
10

Chapter Ten USING DRAW MODE

We'll begin this chapter by covering the tools available on the **Draw Mode** toolbar for adding certain layout elements. Later, we'll cover the toolbar's general editing tools. (If you skipped the overview of Draw Mode in Chapter 9, you might want to take time to read it before proceeding.)

After you choose **Draw Mode**, the Draw Mode toolbar will appear, as shown in Figure 10-1:



Figure 10-1. The Draw Mode Toolbar


Drawing Tools

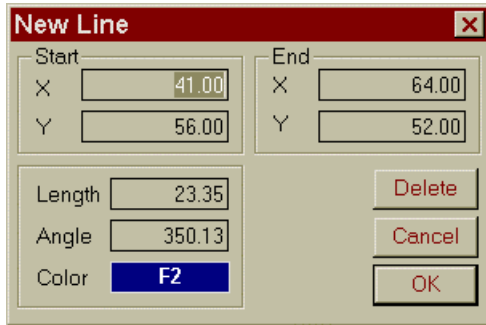
The basic elements of a layout are Lines, Arcs, Text, Messages, Objects, Bars, Plots, and Fills. Icons for adding these elements are found in the Draw Mode toolbar (shown above).

Lines, Arcs, Text, and Fills are covered in this chapter. Messages, Bars, and Plots are covered in Chapter 13 and Objects are covered in Chapter 14.

In addition to the basic drawing tools, Draw Mode provides **Polyline** and **Fillet** tools. These are drawing aids only. The **Polyline** tool creates a group of Lines connected end-to-end. Because the individual segments of the Polyline are immediately converted into Lines, it's best to think of the **Polyline** tool as providing a different form of Line entry. Similarly, the **Fillet** tool, which rounds off corners, provides a convenient way to construct Arcs.

Adding and Editing Lines

When you click on the  **Line** tool, the **New Line** dialog box will appear:




The **New Line** dialog box is a window with a red title bar and a close button (X). It contains two columns of input fields. The left column is labeled 'Start' and the right column is labeled 'End'. Each column has 'X' and 'Y' coordinates. Below these are fields for 'Length', 'Angle', and 'Color'. The 'Color' field is currently set to 'F2' and has a blue background. To the right of the input fields are three buttons: 'Delete', 'Cancel', and 'OK'.

| Start | | End | |
|--------|--------|-----|-------|
| X | 41.00 | X | 64.00 |
| Y | 56.00 | Y | 52.00 |
| Length | 23.35 | | |
| Angle | 350.13 | | |
| Color | F2 | | |

Buttons: Delete, Cancel, OK


Adding a Line


To add a Line you simply use the mouse to draw from one end point to the other, then adjust the Line if desired.


When you click on , a red, square handle will follow the cursor as you move your mouse. When you click and release the left mouse button, the location of the Line's starting point is established, and a second red, square handle, corresponding to the Line's endpoint, will begin following your mouse cursor. When you click a second time, the Line's endpoint location will be established.

If you are not satisfied with your Line, you can now drag either endpoint with your mouse to adjust the Line's position. You can drag the whole Line by placing the mouse cursor near the middle of the Line.

Quickly Adding Many Lines

To start adding another new Line, you can click on  again and follow the same procedure given above.

If you are adding several lines, there is an important shortcut. When you are satisfied with the Line you have just added, click the mouse in any open area of the drawing. This "third click in an open area" is equivalent to clicking on  again, but you don't have to move the mouse as far.

If, with your “third click,” you should accidentally click on another element, Proof will assume that you want to edit that element instead of adding a new Line. If this happens, and you want to resume adding Lines, you *must* click on  again.

The Line dialog box looks almost the same while you are editing a Line as it does while you are adding new Lines. The only difference is that the dialog box’s caption will be “Edit Line,” rather than “Add Line.”

Editing an Existing Line

To edit a Line, click on or near the Line. The end points will be highlighted with red handles. The Edit Line dialog box will appear and will reflect the current properties of the Line (x and y coordinates, length, etc.). To change the length or angle of the Line, click on one of the highlighted end points, and drag it to the new location. To change the location of the Line, click and hold the mouse button near the middle of the Line and drag it to the new location.


To change the color of the selected Line, click inside the colored box containing the color name (e.g. “F2”), and a color Palette will appear. When you click on the desired color in this Palette, the selected line and the current pen color will change to the new color.

You can also edit a Line’s location, length, and angle properties from the keyboard by selecting the appropriate option from the Edit Line dialog box and typing values directly.



Finishing and Saving

When you have finished *adding* Lines, you can click on any other element or menu choice, or click on the **OK** button. If you are adding a Line (not editing a previously drawn line), and you press the <Esc> key, the Line will be deleted.


When you have finished *editing* a Line, you can click on any other element or menu choice, click on the **OK** button, or press the <Esc> key.

