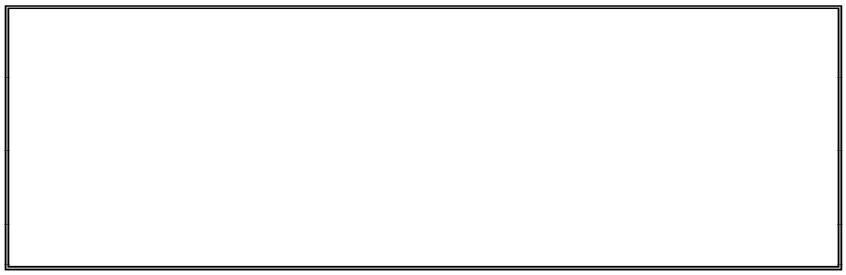
Canvas

Before you can load any images, contours, or vectors into CompositeTool, you must first open a canvas frame. To do so, click the Canvas button on the Base frame.

NOTE: When CompositeTool reads program setting files from the FileUtil frame, you do not have to have the Canvas frame opened. However, you *do* have to open the canvas and click the FinalPic button before the setting file composite will appear on the canvas.‘

When the canvas opens (Figure 3.2), it is considerably smaller than full screen size, since you are actually only viewing the top section of the complete canvas frame.

Figure 3.2 Canvas Frame



You may load in data, manipulate text, and perform all CompositeTool functions regardless of the size of the canvas, although you may not be able to fully view the results until the canvas is enlarged. To do so, use the right mouse button as explained in the section “Mouse Buttons” in Chapter 1. When selecting an option from the SunView Frame Selection

menu in this manner, use the Fullscreen option rather than the Zoom option in order to ensure both vertical and horizontal expansion. At any time, you can return the canvas to its original, smaller size by selecting the Unzoom option on the SunView Frame Selection menu.

NOTE: In order to remain oriented to the absolute nature of the canvas size, use the grid (refer to this chapter's section "Grid Frame") while laying out a display.

In its entirety, the Canvas frame is 1152 horizontal pixels by 900 vertical pixels. The canvas frame border is 5 pixels wide on every side, leaving a canvas of 1142 horizontal pixels by 890 vertical pixels available for your use.

Finally, note that the origin of the canvas is always in the upper left corner, and this origin is absolute (that is, the canvas cannot be scrolled up and down or from side to side).

To take a photographs of the canvas and its contents of it, using the negative to make 35mm slides see this chapter's section "Photographing Your Display." In order not to detract from the final presentation-quality screen display, the Canvas frame does not contain a title bar.

Frame Manipulation

Most CompositeTool frames are set up so that you work through their options as outlined below; however, you do not have to strictly adhere to these steps.

1. Select the desired frame from the Base frame.

2. Enter the specifications for your image in the frame (e.g. pixel size, pixel color range, palette, tag, and filenames, etc.) by positioning the mouse beside the available options. Click the mouse to move the prompt to that point, and type the values in.

3. Click the DRAW it or ERASE it buttons to view the image with the specifications you have just entered.

4. Click STORE displayed values or DISCARD displayed values to store or discard the most recently entered values.

5. Click FinalPic toggle to ON in order to permanently save the most recently entered values and to view them when you press the FinalPic button in the Base frame. Click FinalPic toggle to OFF to not save values.

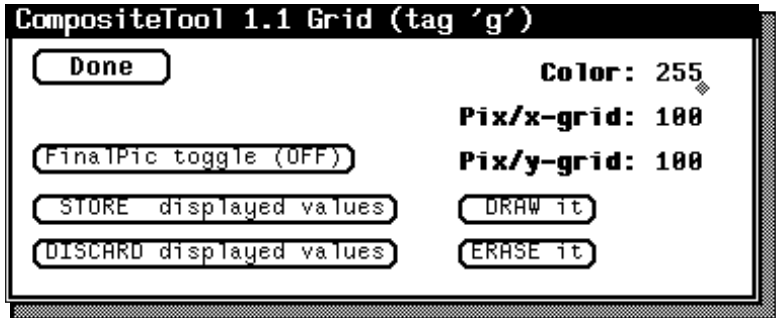
6. Click Done in the opened frame to close it.

7. Click FinalPic in the Base frame to display the new image.

Grid Frame

The Grid (Figure 3.3) frame is intended as an aid in layout while developing the canvas image. You can turn on the grid (via a toggle) during development, and once you are satisfied with the layout, turn it off before drawing the final picture.

Figure 3.3 Grid Frame



De-

fining Grid Color

The Color variable defines the color of the drawn grid. The Color number is a palette entry index into the current palette and must be in the range (0-255). See this chapter's section "Palette Frame" and Chapter 2's "Raw Palette Files."

