The ElectricImage™ *Reference*

A guide to the

ElectricImage™ Animation System

Version 2.0

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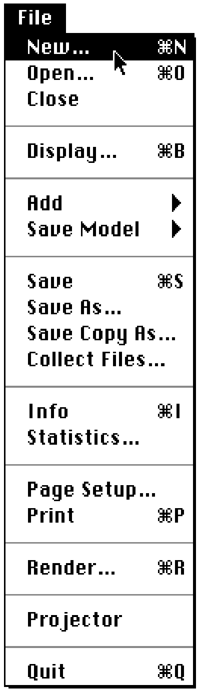
Chapter 1 The File Menu Commands

New…



This command creates a new project.

To create a new project:

1. Choose **New…** from the File menu.

   (If you have made any changes to an open project, a dialog box opens and prompts you to save the changes, then the project closes.)

   A directory dialog box, as shown in Figure 1.1, opens.

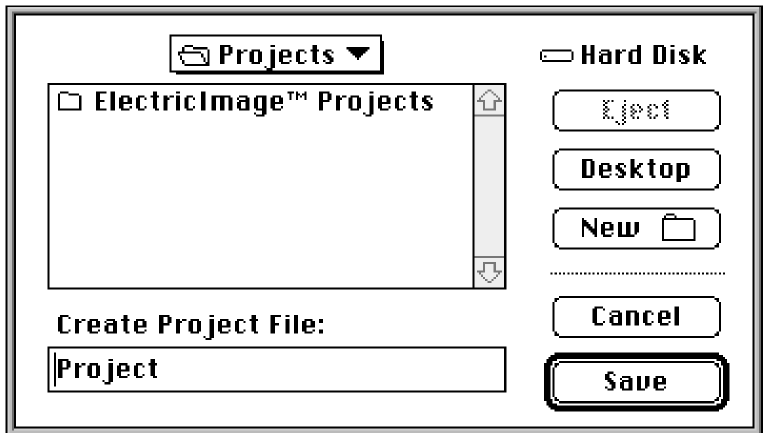


Figure 1.1 Directory dialog box used to create a new project

2. Open the folder (or create a new folder) where the new project file will be stored.

3. Replace the default name by typing a name for the new project file (unless you want to use the default).

4. Either click **Save** or press **Return**.

   Another directory dialog box, as shown in Figure 1.2, opens, which allows you to add models to the project.

W

You do not have to add models to the project at this time. Models can be added to a project at any time, as discussed in the sections “Add > Model…” (page 1-12) and “Add > Import…” (page 1-22).

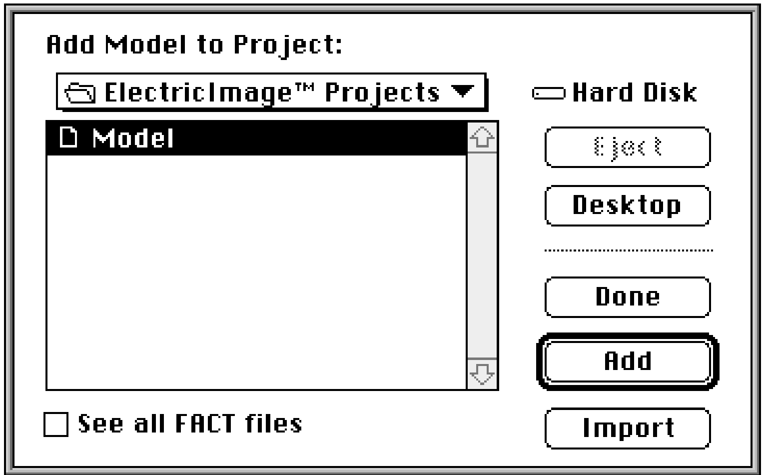


Figure 1.2 Directory dialog box used to add a model to a project

5. If you want to add a model to the project at this time, go on to Step 6 now.

If you do not want to add a model at this time, click **Done**.

The ElectricImage workspace, comprised of the World View and Camera View windows, opens. For an explanation of these windows and their use, refer to Chapter 6: The World View Windows and Chapter 7: The Camera View Window.

6. Open the folder where the model is located (if necessary).

W

ElectricImage works only with models in the FACT format (to see a listing of all FACT files in the directory dialog box, click **See all FACT files)*****, however it is capable of converting models from the most popular formats into the FACT format so that they can be used in ElectricImage projects.***

7. If you want to add a FACT format file, go on to Step 11 now.

If you want to add a non-FACT format file, click **Import**.

A directory dialog box, as shown in Figure 1.3, opens.

8. Open the folder where the model is located (if necessary).

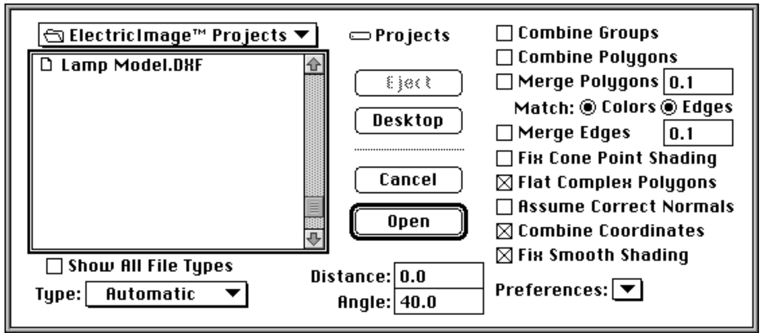


Figure 1.3 Dialog box used to convert a model to FACT format

9. If the model is not listed in the directory, either click the **Show All File Types** check box or select the correct format from the **Type** pop-up menu.

W

Most files can be opened with the Automatic file format (the default in the Type pop-up menu). Figure 1.19 (page 1-23) provides a list of the file formats that ElectricImage can import.

10. Use the controls in the dialog box to select import options (if desired). For an explanation of these controls, refer to the section "Import Options" (page 1-25).

11. Click on the model filename in the directory, and click **Add**.

If the model contains a single group only, or two or more groups that are hierarchically linked, it is automatically added to the project and the directory dialog box reopens to allow you to add another model to the project (go on to Step 13 now).

If the model contains two or more groups that are not hierarchically linked, an alert dialog box, as shown in Figure 1.4 (page 1-6), opens, allowing you to create a hierarchy for the groups.

W

You do not have to create a hierarchy at this time. Hierarchies can be created at any time by using the Link to Parent tool, as discussed in the section "Link to Parent" (page 5-18) in Chapter 5: The Tools Menu Commands or the section "The Link to Parent Tool" (page 19-19) in Chapter 19: The Tool Palette.

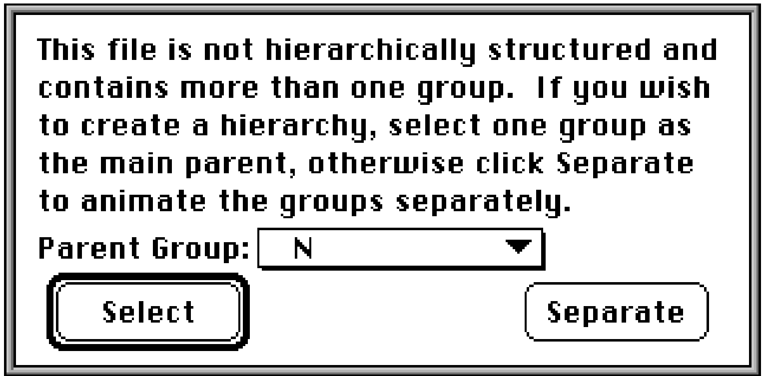


Figure 1.4 Alert dialog box for a model not hierarchically structured

12. If you want to create a hierarchy at this time, choose the parent group from the **Parent Group** pop-up menu and click **Select**.

If you do not want to create a hierarchy, click **Separate**.

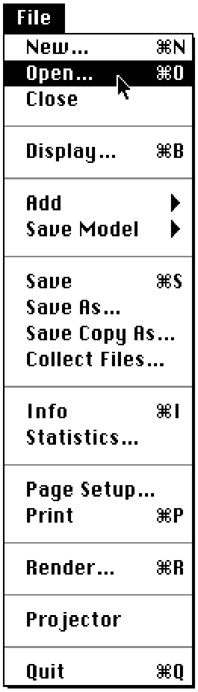
The model is added to the project and the directory dialog box reopens to allow you to add another model to the project.

13. If you want to add another model to the project, repeat the steps for selecting a model.

If you do not want to add another model, click **Done** or **Cancel**.

The ElectricImage workspace, comprised of the World View and Camera View windows, opens. For an explanation of these windows and their use, refer to Chapter 6: The World View Windows and Chapter 7: The Camera View Window.

Open…



This command opens a previously created project.

To open a previously created project:

1. Choose **Open…** from the File menu.

   (If you have made any changes to an open project, a dialog box opens and prompts you to save the changes, then the project closes.)

   A directory dialog box, as shown in Figure 1.5, opens.

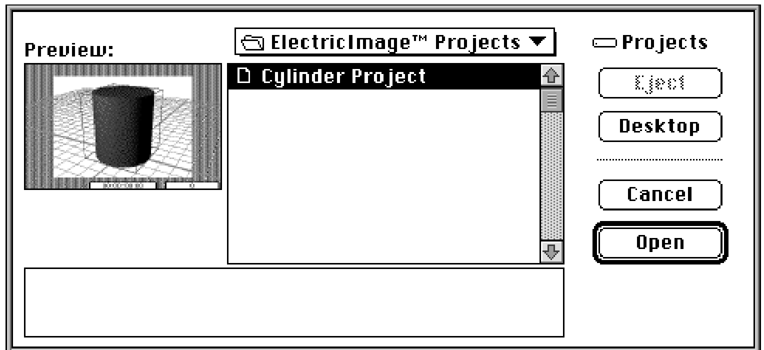


Figure 1.5 Directory dialog box used to open a project

2. Open the folder where the project is located (if necessary).

3. Click on the project file and click **Open**.

   The project starts loading and, if all project files are located, the ElectricImage workspace, comprised of the World View and Camera View windows, opens. For an explanation of these windows and their use, refer to Chapter 6: The World View Windows and Chapter 7: The Camera View Window.

   If, however, the project contains a model that cannot be found, an alert dialog box, as shown in Figure 1.6, opens (go on to Step 4 now).

   If the project contains a texture that cannot be found, an alert dialog box, as shown in Figure 1.7, opens (go on to Step 5 now).

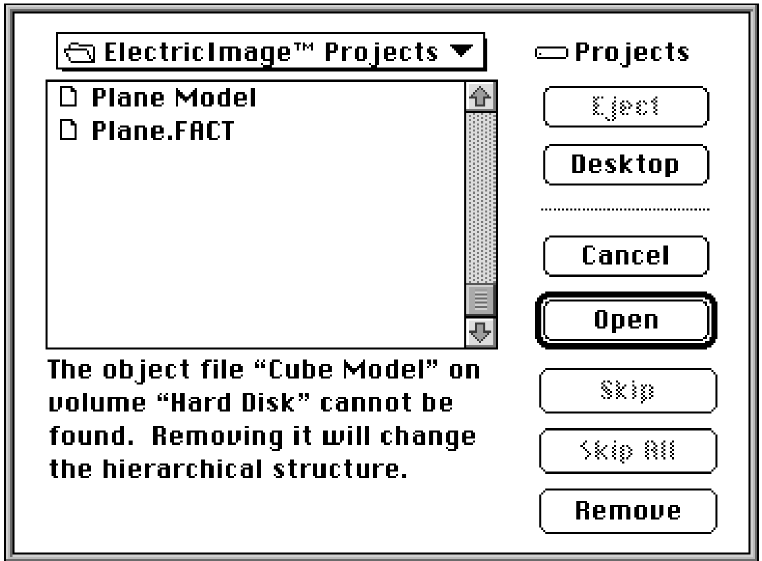


Figure 1.6 Alert dialog box when a model is not found

4. At this point you can either:
   - Click **Cancel** to cancel the **Open...** command.
   - Attempt to find the model in a different folder or on a different disk. To do so, open the folder where the model is located, select the model file and click **Find**.
   - Open the project with a different model to replace the missing model. To do so, select a different model file and click **Find**.
   - Click **Remove** to open the project, removing the missing model from the project. (Removing the model will change the hierarchical structure of the project.)

   *If you do not cancel the **Open...** command, the project continues loading and, if all remaining files are located, the ElectricImage workspace, comprised of the World View and Camera View windows, opens. For an explanation of these windows and their use, refer to Chapter 6: The World View Windows and Chapter 7: The Camera View Window.*

   If the project contains a texture file that cannot be found, an alert dialog box, as shown in Figure 1.7 (page 1-9), opens.

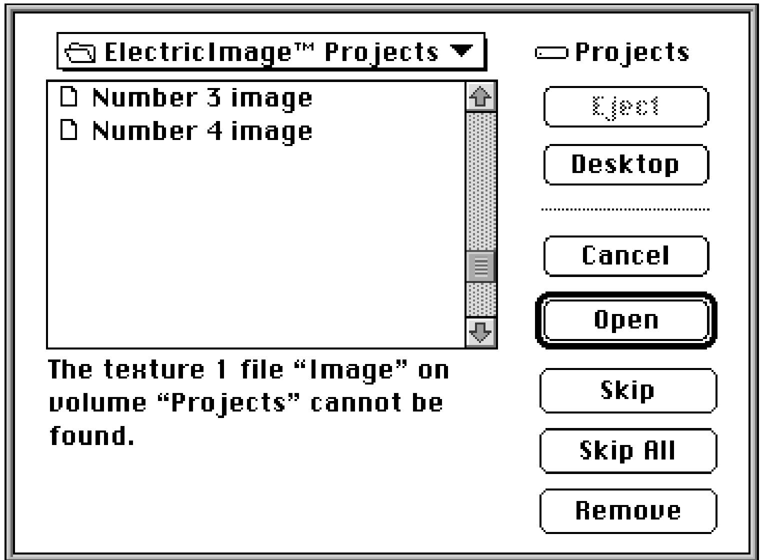


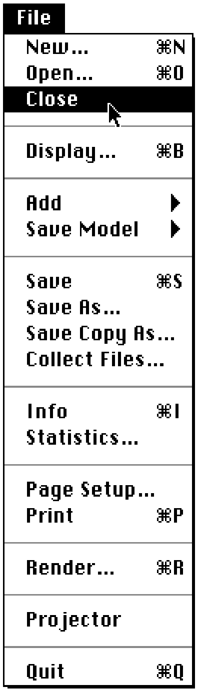
Figure 1.7 Alert dialog box when a texture is not found

5. At this point, you can either:

- Click **Cancel** to cancel the **Open…** command.
- Attempt to find the Texture in a different folder or on a different disk. To do so, open the folder where the texture is located, select the texture file and click **Find**.
- Open the project with a different texture to replace the missing texture. To do so, select a different texture file and click **Find**.
- Click **Skip** to open the project with the missing texture disabled.
- Click **Skip All** to open the project with all missing textures disabled.
- Click **Remove** to open the project, removing the missing texture from the project.

If you do not cancel the ***Open…*** *command, the project continues loading and the ElectricImage workspace, comprised of the World View and Camera View windows, opens. For an explanation of these windows and their use, refer to Chapter 7: The Camera View Window and Chapter 7: The Camera View Window.*

Close



This command closes the current project.

To close the current project:

1. Choose **Close** from the File menu.

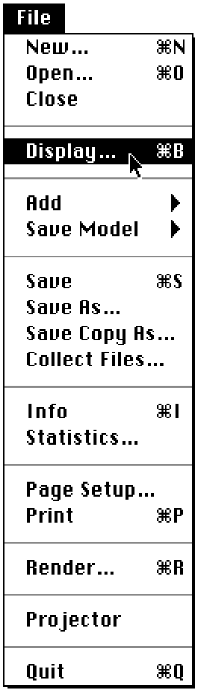
   (If you have made any changes to the current project, a dialog box opens and prompts you to save the changes.)

   The current project closes, but ElectricImage remains open.

2. At this point, you can:

   - Create a new project, as discussed in the section “New…” (page 1-3).
   - Open a previously created project, as discussed in the section “Open…” (page 1-7).
   - Display a QuickTime movie, as discussed in the section “Display…” (page 1-11).
   - Transfer to the Projector application, as discussed in the section “Projector” (page 1-56).
   - Quit the ElectricImage Animation System, as discussed in the section “Quit” (page 1-57).

Display…



This command displays a QuickTime movie in a separate window.

W

The Display… command provides a way of watching a QuickTime movie created by the Camera window's preview function, as discussed in the section "Previewing Animations" (page 7-9) in Chapter 7: The Camera View Window.

To display a QuickTime movie:

1. Choose **Display…** from the File menu.

   A directory dialog box, as shown in Figure 1.8, opens.

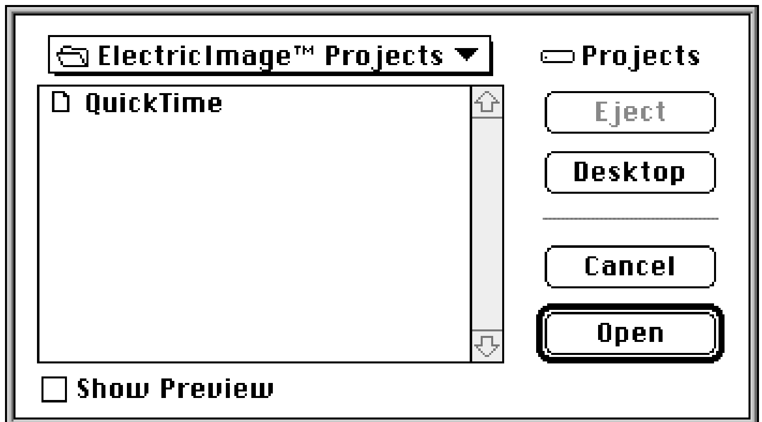


Figure 1.8 Directory dialog box used to display a QuickTime® movie

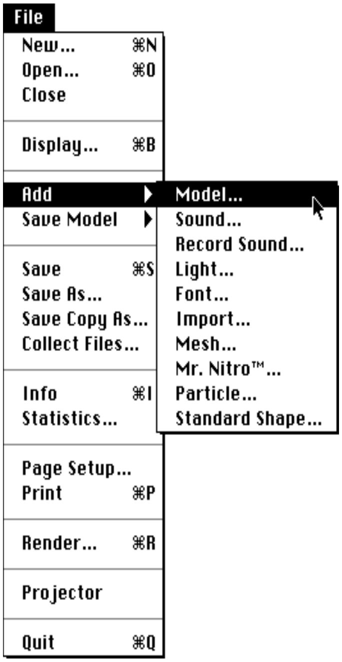
2. Open the folder where the QuickTime movie is located (if necessary).

3. Click on the movie file and click **Open**.

   A standard Macintosh QuickTime display window opens and the QuickTime movie begins playing. You can control the display of the movie with the window's slider bars.

4. When done, click the window's close box.

Add > Model…



This command adds a model to the current project.

W

This command is intended primarily for adding models that are in the ElectricImage FACT format (see the note below). To add a non-FACT format model, you can still use this command, or use the Add > Import command, explained in the section "Add > Import…" (page 1-22).

To add a model to the current project:

1. Choose **Add >** then **Model…** from the File menu.

   A directory dialog box, as shown in Figure 1.9, opens.

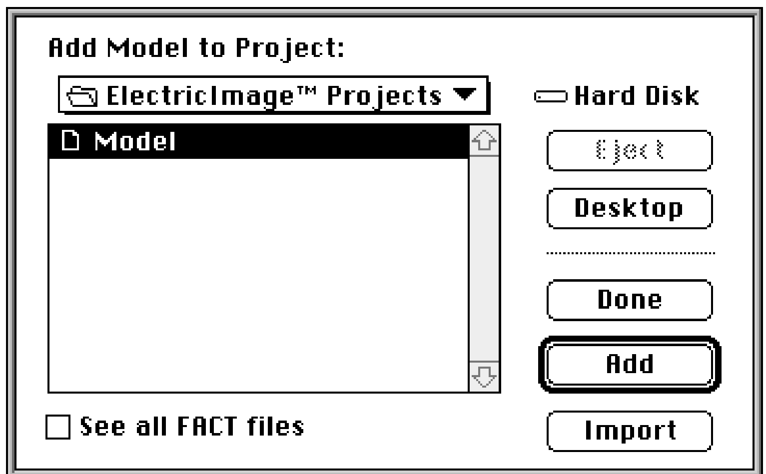


Figure 1.9 Directory dialog box used to add a model to a project

2. Open the folder where the model is located (if necessary).
3. If you want to add a FACT format file, go on to Step 4 now.

   If you want to add a non-FACT format file, click **Import**.

   Refer to the section "Add > Import…" (page 1-22) for direction on importing non-FACT format files.
4. Click on the model filename in the directory, and click **Add**.

If the model contains a single group only, or two or more groups that are hierarchically linked, it is automatically added to the project and the directory dialog box reopens to allow you to add another model to the project (go on to Step 6 now).

If the model contains two or more groups that are not hierarchically linked, an alert dialog box, as shown in Figure 1.10, opens, allowing you to create a hierarchy for the groups.

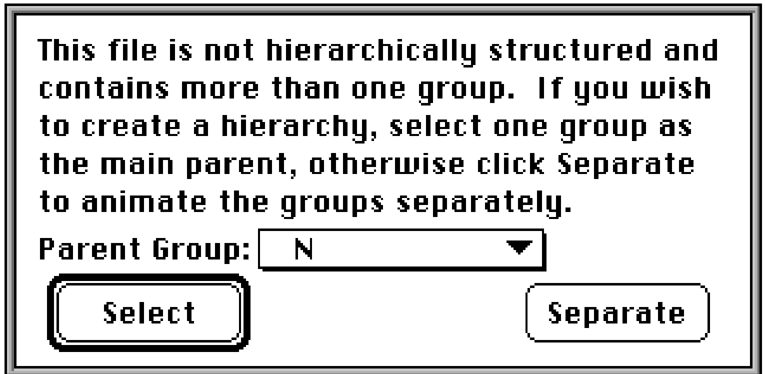


Figure 1.10 Alert dialog box for a model not hierarchically structured

W

You do not have to create a hierarchy at this time. Hierarchies can be created at any time by using the Link to Parent tool, as discussed in the section "Link to Parent" (page 5-18) in Chapter 5: The Tools Menu Commands or the section "The Link to Parent Tool" (page 19-19) in Chapter 19: The Tool Palette.

5. If you want to create a hierarchy at this time, choose the parent group from the **Parent Group** pop-up menu and click **Select**.

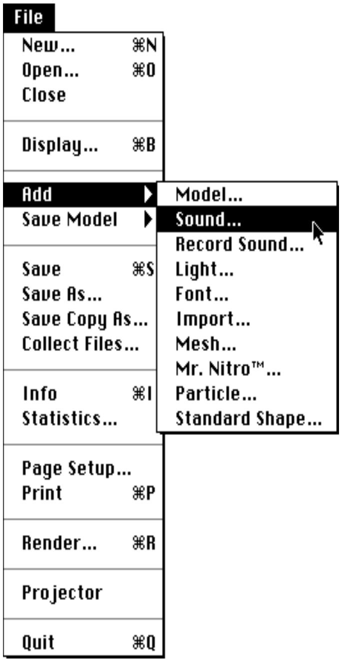
If you do not want to create a hierarchy, click **Separate**.

The model is added to the project and the directory dialog box reopens to allow you to add another model to the project.

6. If you want to add another model to the project, repeat the steps for selecting a model.

If you do not want to add another model, click **Done** or **Cancel**.

Add > Sound…



This command adds a sound file to the project.

W

Sound files must be in either AIFF or QuickTime format. For more information on using sound files, refer to Chapter 12: The Sound Info Window.

To add a sound file to the current project:

1. Choose **Add** > then **Sound…** from the File menu.

   A directory dialog box, as shown in Figure 1.11, opens.

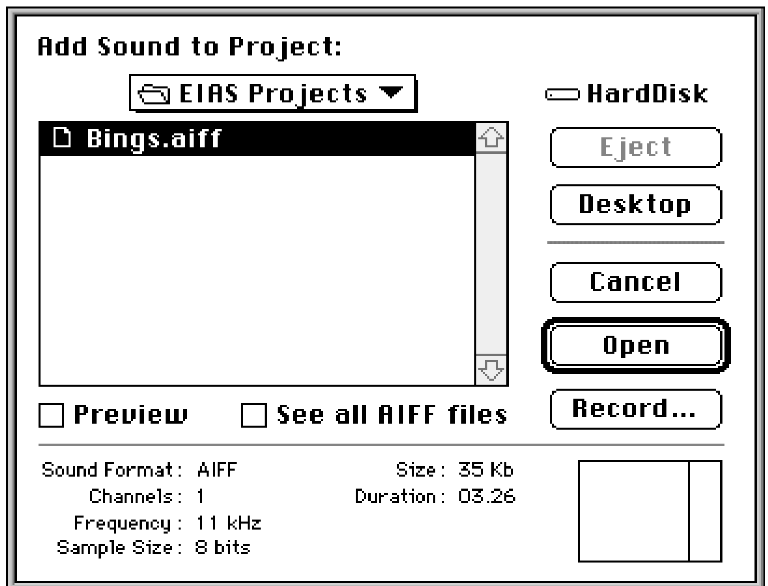
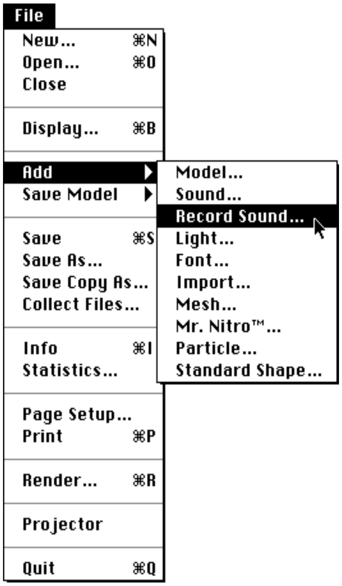


Figure 1.11 Directory Dialog box used to add a sound file to a project

2. Open the folder where the sound file is located (if necessary).
3. To see a listing of all AIFF format files, click the **See all AIFF files** button.
4. To preview sounds, click the **Preview** button.
5. Click on the sound file and click **Add**.

Add > Record Sound…



This command enables you to record a sound and add it to the project.

To record a sound file to add to the current project:

1. Choose **Add >** then **Record Sound…** from the File menu.

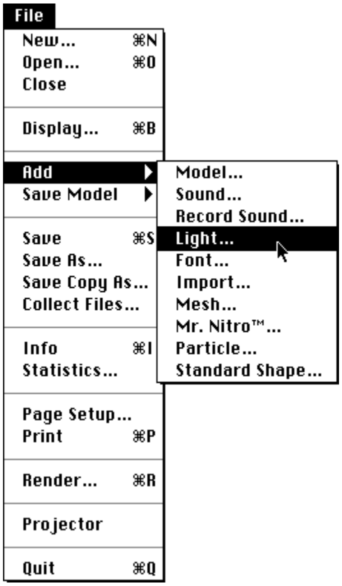
   A dialog box, as shown in Figure 1.12, opens.

Figure 1.12 Dialog box used to record a sound file to add to a project

2. Record the sound.
3. To save the recorded sound, click **Save** or press **Return**.

   A directory dialog box opens for you to save the sound file, and the file is added to the project.

Add > Light…



This command adds a light to the project.

To add a light to the current project:

1. Choose **Add** > then **Light…** from the File menu.

   The mouse arrow changes to a light icon.

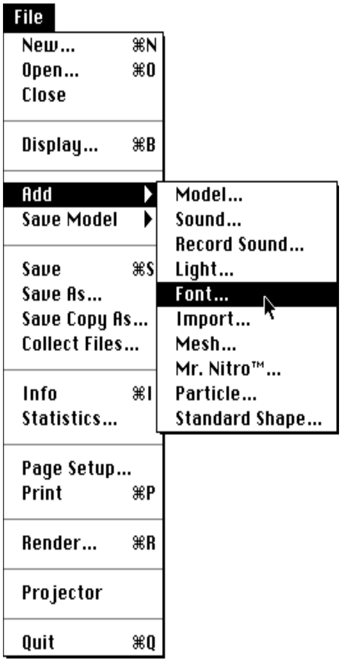
2. Position the light icon in any of the World View windows and click the mouse.

   The light is added to the project and can be repositioned and configured as desired.

W

For an explanation of the various settings and attributes for lights in ElectricImage, refer to Chapter 11: The Light Info Window.

Add > Font…



This command creates a font model in ElectricImage FACT format and adds it to the current project.

To create a font model and add it to the current project:

1. Choose **Add >** then **Font…** from the File menu.

   A dialog box, as shown in Figure 1.13, opens.

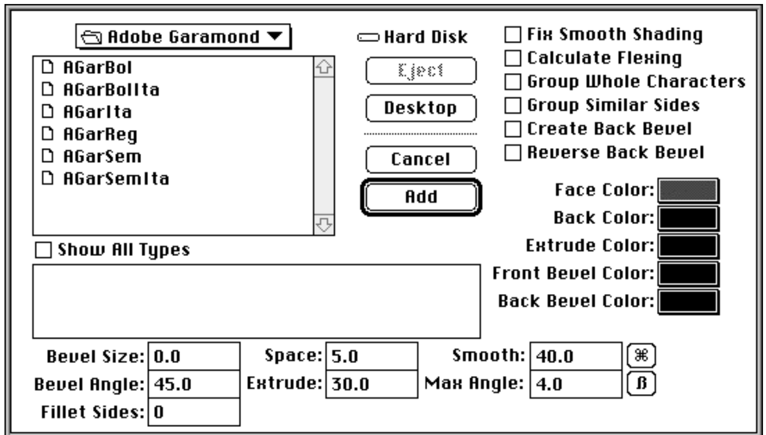


Figure 1.13 Dialog box used to create a font model

2. Open the folder where the font is located.
3. If the typeface is not listed in the directory, click the **Show All Types** check box. Only PostScript Type 1 fonts are displayed in the file directory.
4. In the large edit box beneath the directory, type the characters to be converted into a model. (To convert the entire alphabet, click the ß button on the upper left side of the dialog box.)
5. Use the controls in the dialog box to select modelling options (if desired). For an explanation of these controls, refer to the section “Font Modelling Options” (page 1-18).
6. Click on the typeface in the directory and click **Open**.

   The font model is created and added to the current project.

Font Modelling Options

Smooth

This edit box contains a value that determines the angle at which a hard edge appears between polygons when using smooth shading (see **Fix Smooth Shading**, below). The default is 40˚.

This feature works by comparing the angle of the polygon to the angle of the polygon next to it. If the angle is greater than the value in the Smooth edit box, the polygon will shade as a hard edge. If the angle is less than the value in the Max Angle edit box, the edge will smooth shade.

Fix Smooth Shading

This check box option, when enabled, creates hard edges when smooth shading a model (see **Smooth**, above).

Max Angle

This edit box contains a value that determines whether the font outlines are sampled in a course or smooth fashion. The default angle is 4˚, meaning that the outline will be sampled so that there is no angle greater than 4˚ along the edge of the resulting model, providing in a fairly smooth font. The larger the angle, the courser the font. If the font you are working with has very shallow curves, a smaller Max Angle is advised, but be aware that this will create a far greater number of polygons.

Space

This edit box contains a value that adjusts the width between the characters in the font. The value of the spacing size is in units, relative to the other values found in the **Extrude** and **Bevel Size** edit boxes.

W

Occasionally, when creating large, outside bevels, letters will overlap with each other. To adjust inter-character spacing, enter the result of twice the bevel size (bevel size * 2) into the Space edit box. The letters will just touch, but not overlap.

Extrude

This edit box contains a value that gives a font depth. The default distance for the extrusion is 300 units (units are relative to the other values found in the **Space** and **Bevel Size** edit boxes). To make a font flat, set the value in the **Extrude** edit box to 0.

Bevel Size This edit box contains a value that sets the size of the bevel (the default is 0 for no bevel). The value of the bevel size is in units relative to the other values found in the **Extrude** (page 1-18) and **Space** (page 1-18) edit boxes. A negative value will bevel inside the original font outline, and a positive value will bevel outside the original outline, as shown in Figure 1.14.

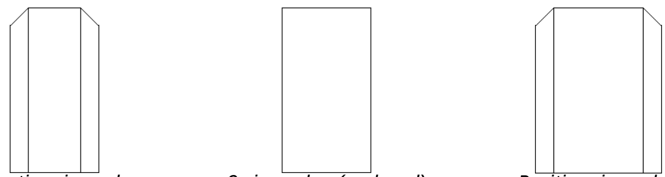


Figure 1.14 Bevel sizes (side views)

W

Larger bevels can sometimes twist back into themselves, causing the absence of front faces, so be conscious of bevel size. Tolerances are reached faster if you bevel inward than if you bevel outward.

In order for the bevel to be straight, the **Fillet Sides** edit box (page 1-20) needs to be set to zero (the default value).

Bevel Angle This edit box contains a value that works in conjunction with the **Bevel Size** edit box to set the degree to which the bevel will occur on the font, as viewed from the side.

The default is 45˚; an angle smaller than 45˚ will cause the bevel to recede towards the center of the model (as viewed from the side); an angle larger than 45˚ will cause the bevel to advance away from the center (as viewed from the side), as shown in Figure 1.15.

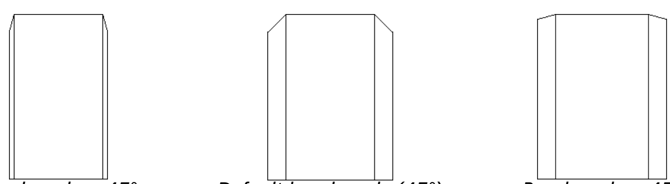


Figure 1.15 Bevel angles (side view)

Fillet Sides

This edit box contains a value that creates a rounded bevel. You can add a rounded edge to the font instead of an angled bevel by increasing the value in the Fillet Sides edit box to a value larger than zero. The value determines how many segments are to be in the fillet. For a good rounded appearance, a number of 6 or 8 is sufficient, as shown in Figure 1.16.

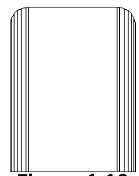


Figure 1.16
Side view of rounded bevel created with Fillet Sides value of 6

W

Filleting adds many polygons to the model, and, as a result, the font model will take significantly longer to create.

Create Back Bevels

This check box option, when enabled, creates a font model with back facing bevels as well as front facing bevels.

Reverse Back Bevel

This check box option, when enabled, reverses the angle of the back bevel so that it is opposite the front bevel. This can result in a “stepped,” pyramid-like bevel or fillet, as shown in Figure 1.17.

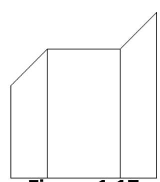


Figure 1.17
Right side view of reverse back bevel

Calculate Flexing

This check box option, when enabled, causes subtle curves to be added to what are actually straight lines, utilizing flexing information contained in Type 1 fonts. If you do not wish to have the flexing in a 3D font model, uncheck this box.

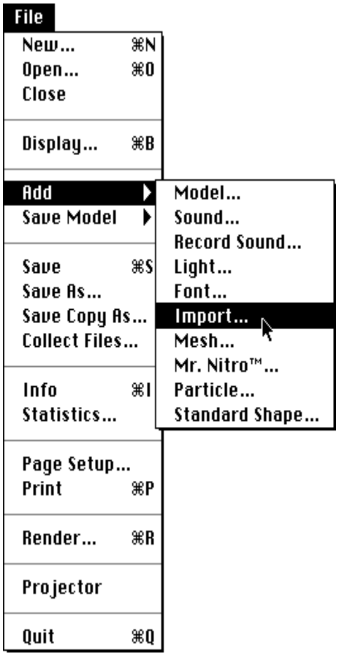
Group Whole Characters

This check box option, when enabled, causes all faces of individual characters in the font model to be grouped together as single groups (as opposed to the default grouping, which has the extruded sides as the parent group to the front face, back face, front bevel and back bevel).

Group Similar Sides

This check box option, when enabled, causes similar faces of all characters in the font model to be grouped together, such as both bevels in one group and both faces in another group (as opposed to the default grouping, which has the extruded sides as the parent group to the front face, back face, front bevel and back bevel).

Add > Import…



This command imports a model into the current project, converting non-FACT and non-standard FACT files to the FACT format required by ElectricImage.

W

If the model you wish to add to the project is already in the ElectricImage FACT format, you do not need to use this command. Instead, use "Add > Model…" (page 1-12).

To import a model into the current project:

1. Choose **Add >** then **Import…** from the File menu.

A dialog box, as shown in Figure 1.18, opens.

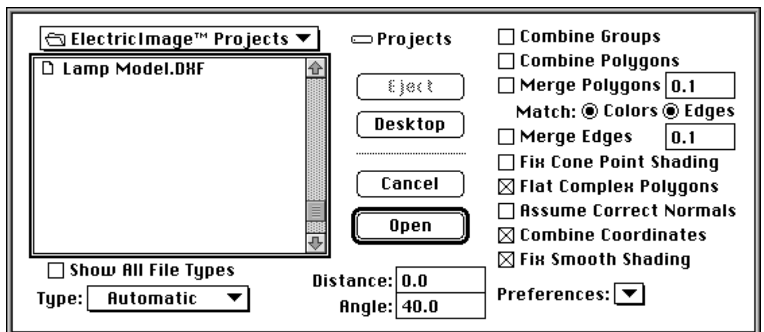


Figure 1.18 Dialog box used to convert a model to FACT format

2. Open the folder where the model is located.

3. If the model is not listed in the directory, either click the **Show All File Types** check box or select the correct format from the **Type** pop-up menu.

W

Most files can be opened with the Automatic file format (the default in the Type pop-up menu).

Figure 1.19 (page 1-23) provides a list of the file formats that ElectricImage can import.

Figure 1.19 Table of formats that ElectricImage can import

Alias Sketch! (Styleguide export)
Architrion II
Autodesk 3D Studio
Cad-3D (an Atari format)
Cubicomp
Cyberware
DXF (Macintosh and PC DXF files are supported)
Dynaware—Dynaperspective
FACT—ElectricImage model file format
Filmroll
Generic (a text file)
Lightwave (Newtek Video Toaster™)
MacConcept
Mac 3D (text files only)
Movie.BYU
MPS Demo (Evans & Sutherland)
OFF (.geom)—Digital Equipment Corporation
OSU (.DETail)—Ohio State University
Phoenix 3D
Sculpt 3D (Amiga and Macintosh)
Super 3D (text file only)
Swivel 3D
TWGES (for VersaCAD/PC)
Videoscape (an Amiga file format)
Wavefront .OBJ
Zing (Pro 3D)
Zoom
3D Turbo
3DGF Binary (Macromind 3D)

4. Use the controls in the dialog box to select import options (if desired). For an explanation of these controls, refer to the section “Import Options” (page 1-25).

5. Click on the model file and click **Open**.

   The model is converted to FACT format and added to the current project.

W

If the model selected is in Cyberware format, a dialog box opens for you to set import preferences. For information on these controls, refer to the section “Cyberware Import Preferences” (page 1-29).

Import Options

Combine Groups

This check box option, when enabled, takes a model file with many groups and places all the entities into a single group in the file. If the result is saved as a FACT file, all of the entities are placed in a single group; if the result is saved as a DXF file, all of the entities are placed in a single layer, etc.

W

This option does not smooth shade across merged groups; you must re-import the saved FACT file to smooth shade the entire group.

Combine Polygons

This check box option, when enabled, searches the database for duplicate polygons—that is, polygons occupying the exact same space. This can be a time consuming process if you are converting large models, and only needs to be used if there is some kind of shading irregularity (if a model appears to have a consistent shading glitch, it may have a duplicate polygon in the area of the glitch). Use this option to correct the problem. You can select Get Info from the File menu before and after to check the polygon count and see if any polygons were removed.

Merge Polygons

This check box option, when enabled, sorts through the database, locating all co-planar polygons (polygons which lie on the same plane) and fuse them together, forming one complex polygon. Its effects can be modified, depending upon your choice of the sub-options.

- The edit box contains a value for the angle tolerance to be used when determining whether or not polygons are co-planar. The default is set to 0.5°.
- The **Match Colors** radio button option, when selected, prevents polygons with different colors from being merged, when using the Merge Polygons option. (This defaults to on, since you would most likely wish to retain colored polygons. If for some reason you not wish to retain unique colors, de-select the button.)

- The **Match Edges** radio button option, when selected, will force both ends of an edge to share points before the two polygons can be merged.

  Note that turning off this feature allows two polygons to be merged if they share only one point and part of one edge.