All new and modified elements become part of the layout in memory immediately, but you must use the **Save Layout** option from the **File** menu (or click on ) when you want to permanently save your layout. *This applies to everything you do in Draw Mode.*


Adding Lines Using the Polyline Tool

You can use the  **Polyline** tool to draw connected Line segments. You can draw polygons, or any shape that has multiple Line segments of different lengths and angles. When you click on , a Polyline dialog box appears that is similar to the Line dialog box. The only difference is that the dialog box's caption is "Add Lines (Polyline Mode)." (This caption underscores the fact that the segments comprising a Polyline are converted into individual Lines.)


To begin drawing a Polyline, position the mouse cursor at the desired start point, then click and release the mouse button. This is the first end point. Move the mouse to the next end point and click. The first Line segment is drawn on the screen. Move the mouse to the next end point and click. The second segment is now drawn on the screen. Keep adding segments until the desired shape is drawn.

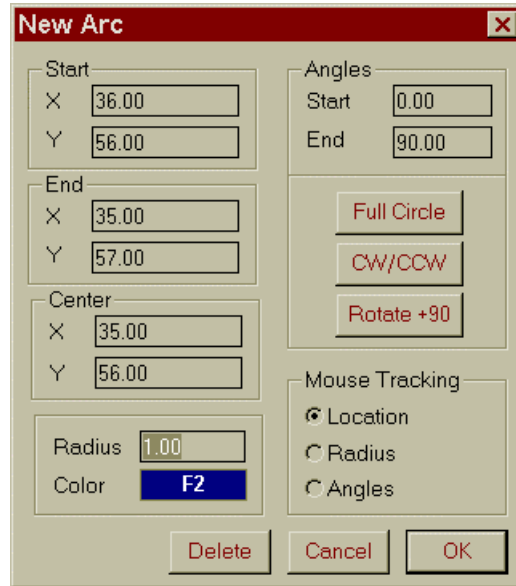
When your shape is complete, click on the endpoint of the final Line segment, then click the mouse on the Line dialog box's **Cancel** button, or press the <Esc> key. If you want to add another Polyline, click on  again.

Polylines Are Really Lines

A Polyline is converted to Lines as each segment is drawn. There is no "edit polyline" feature. If you try to select a previously drawn Polyline creation for editing, only the Line you click on will be highlighted. That is because the segments that comprise the shape are immediately converted into separate Lines as you complete each segment. (Even  Undo only "undoes" the most recent Line.) You can edit these individual Lines using the mouse or keyboard, as explained in the previous section on Lines, or manipulate certain properties of a group of Lines using Box Edit, described later in this chapter.

Adding and Editing Arcs


When you click on the  **Arc** tool, the **New Arc** dialog box will appear:



The **New Arc** dialog box contains the following fields and controls:

- Start** coordinates: X = 36.00, Y = 56.00
- End** coordinates: X = 35.00, Y = 57.00
- Center** coordinates: X = 35.00, Y = 56.00
- Radius**: 1.00
- Color**: F2
- Angles** section:
 - Start: 0.00
 - End: 90.00
 - Buttons: Full Circle, CW/CCW, Rotate +90
- Mouse Tracking** section:
 - ☒ Location
 - ☐ Radius
 - ☐ Angles
- Buttons at the bottom: Delete, Cancel, OK


Mouse Tracking


In order to draw Arcs using the  **Arc** tool, you need to understand the tracking options in the Arc dialog box. There are three options: **Location**, **Radius** and **Angles**.

Initially, before a new Arc is visible, and regardless of which option is selected, you are moving your pointing device without holding down the button. The arrow cursor will always track the Location — where the center point will be placed.

The tracking options control what happens after the arc is visible (i.e. you have clicked once to position a new Arc or you are editing an existing Arc). If you leave the Location radio button selected, all three handles (center and endpoints) are active and dragging will track the location of the handle nearest which you clicked (the entire Arc will move). If you select Radius tracking, the center of the arc will remain fixed as you drag the arc, increasing or decreasing its radius. If you select Angles tracking, the mouse will track the starting or ending angle of the Arc as you click near either of the two endpoints and drag.

Adding New Arcs

An Arc that will connect with Lines in a tangent manner (e.g. a rounded corner on a rectangle or a curved section on a mostly straight guidepath) is much easier to construct using the  **Fillet** tool, covered later in this chapter.

To add an Arc without using the Fillet tool, click on . An Arc that has handles on its center and end points will appear, centered on the mouse cursor. Move the mouse cursor near where you want the Arc's center and click once to place the Arc. In Location tracking mode, you can subsequently drag the Arc to any new location.

As you drag the Arc the (x, y) location values in the Arc dialog box will change to reflect the current placement. You can also change the Arc's location by selecting the **Center X** and **Center Y** menu options and typing in the desired values.

Setting the Radius

After placing the Arc, give it the desired radius. You can do this by typing a value directly into the Radius option of the Arc dialog box and pressing **<Enter>**. The default value is 1.00.