Defining Grid Spacing

The Pix/x-grid and Pix/y-grid variables refer to the pixel spacing between x and y grid lines. In addition to the x (horizontal) and y (vertical) lines, an "x" is drawn on the canvas in such a way that the diagonal lines meet at the exact center of the canvas. During development of the canvas picture, you may have only a part of the canvas visible. The "x" serves to orient the center of the canvas when you open the screen to full-size.

FinalPic toggle

This ON/OFF toggle applies to the FinalPic button on the Base frame. The current setting is shown on the button. If OFF, the newly entered values for the grid will not be drawn when the FinalPic button is pressed. If ON, the new grid will be drawn when the FinalPic button is pressed.

STORE displayed values

The numerical values shown for grid color and spacing (in pixels) are stored, replacing the previously stored values.

NOTE: Just because you enter values in a frame or have CompositeTool draw your image specifications by pressing the DRAW it button, numerical values ARE NOT SAVED. Once the frame is closed, the most recently

entered values are lost and the last stored values are restored. Thus, you MUST press the STORE displayed values button before pressing FinalPic in the Base frame for CompositeTool to save and display the new values.

DISCARD displayed values

DISCARD displayed values discards the numerical values shown for grid color and spacing (in pixels) and replaces them by the most recently stored numerical values.

DRAW it

DRAW it draws the grid using the numerical values shown for color and spacing (not the currently stored numerical values). Only one grid can be drawn at a time. This means that the current grid is always erased before a new one is drawn.

ERASE it

ERASE it erases the grid by filling it in using the current canvas background pixel value which you've specified in the Palette frame.

Done

The Done button closes the Grid frame. If you've entered any values without pressing the Stored Displyed values button to store the data, a message appears on the screen asking you to confirm this decision. This feature helps prevent accidental loss of newly entered data.

Palette Frame

The Sun Workstation uses the RGB (red, green, blue) color model, where each of the three primary colors can take 256 distinct gradations, ranging from no color to full color. A single byte, consisting of 8 bits, is used to distinguish the 256 possible values of gradation. These gradations are stored in arrays (one for each primary color), and when a color is displayed on the screen, the Sun combines the gradations for the three primary colors to form the color displayed. For example, a high gradation of red and green plus a low gradation of blue will produce a shade of yellow.

Each array that stores the gradations of the three primary colors is 256 bytes long, and the elements of each array are completely arbitrary. That is, the levels of color gradation (the elements of the arrays) may be in any order, with duplicates and omissions allowed.

The three arrays used to store the gradations of the three primary colors are collectively referred to as the *palette.* Once a palette has been defined (that is, once the three arrays have been loaded), the colors that are displayed on the screen are referred to by number (0 through 255), representing the element number of each of the red, green, and blue arrays. For example, referring to pixel value 8 means that element number 8 of the red array plus element number 8 of the green array plus element number 8 of the green array are to be combined to form the color

displayed on the screen.

CompositeTool provides on startup an initial palette, which you may change at any later time. When loading your own palette, note that elements 0, 253, 254, and 255 are reserved. Element 0 (canvas background color) is set to white. Element 255 (canvas foreground color) is set to black. Element 253 (set to black) and element 254 (set to white) are used for other purposes. When a palette is loaded, CompositeTool will change these elements accordingly, no matter what values you assign. Refer to Chapter 2, section "Raw Palette Files," for more information on palettes.

NOTE: You are advised not to use the color definitions in the `.sunview` file in the home directory. If colors are defined, then moving the cursor into and out of CompositeTool windows will cause an irritating flash on the screen, and the CompositeTool canvas will not be viewable unless the cursor is inside the canvas.

Figure 3.4 Palette Frame

— **Load palette**

Load palette allows you to enter a filename which CompositeTool finds when you press the option's button. If the file is a "raw" palette then it must be a stream of 768 bytes. The first 256 bytes represent the gradations of red, the next 256 bytes represent the gradations of green, and the final 256 bytes represent the gradations of blue. Otherwise, it must be an HDF file with a palette in it and the equivalent data is extracted from the first palette in the file. Note that the palette data is actually stored "interleaved," that is red byte, green byte, blue byte, etc. in an HDF file.

Load background color

Load background color allows you to specify the canvas color when you enter a number between 0 and 255 and press the button. A blank field is interpreted as 0. The color chosen is based on the current palette. Note that you must click the FinalPic button before CompositeTool changes the canvas' background color.