Merge Edges

This check box option, when enabled, forces edges that fall within the angle tolerance (as indicated in the edit box) to merge. For example, a polygon with three points in a row on a straight edge would lose the middle point.

Fix Cone Point Shading

This check box option, when enabled, adjusts the apex of cones so that cones and cone–like shapes will shade correctly (if not enabled, seams will appear). If your data contains one or more cone–like entities, you may wish to turn this option on. Most models don't need this option, so it defaults to off to save time.

Flat Complex Polygons

This check box option, when enabled, prevents shading artifacts (e.g., wrinkles) from appearing on complex polygons (a polygon with more than four vertices). It defaults to on.

Combine Coordinates

This check box option, when enabled, ensures that polygons which share edges also share vertices. You can also use it to seal vertices, that is, weld points together, which fall within the tolerance indicated in the Distance edit box, to the left of the Combine Coordinates check box. This is an optimization feature which ensures that your models will smooth shade correctly.

Fix Smooth Shading

This check box option, when enabled, determines the angle at which a hard edge appears between polygons. The default is 40˚, which appears in the Angle edit box to the left of the Fix Smooth Shading check box.

This feature works by comparing the angle of the polygon to the angle of the polygon next to it. If the angle is greater than the value in the Angle edit box, the polygon will shade as a hard edge. If the angle is less than the value in the Angle edit box, the edge will smooth shade. You may change the angle in the edit box to suit the model you are importing. If there is a question as to what the correct angle should be, try a test rendering in ElectricImage.

Preferences

This pop-up menu provides a means of setting preferences for importing DXF and Alias Sketch files.

DXF…

Choosing DXF opens a dialog box, as shown in Figure 1.20.

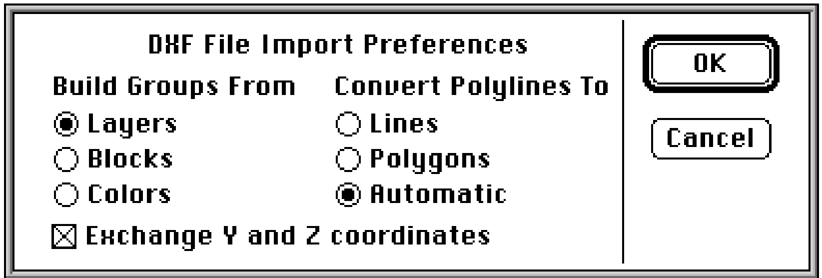


Figure 1.20 Dialog box to set DXF file import preferences

- Build Groups From

  These radio buttons offer a choice of building groups from layers, blocks or colors. The Colors option puts all elements of the same color into a single group.

- Convert Polylines To

  These radio buttons offer a choice of methods for converting closed polylines into complex polygons. The Automatic option will examine the file and attempt to identify which method to use. Otherwise, you can select the Lines or Polygons methods. The Lines options always converts closed polylines to lines as defined by Autodesk. The Polygons option always converts closed polylines to polygons.

W

These choices are provided so that DXF files that do not follow the Autodesk standard can be imported into ElectricImage.

- Exchange Y and Z coordinates

  This check box, when enabled, causes the model to be imported with its Y and Z coordinates exchanged (useful for models created in programs that use different 3D coordinate orientations).

Alias Sketch!…

Choosing **Alias Sketch!** opens a dialog box, as shown in Figure 1.21.

Figure 1.21 Dialog box to set Alias Sketch file import preferences

The **Surface Edges** edit box contains a value for the number of edges to use in breaking up splines and patches when converting them to polygons.

Cyberware Import Preferences

When a Cyberware model is imported, a dialog box, as shown in Figure 1.22, opens.

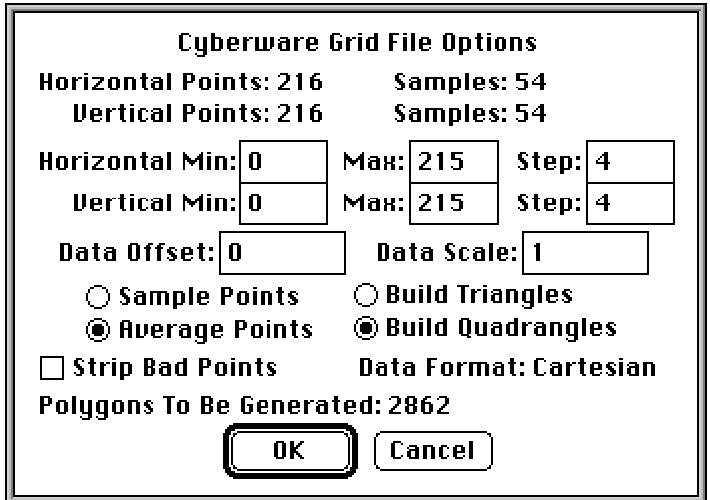


Figure 1.22 Dialog box used to set Cyberware import preferences

Horizontal Points This is the number of horizontal point samples in the file.

Horizontal Samples This is the number of horizontal samples in the output polygon mesh (calculated using the horizontal minimum, maximum and step values).

Vertical Points This is the number of vertical point samples in the file.

Vertical Samples This is the number of vertical samples in the output polygon mesh (calculated using the vertical minimum, maximum and step values).

Horizontal Min This edit box contains a value for the minimum horizontal range of sampled points for conversion to a polygon mesh. The minimum allowable value is zero.

Horizontal Max This edit box contains a value for the maximum horizontal range of sampled points for conversion to a polygon mesh. The maximum allowable value is the number of horizontal points in the file minus 1.

Horizontal Step This edit box contains a value for the number of points to skip over for each horizontal vertex of the mesh. This option is provided to reduce the total number of generated polygons.

Vertical Min This edit box contains a value for the minimum vertical range of sampled points for conversion to a polygon mesh. The minimum allowable value is zero.

Vertical Max This edit box contains a value for the maximum vertical range of sampled points for conversion to a polygon mesh. The maximum allowable value is the number of vertical points in the file minus 1.

Vertical Step This edit box contains a value for the number of points to skip over for each vertical vertex of the mesh. This option is provided to reduce the total number of generated polygons.

Data Offset This edit box contains a value used to create wrinkled spheres and cylinders or to change the base altitude of terrain maps.

Data Scale This edit box contains a value used to modify the altitude of the polygon mesh vertices.

Sample Points This radio button option, when enabled, ignores skipped points, creating a more precise mesh (but producing more jagged results).

Average Points This radio button option, when enabled, averages skipped points, creating a smoother mesh (recommended when either the horizontal or vertical step is greater than zero).

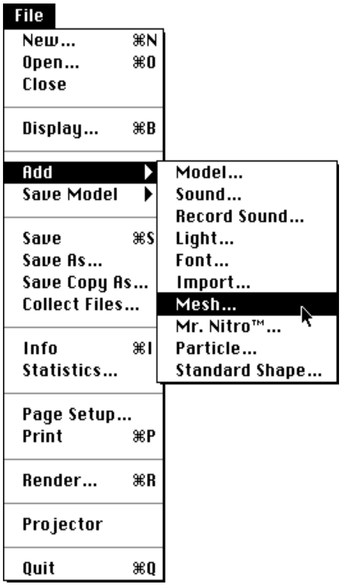
Build Triangles This radio button option, when enabled, converts the imported mesh to triangles.

Build Quadrangles This radio button option, when enabled, converts the mesh to quadrangles. This is the recommended option because fewer polygons are created and they look better when rendered.

Strip Bad Points This check box option, when enabled, will not generate polygons from points which were not correctly sampled.

Data Format This information indicates the type of points in the Cyberware file—cartesian, cylindrical or spherical.

Add > Mesh…



This command adds the Mesh Generator to the project. The Mesh Generator is used to animate various shape transformations, primarily a plane into a sphere (or vice versa).

This command will only appear in the File menu if the Mesh Generator plug-in is stored in the EI Sockets folder. The Mesh Generator will then be accessible from the Object palette as well.

To add the Mesh Generator to the project:

1. Choose **Add** > then **Mesh…** from the File menu.

   A dialog box, as shown in Figure 1.23, opens.

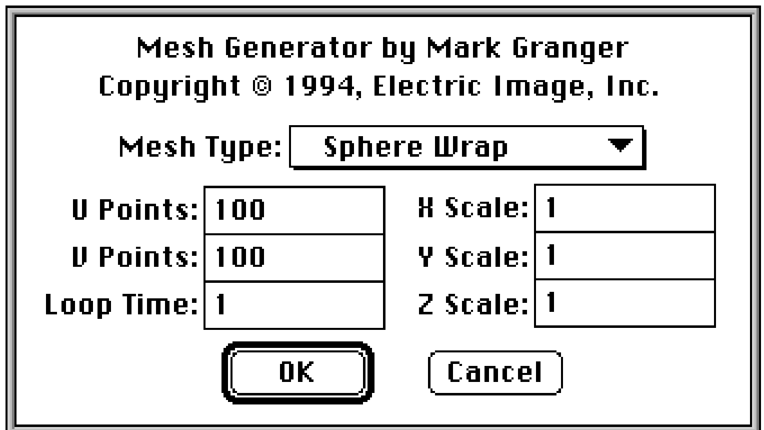
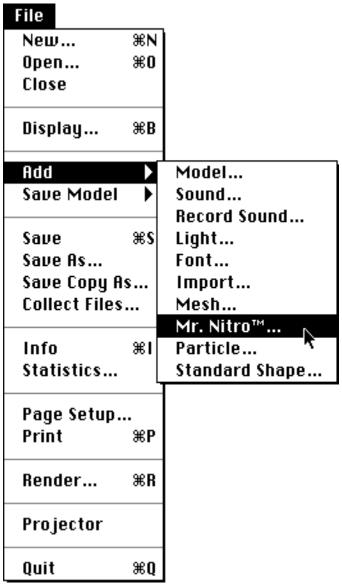


Figure 1.23 Mesh Generator dialog box

2. Select the mesh type, specify its attributes, and either click **OK** or press **Return**.

For more information on the use of the Mesh Generator plug-in, refer to "The Mesh Generator" (page 20-6) in Chapter 20: The Object Palette.

Add > Mr. Nitro™...



This command adds the Mr. Nitro™ special effect to the project. Mr. Nitro™ is used to animate realistic explosions of models.

W

This command will only appear in the File menu if the Mr. Nitro™ plug-in is stored in the EI Sockets folder. Mr. Nitro™ will then be accessible from the Object palette as well.

To add the Mr. Nitro™ special effect to the project:

1. Choose **Add** > then **Mr. Nitro™...** from the File menu.

   A dialog box, as shown in Figure 1.24, opens.

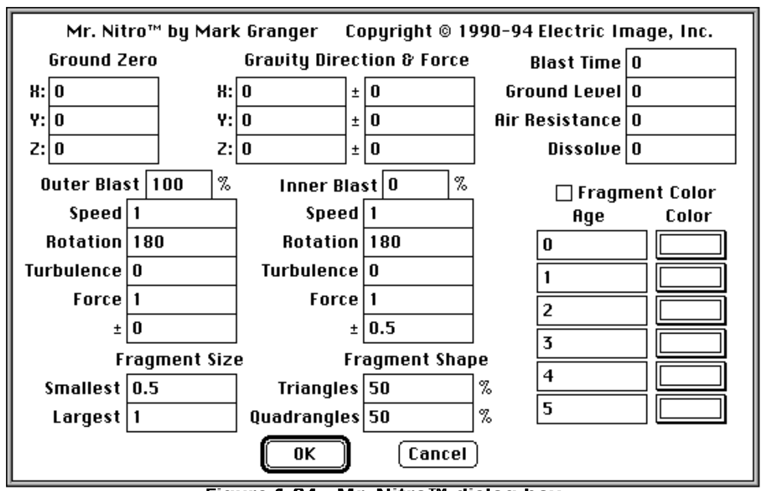


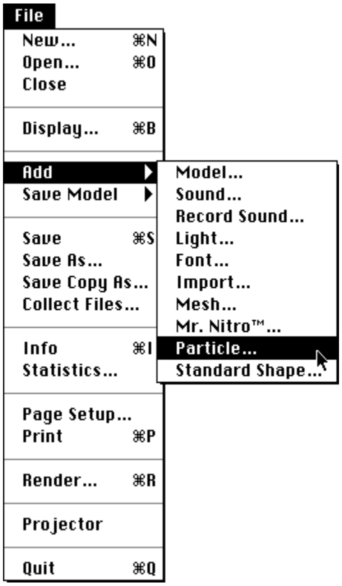
Figure 1.24 Mr. Nitro™ dialog box

2. Specify the attributes of the explosion, and either click **OK** or press **Return**.

W

For more information on the use of the Mr. Nitro™ plug-in, refer to "Mr. Nitro™" (page 20-9) in Chapter 20: The Object Palette.

Add > Particle…



This command adds the Particle Generator to the project. The Particle Generator is used to animate special effects such as sparks, jets of fire, and fountains or streams of water.

W

This command will only appear in the File menu if the Particle Generator plug-in is stored in the EI Sockets folder. The Particle Generator will then be accessible from the Object palette as well.

To add the Particle Generator to the project:

1. Choose **Add** > then **Particle…** from the File menu.

   A dialog box, as shown in Figure 1.25, opens.

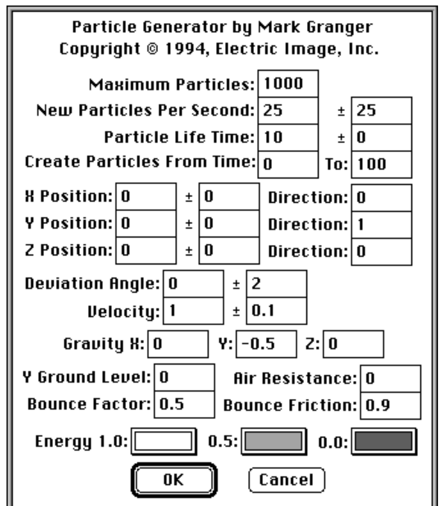


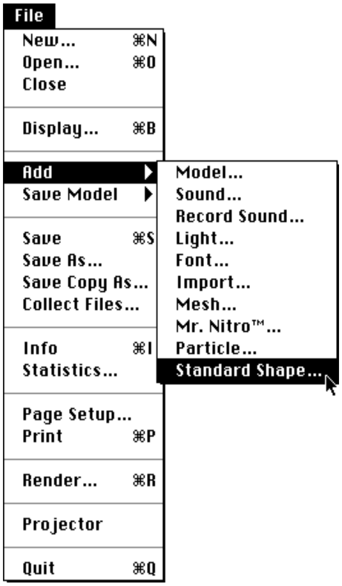
Figure 1.25 Particle Generator dialog box

2. Specify the attributes of the particle generator, and either click **OK** or press **Return**.

W

For more information on the use of the Particle Generator plug-in, refer to "The Particle Generator" (page 20-13) in Chapter 20: The Object Palette.

Add > Standard Shape...



This command adds a standard shape (or primitive) to the project. Standard shapes include planes, cubes, cylinders, cones and spheres.

W

This command will only appear in the File menu if the Standard Shapes plug-in is stored in the EI Sockets folder. Standard Shapes will then be accessible from the Object palette as well.

To add a standard shape to the project:

1. Choose **Add** > then **Standard Shape...** from the File menu.

   A dialog box, as shown in Figure 1.26, opens.

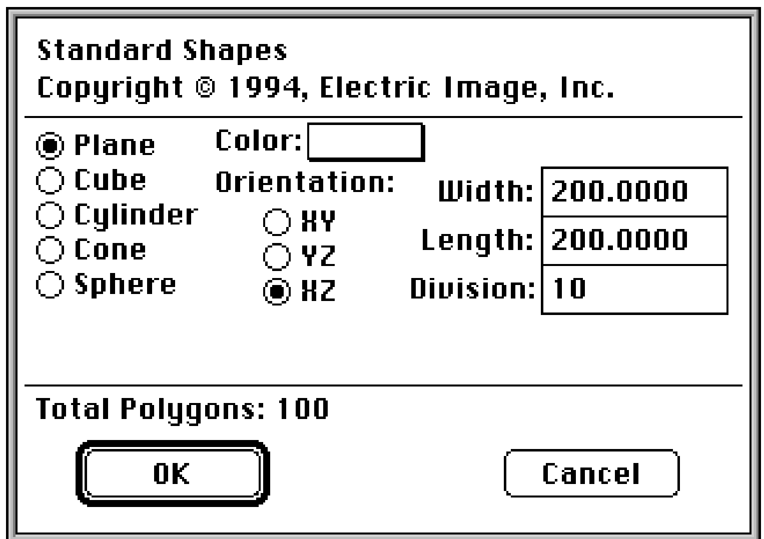


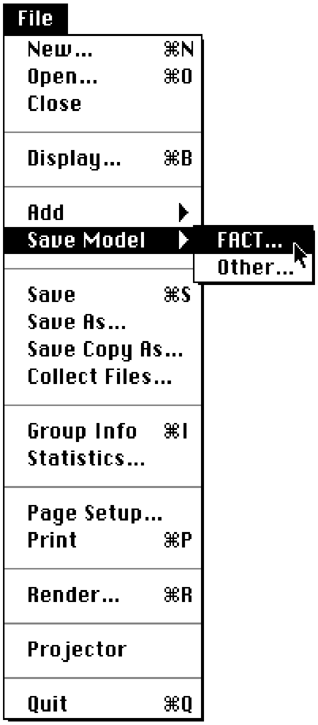
Figure 1.26 Standard Shapes dialog box

2. Choose the type of shape, specify its attributes, and either click **OK** or press **Return**.

W

For more information on the use of the Standard Shapes plug-in, refer to “Standard Shapes” (page 20-17) in Chapter 20: The Object Palette.

Save Model > FACT…



This command creates a new model in FACT format from selected model(s) in the current project.

To save a model:

1. Select the model(s) to be saved into a new model.
2. Choose **Save Model >** then **FACT…** from the File menu.

   A dialog box, as shown in Figure 1.27, opens.

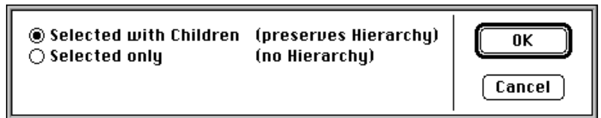


Figure 1.27 Dialog box used to set hierarchy

3. Specify whether or not you want to preserve a model's hierarchical structure by clicking the appropriate radio button.
4. Click **OK** or press **Return**.

   Another dialog box, as shown in Figure 1.28, opens.

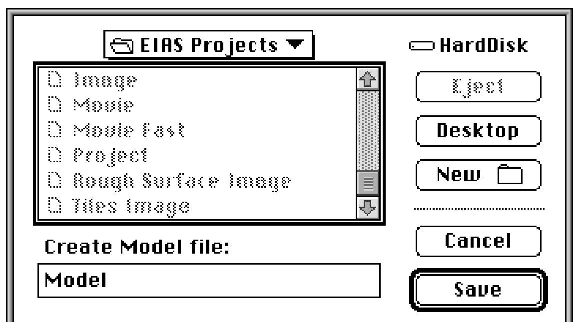
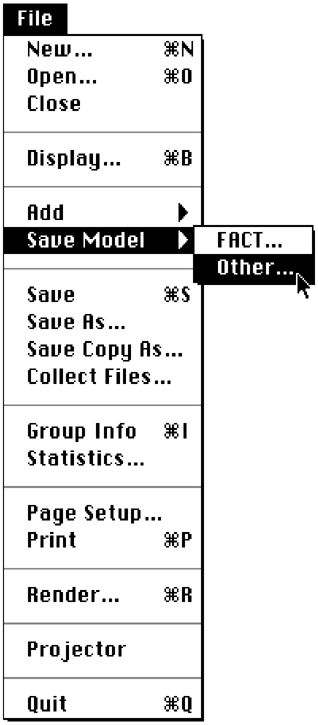


Figure 1.28 Directory dialog box used to save a model

5. Open the folder (or create a new folder) where the new model will be stored.
6. Replace the default name by typing a name for the new model (unless you want to use the default).
7. Click **Save** or press **Return**.

Save Model > Other…



This command creates a new model from selected model(s) in the current project and converts the model from ElectricImage FACT format to any number of commonly used file formats.

To save a model in a non-FACT format:

1. Select the model(s) to be saved into a new model.
2. Choose **Save Model >** then **Other…** from the File menu.

   A dialog box, as shown in Figure 1.29, opens.

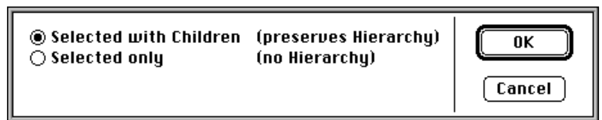


Figure 1.29 Dialog box used to set hierarchy

3. Specify whether or not you want to preserve a model's hierarchical structure by clicking the appropriate radio button.
4. Click **OK** or press **Return**.

   Another dialog box, as shown in Figure 1.30, opens.

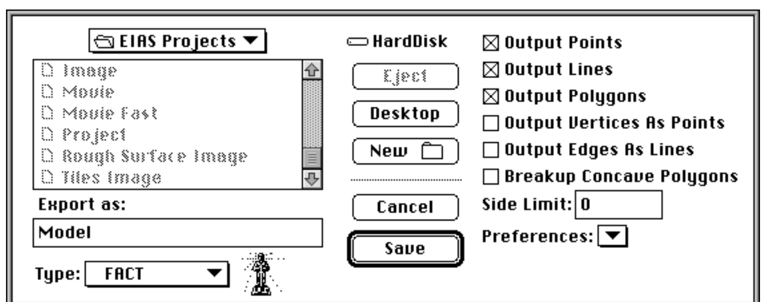


Figure 1.30 Directory dialog box used to export a model

5. Open the folder (or create a new folder) where the new model will be stored.
6. Replace the default name by typing a name for the new model (unless you want to use the default).
7. Select the export model type from the **Type** pop-up menu.

Figure 1.31 provides a list of file formats that ElectricImage can export.

Figure 1.31 Table of formats that ElectricImage can export

DXF (Macintosh and PC DXF files are supported)
Dynaware—Dynaperspective
FACT (ElectricImage file format)
Lightwave (Newtek Video Toaster™)
Movie.BYU
MPS Demo (Evans & Sutherland)
Sculpt 3D
Super 3D (text file only)
Videoscape (an Amiga file format)
Wavefront (.OBJ)
Zoom
3DGF (Macromind 3D)

8. Use the controls in the dialog box to select export options (if desired). For an explanation of these controls, refer to the section “Export Options” (page 1-38).

9. Click **Save** or press **Return**.

Export Options

Output Points This check box option, when enabled, allows the saved model file to contain point data (otherwise points will be filtered out of the model file). Since ElectricImage renders point data, this option defaults to on.

Output Lines This check box option functions the same as the **Output Points** option, above, except that it applies to lines instead of points. Since ElectricImage also renders lines, this option defaults to on as well.

Output Polygons This check box option, when enabled, allows the output of polygons in the model file. If you do not wish to have polygons contained within the file, then uncheck this button. Since polygons give an object its “skin” this option defaults to on.

Output Vertices as Points This check box option, when enabled, generates points at every vertex contained within the model file. Turning off the other output options and leaving this one on results in a mesh of points to render.

Output Edges as Lines This check box option, when enabled, draws lines around the edges of all the polygons contained within the model file. It is useful for simulating grill work around transparent objects and so forth. Also, if you were to turn off all other output options but this one, the result would be a true wireframe representation of your model. Since two lines will be generated whenever two polygons share an edge, the wireframe can be simplified by re-importing the model with the Combine Polygons option turned on.

Breakup Concave Polygons This check box option, when enabled, forces the breakup of concave polygons (polygons which might be indented, such as a five pointed star), automatically converting them to convex. ElectricImage renders convex polygons only, so for FACT files, this option is always on. For other file formats this feature is optional, as those other formats, such as Super 3D, may be able to read concave polygons.

W

ElectricImage is not able to break up polygons that have edges that cross. Non-flat complex polygons can also cause problems when they are broken up.

Side Limit

This edit box contains a value that sets the maximum number of edges or sides for exported polygons. When exporting to Super 3D, for example, you could restrict the exported polygons to triangles and quadrangles by entering “4” into the side limit box. “0” (the default) sets the maximum number of sides supported by the export format.

Preferences

This pop-up menu enables you to reset the preferences to system defaults, or to set preferences for saving models in DXF format.

DXF...

Choosing DXF opens a dialog box, as shown in Figure 1.32.

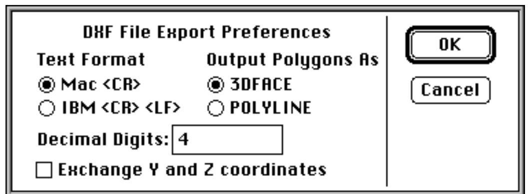


Figure 1.32 Dialog box to set DXF file export preferences

Text Format

These radio buttons give you a choice of text formats for the DXF file:

Mac

This mode (the default) follows text lines with a <CR> character.

IBM

This mode follows text lines with both <CR> and <LF> characters. This is the text format used on IBM PC and UNIX computers.

Output Polygons As

These radio buttons give you a choice of how polygons are output:

3DFACE

This mode (the default) outputs polygons as four-sided 3DFACE elements.

POLYLINE

This mode outputs polygons as multi-sided POLYLINE entities. Although this is not a “legal” AutoCAD DXF format, many other 3D modelers use it to store complex polygons.

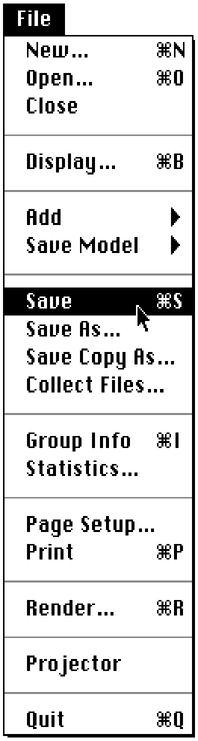
Decimal Digits

This edit box contains a value for the number of digits to the right of the decimal point to output to the DXF file.

Exchange Y and Z coordinates

This check box, when enabled, swaps the Y and Z coordinates of exported DXF files.

Save

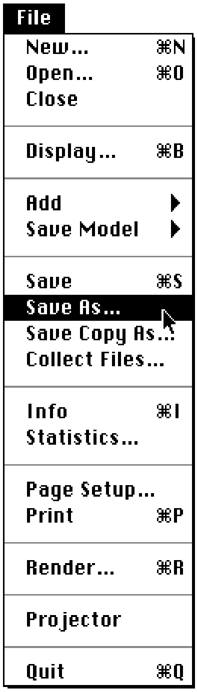


This command saves the current project (if you have made any changes).

To save the current project:

Choose **Save** from the File menu.

Save As…



This command creates a copy of the current project under a new name, after which the new *copy* becomes the current project.

W

See also* “Save Copy As…” (page 1-43), *which creates a copy of the current project under a new name, but maintains the original file as the current project.

To create a copy of the current project and work on the copy as the current project:

1. Choose **Save as…** from the File menu.

   A directory dialog box, as shown in Figure 1.33, opens.

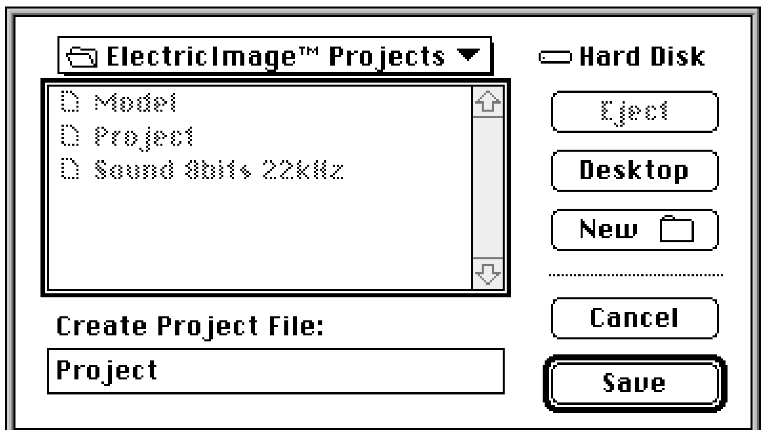
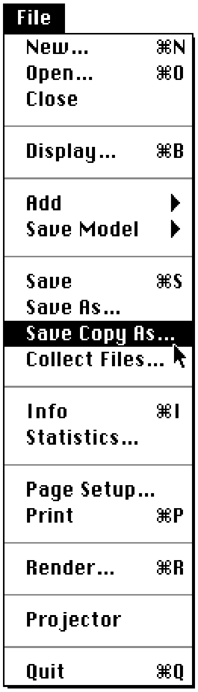


Figure 1.33 Directory dialog box used to save a copy of the project file

2. Open the folder (or create a new folder) where the copy of the project file will be stored.
3. Replace the default name by typing a name for the copy of the project file (unless you want to use the default).
4. Either click **Save** or press **Return**.

Save Copy As…



This command creates a copy of the current project under a new name, but maintains the *original* file as the current project.

See also **"Save As…" (page 1-42),** ***which creates a copy of the current project under a new name, after which the new copy becomes the current project.***

To create a copy of the current project and maintain the original file as the current project:

1. Choose **Save Copy as…** from the File menu.

   A directory dialog box, as shown in Figure 1.34, opens.

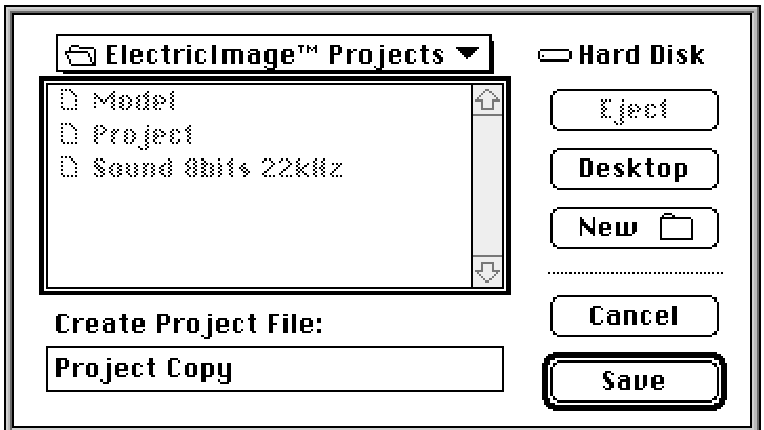


Figure 1.34 Directory dialog box used to save a copy of the project file

2. Open the folder (or create a new folder) where the copy of the project file will be stored.
3. Replace the default name by typing a name for the copy of the project file (unless you want to use the default).
4. Either click **Save** or press **Return**.

Collect Files…

This command copies all related model and image files of the current project into a collection in a designated folder (a copy of the project file is also included).

To collect the project files:

1. Choose **Collect Files…** from the File menu.

   A directory dialog box, as shown in Figure 1.35, opens.

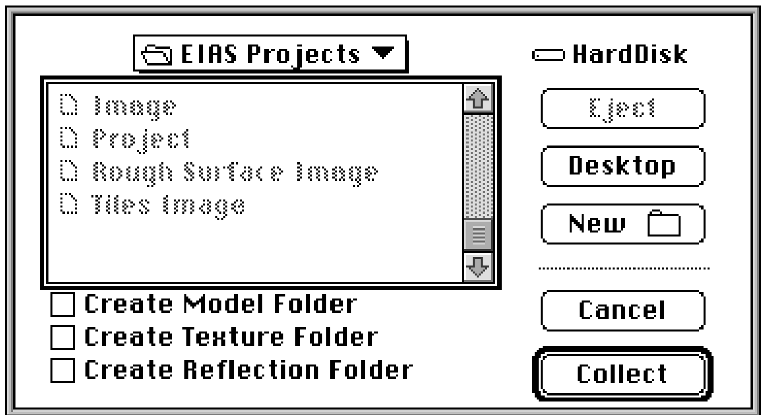


Figure 1.35 Directory dialog box used to collect project files

2. Open the folder (or create a new folder) where the files will be collected.
3. To create a new folder for the project's model(s), click **Create Model Folder**.

   To create a new folder for the project's texture(s), click **Create Texture Folder**.

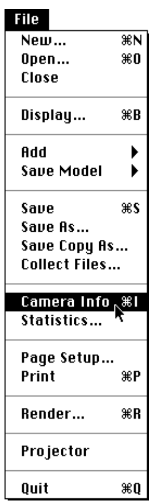
   To create a new folder for the project's reflection(s), click **Create Reflection Folder**.
4. Either click **Collect** or press **Return**.

[Camera/Light/Group/Sound] Info

This command is case-sensitive; that is, the menu item displayed depends upon what type of object is currently selected:

- If the camera is selected, the command is **Camera Info** (see below).
- If a light is selected, the command is **Light Info** (page 1-46).
- If a group is selected, the command is **Group Info** (page 1-46).
- If a soundtrack is selected, the command is **Sound Info** (page 1-47).
- If nothing is selected, the command is unavailable.

Camera Info



This command opens the Camera Info window, accessing settings for the camera's icon display in the World View windows, and its location, directionality, and orientation (yaw, pitch and roll).

To open the Camera Info window:

1. Click on the camera's icon (in either the World View or Project windows) to select it.
2. Choose **Camera Info** from the File menu.

W

For an explanation of the Camera Info window, refer to Chapter 10: The Camera Info Window.

Light Info

This command opens the Light Info window for the selected light, accessing settings for the light's light type, location, directionality, angle of coverage, shadow characteristics, color, intensity, and special effects such as glow and fog.

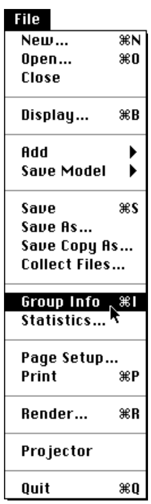
To open the Light Info window for a light in the project:

1. Click on the light's icon (in either the World View or Project windows) to select it.
2. Choose **Light Info** from the File menu.

W

For an explanation of the Light Info window, refer to Chapter 11: The Light Info Window.

Group Info



This command opens the Group Info window for the selected group, accessing settings for the group's location, orientation, scale, shading characteristics and surface attributes.

To open the Group Info window for a group in the project:

1. Click on the group's icon (in either the World View or Project windows) to select it.
2. Choose **Group Info** from the File menu.

W

For an explanation of the Group Info window, refer to Chapter 13: The Group Info Window.

Sound Info

This command opens the Sound Info window for the selected soundtrack, accessing settings for the track's playback speed and timing.

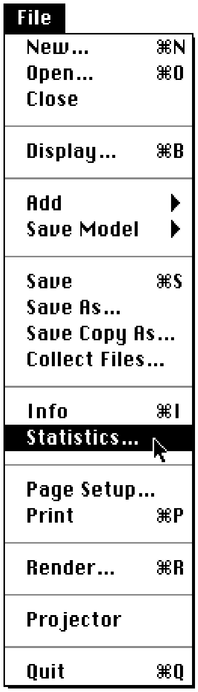
To open the Sound Info window for a soundtrack in the project:

1. Click on the soundtrack's icon (in the Project window) to select it.
2. Choose **Sound Info** from the File menu.

W

For an explanation of the Sound Info window, refer to Chapter 12: The Sound Info Window.

Statistics...



This command displays the following information about the current project:

- How many elements (camera, lights, groups) it contains
- How many vertices and polygons it contains
- How many model and image files it contains
- How much memory is in use and how much is available

To view the project statistics:

1. Choose **Statistics...** from the File menu.

   The Statistics dialog box, as shown in Figure 1.36, opens.

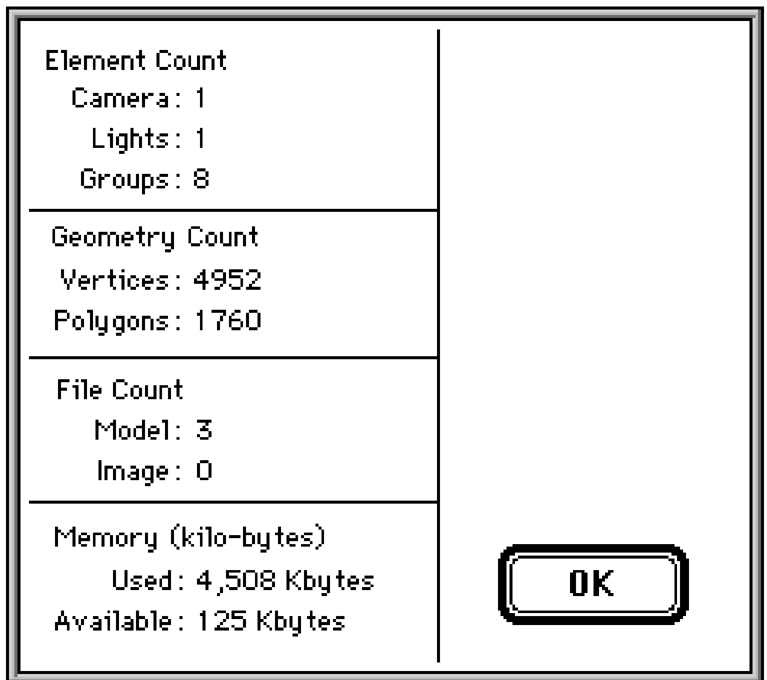
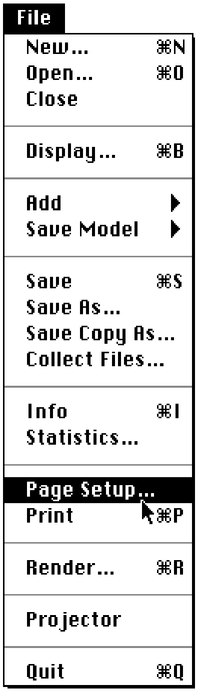


Figure 1.36 Statistics dialog box

2. When done, either click **OK** or press **Return**.

Page Setup…



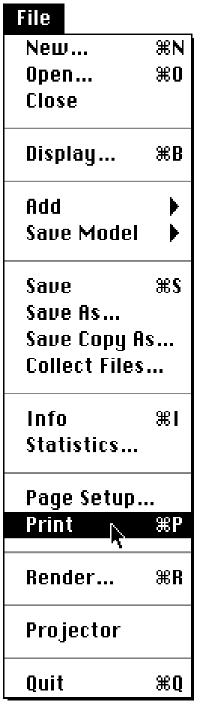
This command opens the standard Macintosh Page Setup dialog box for setting basic page attributes. For an explanation of what you can print in ElectricImage, refer to the section “Print” (page 1-50).

To set basic page attributes for printing:

Choose **Page Setup…** from the File menu.

The standard Macintosh Page Setup dialog opens for the printer selected in the Chooser.

Print



This command prints project data for the current project. It is the same data as seen in the Project window, which is discussed in *Chapter 8: The Project Window*.

To print the project data:

1. Choose **Print** from the File menu.

   A print dialog box opens for the printer selected in the Chooser (Figure 1.37 shows a dialog box for a generic laser printer).

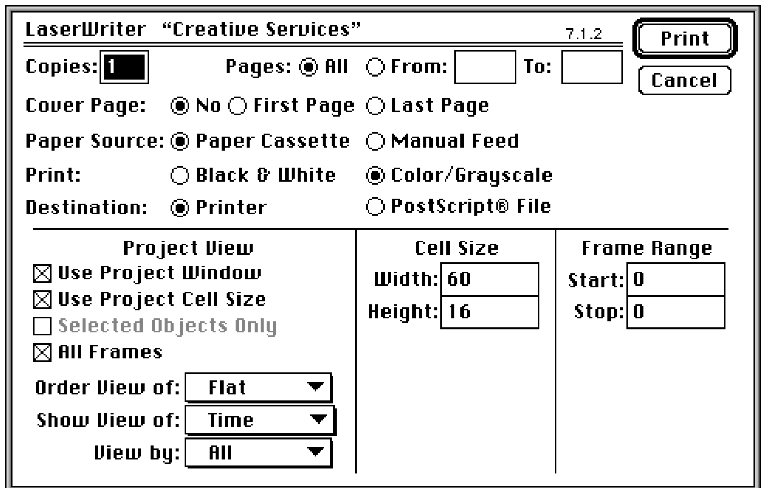


Figure 1.37 Print dialog box for generic laser printer

2. Use the controls in the dialog box to select your printing preferences. For an explanation of these controls, refer to the section "Printing Preferences" (page 1-51).

3. Either click **Print** or press **Return**.

W

If the amount of data to be printed is too large to fit on a single page, tiling is performed automatically.

Printing Preferences

Use Project Window This check box option, when enabled, prints the project data as it is currently displayed in the Project window. It defaults to on.

Use Project Cell Size This check box option, when enabled, uses the size of the data cells as they are currently set in the Project window. It defaults to on.