To change the radius using the mouse, select Radius tracking, and drag the arc until the desired radius is obtained. The changing radius value will be displayed in the Radius control. Notice that the radius changes in Snap-to-Grid increments unless Snap-to-Grid is disabled in the **Snap Options** dialog box. (See Chapter 9 for an explanation of Snap-to-Grid.)

Setting the Start and End of Angles

Once the radius is set, you can change the starting and ending angles of the Arc. To do this, select the **Start** and **End** controls and type in the desired values using the keyboard. You can also click **Full Circle** to set the starting and ending angles to 0 and 360, respectively.

To change the angles using the mouse, select Angles tracking and drag click the Arc's endpoints until the desired angles are obtained. As you drag the Arc's endpoints, the current Start and End angles will be constantly updated in the Start and End dialog box angle controls.


For some Arcs, it is easier to use the **Rotate +90** button to re-orient the Arc instead of, or prior to, selecting a tracking mode. For each mouse click on **Rotate +90**, the Arc will rotate counterclockwise by 90 degrees.


Other Arc Properties


Every Arc has a clockwise (CW) or counter-clockwise (CCW) direction. If you click on the

CW/CCW button, the Arc will be “flipped” (drawn in the opposite direction). For example, a 90-degree Arc will be converted into a complementary 270-degree Arc.

Quickly Adding Many Arcs


To start adding a new Arc you can click on  again and follow the same procedure given above. Note that each subsequent Arc initially adopts the Angles and Radius of the most recently added or edited Arc.

If you are adding several Arcs, there is an important shortcut. When you are satisfied with the Arc you have just added, click and release the mouse in any open area of the drawing. This “click in an open area” is equivalent to a click on  again, but you don’t have to move the mouse as far.



If you should accidentally click on another element while trying to add one or more Arcs, Proof will assume that you want to edit that element instead of adding a new Arc. If this happens, and you want to resume adding Arcs, you *must* click on  again.

Editing Arcs

To edit an existing Arc, click on or near the Arc you would like to change. The end points and center will be highlighted with red handles. You may now change the Arc following the same steps used for creating a new one.

To change the color of the selected Arc, click on the desired color in the **Color** Palette at the bottom of the **Edit Arc** screen. If you want to add new Arcs after editing existing Arcs, you must click on  once again. If you are finished editing Arcs, click on any other menu item or press the <Esc> key. The Arc dialog box looks almost the same while you are editing an Arc as it does while you are adding new Arcs. The only difference is that the dialog box’s caption is “Edit Arc,” rather than “Add Arc.”

Adding Fillets

The  **Fillet** tool is used to create an Arc that connects and rounds off 2 non-parallel Lines. Use the Fillet tool if you are drawing shapes with rounded corners (such as guidepaths). When you click on , the **Fillet** dialog box will appear:



To set the desired radius, simply type a number in the dialog box's **Radius** control. The default Fillet radius is the same as the current default Arc drawing radius. The default radius is initially 1.0, but after any Arcs are created (with or without the Fillet tool) or edited, the default radius is that of the most recently "touched" Arc.

If **Trim** is off, the Fillet will be added to the layout without affecting any Lines. Once the Fillet is added, there will be intersections where the endpoints of the new Arc meet each of the intersecting Lines. When Trim is on, adding a Fillet removes the part of each of the two intersecting Lines that lies outside the Fillet, leaving a rounded corner.

One-Click vs. Two-Click Fillets

To add a Fillet in one click, position the mouse cursor near the intersection of two Lines. Be sure you are *inside* the desired corner. The Fillet will connect the two nearest Lines, inside the corner. If the Lines do not intersect, but would if they were extended, the Fillet will be placed at the hypothetical intersection point. If you have not clicked close enough to an intersection, Proof will ask you to try again.

In areas with heavy drawing details, it may be easier and more precise to add the Fillet in two clicks. For a two-click Fillet, select **Two Click** mode. Be sure you click on the desired side of each Line (see Figure 10-2). The Fillet will connect the Line closest to the first click with the Line closest to the second click. If you click the same Line twice, you'll need to repeat both clicks.

Figure 10-1 illustrates the difference between a one-click Fillet and a two-click Fillet.

