

This chapter provides a complete reference to using the commands and elements available in the Lyric version of the Sketch command menu. You should now be familiar with the terminology and basic concepts of using menus described in the first two chapters of this manual. Each command is described in the order that it appears on the Sketch command menu, and begins on a new page.

Introduction

This chapter provides a complete reference to using the commands and elements available in the Lyric version of the Sketch command menu. You should now be familiar with the terminology and basic concepts of using menus described in Chapters 1 and 2. Each command is described in the order that it appears on the Sketch command menu.

Commands with submenus and pop-up menus are described in total, and illustrated by figures showing all possible menu occurrences. Each section of command documentation begins with a figure showing the command and its options, and is followed by a description of what each option does.

The Sketch command menu is not the only means of performing some functions described here. For instance, when you are typing text into a Sketch window, you can use the keyboard's Backspace key to delete text, just as you would in TEdit. You can also delete text using CONTROL key combinations, such as using CONTROL-W to delete the previous word. However, this chapter concentrates on command usage. For a detailed explanation of these alternatives to the command menu, see the chapter titled Using Sketch with TEdit.

You can also duplicate some Sketch commands programmatically. If you are an experienced Lisp programmer, you may wish to skim over this user's guide, and turn to the Programmer's Interface to Sketch, Chapter 7 of this document.

Delete

The **Delete** command lets you remove Sketch elements, groups of elements, individual characters, bitmaps, and individual control points from your sketch.



The **Delete** command is followed by a grey arrow in the command menu, indicating that a submenu is available. The available options are shown below.

Delete Element(s) deletes one or more elements from the sketch.

Delete point deletes a control point from a wire or curve.

Deleting Elements

Select the **Delete** command. At this point, the control points will appear. Select the control points of the element or elements you want to delete so that they become highlighted. When you release the left mouse button, the selected elements will be deleted. You can abort the deletion process before you release the mouse button by moving the cursor outside the Sketch window and releasing the button. If you delete an element by mistake, you can restore it by using the **Undo** command described below.

Deleting Characters in a Piece of Existing Text

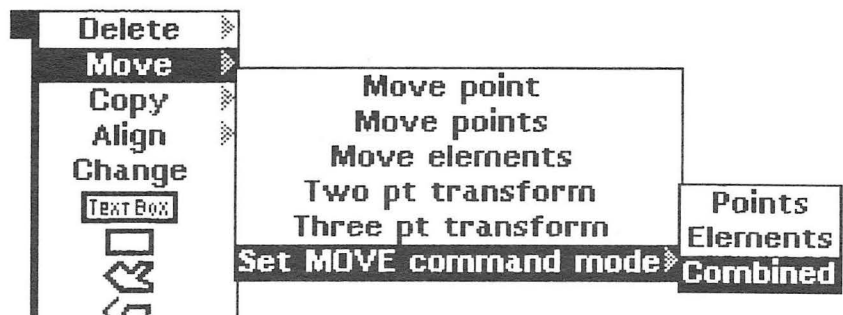
Select the **Delete** command to display the control points of the characters, and then select the control points of the characters you wish to delete by pressing the left mouse button.

Deleting Control Points

You can delete individual control points using the **Delete** command. Select **Delete**, move the mouse cursor right and out through the grey arrow, until **Delete point** is highlighted. Release the mouse button and the control points of your Sketch will be displayed. Select the point you wish to delete and press the left mouse button.

Move

The **Move** command can be used to move points, elements, bitmaps, and text. There are five different options for moving that differ in what can be moved. The first option moves a single control point, the second moves a collection of control points, the third moves one or more elements, and the fourth moves either a single control point or a collection of elements, depending upon how the selection is made. Initially, the **Move** command in the Sketch command menu is set up to move points and elements in the fourth option. The other options are accessed with a submenu to the **Move** command. If you wish, you can set which mode will be used when the **Move** command in the main menu is selected. The commands **Two Pt Transform** and **Three Pt Transform** will move and apply a transformation to elements in a single operation.



Moving an Element

Select the **Move** command, move the cursor over one of the control points of the element (which will be marked with a □), and press the left button. The control point marker will darken to ■. Holding the left button down, move the cursor outside the control point marker. When you have moved outside, the other control points of the element (if there is more than one) will darken also. Release the button. The message "Move image to its new position." will appear in the Sketch prompt region. Move the cursor, and the image of the element you selected will follow. (There may be a delay while the image is being computed. During this time, the cursor will change to ⌛.) Move the image to the place you want and press the left button. The element will be moved to the shown location. To abort the **Move** command, move the entire image outside of the window and release the left button.

If the control point you selected is the control point for more than one element, all the elements for which it is a control point will be selected when you move outside it. If this happens, deselect the elements you don't want to move. Do this by moving the cursor back over the points until they are no longer highlighted.

Note: The image of the elements being moved may contain only part of the elements. All the displayed elements will be moved and redrawn when you release the button.

Moving a Collection of Elements

Select the **Move** command, move the cursor to the area containing the control points for the elements, and select the elements. When you release the button, the message "Move image to its new position." will appear in the Sketch prompt region. Move the cursor, and the image of the elements you selected will follow. Move the image to the place you want and press the left button. The elements will be moved to the shown locations. To abort the **Move** command, move the entire image out of the window and release the left button.

Note that the image of the elements being moved may contain only part of the elements. All the displayed elements will be moved and redrawn when you release the button.

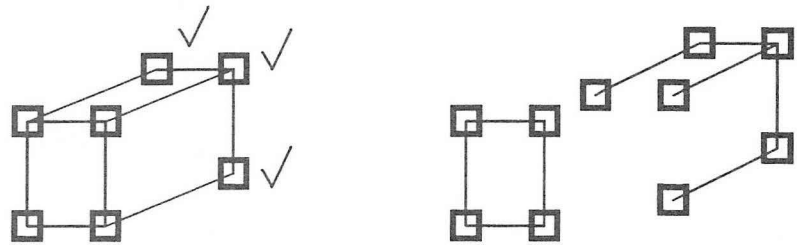


Figure 3-1. Result of the **Move elements** subcommand

The above drawing is made entirely of lines. The checked points were selected and moved to the right of the drawing. Notice that all elements with a selected control point were moved. Compare this with the behavior of the **Move point** command described below.

Moving a Control Point Using the Move Command

Select the **Move** command. The control point of the Sketch element will be displayed. Move the cursor into the box (□) that marks the control point you wish to move and press the left button. The cursor will change to ⊕, and the other control points of the element selected will be highlighted in grey. Move the cursor to the new location and press the left button. The control point will be moved to the new position and the element it is a part of will be redrawn. To abort the **Move** command, move the cursor outside of the window and release the left button.

If the cursor is not over the individual control point both when you press the button and when you release it, the entire element

will be moved. Abort the move by positioning the entire image outside the window and try this command again. If you have trouble selecting exactly in the box, you can use the **Move point** subcommand (described next).

If the selected point is a control point for more than one element, only one of the elements will be affected. If you want to move all the elements, use the **Move points** subcommand.

Moving a Control Point Using the Move Point Subcommand

Move the cursor over the **Move** command, press the left button, and slide the cursor to the right through the arrow to invoke the submenu. Select the **Move Point** command. The control points of the sketch elements will be displayed. Move the cursor into the box (□) that marks the control point you wish to move and press the left button. The cursor will change to ⊕, and the other control points of the element selected will be highlighted in gray. Move the cursor to the new location and press the left button. To abort the **Move** command, release the left button when the cursor is outside the window.

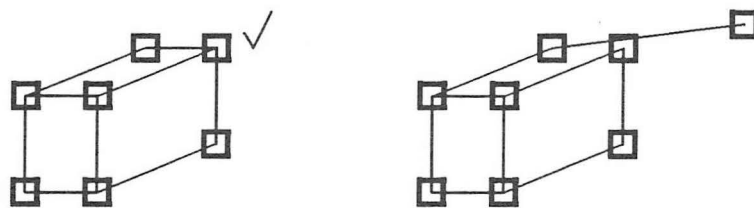


Figure 3-2. Result of Using the **Move Point** subcommand

In the above figure, the checked point was moved to the right. Notice that just one of the control point's elements was moved. A point can also be moved with the **Move** command. However, the **Move point** subcommand provides an easier method of selecting a point because you cannot mistakenly select the whole element.

Moving a Collection of Control Points

Move the cursor over the **Move** command, press the left button, and slide the cursor to the right through the arrow. Select the **Move points** option from the submenu. The control points of the sketch elements will be displayed. When you release the button, the message "Move image to its new position." will appear in the Sketch prompt region. Move the cursor, and an image of the part of the figure containing the points you selected will follow. The image will not redraw itself as you move the cursor. Move the image to the place you want and press the left button. The control points will be moved to the shown locations and any elements they are part of will be

redrawn. To abort the **Move** command, release the left button when the entire image is outside the window.

Note: In rare situations, the image may be empty. If you move the cursor to the right place and release the left button, the selected points will be moved as usual.

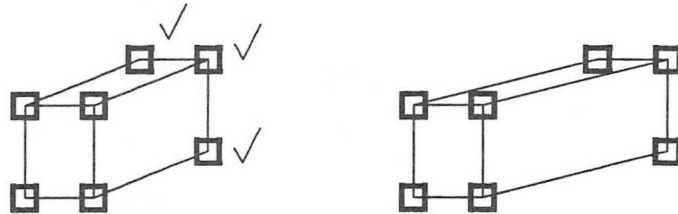


Figure 3-3 Result of using the **Move points** subcommand

In the above figure, checked points were move to the right. Notice that just the selected control points were moved. When a point is moved, all the elements that have a control point at that location are affected. This is often what is desired, as when an arrow is coming out from a box. If you want to move the control point of only one element, use the **Move point** subcommand to separate the two points.