Selected Objects Only This check box option, when enabled, prints data for selected object(s) only.

All Frames This check box option, when enabled, prints the project data for all frames of the project. It defaults to on.

Order View by This pop-up menu gives you a choice of two display modes for the information. The menu choices are:

Flat

This option (the default) displays information in a flat list mode.

Hierarchy

This option displays information in a hierarchical mode (showing children grouped and indented beneath their parents).

Show View of This pop-up menu gives you a choice of printing project data from one of the four editing modes. The menu choices are:

Time

This option (the default) displays timing data.

Frame

This option displays frame data.

Keyframe

This option displays frame data with keyframes individually indicated.

Index

This option displays keyframe data only.

View by

This pop-up menu gives you a choice of what specific object class data to be printed. The menu choices are:

Position

This option displays object position data only.

Rotation

This option displays object rotation data only.

Scale

This option displays object scale data only.

Color

This option displays object color data only.

All

This option (the default) displays all object class data.

Custom…

This option opens a dialog box, as shown in Figure 1.38, which is used to select the specific object class data to be printed.

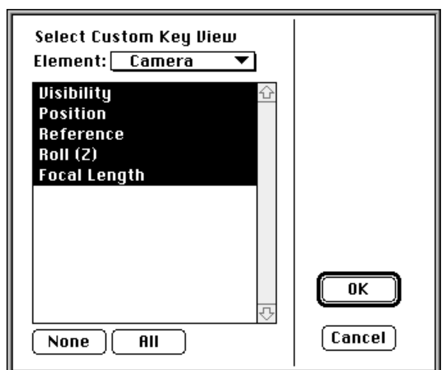


Figure 1.38 Dialog box used to select custom view

The dialog box's **Element** pop-up menu gives you a choice of **Camera**, **Light** and **Group**.

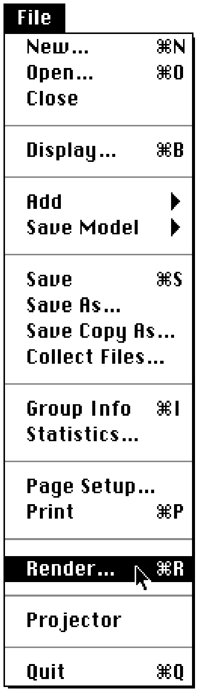
The list below the **Element** pop-up menu shows the kind of data available for the selected element.

To select data to display, click on the data in the list (shift-click to select more than one type of data from the list), then either click **OK** or press **Return**.

Cell Size Width and Height These edit boxes contain values that specify the width and height of the cells to be printed (if not using the project default values).

Frame Range Start and Stop These edit boxes contain values that specify the beginning and end frames of the data to be printed (if not using all frames).

Render…



This command opens the Render Control window, which is used to set the current project's global rendering attributes as well as to render the project.

To open the Render Control window:

1. Choose **Render…** from the File menu.

   The Render Control window opens, as shown in Figure 1.39.

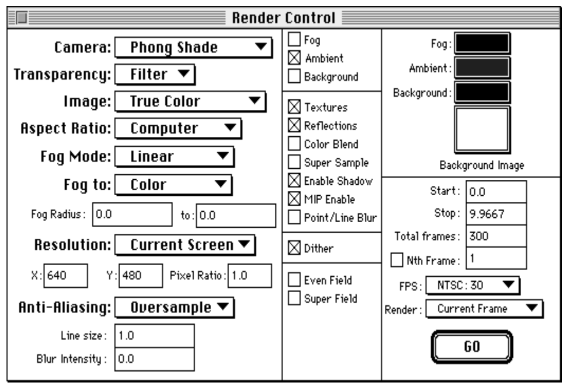


Figure 1.39 Render Control window

2. Use the window's controls to set the rendering attributes you want for the project (if you are not using the default settings).

   W

   For an explanation of the Render Control window and its use, see Chapter 9: The Render Control Window.

3. If you do not want to render the project at this time, you can close the window or reposition it.

   If you want to render the project at this time, click **Go**.

   (If you have made any changes to the current project, a dialog box opens and prompts you to save the changes.)

   A directory dialog box, as shown in Figure 1.40, opens, prompting you to enter a name for the rendered image file.

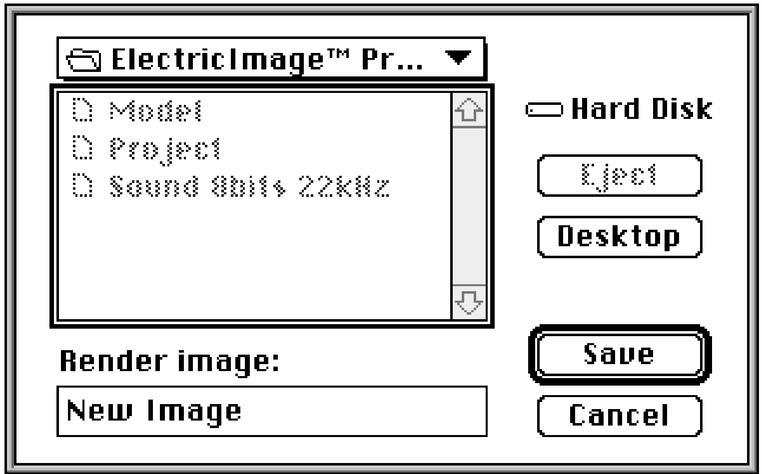


Figure 1.40 Directory dialog box used to save a rendered image file

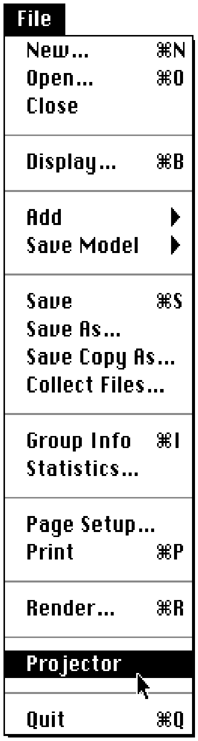
4. Open the folder (or create a new folder) where the project's image file will be stored.
5. Replace the default name by typing a name for the image file (unless you want to use the default name).
6. Either click **Save** or press **Return**.

   The ElectricImage application closes and the ElectricImage Camera is launched to render the project.

W

For an explanation of the ElectricImage Camera, refer to Chapter 22: The ElectricImage Camera.

Projector



This command closes the ElectricImage application and launches the Projector application, which is used to display rendered images and animations from ElectricImage projects, PICT files, and QuickTime movies. It also contains powerful functions for editing and applying filters to rendered images and animations.

To launch Projector:

Choose **Projector** from the File menu.

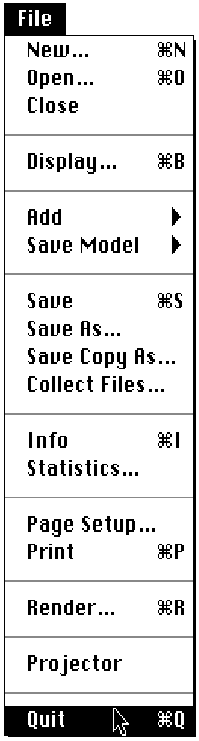
(If you have made any changes to a currently open project, a dialog box opens and prompts you to save the changes.)

The ElectricImage application closes and the Projector application opens.

W

For an explanation of the Projector application and its use, refer to The Projector Reference.

Quit



This command closes the current project and exits the ElectricImage Animation System.

To quit the ElectricImage Animation System:

Choose **Quit** from the File menu.

(If you have made any changes to a currently open project, a dialog box opens and prompts you to save the changes.)

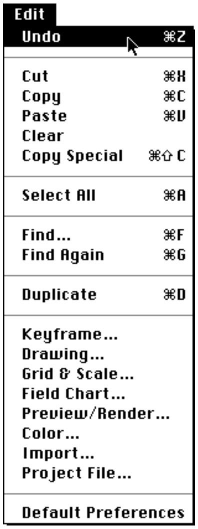
Chapter 2 The Edit Menu Commands

Chapter 2 The Edit Menu Commands

W

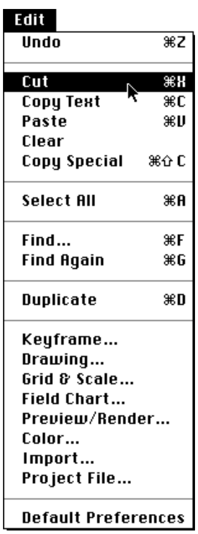
The Edit menu commands are different depending upon what windows are active and whether or not objects, text, textures, etc. are selected. When, for example, the Surface Editor is open, the preference selection commands are unavailable, but there is a Revert command to reset the surface attributes of the current group to their original settings.

Undo



This command undoes any changes that have been made in the current project. It is a single-level undo (only the last change is undone).

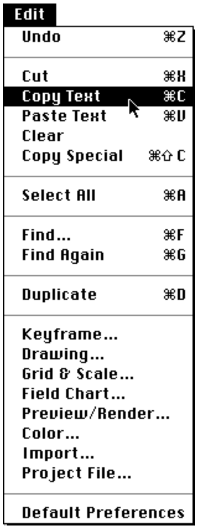
Cut



This command cuts the following kinds of information (when selected) from the current project and copies them to the scrap:

- surface attributes (from the Surface Editor)
- information in cells (from the Project window)
- text in edit boxes (from all windows with edit boxes)

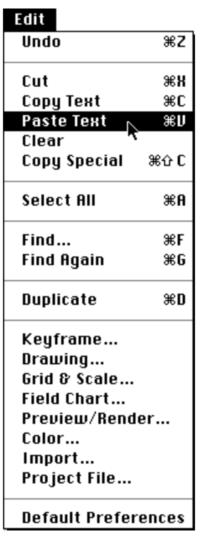
Copy



This command is case-sensitive; that is, the menu item displayed depends upon what window is active and what type of object is currently selected:

- If text is selected in an edit box, the command is **Copy Text** (as shown at left) and it copies the selected text to the scrap.
- If the Surface Editor is active, the command is **Copy Surface Color** and it copies the surface attributes to the scrap.
- If the Group Texture window is open and a texture is selected, the command is **Copy Texture Map** and it copies the selected texture to the scrap.
- If the Project window is active and a data cell is selected, the command is **Copy Cells** and it copies the selected cell data to the scrap.

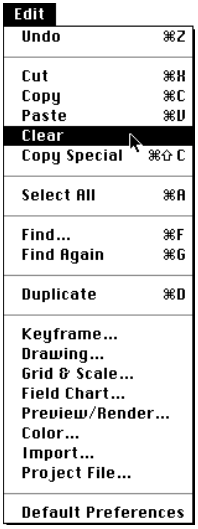
Paste



This command is case-sensitive; that is, the menu item displayed depends upon the type of data was copied to the scrap with either the **Cut** command (page 2-3) or **Copy** command (page 2-4):

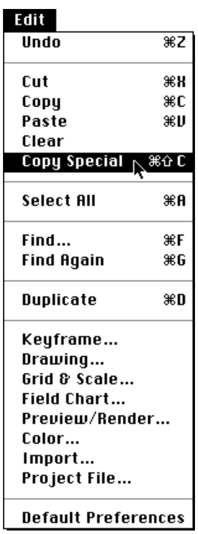
- If text was copied, the command is **Paste Text** (as shown at left) and it pastes the text into the selected edit box.
- If surface attributes were copied, the command is **Paste Surface Color** and it pastes the surface attributes into the selected group.
- If a texture was copied, the command is **Paste Texture** and it pastes the texture into the selected group.
- If cell data was copied, the command is **Paste Cell Text** and it pastes the cell data into the selected cell(s) in the Project window. Refer to “Selecting a Range of Frames” (page 8-13) in *Chapter 8: The Project Window* for more information.
- If Excel text was copied from a Microsoft Excel file into the clipboard or Scrapbook, the command pastes the text into the selected data cells in the Project window (page 8-13).

Clear



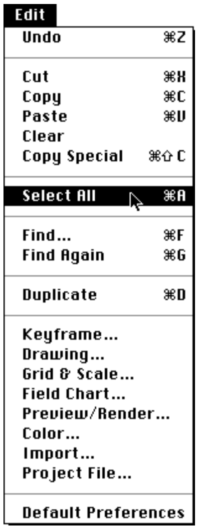
This command clears (deletes) selected models, lights and/or text fields from the project. It will not remove the camera.

Copy Special [Text]



This command copies text (the menu display is case-sensitive) when the standard **Copy** command (page 2-4) is being used to copy attributes.

Select All

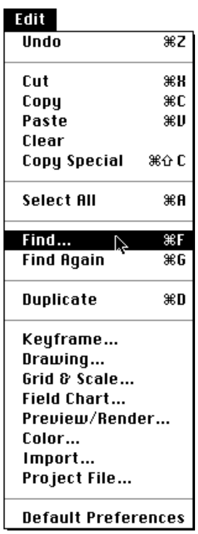


This command selects all cameras, lights and model groups in the current project.

W

Objects that are locked cannot be selected with this command. Objects are locked (or unlocked) in the Project window, as discussed in the section "The Object Status Panel" (page 8-17) in Chapter 8: The Project Window

Find...



This command is used to locate and select objects in the project.

To find an object:

1. Choose **Find...** from the Edit menu.

   A dialog box, as shown in Figure 2.1, opens.

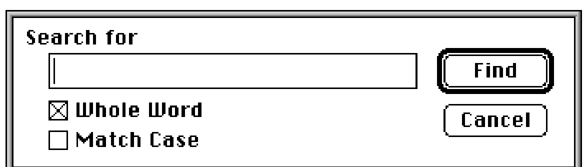
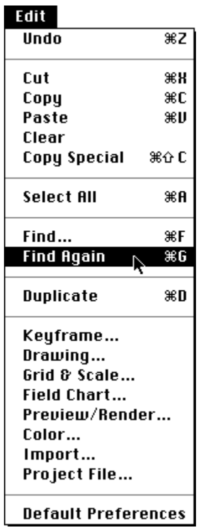


Figure 2.1 Dialog box used to find an object

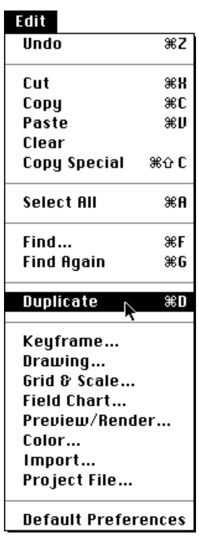
2. Type the name of the object or a search string.
3. Specify whether or not the search string is a whole word (the default) and whether or not to match the case of the letters.
4. Either click **Find** or press **Return**.

Find Again



This command re-executes the **Find...** command (page 2-6) using the same search criteria.

Duplicate

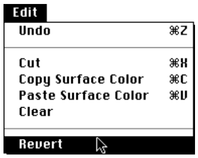


This command duplicates selected elements in the current project. It will not duplicate the camera.

W

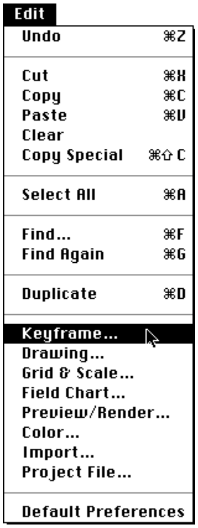
When an object is duplicated, all of its attributes are duplicated as well. If you are creating similar objects, set up the first object as desired (including textures for models), and then duplicate it.

Revert (available in Surface Editor only)



This command resets the surface attributes of the current group to its original settings.

Keyframe…



This command enables you to set your preferences for how keyframes are to be treated in the project.

To set your keyframe preferences:

1. Choose **Keyframe…** from the Edit menu.

   A dialog box, as shown in Figure 2.2, opens.

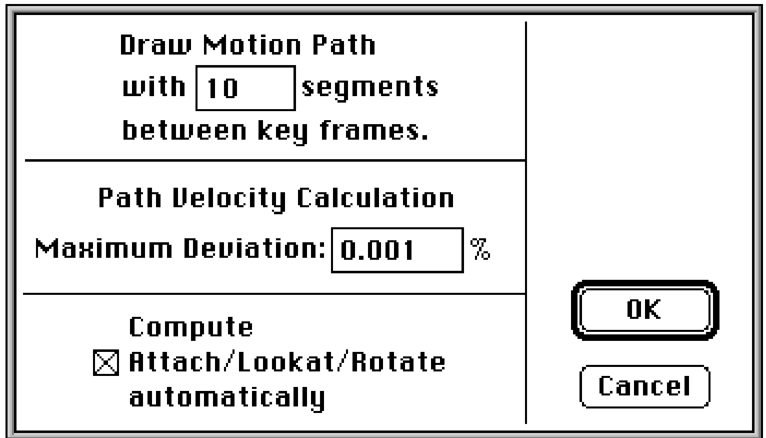


Figure 2.2 Keyframe Preferences dialog box

2. Use the edit boxes to set your preferences. For an explanation of these controls, refer to the section “Keyframe Preferences” (page 2-10).

3. To save the settings, click **OK**. Otherwise, click **Cancel**.

W

To reset the system’s default preferences at any time, choose **Default Preferences** ***from the Edit menu.***

Keyframe Preferences

Motion Path Segments

This edit box contains a value for the number of segments to be included in the animation path. The default is 5 line segments per spline between keyframes.

Path Velocity Calculation Maximum Deviation

This edit box contains a percentage value for the accuracy of calculation of the path. The default is 0.001%.

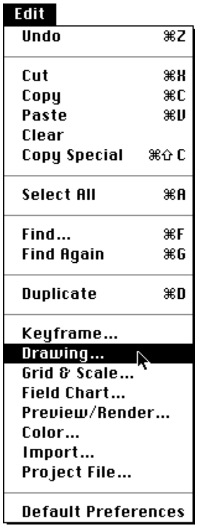
If a high value is specified, the calculation is less accurate but the algorithm runs faster. If a small value is specified, the calculation is more accurate, however the algorithm runs slower. You would generally change this value if the path is short and many frames are generated on it. The distances between frames could be so subtle that a large error factor could affect the output, so you can change the path deviation to generate a more correct path distance. The path deviation is the percentage of the exact path distance.

Compute Attach/Lookat/Rotate Automatically

This check box, enabled by default, determines whether or not custom frames will be automatically generated when the Attach to Object, Look at Object, and Auto Rotate Object functions are executed. If automatic frame generation is disabled, custom frames will be generated for these procedures only under the following conditions:

- When the project is rendered.
- When the project is previewed.
- When the **Calculate Auto Frames** command is chosen from the Keyframe menu, as discussed in the section “Calculate Auto Frames” (page 4-8) in *Chapter 4: The Keyframe Menu Commands*.

Drawing…



This command enables you to set your preferences for how the system draws models in the World View, Camera View and Group windows.

To set your drawing preferences:

1. Choose **Drawing…** from the Edit menu.

   A dialog box, as shown in Figure 2.3, opens.

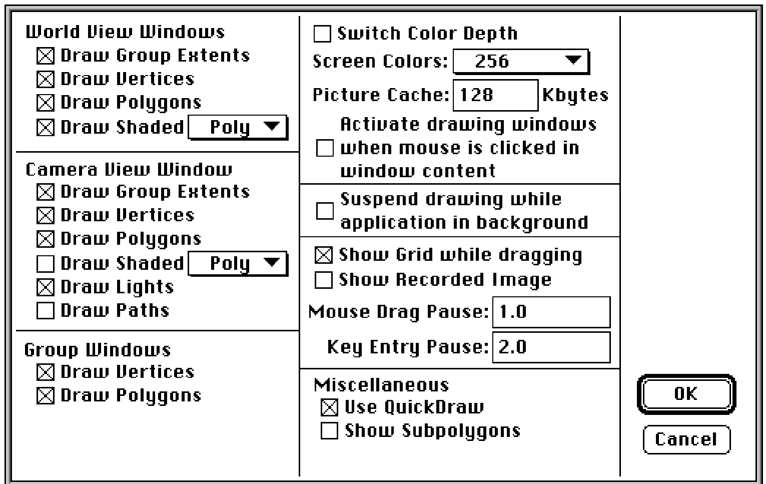


Figure 2.3 Drawing Preferences dialog box

2. Use the edit boxes, check boxes and pop-up menus to set your preferences. For an explanation of these controls, refer to the section “Drawing Preferences” (page 2-12).

3. To save the settings, click **OK**. Otherwise, click **Cancel**.

W

To reset the system’s default preferences at any time, choose Default Preferences from the Edit menu.

Drawing Preferences

Drawing Detail (World View, Camera View, Group Windows)

These check box options, when enabled, specify the level of detail to be drawn in the World View, Camera View and Group windows, as well as the inclusion of lights and motion paths in the Camera View window. The four levels of drawing detail (from lowest level to highest level) are:

Draw Group Extents

Group extents are cubes that surround groups and show only the space in which groups exist. When this option is enabled, group extents are drawn, as shown in Figure 2.4.

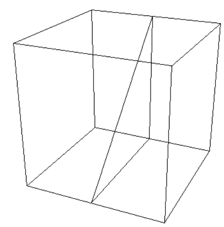


Figure 2.4 Example of Group Extents level drawing

Group extents also indicate, by way of a diagonal line through the center of the cube, in which direction the model is facing as it was imported into ElectricImage. The front face of the model is where the diagonal line touches the bottom of the cube.

Draw Vertices

Vertices are points that define a whole polygon. When this option is enabled, vertices are drawn, as shown in Figure 2.5.

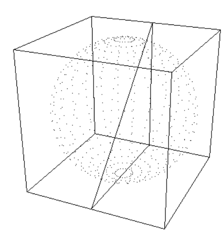


Figure 2.5 Example of Vertices level drawing

In Figure 2.5, the model is a sphere, and the vertices of the sphere appear as points that are visible around the sphere.

Draw Polygons

Polygons are geometric entities used to denote a surface or skin of the model. When this option is enabled, polygons are drawn, as shown in Figure 2.6.

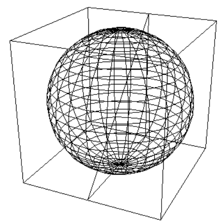


Figure 2.6 Example of Polygons level drawing

In Figure 2.6, the model is a sphere, which is more clearly apparent when the polygons are indicated.

Draw Shaded

This option shades the polygons of the group, accounting for the current lighting in the scene. There are two methods of shaded drawing, selected from the pop-up menu: Poly and Pixel.

Shaded Poly level drawing is flat, with no smoothing, as shown in Figure 2.7.

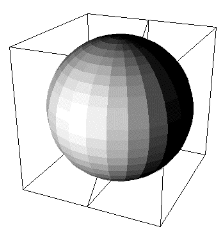


Figure 2.7 Example of Shaded Poly level drawing

Shaded Pixel will draw smooth spotlighted areas—at the expense of processing speed.

Other Camera View Window Drawing Options

The Camera View window also has the following check box options:

Draw Lights

When enabled, any lights within the camera's angle of view will be drawn in the Camera View window.

Draw Paths

When enabled, motion paths of animated objects will be drawn in the Camera View window.

Switch Color Depth

This check box option, when enabled, switches color depth on the fly, as needed, to the proper setting.

Screen Colors

This pop-up menu gives you a choice of screen colors, though it is dependent on the display card in use. The menu choices are:

2

4

16

256 (the default and recommended, as it is the fastest to update)

Thousands

Millions

Picture Cache

This edit box contains a value for the number of kilobytes to be set for the picture cache—the amount of memory (in kilobytes) set aside for the background image. Since the background image is fetched from the disk a piece at a time, the complete frame buffer memory of the image does not need to be allocated. This feature enables you to specify how much of the total memory can be allocated so that you can continue working with the project. It also enables you to read in large images (up to 4K) without running out of memory. There is also a speed increase with larger buffers as the image grows in size.

Activate drawing windows when mouse is clicked in window content

This check box option, when enabled, causes World View windows to be activated when you click in them.

Suspend drawing while application in background

This check box option, when enabled, suspends drawing (and processing) in ElectricImage while the ElectricImage application is in the background. Use this option when ElectricImage drawing may slow down another application (such as Projector) that you have running in the foreground.

Show Grid while dragging

This check box option, when enabled, displays the grid in the Camera View window while the camera is being dragged. Showing the grid provides a better frame of reference for viewing the scene.

Show Recorded Image

This check box option, when enabled, shows the actual picture rendered when a pixel aspect ratio of other than 1 is set in the Render Control window (as this would cause the rendered image to be taller or wider, depending upon the setting).

Mouse Drag Pause

This edit box contains a value (in seconds) for the time interval between the moment when camera dragging stops and the image is redrawn in the Camera View window. This allows the extent box display to remain for a specified period of time before wireframe information is drawn.

Key Entry Pause

This edit box contains a value (in seconds) for the time interval between the moment when key entry stops and the image is redrawn in the Camera View window. This allows the extent box display to remain for a specified period of time before wireframe information is drawn.

Miscellaneous

These check box options indicate the preferred drawing routine and whether or not subpolygons are to be drawn in constructing models.

Use QuickDraw

This check box option, when enabled, uses QuickDraw (the default) rather than the ElectricImage routine. For faster drawing, particularly for previews, deselect it. For an explanation of previews, refer to the section “Previewing Animations” (page 7-9) in *Chapter 7: The Camera View Window*.

Show Subpolygons

This check box option, when enabled, draws fully detailed constructions of models, including subpolygons (at a cost of slower performance.)

Figure 2.8 shows an example of a font model drawn with **Use Subpolygons** disabled.

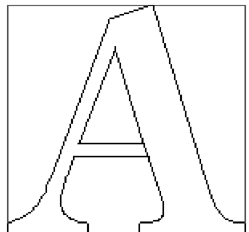


Figure 2.8 Example of model drawn without subpolygons

It shows a multi-sided polygon, along with the three- and four-sided subpolygons that the render uses. This is a more “viewable” form of the type face.

Figure 2.9 shows an example of a model drawn with **Use Subpolygons** enabled. Note the extra information being drawn on the type face.

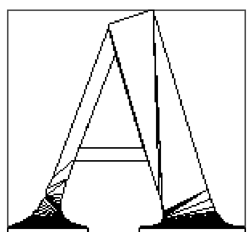
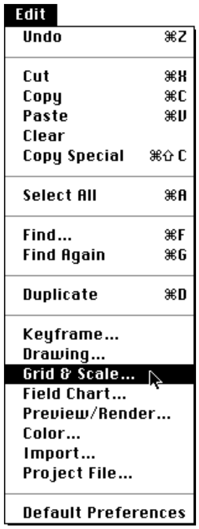


Figure 2.9 Example of model drawn with subpolygons

It shows the actual polygons that the render will use to generate an image of the type.

Grid & Scale…



This command enables you to set your preferences for the origin and scale of grids, and for the display of ruler bars, numbers and objects close to the camera.

W

In ElectricImage, scale is used as a relative means of display, and is not related to measurements such as inches, millimeters, etc. It is keyed to the scale of the first object added to the project.

To set your grid, rulers and number display preferences:

1. Choose **Grid & Scale…** from the Edit menu.

A dialog box, as shown in Figure 2.10, opens.

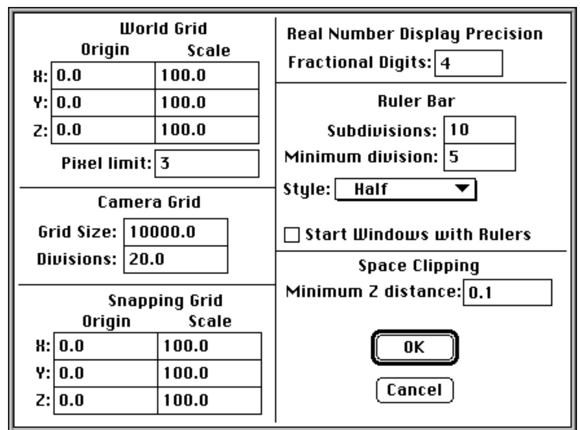


Figure 2.10 Grid & Scale Preferences dialog box

2. Use the check boxes, edit boxes and pop-up menus to set your preferences. For an explanation of these controls, refer to the section “Grid & Scale Preferences” (page 2-18)

3. To save the preferences, click **OK** or press **Return**.

W

To reset the system’s default preferences at any time, choose **Default Preferences** ***from the Edit menu.***

Grid & Scale Preferences

World Grid Origin and Scale

These edit boxes contain values for the location and scale of the grid in the World View windows. They default to origins of 0 for the X, Y and Z coordinates, and to a scale value of 100.

World Grid Pixel limit

This edit box contains a value that specifies (in number of pixels) how close two parallel grid lines can be drawn in the world view windows. This feature can help you avoid the situation where all grid lines touch each other or are being drawn on top of each other, resulting in a solid background (negating the effect of grid limit). More dense or sparse grid spacing can thus be set by changing the pixel limit. A larger pixel limit also means faster grid update (fewer grid lines to draw). Pixel limit does not apply to the Camera View window because there are no two projected lines that are parallel.

Camera Grid Size

This edit box contains a value for the size or area of the grid that can be shown in the Camera View window.

Camera Grid Divisions

This edit box contains a value for the number of divisions in the Camera View window grid. As the size of the camera grid is increased, it is a good idea to increase the number of divisions (to maintain the appearance of the grid). These divisions do not represent fixed values, and are rescaled depending upon the zoom factor of the window. To cancel division scaling (forcing the divisions to be fixed) set the pixel limit to a small number, such as 1 or 2.

Snapping Grid Origin and Scale

These edit boxes contain values for the location and scale of the invisible grid to which elements in the file will “snap” when placed.

W

Grid snap can be toggled on and off using either the Snapping Grid tool on the Tool Palette, as discussed in the section “The Snapping Grid Tool” (page 19-12) in Chapter 19: The Tool Palette, or the caps lock key.

Real Number Display Precision Fractional Digits

This edit box contains a value that specifies the number of digits that will appear after the decimal point in real numbers (such as those contained in edit boxes). The default is 4 (such as 2.3456).

Ruler Bar Subdivisions and Minimum Divisions

These edit boxes contain the number of subdivisions (default is 10) and minimum division (default is 5) for the rulers when displayed.

Ruler Bar Style

This pop-up menu selects the style of ruler to be displayed. The menu choices are as shown in Figure 2.11:

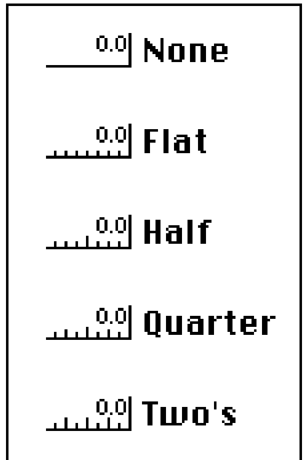


Figure 2.11 Ruler styles

Start Windows with Rulers

This check box option, when enabled, sets automatic inclusion of the rulers when the World View windows are displayed.

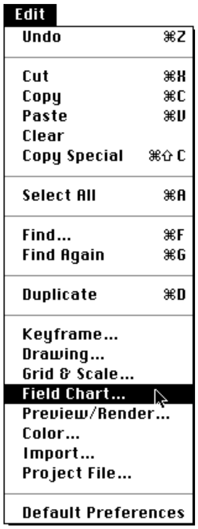
W

The rulers can be toggled on and off using the Show Rulers command in the Windows menu (Command-M), as discussed in the section "Show/Hide Rulers" (page 3-14) in Chapter 3: The Windows Menu Commands.

Space Clipping Minimum Z Distance

This edit box contains a value that specifies the distance out from the camera for which information in the Camera View window will be clipped (also known as the "hither clipping plane").

Field Chart…



This command enables you to set your preferences for the display of a field chart in the Camera View window.

A field chart is a grid subdivided into quadrants, which are further subdivided into fields. Each field maintains the aspect ratio of the current format resolution.

Figure 2.12 shows a standard field chart (said to be a 12 field chart), twelve fields across by twelve fields high.

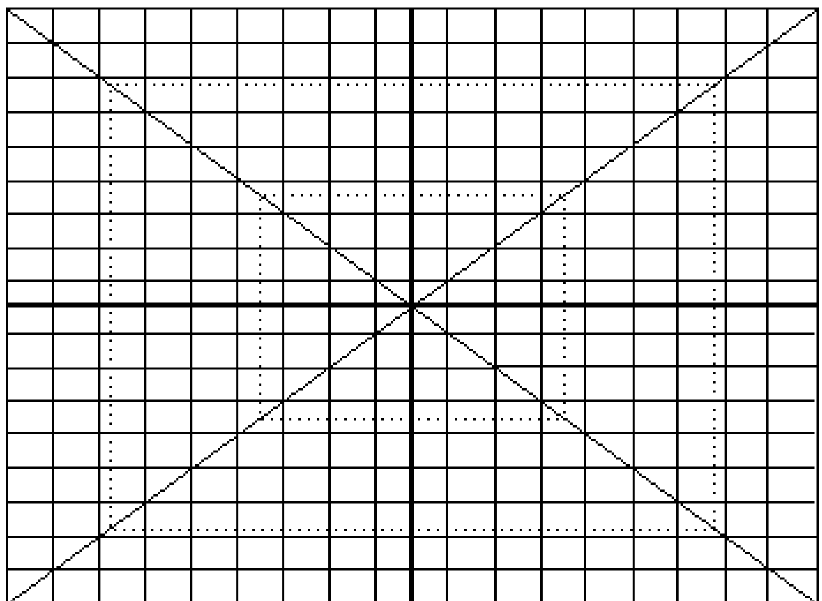


Figure 2.12 Standard field chart

Components of the field chart can be individually activated or deactivated, and the colors of these components are selectable, as described in the following procedure.

To set your field chart preferences:

1. Choose **Field Chart…** from the Edit menu.

   A dialog box, as shown in Figure 2.13, opens.

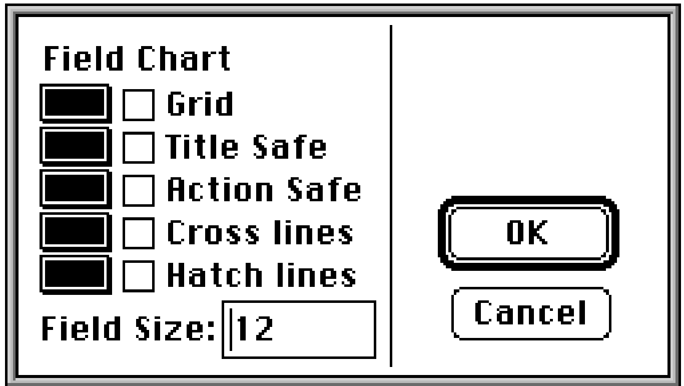


Figure 2.13 Field Chart Preferences dialog box

2. Use the check boxes and color buttons to set your preferences. For an explanation of these controls, see the section “Field Chart Preferences” (page 2-22).

3. To save the preferences, click **OK** or press **Return**.

W

To reset the system’s default preferences at any time, choose **Default Preferences** ***from the Edit menu.***

Field Chart Preferences

Grid This check box turns on the field chart grid, as shown in Figure 2.14.

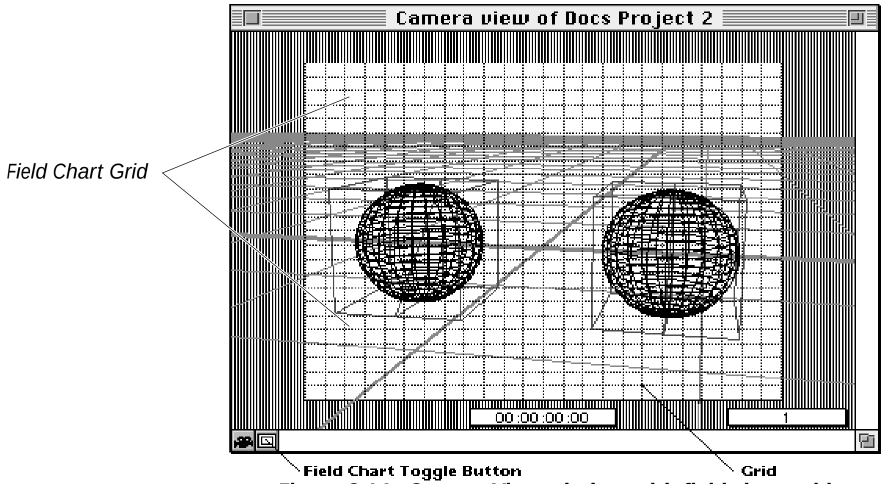


Figure 2.14 Camera View window with field chart grid

Title Safe This check box turns on a frame, as shown in Figure 2.15, within which is considered to be the safe area to display titles (with no risk of cropping).

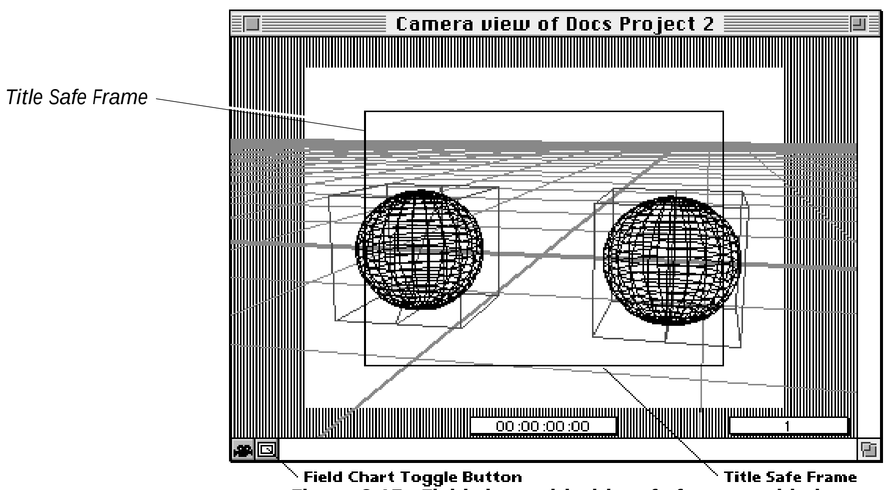


Figure 2.15 Field chart with title safe frame enabled

Action Safe This check box turns on a frame, as shown in Figure 2.16, within which is considered to be the safe area to display action (with no risk of cropping).

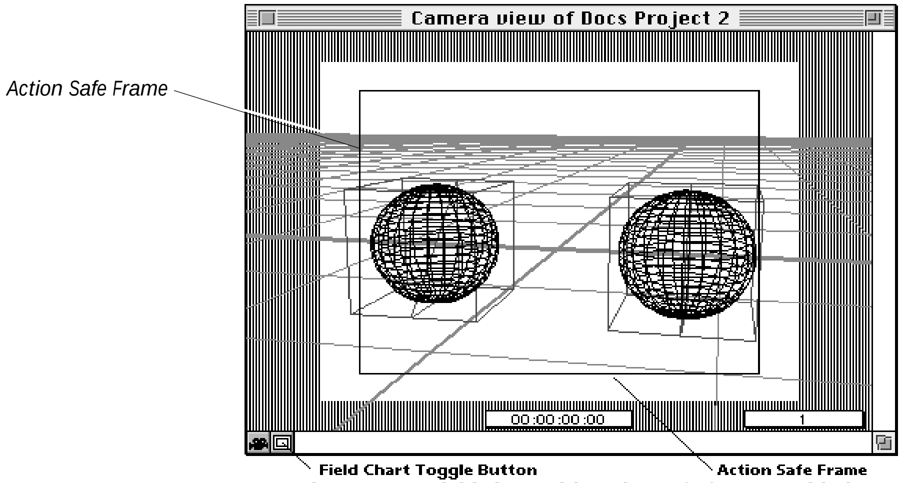


Figure 2.16 Field chart with action safe frame enabled

Cross Lines This check box turns on the cross lines in the center of the field chart display, as shown in Figure 2.17.

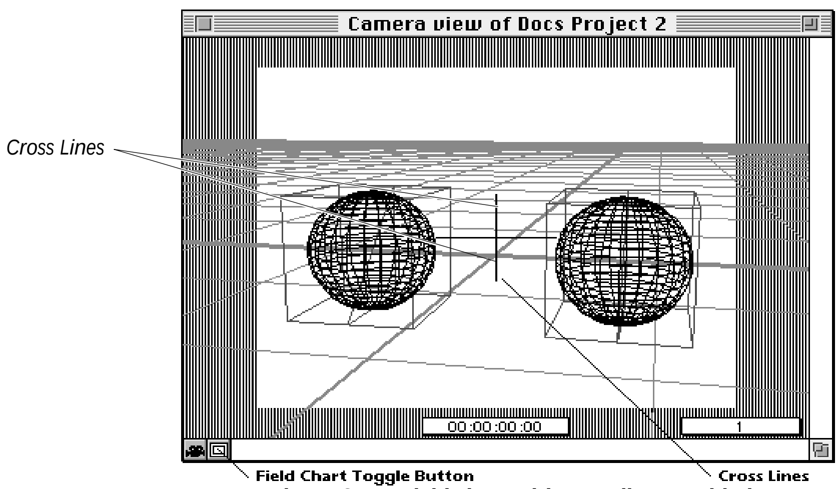


Figure 2.17 Field chart with cross lines enabled

Hatch Lines This check box turns on the diagonal hatch lines of the field chart display, as shown in Figure 2.18.