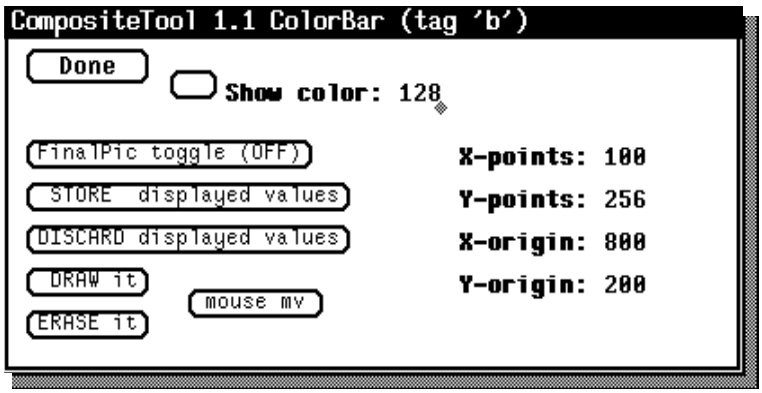
Done

The Done button closes the frame. If you have entered any information without pressing the button to store the data, you are required to confirm the choice by pressing the button again. This feature helps prevent accidental loss of data.

8 Colorbar Frame

The Colorbar visually displays the range of colors in the palette. The appearance of 2D images can vary substantially depending on the palette currently being used, and the colorbar allows you to have some basis for palette comparison. (See this chapter's section "Palette Frame" for more information on palettes.)

Figure 3.5 Colorbar Frame



X/Y

points and X/Y origins

X/Y point options allow you to designate the width and length size of the colorbar while the x/y origins options determine the horizontal and vertical screen position of the bar. The number of x-points (i.e., the width) is arbitrary, and should be based on visibility. Since the colorbar is displayed vertically, 256 y-points will display every allowable color. If the number of y-points does not equal 256, linear scaling of the colorbar is performed. This scaling has no effect on the palette. The colorbar origin is in pixels from the upper left of the canvas.

Show color

Show color displays the numerical value of a particular color. Specify the color value, which corresponds to a palette entry in the current palette, and click the button. A "<" symbol appears on the right edge of the displayed colorbar. The arrow points directly at the color representation of the value you've entered. For example, suppose you enter 100, which in this example will represent a certain shade of red, in the Show color option. An arrow will appear on the colorbar, pointing directly at the associated color of red.

Standard Buttons

Refer to this chapter's section "Grid Frame" for a description of the FinalPic toggle, and the STORE displayed values, DISCARD displayed values, DRAW it, and ERASE it buttons.

mouse mv

The mouse mv (mouse move) allows you to move a drawn colorbar by using the mouse (instructions appear as a message on the base frame when the button is pressed). When you move a colorbar, the move is based on the currently shown numerical values (not the stored values), and the currently shown numerical values are updated to correctly indicate the new colorbar location on the canvas. To deactivate the move capability, select the button again.

NOTE: The arrows ("<") that point to specific colors on the colorbar (see explanation in the section "Show color" above) do not move from their original position on the screen. Thus, when you move the colorbar, the arrows remain stationary.

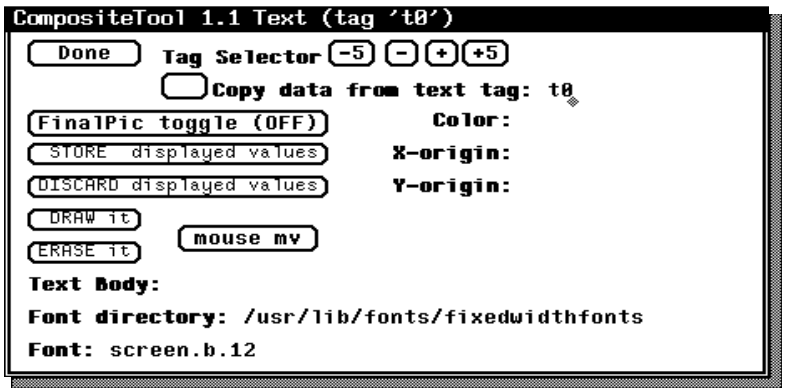
Done

The Done button closes the Colorbar frame.

Text Frame

The Text frame gives you the ability to add text to a screen display. By doing so, you can easily differentiate between several images that have been simultaneously displayed or label a display for a presentation-quality slide.

Figure 3.6 Text Frame



Tag Selector

Tag Selector allows you to alter the text number. CompositeTool is capable of displaying a number of texts simultaneously, and these texts are distinguished by attaching a tag to each one. The current tag is shown in the frame label, and when the text frame is brought up from the base frame, tag 't0' is always displayed. You can increment or decrement the currently shown tag by either one or five, with the text frame label always showing the currently displayed tag. When you increment or decrement the tag number, the effect on the displayed information is the same as if you pressed the Done button; i.e., you are warned that the previous information will be lost. (For additional information, see Chap-

ter 1 “CompositeTool Basics.”)