Separating Two Control Points That Are at the Same Position

When the control points for two different elements are at the same position, there is no way to select one without getting the other. If you want to move only one point, use the **Move point** subcommand on the position and specify a destination that is away from other points. This will move the control point for one of the elements. If it is the wrong point, use the **Move point** subcommand repeatedly until the right control point is found. Move it to the desired location and move the other points back, or undo those moves with the **Undo?** option, which is a subcommand of **Undo**.

Setting the Mode of the Move Command

Select the **Set Move command mode** subcommand and slide the cursor to the right through the grey arrow. The submenu initial behavior; that is, to move a single point or a collection of elements will appear. Still holding the left button down, slide the cursor to the right through the grey arrow. The second submenu will appear. You now have three choices.

1. If you wish to make the **Move** command and move-selection perform the same operation as the **Move Points** command, select the **Points** option.

2. If you wish to make the **Move** command and MOVE key selection (described below), perform the same as the **Move Elements** command, select the **Elements** option.
3. To return the **Move** command to its initial behavior, that is, to move a single point or a collection of elements, select the **Combined** option.

Moving an Element Using the MOVE Key

Move the cursor into the Sketch window and press the left button. Hold down the MOVE key. With the MOVE key held down, move the cursor inside the Sketch window and press the left button. At this point, the control points will appear. Select the elements you wish to move by moving the cursor into one of their control points and pressing the left button. The selected control points will be highlighted. When you have selected the appropriate elements, release the buttons, then release the MOVE key. The message "Move the image to its new position." will be displayed in the Sketch prompt region. Move the cursor, and the image of the elements you selected will follow. Move the image to its new location, and press the left button.

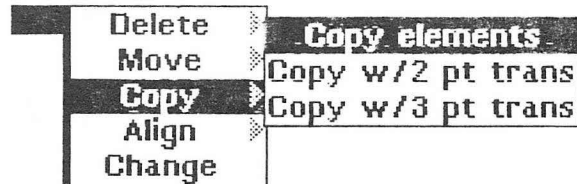
If the image doesn't appear when you release the MOVE key, you probably forgot to locate the caret in the Sketch window before you started.

Note: This kind of move uses the default move mode, which you can change by following the instructions in "Changing the Mode of the Move Command."

To abort while selecting elements, move the cursor outside the window while any mouse button is held down. The control points will no longer be highlighted and nothing will be moved. To abort the move while positioning the image, move the entire image outside of the window and release the left mouse button.

Copy

The **Copy** command can be used to duplicate text, Sketch elements, bitmaps, or whole sketches inside the Sketch window. The **Copy** command and its submenu is shown below.




The options in the **Copy** command's submenu are as follows:

Copy elements copies one or more elements of the sketch.

Copy w/2 pt trans copies one or more sketch elements with a two-point transformation.

Copy w/3 pt trans copies one or more sketch elements with a three-point transformation.

Select the **Copy** command. The control points for all the elements will be marked with . Select the control points of the element or elements you wish to copy. When you release the button, the Sketch prompt region will display the message "Move the figure into place and press the left button." Move the cursor, and a copy of the image of the selected element will follow. Move the image to the place you want and press the left button. The image will be copied to the shown location. To abort the **Copy** command, move the entire image outside of the window and release the left button.

Note: The image of an element being copied may contain only part of the element. All the displayed elements will be copied when you release the button.

The **Copy** command is especially useful for creating multiple versions of the same Sketch element or bit map. You can also copy from one Sketch window to another using the **COPY** key on your keyboard. That procedure is described below in the section titled "Creating Multiple Copies of Sketch Elements."

Copying Elements with Two-Point Transformations

Sketch can scale, rotate, reflect (as in a mirror), and stretch elements. The transformations can be done using either the **Copy** command or the **Move** command. Translation, scaling, and rotation are accomplished by a two-point transformation. It is so called because it is specified by two points in the current coordinate system that are mapped into two points in the new transformed coordinate system. Figure 3-4 shows a copying operation done with a two-point transformation that results in translation, scaling, and rotation.

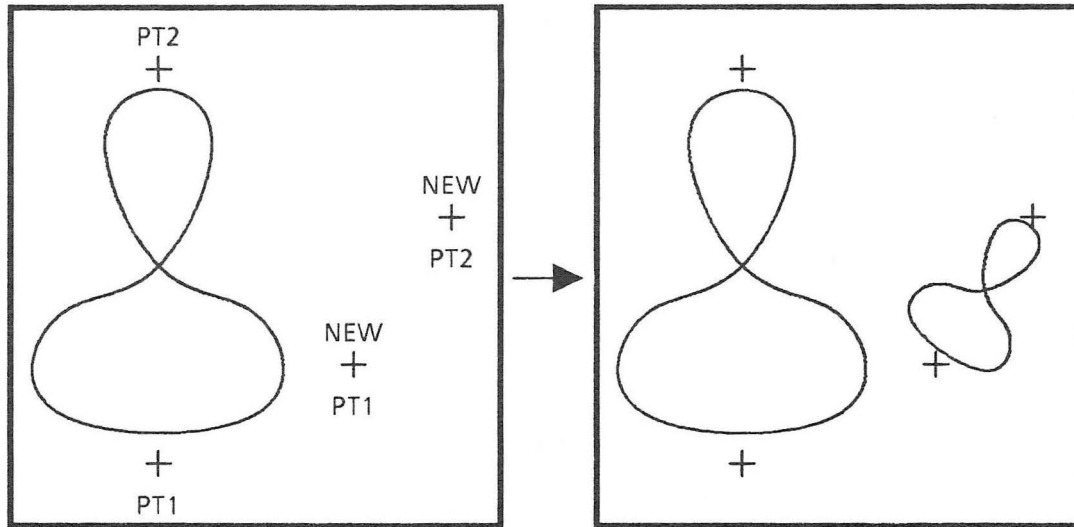


Figure 3-4. Copying an element with a two-point transformation

Reflecting and stretching are accomplished by a three-point transformation. This is so named because it is specified by three points in the current coordinate system that are mapped into three points in the new transformed coordinate system. Figure 3-5 shows a copying operation done with a three-point transformation that results in stretching and reflection. The shapes of circles, ellipses, boxes, and arcs are not affected by the transformation, just the positions of their control points. For example, stretching a circle does not result in an ellipse, but will result in a repositioned circle with a different radius. If you do want circles, ellipses, and arcs to stretch, use curves to approximate them. If you want a box to transform, use a rectangular polygon, not a box.

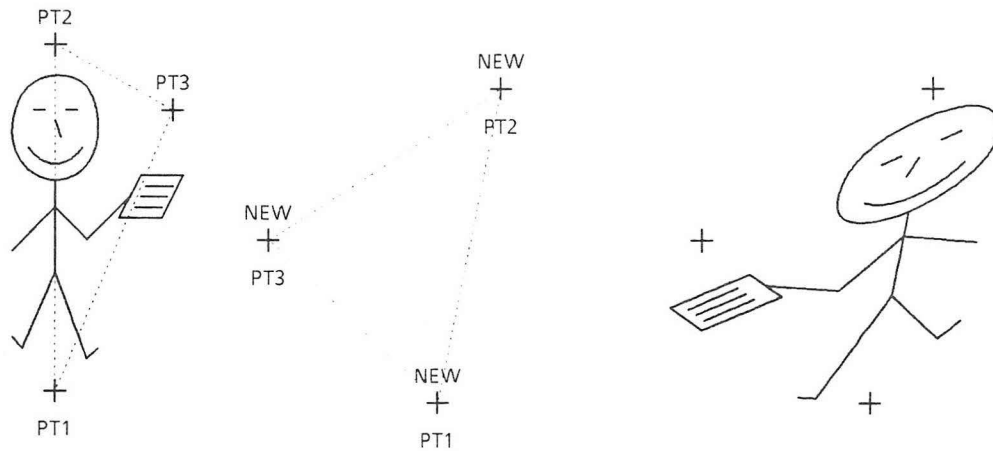


Figure 3-5. Copying an element with a three-point transformation

When an object is scaled by a transformation, the thickness of the line is scaled as well. On the display, this difference may not be apparent because all thicknesses less than one point are displayed as one. In printed copy, however, the transformed elements will have a thinner line.

Making an Element Larger or Smaller

Select the **Copy** command, press the left button, and slide out the right through the grey arrow. The submenu will appear. Select the **Copy w/2 pt trans** subcommand.

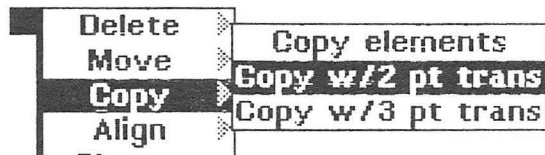



Figure 3-6 Selecting the **Copy w/2pt trans** subcommand

Select the elements you want to scale. When you release the mouse buttons, the cursor will change to . Select two points. These two points identify a line segment in the sketch that will be transformed; they will be marked PT1 and PT2. When scaling, it is convenient to have these points be vertical or horizontal. Select two more points. These two points identify a second segment. The transformation performed on the selected elements will be the one that maps the first selected segment into the second. For this to be a scaling transformation, the second line must be parallel to the first. Figure 3-7 shows the scaling of a collection of elements. If the second two points are closer together than the first, the elements will shrink. If the second two points are farther apart than the first, the elements will grow. If they are the same distance apart, the elements will be the same size. In this case what you have done is to copy the elements, which you can do more easily using the **Copy** command. To abort the **Copy w/2 pt trans** subcommand, move

the cursor outside the window and release the left mouse button.