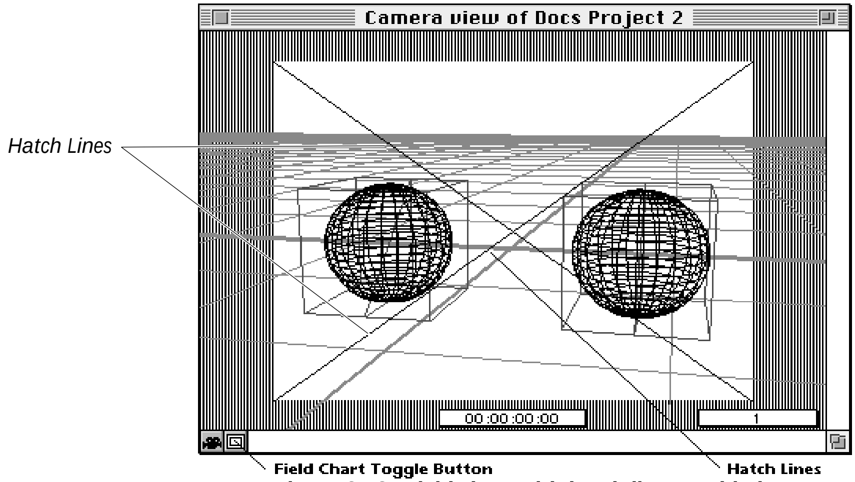


Figure 2.18 Field chart with hatch lines enabled

All Field Chart Elements

With all field chart elements selected, the Camera View window would appear as shown in Figure 2.19.

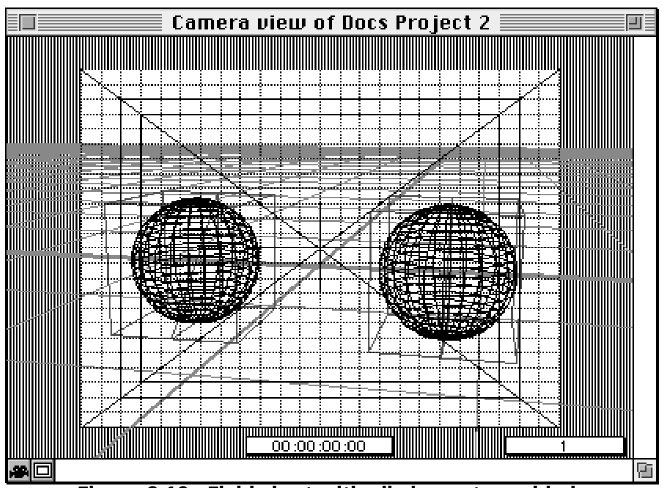


Figure 2.19 Field chart with all elements enabled

Field Size

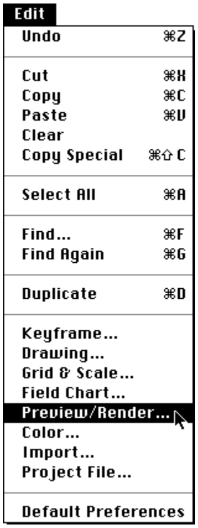
This edit box contains the number of divisions in the field. The default is 12 (for a standard 12 field chart).

Color Buttons

The color buttons to the left of each check box are used to select a color for that element of the field chart. Setting a different color for each element can eliminate confusion in the display.

Clicking a color button opens the standard Apple Color Picker.

Preview/Render…



This command enables you to set your preferences for how the preview function works and where rendered preview files should be placed. For an explanation of the preview function and its use, refer to the section “Previewing Animations” (page 7-9) in *Chapter 7: The Camera View Window*.

To set your preview/render preferences:

1. Choose **Preview/Render…** from the Edit menu.

   A dialog box, as shown in Figure 2.20, opens.

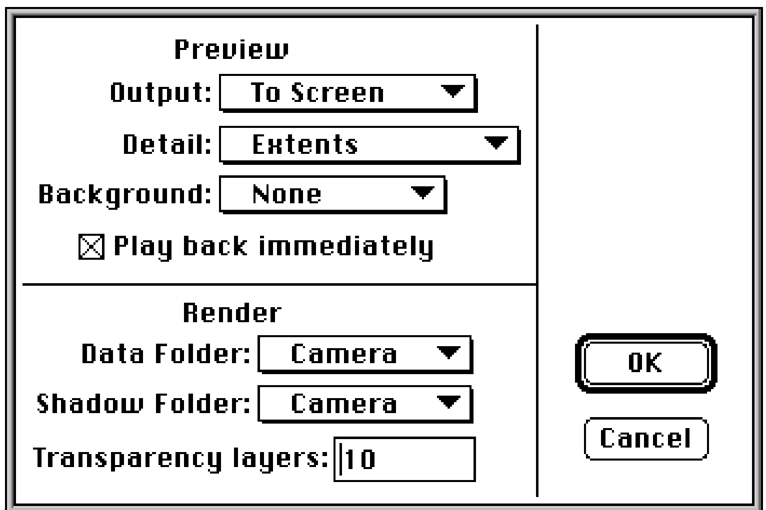


Figure 2.20 Preview/Render Preferences dialog box

2. Use the pop-up menus and edit box to set your preferences. For an explanation of these controls, see the sections “Preview Preferences” (page 2-27) and “Render Preferences” (page 2-29).

3. To save the preferences, click **OK** or press **Return**.

W

To reset the system’s default preferences at any time, choose Default Preferences from the Edit menu.

Preview Preferences

Output This pop-up menu is used to indicate where the preview is to be output. The menu choices are:

To Screen

This option (the default) displays the preview on the screen.

To Image

This option renders the preview to an Image file. It can then be viewed in the Projector application (refer to *The Projector Reference)*.

To QuickTime

This option renders the preview to a QuickTime movie. It can then be viewed with the **Display…** command in the File menu. See “Display…” (page 1-11) in *Chapter 1: The File Menu Commands*.

Detail This pop-up menu is used to indicate the detail to which the preview will be shown. The menu choices are:

Extents

This option (the default) shows group extents only.

Polygons

This option shows polygons (considerably slower than group extents only).

Polygon Shaded

This option shades the polygons of groups, accounting for the current lighting in the scene. The drawing is flat, with no smoothing.

Pixel Shaded

This option also shades the polygons of groups, with smooth spotlighted areas.

W

For an explanation of drawing level detail options, refer to the section “Drawing Preferences” (page 2-12).

Background

This pop-up menu is used to indicate how the background is to be treated during the preview. The menu choices are:

None

This option (the default) removes the background from the preview.

Still

This option uses the current background in the preview.

Increment

This option increments the background in the preview by frame number and recycles if the background sequence contains fewer frames than the animation sequence being previewed.

Play back immediately

This check box option is used for QuickTime files. When enabled, a looping playback is initiated immediately after the preview is generated. Playback will continue until you click the QuickTime window's close box.

Render Preferences

Data Folder

This pop-up menu is used to indicate where the project's data temp files are to be stored during rendering. The menu choices are:

Image

This option stores the data in the folder where the rendered image file is being written.

Camera

This option (the default) stores the data in the folder where the Camera application resides.

Project

This option stores the data in the folder where the project file resides.

Custom

This option opens a directory dialog box in which you can specify a folder in which to store the data.

Shadow Folder:

This pop-up menu is used to indicate where the project's shadow, mirror and environment temp files are to be stored during rendering. The menu choices are:

Image

This option stores the data in the folder where the rendered image file is being written.

Camera

This option (the default) stores the data in the folder where the Camera application resides.

Project

This option stores the data in the folder where the project file resides.

Custom

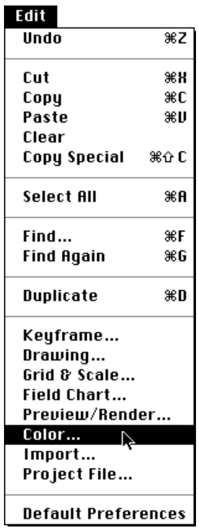
This option opens a directory dialog box in which you can specify a folder in which to store the data.

Transparency Layers

This edit box contains a value that specifies the maximum number of transparent objects that can be layered in one pixel. The available range is 0-255 and the default is 10.

Depending upon the amount of transparent polygons per pixel in a single frame, this value can be used to speed up render time for filter transparencies (if the range is small). The Camera application will not create more layers than necessary, even if the value is set beyond the actual amount for the single frame. As the number of transparencies approaches the layer value, they will gradually become opaque.

Color…



This command enables you to set your preferences for the use of color in the work environment.

To set your color preferences:

1. Choose **Color…** from the Edit menu.

A dialog box, as shown in Figure 2.21, opens.

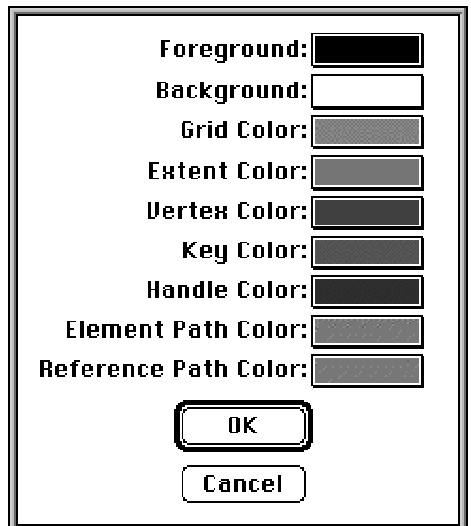


Figure 2.21 Color Preferences dialog box

2. Use the buttons to set your preferences. For an explanation of these controls, see the section “Color Preferences” (page 2-32).

The Apple Color Picker opens when you click a button.

3. Select a color from the Apple Color Picker and click **OK**.

The Color Preferences dialog box reopens, displaying the selected colors in the buttons.

4. To save the preferences, click **OK** or press **Return**.

W

To reset the system’s default preferences at any time, choose* Default Preferences *from the Edit menu.

Color Preferences

Foreground This button sets the color for the foreground and light control regions in the Camera View window, and of the camera and light icons and controls in the World View windows.

Background This button sets the color for the background in the World View and Camera View windows.

Grid Color This button sets the color for the grid in the World View and Camera View windows.

Extent Color This button sets the color for the group extents drawn for models in the World View and Camera View windows. For an explanation of group extent drawing, refer to the section “Drawing…” (page 2-11).

Vertex Color This button sets the color for the vertices drawn for models in the World View and Camera View windows. For an explanation of vertex drawing, refer to the section “Drawing…” (page 2-11).

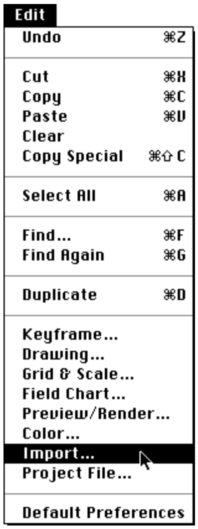
Key Color This button sets the color of the keyframes in the World View windows (when multiple keyframes exist for an object).

Handle Color This button sets the color of the handles in Bezier spline motion paths (when the motion path spline is set to Bezier).

Element Path Color This button sets the color for the element, or motion, path when more than one keyframe exists for an element.

Reference Path Color This button sets the color for an element’s reference path when more than one keyframe exists for the element’s reference point.

Import…



This command enables you to set your preferences for how models and sound files are imported into projects.

To set your import preferences:

1. Choose **Import…** from the Edit menu.

   A dialog box, as shown in Figure 2.22, opens.

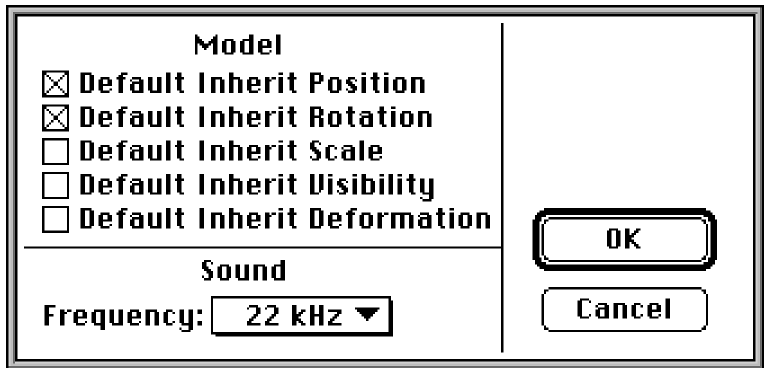


Figure 2.22 Import Preferences dialog box

2. Use the check boxes and pop-up menu to set your preferences. For an explanation of these controls, see the sections “Model Preferences” (page 2-34) and “Sound Preference” (page 2-34).

3. To save the preferences, click **OK** or press **Return**.

W

To reset the system’s default preferences at any time, choose* Default Preferences *from the Edit menu.

Model Preferences

Default Inherit Position This check box option, when enabled, causes a parent group's position values to be passed to its children.

Default Inherit Rotation This check box option, when enabled, causes a parent group's rotation values to be passed to its children.

Default Inherit Scale This check box option, when enabled, causes scaling done to a parent group to be passed its children.

Default Inherit Visibility This check box option, when enabled, causes a parent group's visibility status to pass to its children.

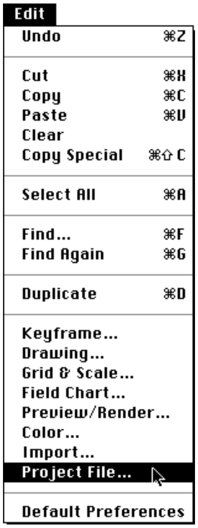
Default Inherit Deformation This check box option, when enabled, causes deformations performed on a parent group to affect its children (which may cause unwanted distortions). For more information on deformations, refer to *Chapter 16: The Group Deformation Window*.

Sound Preference

Frequency This pop-up menu sets the frequency range of imported sound files. The higher the frequency, the higher the fidelity of the sound (but the more memory required). The menu choices are:

- 5 kHz
- 7 kHz
- 11 kHz
- 22 kHz (the default)
- 44 kHz

Project File…



This command enables you to set your preferences for which project data is stored in the project file.

To set your project file preferences:

1. Choose **Project File…** from the Edit menu.

   A dialog box, as shown in Figure 2.23, opens.

Figure 2.23 Project File Preferences dialog box

2. Use the check boxes to set your preferences. For an explanation of these controls, see the section “Project File Preferences” (page 2-36).

3. To save the preferences, click **OK** or press **Return**.

W

To reset the system’s default preferences at any time, choose* Default Preferences *from the Edit menu.

Project File Preferences

Store Display Data
This check box option, when enabled, causes the project's display data to be stored in the project file.

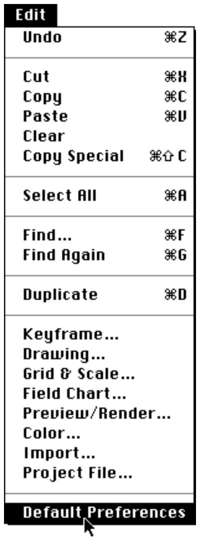
Store Project Window Content
This check box option, when enabled, causes the project's window content to be stored in the project file.

Store Sound Data
This check box option, when enabled, causes the project's sound data to be stored in the project file.

W

Storing these attributes in the project file dramatically speeds up the loading of projects into ElectricImage, as they would normally be created as the file is read into memory. Enabling these options, however, will cause project files to take up more disk space.

Default Preferences



This command resets all preferences to their system defaults.

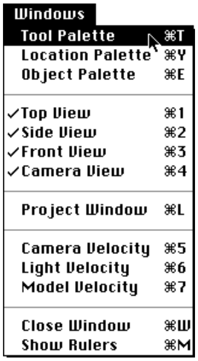
W

This command is helpful if the display becomes difficult to view.

Chapter 3 The Windows Menu Commands

Chapter 3 The Windows Menu Commands

Tool Palette



This command toggles the display of the Tool Palette, shown in Figure 3.1, which is used to perform such tasks as scaling, rotating and deforming objects, hierarchically linking groups together, etc.

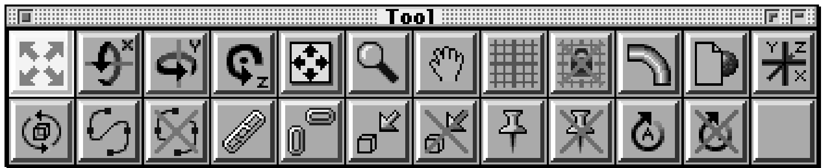
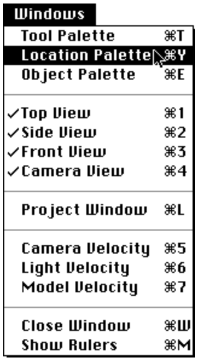


Figure 3.1 Default view of the Tool Palette

For an explanation of the Tool Palette and its use, refer to Chapter 19: The Tool Palette.

Location Palette



This command toggles the display of the Location Palette, shown in Figure 3.2, which indicates the cursor's global coordinates as it is moved within any of the World View windows.

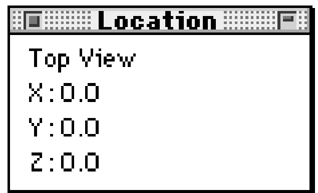
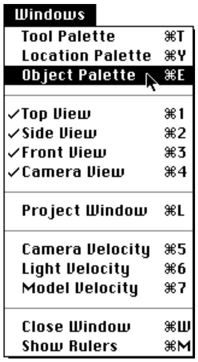


Figure 3.2 The Location Palette

W

For an explanation of the Location Palette and its use, refer to Chapter 21: The Location Palette.

Object Palette



This command toggles the display of the Object Palette, shown in Figure 3.3, which is used to perform such tasks as adding FACT-format models to the project, creating and adding font models to the project, recording and adding sounds, importing models of non-FACT format into the project, adding lights, and executing plug-ins (if loaded in the **EI Sockets** folder).

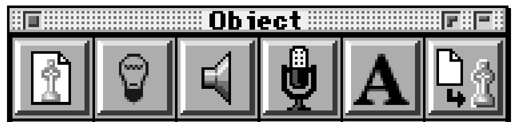
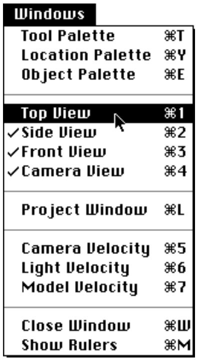


Figure 3.3 Default view of the Object Palette

W

For an explanation of the Object Palette and its use, refer to Chapter 20: The Object Palette.

Top View



This command toggles the display of the top World View window, shown in Figure 3.4, which looks down on the universe from above, displaying the X/Z coordinate plane.

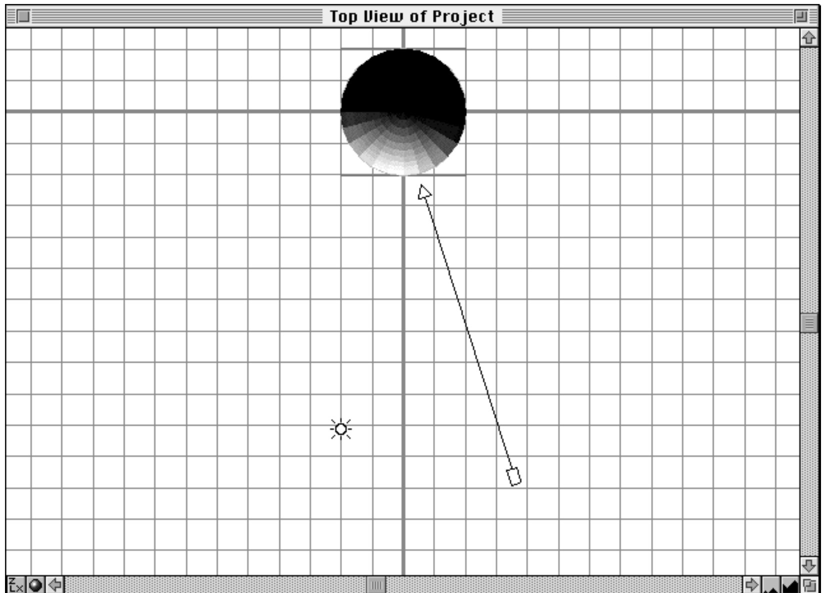
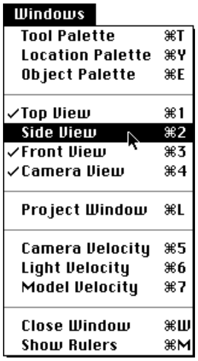


Figure 3.4 The top World View window

W

For an explanation of the World View windows and their use, see Chapter 6: The World View Windows.

Side View



This command toggles the display of the side World View window, shown in Figure 3.5, which looks toward the left of the universe, displaying the Y/Z coordinate plane.

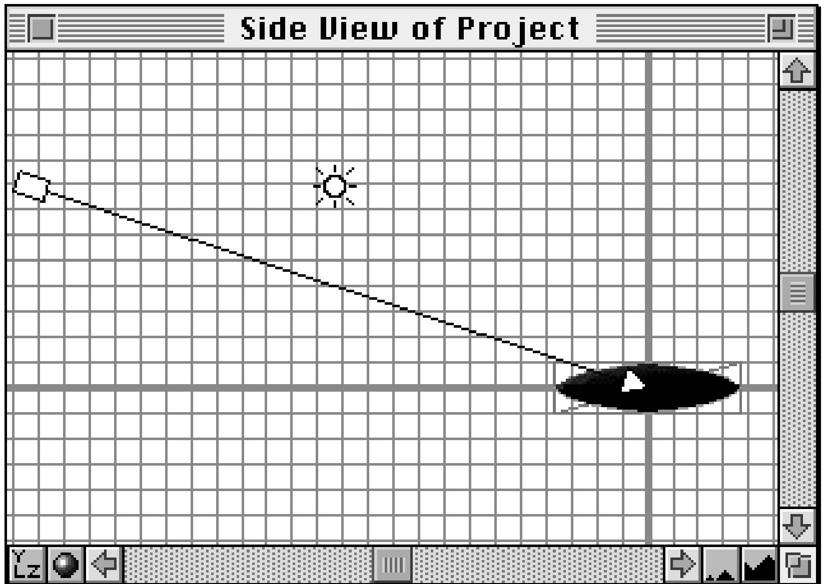
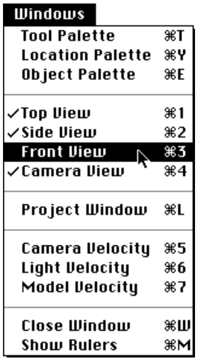


Figure 3.5 The side World View window

W

For an explanation of the World View windows and their use, see Chapter 6: The World View Windows.

Front View



This command toggles the display of the front World View window, shown in Figure 3.6, which looks to the rear of the universe, displaying the X/Y coordinate plane.

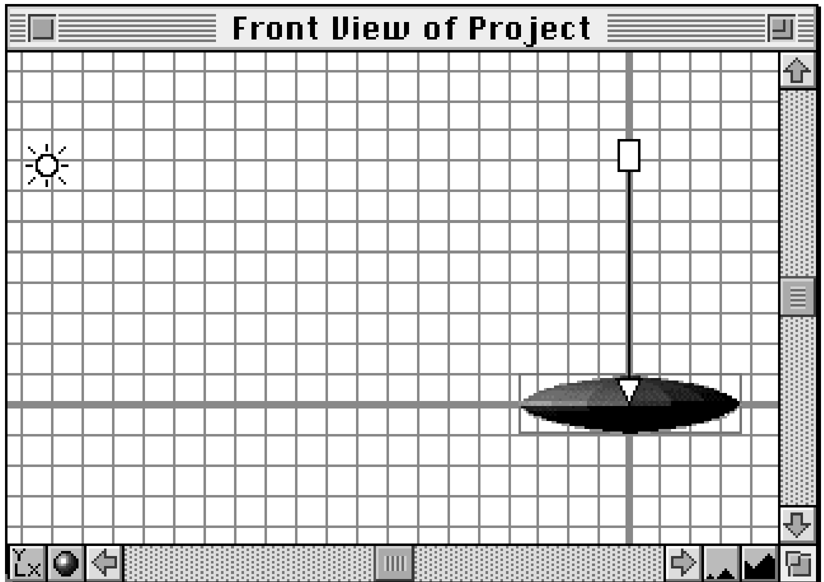
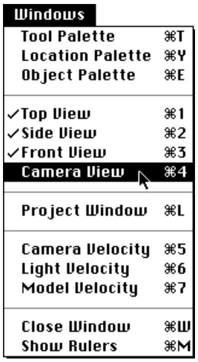


Figure 3.6 The front World View window

W

For an explanation of the World View windows and their use, see Chapter 6: The World View Windows.

Camera View



This command toggles the display of the Camera View window, shown in Figure 3.7, which shows what the camera is seeing at all times, and which is used to preview animations.

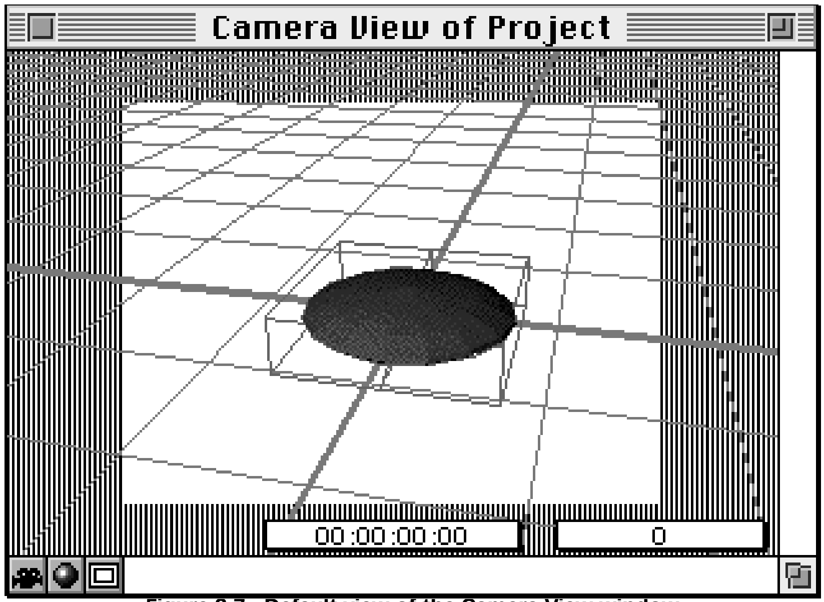
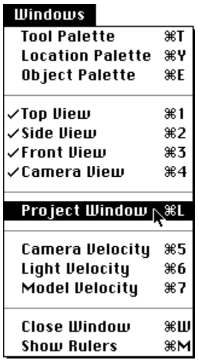


Figure 3.7 Default view of the Camera View window

W

For an explanation of the Camera View window and its use, see Chapter 7: The Camera View Window.

Project Window



This command toggles the display of the Project window, shown in Figure 3.8, where the project editing mode is set and where all of the attributes within the project file are available for viewing and editing.

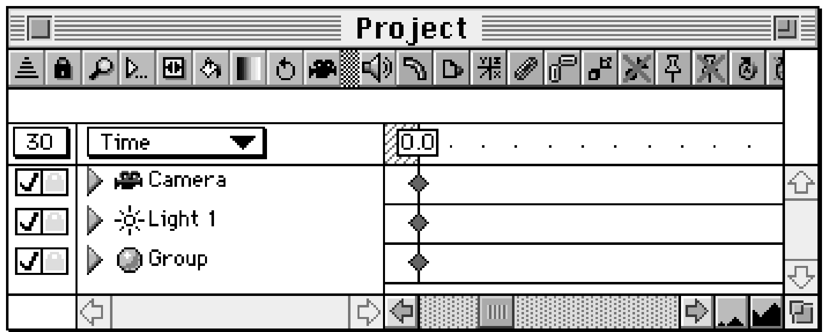


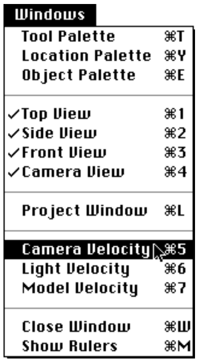
Figure 3.8 Default view of the Project window (Time mode)

The Project Window has a different appearance for each editing mode and can be resized and scrolled to show information not visible in the default view.

W

For an explanation of the Project window and its use, see Chapter 8: The Project Window.

Camera Velocity



This command toggles the display of the Camera Velocity window, shown in Figure 3.9, which charts the rate of change of the camera's speed of movement when the camera is animated.

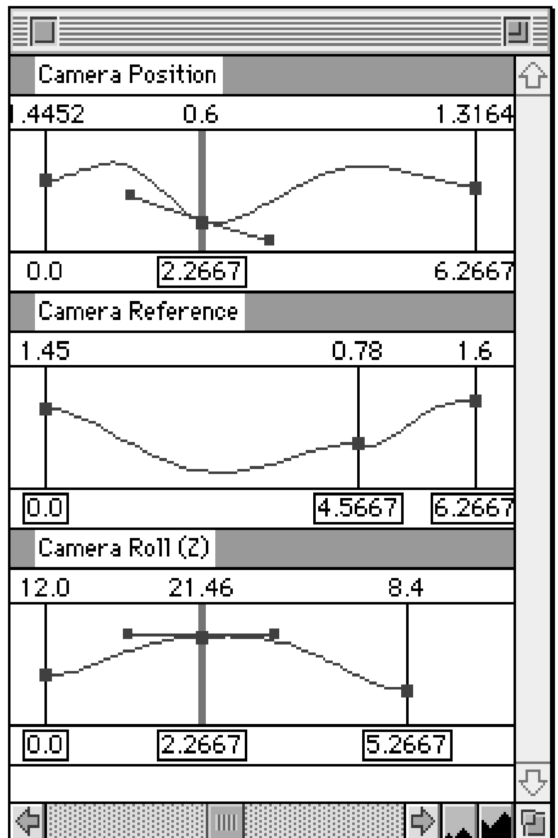


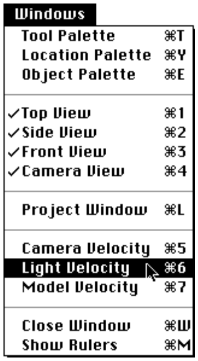
Figure 3.9 Default view of the Camera Velocity window

The timing of the camera's keyframes, and the shape (area) of the motion path affect the camera's velocity.

W

For an explanation of the Camera Velocity window and its use, refer to the section "Camera Velocity" (page 17-9) in Chapter 17: The Velocity Windows.

Light Velocity



This command toggles the display of the Light Velocity window, shown in Figure 3.10, which charts the rate of change of the selected light's speed of movement when the light is animated.

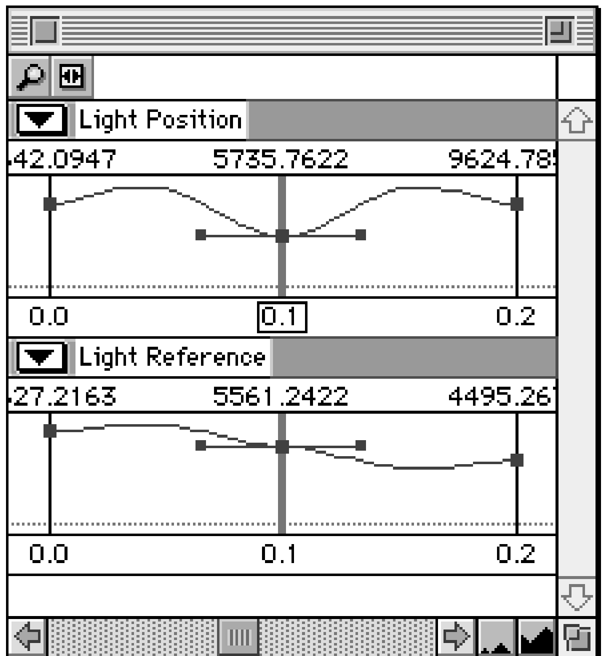


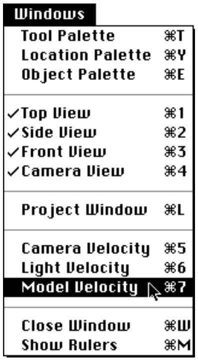
Figure 3.10 Default view of the Light Velocity window

The timing of the light's keyframes, and the shape (area) of the motion path affect the light's velocity.

W

For an explanation of the Light Velocity window and its use, refer to the section "Light Velocity" (page 17-10) in Chapter 17: The Velocity Windows.

Model Velocity



This command toggles the display of the Model Velocity window, shown in Figure 3.11, which charts the rate of change of the selected model's speed of movement when the model is animated.

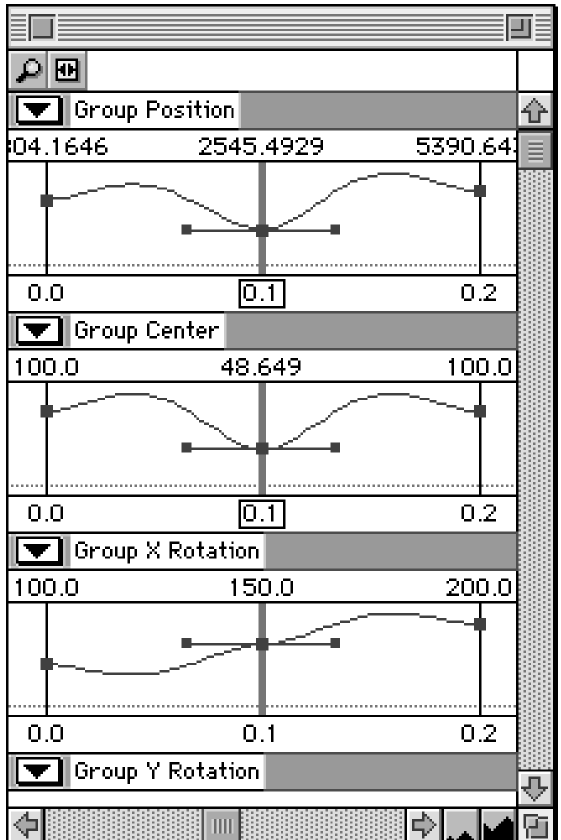


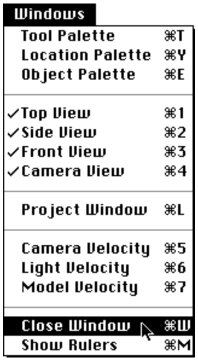
Figure 3.11 Default view of the Model Velocity window

The timing of the model's keyframes, and the shape (area) of the motion path affect the model's velocity.

W

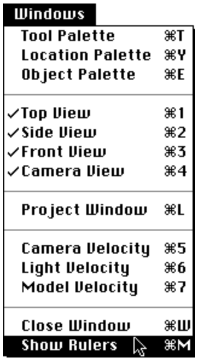
For an explanation of the Model Velocity window and its use, refer to the section "Model Velocity" (page 17-11) in Chapter 17: The Velocity Windows.

Close Window



This command closes the current (or front) window.

Show/Hide Rulers



This command toggles the display of the rulers in the World View windows, shown in Figure 3.12.

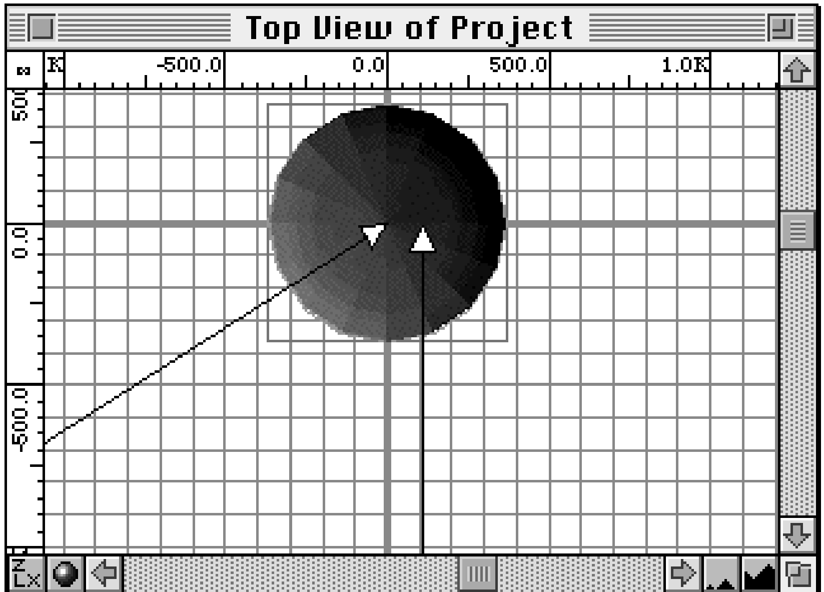


Figure 3.12 World View window with rulers

When the rulers are already displayed, the command in the Edit menu is **Hide Rulers**.

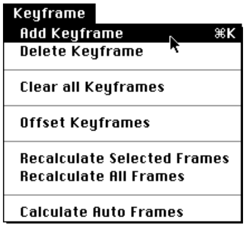
W

For an explanation of the various options for setting ruler display preferences, refer to the section "Grid & Scale..." (page 2-17) in Chapter 2: The Edit Menu Commands.

Chapter 4 The Keyframe Menu Commands

Chapter 4 The Keyframe Menu Commands

Add Keyframe

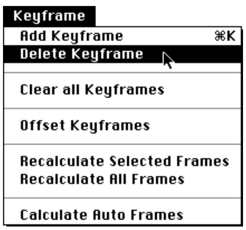


This command adds a keyframe to every data channel for all selected objects (regardless of whether or not a channel is being animated) or, if the Project window is frontmost and in Keyframe mode, keyframes will be added wherever frame cells are selected.

W

***For an explanation of keyframes and their use in ElectricImage, refer to* The ElectricImage Starter.**

Delete Keyframe

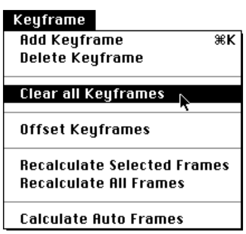


This command deletes selected keyframes for the selected object.

W

To delete all keyframes for a selected object, use the* Clear All Keyframes *command (see below).

Clear All Keyframes

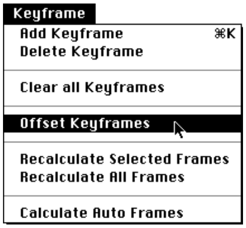


This command deletes all keyframes for the selected object, and the currently selected keyframe becomes the object's base keyframe.

W

To delete selected keyframes only, use the* Delete Keyframe *command (see above).

Offset Keyframes



This command offsets the values for time, position, scale, rotation and reference by a consistent amount for all keyframes (and, optionally, custom frames) of the selected object. It can also be used to scale the time values of keyframes for the selected object.

To offset keyframe values:

1. Choose **Offset Keyframes** from the Keyframe menu.

   The Offset Keyframe window, as shown in Figure 4.1, opens.

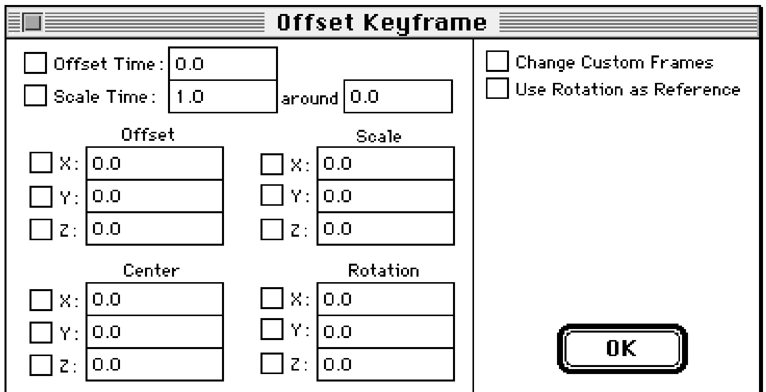


Figure 4.1 Offset Keyframe window

2. Type a value in the edit box for the amount of offset to be applied to that characteristic of the selected object. The characteristics that can be offset are time, position (offset), center, scale and rotation.