Copy data

The Copy data option saves you the trouble of re-entering repetitious information (especially color and font). By selecting a tag and pressing the Copy data from text tag button, you copy the characteristics from this previously defined tag, leaving only the new text body and origin to be entered. Press STORE displayed values and then the DRAW it button. The copy process is now completed.

X/Y Color and Origin of Text

- Color
  The Color entry refers to the pixel value of the drawn text. This number is a palette entry index into the current palette and must be in the range (0-255).

- X/Y Origin
  These variables define the origin, in pixels, of the lower left-hand corner of the text string.

Standard Buttons

Refer to this chapter’s section “Grid Frame” for a description of the FinalPic toggle, and the STORE displayed values, DISCARD displayed values, DRAW it, and ERASE it buttons. Refer to this chapter’s section “Text Frame” for a discussion on the buttons Tag Selection and Copy data from text tag.

Text and Fonts

Text and Font variables define the body of the text and the font to be used, respectively. A default font is supplied by CompositeTool. It is in the User Defaults Database for CompositeTool and can be changed by running `defaultsedit` in SunView or editing `$HOME/.defaults`. To activate the new default font, you must restart CompositeTool.

You may find out what fonts are available by listing all the elements in the given font directory (these elements are the fonts available).

mouse mv

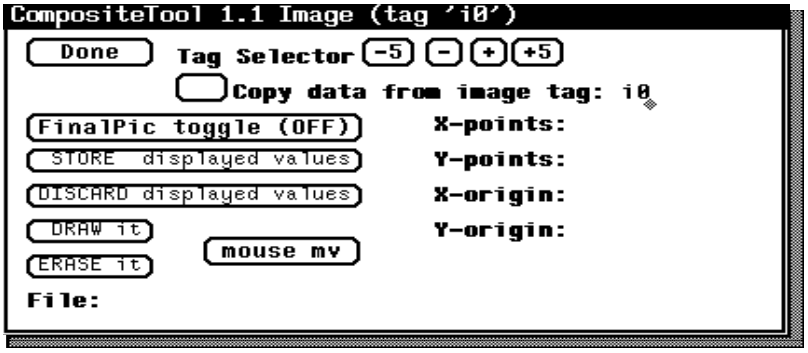
The mouse mv (mouse move) button allows you to move text by using the mouse. (Follow the messages that appear on the Base frame after you’ve pressed the mouse mv button.) When you depress the left mouse button, a small box, which you can move with the mouse, appears on the screen. Drag the square to the desired location on the canvas, being aware that the lower left-hand corner of the box will define the position of the lower left-hand corner of the text. When you release the left mouse button, the text moves to the new location and the box disappears. The move, as reflected in the Base frame, is based on the currently shown numerical values (not the stored values). The current values are updated to correctly indicate the new text location on the canvas. To deactivate the mouse move capability, select the button again.

Done
The Done button closes the Text frame.

Image Frame

CompositeTool determines the characteristics of your data from the entries you've made in the Image frame (Figure 3.7). Refer to Chapter 2, "Formatting Your Data Files" for a discussion of data file formats for input data.

Figure 3.7 Image Frame



Standard Buttons
Refer to this chapter's section "Grid Frame" for a discussion of the FinalPic toggle, and the STORE displayed values, DISCARD displayed values, DRAW it, and ERASE it buttons. Refer to this chapter's section "Text Frame" for a discussion on the buttons Tag Selection and Copy data from image tag. Refer to the section "Colorbar Frame" for a discussion of the mouse mv button.

X/Y points and origins
The X/Y points and X/Y origins define, in pixels, the dimensions of the two-dimensional data and its origin on the canvas, respectively.

The X/Y points are never used for an HDF file. The dimensions in the file are always displayed and replace any entered dimensions.

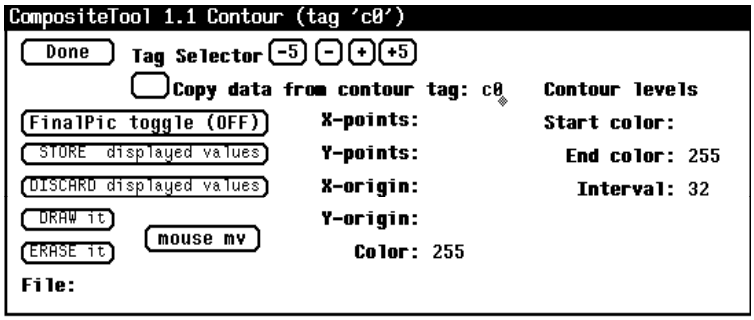
File
The File entry requires that you enter the name of the data file to be displayed.