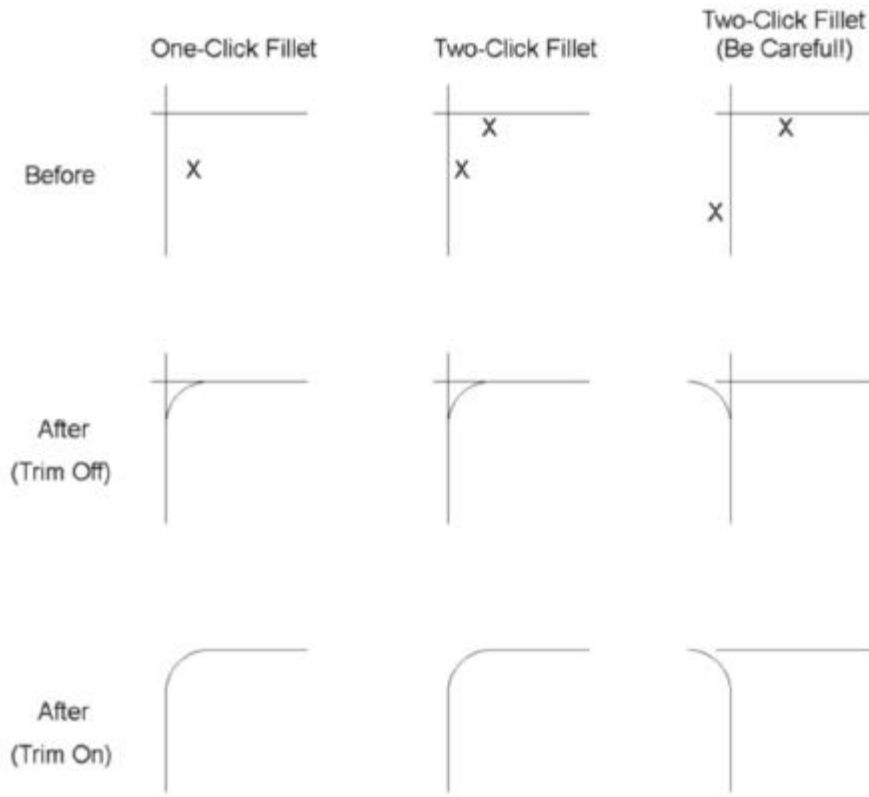




Figure 10-2. One-click and two-click Fillets illustrated

Fillets Are Really Arcs

A Fillet is converted to an Arc as soon as it appears on the screen. You can use the  **Undo** tool to delete the Fillet just placed, but you cannot edit a Fillet except by editing the Arc that results from the Fillet's creation. For example, once you have added a Fillet, you can change its

radius only through editing the Arc. This is the only way you can maintain the Fillet's desired tangency with both Lines.

If you are not satisfied with your Fillet, use  **Undo** or delete the resulting Arc, and after the bad fillet is gone, change a setting if necessary, and try again.



How Fillets Get Their Color

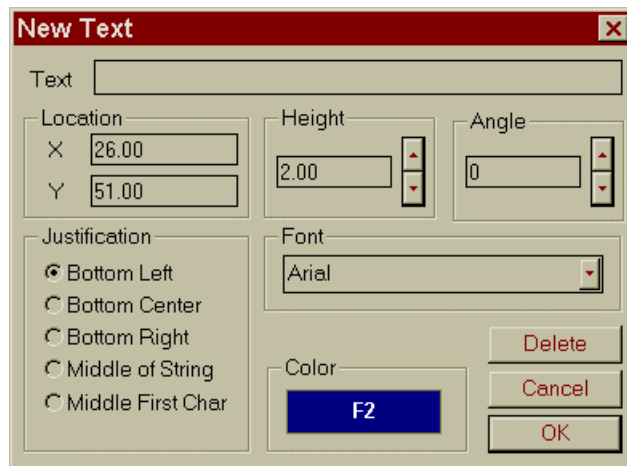
A Fillet derives its color from one of the Lines it connects. For a one-click Fillet, the color is derived from the Line closest to where you clicked the mouse. For a two click Fillet, the color is derived from the first Line clicked. The current pen color has no effect on any Fillets you create.

Adding Many Fillets


Once you have activated the Fillet tool, you can add as many Fillets as you want. You can modify the options in the Fillet dialog box whenever you want. When you are done adding Fillets, click the **Done** button, or press the <Esc> key.

Adding and Editing Text

You can use the  **Text** tool to add text to your layout. When you click on the  tool, the **New Text** dialog box will appear:




Adding a Text Element

When you select , you will see a small red text marker that is controlled by the mouse cursor. The shape of this text marker depends on the current Justification setting. For example, in the default Bottom Left justification, the text marker is an “L” shape. Place the text marker by moving the mouse to the desired location and then click. This establishes the initial position for the text string.

Once the position of the Text element has been established, you can type a text string into the dialog box’s Text control. Spaces are allowed. (You can, if you want, type the text string before choosing its location.)

Press <Enter> when you have finished typing your text string. This text string can be edited at any time. Your Text will appear on the screen at the designated location. Now you are able to change any aspect of the new Text, including its location.

If you click **OK** instead of pressing <Enter>, the Text dialog goes away. You can always click on the text to bring the dialog back (for editing) or click on  to bring the dialog back (to define new text elements).

Text Element Options

You can relocate a text string by dragging it by its position marker, or by typing in new values for **X** and **Y**.

The **Height** control displays the height of the text string (the size of the characters) in coordinate units. You can manually enter values here. The height does not have to be an integer. The up and down arrows to the right of the Text’s height allow you to quickly increase or decrease Text height in “reasonable” increments.