W

For the camera and lights, which have a reference value and not a rotation value, you can offset the reference value by clicking the **Use Rotation as Reference** ***check box and then typing values in the Rotation edit boxes.***

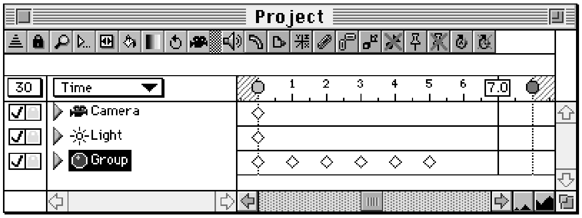
The check boxes to the left of the offset value edit boxes are automatically enabled when values are typed.

3. If you have custom frames that you wish to offset along with keyframes, click the **Change Custom Frames** check box. Otherwise, only keyframes will be offset.
4. To prevent an offset, click in the check box to disable it.
5. Either click **OK** or press **Return**. The keyframe (and, optionally, custom frame) values are offset by the entered amount, and the offsetting can be repeated each time you click **OK** or press **Return**.

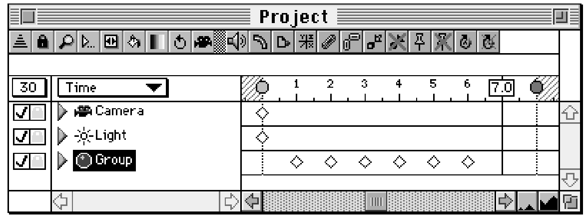
To scale the timing of keyframes:

1. Type a value in the Scale Time edit box for the factor by which to scale the timing of keyframes. For example, a factor of 2 will double the amount of time between the first and last keyframes for the selected object, scaling the timing of any intermediate keyframes accordingly. A factor of 0.5 will halve the amount of time between the first and last keyframes.
2. Type a value in the Around edit box to set the time around which the keyframes will be scaled.

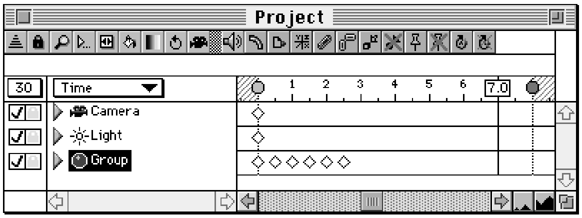
Figure 4.2 (page 4-5) shows examples of the effects of offsetting and scaling keyframe time values.



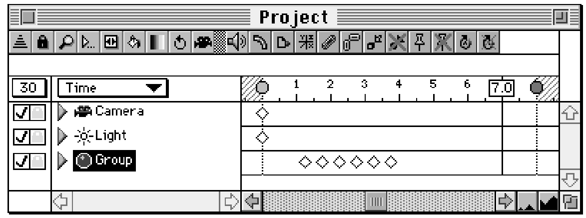
Original keyframe values for group
(keyframes at 0, 1, 2, 3, 4 and 5 seconds)



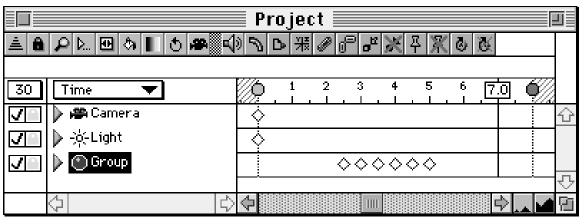
Keyframe time offset by 1.0 seconds
(keyframes now at 1, 2, 3, 4, 5 and 6 seconds)



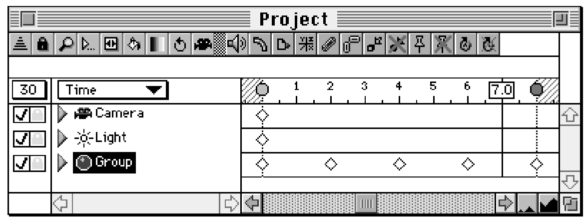
Keyframe time scaled by 0.5 around 0.0 seconds
(keyframes now at 0, 0.5, 1, 1.5, 2 and 2.5 seconds)



Keyframe time scaled by 0.5 around 2.5 seconds
(keyframes now at 1.25, 1.75, 2.25, 2.75, 3.25 and 3.75 seconds)



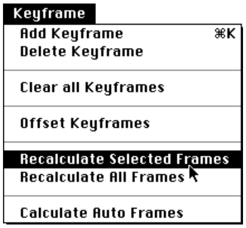
Keyframe time scaled by 0.5 around 5 seconds
(keyframes now at 2.5, 3, 3.5, 4, 4.5 and 5 seconds)



Keyframe time scaled by 2 around 0 seconds
(keyframes now at 0, 2, 4, 6, 8 and 10 seconds)

Figure 4.2 Examples of keyframe timing values offset and scaled

Recalculate Selected Frames

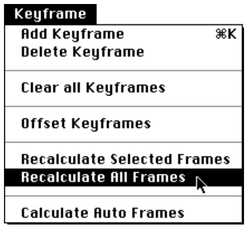


This command forces a reinterpolation of keyframe data for a selected range of frames in the Project window. This function is used to recalculate the data to be used for the frames between keyframes (and thus remove any custom frames created by fill, blend, “attach to” and/or “look at” operations). It is only available when working in Frame or Keyframe editing modes, by selecting a range of frames and choosing this command.

W

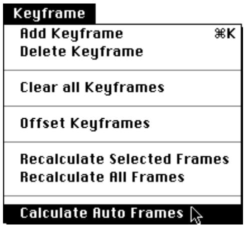
For more information on the Project window and its use, see Chapter 8: The Project Window.

Recalculate All Frames



This command is similar to the **Recalculate Selected Frames** command (page 4-6), except that it forces a reinterpolation of keyframe data for all frames in the project, regardless of whether or not any objects or specific frames are selected. It is a way of “wiping the slate clean” of custom frames for the entire project.

Calculate Auto Frames



This command is used to generate custom frames when they are not generated automatically. By default, custom frames are generated automatically when any of the following features are used:

- Attach to Object
- Look at Object
- Auto Rotate Object

If, however, you disable auto calculation of custom frames for the above procedures, you can use this command to generate them. For information on how to disable auto calculation of custom frames, refer to the section “Keyframe…” (page 2-9) in *Chapter 2: The Edit Menu Commands*.

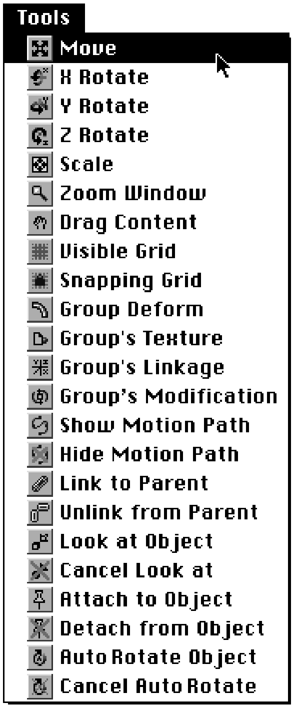
Chapter 5 The Tools Menu Commands

Chapter 5 The Tools Menu Commands

W

The commands in the Tools menu duplicate the icon buttons in the Tool Palette, which are discussed in Chapter 19: The Tool Palette. The Tools menu thus provides an alternate means of using the same functions. Also, some of these tools are available in the Project window's tool palette, as discussed in the section* "The Tool Palette" (page 8-26) *in Chapter 8: The Project Window.

Move



This command makes the **Move** tool (the default tool) the current tool (and keeps it the current tool until another tool is selected).

The **Move** tool enables you to move a selected object in any direction by dragging the object's icon in a World View window, as shown in Figure 5.1.

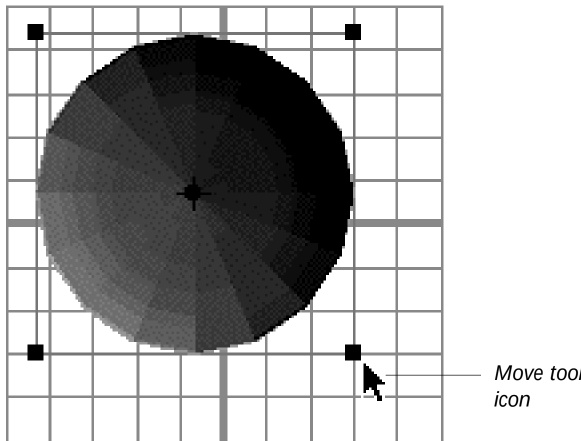
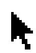


Figure 5.1 Move tool icon in a World View window

Movement can be constrained in the horizontal, vertical and diagonal directions by repeatedly pressing the Tab key and cycling through a series of changes to the Move tool icon:

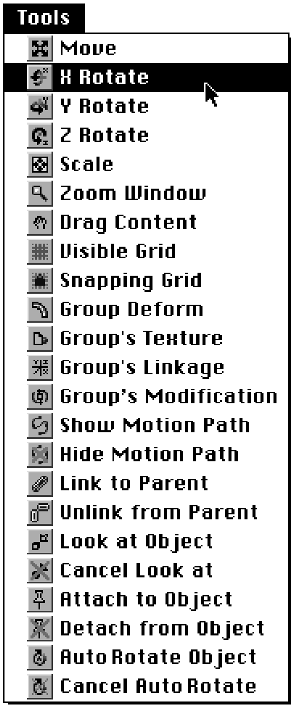
 When the Move tool has this icon, movement will not be constrained.

 When the Move tool has this icon, movement will be horizontally constrained.

 When the Move tool has this icon, movement will be vertically constrained.

 When the Move tool has this icon, movement will be diagonally constrained (to a 45° angle).

X Rotate



This command makes the **X Rotate** tool the current tool (and keeps it the current tool until another tool is selected).

The **X Rotate** tool enables you to rotate a selected object around its X axis by dragging the object's icon in a World View window, as shown in Figure 5.2.

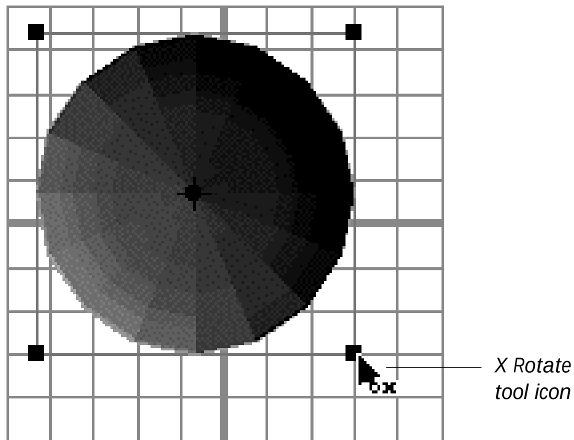


Figure 5.2 X Rotate tool icon in a World View window

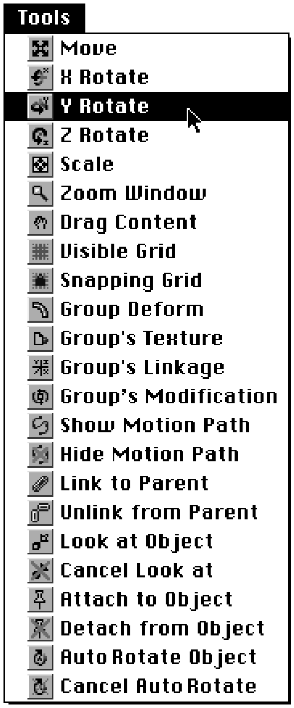
W

In the case of the camera or a parallel or spot light, an added benefit is the ability to rotate around the look–at point (the case for all rotational modes).

W

You can also rotate an object around its X axis with the Move tool (page 5-3) by pressing the Option and Control keys while dragging.

Y Rotate



This command makes the **Y Rotate** tool the current tool (and keeps it the current tool until another tool is selected).

The **Y Rotate** tool enables you to rotate a selected object around its Y axis by dragging the object's icon in a World View window, as shown in Figure 5.3.

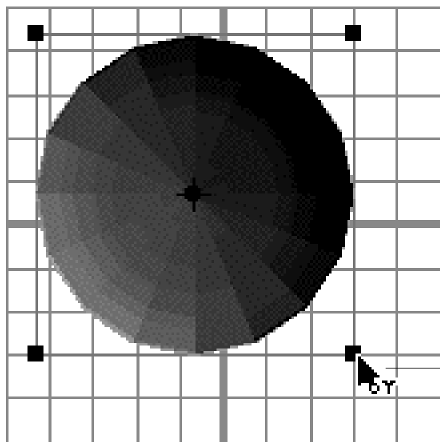
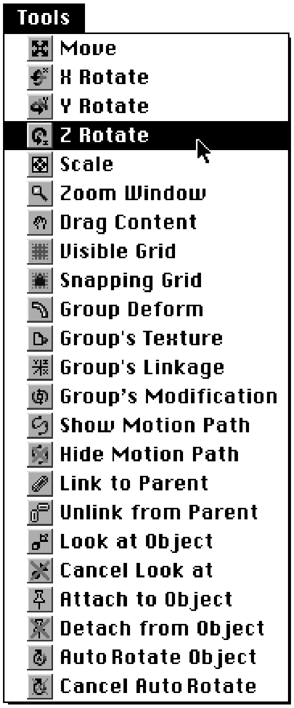


Figure 5.3 Y Rotate tool icon in a World View window

W

You can also rotate an object around its Y axis with the Move tool (page 5-3) by pressing the Command and Control keys while dragging.

Z Rotate



This command makes the **Z Rotate** tool the current tool (and keeps it the current tool until another tool is selected).

The **Z Rotate** tool enables you to rotate a selected object around its Z axis by dragging the object's icon in a World View window, as shown in Figure 5.4.

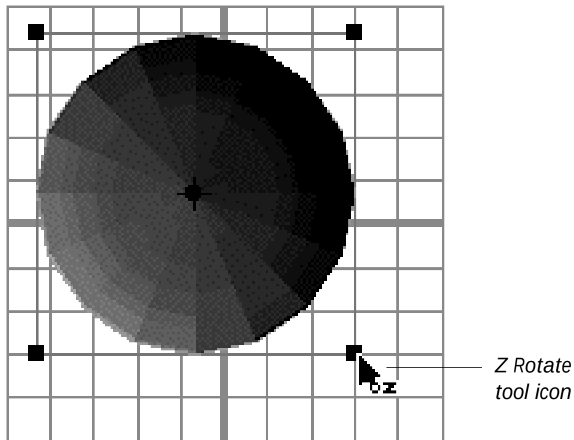
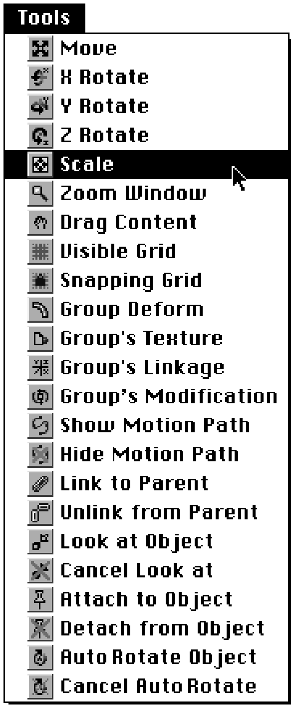


Figure 5.4 Z Rotate tool icon in a World View window

W

You can also rotate an object around its Z axis with the Move tool (page 5-3) by pressing the Command, Option and Control keys while dragging.

Scale



This command makes the **Scale** tool the current tool (and keeps it the current tool until another tool is selected).

The **Scale** tool scales a selected object uniformly by dragging the object's icon in a World View window, as shown in Figure 5.5.

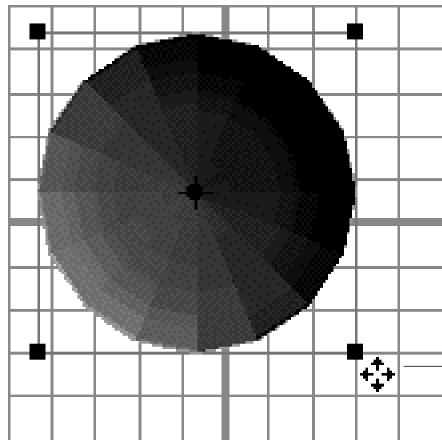
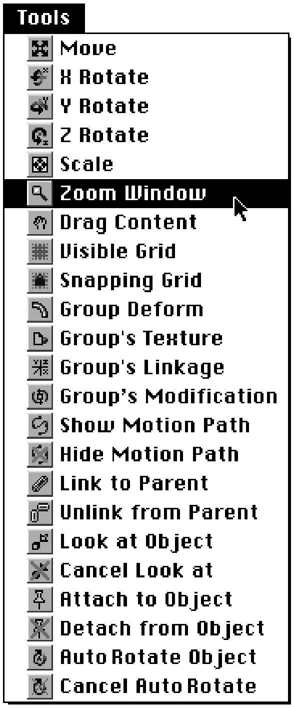


Figure 5.5 Scale tool icon in a World View window

W

The Scale tool applies only to geometric objects, not cameras or lights.

Zoom Window



This command makes the **Zoom Window** tool the current tool (and keeps it the current tool until another tool is selected).

The **Zoom Window** tool zooms in or out on an area of a window, centered on the point over which the tool's magnifying glass icon is placed.

- Zooming in is the default, as indicated by a plus (+) symbol in the magnifying glass icon (as shown in Figure 5.6).
- To zoom out, hold down the option key, which changes the plus symbol to a minus (-) symbol.

W

Zooming in or out is done by a factor of 2 with each click of the mouse.

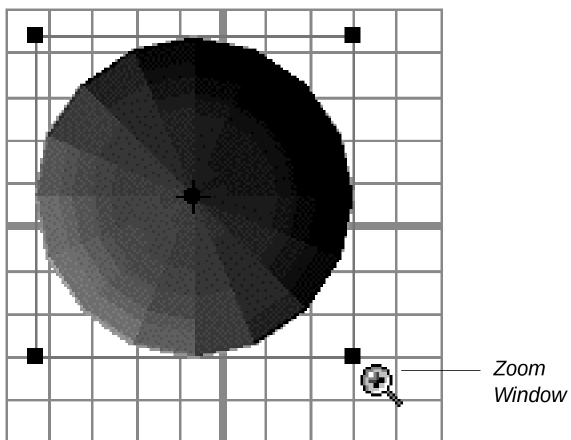


Figure 5.6 Zoom Window tool icon in a World View window

W

You can also zoom in on an area of the window by pressing the Option key while dragging a rectangle around the area.

Drag Content

This command makes the **Drag Content** tool the current tool (and keeps it the current tool until another tool is selected).

The **Drag Content** tool scrolls the contents of a World View window (top, front or side) by clicking and dragging in the window, as shown in Figure 5.7.

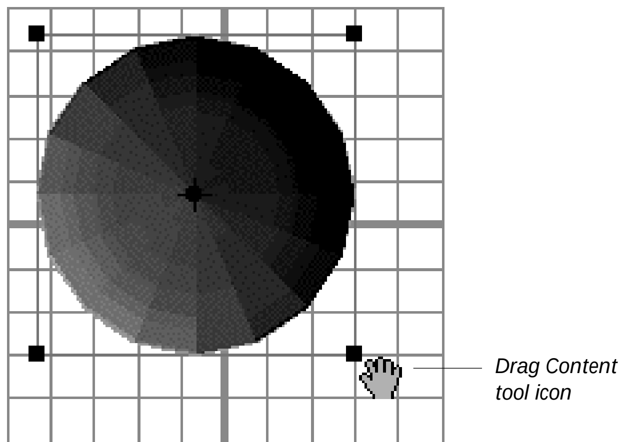
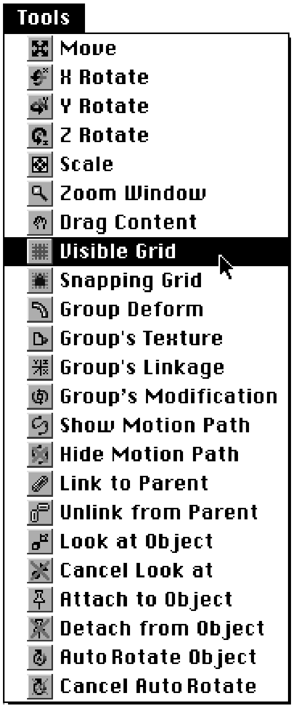


Figure 5.7 Drag Content tool icon in a World View window

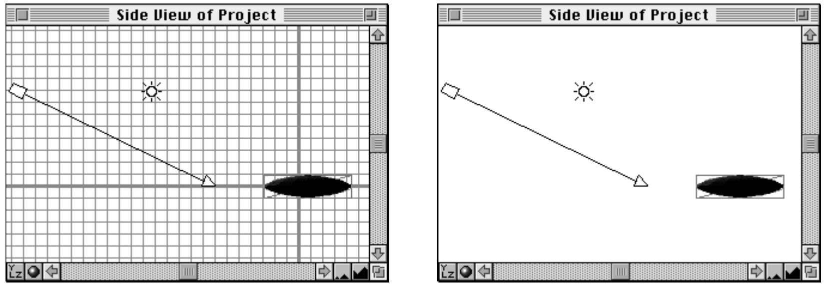
W

You can also scroll the contents of a World View window with the Move tool (page 5-3) by pressing the space bar while dragging.

Visible Grid



This command toggles the visible grid on or off in the World View and Camera View windows, as shown in Figure 5.8.



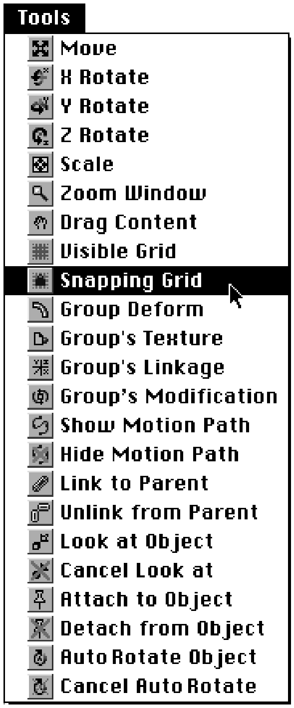
Visible Grid On *Visible Grid Off*

Figure 5.8 Examples of a World View window with visible grid on and off

W

Preferences for the dimensions and use of the visible grid are set with the* Grid & Scale *command in the Edit menu, as discussed in the section* “Grid & Scale...” (page 2-17) *in Chapter 2: The Edit Menu Commands.

Snapping Grid



This command toggles the invisible snapping grid on or off in the World View windows. The snapping grid is used to align objects to pre-determined positions—they will “snap” to a position when moved.

W

Preferences for the dimensions and use of the snapping grid are set with the* Grid & Scale *command in the Edit menu, as discussed in the section* “Grid & Scale...” (page 2-17) *in Chapter 2: The Edit Menu Commands.

W

You can also toggle the snapping grid by pressing the Caps Lock key.

Group Deform

This command opens the Group Deformation window for the selected group.

The Group Deformation window, shown in Figure 5.9, is used to deform the group's shape in various ways, including bending, twisting, tapering, stretching, etc.

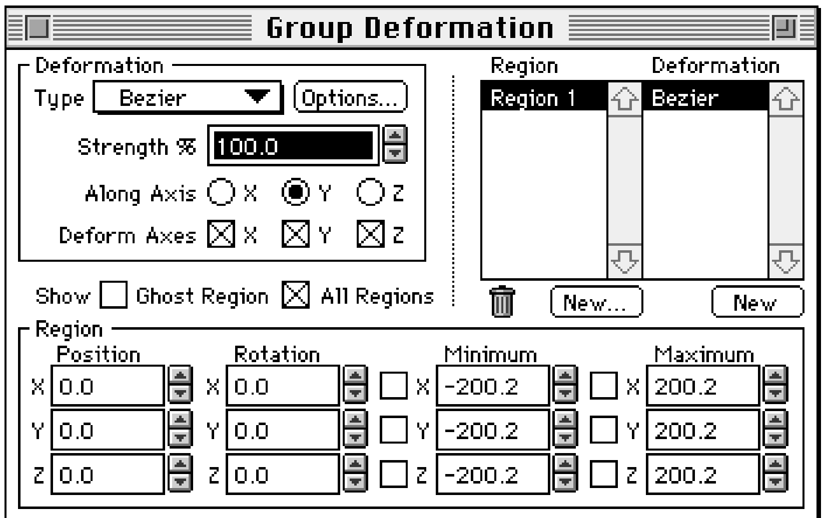


Figure 5.9 Group Deformation window

W

For an explanation of the Group Deformation window and its use, refer to Chapter 16: The Group Deformation Window.

Group's Texture

This command opens the Group Texture window for the selected group.

The Group Texture window, shown in Figure 5.10, is used to set texture and reflection mapping for the group.

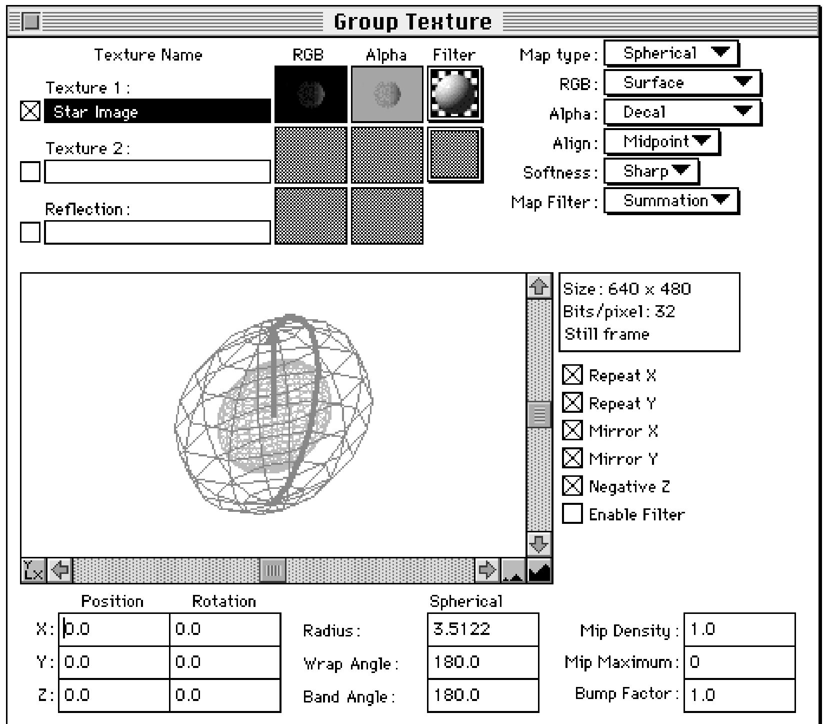


Figure 5.10 Group Texture window

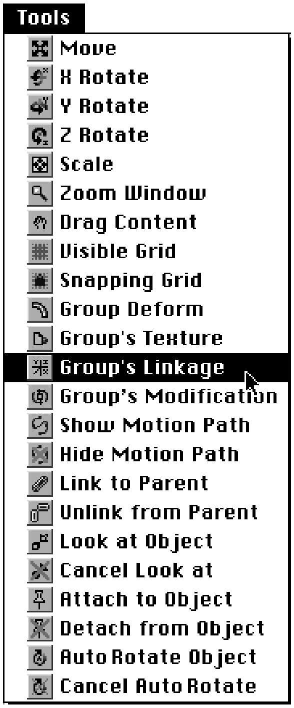
W

For an explanation of the Group Texture window and its use, refer to Chapter 14: The Group Texture Window.

W

You can also open the Group Texture window for a group by pressing the Command key while double-clicking the group's icon.

Group’s Linkage



This command opens the Group Link window for the selected group.

The Group Link window, shown in Figure 5.11, is used to set pivot points and rotation information for the group.

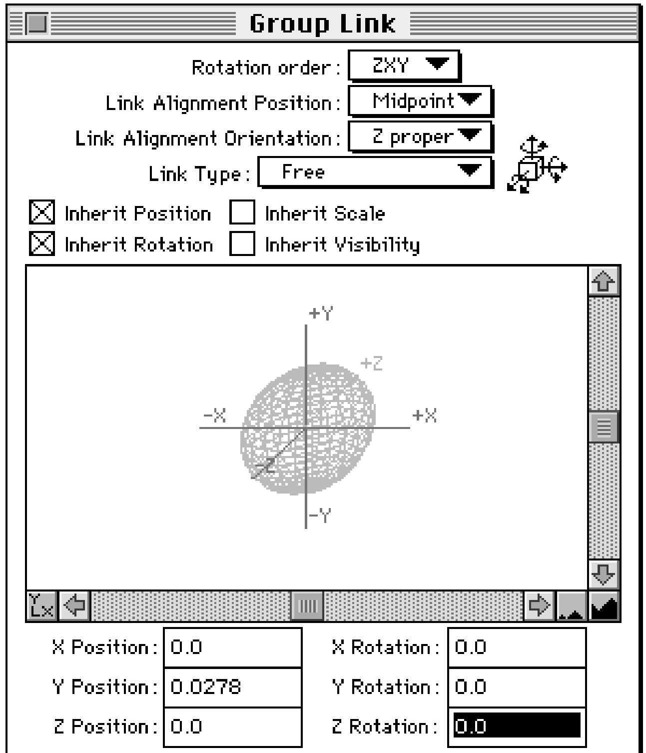


Figure 5.11 Group Link window

W

For an explanation of the Group Link window and its use, refer to Chapter 15: The Group Link Window.

W

You can also open the Group Link window for a group by pressing the Command and Option keys while double-clicking the group’s icon.

Group's Modification

This command opens the Modify Axes window for the selected group.

The Modify Axes window, shown in Figure 5.12, is used to change the orientation of the group in local space (i.e., exchanging or reversing axes to, for example, make the top become the bottom, the front become the back, etc.).

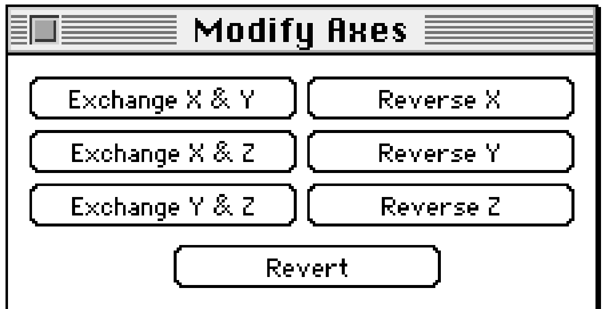
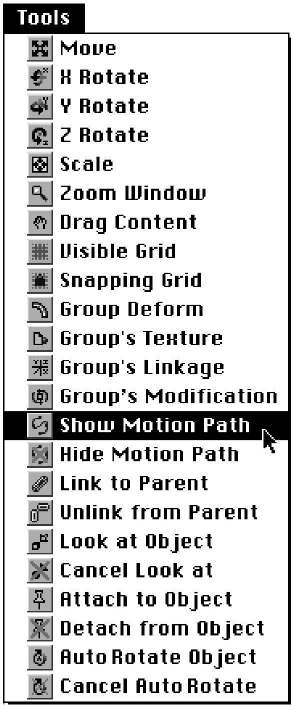


Figure 5.12 Modify Axes window

Show Motion Path



This command displays the path of motion for the selected object, as shown in Figure 5.13. No path is shown if the object has no keyframes, or has not changed position at all.

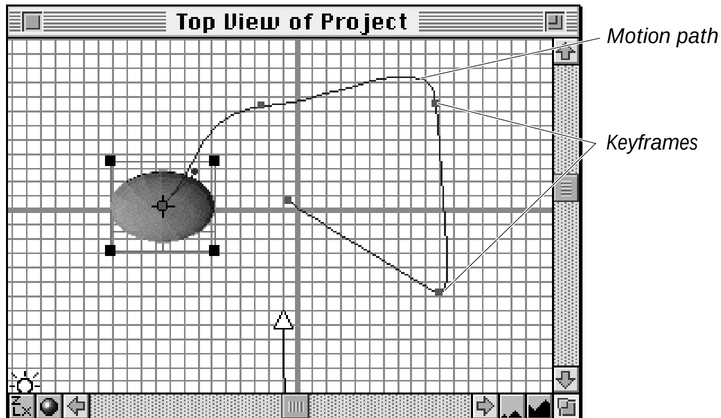
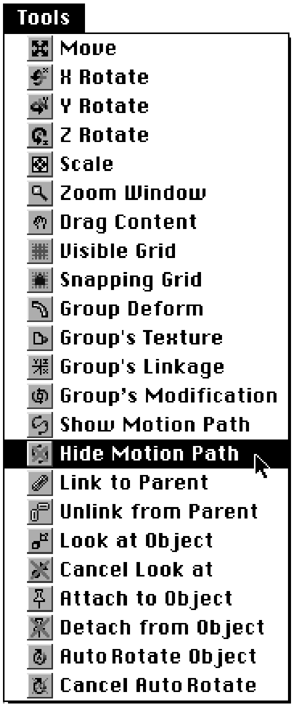


Figure 5.13 Motion path visible in a World View window

Hide Motion Path



This command hides the selected object's path of motion (assuming its path is visible).

W

To show the motion path for a select object, use the* Show Motion Path *command (page 5-16).

Link to Parent

This command allows you to choose a new parent for the selected object(s). If many objects are selected, the new parent will apply to all the selected objects.

To link an object to a new parent object:

1. Select the object to be linked (the child object) in either a World View or the Project window.
2. Choose **Link to Parent** from the Tools menu.

   An instruction appears in the menu bar, as shown in Figure 5.14.

Figure 5.14 Instruction in menu bar

3. To complete the operation, click on the object to be the parent in either a World View or the Project window.

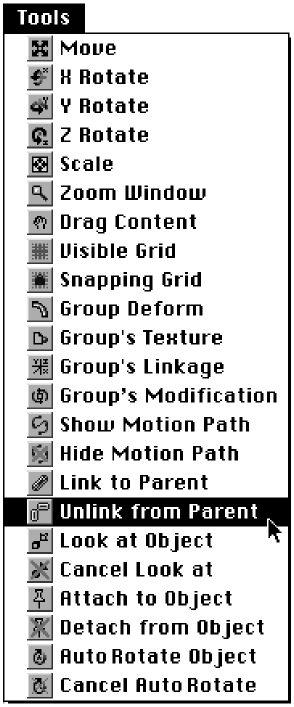
   To cancel the operation, use the menu bar instruction as you would a menu and choose **Terminate Operation**, as shown in Figure 5.15.

Figure 5.15 Canceling the operation

W

To unlink an object from its parent object, refer to the section "Unlink from Parent" (page 5-19).

Unlink from Parent

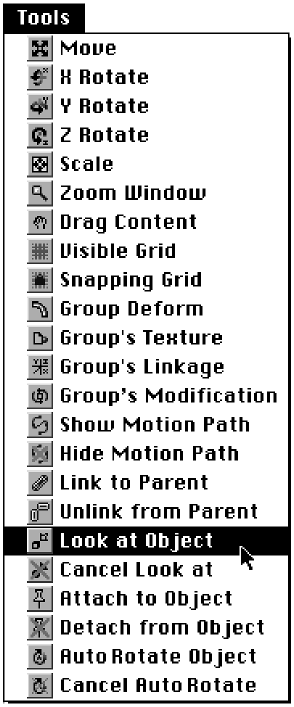


This command removes parentage from all selected objects.

W

To link an object to a parent object, refer to the section "Link to Parent" (page 5-18).

Look at Object



This command forces the selected object to look at another object.

- If the selected object is the camera or a light, its reference point will be locked to the object it is looking at.
- If the selected object is a group, its rotation will be affected by the object it is looking at.

W

Use of this command will generate custom frames for the selected object's reference (or rotation) channel.

To force an object to look at another object:

1. Select the object to be forced, in either a World View or the Project window.

   W

   An object can be forced to look at another object at any time in the animation, and for any range of frames.

2. To apply the command at a specific time, set the Project window to Time mode and move the time selector to the time at which the command is to start.

   To apply the command for a range of frames, set the Project window to Keyframe or Frame mode and select the range of frames to be affected.

3. Choose **Look at Object** from the Tools menu.

   An instruction appears in the menu bar, as shown in Figure 5.16.

Figure 5.16 Instruction in menu bar

4. To complete the operation, click on the object to be looked at, in either a World View or the Project window.

   To cancel the operation, use the menu bar instruction as you would a menu and choose **Terminate Operation**, as shown in Figure 5.17.

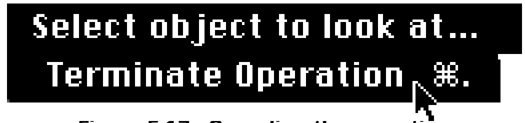
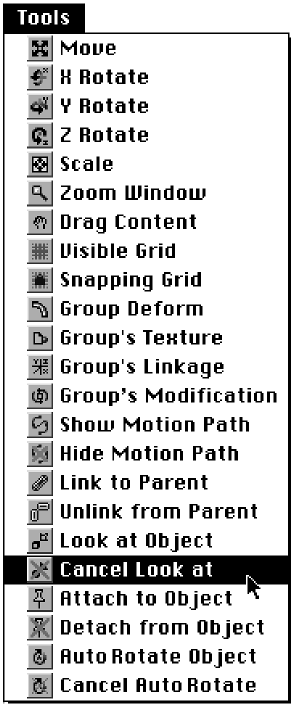


Figure 5.17 Canceling the operation

W

To remove the Look at Object function, refer to the section "Cancel Look at" (page 5-22).

Cancel Look at

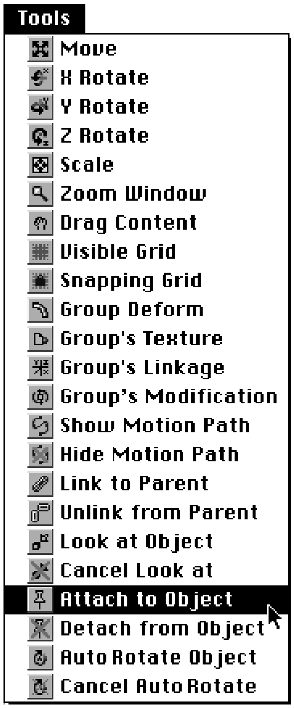


This command removes the **Look at Object** function (page 5-20) from the selected object (but does not recalculate custom frames).

W

To force an object to look at another object, refer to the section "Look at Object" (page 5-20).

Attach to Object



This command forces the selected object to maintain its position relative to the position of another object. As the other object changes position, the selected object will change position.

W

Use of this command will generate custom frames for the selected object's position and reference (or rotation) channels.

To attach an object to another object:

1. Select the object to be attached, in either a World View or the Project window.

   W

   An object can be attached to another object at any time in the animation, and for any range of frames.

2. To apply the command at a specific time, set the Project window to Time mode and move the time selector to the time at which the command is to start.

   To apply the command for a range of frames, set the Project window to Keyframe or Frame mode and select the range of frames to be affected.

3. Choose **Attach to Object** from the Tools menu.

   An instruction appears in the menu bar, as shown in Figure 5.18.

   Figure 5.18 Instruction in menu bar

4. To complete the operation, click on the object to attach to, in either a World View or the Project window.

   To cancel the operation, use the menu bar instruction as you would a menu and choose **Terminate Operation**, as shown in Figure 5.19.

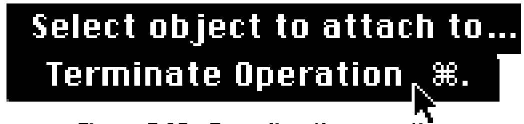
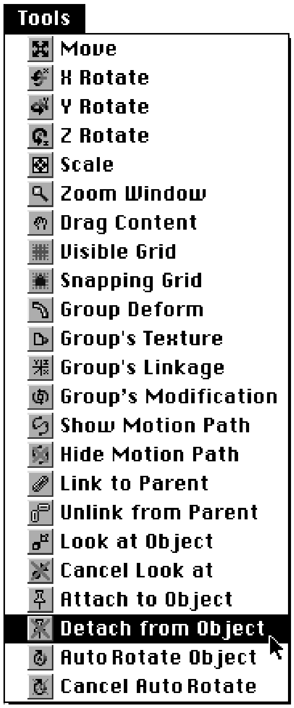


Figure 5.19   Canceling the operation

W

To remove the Attach to Object function, refer to the section "Detach from Object" (page 5-25).

Detach from Object

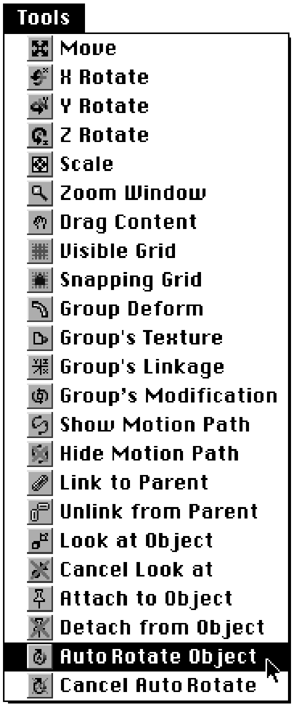


This command removes the **Attach to Object** function (page 5-23) from the selected object (but does not recalculate custom frames).