Done
The Done button closes the Image frame.

Contour Frame

The Contour frame (Figure 3.8) resembles the Image frame, except that the contour algorithm plots in the former are user-specified contour intervals in your data, rather than individually plotted data points as in the latter.

Figure 3.8 Contour Frame



Standard Buttons

Refer to this chapter's section "Image Frame" for a discussion of features not outlined below.

Contour levels

- Start/End color
  Allows you to designate the start and end contour colors [pixel values in the range (0-255)] for the input data .

- Contour interval
  Allows you to designate the interval between the contour levels. Note that large files (for example, of dimension 256 x 256) with contour intervals close together (for example, intervals of 4) may take a long time to plot.

Color

The Color entry (a pixel value) allows you to define the color of the lines drawn within the contour plot. The *pixel value* is a palette entry index into the current palette and must be in the range
(0-255). See this chapter's section "Palette Frame" for more information on palettes.

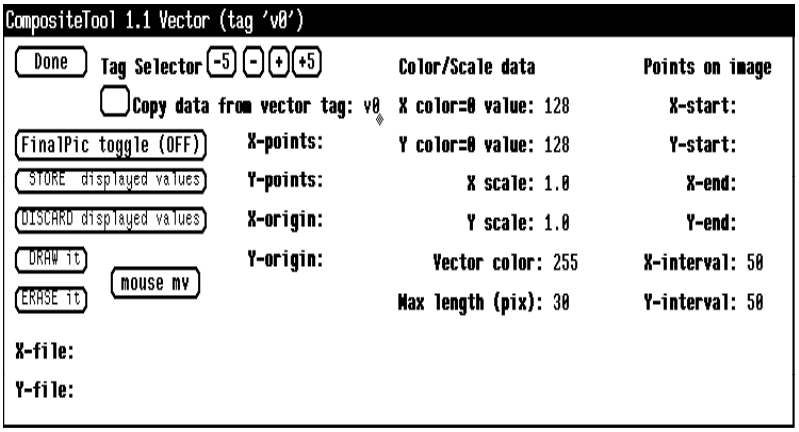
Done

The Done button closes the Contour frame.

Vector Frame

The Vector frame (Figure 3.9) allows you to plot 2D data in a vector format, using two files as input. One file contains x-component data, the other, y-component data. These files are displayed by CompositeTool as the vector magnitude `sqrt(x*x + y*y)` with angle `arctan(y/x)`. This feature is useful when displaying data with real and imaginary components.

Figure 3.9 Vector Frame



Standard Buttons

Refer to this chapter's section "Image Frame" for information on the features not discussed below.

NOTE: Two data files (one for the x-component and one for the y-component)are required, rather than just a single file, as for image data. If the x-component is stored in the first image set and the y-component is stored in the second image set in an HDF file, only the x-component filename is required. Any combination of raw and HDF files are possible for the data files.

Color/Scale data

- X/Y color value
  Color=0 refers to an image data value (from 0 through 255) that is defined as zero. All numbers less than this value are negative, and all numbers greater than this value are positive. You must define these values for both the x-component file and the y-component file.

- X/Y Scale
  Allows you to define the x-component and y-component magnitudes relative to each other. This is the only place in CompositeTool where floating point numbers are used. When entering the scales, you must use fixed decimal notation

(e format is not accepted).

- Vector color
  Defines the color of the lines drawn in the vector plot. The color value is a palette entry represented in the current palette which is defined in the range (0-255). (For more information on palettes, see the section “Palette Frame”).

- Max length
  Refers to the maximum pixel length of the longest vector in the data; all other vectors are scaled down in magnitude with respect to this maximum.

Points on image

The Points on image feature refers to the location of data within the x-file and the y-file that are to be displayed. For example, if X-start is 10, X-end is 200, and X-interval is 60, then vectors will be displayed for image data points 10, 70, 130, and 190 in the horizontal direction, applying to every row for which Y-start, Y-end, and Y-interval are defined.

If Y-start is 20, Y-end is 30, and Y-interval is 10, then vectors will be displayed for ordered data pairs: (10, 20), (70, 20), (130, 20), (190, 20), (10, 30), (70, 30), (130, 30), and (190, 30). Vectors will not be displayed for any other points in the image files. The vector magnitudes, angles, and color are as defined in the Color/Scale data.

