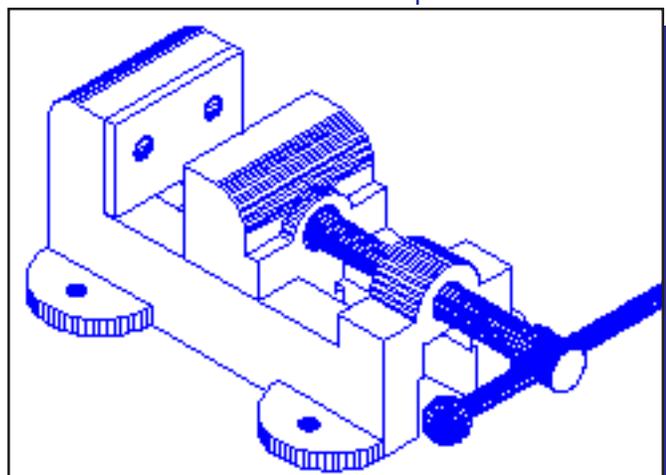
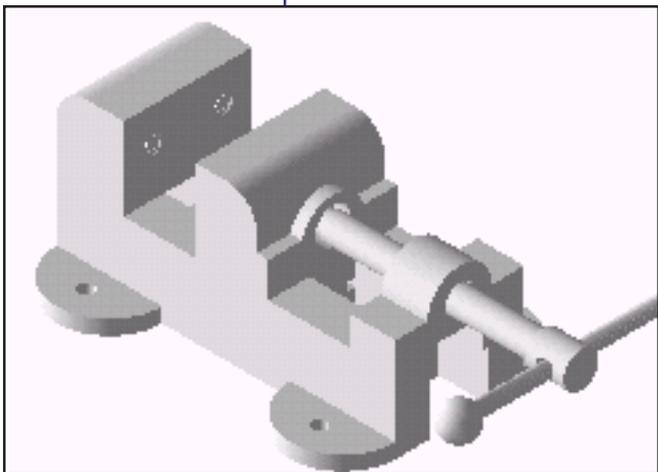


QuickSilver

An Introduction
to Using
SilverScreen



Solid Modeler

SilverScreen™

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Installation

System Setup

Make sure that your hardware meets SilverScreen requirements:

- Intel® compatible computer with at least a Pentium CPU
- Any supported Windows video monitor and card
- Windows-compatible mouse
- Minimum of 32 Mb RAM required
- Hard disk drive

The hard disk requires a minimum of 15 megabytes of available space to complete the SilverScreen installation if all samples are included. The installation procedure checks drive space before beginning the installation.

- Microsoft® Windows® 3.51 or greater

Installing SilverScreen

To begin the installation procedure, start your system and load Windows.

Before continuing with the installation, it is strongly recommended that you exit all Windows programs.

Choose **RUN** from the Windows *Start* menu. Click on **BROWSE** and locate the *Silver.exe* file you downloaded from the web site. Highlight the *Silver.exe* file and choose **OPEN**. If you selected the correct file, select **OK**.

The installation procedure prompts you through each step in the process.

The installation provides three setup options for installing the software: typical, compact, and custom.

The **TYPICAL** setup installs all the program files along with additional files. The additional items are a series of optional files that illustrate the various features of SilverScreen. The *SilverC* files are optional programs that can be executed from within SilverScreen. Any of the optional files can be loaded at a later time using the installation program.

The **COMPACT** setup installs only those program files needed to run SilverScreen.

The **CUSTOM** setup allows you to determine those files that you want to install.

Note that this document does use some of the example files provided. Electing not to load the files saves disk space. Example files are not required to run SilverScreen.

The SilverScreen installation procedure requests a primary drive and folder for installation of the software. The default drive designation (C:) and folder (\Program Files\SilverScreen) can be changed to any valid drive and folder. If the folder does not exist, it is automatically created during the installation.

Destination folder

C:\Program Files\SilverScreen

After designating the main SilverScreen drive and directory, the installation procedure automatically creates a series of sub-folder under the destination folder. If you elected to use the default drive and folder, the sub-folders created would be:

Folder for drawing files	C:\Program Files\SilverScreen\drw
Folder for executable files	C:\Program Files\SilverScreen\ex
Folder for library files	C:\Program Files\SilverScreen\lib

After the installation is completed, you are provided an option to automatically create a shortcut to SilverScreen.

Starting SilverScreen

Once SilverScreen is properly installed, the shortcut to SilverScreen is displayed. SilverScreen is started by double-clicking the icon. If you elected not to create a shortcut, SilverScreen can be executed from the *Start* menu.

Quitting SilverScreen

You can exit SilverScreen by selecting the **File Exit** command or by pressing the **F10** key. A prompt displays if any modified drawings are present.

Save modified drawing [drawing] before exiting?

Selecting YES provides an opportunity to save the drawing. Selecting NO discards any changes and exits SilverScreen.

Editing the System Startup

SilverScreen's install program writes installation information to a file named *Silver.env*. This file, called the *standard startup environment* file, can be altered from within SilverScreen. In addition to the standard environment, SilverScreen allows users to create and use multiple *private environment* files. Since the standard environment file can be altered and additional private environments can be created, it is suggested that you keep the initial standard environment unchanged as a reference for the initial system defaults.

Once SilverScreen is loaded, you can create a private environment file by selecting the following:

1. Select **Tools** from the SilverScreen menu bar.
2. Select **Environment** from the tools menu.
3. Select **New private** (use the EDIT option to edit existing files). At the prompt, enter a name for the private file (up to eight characters beginning with a letter) followed by selecting OK.



4. Make desired changes to the file, i.e. pen, cursor, snap, etc. Note that the default contents of the file are based on the standard environment file.
5. Select **OK** or press **F10** to save the changes and create the file. If you do not want to save the changes, select **CANCEL** or press the **ESC** key.
6. Next, SilverScreen prompts you to determine if you want the changes to take effect immediately.

Modify current environment?

Most items can be modified without exiting the software. Selecting **YES** creates the file and applies many of the changes to the existing environment (not the existing environment file). Selecting **NO** creates the environment file but does not change the current environment.

Loading a Private Environment

To load a private environment, you need to create a shortcut to SilverScreen that loads with the private environment. To create the shortcut, exit SilverScreen by selecting **Files Exit** or **F10** from the menu bar to exit SilverScreen. To create a new shortcut, complete the following:

1. From the Windows desktop, press the right mouse button and select **New** and then **Shortcut**.
2. Select **BROWSE** and locate the main SilverScreen executable file (`engine.exe`) in the `\Silver` (or installed) directory. Select **NEXT** and name the shortcut to identify the private environment. If you plan to have more than one private environment, give each shortcut a unique name. After selecting **OK**, the shortcut should appear on the desktop.
3. Highlight the newly created shortcut and press the right mouse button and choose **PROPERTIES**. Pick the shortcut tab.
4. In the "target" parameter, add the name of the private environment file after `silver.exe`.

Drive:\path\silver.exe <private environment file name>

A typical entry would appear similar to the following:

c:\program files\silver\silver.exe myenv

The file extension does not need to be entered (i.e. `myenv.env`). Select **OK** to accept the changes made in the properties of the shortcut. Double-clicking the modified shortcut starts SilverScreen with the newly attached startup environment file.

Document Conventions

Document Conventions

QuickSilver uses different type styles to delineate information that is displayed and entered when using SilverScreen from that used to explain the function. For example, commands and prompts displayed when SilverScreen is completing the command to draw a polygon appear as follows:

Draw

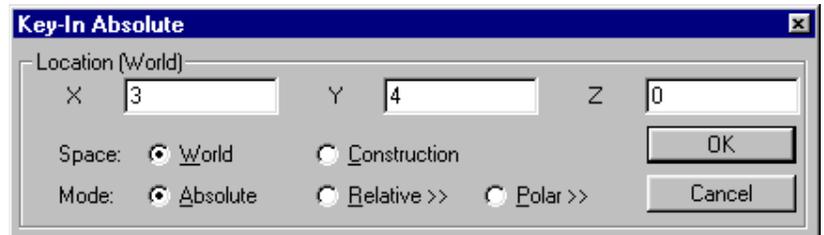
Polygon

Rectangle

Mark corner of rectangle: = (to enter coordinates)



Mark second corner of rectangle: =



The above example depicts how the command is completed using SilverScreen. In this example, the command is completed by selecting **Draw Polygon Rectangle**. This is done by moving the highlighter to the respective option on the menu bar. You can also select the command by pressing and holding the **ALT** key and then the underlined letter; in this case, the letters **D**, **P**, and **R**. The proper letter is emphasized using an underline.

Prompting is indicated with a ":" (colon). For example:

Mark center of circle:

Generally, pressing the **RIGHT** mouse button displays a list of options available to respond to the prompt. In addition, you can press the "=" (equal sign) to display the key-in dialog that allows you to type coordinate positions rather than indicating the position with the mouse. In the earlier examples, pressing the "=" (equal sign) when prompted to mark a position displays the dialog box for entering the position. That and other options are displayed using the **RIGHT** mouse button when prompted for an entry.

Drawing Structure

SilverScreen drawings contain several components that comprise the drawing structure. The following is a brief overview of the components:

Primitive - Primitives (lines, arcs, circles, polygons, etc.) are the basic geometric shapes that comprise the foundation of the drawing structure. A primitive is the most basic element that can be acted upon (moved, scaled, erased, etc.) using system commands. Some commands work only with primitives.

Object - Each drawing primitive is assigned to a named drawing OBJECT entity. All drawn primitives are placed in the current object, which is displayed in the CONTEXT TOOLBAR described later in this section. Many operations automatically create new objects. For example, copying an object automatically creates a new object.



If the object encloses a complete volume of space, it is referred to as a **Solid**. Many of SilverScreen's advanced modeling features can only be performed on valid solids.