The **Angle** control displays the angle (in integer degrees) at which the Text is drawn. You can manually enter values here. Text angles are expressed as integer degrees. The up and down arrows to the right of the Text’s angle allow you to quickly rotate the text in 10-degree increments.


To change the Text’s **Font**, select a font from the list of available fonts.

To change the Text’s **Justification**, simply select one of the five available modes. When you do so, the Text marker will change to a shape that is indicative of the new justification mode, and the Text will be redrawn. **Bottom Left**, **Bottom Center**, and **Bottom Right** all cause the baseline of the text to be on the text marker. **Middle of String** centers the text string vertically and horizontally. **Middle of First Char** centers the *leftmost character* vertically and


horizontally. The best way to learn about these options is to try them.

Quickly Adding Many Text Elements

If you are satisfied with your Text and want to add another Text item, you can click **Text** again. You will then see the text marker once again, that is controlled by the mouse cursor.


If you have just finished adding a Text element and want to add another, you can also simply click in an open area, and you will see a new text marker that is controlled by the mouse cursor. This is equivalent to clicking  again, but you don't have to move the mouse as far.

The Text dialog box looks almost the same while you are editing Text as it does while you are adding new Text. The only difference is that the dialog box's caption will be "Edit Text," rather than "Add Text."



If you should accidentally click on another element while trying to add one or more Text elements, Proof will assume that you want to edit that element. If this happens, and you want to resume adding Text, you *must* click on  to resume adding Text.

Editing a Text Element

To edit existing Text, click on or near the desired text string. You can change any of the Text characteristics in the same way you would if creating a new text string. You can edit the text itself using normal Windows editing tools in the Text control of the Text dialog box.


If you are editing a Text element, you must click on  if you want to add new Text.

Filling Shapes With Color


You can use the  **Fill** tool to fill in bounded regions with the current pen color. A region to be filled may be bounded by any combination of Lines and Arcs *only*. Fills are saved in the layout file based on a single point that is the "seed" for the Fill. The region must be completely bounded or else the Fill will leak and fill any unbounded space. If this happens, click on  **Undo**.

When you click on , the **Fill** dialog box will appear:



As long as the Fill tool is active, Proof will initiate a Fill anywhere you click in your layout. If you fill the wrong region, you can click  **Undo**.

To specify a Fill's color, click on the **Color** button, and select a color from the color palette that appears. Note that a Fill can be any color other than the Backdrop color. If you try to do a **Backdrop**-colored Fill, it is treated as a Fill *removal*.

To *remove* Fills the normal way, click on , then choose **Remove Fill**. In remove fill mode, if you click in a filled region, the fill will be removed.

You can fill or remove as many regions as you like with a series of mouse clicks. There is no need to go back to the toolbar each time.

You will notice that the coordinate grid if visible disappears, while the Fill tool is active. This is because the dots that make up the grid would cause problems for the fill algorithm. Text, Messages, Bars, Plots, and Layout Objects also disappear while the Fill tool is active. If your layout contains filled regions, elements of these four types are always drawn after the regions are filled. In other words, the only allowable boundaries for filled regions are Lines and Arcs, so only the Lines and Arcs are shown while you use the Fill tool. Backdrop-colored Lines and Arcs, which will not be visible in Run Mode but which appear *blue* in Draw Mode, are also suppressed while the Fill is in progress.

When the Fill tool is deactivated, the normal Draw Mode appearance is re-established.

How Fills are Drawn

Fills are an exception to a rule that otherwise applies almost universally to Proof's operation. In almost all manipulations of layout elements, purely geometric descriptions are used. For example, Line coordinates are stored as (X,Y) values, and only when a Line is actually drawn are these values converted to (I,J) integer screen coordinates. When a Fill is drawn, Proof converts the location of the Fill's "seed" point into an (I,J) screen coordinate. Proof samples the color of this point. If the color differs from the Fill's color, Proof fans out in all directions from the seed point, changing the color of all pixels that match the original color of the seed point. The fanning-out in any given direction is terminated when a pixel whose color differs from that of the original seed pixel is encountered, i.e., when a bounding Line or Arc is reached, or when a screen border is reached.

Using Fills Safely

Three problems arise frequently in the use of Fills.



First, if the Lines or Arcs you think form a bounded region contain "holes," a Fill will leak out into a broader region than you intended. Holes that are not apparent at a given magnification may become apparent when you zoom in, increasing magnification. This problem is not uncommon when CAD files are imported into Proof, depending on the techniques used by the person who drew the CAD layout.

Second, if a seed point is drawn very close to a bounding Line or Arc, and the layout is drawn at low magnification (zoomed out), the seed point's location, when rounded to the nearest pixel, may overlap a Line or Arc, causing the Fill operation to "follow" the pixels comprising the Line or Arc as the fanning out process occurs during Fill drawing. To reduce the likelihood of this happening, always place Fill seed points "out in the open," i.e., as far away from all bound Lines and Arcs as possible.