W

To attach an object to another object, refer to the section "Attach to Object" (page 5-23).

Auto Rotate Object



This command forces a moving object to follow the line of its motion path, rotating on its local axes and always “looking” in the direction of the path.

W

Use of this command will generate custom frames for the selected object’s rotation channels.

To automatically rotate an object on its motion path:

1. Select the object to be automatically rotated, in either a World View or the Project window.

   W

   An object can be automatically rotated at any time in the animation, and for any range of frames.

2. To apply the command at a specific time, set the Project window to Time mode and move the time selector to the time at which the command is to start.

   To apply the command for a range of frames, set the Project window to Keyframe or Frame mode and select the range of frames to be affected.

3. Choose **Auto Rotate Object** from the Tools menu.

If the Auto Rotate sequence is for the camera or a light, you can override the length of the object’s reference vector.

To modify the reference vector:

1. Set the Project window to Keyframe mode and double-click on a cell in the Auto-Rotate channel, as shown in Figure 5.20.

   W

   Auto rotation sequences are numbered (AR #1, AR #2, etc.), permitting multiple auto rotation sequences for an object during the course of the animation.

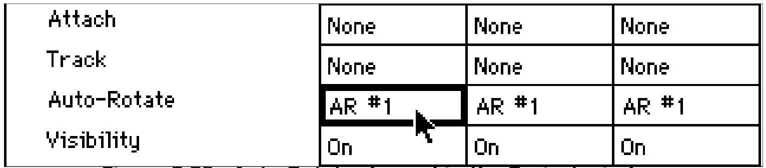


Figure 5.20 Auto-Rotate channel in the Project window

A dialog box, as shown in Figure 5.21, opens.

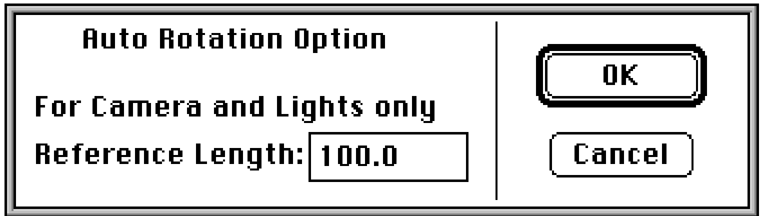


Figure 5.21 Dialog box used to set auto rotation options

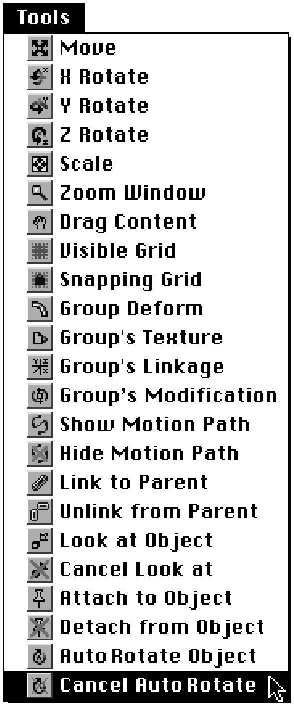
2. Enter a value in the **Reference Length** edit box. The value corresponds to the scale of the rulers in the World View windows.

3. Click **OK** or press **Return**.

W

To cancel the Auto Rotate function, refer to the section "Cancel Auto Rotate" (page 5-28)

Cancel Auto Rotate



This command removes the Auto Rotate function from the selected object (but does not recalculate custom frames).

W

To use the Auto Rotate function, refer to the section "Auto Rotate Object" (page 5-26)

Windows and Palettes

Chapter 6 The World View Windows

Chapter 6 The World View Windows

Overview

The World View windows are the drawing windows of the ElectricImage workspace. It is in these windows that objects (models, lights and the camera) are represented by icons which can be selected and dragged with the mouse. Also, the paths that objects travel (if animated) are visible as lines which can be edited in much the same way as lines are edited in most popular Macintosh drawing programs.

There are three World View windows, showing three views of the ElectricImage universe:

- Top (from the top looking down)
- Side (from the right side looking across to the left side)
- Front (from the front looking to the back)

Each view can also be changed to any of the other views. Figure 6.1 shows a top World View window.

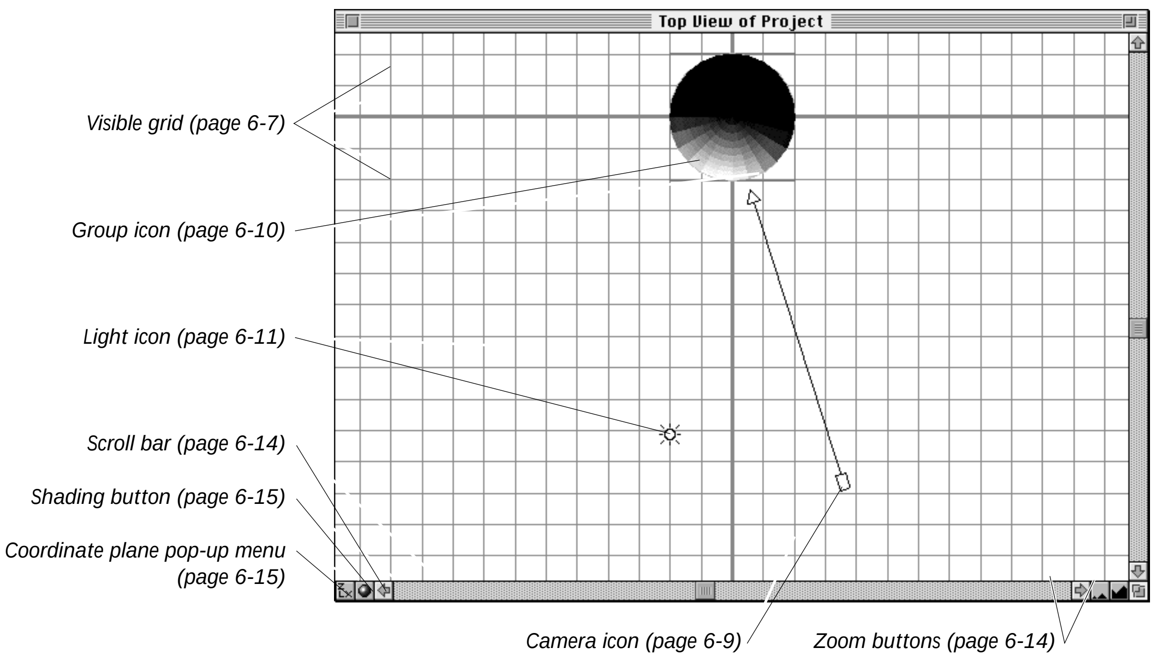


Figure 6.1 Sample World View window

Opening the World View Windows

The World View windows open automatically when ElectricImage is launched and a project file is opened. The windows can be closed and reopened, however, through the use of the following commands in the Windows menu:

- **Top View**, discussed in the section “Top View” (page 3-5) in *Chapter 3: The Windows Menu Commands*.
- **Side View**, discussed in the section “Side View” (page 3-6) in *Chapter 3: The Windows Menu Commands*.
- **Front View**, discussed in the section “Front View” (page 3-7) in *Chapter 3: The Windows Menu Commands*.

Top View

The top World View window looks down on the universe from above, showing the X/Z coordinate plane, as illustrated in Figure 6.2.

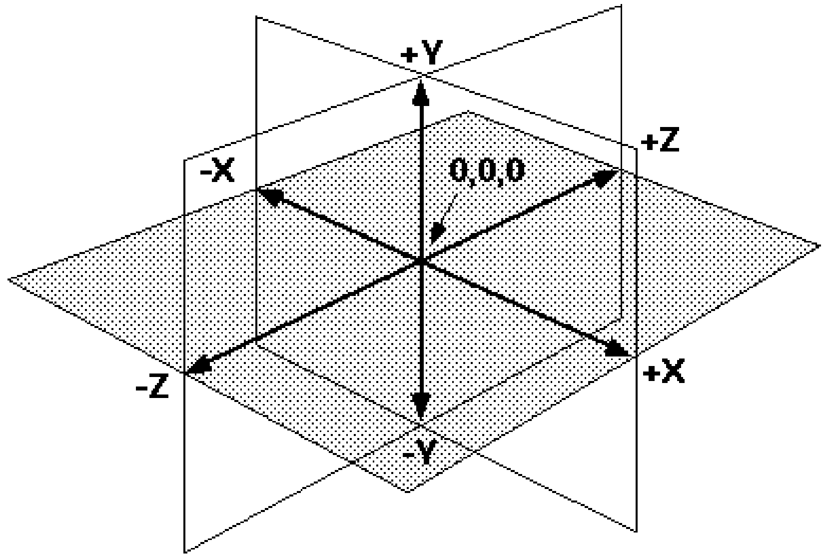


Figure 6.2 X/Z coordinate plane (in gray) shown in the top view

In the top view, objects are seen and manipulated in global X and Z coordinate space only. The Y coordinate space for objects is therefore not affected in the top view.

Side View

The side World View window looks toward the left of the universe, showing the Y/Z coordinate plane, as illustrated in Figure 6.3.

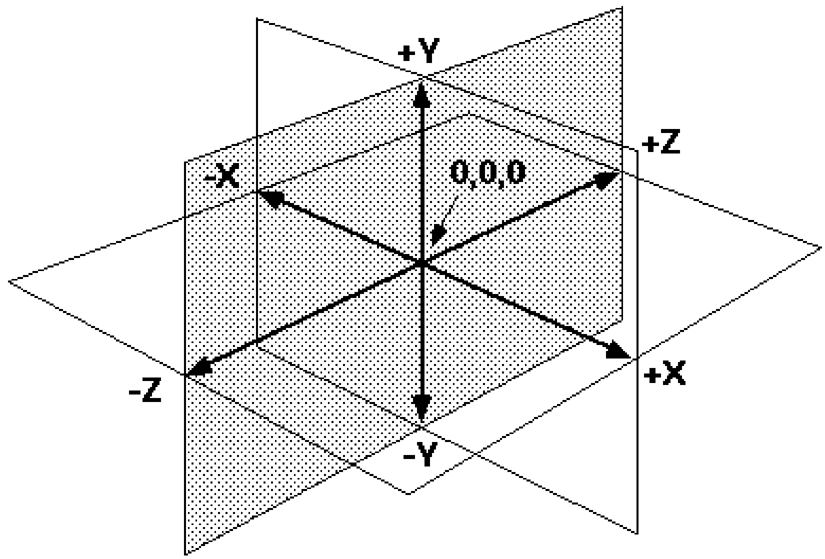


Figure 6.3 Y/Z coordinate plane (in gray) shown in the side view

In the side view, objects are seen and manipulated in global Y and Z coordinate space. The X coordinate space for objects is therefore not affected in the side view.

Front View

The front World View window, looks to the rear of the universe, showing the X/Y coordinate plane, as illustrated in Figure 6.4.

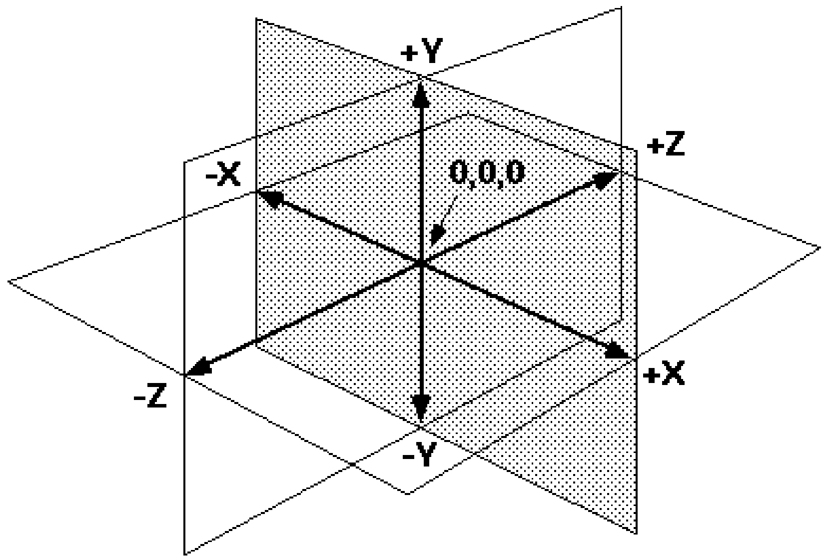


Figure 6.4 X/Y coordinate plane (in gray) as shown in the front view

In the front view, objects are seen and manipulated in global X and Y coordinate space. The Z coordinate space for the object is therefore not affected in the front view.

Window Elements

Grid and Rulers

The World View windows contain grids and rulers to aid in positioning objects (groups, lights and the camera).

Visible Grid

The visible grid is scaled to the first object added to the project, but can be rescaled, as shown in Figure 6.5.

X, Y and Z scale set at 100

X, Y and Z scale set at 200

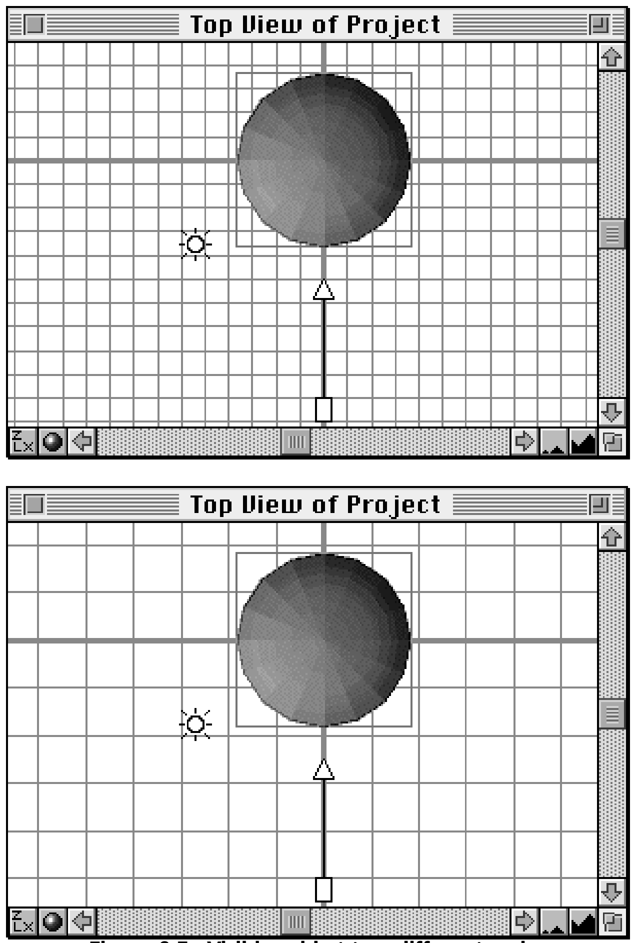


Figure 6.5 Visible grid at two different scales

Snapping Grid

In addition to the visual grid, there is also an invisible snapping grid to which objects will “snap” when placed. Grid snap can be toggled on and off using either the **Snapping Grid** tool on the Tool Palette, as discussed in the section “The Snapping Grid Tool” (page 19-12) in *Chapter 19: The Tool Palette*, or the Caps Lock key.

Rulers

The rulers are not displayed by default, but can be toggled on and off with the use of the **Show Rulers** command in the Windows menu, as discussed in the section “Show/Hide Rulers” (page 3-14) in *Chapter 3: The Windows Menu Commands* (or press Command-M). Figure 6.6 shows a World View window with rulers displayed.

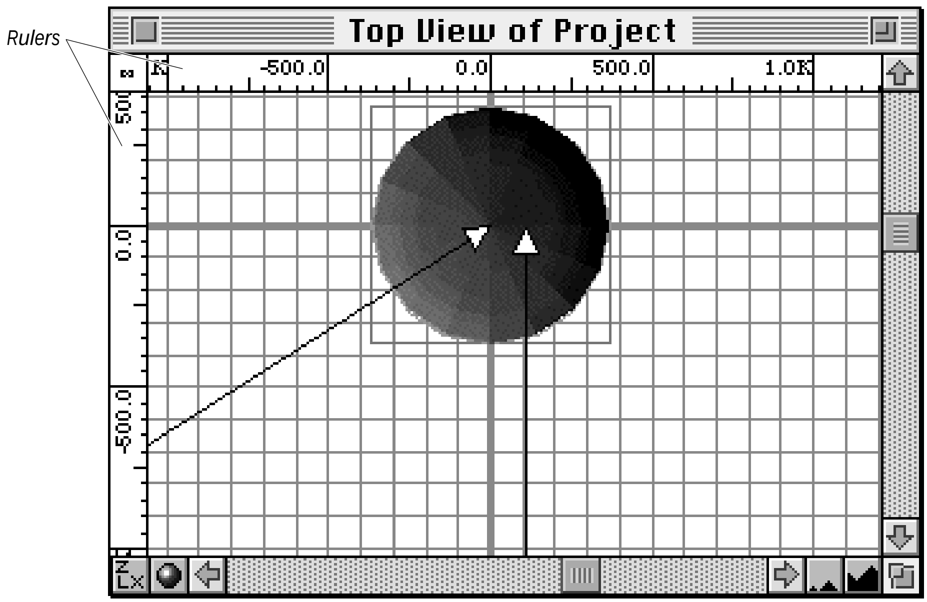


Figure 6.6 Rulers in a World View window

Configuring the Display

To configure the grid and ruler display to your own preferences, use the **Grid & Scale…** command in the Edit menu. For an explanation of the various grid and ruler settings, refer to the section “Grid & Scale…” (page 2-17) in *Chapter 2: The Edit Menu Commands*.

The Camera

Figure 6.7 shows the camera icon and its various elements.

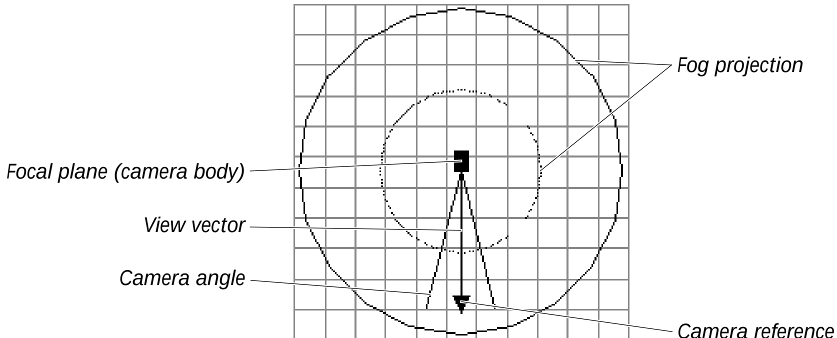


Figure 6.7 Camera icon elements

Focal plane This box indicates the position of the camera. Dragging it changes the camera's position, but not where it is looking.

Camera reference This arrowhead indicates the direction in which the camera is looking. Dragging it changes where the camera is looking but not its position.

View vector This line between the focal plane box and the reference arrowhead maintains a fixed orientation for the camera. Dragging it changes both the camera's position and where it is looking.

Camera angle These lines indicate the angle of view seen by the camera's lens, and is displayed only if enabled.

Fog projection These circles represent the area of fog, and is displayed only if enabled and if fog is specified in the Render Control window.

W

Camera angle and fog projection are not displayed by default. They must be enabled in the Camera Info window, which is also used to position and orient the camera with numerical values (refer to Chapter 10: The Camera Info Window). For an explanation of fog, refer to Chapter 9: The Render Control Window.

Groups

Figure 6.8 shows a group icon in its various levels of drawing detail.

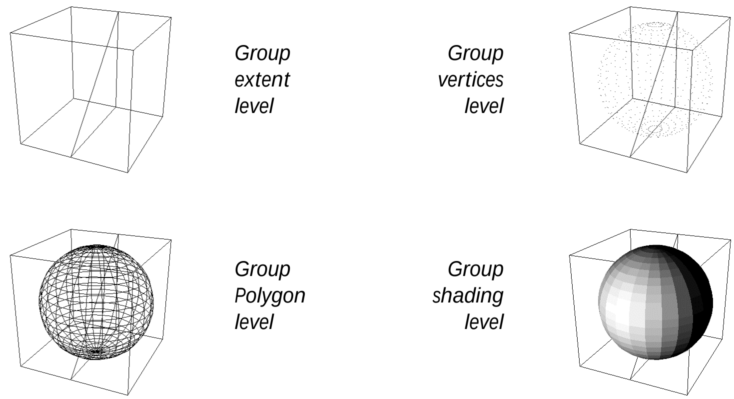


Figure 6.8 Group icon elements at different shading levels

Group extent This is a cube that surrounds a group and shows only the space in which the group exists. It also indicates, by way of a diagonal line through the center of the cube, in which direction the model is facing as it was imported into ElectricImage. The front face of the model is where the diagonal line touches the bottom of the cube.

Group vertices These are points that define a whole polygon.

Group polygons These are geometric entities denoting a surface or face of the group.

Group shading This shows the polygons of the group, accounting for the current lighting in the scene. There are two methods of shaded drawing:

- Shaded Poly level drawing is flat, with no smoothing.
- Shaded Pixel will draw smooth spotlighted areas—at the expense of processing speed.

W

The drawing level can be set on the fly with the Shading button (page 6-15) or by setting preferences with the Drawing... command in the Edit menu, as discussed in the section "Drawing..." (page 2-11) in Chapter 2: The Edit Menu Commands.

Lights

Figure 6.9 shows a light icon and its various elements.

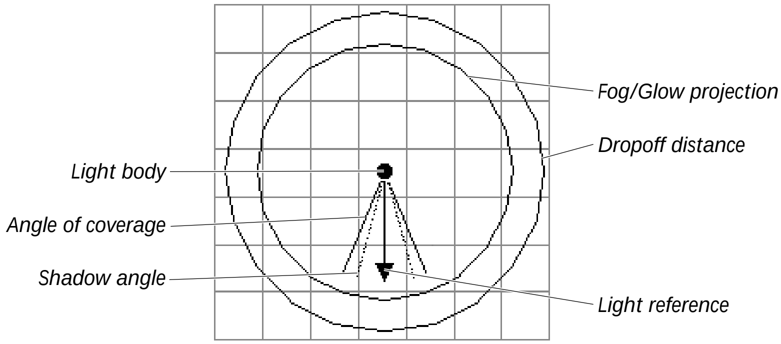


Figure 6.9 Light icon elements

Light body This icon represents the position of the light.

Light reference This arrowhead represents the direction in which the light is pointed. It is applicable only to parallel and spot light types; radial, ambient, camera and tube light types radiate light in all directions.

Angle of coverage These lines represent the angle within which objects will be illuminated by the light, and is displayed only if enabled.

Dropoff distance This circle represent the distance from the light beyond which objects will not be illuminated by the light, and is displayed only if enabled.

Shadow angle These lines represent the angle within which objects illuminated by the light will cast shadows, and is displayed only if enabled.

Fog/glow projection These circles represent the area of visible fog or glow, if such effects are enabled.

W

Angles and distance visibility are enabled in the Light Info window, which is also used to select the light type, set special effects, and position and orient the light with numerical values (refer to Chapter 11: The Light Info Window).

Motion Paths

Figure 6.10 shows a motion path and its various elements.

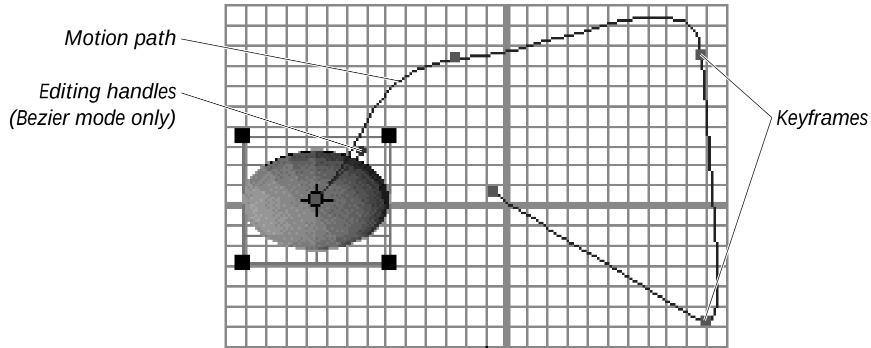


Figure 6.10 Motion path elements

Motion path This line represents the path followed by an animated object, and is visible only if the object is animated. There are four different spline types available for motion paths: linear, natural cubic, Hermite and Bezier. They are set in the Project window

Keyframe This box represents the location of a keyframe.

Editing handles These are used to edit the motion path (for Bezier splines only).

Window Controls

In using the World View windows, there are several controls that you can use to manipulate the view, as shown in Figure 6.11.

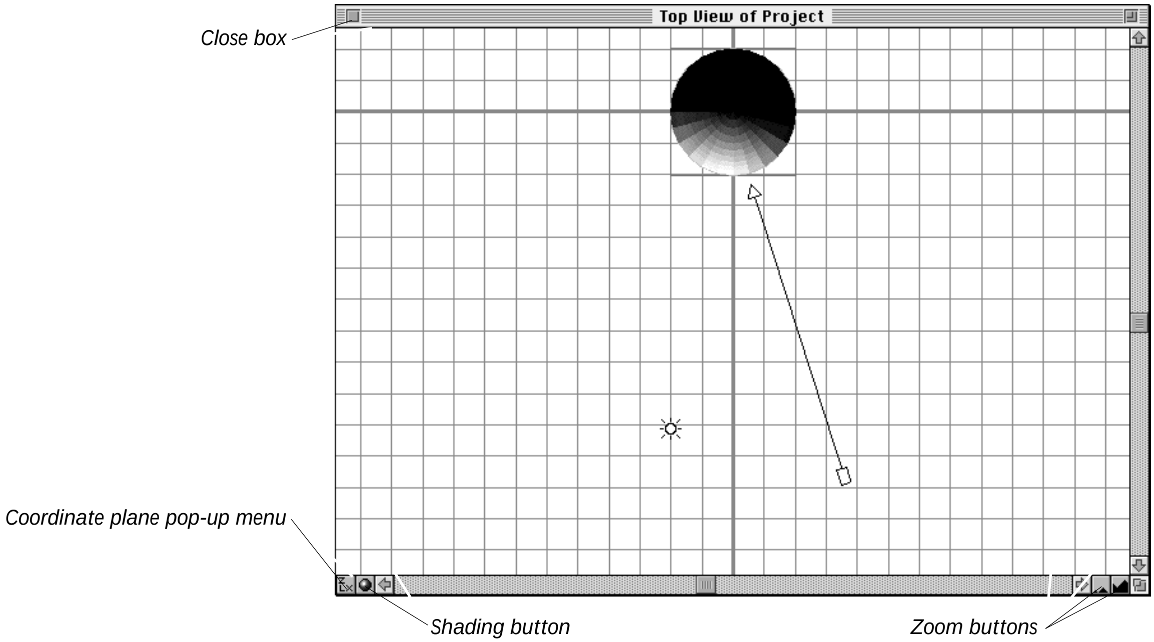


Figure 6.11 Window controls

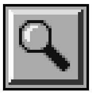
The view can be changed in three basic ways:

- The area displayed can be changed by zooming in, zooming out and scrolling or dragging the window's contents, as discussed in the section "Changing the Area Displayed" (page 6-14).
- The coordinate plane can be changed, effectively changing the view to top, side or front, as discussed in the section "Changing the Coordinate Plane" (page 6-15).
- The shading of groups can be changed to a higher level of detail, as discussed in the section "Changing the Shading Level" (page 6-15).

Changing the Area Displayed

There are several ways of changing the area displayed inside a World View window. To zoom in and out:

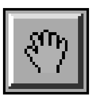
- Use the zoom buttons in the lower right corner of the window. To zoom in, click on the right zoom button. To zoom out, click on the left zoom button. To zoom in or out to a view that includes all objects in the project, hold down the option key while clicking either one of the zoom buttons.



- Use the **Zoom Window** tool from either the Tool Palette or the Tools Menu. To zoom in, click on the area you wish to zoom in on with the **Zoom Window** tool. To zoom out, hold down the option key while clicking with the **Zoom Window** tool. For an explanation of the **Zoom Window** tool, refer to the section “The Zoom Window Tool” (page 19-9) in *Chapter 19: The Tool Palette*, or the section “Zoom Window” (page 5-8) in *Chapter 5: The Tools Menu Commands*.
- Hold down the option key and drag a rectangle around the area you wish to zoom in on.

To scroll the window’s contents:

- Use the vertical and horizontal scroll bars.



- Use the **Drag Content** tool from either the Tool Palette or the Tools menu to scroll the window’s contents. For an explanation of the **Drag Content** tool, refer to the section “Zooming in or out is done by a factor of 2 with each click of the mouse.” (page 19-9) in *Chapter 19: The Tool Palette*, or the section “Drag Content” (page 5-9) in *Chapter 5: The Tools Menu Commands*.

Changing the Coordinate Plane

The coordinate plane shown in a World View window can be changed to a top, side or front view through the use of the coordinate plane pop-up menu located to the left of the horizontal scroll bar in the lower left corner of the window, as shown in Figure 6.11 (page 6-13).

This pop-up menu gives you the choice of Side, Top or Front, and its button changes to show the current display axes for the window.

W

Because you can use this pop-up menu to toggle among the side, top and front views, you can, if you wish, display only one world view window at a time and use the remaining space on your monitor for the Project window (and/or other windows).

Changing the Shading Level

Objects in the World View windows can be shaded to more readily observe the forms of models or to preview the effect of lighting in the scene. The various drawing levels are discussed in the section “Groups” (page 6-10).

The shading button in the lower left corner of the window, as shown in Figure 6.11 (page 6-13), can be used to change on the fly what a World View window will draw.

Clicking the button will shade the group(s) in the window. Pressing the Option key while clicking the button will open a pop-up menu that enables you to choose a drawing level for the window. The drawing levels are discussed in the section “Groups” (page 6-10).

Chapter 7 The Camera View Window

Chapter 7 The Camera View Window

Overview

The camera view window shows what the camera is seeing at all times, with readouts for current time (represented as time code) and current frame. Figure 7.1 shows the Camera View window as it appears when ElectricImage is launched and a project file is opened.

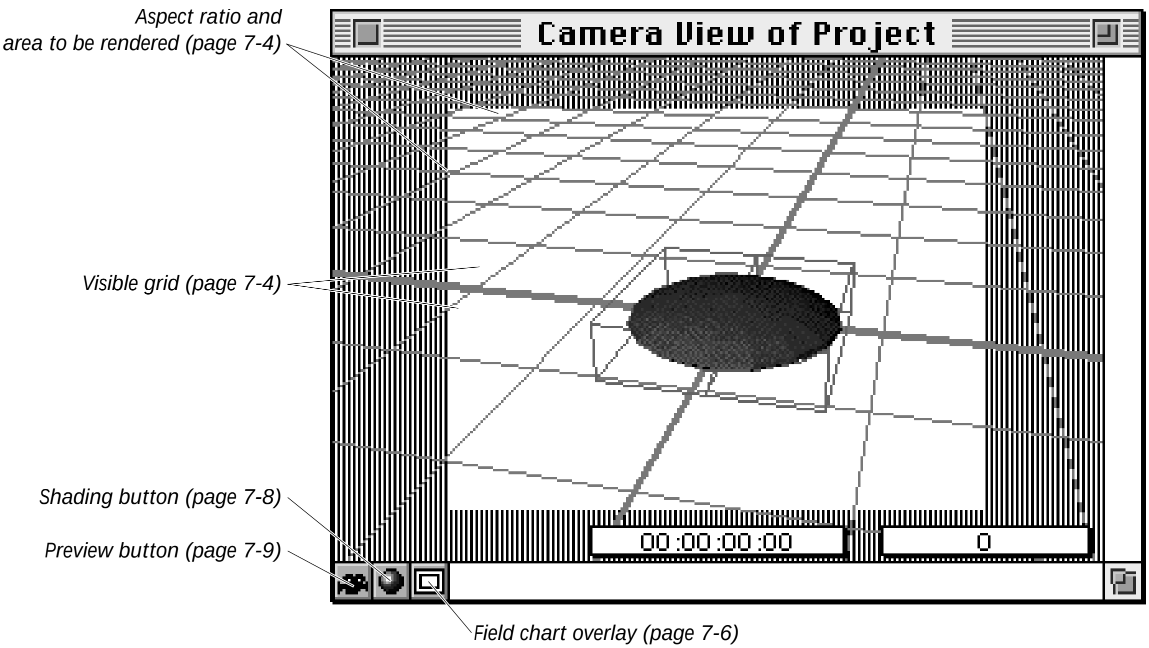


Figure 7.1 Camera View window

W

The Camera View window simulates the view through the viewfinder of an actual production camera. When you look through the eyepiece of one of those cameras, the viewing image appears either on what is called the ground glass, or viewing reticle (film), or on a small CRT (video). The ground glass has lines etched upon it indicating various film projection formats, Title Safe and Action Safe areas. ElectricImage represents the maximum viewing (rendering) area by the white (or clear) rectangle in the Camera View window. This was done so you can tell when something is just outside of camera view (it comes in very handy when animating).

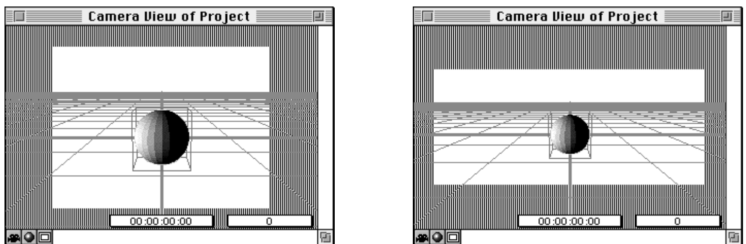
Opening the Camera View Window

The Camera View window opens automatically when ElectricImage is launched and a project file is opened. The window can be closed and reopened, however, through the use of the **Camera View** command in the Windows menu, discussed in the section “Camera View” (page 3-8) in *Chapter 3: The Windows Menu Commands*.

Window Elements

Aspect Ratio and Area to be Rendered

In the Camera View window, the white rectangle shows the current aspect ratio of the image to be rendered. The aspect ratio is set in the Render Control window, as discussed in *Chapter 9: The Render Control Window*. It defaults to the current screen's aspect ratio. Whatever falls within the white (or clear) rectangle will appear in the final image. Whatever falls outside, in the gray region, will be outside of the camera view when the image is rendered. Figure 7.2 shows how two different aspect ratios would appear in the Camera View window.



Standard 35mm (4:3) aspect ratio *TechniScope aspect ratio*

Figure 7.2 Aspect ratios in ElectricImage

Visible Grid

The Camera View window contains a grid to aid in observing the scene (by providing perspective). The scale of the grid and the number of divisions can be configured to suit your requirements through the use of the **Grid & Scale…** command in the Edit menu, as described in the sections "Camera Grid Size" (page 2-18) and "Camera Grid Divisions" (page 2-18) in *Chapter 2: The Edit Menu Commands*.

When the camera is dragged, the grid is turned off (by default) to speed redrawing. To keep the grid turned on, use the **Drawing…** command in the Edit menu, as discussed in the section "Show Grid while dragging" (page 2-15) in *Chapter 2: The Edit Menu Commands*.

Changing What the Camera Sees

The camera is manipulated by either clicking and dragging it in any one of the three World View windows, or by editing numerical values in the Camera Info and Project windows. The effects of moving the camera are shown in the Camera View window:

- Dragging the reference point (arrow head) changes where the camera is looking.
- Dragging the focal plane (square) of the camera changes the position of the focal plane as well as its yaw and pitch, but the reference point remains stationary. As the camera is dragged around an object, it would always be looking in the direction of the reference point.
- Dragging on the line between the focal plane and reference will drag both camera and viewpoint, without affecting the yaw, pitch, or roll of the camera. This would equate to a “trucking” or “dolly” motion.

Objects Visible in the Camera View Window

Since the Camera View window displays what the camera sees at all times, the various objects in the project will be seen if they fall within the camera’s field of view. The window can be configured, however, to display or not display shading detail for models, the position of lights, and motion paths for animated objects. The section “Drawing Objects in the Camera View Window” (page 7-8) discusses how these elements are controlled.

Window Controls

Field Chart Overlay

A field chart can be overlaid in the Camera View window and toggled on and off by clicking the Field Chart toggle button in the lower left corner of the window.

The components of the field chart can be activated or deactivated by holding down the Option key while clicking on the Field Chart toggle button. A pop-up menu will give you a choice of field chart components to be displayed. When all elements of the field chart are enabled, the result is similar to that shown in Figure 7.3.

Field Chart toggle button

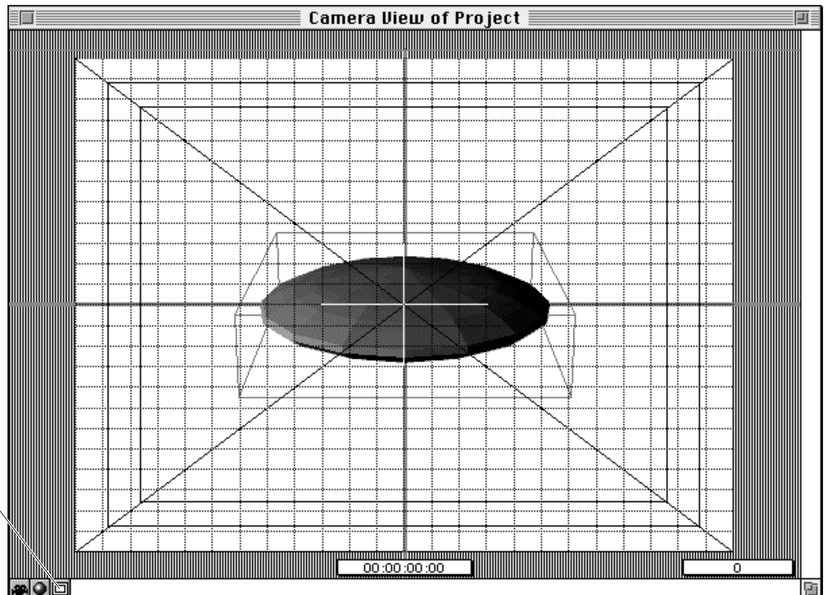


Figure 7.3 Camera View window with all field chart elements shown

For an explanation of the field chart elements, or how to set permanent field chart preferences, refer to the section "Field Chart…" (page 2-20) in *Chapter 2: The Edit Menu Commands*.

Fast Background Image Drawing

If the project contains a background image (single or multiframe) and the background image is set to be displayed in the Camera View window, the paint brush button appears at the bottom of the window, as shown in Figure 7.4.

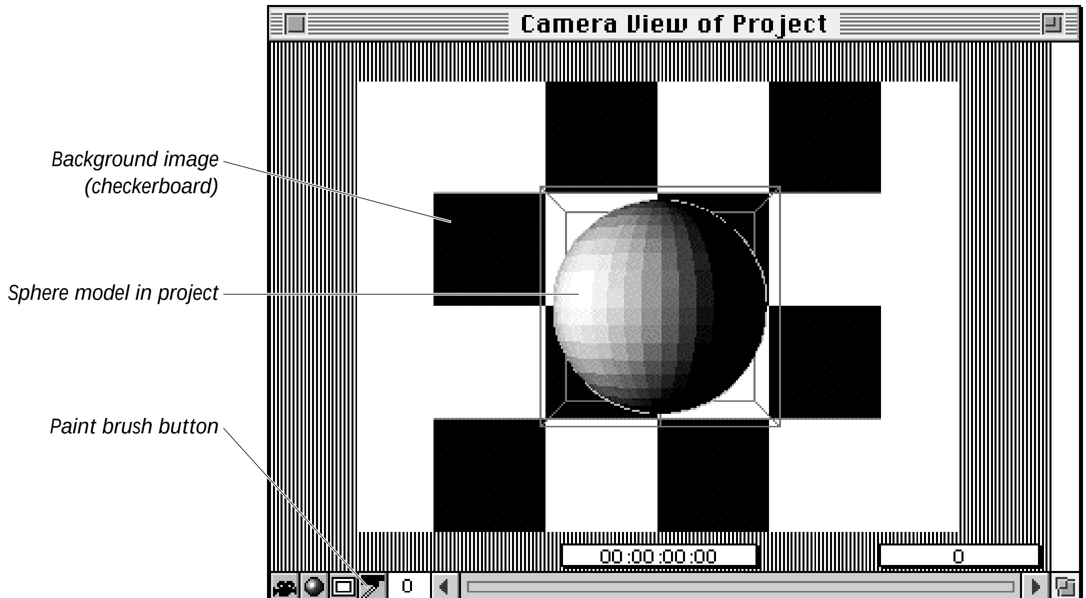


Figure 7.4 Camera View window with background image

Clicking on this button forces the background image to be drawn before anything else. Otherwise, the background image will be drawn slowly because other windows will be updated at the same time.