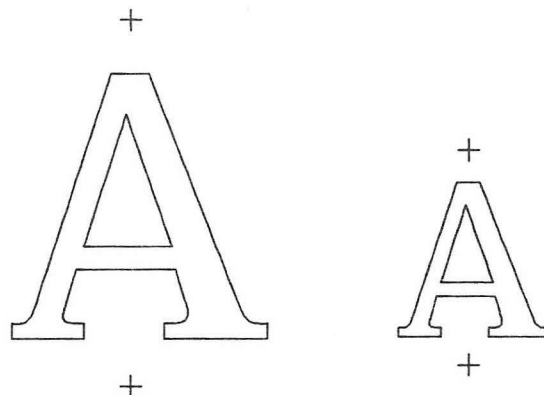



Figure 3-7. Scaling with a two-point transformation

Note that in the above figure, the line through the first two points is parallel to the line through the second two points.

The **Two pt transform** subcommand to the **Move** command is used in a similar fashion. It moves the selected elements rather than copying them. See the description of the **Move** command for more information.

Rotating an Element

Select the **Copy** command, press the left button, and move the cursor out through the grey arrow. The Copy command submenu will appear. Select the **Copy w/2 pt trans** item. When

you release the mouse buttons, the cursor will change to . Select two points. These two points identify a line segment in the sketch that will be transformed. They will be marked PT1 and PT2. Select two more points. These two points identify a second segment. The transformation performed on the selected elements will be the one that maps the first selected segment into the second. For this to be a rotation transformation, the second line must be the same length as the first. If not, the elements will be scaled as well as rotated. Figure 3-8 shows the rotation of a collection of elements. After you have selected the fourth point, a rotated copy of the selected elements will be added. To abort this command, move the cursor outside the window and release the left mouse button.

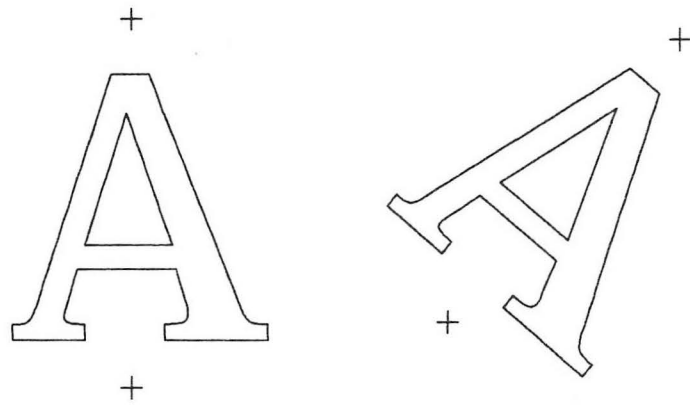



Figure 3-8. Rotating with a two-point transformation

Stretching or Reflecting an Element

Select the **Copy** command, press the left button, and slide out the through the grey arrow to display the submenu. Select the **Copy w/3 pt trans** subcommand. Select the elements you wish to stretch or reflect. When you release the mouse buttons, the cursor will change to . Select three points. These three points identify a triangle in the sketch that will be transformed. They will be marked PT1, PT2, and PT3. Select three more points. These three points identify a second triangle. The transformation performed on the selected elements will be the one that maps the first specified triangle into the second. Some examples of using three-point transformation are shown in the figures that follow. To abort this command, move the cursor outside the window and release the left mouse button.

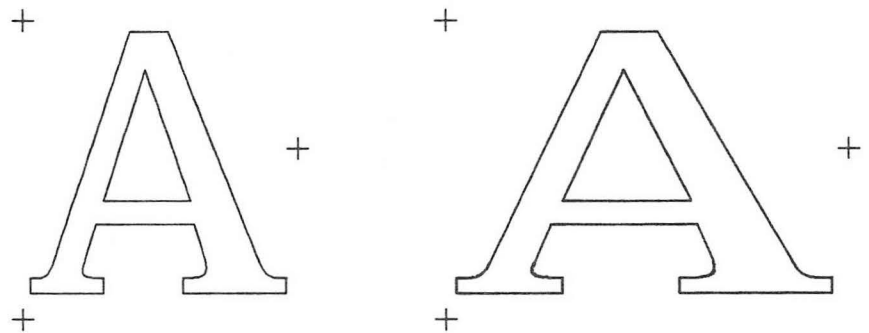


Figure 3-9. Stretching with a three-point transformation

The **Three pt transform** subcommand to the **Move** command is used in a similar fashion, but moves the selected elements rather than copying them. For more information, see the description of the **Move** command.

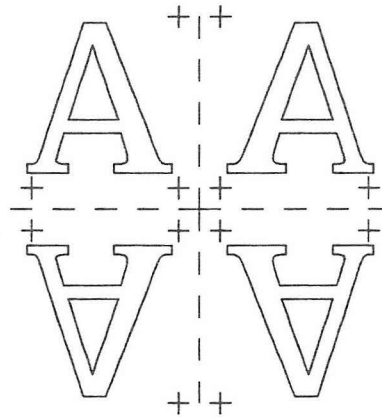


Figure 3-10. Reflecting with a three-point transformation using the **Copy** command

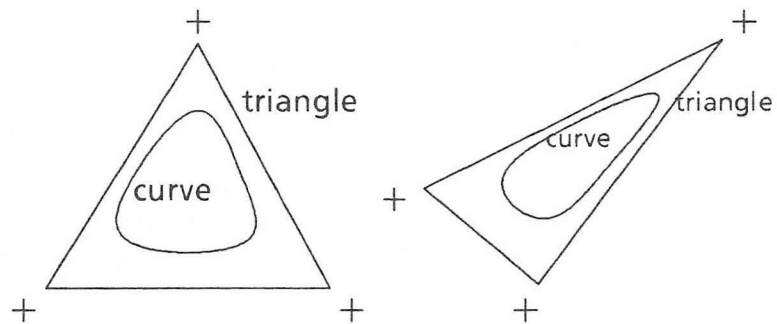


Figure 3-11. A three-point transformation using the **Copy** command

Note that in the figure above, the text is just scaled and repositioned.

Creating Multiple Copies of Sketch Elements

This feature of **Sketch** makes it much easier to place multiple copies of a collection of elements. While selecting the control points of elements during the **Copy** command operation, hold down the **COPY** key. With the cursor in the **Sketch** window, you can now position a new copy of the selected elements every time you press the left or right mouse button. Abort the process by putting the image completely outside the window, or release the **COPY** key before you release the mouse button.

Align

The **Align** command and its subcommands allow you to align elements in various ways. The command and its submenu are shown below.



Selecting the main menu command **Align** displays a collection of control points and moves them so that they all line up with the leftmost one.

Align left aligns a collection of points with the leftmost one.

Align right aligns a collection of points with the rightmost one.

Align top aligns a collection of points with the one closest to the top of the sketch.

Align bottom aligns a collection of points with the one closest to the bottom of the sketch.

Move onto grid moves control points to the nearest grid point. See the documentation for the **Grid** command for more information about positioning control points.

Space evenly in X moves points so that they are evenly spaced between the rightmost and leftmost.

Space evenly in Y moves points so that they are evenly spaced between the one closest to the top of the sketch and the one closest to the bottom.

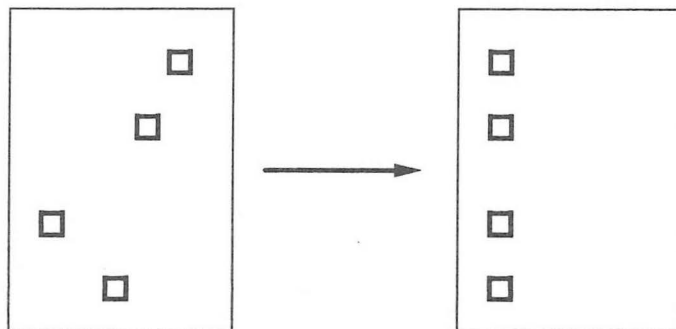


Figure 3-12. The effect of using **Align**

The subcommands **Space evenly in X** allows you to select a collection of points and move them so that the distance between them is evenly divided between the leftmost and the rightmost points. However, this will not necessarily leave points on grid points. If you want them on grid points, you can use the **Move onto grid** subcommand to move the points to the nearest grid point.

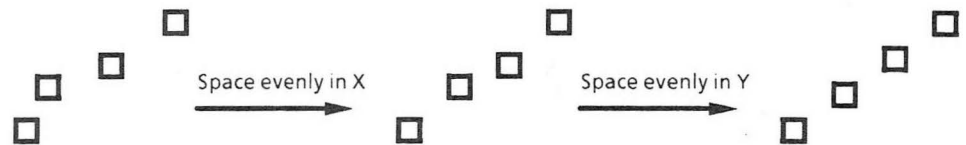


*Figure 3-13. Control points aligned with the **Space evenly in X** subcommand*

The command **Space evenly in Y** is similar but moves the points vertically rather than horizontally.

Aligning Things Evenly Along a Line

By applying the **Space evenly in X** and the **Space evenly in Y** commands in succession, you can arrange control points evenly along a line. Before applying the command, move the points so that one end of the line is occupied by the leftmost, bottommost point and the other end is occupied by the topmost, rightmost point.



*Figure 3-14. Effect of using the **Space evenly in X** subcommand followed by the **Space evenly in Y** subcommand*

Change

You can use the **Change** command to alter the size, looks, filling, or properties of Sketch elements. The **Change** command has no submenus, but invokes a series of pop-up menus once you select the things to be changed.



Changing the Way Text Looks

You can change the properties of text by using the **Change** command. After selecting the **Change** command, select a piece of text or a collection of pieces of text that you wish to change. You will then be presented with a menu of possible ways of changing the text.




Figure 3-15. The pop-up menu for changing text

Changing the Size of a Text Box

Move either control point of the text box using one of the point-moving methods described in the section titled "Moving Elements."