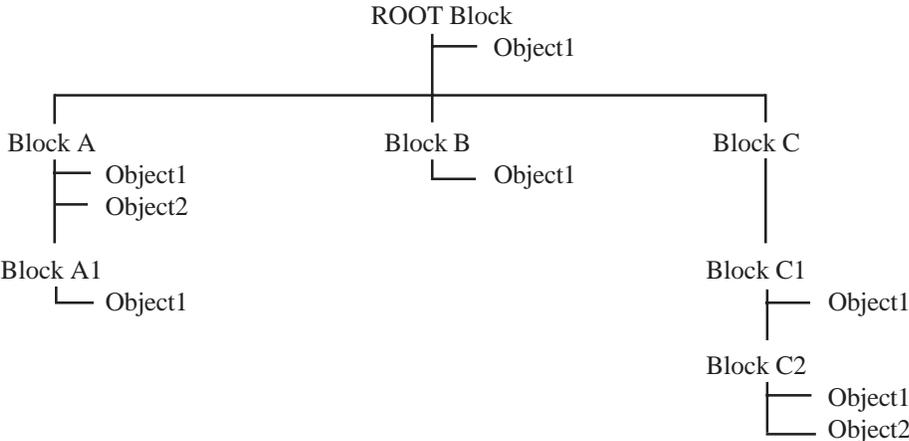
Block - Just as primitives are placed within objects, objects are placed within a BLOCK entity. Blocks are the next level of SilverScreen's hierarchical drawing structure. Blocks can contain several objects or other blocks, thus allowing you to nest blocks within blocks. This permits far more extensive control over the drawing structure.



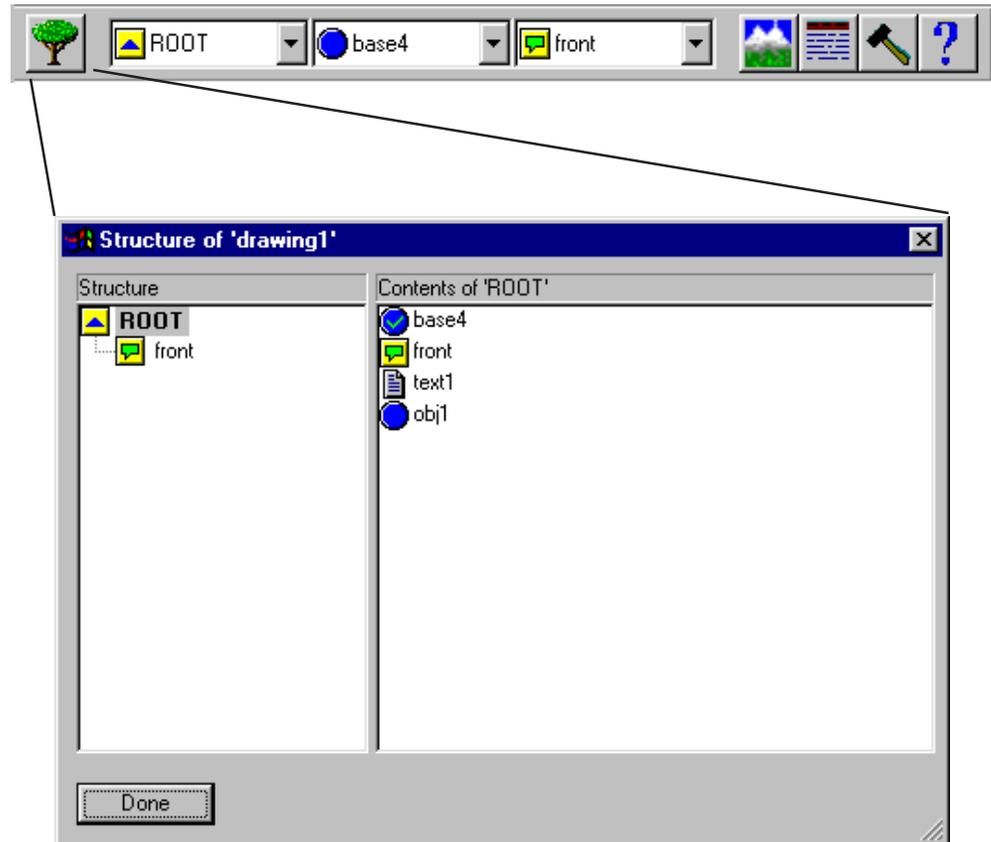
There is one unique block, called the ROOT block. The ROOT block forms the first major level of the structure. Other blocks are then organized relative to the ROOT block. Blocks can reside within the ROOT block or they can reside within other blocks.



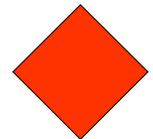
The following example illustrates the structure.



Objects and blocks reside within the ROOT block or other blocks. A drawing's structure can be displayed using the **Structure Tree** command or selecting the tree icon from the CONTEXT TOOLBAR.



Symbol - Previously drawn items can be stored as MODELS in special disk libraries called model libraries. These symbols can then be inserted into any drawing using the **Structure Model Insert** command. A model can be inserted into a drawing as either an OBJECT or as a SYMBOL. Symbols remain "linked" to the original model in the library, therefore, any change to the MODEL is automatically reflected in a change to the symbol. If the model was inserted as a symbol, it is updated, if it is inserted as an object, it is not affected by a change in the model. A symbol can also be inserted into the drawing as a BLOCK.



Detail - Dimensions and other detailing features (i.e. center marks) are identified in the drawing structure as details. Details are created using options in the **Annotate** menu.

Text Lines - Individual lines of text are identified in the drawing structure as text lines. Text lines are created using options in the **Annotate Insert Text** menu.

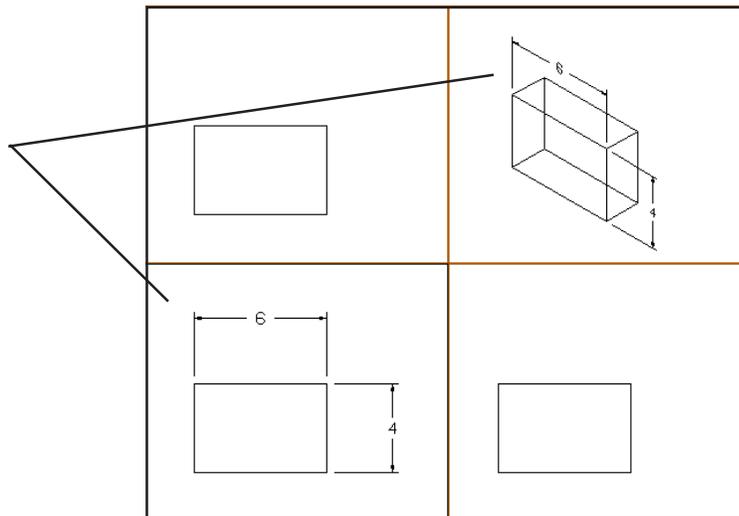


Annotation Block - The drawing structure contains a special class of blocks called an ANNOTATION BLOCK. Annotation blocks are normally used to place dimensions, notes, and other details that are part of the drawing's annotation. Annotation blocks are unique because they are view independent in each window. In other words, you can control which annotation block is displayed in a particular window. For example, you normally would elect to display the "front" annotation block containing the front face view dimensions in the front window. It would not make sense to display these dimensions in the right face view window though you may want to display them in the isometric view window.



Annotation blocks, when the visibility is enabled, are displayed during hidden-line removal (**Render Hidden line removal** command).

"Front" annotation block visible in the front face and isometric views.

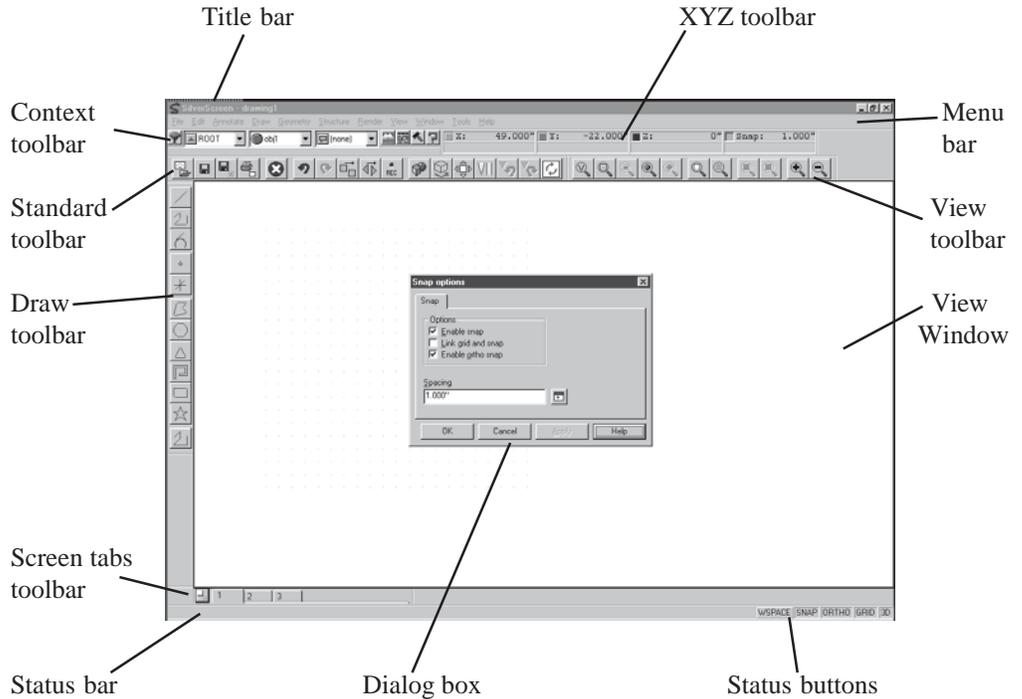


Entities - Objects, symbols, text lines, and blocks are collectively referred to as entities.