For an explanation of background images and how they are set to be displayed in the Camera View window, refer to the section "Background Image Control" (page 9-20) in *Chapter 9: The Render Control Window*.

Drawing Objects in the Camera View Window

Objects in the Camera View window can be shaded to more readily preview the effect of lighting in the scene. The Camera View window can also show lights and motion paths.

The shading button in the lower left corner of the window, as shown in Figure 7.5, can be used to change on the fly what the Camera View window will draw.

Shading button

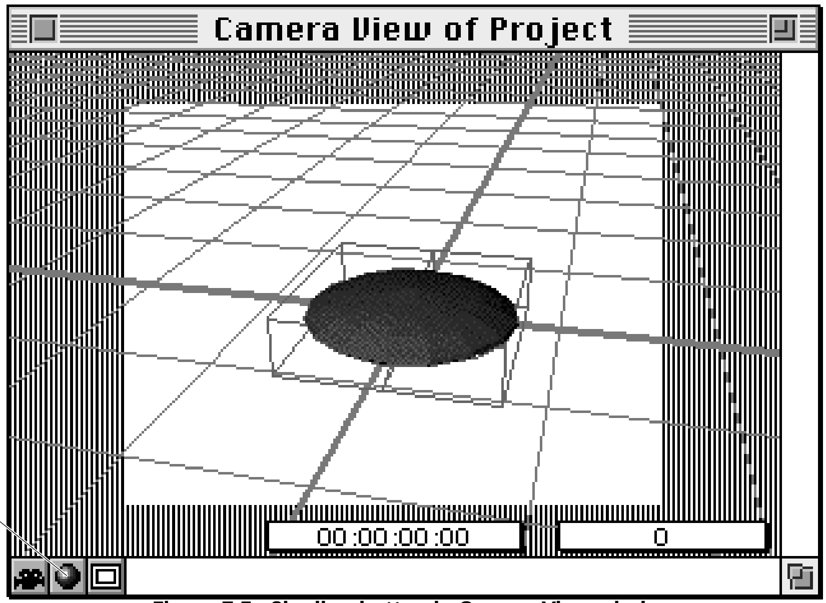


Figure 7.5 Shading button in Camera View window

Clicking the button will shade the group(s) in the window. Holding down the Option key while clicking the button will open a pop-up menu that enables you to choose a drawing level for the window as well as to enable or disable the drawing of lights and motion paths.

W

Preferences for drawing level can also be set with the Drawing... command in the Edit menu. For an explanation of the options for drawing level, see the section "Drawing..." (page 2-11) in Chapter 2: The Edit Menu Commands.

Previewing Animations

Animations can be previewed in the Camera View window, or by writing the preview to an image file (for real time viewing in the Projector application) or to a QuickTime movie.

The preview button in the lower left corner of the window, as shown in Figure 7.6, is used to initiate a preview and also to specify on the fly the drawing level and output options for previews.

Preview button (page 7-9)

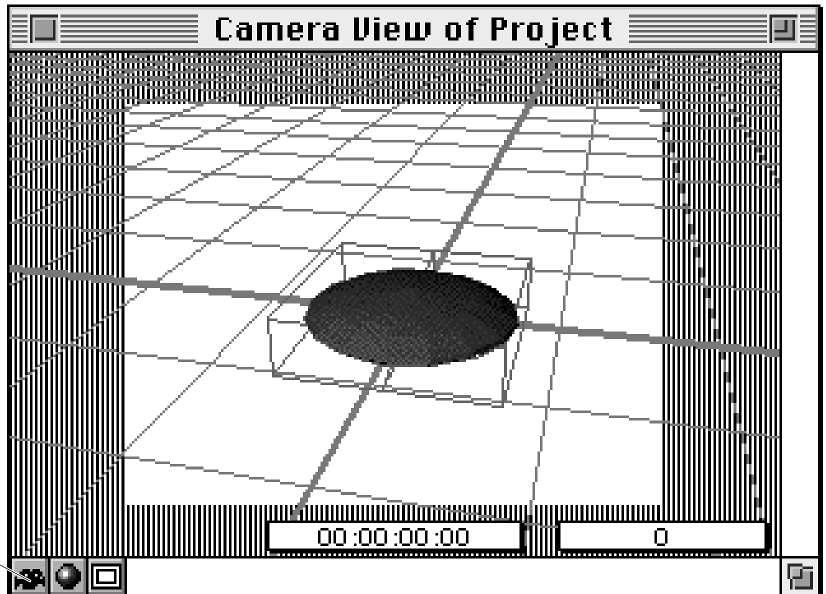


Figure 7.6 Preview button in the Camera View window

Clicking the button will initiate the preview. Holding down the Option key while clicking the button will open a pop-up menu that enables you to choose preview options.

W

Preferences for drawing level and output of previews can also be set with the Preview/Render... command in the Edit menu. For an explanation of the options for previewing animations, see the section "Preview/Render..." (page 2-26) in Chapter 2: The Edit Menu Commands.

When the preview is output to the screen, the Camera View window changes slightly, as shown in Figure 7.7.

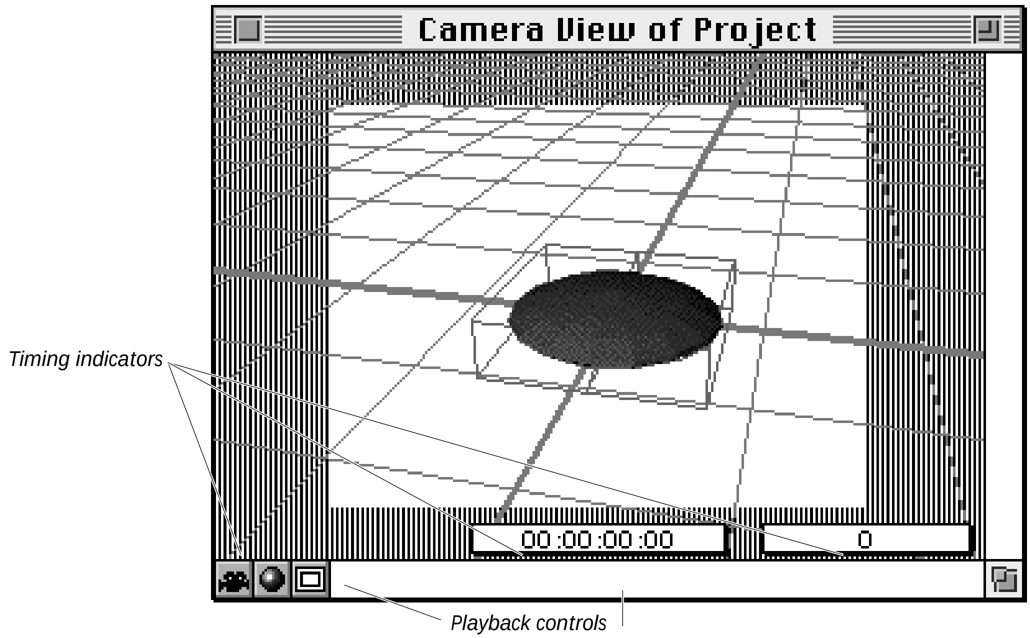


Figure 7.7 Camera View window in preview mode

To stop the preview and return to the normal window display, click anywhere in the window.

Timing Indicators

Beneath the white viewing area rectangle, from left to right, are a speed indicator, showing the actual playback speed of the animation in frames per second, the timecode readout, which gives a current frame count using SMPTE timecode, starting at time zero, and the current frame indicator, where the current frame is displayed.

Playback Controls

Playback controls are visible in the lower scroll bar, and work in a similar fashion to the way VCR controls work. Clicking on the Pause button will pause the playback, and enable you to "step" through the animation by clicking on the step forward or step backward buttons.

You can go to the beginning of the animation at any time by clicking on the "Go To First Frame" button, or you can go to the end of the preview by clicking on the "Go To Last Frame" button.

Rotoscoping

Rotoscoping involves the “tracing” of existing images, usually to locate or isolate some component of the source image for later use in a special effect shot, or to match a motion for an element to be added later. When using a multiframe background image for rotoscoping, a frame count is displayed at the bottom of the window, along with the scroll bar.

In Figure 7.8, the display indicates the frame number of the background image that is currently being drawn in the window. The scroll bar is used to change the frame being displayed.

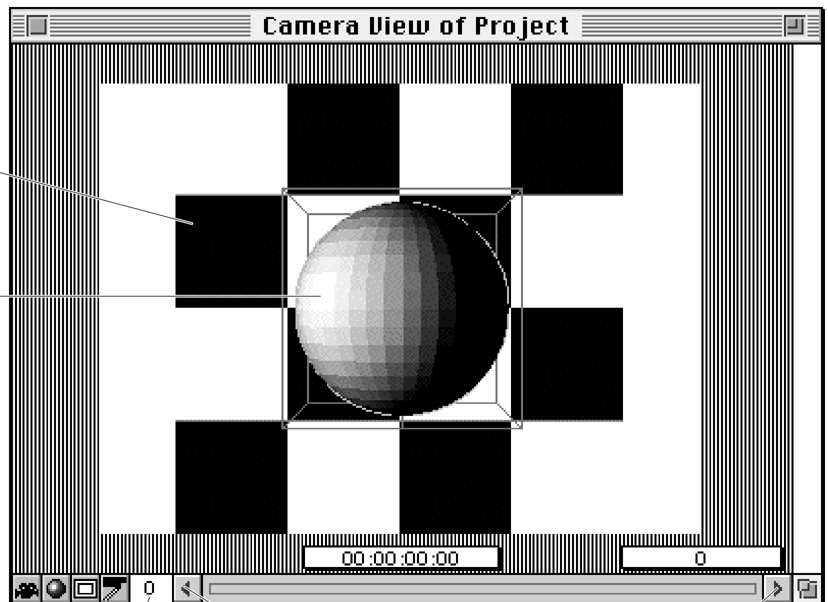


Figure 7.8 Using the Camera View window for rotoscoping

Chapter 8 The Project Window

Chapter 8 The Project Window

Overview

The Project window is the single most important window in ElectricImage. It contains a complete animation overview of the project and as such is very powerful, offering a great deal of information. It is in this window that you set the animation mode in which to edit the project, and where you can observe and animate all of the attributes within the project file.

There are four editing modes: Time, Keyframe, Frame and Index (discussed in detail on the following pages). The default view is Time mode, as shown in Figure 8.1.

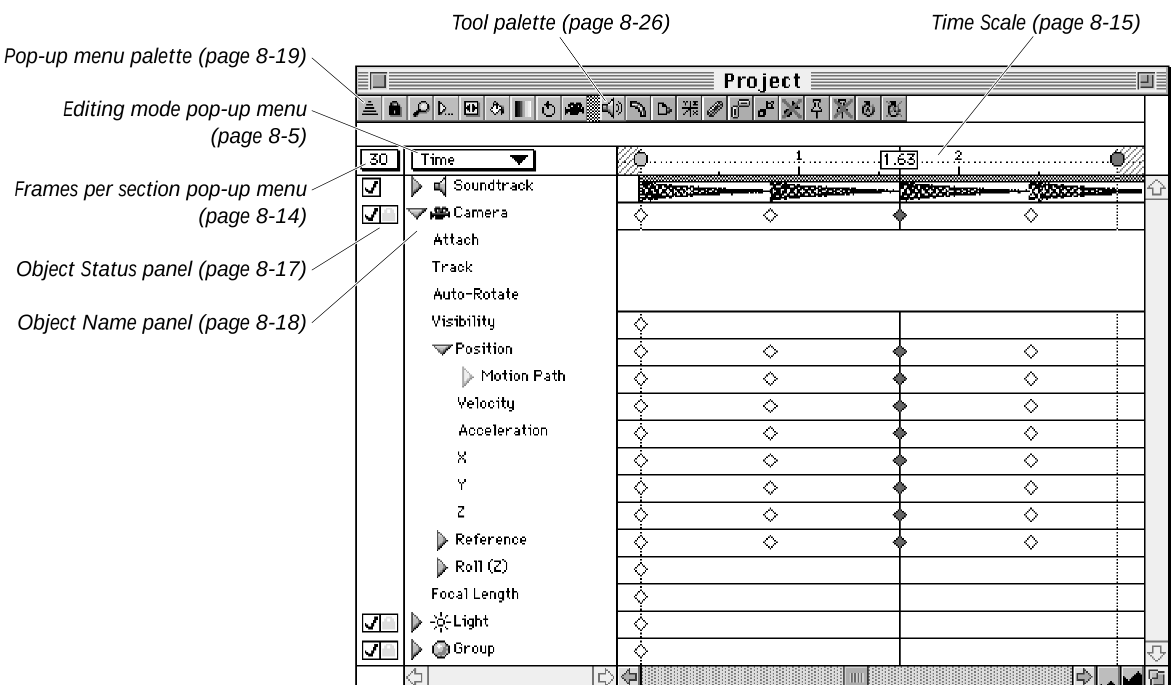


Figure 8.1 Project window in Time mode

In Time mode, the Project window is used to set the duration of the animation and the timing of individual events.

In the other modes, the Project window resembles a spreadsheet, with a column of editable data for each frame in the project (Keyframe and Frame modes show all frames; Index mode shows only the keyframes, listed in order of creation). You can thus use the Project window to specify virtually all attributes of the scene (as a supplement to clicking and dragging in the World View windows).

The Project window also accepts input from spreadsheet programs such as Microsoft® Excel or Mathematica™, as a means of, for example, importing formulas for animated sequences.

Opening the Project Window

To open the Project window, choose **Project Window** from the Windows menu, as discussed in the section “Project Window” (page 3-9) in *Chapter 3: The Windows Menu Commands*.

Editing Modes

The appearance and use of the Project window differ according to the editing mode selected. The editing mode is selected in the editing mode pop-up menu, as shown in Figure 8.2.

Editing mode pop-up menu

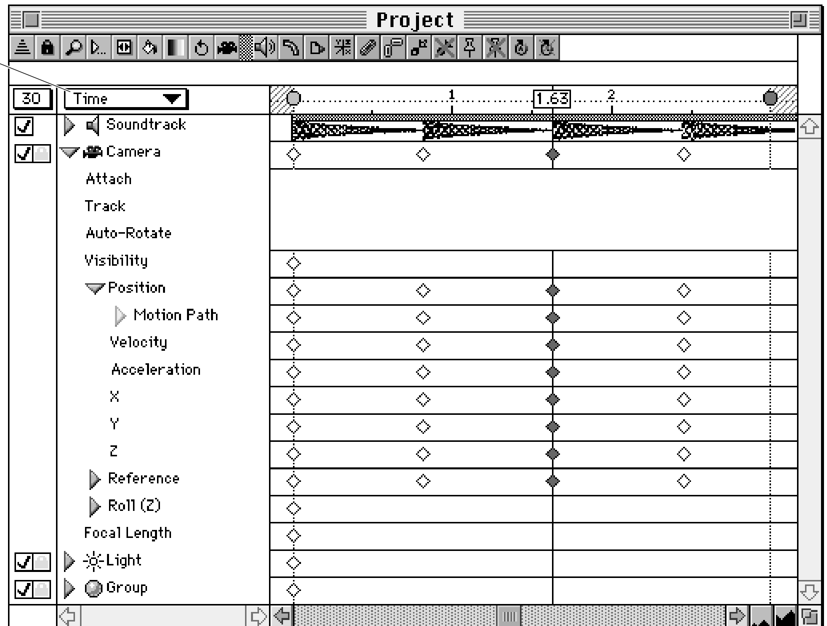


Figure 8.2 The Project window's editing mode pop-up menu

There are four editing mode choices on the menu, as follows:

- Time Mode (page 8-6)
- Keyframe Mode (page 8-7)
- Frame Mode (page 8-8)
- Index Mode (page 8-9)

Time Mode

In Time mode (the default), the Project window appears as in Figure 8.3.

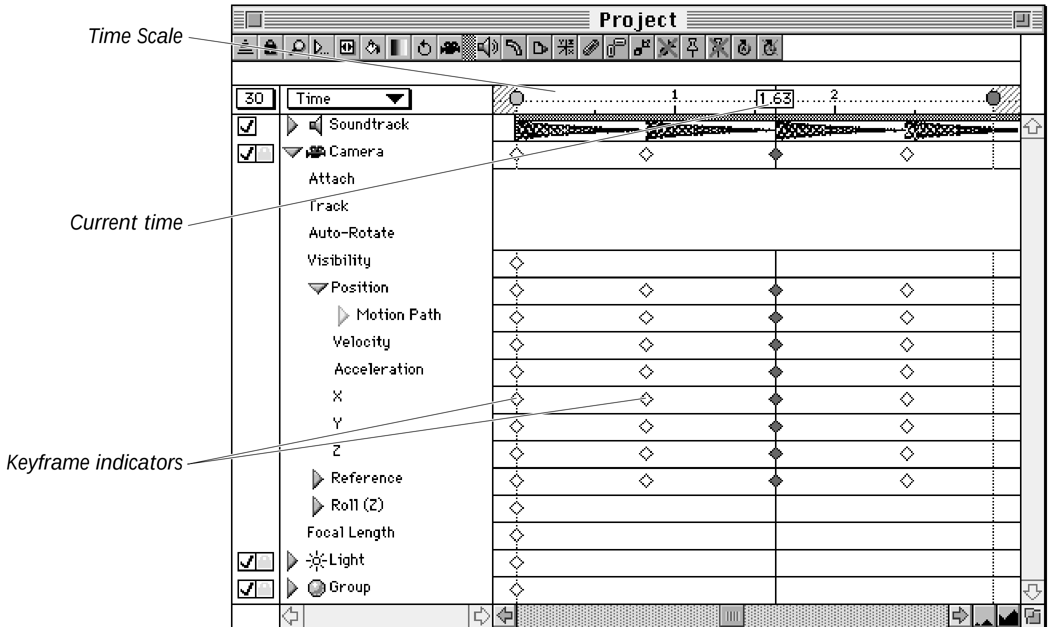


Figure 8.3 The Project window in Time mode

In this mode, the data panel contains timing control devices so that the Project window can be used to control the timing of events in the animation. For an explanation of these controls, refer to the section "Setting the Timing of Events" (page 8-15).

When in Time mode, the World View windows will draw objects at the currently active (selected) time. Those objects may or may not contain keyframes which are present at the current time.

Keyframes are automatically added any time you change the current time in the Project window (by dragging the time selector) and then set an event, such as changing the position of a model, or adjusting the color of a light.

Keyframe Mode

In Keyframe mode, the Project window appears as in Figure 8.4.

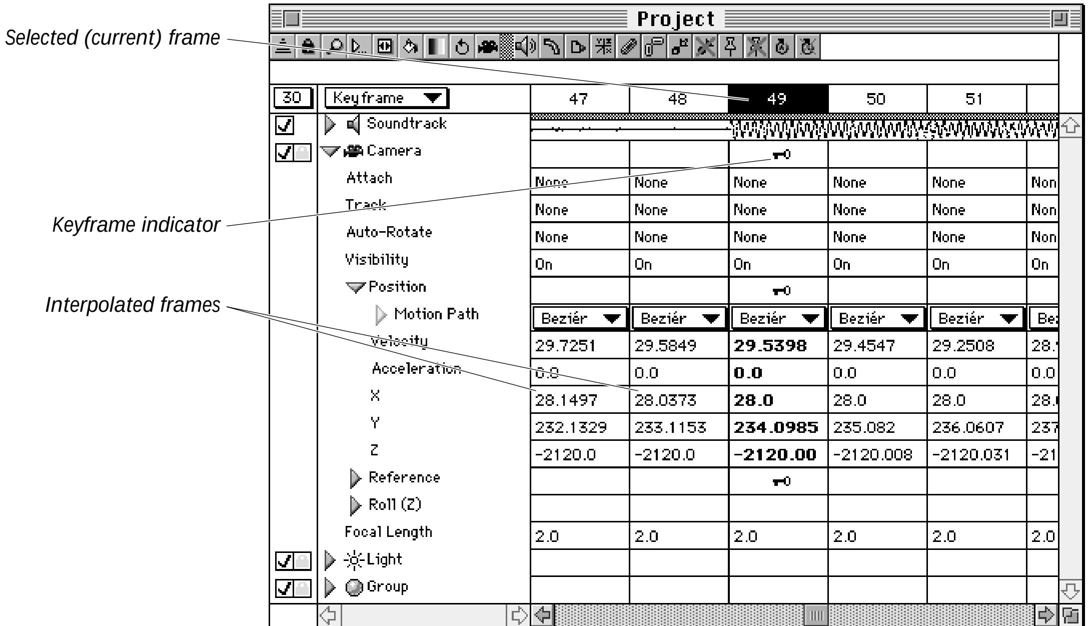


Figure 8.4 The Project window in Keyframe mode

When in Keyframe mode, the Project window displays all events occurring in the project by keyframes and interpolated frames, with keyframes indicated by key icons. Therefore, instead of a time scale to set the current time (as is the case in Time mode), you are presented with a frame scale to select the current frame (in the example above, frame 49 is selected).

The Keyframe mode will actually let you edit animation values directly by clicking in a data cell, and then entering the new value in the edit box, as discussed in the section “Editing Data” (page 8-11). If you make a change or addition to a channel that does not contain a keyframe, a new keyframe is automatically added at that position.

In this mode you can also select a range of frames to which you can apply effects, as discussed in the section “Selecting a Range of Frames” (page 8-13).

Frame Mode

In Frame mode, the Project window appears as in Figure 8.5.

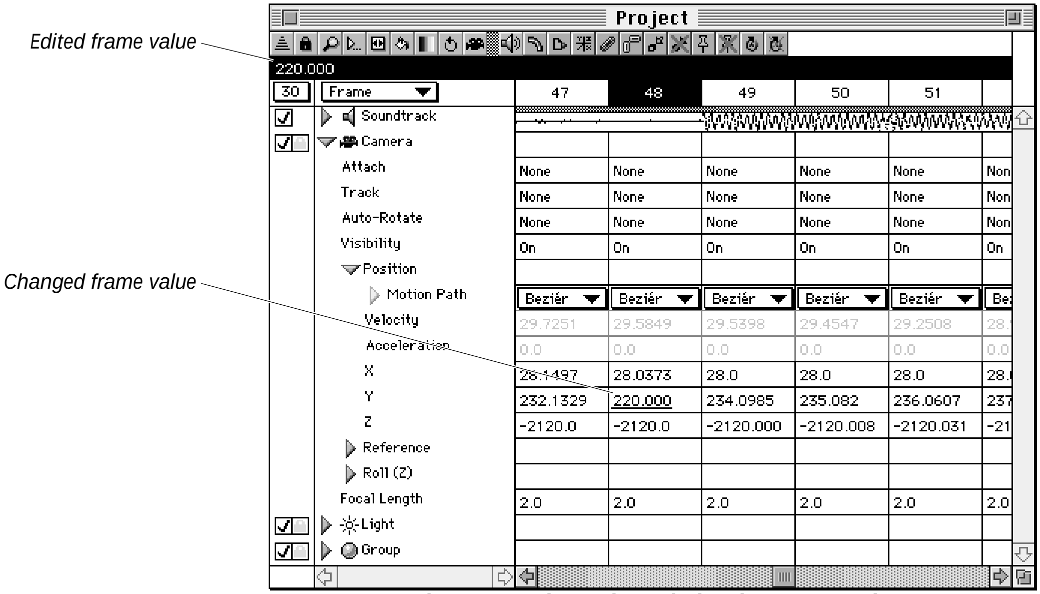


Figure 8.5 The Project window in Frame mode

When in Frame mode, the Project window displays all events occurring in the project by actual frames. Setting the active frame in Frame mode works the same as in Keyframe mode (page 8-7), by clicking the frame number in the frame scale.

Unlike Keyframe mode, however, editing a frame's data in Frame mode changes the value for that frame only—no keyframes are created and no interpolation will occur; you would be creating data that deviates from the keyframes you have created and the frames interpolated from those keyframes. This feature can be thus be used to create intentional "glitches" in the animation. (If you need to, you can always reinterpolate the frame list by selecting the range of frames and choosing **Recalculate Frames** from the Keyframe menu, or **Recalculate All Frames** for all frames.)

Changed frame values are underlined in the data cell, and the underline remains in the cell if you switch back to Keyframe mode.

Index Mode

In Index mode, the Project window appears as in Figure 8.6.

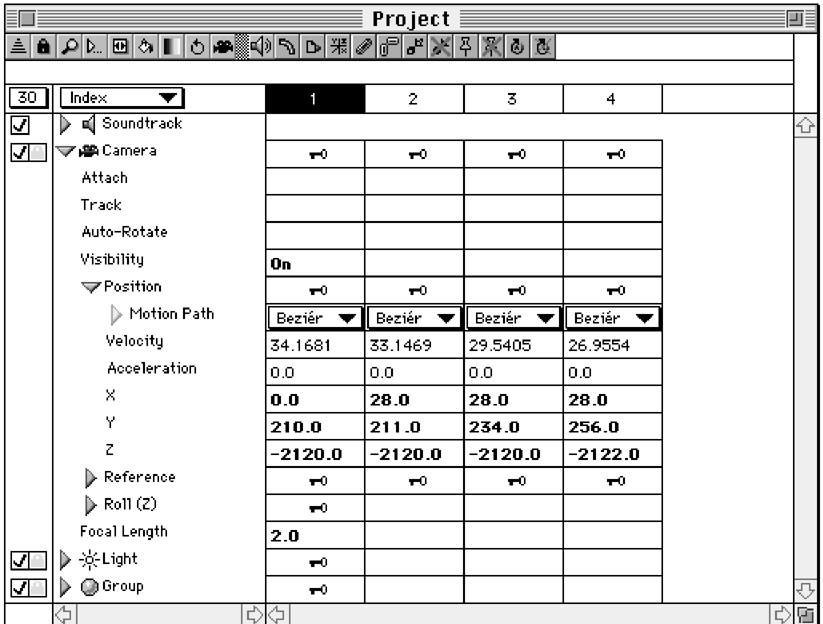


Figure 8.6 The Project window in Index mode

When in Index mode, the Project window displays keyframes only, by the order in which they were created for each object. The current index is set by clicking the appropriate value in the index scale at the top of the data panel.

In Figure 8.6, there are four keyframes for the camera (appearing in index columns 1 through 4) and one keyframe for the Light and Group (appearing in index column 1).

W

As in Keyframe and Frame modes, you can edit animation values directly, as described in the section "Editing Data" (page 8-11).

Window Controls

Resizing and Scrolling the Display

All panels are resizable by moving the cursor to a vertical edge of a panel, clicking on it, and dragging that edge to its new location.

- If the size of the panel becomes too small, the edge will snap to the nearest edge of the next panel or window.
- If the size of the panel is too large, the edge stays at the outermost position indicating the panel's maximum size.

The following controls are also available for scrolling the display:

- The horizontal scrollbar in the Object Name panel can be used if the names extend beyond the panel's edges.
- In Frame and Keyframe modes, the horizontal scrollbar in the Object Data panel can be used if there are more cells to be displayed beyond the right edge of the window.
- In Time mode, the horizontal scroll bar is used to show more keyframes in the time line, if any.
- All panels can be scrolled vertically with the vertical scrollbar.
- In Time mode, the zoom controls in the lower right corner of the window can be used to zoom the window. Holding down the Option key while clicking either zoom control centers the time display between the start and stop times of the project.

Editing Data

The Project window's edit box is used to update information in the window's data cells and to rename objects (e.g., lights and groups). The edit box functions in all editing modes other than Time mode.

To edit cell data:

1. Click in the data cell to be edited.

The cell is selected and the cell's data is put into the edit box, as shown in Figure 8.7, highlighted for editing.

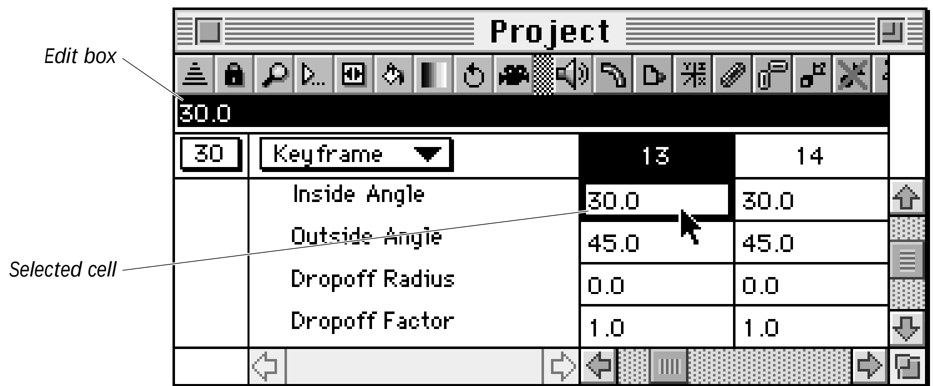


Figure 8.7 Selected cell and its data in the edit box

2. Type a new value for the cell.

3. Press **Return**.

The new data replaces the old data in the data cell.

To rename an object:

1. Click on the object's name in the object panel.

   The object is selected and the object's name is put into the edit box, as shown in Figure 8.8, highlighted for editing.

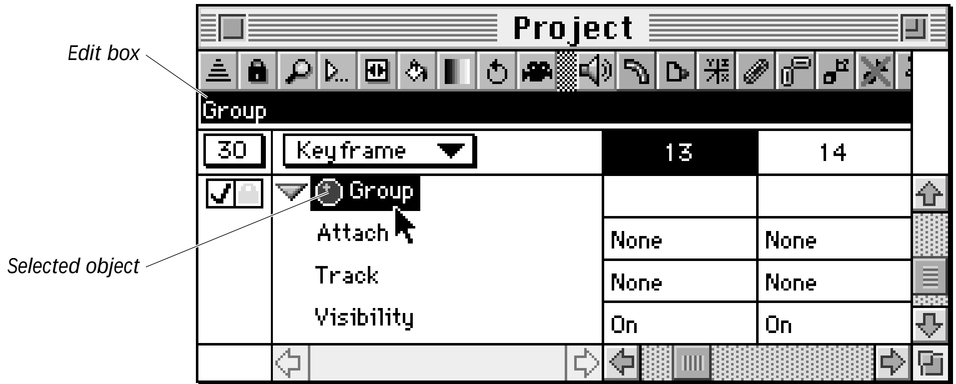


Figure 8.8 Selected object and its name in the edit box

2. Type a new name for the object.

3. Press **Return**.

   The new name replaces the old name in the object panel.

Selecting a Range of Frames

In all editing modes other than Time mode, a range of frames can be selected, as shown in Figure 8.9, to restrict an operation to only those frames.

28.1497	28.0373	**28.0**	28.0	28.0
232.1329	233.1153	**234.0985**	235.082	236.0607
-2120.0	-2120.0	**-2120.00**	-2120.008	-2120.031

Figure 8.9 Example of selected range of frames

To select a range of frames, click on the first frame in the range and either drag to the last frame or shift-click on the last frame.

Operations that can be performed on a range of frames include:

- Fill (page 8-22)
- Blend (page 8-23)
- Cycling (page 8-23)
- Look at Object (page 8-27)
- Attach to Object (page 8-28)
- Auto Rotate Object (page 8-29)

W

You can also paste cells from a Microsoft Excel file into a range of cells in the Project window. This enables you to create animation data from formulas in Excel, copy the Excel data to the clipboard or Scrapbook, and replace a selected range of frames in the Project window with the Excel data.

Setting Frames Per Second

The FPS pop-up menu is used to select the number of frames per second to be calculated and rendered.

Along with duration, FPS determines the total number of frames for the animation (i.e., if the duration is 10 seconds, selecting 30 FPS calculates and renders 301 frames—frame 0 plus 300 frames).

The menu choices are:

Custom… This option opens a dialog box, shown in Figure 8.10, that enables you to specify a number other than the NTSC (30 FPS), PAL (25 FPS) or motion picture (24 FPS) standards.

Figure 8.10 Dialog box used to set custom frames per second

NTSC: 30 This option uses the NTSC video standard of 30 FPS.

NTSC: 30i This option uses the NTSC video standard of 30 FPS, but with interlacing. Each frame is split into two fields, so that in Keyframe and Frame modes the data panel will show frames as 0a, 0b, 1a, 1b, 2a, 2b, etc.

PAL: 25 This option uses the PAL video standard of 25 FPS.

PAL: 25i This option uses the PAL video standard of 25 FPS, but with interlacing. Each frame is split into two fields, so that in Keyframe and Frame modes the data panel will show frames as 0a, 0b, 1a, 1b, 2a, 2b, etc.

Film: 24 This option uses the motion picture standard of 24 FPS.

Setting the Timing of Events

In Time mode, the horizontal time scale, shown in Figure 8.11, is used as a reference for setting the duration and timing of events, in seconds.

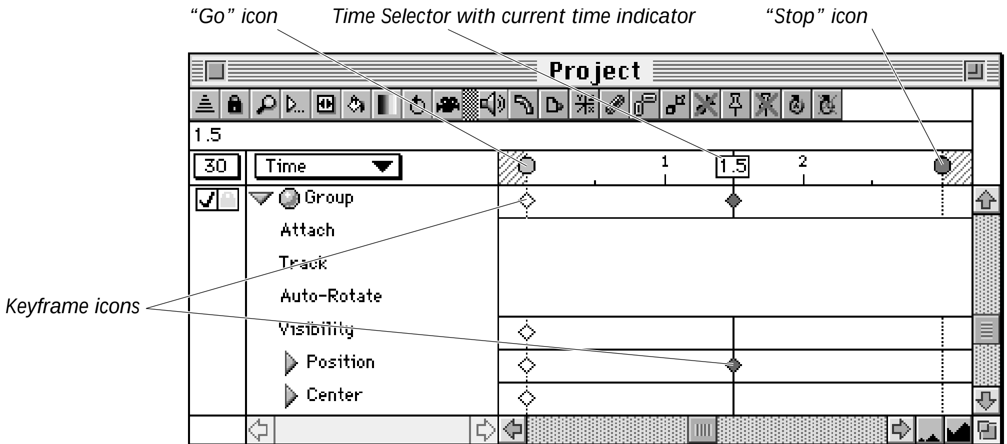


Figure 8.11 The Project window's time scale

Time Selector The Time Selector is a vertical bar with a box at the top that contains the current time. To set the time at which events occur in the animation, drag the Time Selector by its box across the time scale. The value in the box changes as the Time Selector is dragged.

"Go" Icon The green "go" icon, which appears in the time scale, indicates the start time of the animation (it defaults to 0). The animation's start time can be changed by clicking and dragging this icon to the left or right (activating the Time Selector).

"Stop" Icon The red "stop sign" icon, which also appears in the time scale, indicates the stop time, or duration, of the animation (it defaults to 10 seconds; here it is seen at 5 seconds). The animation's stop time (or duration) can be changed by clicking and dragging this icon to the left or right (activating the Time Selector).

Keyframe Icons The diamond-shaped icons in the data panel indicate the occurrence of keyframes at specific times in the animation. The times at which keyframes occur can be changed by clicking and dragging these icons to the left or right (activating the Time Selector).

In Figure 8.11, the animation is 3 seconds in duration (the green “go” icon is at 0 seconds on the time scale and the red “stop sign” icon is at 3 seconds on the time scale), with keyframes for Group occurring at 0 and 1.5 seconds. The keyframe at 1.5 seconds is currently selected, and that is where the Time Selector is currently visible.

The Object Status Panel

Located down the left side of the Project window, this panel, as shown in Figure 8.12, shows flags indicating the status of an object's visibility and selection locking.

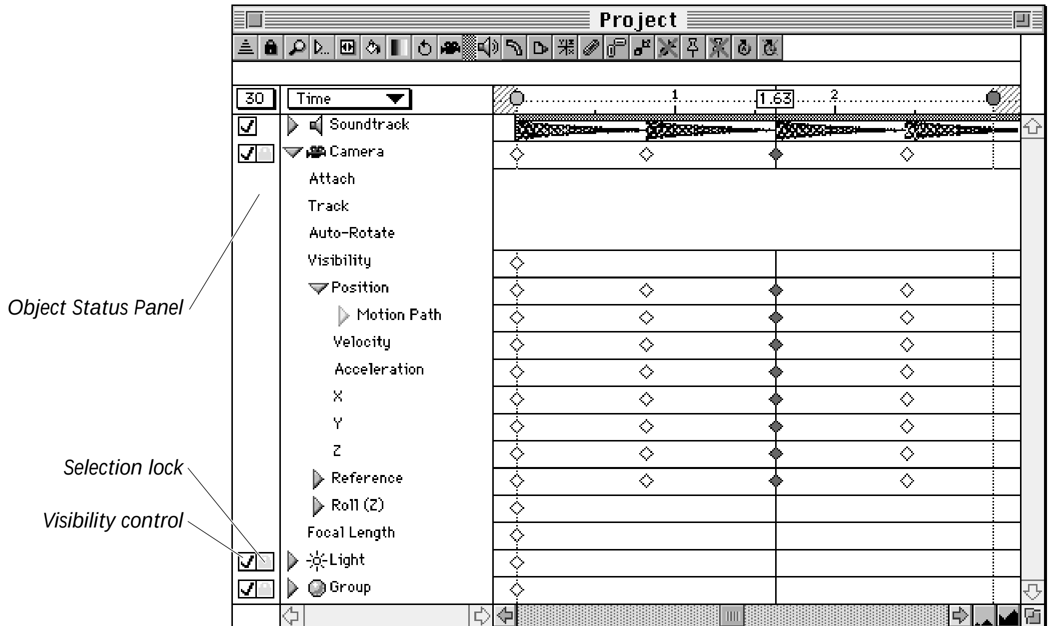


Figure 8.12 The Project window's status panel

The status can be changed by clicking on the appropriate icon:

- Clicking the visibility control toggles the visibility of the object. Invisible objects are not rendered, but animation information will be passed to their children (if so hierarchically structured).
- Clicking the selection lock prevents the object from being selected in the World View windows. It may still be selected in the Project window, however.

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Pressing the Option key while clicking either of these controls will toggle the status of both the group you are clicking and any groups hierarchically linked below it.

The Object Name Panel

Located to the right of the flag panel, the Object Name panel, as shown in Figure 8.13, contains window controls and titles for the objects in the project.

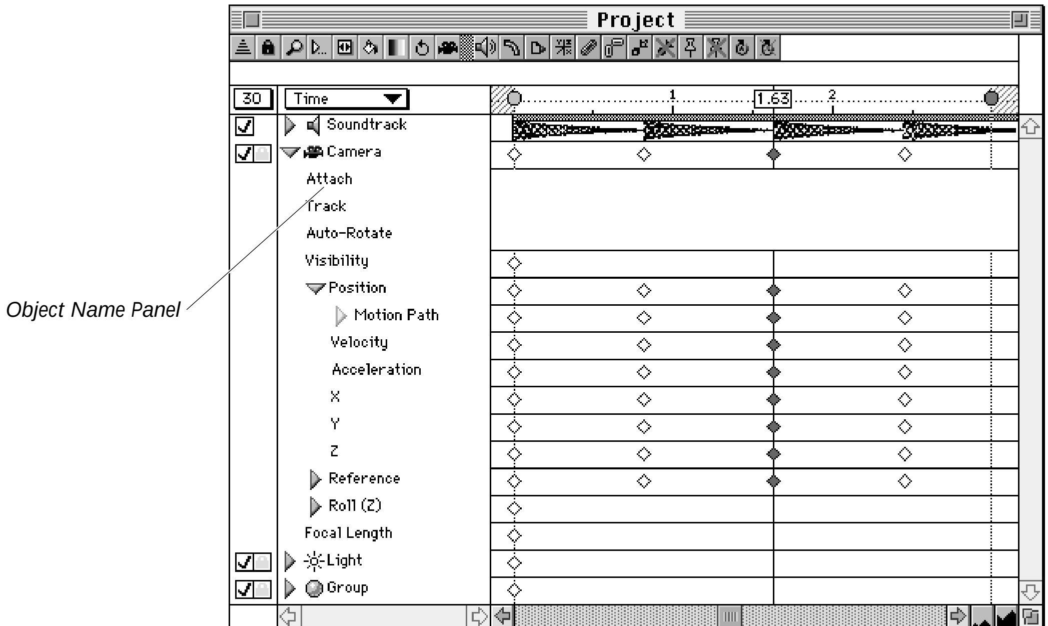


Figure 8.13 The Project window's object panel

W

The appearance of an object's children (groups hierarchically linked below the parent group) in the Object Name panel can be toggled on and off by pressing Command-H.

Objects can be selected by clicking on their icons or on their names. Double-clicking opens the object's Info window.

W

Object names can be changed (except for the camera), using the Project window's Edit box (page 8-12).