Changing the Border Thickness of a Text Box

Select the **Change** command, move the cursor to one of the control points of the text box (which will be marked with a ) and press and release the left button. The menu shown in figure 3-16 will appear.

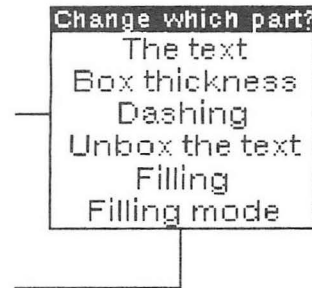


Figure 3-16. The pop-up menu for changing a text box

Select the item **Box thickness**. This will bring up a menu shown below.

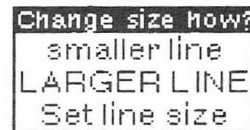


Figure 3-17. The pop-up menu for changing a text box's thickness

Selecting **smaller Line** will make the box outline one size smaller (thinner) than it is. Selecting **LARGER Line** will make it one size larger. Selecting **Set line size** will bring up a number pad menu (see figure 3-18). In this case, you should enter the size in screen points (1/72 of an inch) that you want the box thickness to be. The box thickness can be set to zero with the **Set line size** command, but the **smaller line** command will not make it less than one. If the thickness is zero, the box around the text won't appear, but any filling will remain and the text will still justify itself within the box's boundary.

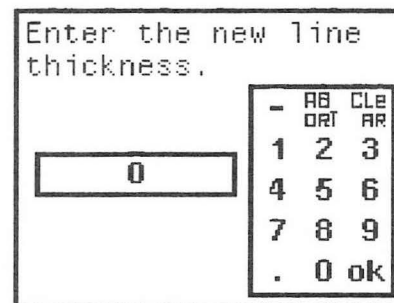


Figure 3-18. The number pad menu for entering line thickness

Instructions for using this menu are :

1. Select a number. The number you select will replace the one in the horizontal bar. In the above figure, it's 0. If you accidentally enter the wrong number, select **CLEAR**, and then try again.
2. Select **ok**. The new line size will be applied to the box.

You have the option to enter minus numbers and decimal numbers by selecting the minus sign or decimal point after you

select the number. Note that the program is limited in its ability to display very small variations in size.

Changing the Filling Mode of Elements

Elements that have a filling property (boxes, text boxes, circles, polygons and closed curves) now have a mode property that determines how the filling should effect elements it covers.

To change the filling mode, select the **Change** command. Use the cursor to select the element or elements whose filling mode you want to change. A menu of change operations will appear.

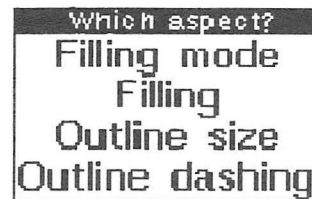
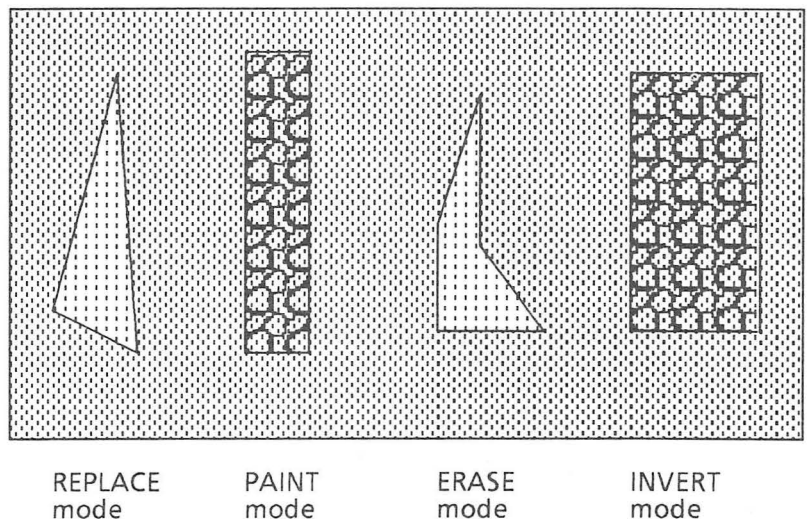


Figure 3-19. The menu that allows you to change the filling mode

One of the items in the menu will be **Filling mode**. Select this item. The menu shown below will appear. Select the desired mode.



Figure 3-20. The menu of available filling modes



REPLACE
mode

PAINT
mode

ERASE
mode


INVERT
mode

Figure 3-21. Some examples of fillings over a filled box

The image on the screen will often appear to be inaccurate when you have made changes to filling. To accurately display your changes, put the cursor in the title bar of the window, press the right mouse button, and select the **Redisplay** command from the Lisp background menu.

Text Box TEXT BOX

The **Text Box** element lets you create graphic frames for text. It has no associated subcommands, but the sketches created with it can be altered using the **Move**, **Change** and **Align** commands.

Select TEXT BOX from the command menu and the cursor becomes a . Draw the box by pressing the left mouse button and releasing when the box is the correct size. You can create an empty text box to put text in, or you can draw a box around existing text.

Justifying Boxed Text

Whenever the caret is inside a text box, the characters typed become part of the text within the box. The text in a box is broken into lines between words so that each line fits within the width of the box. If a single word in the text is wider than the box, it extends beyond the boundaries of the box. Characters outside the box cannot be selected for editing; the box must be enlarged to allow these to be edited.

Changing the Size of a Text Box

The frame around the text has control points at its upper-right and lower-left corners. Moving one of these changes the size of the box. The box has thickness and dashing pattern properties that affect the frame and a filling property that shades the part of the box not occupied by text.

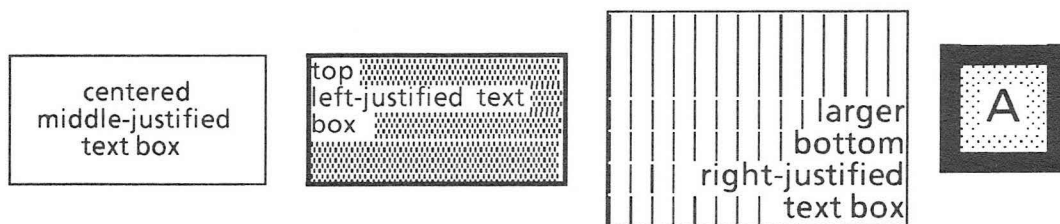
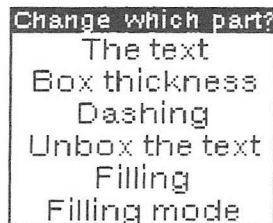


Figure 3-22. Some examples of text boxes

Putting a Box Around Existing Text

Select the **Change** command, move the cursor to the control point of the text you wish to box, and press and release the left button. The **Change text how?** submenu will appear (see figure 3-15). Select the **Box the text** item. The text will become part of a text box.

If you select the **Change** command again, the **Change which part?** menu (shown below) appears first.



You must then choose one of the items, and if you choose to change the text, the **Change text how?** submenu that appears will not contain the **Box the text** item.

Creating Multiple Text Boxes

Locate the caret inside a text box, then hold down the CONTROL key and press the RETURN key. A new text box of the same size will appear below the first. Any characters typed will now go into the new box. If the caret is not in a text box, a new box will appear at the current cursor position.


Note: Do not release the CONTROL key until the new box appears.

Creating a Sized Box to Put Text In

Select the **TEXT BOX** command from the command menu, move the cursor to one corner of the desired box location, press and hold the left button, move the cursor to the diagonally opposite corner, and release the button. While you are moving to the opposite corner, a grey outline of the box will be shown. When you release the button, the grey outline will be replaced by a solid one. You can stop this command by releasing the button when the cursor is outside the window.

To change the border thickness of an existing text box, use the **Change** command.


Making a Dashed Border Around a Text Box

You can make the border of a text box dashed by specifying a *dashing pattern*. A dashing pattern is a sequence of numbers that indicates how many brush marks should be on and off. To specify a dashing pattern, first select the **Change** command, then move the cursor to one of the control points of the text box (marked with a ) and press and release the left button. The menu shown in figure 3-16 will appear. Select the **Dashing** option. This will bring up a menu titled **New Dashing Pattern?** that contains several dashing patterns and the option **Other** and **No Dashing**. Selecting one of the dashing patterns will apply that pattern to the border.

Selecting the **Other** option will bring up a series of number pad menus in which you enter, alternatively, the size of the black portion of the pattern and the size of the white portion of the pattern. The pattern can have as many alternations as you like.

Number pad menus will continue to appear until you enter zero. When you enter zero, a menu is appears showing what your new dashing pattern looks like and requesting confirmation. If you like the pattern, select **Yes**. If you select **No**, you will be given a chance to enter another series of sizes. If you select **Yes**, the box outline will be dashed according to your pattern. The pattern you entered will be remembered and will appear in the dashing menu next time you change the dashing.

Removing a Box From Around Text

Select the **Change** command, move the cursor to one of the control points of the text box (marked with a ) and press and release the left button. The menu shown in figure 3-16 will appear. Select the item **Unbox the Text**. The box and all of its properties (such as filling) will be removed. If you want to keep the filling but not display the box, set the border thickness to zero.

Box

This command lets you create boxes of various sizes, but differs from the **Text Box** command in that it does not automatically justify text inside it. Use it to create diagrams, pictures, etc.. Do not use it to create frames around text, or to produce charts.

Select this command element as any other, shape the box, and release the left button.

In every other way, the **Box** command element is like the **Text Box**. It can be changed, moved, copied, its outline can be dashed, or it can contain a filling that you specify. However, when you type text characters into a box made by selecting this item, notice that each set of text characters will show a separate control point. This text can be moved independently of the box. Text typed into a Text Box becomes part of the Text Box element. The figure below show what happens when you select two differently-created boxes for change.