Working With SilverScreen

Working With SilverScreen

When you first load SilverScreen, the display is divided into several major areas. The following illustration shows the major areas of the interface:

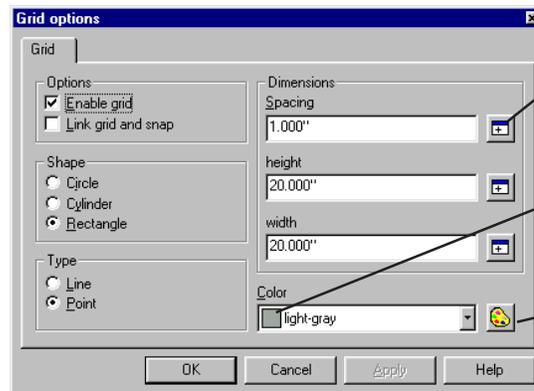


Menu Bar

The menu bar provides options for completing SilverScreen commands. Items are selected by either using the pointing device to highlight the option or pressing and holding the ALT key while pressing the underlined letter indicated for each option.

Dialog Box

Dialog boxes display information and allow input during the completion of many commands. The dialog boxes provide several key methods of input.



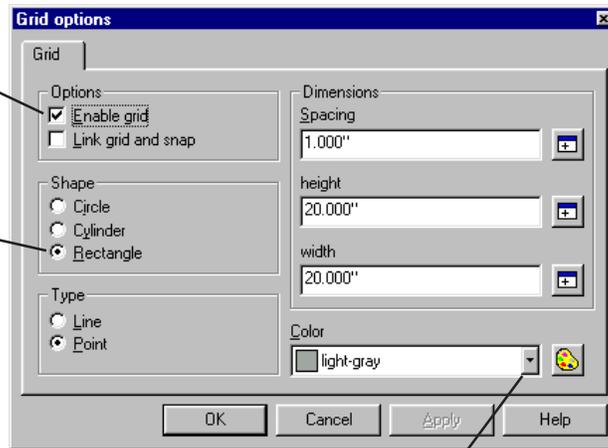
Clicking the cursor button allows you mark two points in the view window to establish a distance.

Clicking the color button allows you to select the color by name.

Clicking the color palette displays available colors.

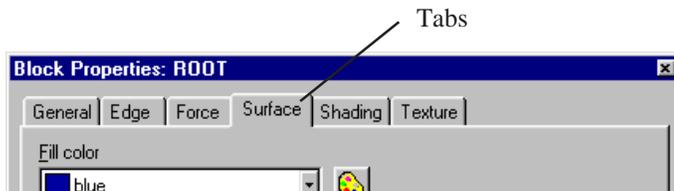
The check indicates the function is enabled.

Buttons allow you to select only one of the options.



Pull-down displays a list of options.

In some cases, the dialog information exceeds that which can fit in a single box. In those cases, a tab dialog box is displayed. Clicking a tab displays the information associated with the tab.



Status Bar

This area provides information relative to the completion of a command. Initially, the status bar displays a single-line help for the currently highlighted menu option. Once a command is selected, this area displays prompting and options available during the completion of the command. For example, if the highlighter was located on Radius when beginning the command Draw Circle Radius, the status area would display:

Draw circle based on center and radius

Once the command was selected, the prompt would change to indicate required actions and display of options available for this command.

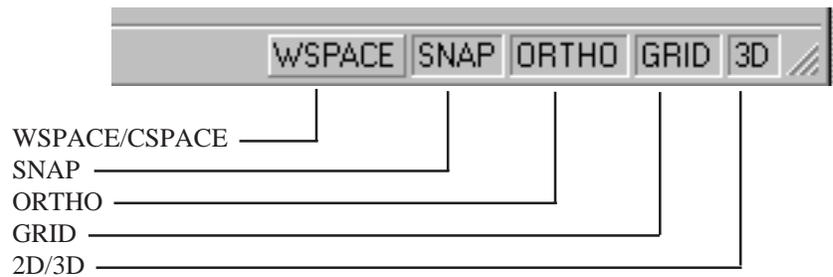
LEFT: Mark center of circle RIGHT: Options Ctrl-RIGHT: Change view

The prompt indicates the center of the circle is entered by pressing the LEFT mouse button. Additional options for specifying the circle center are available by pressing the RIGHT mouse button. These options include keyboard entry of position, and locating the cursor by jumping to a position relative to existing geometry.

The Ctrl-RIGHT option indicates that pressing and holding the control key when pressing the RIGHT mouse button allows you to change your view during the execution of the current command. Options include changing view, (front, right, isometric, etc.), modifying position (swing, truck), zooming, and isolating geometry.

Status Buttons

The STATUS BUTTONS are used to enable several SilverScreen drawing aids.



WSPACE/CSPACE

This toggles between world space (WSPACE) and construction space (CSPACE). The world space is a set of fixed axes (x, y, and z) about which the drawing is stored. The construction space is a set of axes that can be placed at any orientation or position allowing geometry to be easily placed in other than the standard views. The world and construction spaces are described later in this section.

SNAP

Clicking with the left button toggles snap on and off. SilverScreen maintains very precise coordinate position data; therefore it is very sensitive to movements of the display cursor. The primary purpose of cursor snap is to force the cursor to move at prescribed intervals. When snap is enabled, the cursor is forced to locate itself at specific preset incremental distances defined by the snap spacing. For example, if the snap spacing is set to .5 units, the cursor moves at incremental steps of .5 (.5, 1, 1.5, 2, 2.5, etc.). The snap spacing is changed using the **Draw Tools Snap** command. The spacing is set in the current unit of measurement.

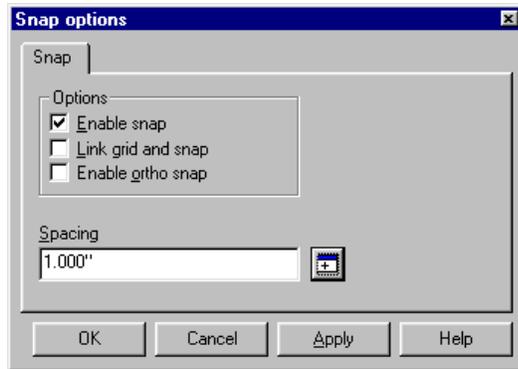
The current snap spacing is displayed in the XYZ TOOLBAR next to the word "snap." When snap is enabled, the button next to "snap" is in the down position. You can also enable and disable the snap using the button on the XYZ TOOLBAR.



Snap spacing

The current unit precision (**Edit Settings**) does influence the status area display. For example, if precision is set to 2 places, a snap interval of three places is rounded to the 2 places displayed; therefore a snap interval of .125 is displayed as .13. Even though the value displayed is rounded, the actual spacing remains set to the actual value entered.

There are several options for quickly adjusting the snap spacing interval in addition to the command. The first option is place the cursor in the snap area of the XYZ TOOLBAR and press the right mouse button. This displays the snap options dialog box. The second option is to place the cursor on the SNAP status button and press the right mouse button. This also displays the snap options dialog box.



The *Link snap with grid* option makes the snap spacing equal to the grid spacing.

ORTHO

The ORTHO status button is used to toggle the ortho snap mode on and off. When enabled, ortho snap assures that all lines drawn are orthogonal to the current space. Lines drawn with the ortho snap enabled are forced parallel to one of the primary axes (x, y, z). For example, if the construction space has not been rotated and you are viewing one of the face views of the drawing, enabling ortho snap results in lines that are only horizontal or vertical but not diagonal. The ortho snap mode is valuable if you want to maintain lines that are parallel or perpendicular to the drawing axes.

Points are entered in a normal manner. The resulting lines are drawn along one of the primary axes. The position of the second point relative to the first point determines the direction of a line. If drawing in a face view, all lines appear horizontal, vertical, or perpendicular to the face view.

The examples below illustrate entering the endpoints of a line on a construction space that is aligned to the view. In the first example ORTHO SNAP is disabled and in the second it is enabled.



Ortho Snap Disabled



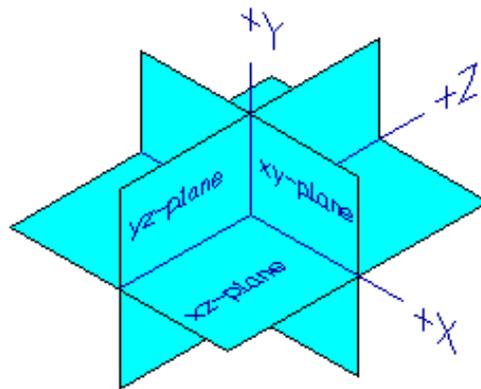
Ortho Snap Enabled

Placing the cursor on the ORTHO status button and pressing the right mouse button displays the snap options dialog box.

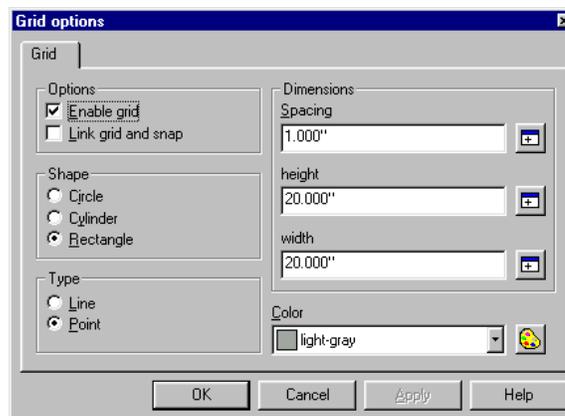
GRID

This button enables and disables the display of the grid. SilverScreen allows you to display a grid similar to those found on grid or lined paper. The grids displayed in the view window assist in maintaining proper orientation and in determining relative distance. SilverScreen provides complete control of the type, size, and position of the grid.

The grid is displayed on the xy-plane of SilverScreen's current construction space. The construction space is a movable set of axes upon which most of the drawing geometry is created. Moving the construction space automatically moves the grid. The construction space and the grid are moved in several ways. Initially, the world space and construction space are aligned.



Placing the cursor on the GRID status button and pressing the right mouse button displays the grid options dialog box.



The grid is set to a specific height and width in the current unit of measure. In addition, the default color for displaying the grid is specified. The spacing, size, and color of the grid is a matter of preference and relative to the scale of the drawing being completed. Although you can chose any size and spacing, specifying a large grid with very small spacing intervals slows refresh of the display when the grid is enabled.