Third, for a Fill to be drawn, its seed point must be on-screen. Consider a layout that shows a map of the world, with blue-filled oceans. If a single seed point is used to fill contiguous bodies of water, and the seed point is off-screen, the oceans will not be filled with blue color as intended. The solution to this problem is to use multiple seed points. To view where the seed points are, click on the **Blink Seed Pixels** button.

Common Editing Tools

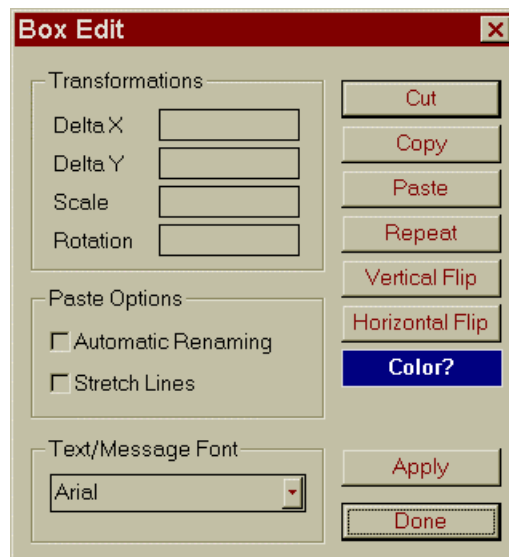
In the sections that follow, we'll discuss the following common editing tools found on the Draw Mode Toolbar:

-  Perform “Box Edit” operations (capture and edit a collection of elements)
-  Initiate trimming of unwanted portions of lines and arcs (very convenient)

Box Edit

 **Box Edit** is a powerful tool for manipulating groups of elements. To use Box Edit, you capture a collection of layout elements by drawing a box around them. The captured elements can then be manipulated using a variety of tools. Box Edit can be used to move geometry to and from Draw and Class Modes, and even across files (by changing layout files without exiting Proof). Thus, Box Edit enables you to maintain a library of shapes in a separate file, if you so desire.

When you click on  , the **Box Edit** dialog box will appear:



To establish the box, position the cursor above and to the left of the elements then click *and hold down* the mouse button. Move the mouse across the elements you want to enclose and release the mouse button to establish the opposite (lower right) corner. (You can actually start at any corner and move the mouse to the opposite corner of the desired box.)

The elements captured in the box will flash when you release the mouse button. In order to be selected, a Line, Arc, Bar, or Plot must be entirely enclosed within the box boundaries. (A special-case exception to this rule occurs when you use the Stretch **Lines** option, described below.) For Text and Messages, only the text marker must be in the box in order for the entire Text or Message to be included. Similarly, for a layout Object (Chapter 14) only the hot point is considered, and for a fill point the point itself must be in the box.

If your box fails to capture the intended layout elements, start over by redrawing the box. As long as Box Edit is active, you can establish a new box at any time. A common error is to *click* on the screen. This causes creation of a very small or null box. (The box's upper left and lower right corners are near one another or at the same point.) When this happens, you'll get a "no elements selected" message.

Once you have established a box around one or more elements, you have several options. We'll examine these options one at a time in the next section.

As with any layout modification, changes you make using Box Edit are part of the layout in memory but will not be saved permanently until you choose **Save Layout** from the **File** menu.

Using Box Edit

Cut

Click the Cut button to remove the boxed elements from the layout. The boxed elements most recently cut or copied are saved internally for subsequent pasting.

Copy

The **Copy** button works exactly like Cut except that the original elements are not deleted.

Paste

When you click on the **Paste** button, a second box will be drawn atop the box you drew to capture layout elements. As you move the mouse, the second box will follow the mouse cursor. The use of two boxes makes it easy to see the relative positions of the old layout elements and where their copies will be placed as a result of the paste operation. When you are satisfied with the position of the new box, click the mouse. To abort a paste operation, close the Box Edit dialog box, or press the <Esc> key. Proof will perform a zoom-to-fit automatically if the elements you paste extend off-screen.

Repeated Pasting

Occasionally, you may want to repeat a paste operation several times. For example, if you've drawn a machine, you may want to create a row of several equally spaced machines. When you perform a paste operation, Proof keeps track of the offset between the pasted box's location and the original box's location. For example, you might paste a second machine 10 feet (in your system's coordinate system) to the right of a first machine. To paste a third copy 10 feet to the right of the second machine, simply click the **Repeat** button. You can repeat this process as many times as necessary.

Note that if Rotation and/or Scaling (covered below) are used, these transformations are also applied when **Repeat** is clicked. For example, it's possible to create a star by pasting a Line four times with an appropriate (X,Y) offset and a 72-degree rotation. (5 times $72 = 360$.)