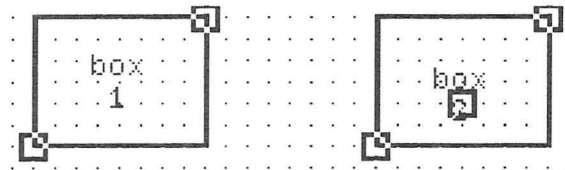


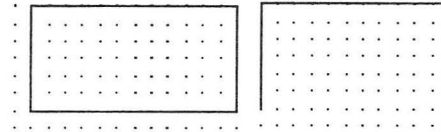
Figure 3-23. A Text box and a box

Box number 1 was create using the **Text Box** command item, while box number 2 was created using just the **Box** command. Text was typed into both boxes. The grid has been left in the figure to show the difference in justification between the text in both boxes. Note that the text in box 1 is perfectly centered within the box, while the text in box 2 is not. Moreover, the first box displays no control point for the text, while the second box does.

Lines



These two elements are grouped together because they both create lines. The first creates closed lines, and the second creates open ones. The differences in usage are explained below.

The first of these two commands always creates closed lines. If you select this command and draw a partial box in the Sketch window, the last line will be added. In the first rectangle shown below, only the left, top and right lines were drawn. Then the command was aborted.







However, because it was created using the closed line command, the rectangle was completed. The same size rectangle drawn using the open line command is drawn exactly as shown. In both cases, only three lines were actually drawn.

Adding Lines

You can create lines using the  command. Select the command, and the cursor will become . Position the cursor in the Sketch window and draw the lines, pressing the left mouse button to designate an end point or angle. To stop the process, move the cursor outside the window.

Drawing Polygons

Use the closed line command to draw polygons. Select the  from the Sketch command menu. The cursor will change to  and an  will follow the cursor. Move the cursor to each vertex of the polygon and press the left button. When you select a point, it is marked with a . When you have selected all the points, move the cursor outside the window and press the left button. The points you selected will become the control points of the polygon. To abort, move the cursor outside the window and press the left button before selecting any points.

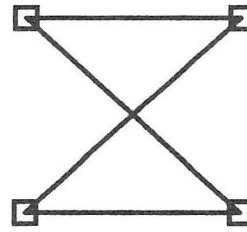






Figure 3-24. Example of polygon with the control points highlighted

You can move any of the control points if you wish to change the polygon.

Curves

There are two kinds of curves you can add to a sketch: open curves and closed curves. This section tells you how to add each kind of curve.

Open Curves

Select the  command from the Sketch command menu. The cursor will change to  and an  will follow the cursor. Move the cursor to the points you want the curve to go through and press the left button. When you select a point, it is marked with a . When you have selected all the points, move the cursor outside the window and press the left button. The points you selected will become the control points of the curve. To abort, move the cursor outside the window and press the left button before selecting any points.

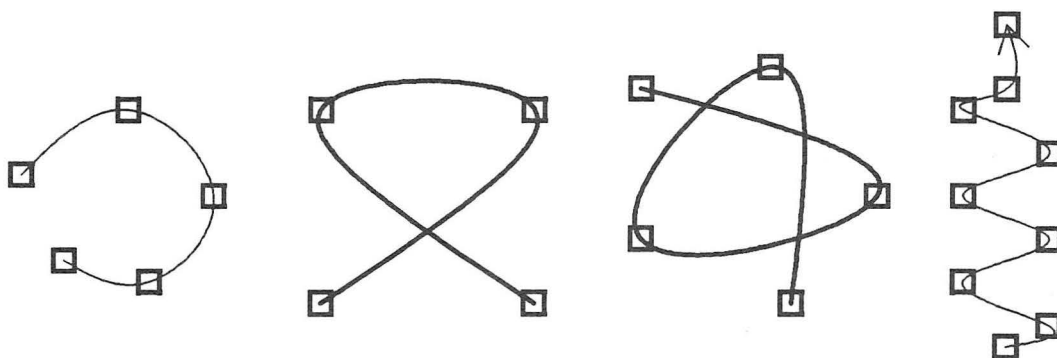






Figure 3-25. Some examples of curves

You can move any of the control points to change the shape of the curve. In general, when you construct a curve, the closer together the points are the sharper the curve is; the farther apart they are, the smoother it is. The best way to learn how the control points affect the shape is to enter lots of different curves and move their points around.

Closed Curves

Select the  command from the Sketch command menu. The cursor will change to  and an  will follow the cursor. Move the cursor to the points you want the curve to go through and press the left button. When you select a point, it is marked with a . When you have selected all the points, move the cursor outside the window and press the left button. The points you selected will become the control points of the closed curve. To abort, move the cursor outside the window and press the left button before selecting any points.

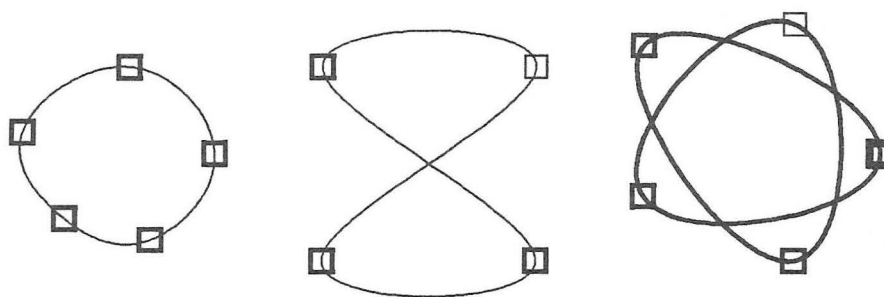


Figure 3-26. Some examples of closed curves

You can move any of the control points (using one of the point-moving commands) to change the shape of the closed curve.

Arcs

In Sketch, you can draw partial circles using the **Arc** command. An arc is characterized by three control points (see figure 3-27) and a direction. The shape and angle of the arc can be changed by moving any of the control points (using one of the point-moving commands). The angle of the arc can also be changed by setting the number of degrees the arc spans. (See the section "Setting the Number of Degrees an Arc Spans," below.) The direction determines whether the arc is traversed in a clockwise or a counterclockwise direction from the starting point. An arc has thickness (size), brush shape, and dashing properties; it can also have arrowheads.

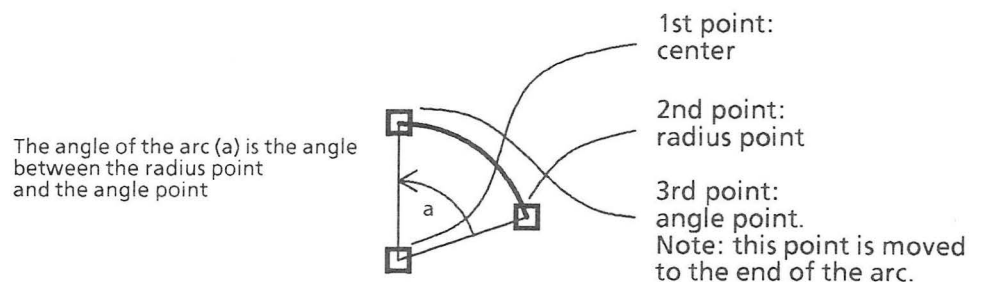








Figure 3-27. The control points of an arc

Drawing an Arc

Select the  command from the Sketch command menu. The cursor will change to . Move the cursor to the center of the arc and press the left button. The selected point is marked with  and the cursor changes to . Move the cursor to one end of the arc and press the left button. This point determines the radius of the arc and its first end. The arc will begin at this point. The selected point is marked with  and the cursor changes to . Move the cursor to the other end of the arc and press the left button. The arc will be added. To abort this command, press the left button with the cursor outside the window.

Setting the Number of Degrees an Arc Spans








Select the **Change** command, move the cursor to one of the control points of the arc (which will be marked with a ) and press the left button. The menu shown in figure 3-28 will appear.



Figure 3-28. The aspect menu for changing an arc

Select the **Angle** item. A number pad menu titled **Enter Arc Angle in Degrees** will appear. Enter the number of degrees that the arc should span by selecting digits from the number pad. When you are finished, select **ok**. The selected arc (or arcs) will be changed to span the indicated number of degrees. The third control point (the angle point) is moved to accomplish this. To abort the command, select the **ABORT** item from the number pad.

Ellipses

Select the  command from the Sketch command menu. The cursor will change to . Move the cursor to the point you want to be the center of the ellipse and press the left button. The selected point is marked with  and the cursor changes to . Move the cursor to the point you want to determine one radius and the orientation of the major axis of the ellipse (see figure XX). Press the left button. The selected point is marked with  and the cursor changes to . Move the cursor to any point that is the same distance from the center as you want the second radius to be and press the left button. The ellipse will be added.

The control points of the ellipse are the center and first radius point you selected and the point on the ellipse at the minor radius. Any of them can be moved using one of the point-moving commands to change the size, orientation, and location of the ellipse. To abort this command, put the cursor outside the window and press the left button.