Although the grid is a set height and width, cursor movement and the drawing area extend beyond the extents of the grid.

2D/3D

Cursor movement can be made to function on a 2D plane or within the 3D volume. The 2D/3D status button toggles between 2D and 3D. If 2D is selected, cursor movement is restricted to the xy-plane of the current space. If set to 3D, the cursor can be located at any position in 3D space.

SilverScreen allows the cursor to be moved on all three axes.

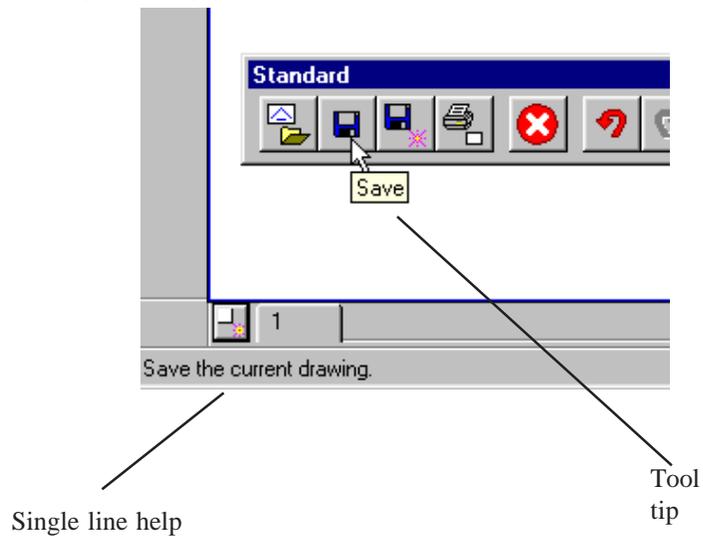
Horizontal and vertical movements can be done using the mouse or the keyboard arrow keys. Movement along the depth axes is done by holding the shift key while moving the mouse or by using the keyboard “+” and “-” keys. Movement along the depth axes does not function when the 2D/3D status button is set to 2D.

If the 2D/3D status button is set to 3D, the cursor snap functions on all three axes of the current space. If the 2D/3D status button is set to 2D, the jump options only locate positions on geometry that reside on the xy-plane of the current space. For example, if the drawing contains a circle and the current space is positioned such that the circle is not on its xy-plane, a JUMP CENTER will not locate the center if 2D is current. To locate the center of the circle, the C-space needs to be aligned to the circle or the 2D/3D status button must be set to 3D.

Toolbars

SilverScreen has several specialized toolbars designed for a variety of functions. Toolbars can be individually displayed or hidden. They can also be moved to any location or "docked" in to a particular position. Tools can be added or removed from existing toolbars. You can also create totally new custom toolbars.

The command associated with each tool is displayed with a tool tip and in the single line help when the mouse pointer is placed over the tool.

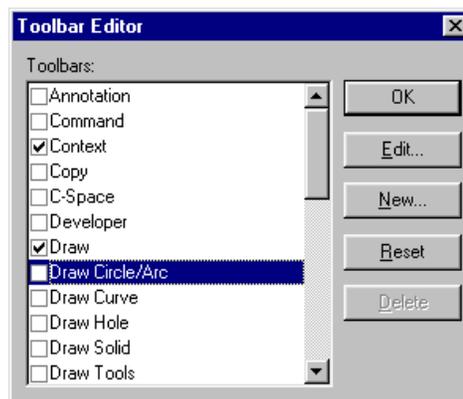


The display of toolbars is controlled by the toolbar editor dialog. This dialog is displayed in one of several ways. You can select the **Tool Toolbars** command. You can also select the toolbars tool.

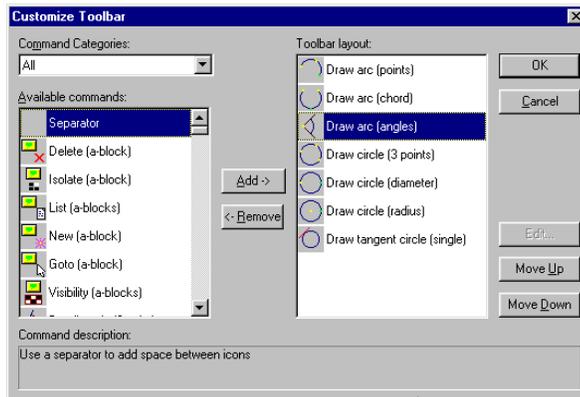


Placing the cursor over any of the displayed toolbars and clicking the right mouse button also displays the toolbar editor dialog.

Tools can be added and removed from any existing toolbar. To modify a toolbar, select the **Tool Toolbars** command and highlight the toolbar you want to modify.



Select the **Edit** button to display the customize toolbar dialog.

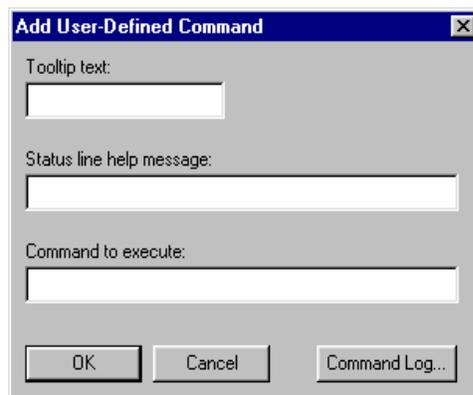


The **COMMAND CATEGORIES** determines which available tools are displayed. The currently highlighted tool in the available commands section can be added to the current toolbar layout by selecting **ADD**. The currently highlighted tool in the toolbar layout section can be removed by selecting **REMOVE**.

You can also use the **MOVE UP** and **MOVE DOWN** buttons to change the position of the tool on the toolbar.

The **USER DEFINED** command category allows you to define the function assigned to a tool. A number of undefined tools are available. To assign a function to a tool, double click the unassigned tool. Note that double clicking the unassigned tool adds it the the current toolbar.

The **ADD USER-DEFINED COMMAND** dialog is displayed.



The **TOOLTIP TEXT** is the tool tip to be displayed when the cursor is over the newly defined tool. The **STATUS LINE HELP MESSAGE** is the message that is displayed in the status area. The **COMMAND TO EXECUTE** is the command that is associated with the tool. Note that double clicking the unassigned tool adds it the the current toolbar.

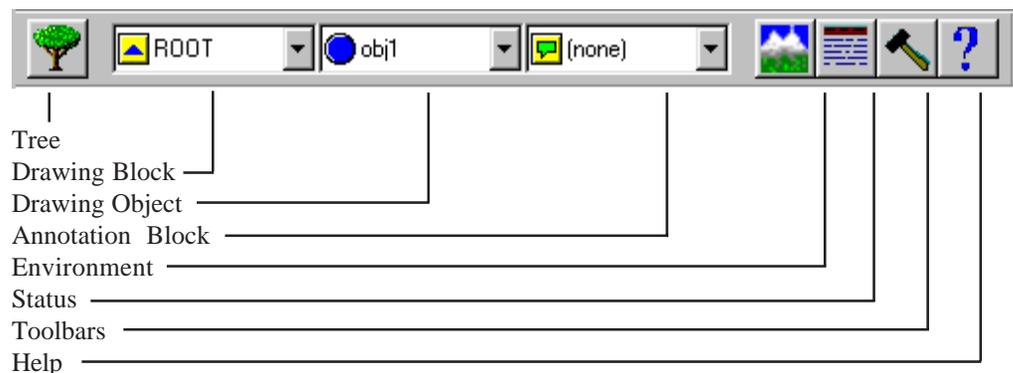
The COMMAND LOG button displays a list of commands previously executed. An easy way to assign a function to a tool is to execute the command prior to editing the tool. The command will then appear in the command log. Commands can be copied from the command log to the dialog box by highlighting the command in the command and entering CTRL C (control key + C to copy). Close the command log and return to the dialog box. Click the cursor in the COMMAND TO EXECUTE entry area and press CTRL V (control key + V to paste).

Once a command has been assigned to a tool, select OK.

Several toolbars offer special or unique functions.

CONTEXT TOOLBAR

The CONTEXT TOOLBAR is used to select, manage, and modify SilverScreen's hierarchical drawing structure.



TREE

Displays the hierarchical structure of the current drawing. SilverScreen's hierarchical drawing structure maintains primitives in a logical grouping of objects. Objects are then stored in blocks to form a hierarchy that aids in the management of a drawing. The TREE is described later in this section.

DRAWING BLOCK,

Displays the current drawing blocks. Blocks can contain other blocks, objects, symbols, text-lines, and details. The icon  is used to represent drawing blocks. The primary block is referred to as the ROOT block which is represented by the  icon. All blocks reside within the ROOT block. The pull-down menu can be used to select another current drawing block.

DRAWING OBJECT

Displays the current drawing object. The icon  is used to represent objects. If the object is a valid solid, the  icon is displayed next to the object. The pull-down menu can be used to select another current drawing object.

ANNOTATIONBLOCK

Displays the current annotation block. The  icon is used to represent annotation blocks. Since annotation blocks are view dependent, the current annotation block applies only to the currently active window. By default, SilverScreen automatically creates three annotation blocks that correspond to the three standard face views (top, front, and right). The pull-down menu can be used to select another current annotation block. You can also draw in the current annotation block by making the desired annotation block the current drawing block. This is done by using the pull-down menu in the DRAWING BLOCK to select an annotation block. This allows you to draw annotation features (center lines) that are view dependent.

ENVIRONMENT

Displays the current environment settings. The settings include the location of files, data security, measurement notation, print line width, C compiler settings, startup execution, pen, cursor, snap, grid, window, view, and multi-window linkages. Several of the items are described later.

STATUS

Displays the current settings for several SilverScreen functions. The settings include view, units of measure, pen, c-space, and window linkages. Several of the items are described later.