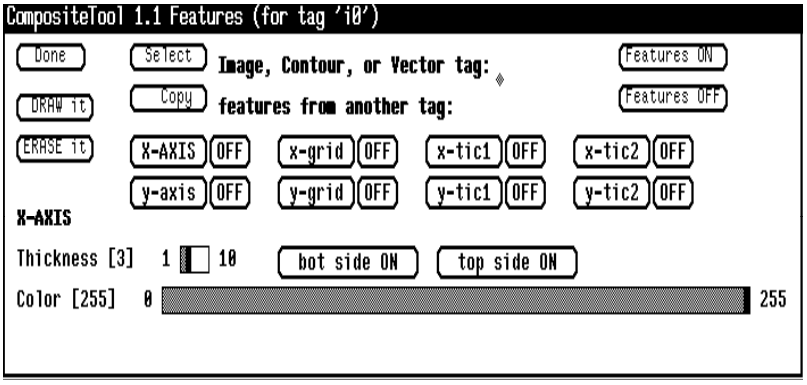
Done

The Done button closes the Vector frame.

Features Frame

The Features frame (Figure 3.10) allows you to copy features from other tags and apply them to a current tag, as well as annotate 2D data with several commonly used visual features: axes, grid lines, and major and minor tick marks.

Figure 3.10 Features Frame



Select

The Select button applies to any image, contour, or vector tag. You must explicitly enter the appropriate tag to which this feature will apply and then press the Select button. Specifications for image, contour, and vector tags are shown in their respective frames.

Copy

The Copy button allows you to copy the features of any image, contour, or vector data, once you have defined those features (fonts, color, etc.). You can copy image features from contour features, other image features, or vector features.

Features ON/Features OFF

The Features ON/Features OFF toggle turn axes, grids, and tick marks on or off en masse.

DRAW it/ERASE it

DRAW it and ERASE it draw and erase the current features in the usual manner. For a discussion of how these buttons work, refer to this chapter's section "Grid Frame." These buttons draw or erase only the features (specifications of the image, contour, or vector), not the actual data image, contour, or vector that is being annotated.

Axes, Grids, and Tick Marks

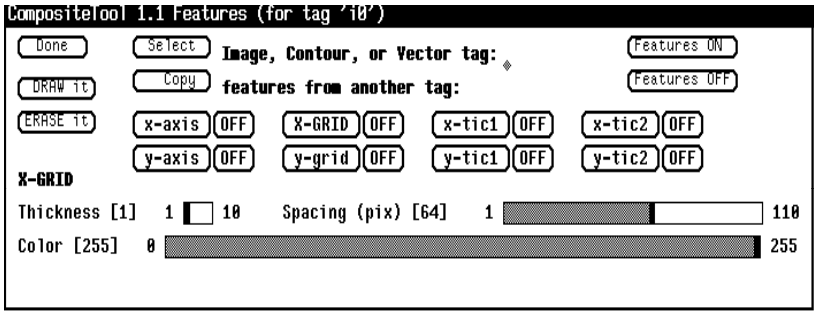
Axes, grids, and tick marks may be set on or off individually. To change the current settings for any of these, press the ON/OFF button located next to the desired option. The chosen feature will change from lower case to upper case, and information on the feature appears in the lower part of the frame. You can now change the selected item's characteristics. For example, after selecting the x-axis button, you would position the mouse in either the Thickness or Color slider bar, and click at the desired location. The bar will adjust itself by extending only to the point you've

clicked. Notice that the Thickness and Color values, located to the left of the bars, also reflect the value of the area you have chosen.

- Axes
  Allows you to adjust the thickness and color of axes using sliders. The buttons allow you to set the top and/or bottom axis on/off (for the x-axis), and the left and/or right axis on/off (for the y-axis). When you click x-axis or y-axis, sliders appear at the bottom of the Features frame.

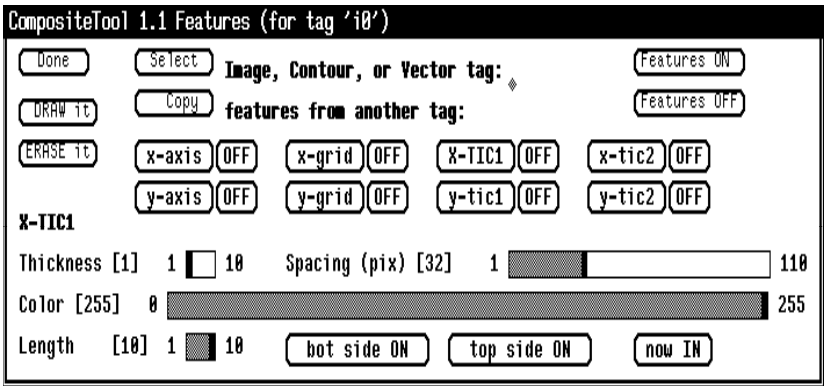
- Grids
  Allows you to adjust the thickness, color, and spacing of grids using sliders. Figure 3.11 shows the sliders that appear at the bottom of the Features frame when you click x-grid. (The Features frame appears similarly when y-grid is chosen.)