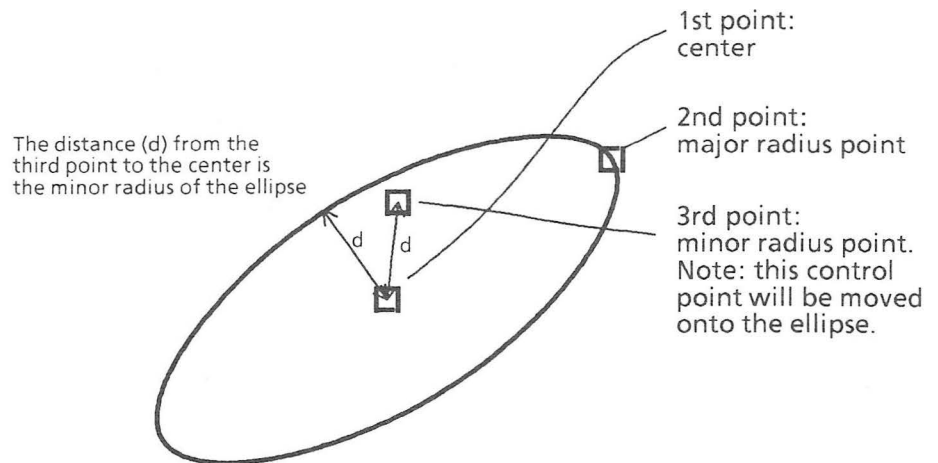





Figure 3- 29. The control points for an ellipse

Circles ○

Select the ○ command from the Sketch command menu. The cursor will change to . Move the cursor to the point you want to be the center of the circle and press the left button. The selected point is marked with  and the cursor changes to . Move the cursor to a point you want to be on the radius of the circle and press the left button. The circle will be added. The two points you selected are the control points of the circle. Either can be moved using one of the point-moving commands to change the radius and location of the circle. To abort this command, move the cursor outside the window and press the left button. Figure 3-30 shows two examples of circles.

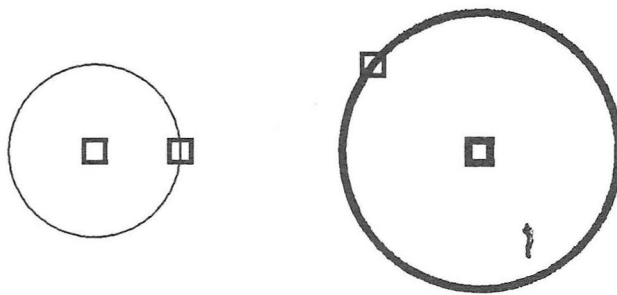



Figure 3-30. Two examples of circles with the control points displayed

Bit Image

The **Bit image** command lets you create a bit image in a sketch that can be zoomed. Select this command from the menu and you will be asked to choose a region of the screen that will be inserted as a bit image into the sketch. The bit image is different from a bitmap image object (one that results from copy-selecting a bitmap into a sketch) in that the bit image will zoom when the sketch is zoomed.

Using the Bit Image Command

Select **Bit image**, and the cursor will become . Select the element or elements you want to convert, and the prompt region will instruct you to place the bitmap in the desired location of the Sketch window. The figure below shows two identical ellipses. However, when you select a command that causes the control points to be displayed, notice that the ellipse on the right has been turned into a bitmap and has only one control point

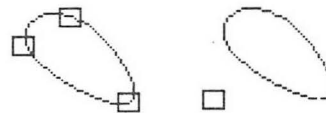


Figure 3-31. A sketch and a bitmap with control points displayed

If you convert a sketch or Sketch elements into a bitmap, you should first turn off the grid (see the description of the **Grid** command) because otherwise it will become part of the bitmap you select.

Bitmaps created with this command can be used in text files or other sketches. However, if you wish to change them, you will be asked to edit the sketch. In other words, putting the cursor over the bitmap will invoke the pop-up menu shown here instead of the **Operations on bitmaps** menu shown in figure 6-1.

Editsketch

Figure 3-32. The pop-up menu for changing a sketch converted to a bit image.

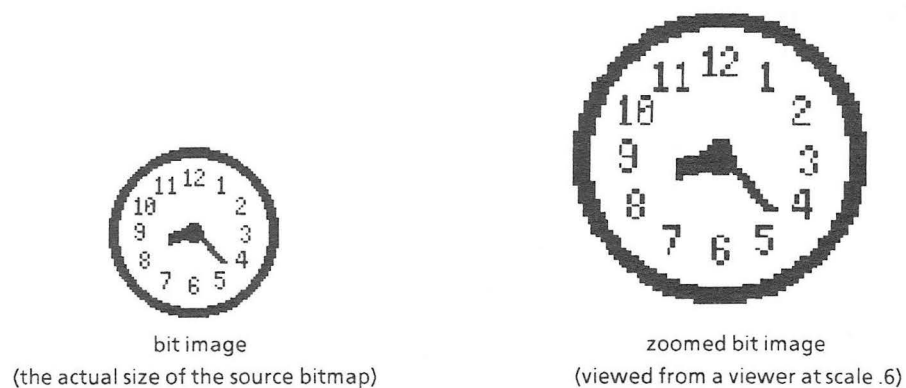


Figure 3-33. An example of an enlarged (zoomed) bit image

For more information about scaling bitmaps, see the chapter titled Using Bitmaps in Sketches.

Bury

The **Bury** command lets you determine how Sketch elements overlap. Elements have an order in which they are displayed. An element that is displayed early can be covered by elements layed down later. Thus, changing the order in which overlapping elements are displayed can affect the resulting image. Three subcommands are provided to change the order in which elements are displayed.



Figure 3-34. The **Bury** command and its submenu of commands

Using the Bury Command

Select **Bury** from the Sketch command menu. The control points of all elements will be displayed. Select an element or elements to bury. The element will be placed on the bottom of the display stack, that is, it will appear underneath any other elements. If you select more than one element, they will all be displayed before any non-selected elements and their relative order maintained. The **Send to bottom** subcommand does the same thing as **Bury**.

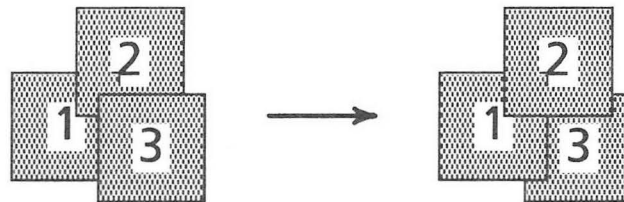


Figure 3-35. The result of **Bury** applied to text box number 3

Bring to Top

The **Bring to top** subcommand will let you select an element or elements and will change their order so that they are displayed last. That is, they will appear on top of any other elements. If you select more than one element, they will all be displayed after any non-selected elements and their relative order maintained.



Figure 3-36. The result of the *Bring to top* subcommand applied to text box number 1

Reverse Order

The **Reverse order** subcommand will prompt you to select a collection of elements and will reverse their display orders. A special case is when two elements are selected. In this case the element positions are switched.

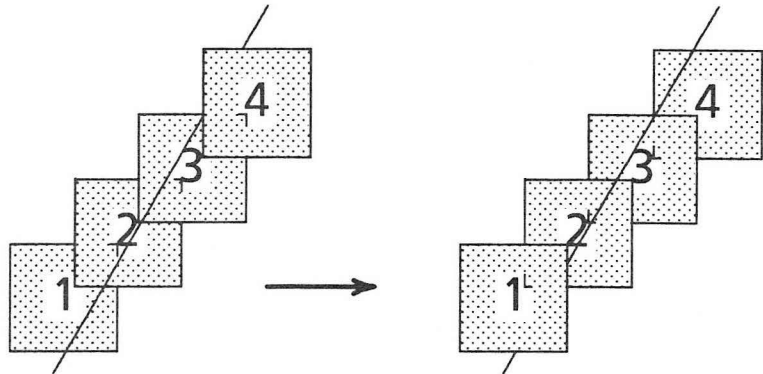
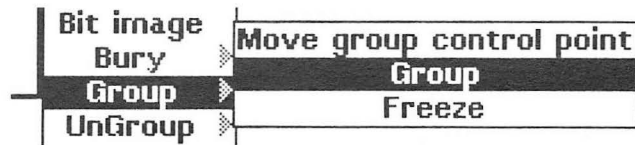


Figure 3-37. The result of the *Reverse order* subcommand applied to four text boxes but not the line

Group

Use the **Group** command to consolidate sketch elements, so that they can be deleted, moved, copied, or changed as a group. The **Group** command and its submenu are shown below.



Using the Group Command

When you select **Group**, the control points of your Sketch element will be displayed. Selecting all control points and releasing the left mouse button will group that Sketch element. After the elements are grouped, they have a single control point at their center. This is sometimes convenient to reduce the number of control points in a diagram or to more easily duplicate common parts of a figure. The elements in a group are moved, copied, deleted, and changed together.

Groups can be included to form new, larger groups. Figure 3-38 shows the control points for an ungrouped figure and the same figure grouped.

Note that grouping does not affect the way an image looks, just the ease with which you can manipulate it.



Figure 3-38. How grouping affects a collection of Sketch elements

Move group control point moves the control point of a group without moving the group.

The **Group** subcommand has the same function as the one in the Sketch command menu.

If you want to change just one piece of a group or move one of the elements within it, you must ungroup it first. See the description of the **Ungroup** command below.

Freezing Elements

You can freeze Sketch elements to make them unaffected by edit changes. The control points of frozen elements will not be displayed (and hence cannot be selected) when you select one of the edit commands from the Sketch command menu. This provides a way to keep part of the figure fixed while editing an overlapping part. It also reduces the number of control points.

Selecting **Freeze** causes the control points to be displayed. You then select the element you wish to freeze and the control points will disappear. Elements can be unfrozen by using the **UnFreeze** command that is a subcommand to the **UnGroup** command.

Ungroup

This command performs the exact opposite function of the **Group** command.



Using the Ungroup Command

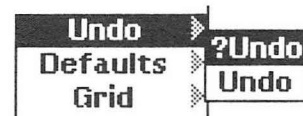
Select the **Ungroup** command, move the cursor to the control point of the group you want to ungroup, and press the left button. The selected group will be ungrouped so that its elements can be individually changed. If you select a collection of elements, only the first selected group will be ungrouped. The **Ungroup** subcommand performs the same function as the **Ungroup** command in the Sketch command window.