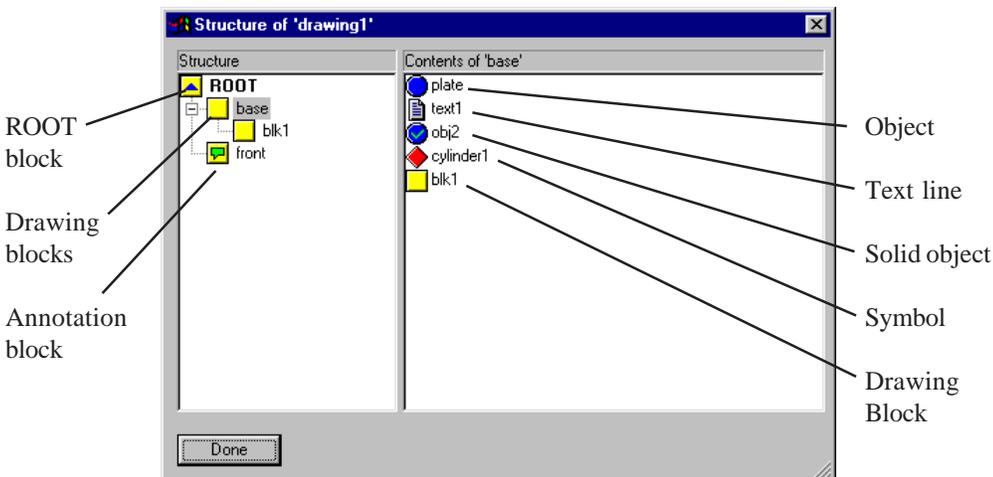
TOOLBARS

Displays the toolbar editor. The toolbar editor determines which toolbars are displayed and also allows you to customize the toolbars.

HELP

Displays the SilverScreen help topics.

The TREE is used to display the structure of the entire drawing.



Blocks are the major organizational units in SilverScreen. The primary block is called the ROOT block. There is only one ROOT block. All other blocks are located below the ROOT block. Blocks can contain other blocks. If a block is at the same level it is referred to as a "sibling." A block contained within a block is referred to as a "child." In the above example, *bracket* and *bracket2* are "siblings." They are also each a "child" of the *base* block.

All drawing primitives are stored in drawing OBJECTS. If all the primitives in an object form a valid solid, the object is considered a SOLID. All objects reside within a block. If no additional blocks have been created, all objects are stored in the ROOT block.

Drawing geometry can be stored in a model library for insertion in a drawing. The geometry can be inserted (Structure Model Insert) in the drawing as a block, object, or symbol. If inserted as a SYMBOL, the geometry maintains a link between the inserted symbol and the source model. Modifying the source model results in all inserted symbols being automatically updated.

Text lines (Annotate Insert Text) are treated as a single entity. They occupy a position in the hierarchy similar to objects and symbols.

The TREE provides several options for managing the drawing structure. Pressing the RIGHT mouse button when an entity is highlighted provides a context-sensitive list of options.



CREATE

Allows you to create a new block as a child of the current block or a new object in the current block. A dialog box displays prompting for the new name. A block in the "structure" section must be highlighted for this option to be available.

DELETE

Deletes the currently highlighted entity.

RENAME

Allows you to rename the currently highlighted entity.

ZOOM

Zooms the current window to display the currently highlighted entity.

PROPERTIES

Displays the properties for the currently highlighted entity. Depending on the entity, a dialog box displays allowing you to change properties assigned to the currently highlighted entity.

In addition to the menu options, entities can be "dragged" to a new position in the drawing. For example, an object can be moved from one block to another block by highlighting the object. While pressing and holding the left mouse button, the object can be "dragged" to a new position. In another example, an object can be made view dependent by moving it from a drawing block to an annotation block.

Naming Blocks and Objects

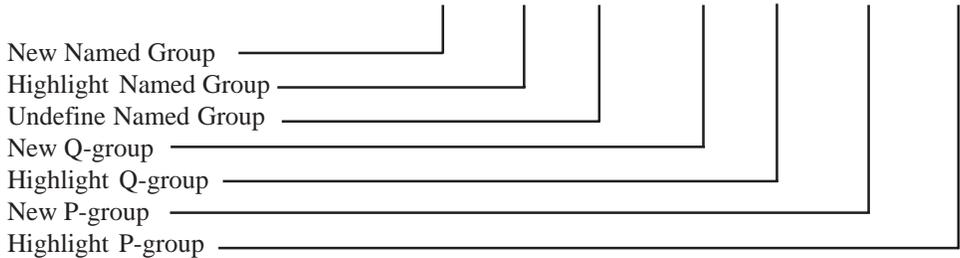
When creating new blocks or objects, names can be up to 31 characters in length. All the characters in the name must be letters, numbers, or an underscore (_). You cannot use spaces or special characters such as \$, #, /, *, !.

Correct: First_floor_bath

Incorrect: First floor/bath

GROUP TOOLBAR

This toolbar provides a quick method of creating groups of entities (blocks, objects, and symbols). Many of the SilverScreen commands allow you to operate on a single entity (i.e. object) or a group of entities.

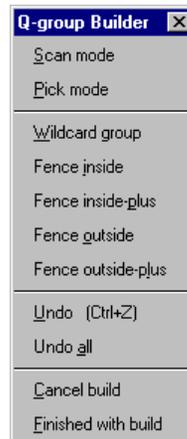


Quick groups allow the selection of multiple blocks, objects or symbols. There is only one quick group. If you want a more permanent collection of entities, you can create named groups. P-groups or primitive groups are temporary groups of primitives. There is only one primitive group.

NEW NAMED GROUP

If you select the tool, you are prompted to select the desired entity. Only entities of the type represented by the tool can be selected (i.e. you can only pick objects if object was selected). You are prompted to name the group. Each selected entity is highlighted and selected using the left mouse button.

A list of options is available in the *Q-group Builder* menu selected using the right mouse button.



The *Q-group Builder* menu is displayed anytime you select the right mouse button while one of the group toolbar tools are being used. The menu presents multiple options that can be used to select items for a group.

HIGHLIGHT NAMED GROUP

This option displays all previously named groups. The selected group is highlighted.

UNDEFINE NAMED GROUP

This option displays a list of previously named groups in the current drawing. Selecting the group and selecting OK undefines the group.

NEW Q-GROUP

If you select the tool, you are prompted to select the desired entity. Only entities of the type represented by the tool can be selected (i.e. you can only pick objects if object was selected). You are prompted to name the group. Each selected entity is highlighted and selected using the left mouse button. The *Q-group Builder* menu is available for selecting multiple entities.

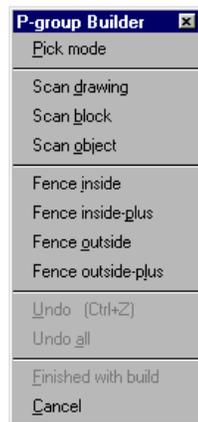
HIGHLIGHT Q-GROUP

This option highlights the previously defined Q-group.

NEWP-GROUP

If you select the tool, you are prompted to select primitives. Each primitive is selected using the left mouse button. The *P-group Builder* menu is available for selecting multiple primitives.

A list of options is available in the *P-group Builder* menu selected using the right mouse button.



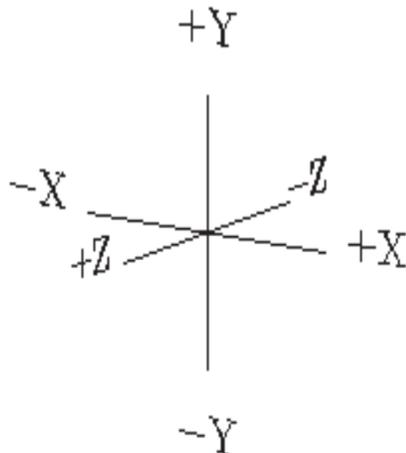
The *P-group Builder* menu is displayed anytime you select the right mouse button while selecting primitives. The menu presents multiple options that can be used to select items for a group.

HIGHLIGHT P-GROUP

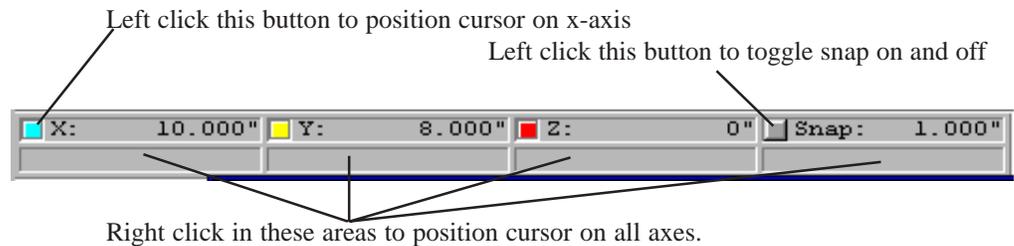
This option highlights the previously defined P-group.

XYZ TOOLBAR

The XYZ TOOLBAR displays the current cursor position. Positions within a drawing are based on a Cartesian coordinate system. The cursor's movement, as well as all positions, are specified in terms of a relation to three mutually perpendicular planes, referred to as coordinate axes.



All graphic elements that comprise a drawing are stored with respect to their x, y, and z coordinate positions in 3-D space. The coordinate values are independent of how you are viewing an object (top, right, isometric, etc.). This can be illustrated by the example of looking at a house that is 35 feet from the curb. The house is always 35 feet from the curb regardless of whether you are looking at it from street level or from an altitude of 100 feet.

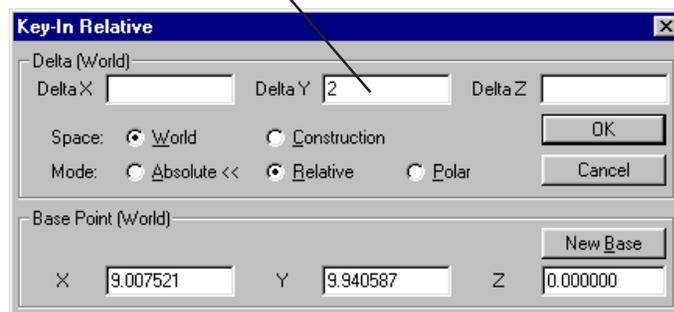


The XYZ TOOLBAR displays each of the major axes for the current space. The color of each axis button corresponds to the color of each leg of the triad cursor. Once a command is executed, the position can be changed using either the mouse or the keyboard arrow keys.