Figure 3.11 Feature Frame with X-Grid Selected



- Tick Marks
  Allows you to adjust the thickness, color, spacing, and length of major and minor tick marks using sliders. x-tic1/y-tic1 specify the x/y major tic marks while x-tic2/y-tic2 specify the x/y minor tic marks. Figure 3.12 shows the sliders and buttons that appear at the bottom of the Features frame when you click x-tic1. (The Features frame appears similarly when y-tic1, x-tic2, and y-tic2 are chosen.)

Figure 3.12 Feature Frame with X-Tic Selected



The bot side ON and top side ON buttons allow you to set the top and/or bottom tick marks on/off (for x-ticks) and the left and/or right tick marks on/off (for y-ticks), respectively. The now IN button, which toggles to now OFF, allows you to draw tick marks into or out of the data region.

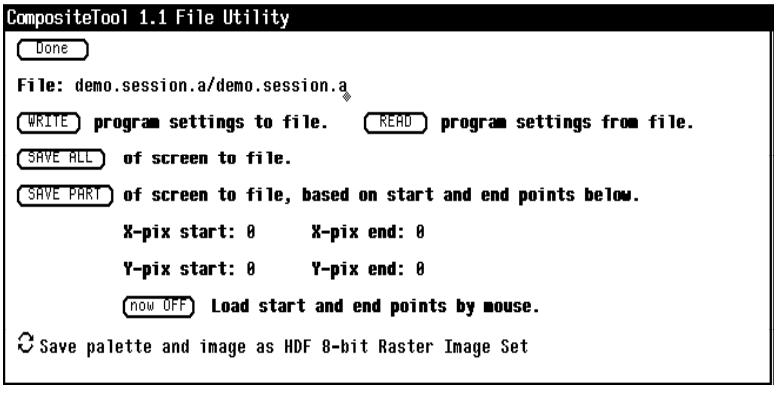
Done

The Done button closes the Features frame.

File Utility Frame

The File Utility frame (Figure 3.13) allows you to store CompositeTool sessions for later use, retrieve sessions previously saved, and saves all or part of the Canvas frame (screen dumps) in a file in one of three ways: (1) as an image and its palette as an HDF 8 bit Raster Image Set, (2) as a compressed image and its palette as an HDF 8 bit Raster Image Set, and (3) as an image without a palette as a raw raster image.

Figure 3.13 File Utility Frame



File

The File button names the output file (for the WRITE, SAVE ALL, and SAVE PART buttons), or the input file (for the READ button).

Write

The WRITE button stores the current CompositeTool session to a file. Only the CompositeTool session variables are written (not the actual data files themselves), so the file requires very little space.

NOTE: The file is stored with all filenames specified by full pathnames. Composites may be moved around as long as all files referred to in the *session* file have been copied to the directory and are at the same level as the session file.

READ

The READ button loads a CompositeTool session from a file.

NOTE: If the reading of a session file fails and this is due to a wrong absolute path of one or more files, copy those files to the directory at the same level as the session file. You may find all the filenames used in the composite by searching the session file with a text editor.

SAVE ALL

The SAVE ALL button initiates and completes a screen dump of the whole Canvas frame using the file format you've specified from the File Format options. (See "File Formats" below.)

SAVE PART

The SAVE PART button initiates and completes a screen dump, based on the start and end points shown and the file format you've specified from the File Format options. (See "File Format" below.)

X and Y Pixel Ranges

This option allows you to chose the pixel range representation of the x and y values. You may either enter the x and y start and end points explicitly, or load the points using the mouse. To use the mouse, press the button labeled "Load start and end points by mouse", and follow the instructions given in the message on the Base frame.

File Format

Select the file format for a screen dump by clicking the circular arrows at the bottom of the File Utility frame. In Figure 3.13, the circle is labeled with the default format "Save palette and image as HDF 8-bit Raster Image set." This label changes as you repeatedly click the circular arrows using the left mouse button. Eventually, the name of the file format in which you want to save your image appears. The selections available include the following: (1) Save palette and image as HDF 8 bit Raster Image Set, (2) Save palette and compressed image as HDF 8 bit Raster Image Set, and (3) Save image only as raw raster. (Refer to Chapter 2,

"Formatting Your Data Files" for more detailed information on saving files.)