Unfreeze

You can unfreeze elements just as you would ungroup them. Move the cursor to the control point of the group you want to unfreeze, and press the left button. The selected group will be unfrozen so that its elements can be individually changed. If you select a collection of elements, only the first selected group will be unfrozen.

Undo

Use this command to recover if you make a mistake or to display a list of Sketch events performed during your Sketch session.



Using the Undo Command

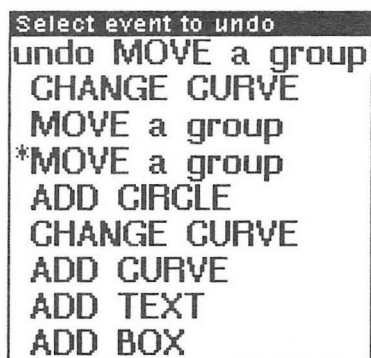
Select the **Undo** command, press and hold the left button, and move the cursor out through the grey arrow. A menu containing the items **?Undo** and **Undo** will appear. Select the **?Undo** subcommand. A pop-up menu listing the previous commands you performed, similar to the one shown in figure 3-39, will appear. If you had added a text box, then copied it using the **Copy** command, the menu would appear as follows:



Figure 3-39. A sample list of Sketch events to undo

Note that the copy event has been added to the top of the menu because the most recent event is always placed at the top.

From this menu, select the event that you wish to undo. If the selected graphical element has been changed more than once, the changes to it must be undone in reverse order. If you try to undo them out of order, the message "Element subsequently modified, can't undo" will appear in the Sketch prompt region. Events that have already been undone are preceded by an asterisk (*). Selecting one of these commands will not change anything, but invokes the message "That event has already been undone." Undo events are also added to the pop-up menu and can be selected to be undone. Selecting an undo event restores the effect of the command to its previous state. The sample menu below shows the result of a more complicated Sketch session.



*Figure 3-40. A sample pop-up menu that appears when you select **Undo**?*

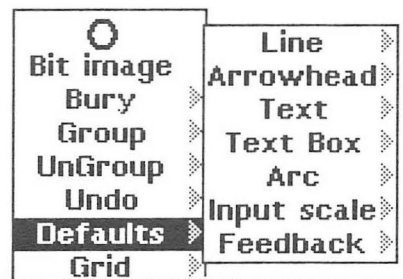
Note that in the menu above, the **MOVE a group** event has already been undone and is marked with an asterisk.

Defaults

Use this command for changing the properties of lines, arrowheads, text, text boxes, and arcs. If you intend to add text to your sketch, this command is especially useful because it allows you to right, left or center justify text as you type it in. You can also change the input scale for sketch elements which determines the size and thickness of all these elements as they are entered.

Selecting the **Feedback** subcommand allows you to control the feedback that the program provides while elements are being drawn.

The properties an element has when it is first added to a sketch are called the *default* properties. For example, there is a default size that determines how wide newly added lines, curves, boxes, etc., will be. All these defaults can be changed using the **Defaults** command and its subcommands. If you want to add a collection of elements that are different from the standard ones, using the **Defaults** command is often the easiest way to do it. For example, if you want many of extra-thick arrows, change the default properties of new lines to have a thickness of two and an arrowhead on the last point specified before you enter the lines for the arrows. If you wanted all the elements you create to be larger, you would select the **Input scale** subcommand and choose an appropriate scale from the number pad menu that appears. Any defaults that you change are saved when the sketch is saved. The **Defaults** command and its subcommands are shown below.



Using the Defaults Command to Change Text

Select the **Defaults** command, press the left button, and slide the cursor out through the grey arrow. The submenu shown above will appear. Now select the **Text** option and slide the cursor out through the grey arrow. The submenu shown below will appear.

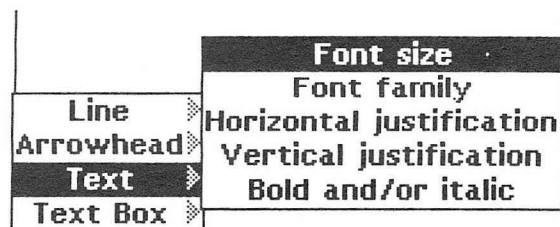


Figure 3-41. The menu for the Text subcommand

Selecting **Font size** will invoke a pop-up menu to prompt you for the size that new text should have.

Selecting **Font family** will prompt you for the family that new text should have and will invoke a menu of font choices. If the specified font cannot be found in the current default size, an error message is printed and the default is not changed.

Selecting the item **Horizontal Justification** will prompt you for whether the new text should be left, right, or center justified.

Selecting the item **Vertical Justification** will prompt you for whether the new text should be top, bottom, middle, or baseline justified.

Selecting the item **Bold and/or Italic** will prompt you for the bold and italic properties that new text should have.

Changing the Properties of New Text Boxes

Move the cursor over the **Defaults** command, press the left button, and slide the cursor out through the grey arrow. Then select **Text Box**, and move the cursor to display the subcommands shown in figure 3-42.

Selecting **Horizontal justification** will invoke a pop-up menu that lets you choose whether the text in new text boxes should be left, right, or center justified. Selecting the item **Vertical justification** lets you choose whether the text in new text boxes should be top, bottom, middle, or baseline justified. The font size, family, and bold and italic properties for new text boxes are the same as for text. The line thickness of the box is the same as the thickness of lines.

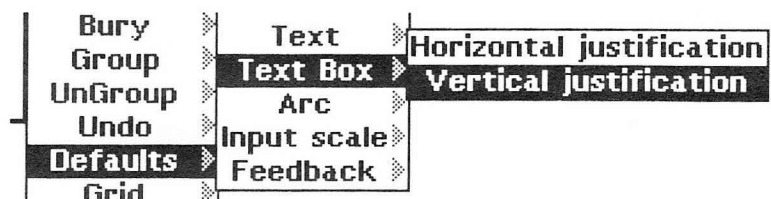


Figure 3-42. The Defaults command's Text Box options

Changing the Properties of New Lines

Move the cursor over the **Defaults** command, press the left button, and slide the cursor out through the grey arrow. The menu shown in figure 3-43 will appear. Move the cursor over the **Line** item and out the right through the grey arrow. A menu containing the items **Size**, **Shape**, **Add arrowhead**, and **Mouse line specs** will appear. Selecting the item **Size** will invoke a pop-up menu that lets you choose a number that will become the thickness of any new lines, curves, circles, etc. Selecting the item **Shape** lets you choose a brush shape that will become the shape of any new lines, curves, circles, etc. Selecting the item **Add arrowhead** will let you choose which end or ends, if any, of new lines, curves, and arcs should automatically get arrowheads. To change the characteristics new arrowheads have, see below. Selecting the item **Mouse line specs** enables you connect lines created by pressing the middle button in the Sketch window.

Changing the Properties of New Arcs

Move the cursor over the **Defaults** command, press the left button, and slide the cursor out through the grey arrow. A menu that contains the item **Arc** will appear. Still holding down the left button, move to over **Arc** and slide out the right side through the grey arrow. A menu with the items **Clockwise** and **Counterclockwise** will appear (see figure 3-43). Selecting **Clockwise** will make new arcs go from their radius point to their angle point in a clockwise direction. Selecting **Counterclockwise** will make new arcs go from their radius point to their angle point in a counterclockwise direction.

The line thickness of arcs is the same as the thickness of lines.

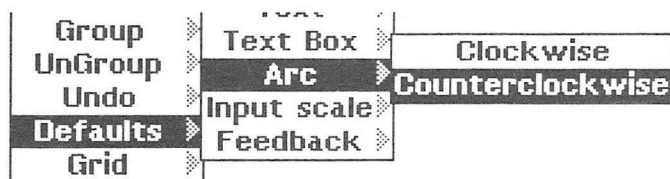


Figure 3-43. Changing the direction of arcs

Changing the Properties of New Arrowheads

Select **Arrowhead** subcommand and move the cursor out through the grey arrow. A menu containing the commands **Size**, **Angle**, and **Type** will appear.

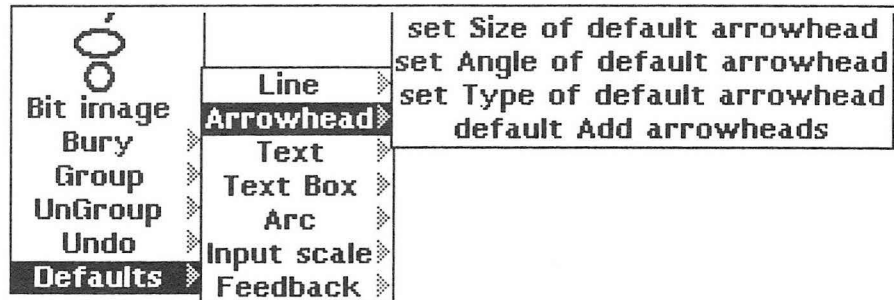
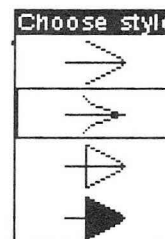


Figure 3-44. The options for new arrowheads

From this menu, select the arrowhead property you want to change. Selecting **set Size of default arrowhead** will bring up a number pad menu titled **New Arrowhead Size in Screen Pts** and giving the current default arrowhead size (length of the edges). Enter the number you want to become the size of new arrowheads, then select **OK**. You can abort the process by selecting **Abort** from the number pad menu.

Selecting **set Angle of default arrowhead** will bring up a number pad menu titled **New Head Angle in Degrees**, which gives the current number of degrees of the angle between the edges of new arrowheads. Enter the angle you want, then select **OK**.