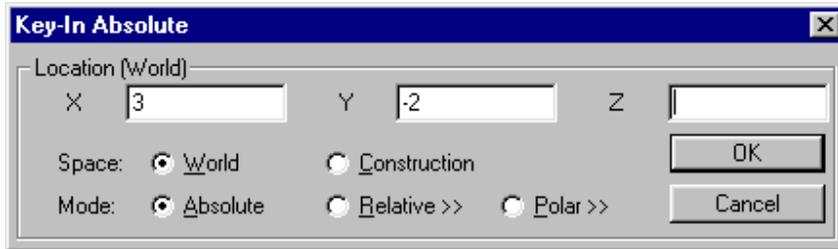
The mouse is used primarily to control X and Y positions. It can also be used to control the Z depth by pressing and holding the shift key on the keyboard and then moving the mouse. The left and right keyboard arrow keys can be used to move the cursor on the x-axis. The up and down arrow keys move the cursor on the y-axis. In addition, you can use the keyboard "+" (plus) and "-" (minus) keys to move the cursor on the z-axis.

Positions can also be entered using the keyboard. If you use the left mouse button to click on an axis button, a dialog box displays allowing you to enter a specific coordinate position for that axis. For example, selecting the y-axis button displays a dialog with the input prompt positioned on the y-axis entry area.

Typing a "Y2" during entry places the value in y-axis entry area



In the above example, the cursor position would be moved 2 units from its current position along the positive y-axis of world space. If set to ABSOLUTE, the cursor would have moved to a position 2 units from 0 on the y-axis. The x-axis and z-axis positions would remain the same. The current position of the cursor is indicated by the *base point*. The NEW BASE option allows you to change the current position.



In the above example, the cursor position would be moved to 3 on the world space x-axis and minus 2 units on the world space y-axis.

Key-in Entry

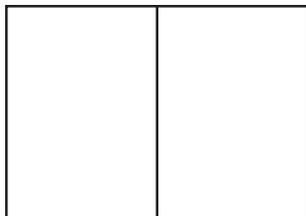
A key-in can be activated in several different ways.

<i>Action</i>	<i>Description</i>
Right mouse	Select the XYZ option to display the key-in dialog.
=	Displays the key-in dialog.
x	Displays the key-in dialog and places cursor in x-axis entry area.
y	Displays the key-in dialog and places cursor in x-axis entry area.
z	Displays the key-in dialog and places cursor in x-axis entry area.
2,4,1	Displays the key-in dialog and places a 2 in x-axis entry area, 4 in y-axis area, and 1 in z-axis area.

A comma is used to move from "x" to "y" to "z" entry areas.
You can also use the tab key.

SCREEN TABS TOOLBAR

SilverScreen permits you to divide the view window into a number of other smaller windows. There are several standard window SPLITS that automatically create a number of windows.



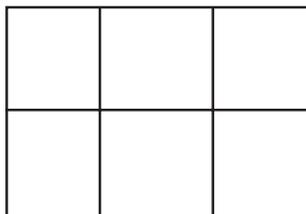
Two-Way



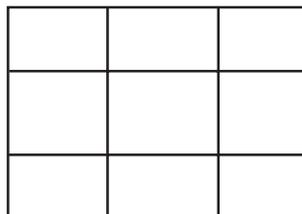
Three-Way



Four-Way



Six-Way



Nine-Way

If the view window is split after a drawing is loaded, the drawing appears in each of the newly created windows. If the window is split before a drawing is loaded, a drawing loads only into the current window.

Once windows have been established, SilverScreen allows you to load a totally different drawing, font, model, or pattern into any of the windows displayed. If the windows contain different views of the same drawing, font, model, or pattern, the display is comprised of a series of interactive views. If the windows contain separate drawings, fonts, models, or patterns, the display contains a series of independent graphic windows.

When a window split has occurred, one of the windows created remains the current window. The current window border is highlighted and remains distinct from the other borders. Current defaults and status information reflect the settings associated with the contents of the current window. You may select a new current window by clicking the cursor in the window.

Windows that contain the same drawing remain completely interactive. Changes made to a drawing in one window are reflected in all other windows containing that drawing.

As you create different combinations of windows, SilverScreen remembers the combinations and temporarily stores them as SCREENS. The number of screens that have been created during a drawing session is displayed in the SCREEN TABS TOOLBAR.



Each screen can be thought of as a layer of windows that has been identified by a number or name. Any one of the screens can be retrieved during a drawing session. For example, one screen may contain the entire drawing, a second may be an enlarged view of one part of the drawing, and yet a third screen may contain a four-way split of the drawing. You can select a different screen to be displayed by selecting the desired tab on the toolbar.

COMMAND-LINE TOOLBAR

The COMMAND-LINE TOOLBAR allows you to keyboard enter any of the SilverScreen commands. The last command entered remains on the command line. You can quickly repeat any of the previously executed commands by using the pull-down to list and select a command. Highlight the desired command and then select the EXECUTE button. You can also browse previously executed commands using the COMMAND LOG button.



In the above example, the interactive drawing of a circle (idraw circle radius) is executed when the EXECUTE button is selected.

An interactive command (preceded with an `i`) means the command allows user input during execution. In this example, interactive means you are prompted for the center and radius of the circle when the command is executed. If the command entry was "draw circle radius 1,0,0", the command would draw a circle with a 1" radius at the current cursor position.

The syntax of a command can be easily located by executing the command and then checking the **Tools Command log** command. This displays the last command entered. The last command can be highlighted by going to the end of the log and dragging the text tool over the last line. Press `CTRL C` on the keyboard to copy the line. Close the command log and place the text tool in the **COMMAND-LINE TOOLBAR** and press `CTRL V` to paste.

The command log lists interactive commands twice. The first listing, which is not executed but provided as a reference, is the interactive listing. The interactive listing is preceded by a "remark" (`\\`) statement to prevent the command from executing. The second listing is the actual command that was executed.

```
\\ icommand circle radius
\\ idraw circle radius
at 3,2,0
draw circle radius 1,0,0
```

The last two lines indicate the actual command that was executed at a specific location and size. The first command (`ICOMMAND`) actually issues the command. The second command (`IDRAW`) also issues the command, but provides information necessary to complete any dialog box entry required for the command. If you want to issue the command and allow the user to fill in the dialog, you would use the `ICOMMAND`. If you wanted to issue the command and provide all the necessary information for the dialog (but still allow the user to draw), you would issue the `IDRAW`. To use the interactive commands, you must remove the "rem" or "remark" from the command line.

```
\\ icommand draw circle radius
icommand draw donut radius
```

View Window

The view window is the area in which all drawing is done. It can be divided into several multiple windows. The windows can be either tiled (adjacent) or overlay.

Mouse Pointer and Drawing Cursor

The availability of the mouse pointer and the view window cursor is controlled by the current mode. If you are in the `DRAW MODE`, the cursor is active. If you are in the `OPTION MODE`, the mouse pointer is active. The draw mode is used to draw by positioning the cursor at a specified coordinate location and pressing the left mouse button. The option mode is used to select items by placing the mouse pointer arrow near the item desired and pressing the left mouse button.

Scan and Pick Modes

SilverScreen allows you to pick primitives and entities using either a `SCAN MODE` or a `PICK MODE`. The scan mode individually highlights each primitive or entity in sequence as the pointing device is moved or arrow keys are pressed. The highlighted item is selected by pressing the left mouse button or the `ENTER` key.

The pick mode allows you to use the pointer arrow to select the item desired. The pointer arrow is placed near the item desired and selected by pressing either the left mouse button or the ENTER key. If the pick mode detects several items at the pick location, a prompt indicates several "candidates" exist and those candidates are highlighted. You must then indicate which candidate is the one desired. This is accomplished by either picking the candidate desired or by switching to the scan mode and scanning for the desired item. Only candidates can be picked or scanned.

During any command that requires the selection of a primitive or entity, an option to change to the PICK or SCAN mode is displayed in the status bar.

Option Menu

SilverScreen offers options to perform certain functions during the execution of a command. These options are displayed in a menu that can be activated by pressing the RIGHT mouse button or by pressing and holding the CTRL key on the keyboard and then pressing the right mouse button. Generally, a command provides a prompt indicating the options are available.

Although the options presented vary according to the context of the command being executed, the example below illustrates option menus. Before beginning a command, you can press the RIGHT mouse button to display a series of options.

Use:
RIGHT MOUSE

To display the following options:



If you begin drawing a circle, you also have options available during the command.

Draw Circle Radius (mark center of circle)

Use:
RIGHT MOUSE

To display the
following options:

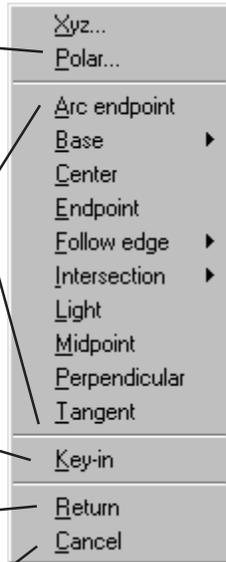
Allows keyboard
entry

Allows options to
jump to points on
existing geometry

Allow a value
to be entered

Returns to
command

Cancels command



Use:
CTRL+RIGHT MOUSE

To display the
following options:

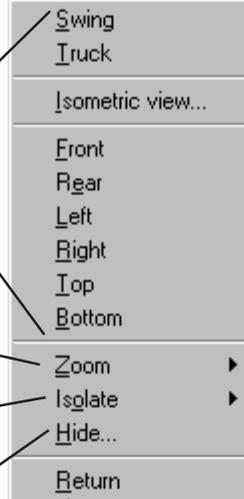
Change
drawing
view

Zoom drawing

Isolate portion
of drawing

Render with
hidden line

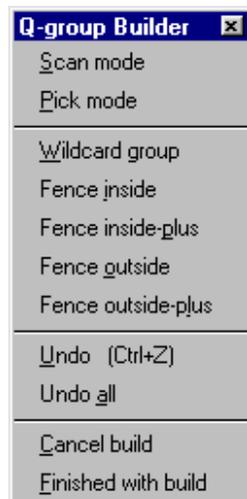
Return to command



Q-group and P-group Builder

Selection of multiple objects or multiple primitives is accomplished using the *Q-Group* (entity) and *P-Group* (primitive) Builders. The builders allow you to select items by scanning, picking, entering the names of the items, including using wildcards, or use of a fence.