Automatic Renaming – To Paste Layout Elements That Have Names

A number of layout elements we haven't yet covered have *names*. (Messages, Bars, and Plots are covered in Chapter 13; and Layout Objects are covered in Chapter 14.) If you paste an element that has a name, a new name must be used for the pasted copy. (You can't have two layout elements of the same type with the same name.) There are two ways to create a new name for a pasted element. The easiest way is to check the dialog box's **Automatic Renaming** option. When this option is enabled, Proof will add or modify digits at the end of the name of each named layout element to be pasted. If the name ends in a letter, then the digit 1 will be added to the end of the name in the second copy. If the name already ends in a number, then the number will be incremented by 1 (or more, if necessary, to avoid a conflict with an existing name for the same type of element).

If the Automatic Renaming option is disabled (the default), you will be prompted for a new name for each named element that is being copied a second or subsequent time.

Note that Paths, although they are named, are not considered layout elements. When you make a second copy of a boxed selection whose elements are used in Path definitions, no Path definitions are copied. Only the *elements* are copied.

Stretching Lines During Pasting Operations

If the **Stretch Lines** option is enabled, two special exceptions are made to the usual operation of Box Edit. First, a Line can be captured even though only one of its endpoints falls within the editing box. Normally *both* endpoints must fall within the editing box to qualify for capture. Second, when the editing box is moved, rotated, re-scaled, for any Lines that have only a single endpoint in the editing box, the position of the endpoint outside the editing box remains unchanged, and the line is stretched, as necessary, between the fixed endpoint (outside the box) and the relocated endpoint (inside the box).

Geometric Transformations

The **Delta X**, **Delta Y**, **Scale**, and **Rotation** controls of the Box Edit dialog box show how far you have moved, re-scaled, or rotated a boxed group of elements.

Scale and **Rotation** values must be typed into their respective controls in the Box Edit dialog box.

Delta X and **Delta Y** values are relative to the original position of the box. They can be typed into their respective controls in the Box Edit dialog box, or they can be updated automatically as you drag the editing box or paste box.

When you start a box-editing “session,” Grid-dependent default values are chosen for Delta X and Delta Y, the Scale is 1.0, and **Rotation** is set to zero. These transformations are described in more detail below.

Delta X, Delta Y

Delta X and **Delta Y** are the most commonly used Box Edit controls. They display, and can be used to reposition, an editing box’s contents or to position a paste box’s contents.

Scale

You can rescale any boxed group of elements by entering a new scale value directly into the **Scale** dialog box control. Be careful if you use a scale other than 1.0 in conjunction with multiple pastes. It is best to rescale the “original” boxed elements before you cut or copy them.

Rotation

You can rotate any boxed group of elements by entering a new value directly into the **Rotation** dialog box control. Be careful of the effects of using a nonzero rotation in conjunction with repeated pastes. In some cases these will be desired effects, such as in positioning shapes along a circle or other curve.

The center of rotation is the center of the box. Because of this, you may need to set up the Box Edit box very carefully in order to achieve rotational multiple-paste effects.

Vertical Flip, Horizontal Flip

These buttons flip the boxed elements left-to-right, or top-to-bottom. The newly flipped state is used for all subsequent Pastes. These operations are infrequently used, but may be useful in some circumstances. For example, you could use horizontal flipping to create right- and left-handed versions of a machine.

Color

You may want to change the color of all the boxed elements. This can be very useful if, for example, you have drawn a complicated path in a foreground color and later decide that you should have drawn it in a layout color.

To change the color of the boxed elements, click the **Color?** button and select a color from the color palette that appears.

Font


You may want to change the font of all the boxed Text or Message layout elements. To do so, simply select a font from the Box Edit dialog box's **Font** control.

Exercise 10-1: Copying and Pasting with Box Edit

In this exercise you will create a layout file that contains 10 evenly spaced machines. You will name the file `boxedit.lay`.

Open a new layout file by starting Proof and choosing **File, New**. Select **Draw** from the **Mode** menu.

Using the Draw tools, draw a machine. You may draw the machine to your specifications, but keep it simple (just a few rectangles will suffice).

Once you have completed your machine, click on  **Box Edit**.


Next, position the “+” cursor above and to the left of the machine; press *and hold down* the left mouse button to establish the top left corner of an editing box, drag the lower right corner of the editing box so the entire machine is captured, and release the mouse button. You should see the entire machine flash, indicating which elements have been captured and will be affected by subsequent Box Edit operations.

If you didn’t get the entire machine enclosed in the box, simply redraw the editing box.

Click the **Copy** button, the **Paste** button, and move the mouse to a location to the right of the original editing box. The paste box will track your mouse movement. Finally, click the mouse, and a copy of your machine will be pasted into the layout at the new location.


You can still fine-tune the position of the pasted elements. By clicking and holding the mouse button near the center of the box containing the copy, drag the copy to another nearby location.

Next click the **Repeat** button eight times. You will now have ten equally spaced machines.

You can save your file by using the **Save Layout** option under the **File** menu or by clicking the  **Save** button. Proof will prompt you for a file name, and you can type `boxedit.lay`, then click **OK**.