Selecting the **set Type of default arrowhead** will bring up the menu shown below from which you can select the type of new arrowheads you want to have.



Finally, selecting the **default Add arrowheads** will bring up a menu like the one shown below. Any open lines or curves that you add to your sketch will have arrowheads added to the end you specified.

Which end?
First
Last
Both
Neither
Left
Right

After this, whenever you add an arrowhead it will have the specified property.

Grid

Use the **Grid** to help align, place, and reposition elements and text. The **Grid** command and its submenu are shown below.



Using the Grid

Select the **Grid** command from the Sketch command menu. If you have a new Sketch window, move out through the grey arrow and select **Display grid**. The default behavior is to have the grid always tuned on, but it is not displayed until you request it.

Selecting **Turn grid ON** has no effect unless the grid was previously turned.

Turn grid OFF lets you place Sketch elements anywhere in the window, not just on grid points.

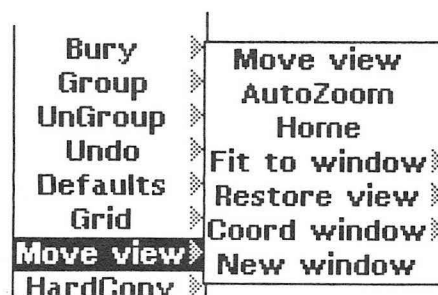
Larger Grid doubles the current distance between the grid points.


Selecting **smaller Grid** halves the distance between the grid points. If you select **smaller grid**, and the grid appears to disappear, look in the white prompt region of your Sketch window. The information there will tell you what position the grid has. For instance, if the message says "New grid has a position every 2.0 screen points." you will not be able to see the grid display.

The grid display will not be visible when you print your sketch, unless you have converted it into a bitmap. If you are using the grid display while creating bitmaps, remember to select **Remove grid display** before you print your sketch, or the grid points will become part of the image. printed also.

Move View

Use this command to move around in a sketch, or to manipulate whole sketches.





Selecting the **Move view** command lets you move to any part of a sketch, without scrolling the window. First, select **Move view** from the menu. The cursor will change to . Specify the new portion of the sketch that is to appear in the window by pressing any mouse button at one corner of the region and sweeping the cursor to the opposite corner. The specified region is outlined in grey. When you release the mouse button, the portion of the sketch within the grey box is scaled to fill the current sketch window. The box maintains the same aspect ratio (proportions) as the window. The section may be smaller or larger than the current window size. To abort this command, specify a region that does not overlap the window, or press CONTROL-E. The **Move view** subcommand performs the same function.


AutoZoom

The **Move view** command allows you to zoom in on any part of your sketch. However, the **AutoZoom** subcommand provides more control and lets you expand or shrink an image.

Select **AutoZoom** from the subcommand menu. Instructions for its use will be printed in the Lisp prompt window as follows:

Left button zooms in; right button zooms out

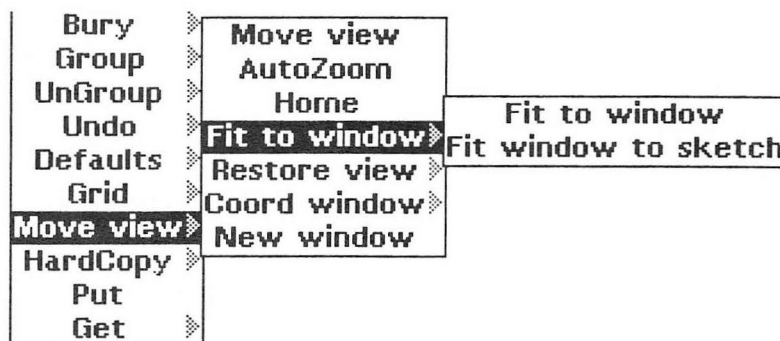
The cursor will change to . Move the cursor to the point in the sketch around which you want to zoom. If you want to zoom in (make the image larger), press the left button. The cursor will change to  and the image will get larger, leaving the point under the cursor in the same location in the window. If you want to zoom out (make the image smaller), press the right button.

The cursor will change to  and the image will get smaller, leaving the point under the cursor in the same location in the window. The image will continue to grow or shrink around the position of the cursor as long as either the left or right mouse button is down. To stop this mode, move the cursor out of the window and press any mouse button.

Selecting **Home** returns to the original sketch at its original scale.

Fit to Window

The **Fit to window** subcommand under the **Move View** command will zoom the sketch so that it just fits within the current window. It has a sub-subcommand **Fit window to sketch** that will reshape the window so that the entire sketch (at the size shown) just fits within it. This is useful if you change a sketch that was edited from a document.



Restore View

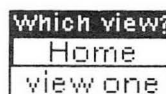
This subcommand moves you back to a previously saved view. Its submenu contains a **Restore view** option that performs the same function as the main command, as well as one that lets you save a view, followed by an option to delete a previously saved view. The menus as shown below.




Save View

The **Save view** option lets you name and save a particular view for future reference. This is useful when you are manipulating the Sketch elements or the window but wish to be able to return to a particular view.

When you select the **Save view** option, the Sketch prompt region will ask you for a name. Pick a name for the view, type it into the prompt region, then press <RETURN>. If you choose the name "view one", for instance, that title will be added to a menu that appears when you select one of these three options. The menu that appears below illustrates what you will see.



However, when you choose the option **Forget view**, the same menu looks as follows:

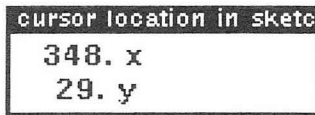


```
Which view?  
view one
```

Note that the only view you can "forget" is one you created. The Home view is a default and cannot be eliminated using this command option

Coord Window

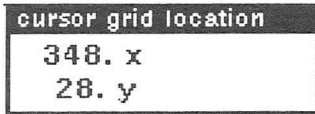
This command creates a window that shows the cursor in global coordinates. The window will appear and attach itself to the lower right corner of the Sketch window as soon as you release the left mouse button. To close the window, put the cursor in its black title bar, press the right mouse button, and select **Close** from the Lisp background menu.



```
cursor location in sketch  
348. x  
29. y
```

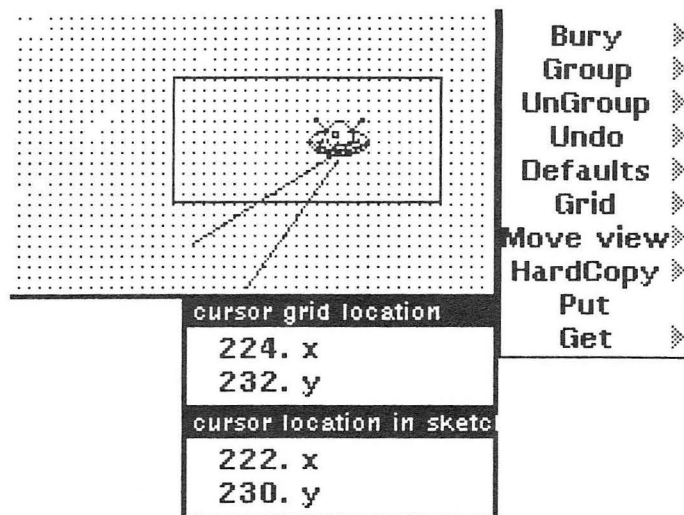
Grid Coord Window

This command creates a window that shows the grid position nearest the cursor in global coordinates. The window will appear and attach itself to the lower right corner of the Sketch window as soon as you release the left mouse button. To close the window, put the cursor in its black title bar, press the right mouse button, and select **Close** from the Lisp background menu.



```
cursor grid location  
348. x  
28. y
```

If you choose to monitor the cursor location using both options, select both individually. They will attach as shown below, and will remain active as long as you move the cursor. When you press the left mouse button to position the caret, the cursor's coordinates will temporarily freeze, then continue to record new values as you move the cursor around in the window.



New Window

Selecting this command opens a new viewer onto the same sketch. The second window can be scrolled or zoomed without affecting the view in the original window. The windows can be sent to a printer, in case you want a hardcopy of a scrolled or zoomed view. However, editing changes made to the either window are reflected in both. You can use the **Put** command to save either of the views to a file, or both of them, providing that you remember to give them different names.

HardCopy

Use this command to print the sketch you have created.



The Hardcopy command's options are:

To a file puts the image on a file, then prompts for the filename and format.

To a printer sends the image to a printer of your choice.

Whole sketch sends the image of the whole sketch at the current scale to the printer. A submenu lets you choose to send the sketch to a file or a printer.

Hardcopy Display makes the display correspond to the hardcopy image on the default printer.

Normal Display changes the display to use display fonts.

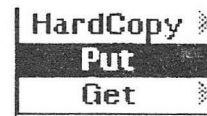
You can hardcopy a window created by selecting the "Edit Sketch" pop-up menu even if you have not finished editing. You can also hardcopy a Sketch window produced by selecting the **New window** option from the **Move View** command menu.

Put

This command lets you save your sketch on a file. Select **Put** from the Sketch command menu, and the prompt region will display the message "File to PUT to:" followed by a flashing caret. Type the name of the file to save your sketch on. The normal convention is

`{server}<directoryname>subdirectory>filename.sketch`

Label your Sketch files with the extension ".Sketch" for future convenience. If you choose to specify just the file name, default names will be assigned in the other fields but no extension will be assigned to the file.



You can use this command to save a second window onto a sketch (an option of the **Move view** command.) The second window will have the same title as the one you gave the original sketch, but a different version number.

Get

The **Get** command is similar to its TEdit counterpart. You can get a sketch from a specified file and make it appear in an empty Sketch window. It also allows you to include parts of another file in your sketch.



The **Get** command and **Get** subcommand have the same behavior. The **Include** subcommand lets you add one sketch to another.