The builders are available anytime a command allows you to select multiple primitives or entities. A series of options for creating a quick group of entities is available in the *Q-group Builder* menu.



SCAN AND PICK MODES

You may elect to select some items with **Scan mode** and others with the **Pick mode**. With the PICK mode, you use the cursor to select the desired entity. With the SCAN mode, each item is sequentially highlighted as the mouse is moved or the keyboard arrow keys are pressed. The currently highlighted item is selected using the left mouse button or by pressing enter on the keyboard.

WILDCARD GROUP

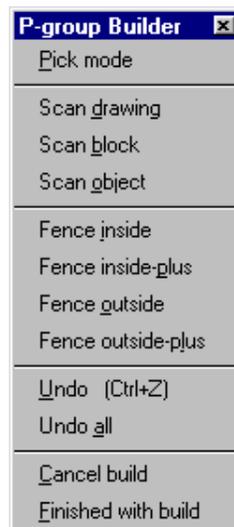
The **Wildcard group** option allows you to select entities by name using any of the wildcard options. For example, entering `\blk2\b*` finds all objects beginning with the letter "b" in the block "blk2".

FENCE

The FENCE option allows you to use the **Fence inside**, **Fence inside-plus**, **Fence outside**, and **Fence outside-plus** options to select items. For example, if you choose the **Fence inside** option, all entities that are completely enclosed in the fence are selected.

You may elect more than one of the available options to place items in the group. Once you have selected the desired items, select the **Finished with build** option to form the group and exit the menu. The **Undo** option allows you to remove the last item selected. The **Undo all** options removes all currently selected items. The **Cancel** option exits the *Q-group Builder* menu.

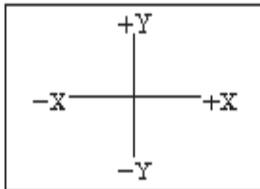
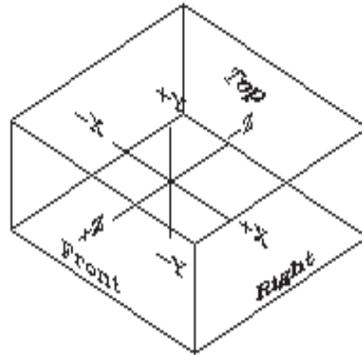
A series of options for creating a quick group of primitives is available in the *P-group Builder* menu.



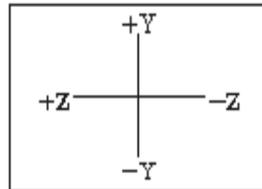
The options work similar in the *P-group Builder* as they do in the *Q-group Builder*. The major difference is in the use of the scan mode. You can determine the extent of the scan by selecting either **Scan drawing**, **Scan block**, or **Scan object**. You may elect to select some items with **Scan mode** and others with the **Pick mode**. With the PICK mode, you use the cursor to select the desired primitive.

World Space

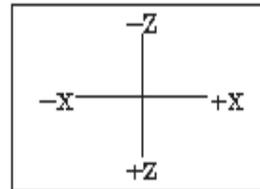
SilverScreen refers to the initial drawing volume defined by the Cartesian x, y, and z coordinate axes as the drawing's WORLD SPACE. When SilverScreen is initially loaded, you are viewing the world coordinates from the front view. In that view, the "world" axes are positioned such that the x-axis is horizontal, the y-axis vertical, and the z-axis moving toward and away from the viewing plane. If the view is changed to the right side of the drawing, the "world" z-axis becomes horizontal, the y-axis remains unchanged, and the x-axis moves toward and away from the viewing plane.



Front Face View



Right Face View



Top Face View

The world coordinates are fixed and cannot be modified. What changes is your viewing angle relative to the axes of the world space.

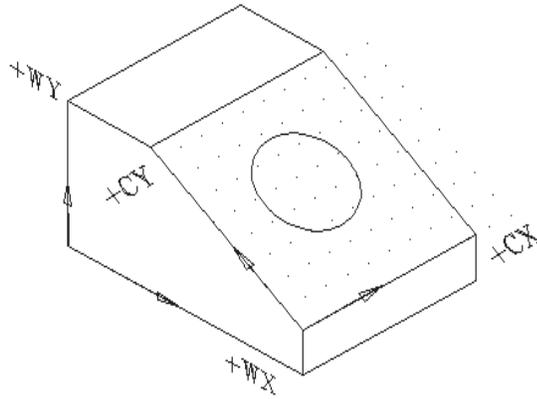
Construction Space

SilverScreen input is relative to the three coordinate axes. In many cases, the position of the fixed world space x, y, and z-axes is not appropriate for drawing elements that do not reside orthogonal to those axes. The CONSTRUCTION SPACE defines another set of "movable" x, y, and z-axes that are provided to allow drawing at any orientation independent of the WORLD SPACE.

Initially, the CONSTRUCTION and WORLD spaces are aligned. The position or orientation of the construction space is set to initially align with the x, y, and z-axes of the world space. You can move the construction space to permit drawing on surfaces other than the world space xy-plane.

The next example illustrates how the xy-plane of the construction space can be oriented differently than the xy-plane of the world space.

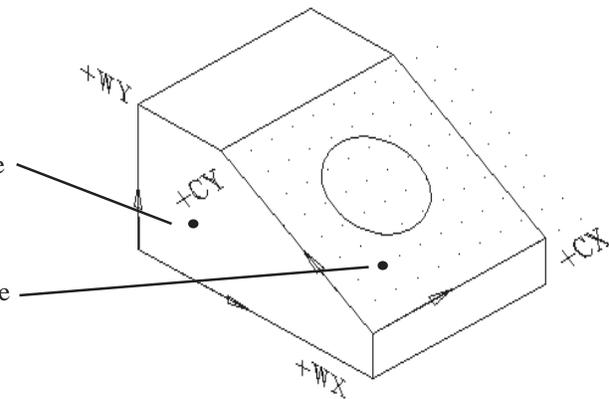
The grid is displayed relative to the construction space.



In the illustration, the xy world space plane is indicated by the “WX” and “WY.” The construction plane is represented by the “CX” and “CY.” In addition, the grid is always displayed on the xy-plane of the construction space. When the WSPACE/CSPACE button on the status bar is set to CSPACE, entry is relative to the current construction space. When the WSPACE is displayed, entry is relative to the world space.

In the example to the right, this point is located at an absolute position of 2,2,0 in the world space.

This point is located at an absolute position of 2,2,0 on the construction space.



Positioning the Construction Space

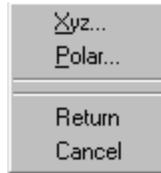
The construction space, or C-space, is positioned using the **Draw Tools C-space** command. The commands allow you to align and rotate the C-space, and move its origin. The C-space can be aligned to a set of axes you define, an entity-space, a primitive, the current view, or the world space.

Entity Space

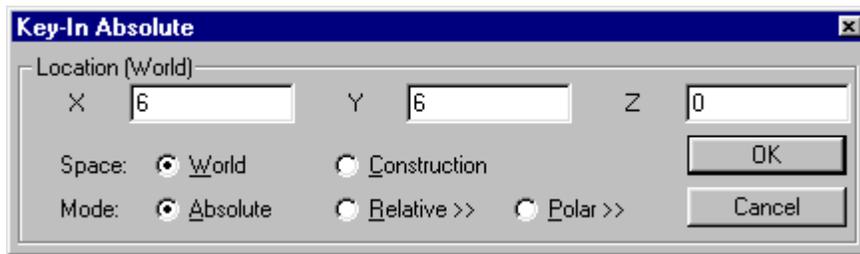
When a new entity (block, drawing, object, symbol, or text-line) is created, the current position of the construction space is saved and stored as the ENTITY SPACE or E-SPACE. In essence, this provides each entity with its own set of axes that are independent of the world space axes. Entities can be manipulated relative to their entity spaces; therefore, it is not necessary to continually determine the orientation of an entity about the world or construction space axes.

W-space and C-space Entry

In most cases, entry can be made relative to either the world space or the construction space. To perform a keyboard entry, select XYZ from the OPTIONS menu.



The options menu is displayed by pressing the RIGHT mouse button during the completion of drawing commands. Selecting XYZ displays a KEY-IN dialog box.



In the above example, the position entered is a 6 on the x-axis, 6 on the y-axis, and a z-axis of 0. In this case, the entry is an absolute distance from 0,0,0 of the world space.

All key-in entries are made relative to either the world or construction space. The space that is displayed in the dialog box is based on the setting of the WSPACE/CSPACE button on the status bar. For example, if the button is currently set to WSPACE, the dialog defaults to that setting. It can be changed in the dialog box. If the two axes are not aligned, an entry in one results in a different position than an entry in the other.