Done

The Done button closes the File Utility frame.

Display Photographs

Like NCSA Layout for the Macintosh, CompositeTool makes it easy for you to take presentation quality photographs of your display. You can use a film recorder directly interfaced into the computer, such as a Dunn or Mirus, or a 35mm camera to photograph your displays. This section contains some suggestions to help you take quality photographs of your display using your own camera.

1. Select a film with a speed of 100 ASA. NCSA photographers have had good results with Kodak Ektachrome 100 (daylight balanced) film.

2. Set up the camera on a tripod directly in front of the screen. If possible, use a cable release with the camera to minimize shaking.

3. Make sure the camera is aligned squarely in front of the monitor (see Figure 3.14).

4. If possible, use a narrow, or *telephoto*, lens. Wide angle lenses tend to distort the image, whereas telephoto lenses actually flatten it. The distance at which you set the camera will depend on the focal length of the lens.

5. Photograph in the darkest environment possible, to reduce reflection from the monitor.

   NOTE: Since the dimensions of a Sun screen (see this chpater's section "Canvas") are not proportional to those of a 35mm slide, a small area of the monitor will probably be included in full-screen slides. However, if the film is shot in a room-darkened environment, this area will appear as black on the slide.

6. Focus on a slightly larger area than what you want for the final display, since the slide holder will probably obscure the periphery of the slide.

7. Select a slow shooting speed. Speeds of 1/60 of a second and faster are too fast for the refresh rates of most screens, and often capture a refresh line on film. A typical exposure setting for most computer screens, using ASA 100 film, is about f2.8 at 1/4 second.

8. If you have an exposure meter on your camera, use it in the following manner: Put a large mid-gray image on your screen; that is, a gray which is roughly half way between the white and black of your screen. (You can use a solid color, or even an image, if you can safely say that the overall brightness is mid-gray—not always an easy judgment.) Take an exposure reading from this screen.

9. Photograph the same display at different exposures to ensure that a properly exposed image is captured. This method of shooting, called *bracketing*, is especially important when you are using slide film, which is very sensitive to light changes.

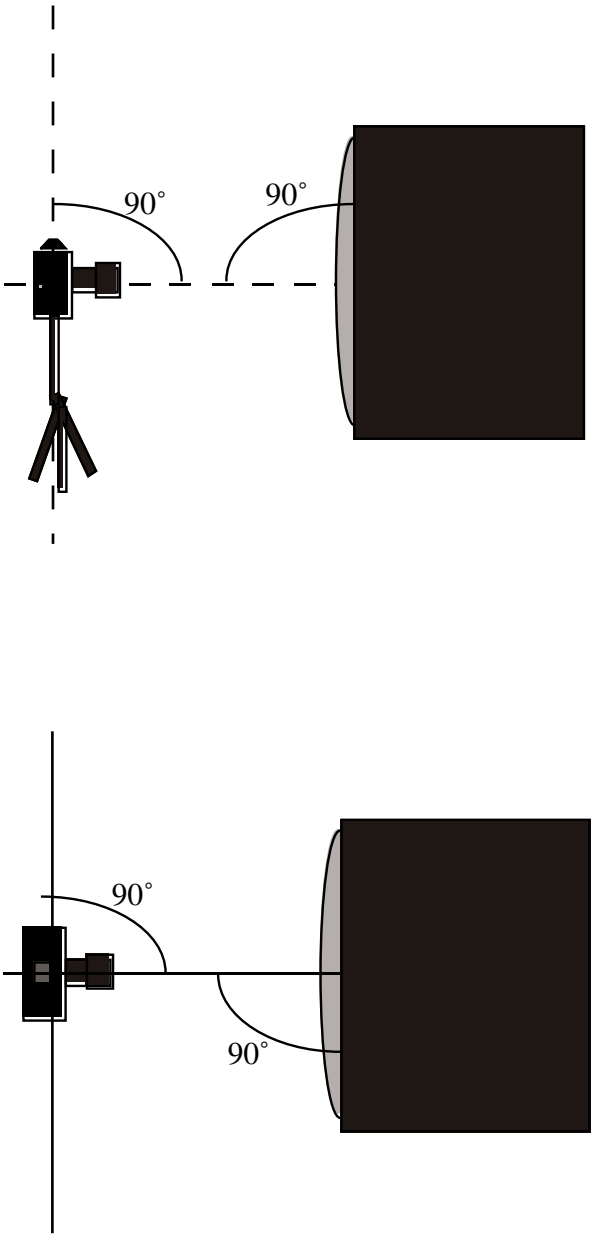



Figure 3.14 Side and Top Views of Photo Display Setup