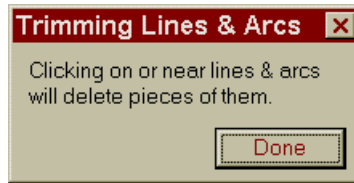
Now repeat the exercise using different Rotation and Scale values before you paste.

Trimming Lines and Arcs


You can use the  **Trim** tool to remove unwanted sections of Lines or Arcs. The section to be trimmed might be at the end or in the middle of the Line or Arc. For example, you may want to trim the part of a Line that extends beyond an intersection with another Line. Or, you may want to trim to the intersection of two Arcs, or to the tangent point or intersection of a Line and an Arc. You might want to remove detail from the inside of an enclosed area.

When you use the Trim tool, the nearest Line or Arc is trimmed in both directions to the nearest intersection with a Line or Arc. If there is no intersection in one of the directions, the end of the Line or Arc is snipped off. If there is no intersection in either direction, the entire Line or Arc vanishes.

When you click on , **Trim** dialog box will appear:



The presence of this dialog box will remind you that trimming is underway. Sooner or later, you'll forget that you're trimming and click on a layout element that you want to edit. You'll be surprised when all or part of the layout element disappears. This is why we have Undo.

To perform a Trim, click on or near the part of a Line or Arc you want to trim. Proof immediately trims the Line or Arc. If you are not happy with the result, click  **Undo** and try again. This time be more precise when you click the Line or Arc you want to trim.

Trimming is very useful in drawing some types of layouts. Often it is more convenient to “rough in” several intersecting Lines and then trim back to the point of intersection. Consider the AGV guideway “T” intersection in Figure 10-3. It's a simple matter to draw two intersecting Lines, add two Fillets, and trim the horizontal Line. This intersection would be very difficult to draw without the Fillet and Trim tools.

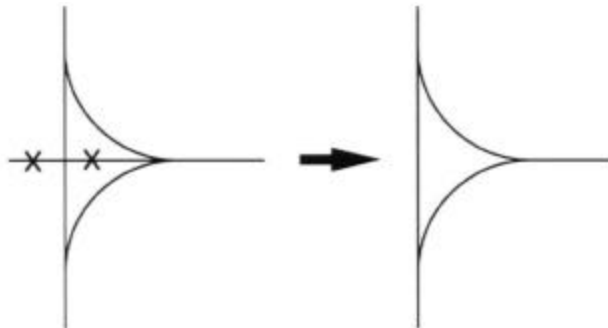


Figure 10-3. Trimming Lines from an AGV guideway intersection

Exercise 10-2: Trimming Lines and Arcs

Click on **File**, **Open Layout**, and select `trimtest.lay` from the **exercise** folder. Eliminate all “loose ends” by entering Draw Mode, and using the Trim tool. When you have finished, **do not save** the layout. We will need the original layout for a subsequent exercise.

Exercise 10-3: Drawing a Complete Layout

Try out your drawing skills by drawing the sample layout in Figure 10-4, below. The numbers are for your reference only in determining the appropriate scale and location; they don’t need to be part of the drawing. You will need to use some form of panning and zooming to get to the correct scale and location. Use the layout color for the Lines and Arcs, and use some other color for the centered text. All the Arcs have a radius of 4. (Notice how the Snap-to-Grid feature makes lining things up a “snap.”)

Save your layout as `guide.lay`.

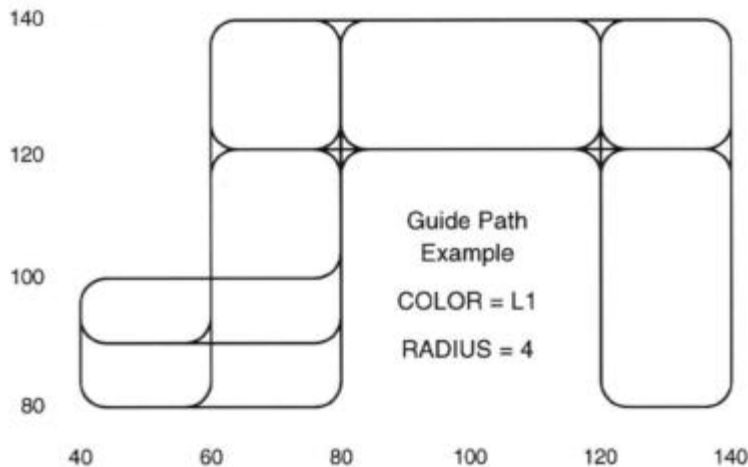


Figure 10-4. Sample layout for Exercise 10-4

If you save this layout and exit Proof (before or after you have finished drawing it), then re-start Proof and re-open `guide.lay`, the screen will appear blank. This is because the default Home view does not encompass any part of this drawing. If this happens to you, try clicking **View**, **Zoom-to-Fit**, and then fine-tune the view as desired. When you are ready to exit again, before saving the layout, choose **View**, **Save Current View As**, and then select **(Home)** from the list of views. Then **Save** the layout and **Exit**.