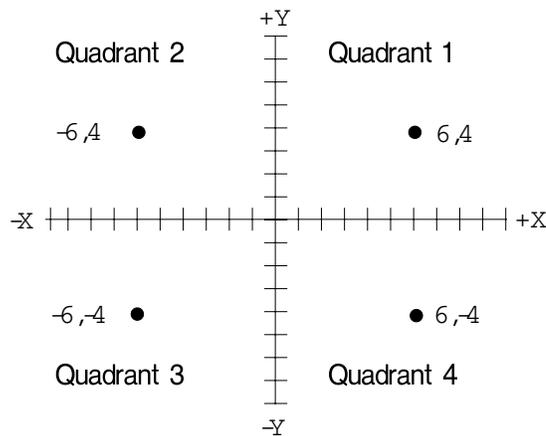
The KEY-IN dialog box can also be activated by pressing the "=" (equal), "x", "y", "z", or "@" (for polar) key on the keyboard.

Absolute, Relative, and Polar Entry

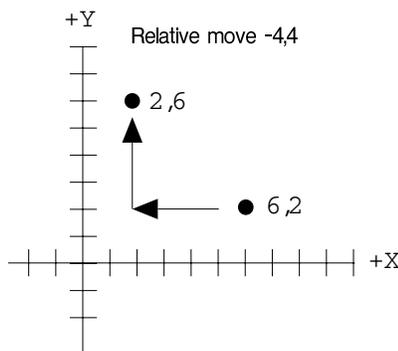
A position or movement on a coordinate axis can be entered in several different ways, including:

- An ABSOLUTE x, y, and z distance from the coordinate system's 0,0,0 origin
- A RELATIVE x, y, and z displacement from the current cursor position
- A relative angle and distance from the current cursor position, referred to as a POLAR movement

An absolute coordinate position specifies the distance a point is from the $x=0$, $y=0$, and $z=0$ origin. Initially, a point located to the right of the origin on the x -axis has a positive value and negative value if located to the left. The y -axis is a positive value above the origin and a negative value below. The z -axis is a negative value when moving past the origin toward the screen and a positive value if moving away from the origin and toward you. Each example below illustrates an absolute position on the X , Y , and Z coordinate axes.

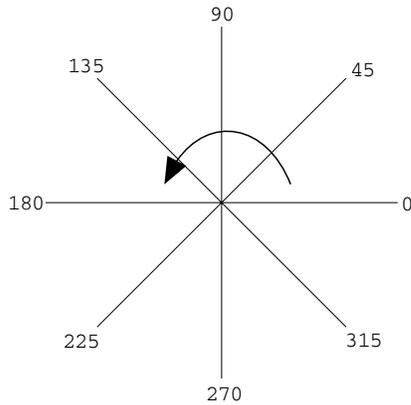


Relative movement, frequently referred to as a delta or incremental move, specifies the x , y , and z displacement from an existing or specified point anywhere on the coordinate axes. The existing point might be the center of a circle or the endpoint of a line. The following example illustrates a delta move from the x , y point $(6,2)$ to the new x , y position $(2,6)$. The actual relative move is specified as $(-4,4)$, since the displacement is -4 on the x -axis and 4 on the y -axis.

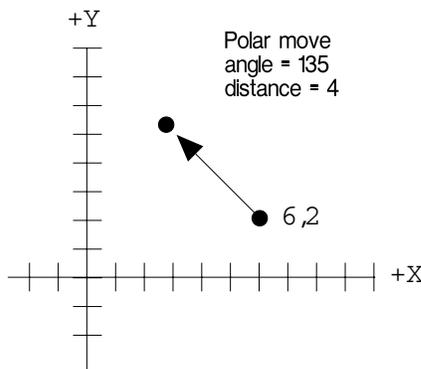


Polar coordinate positioning specifies the displacement in terms of angle and distance from an established point. Because it uses an established reference point, it is similar to relative movement. Entering a polar angle uses the “right hand” rule. Angles specified as positive (+) move counterclockwise, those specified as negative (-) move in a clockwise direction. The angle convention is based on a specified origin with an angle specification in the range of 0 to 360 degrees. An angle of 0 (zero) degrees is at the 3 o’clock position and an angle of 180 degrees is at 9 o’clock.

The following illustrates the angle convention:



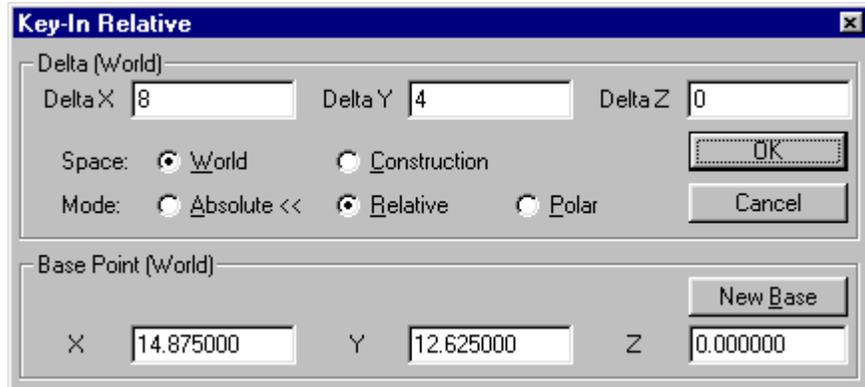
If the angle specified is relative to the xy-plane, entering a polar angle of 270 degrees and a distance of 4 has the same effect as specifying a relative movement of x0y-4. The 270 degree angle specifies a move along the negative y-axis without changing the x-axis. Since the “right hand” rule specifies a negative angle moves clockwise, -90 degrees is the same as specifying +270 degrees. The origin about which the angles are specified can be located at any point in space and be relative to any of the coordinate planes.



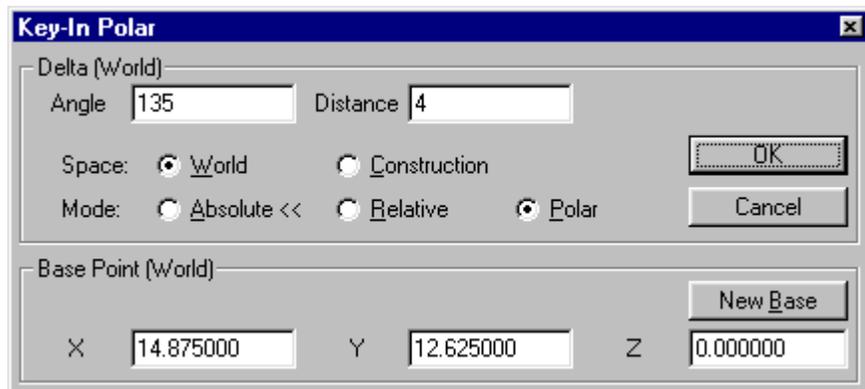
Remember, keyboard entry is activated by either selecting XYZ or POLAR from the OPTIONS menu or by pressing the "=" key when prompted to mark a point.

The KEY-IN dialog box allows you to select any of the three available entry options.

RELATIVE or POLAR positions are based on the current cursor position, referred to as the base point in the KEY-IN dialog box. The location of the base point can be altered by selecting NEW BASE.



The KEY-IN POLAR object prompts for angle and distance.



Quick Keys

SilverScreen provides several quick keys or shortcut keys to many of its most frequently used commands. The quick keys can be customized to allow you to define the keys and the associated functions.

The list of quick keys is accessed by selecting the **Tools Macro Edit** command.



The macro keys show the keys and the macro definition shows the SilverScreen commands that are issued when the keys are selected. In the above example **Ctrl-Z** issues an **Undo**.

Demonstration Files

The SilverScreen installation procedure includes several demonstration programs that provide an overview of SilverScreen functions. The demonstration files are started once SilverScreen is loaded by selecting **Tools Execute** or by pressing the **F8** quick key. Each option prompts you for the name of a file. You can select the name from the available list of files.

The major demonstration is activated by entering the file name *Demo.ex* when prompted for the file to execute. There are several other programs that perform a variety of functions. The demonstration programs have been written and compiled using SilverC, SilverScreen's internal C compiler. The *Demo.ex* program actually offers a menu for selecting several "script" files that are included as part of the demonstration package.

You CAN break out of the demonstration by selecting the **BREAK** button or pressing **CTRL Z** on the keyboard. You will be prompted to cancel or suspend the file execution? Either choice takes you back to the demonstration main menu from which you can exit. If you try to break out (**CTRL Z**) when the *Press any key to continue* prompt is displayed, SilverScreen may have trouble recognizing this is a break out message. Just strike the **CTRL Z** key combination several times, and you should exit the demonstration.

SilverScreen allows the user to activate a "record" mode that saves the commands entered in an ASCII file called a script file. The script file can be played back at a later time to recreate the same command sequences used to complete the drawing. The script file can also be edited with a standard text editor.

The SilverScreen installation procedure includes several extended script files that complete entire drawings. The extended script files can be executed from within DEMO or they can be executed individually using **Tools Execute** or by pressing the **F8** quick key.

The script files and the drawings they create are designed to appeal to engineers and architects alike. If you want to follow more closely the commands used in a script file, you can get a print out of a particular script file's commands by loading the script file using the SilverScreen editor (**Tools Edit file...**) and printing the contents. The script file is an ASCII text file that ends with a .sf file extension (i.e. pantheon.sf). Executing the DEMO program offers an option to view the contents of the extended script files.

The example below illustrates a portion of a typical script file.

```
\\ icommand clear
clear
\\ icommand pen current
pen current color white linestyle solid width 1
\\ icommand units
units measure inches
\\ icommand window define
window define height 5 width 6 lower-left 1.5,2.75,0 front
Note The next operation draws a polygon
\\ icommand draw polygon rectangle
\\ idraw polygon rectangle
goto root
create object obj1
draw rectangle 2,4,0 6.1875,4.0 normal 0,0,-1
zoom drawing
```

```
\\ icommand pen current
pen current color light-red linestyle solid width 1
\\ icommand draw circle radius
\\ idraw circle radius
at 12.6,8,0
draw circle radius -3.30,0.064,0
\\ icommand draw lines single
\\ idraw lines single
draw line 7,4,0 17.4,7.8,0
\\ icommand edit trim single primitive
trim single circle \obj1.6 points 9.77,8.407,0 15.86,7.726,0
point 15.90,8.4087,0
```

Viewing a script file provides an overview of how each item within the file was created.