The Pop-Up Menu Palette

The palette at the top of the Project window is a collection of pop-up menus used to control the Project window's contents.

Clicking on the icon in the palette opens a pop-up menu, and some icons change to indicate the particular menu choice. The pop-up menus, from left to right, are:

Flat/Hierarchy View

This pop-up menu is used to control the window's hierarchical display. The window can be viewed as either a hierarchical list or in order of creation, organized as class types, for camera, light, or model. The menu choices are:

Flat This option shows a flat listing of objects in order of creation.

Hierarchy This option (the default) shows objects in hierarchical order. Children are indented from the parent to show their relationship.

Snap to Frame

This pop-up menu (used in Time mode only) controls whether or not the Time Selector will snap to a frame or keyframe when it is dragged to a new position. The menu choices are:

None This option turns off the snap to frame function.

Snap to Frame This option (the default) causes the Time Selector to snap to a frame when it is dragged to a new position.

Snap to Keyframe This option causes the Time Selector to snap to a keyframe when it is dragged to a new position.

Custom View

This pop-up menu is used to control what data is displayed in the Project window. The menu choices are:

All This option (the default) shows all data in the project file.

Custom… This option opens a dialog box, as shown in Figure 8.14, that enables you to specify which data for which object class to display.

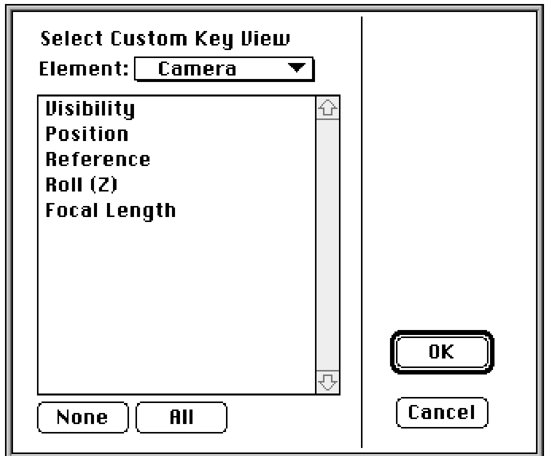


Figure 8.14 Dialog box used to specify a custom view

1. Select the object class from the **Element** pop-up menu (Camera, Light or Group).
2. Click on the attributes in the window list below (shift-click to select more than one), or click **All** to select all attributes from the list (clicking **None** de-selects any selected attributes).
3. Either click **OK** or press **Return**.

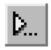
Position This option shows only data for the position of objects.

Rotation This option shows only data for the rotation of objects.

Scale This option shows only data for the scale of objects.

Color This option shows only data for the color of objects.

Open / Close



This pop-up menu is used to open or close the different levels of hierarchical data in the Project window's data panel. The menu choices are:

Open Root This option opens data cells for all roots.

Open Selected Root This option opens data cells for selected roots.

Open Animated This option opens data cells for all animated values.

Open Selected Animated This option opens data cells for selected animated values.

Open All This option opens all data cells.

Open Selected All This option opens all data cells for selected objects.

Close All This option closes all data cells.

Close Selected All This option closes all data cells for selected objects.

Show / Hide Children This option toggles display of a parent object's children (keyboard equivalent is Command-H).

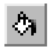
Cell Size

This pop-up menu is used to change the size (width and height) of the key and frame cells. There is one selection from the pop-up menu, which opens a dialog box that enables you to specify values for column width and height.

W

Click the* Default *button to return to the default settings for cell size.

Fill



This pop-up menu (used in Keyframe, Frame or Index modes) fills the data cells in a range of selected frames with a specified constant value. It can also be used to invert, scale and offset the values in the selected range frames.

W

The range of frames is selected by clicking and dragging or shift-clicking.

The menu choices are:

Fill Selected This option fills the selected range of frames with the data from the first (left-most frame) in the selection of frames. For example, selecting frames 1 through 5 and choosing this option would fill frames 2 through 5 with the data from frame 1.

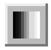
Fill Constant… This option opens a dialog box that enables you to specify a value that will fill the selected range of frames.

Invert This option inverts the data in the selected range of frames (positive values become negative, and vice versa).

Scale… This option opens a dialog box that enables you to specify a factor by which the data in the selected range of frames will be scaled.

Offset… This option opens a dialog box that enables you to specify a value by which the data in the selected range of frames will be offset.

Blend



This pop-up menu (used in Keyframe, Frame or Index modes) controls the blending of data across a range of selected frames (page 8-13), in order to “smooth” the data values in those frames in either a linear or curved fashion. This operation is very useful if you wish to smooth out rough moves, or create some kind of transition to Project window data values.

W

Blended frames are custom frames, denoted in the Project window by underlined text. Custom frames need to be reevaluated when changed, and that recalculation will occur when the animation is previewed, rendered or saved (or when recalculated manually).

The menu choices are:

Blend Linear This option uses a linear method of interpolating the data.

Blend Curve This option uses a curve method of interpolating the data.

Cycling

This pop-up menu (used in Keyframe or Frame modes only) controls the cycling of data across a range of selected frames (page 8-13), causing a sequence to repeat cyclically until the end of the animation. This operation is very useful for repetitive motion, such as a 5° rotation on a wheel, or the flapping wings of a butterfly. It can be used to increment motion as well.

W

Cycled frames are custom frames, denoted in the Project window by underlined text. Custom frames need to be reevaluated when changed, and that recalculation will occur when the animation is previewed, rendered or saved (or when recalculated manually).

The menu choices are:

Repeat This option repeats the selected sequence of frames until the end of the animation. For example, repeating frames 1 through 5 would repeat the values from frames 1 through 5 starting with frame 6 and continuing until the end of the animation (i.e., the new sequence of frames would be 1, 2, 3, 4, 5, 1, 2, 3, 4, 5, 1, 2, 3, 4, 5, etc.).

W

When repeating within a range of keyframes, select all frame cells with the range except the very last keyframe. This will ensure a smooth transition between repeat cycles.

Oscillate This option oscillates the data from the selected sequence of frames until the end of the animation. For example, oscillating frames 1 through 5 would take the values from frames 1 through 5 and repeat them in an oscillating sequence starting with frame 6 and continuing until the end of the animation (i.e., the new sequence of frames would be 1, 2, 3, 4, 5, 4, 3, 2, 1, 2, 3, 4, 5, etc.).

W

When oscillate repeating within a range of keyframes, select all frame cells with the range except the very last keyframe. This will ensure a smooth transition between repeat cycles.

Offset Repeat This option repeats and incrementally adds the values from the selected sequence of frames until the end of the animation. For example, offset repeating frames 1 through 5 would both repeat and add the incremental change in values from frames 1 through 5 starting with frame 6 and continuing until the end of the animation (i.e., the new sequence of frames would be 1, 2, 3, 4, 5, 5+1, 5+2, 5+3, 5+4, 5+5, 5+5+1, 5+5+2, 5+5+3, 5+5+4, 5+5+5, etc.).

W

When offset repeating within a range of keyframes, select all frame cells with the range including the very last keyframe. This is different than the previous choices due to the fact that offset is always adding the value and offset to the previous frame.

Render

This pop-up menu is used to specify the frames that are to be rendered.

W

The same options are available in the Render Control window's* Render *pop-up menu, as described in the section "Render" (page 9-25) in Chapter 9: The Render Control Window.

The menu choices are:

All Frames This option (the default) renders all frames in the animation.

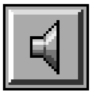
Range of Frames This option opens a dialog box for entering the specific start and stop frame numbers to be rendered.

Every Nth Frame... This option opens a dialog box for entering the specific nth frames to be rendered (i.e., every 2nd frame, every 3rd frame, etc.).

The Tool Palette

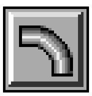
The tool palette to the right of the pop-up menu palette contains a collection of tools from the Tool Palette and Tools menu. The tools (active only when an object is selected) from right to left, are:

Sound



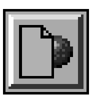
This tool plays the selected soundtrack object. If a portion of the soundtrack is selected, only that portion will play. For information on adding soundtracks to a project, refer to the sections “Add > Sound…” (page 1-14) and “Add > Record Sound…” (page 1-15) in *Chapter 1: The File Menu Commands*.

Group Deform



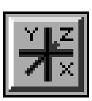
This tool opens the Group Deformation window for the selected group. For an explanation of the Group Deformation window and its use, refer to *Chapter 16: The Group Deformation Window*.

Group’s Texture



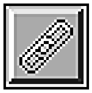
This tool opens the Group Texture window for the selected group. For an explanation of the Group Texture window and its use, refer to *Chapter 14: The Group Texture Window*.

Group’s Linkage



This tool opens the Group Link window for the selected group. For an explanation of the Group Link window and its use, refer to *Chapter 15: The Group Link Window*.

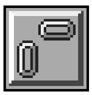
Link to Parent



This tool allows you to choose a new parent for the currently selected object. If many objects are selected, the new parent will apply to all the selected objects. To cancel the operation, press the command-period keys.

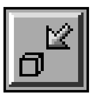
For more information on the use of this tool, refer to the section “Link to Parent” (page 5-18) in *Chapter 5: The Tools Menu Commands*.

Unlink from Parent



This tool removes parentage from all selected objects.

Look at Object



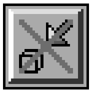
This tool forces the selected object to “look at” another object. If the selected object is the camera or a light, its reference point will be locked to the object it is looking at. If the selected object is a group, its rotation will be affected by the object it is looking at.

W

This tool creates custom frames for the selected object’s reference (or rotation) channels, denoted in the Project window by underlined text. Custom frames need to be reevaluated when changed, and that recalculation will occur when the animation is previewed, rendered or saved (or when recalculated manually).

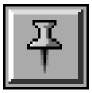
For more information on the use of this tool, refer to the section “Look at Object” (page 5-20) in *Chapter 5: The Tools Menu Commands*.

Cancel Look at



This tool removes the **Look at Object** function from the selected object (but does not recalculate custom frames).

Attach to Object



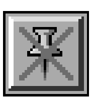
This tool forces the selected object to maintain its position relative to the position of another object. As the other object changes position, the selected object will change position. In effect, it is a way of temporarily connecting groups together, much like the hierarchy feature. The major difference is that the Attach to Object function is temporary and time-based, and can be cancelled at any point in the animation. Hierarchies, on the other hand, are global, and any changes made apply to the entire animation. Because of this, you should assign hierarchies before animating.

W

This tool creates custom frames for the selected object's position and reference (or rotation) channels, denoted in the Project window by underlined text. Custom frames need to be reevaluated when changed, and that recalculation will occur when the animation is previewed, rendered or saved (or when recalculated manually).

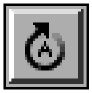
For more information on the use of this tool, refer to the section "Attach to Object" (page 5-23) in *Chapter 5: The Tools Menu Commands*.

Detach from Object



This tool removes the **Attach to Object** function from the selected object (but does not recalculate custom frames).

Auto Rotate Object



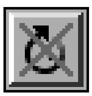
This tool forces the selected object to change its orientation as it follows its motion path, always “looking” in the direction it is going.

W

This tool creates custom frames for the selected object’s rotation channels, denoted in the Project window by underlined text. Custom frames need to be reevaluated when changed, and that recalculation will occur when the animation is previewed, rendered or saved (or when recalculated manually).

For more information on the use of this tool, refer to the section “Auto Rotate Object” (page 5-26) in *Chapter 5: The Tools Menu Commands*.

Cancel Auto Rotate



This tool removes the **Auto Rotate Object** function from the selected object (but does not recalculate custom frames).

The Data Channel Panel

Located to the right of the object panel, the data channel panel contains the data (attributes) for objects in the project. In all editing modes other than Time, the data cells in this panel can be edited, as discussed in the section “Editing Data” on page 8-11.

Displaying Data Channels

When the Project window is first opened, the data channels are not displayed. Each object in the object panel can be opened up to list its data channels in much the same manner as folders in the Finder can be opened up to list their files.

W

You can also use the* Open/Close *pop-up menu in the Project window’s pop-up menu palette to open and close the display of selected attributes. Refer to the section “Open/Close” (page 8-21).

When the list becomes longer than the height of the window, you can then scroll the window’s contents with the window’s scroll bar.

Available Data Channels

The data channels available for the camera are listed in *Appendix A: Camera Data Channels*.

The data channels available for lights in the project are listed in *Appendix B: Light Data Channels*.

The data channels available for groups in the project are listed in *Appendix C: Group Data Channels*.

The data channels available for soundtracks in the project are listed in *Appendix D: Sound Data Channels*.

Chapter 9 The Render Control Window

Chapter 9 The Render Control Window

Overview

The Render Control window, as shown in Figure 9.1, is used to set the current project's global rendering attributes and/or to initiate rendering.

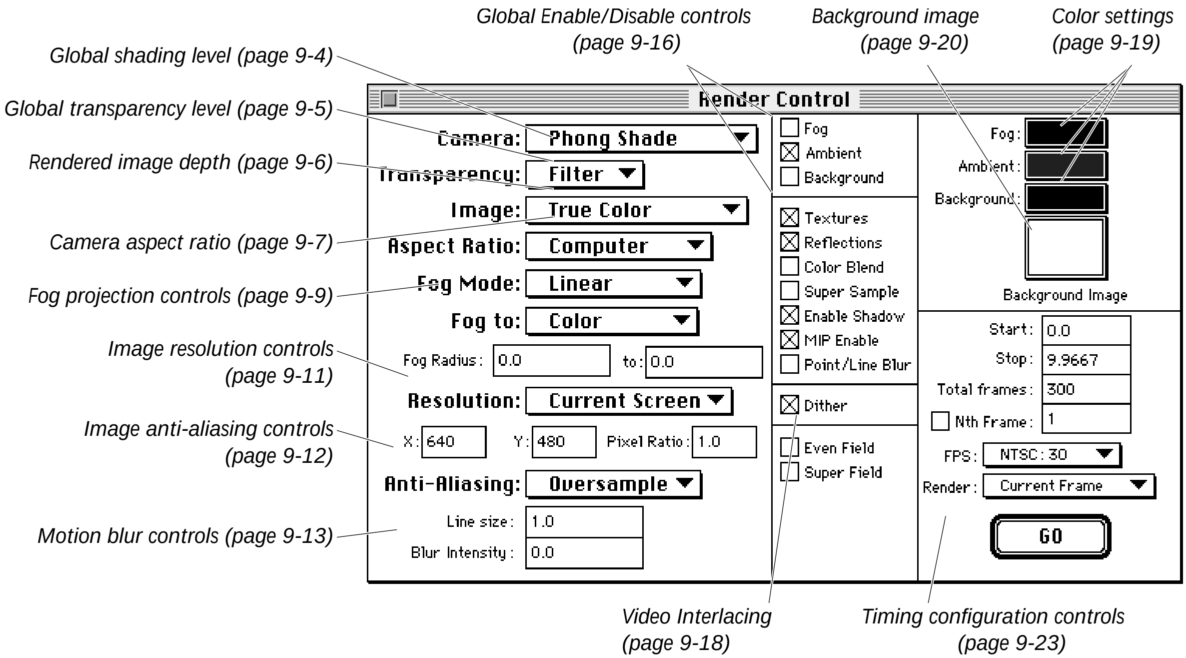


Figure 9.1 Render Control window

The window's global settings enable, disable and override group level settings and special effects.

Opening the Render Control Window

To open the Render Control window, choose **Render...** from the File menu, as discussed in the section "Render..." (page 1-54) in *Chapter 1: The File Menu Commands.*

Global Shading Level

The **Camera** pop-up menu sets the maximum shading level used for the entire image. It overrides group level rendering settings, which are discussed in *Chapter 13: The Group Info Window*, and defaults to Phong shading, the highest quality shading level.

W

This global shading control is very useful for creating motion tests, where full quality Phong shading is not necessary (but faster rendering is). Rather than reduce the shading level for each group, reduce the level at this stage, then increase it again after the test is done.

The menu choices are:

Wireframe Shade This option overrides any Flat, Gouraud and Phong group level settings and renders groups in wireframe (for the fastest rendering times).

Wireframe images can be anti-aliased if the **Anti-Aliasing** pop-up menu (page 9-12) is set to either *Adaptive* or *Oversample*. Wireframe thickness in pixels is controlled by the *Point/Line Thickness value*, set in the **Point/Line Thickness** edit box (page 9-19).

Flat Shade This option sets the maximum shading level to Flat shading, which delivers the lowest quality (but fastest) solid rendering. It allows Wireframe and Flat shading set at the group level, but overrides any Gouraud and Phong shading set at the group level.

Gouraud Shade This option sets the maximum shading level to Gouraud shading, which delivers a higher quality (but slower) solid rendering than Flat shading. It allows Wireframe and Flat shading set at the group level, but overrides any Phong shading set at the group level.

Phong Shade This option, the default, sets the maximum shading level to Phong shading, allowing all shading types set at the group level. Phong shading provides the highest quality (but slowest) solid rendering.

Global Transparency Level

The **Transparency** pop-up menu sets the maximum transparency level used for the entire image. It overrides group level transparency settings, which are discussed in the section “Transparency” (page 13-5) in *Chapter 13: The Group Info Window*, and defaults to Filter format, the highest level of transparency shading.

W

This setting is only relevant when rendering transparent groups.

The menu choices are:

Dither This option sets the maximum transparency level to Dither format, which provides only 16 levels of transparency and no transparency mapping, but with very fast rendering times. Any Filter format group level settings are overridden and transparent groups are rendered in Dither format.

Filter This option (the default) sets the maximum transparency level to Filter format, allowing all transparency formats set at the group level. Filter format provides 255 levels of transparency and transparency mapping, but with slower rendering times.

Rendered Image Depth

The **Image** pop-up menu controls the final bit depth of the image to be rendered.

W

All images are first created in 32 bit color and then converted to the final image depth as set with this control. 256 color animations are histogrammed from the 32 bit IMAGE file, resulting in a consistent frame-to-frame 8 bit color palette. 256 shades are rendered directly in gray scale; no histogramming is required.

The menu choices are:

B&W Lines This option renders the image in black and white, with lines only. The shading level is set to *Flat*, overriding the **Camera** pop-up menu setting (page 9-4). Anti-aliasing is turned *off*.

B&W Filled This option renders the image in black & white, with polygons rendered in the same color. Shading level is set to *Flat*, overriding the **Camera** pop-up menu setting (page 9-4). Anti-aliasing is turned *off*.

B&W Dithered This option renders the image in black and white, with polygons shaded in a MacPaint-style dither pattern. The shading level is set to *Flat*, overriding the **Camera** pop-up menu setting (page 9-4). Anti-aliasing is turned *off*.

B&W Summation This option renders the image in black and white, with polygons shaded in a summation dither pattern. The shading level is set to *Flat*, overriding the **Camera** pop-up menu setting (page 9-4). Anti-aliasing is turned *off*.

256 Shades This option renders the image in gray scale, with normal polygon shading at the level set in the **Camera** pop-up menu (page 9-4).

256 Colors This option renders the image in optimized 8 bit color, with normal polygon shading at the level set in the **Camera** pop-up menu (page 9-4).

True Color This option renders the image in 32 bit color, with normal polygon shading at the level set in the **Camera** pop-up menu (page 9-4).

Camera Aspect Ratio

The **Aspect Ratio** pop-up menu sets the aspect ratio for the image/animation to be rendered. The aspect ratio is the mathematical relationship between the X by Y pixels of the image to be rendered.

W

The default Macintosh aspect ratio is expressed as 4:3, given the pixel resolution of 640 by 480. ElectricImage will default to the aspect ratio of the startup display card. The current aspect ratio is equivalent to the aspect ratio of the white rectangle visible in the Camera window.

The menu choices are:

Custom... This option opens a dialog box, as shown in Figure 9.2, for entering a custom aspect ratio (other than those on the menu).

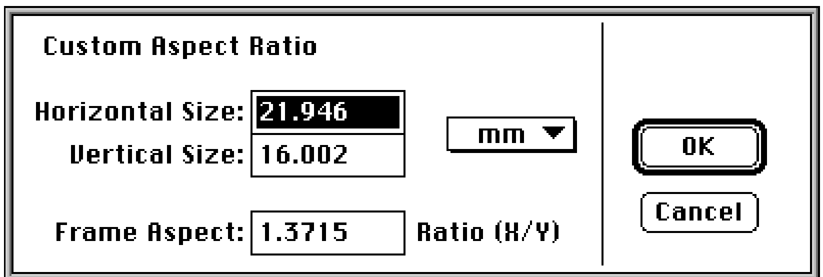


Figure 9.2 Dialog box used to set a custom aspect ratio

Either enter values in the **Horizontal Size** and **Vertical Size** edit boxes (with units of measure a selected from the pop-up menu), or enter an aspect ratio in the **Frame Aspect** edit box, then either click **OK** or press **Return**.

Computer This option (the default) specifies the 4:3 aspect ratio of a native Macintosh display screen. Default focal length of the camera is set to 2.0 on start up of the program. The focal lengths listed below are factored from this focal length, and the results have been rounded.

Super 8mm This option specifies the 4:3 aspect ratio of Super 8mm film. Focal length is 11mm.

16mm	This option specifies the 18:13 aspect ratio of 16mm film. Focal length is 21mm.
Super 16mm	This option specifies the 5:3 aspect ratio of Super 16mm. Focal length is 25mm.
35mm	This option specifies the 3:2 aspect ratio of 35mm slide film. Focal length is 75mm.
35mm Full	This option specifies the 4:3 aspect ratio of full frame vertical 4 perf 35mm film (also known as Academy aperture, after the Academy of Motion Picture Arts and Sciences). Focal length is 50mm.
VistaVision	This option specifies the 3:2 aspect ratio of the VistaVision format (8 perf horizontal). Focal length is 75mm.
65mm	This option specifies the 16:7 aspect ratio of 65mm vertical 5 perf film. Focal length is 105mm.
IMAX	This option specifies the 6:5 aspect ratio of 65mm horizontal 15 perf IMAX. Focal length is 141mm.
70 mm	This option specifies the 2.19:1 aspect ratio.
TechniScope	This option specifies the 2.35:1 aspect ratio.

Fog Projection

W

Fog projection in ElectricImage simulates atmospheric "depth cuing" (aerial density). While it can simulate distant haze or fog in a landscape, it does not induce atmospheric effects such as visible light shafts or glows.

In order for the following settings to take effect, the **Fog** check box (page 9-16) must be enabled.

Fog Mode

This pop-up menu determines the type of transition that will occur between the region in which the fog effect starts, and the region in which the fog effect reaches its maximum density. The choices are:

Linear — This method (the default) results in an even increase in density in the fog region, as defined by the fog radius edit boxes.

Exponential — This method forces the density in the fog radius to increase in an exponential fashion.

Fog to

This pop-up menu determines the type of fogging technique to be used. The choices are:

Color — This method (the default) fogs to a color selected with the **Fog Color** Button (page 9-19).

Alpha — This method fogs to the alpha value 0 (transparent). When digitally compositing the scene, the objects enveloped by fog will eventually fade out to the composited background.

Background — This method fogs to the background color as set in the **Background Color** button (page 9-19). The alpha value of the obscured objects will remain unchanged.

Fog Radius

These edit boxes contain values that define the inner and outer fog radii of the camera. The inner radius is where the fog will begin, and the outer radius is where the fog will be the most dense.

The inner and outer fog radii are drawn in the world view windows as two circles which enclose the camera controls. These circles are visible only when the camera is selected.

The inner radius delineates where the fog effect would begin. The outer radius delineates where the fog value would reach maximum density (opacity).

The inner radius and outer radius edit boxes set the fog region. The origin of the fog region is at the camera position. The radii are listed as distances in world coordinate space.

To view the inner and outer fog radii in the World View windows, you must select the camera and enable the fog projection in the Camera Info window, as discussed in the section “Show Fog” (page 10-4) in *Chapter 10: The Camera Info Window*.

Image Resolution

The **Resolution** pop-up menu and accompanying edit boxes determine the final X by Y pixel resolution of the image to be rendered. The resolution constrains to the aspect ratio set with the Aspect Ratio pop-up menu. The choices are:

- 260 x 200
- 320 x 240
- 640 x 480
- 1024 x 768
- 1280 x 960
- 2048 x 2048
- 4096 x 4096
- Current Screen (the default)
- NTSC
- PAL
- HDTV
- Abekas NTSC
- Abekas PAL

X and Y Edit Boxes

These edit boxes contain values for resolution (allowing for manual entry of X and Y resolution values as opposed to choosing from the Resolution pop-up menu). The maximum theoretical resolution is 16,000 pixels by 16,000 lines.

Pixel Ratio

This edit box contains a value that controls the aspect ratio of each pixel when rendered. It defaults to 1.0 to render square pixels for display on Macintosh screens. NTSC, PAL and HDTV pixels are not square, however, so this control is available to adjust the pixel aspect ratio accordingly when necessary. The value in this box changes automatically according to the selection in the **Resolution** pop-up menu.

Image Anti-Aliasing

Anti-aliasing is a filter which removes the jagged edge look (“jaggies”) from an image.

Anti-Aliasing

This pop-up menu determines the quality of anti-aliasing used in an image. The choices are:

None This option specifies that no anti-aliasing be performed on the image.

Adaptive This option specifies that adaptive anti-aliasing be performed on the image. The resulting image appears sharper than the Oversample technique (discussed below) though reduction of video artifacts may not be as effective (depending on the thresholds set in the **Adaptive Sampling Thresholds** edit boxes, discussed below).

Oversample This option (the default) specifies that the oversample technique be performed on the image. This produces a softer image, but significantly reduces artifacting. It is the default because it produces consistently better images for video.

Adaptive Sampling Thresholds

The Min and Max edit boxes contain values that control the type of anti-aliasing to be performed between adjacent pixels of different color values. If the difference in levels between the pixels is less than the minimum value, the image is sharper. If the difference in the levels is greater than the maximum value, the image is softer. If the difference falls between the minimum and maximum values, adaptive anti-aliasing is performed. The higher the difference, the softer the image; the lower the difference, the sharper the image.

Motion Blur

This section of the Render Control window is used to control the various motion blur features of ElectricImage.

Shutter Angle

This edit box contains a value in degrees for the circular angle at which the camera shutter is open. A value of 360° simulates a shutter that is always open. A value of 180° (the default) simulates a shutter that is open for half a frame, mimicking a motion picture camera. This feature controls the length of the motion blur streak in that the higher the shutter angle value, the longer the streak.

W

Streak length is computed by the distance an object moves past the camera's field of view from frame to frame.

Point/Line

This check box, when checked, enables the point/line motion blur technique at the global level. In this mode, only points and lines leave streaks behind them.

W

This technique is most suitable for motion blur of star streaks and particle systems.

Blur Intensity

This edit box, used only in conjunction with the Point/Line technique, contains a value that controls the brightness of streaks left by points and lines. A value of 0.0 (the default) imparts a constant value regardless of the length of the streaks. Large values produce brighter streaks. Smaller values produce dimmer streaks. In general, the longer the streak the dimmer the streak.

Motion Vector

This check box, when checked, enables the motion vector technique at the global level. All model elements (points, lines and polygons) are blurred. Blurs are always linear—they are never curved when viewed as a single frame.

W

This is a fast, versatile and very high quality technique. It is most suitable for rendering single elements which can later be composited together to produce the final animation. An example of when not to use this technique is for spinning fan blades partially obscured by their stationary housing. This would produce undesirable results, and would be better served by the Multi-Frame technique (discussed below).

Blur Noise

This edit box, used only in conjunction with the Motion Vector technique, contains a value for the number of blur samples per pixel. The higher the number, the less visible noise in the streak. A value of zero produces the maximum number of samples for a streak based on its length. A value of 4 (the default) renders quickly and produces high quality results. Values over 10 will drastically slow rendering and will not improve the image.

Multi-Frame

This check box, when checked, enables the multi-frame technique, which renders multiple samples of each frame at different times before averaging them together. It takes longer to render and can produce a strobe-like effect if too few samples are rendered. The number of samples is set in the **Blur Frames** edit box, discussed below.

W

This technique, which can be used in conjunction with the Point/Line and Motion Vector techniques, is best applied to a range of frames (as opposed to the entire animation) when there is complex or rapid motion.

Blur Frames

This edit box, used only in conjunction with the Multi-Frame technique, contains a value for the number of samples rendered for each frame before they are averaged together. The time required to render a single frame with this technique is the Blur Frames value times the amount of time required to render the frame without blurring.

Global Enable/Disable Controls

These check boxes are used to turn on or off special effects functions. The effects are enabled if the boxes are x'ed.

Fog This check box option enables/disables the fog feature. It defaults to *off*. When enabled, the fog radius projection is displayed in the World View windows.

Ambient This check box option enables/disables the global ambient feature. If defaults to *on*. To view or change the value of the global ambient, click on the **Ambient** button, located in the upper right corner of the window (page 9-19).

Background This check box option enables/disables the selected background color or image. It defaults to *off*. When a background color or image has been assigned, this check box is automatically enabled.

Textures This check box option enables/disables texture maps for rendering. It defaults to *on*. This function must be on for texture maps to be rendered.

Reflections This check box option enables/disables reflection maps for rendering. It defaults to *on*. This function must be on for reflection maps to be rendered.

Color Blend This check box option enables/disables the color blend effect. It defaults to *off*. All groups flagged for color blending at the group level are enabled with this option on.

Super Sample This check box enables/disables the super sample effect. It defaults to *off*. All groups flagged for super sampling at the group level are enabled with this option on.

Enable Shadow This check box enables/disables the casting and receiving of shadows set at the individual light and group level. It defaults to *on*.

MIP Enable This check box enables/disables MIP mapping. It defaults to *on*.

W

ElectricImage provides two methods of filtering for texture, reflection, bump and environment maps: MIP and summation. These are used to negate the moire and popping effects which occur when attempting to map a finite grid of pixels onto the surface of an infinitely resolvable model. MIP mapping can sometimes result in "blurry" images. The alternative is summation mapping (see below), which creates texture maps that appear sharper. Summation mapping requires more memory, however, than MIP mapping.

Sum Enable This check box enables/disables summation mapping. It defaults to *on*.

Add Noise This check box enables/disables the addition of dithering noise to images, which eliminates banding. It defaults to *on*. There is really no reason to disable this function, as doing so will effectively reduce image quality.

Video Interlacing Control

The **Even Field** check box enables/disables Even Field interlace rendering. It defaults to *off*.

W

With Even Field rendering, video field 2 is rendered first, then video field 1, putting the even video field before the odd field. Normally, video always displays field 1, the odd field, first, however some Macintosh display cards may flip the field order.

Color Settings

Fog

This color button sets the color of the fog value for the image to be rendered, if **Fog to Color** is the method selected from the **Fog to** pop-up menu (page 9-9). Click on the button to get to the Apple Color Picker to change the fog color. The new fog color will appear in the button.

Ambient

This color button sets the minimum light value of the image to be rendered.

It can be used to prevent dark areas of the image from going completely black. Click on the button to get the Apple Color Picker to change the minimum amount of fill. The new color value will appear in the button.

Background

This color button sets the color of the background of an image to be rendered. Click on the button to get to the Apple Color Picker to change the background color. The new background color will appear in the button.

Wireframe Point/Line Size

When a project is rendered in wireframe, as selected from the Camera pop-up menu (page 9-4), the thickness of points and lines in the wireframe defaults to 1 pixel. You can specify a different thickness, however, with the **Point/Line Thickness** edit box.

Background Image Control

The **Background Image** button is used to assign an image to be composited into the background when the image is rendered. This eliminates the need to digitally composite the foreground and background later. The button is also used to remove a previously assigned background image.

W

The background image can either be a single frame or an animation, but must be in Image format. (Refer to **The Projector Reference** ***for information on converting other picture file formats to Image.)***

To add a background:

1. Click on the **Background Image** button.

   A dialog box, as shown in Figure 9.3, opens.

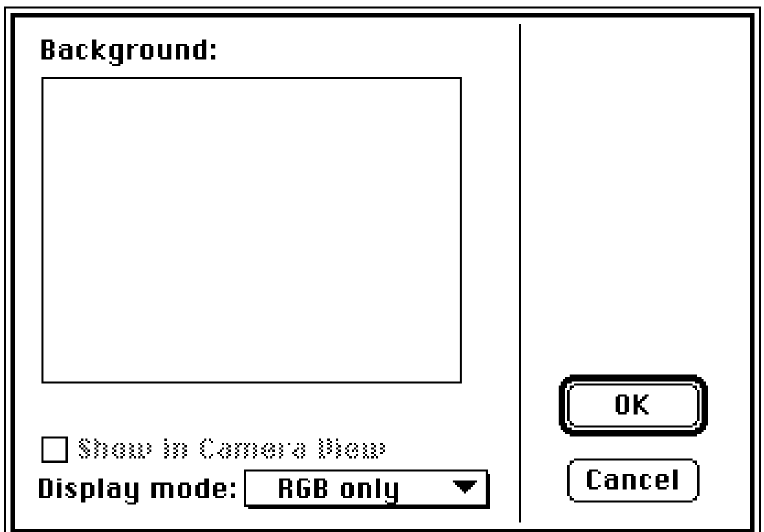


Figure 9.3 Dialog box used to add/remove background image

   If there is already an image assigned to the background, it is shown in the **Background:** *window. Otherwise, that window is empty (as in Figure 9.3).*

2. Click in the **Background:** window of the dialog box.

A directory dialog box, as shown in Figure 9.4, opens.

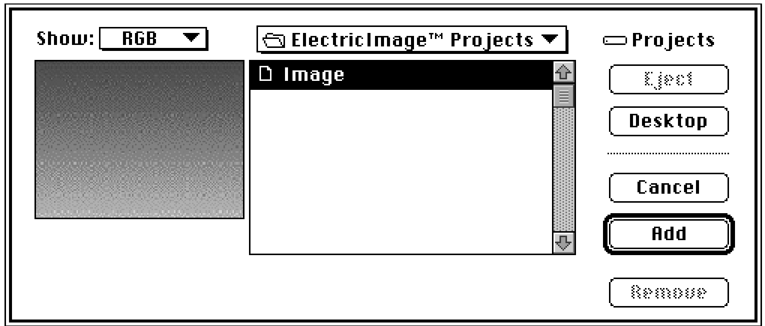


Figure 9.4 Directory dialog box used to add background image

3. Open the folder where the background image file is located (if necessary).

4. Click on the background image filename.

When selected, the file's RGB channels are displayed in the window to the left of the file list. The **Show** *pop-up menu above the display window can be used to also show the file's alpha channel (if it has one) and the file's image depth and dimensions in pixels.*

5. Either click **Add** or press **Return**.

The directory dialog box closes and the dialog box shown in Figure 9.3 (page 9-20) reappears with the selected background image shown in the Background Image window.

6. If you wish to see the background image in the Camera View window, click the **Show in Camera View** check box.

7. When done, either click **OK** or press **Return**.

To remove a background:

1. Click on the **Background Image** button in the Render Control window.

   The dialog box shown in Figure 9.3 opens.

2. Click in the **Background:** window of the dialog box.

   The directory dialog box shown in Figure 9.4 opens.

3. Click the **Remove** button.

Timing Configuration

Start Time and Stop Time

These edit boxes contain values for the start and end times of a sequence of frames to be rendered. The start time represents the beginning of the sequence of frames, and the stop time represents the end of the sequence.

W

The start and stop times are represented in the Project window when in Time mode by the green "Go" sign and the red "Stop" sign, located in the horizontal time scale. For an explanation of the Project window and Time mode editing, refer to "Time Mode" (page 8-6) in Chapter 8: The Project Window.

Total Frames

This edit box contains a value for the number of frames to be rendered. A number greater than one must be entered here if an animation is to be rendered and/or to preview an animation in the Camera View window. This number is the result of the formula:

(((timerange x FPS + 1 = total frames)))

where timerange equals the duration of the animation in seconds (the distance between the Start and Stop icons in the Project window's time scale), FPS is the number of frames per second selected (see the FPS pop-up menu discussion on the next page), and the 1 is for an additional frame because the first frame in the animation is Frame 0.

The total frames is included in this window primarily as a reference. Changing the number in this edit box will result in the Project window's stop sign being reset based on the above formula.

Nth Frame

This check box option with edit box is used to specify that only every nth number of frames (as set in the edit box) should be rendered. The edit box contains a value for the nth number of frames to be rendered (i.e., **1** for every frame, **2** for every second frame, **3** for every third frame, etc.).

W

This feature works independently of the Render pop-up menu (page 9-25); that is, no matter what you select from the Render pop-up menu (all frames or a range of frames), the Nth frame value will cause every Nth frame of that selection to be rendered.

FPS

This pop-up menu is used to select the number of frames per second (FPS) to be calculated and rendered. When taken into consideration with the duration of the animation, FPS determines the total number of frames for the animation.

The menu choices are:

Custom… This option brings up a dialog box for entering a specific FPS, as shown in Figure 9.5.

Figure 9.5 Dialog box used to specify custom FPS

Enter a number other than the NTSC (30 FPS), PAL (25 FPS) or motion picture (24 FPS) standards. For interlace rendering, click the **Interlace** check box (see explanation of interlace rendering, below).

NTSC: 30 This option (the default) specifies the NTSC video standard of 30 FPS.

PAL: 25 — This option specifies the PAL video standard of 25 FPS.

Film: 24 — This option specifies the motion picture standard of 24 FPS.

Interlace Rendering — Selecting either NTSC:30i or PAL:25i enables interlace rendering. Each frame is split into two fields, with the odd field dominant unless the **Even Field** check box is enabled.

Render

This pop-up menu is used to select the range of frames that are to be rendered. The menu choices are:

Current Frame — This option (the default for single-frame projects) causes only the current frame in the animation to be rendered.

All Frames — This option (the default for multi-frame projects) causes all frames in the animation to be rendered.

Range of Frames — This option opens a dialog box for entering the specific start and stop frame numbers to be rendered.

W

These options are affected by the value in the Nth Frame edit box (page 9-24); that is, no matter what you select from the pop-up menu (all frames or a range of frames), the Nth frame value will cause every Nth frame of that selection to be rendered.

Rendering the Project

To initiate rendering, click the **Go** button in the lower right corner of the window, which will close the project and launch the ElectricImage Camera application.

W

For an explanation of the Camera interface, refer to Chapter 22: The ElectricImage Camera.

Chapter 10 The Camera Info Window

Chapter 10 The Camera Info Window

Overview

The Camera Info window, as shown in Figure 10.1, contains settings for the camera's icon display in the World View windows, and current stats on its location in global space, directionality, and orientation (yaw, pitch and roll).

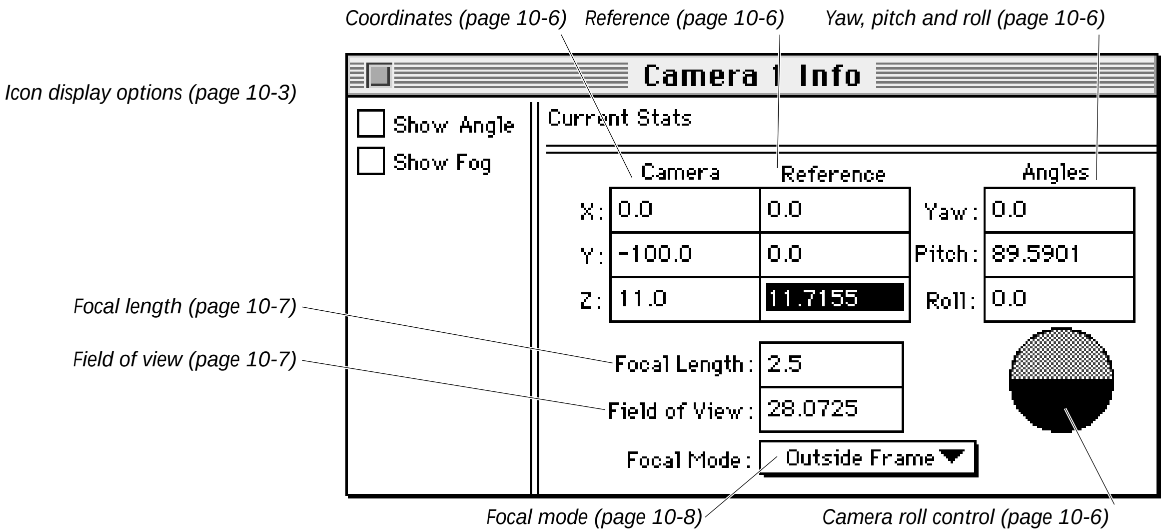


Figure 10.1 The Camera Info window

Opening the Camera Info Window

To open the Camera Info window, select the camera, then choose **Camera Info** from the File menu (or double-click on the camera).

Icon Display Options

The left side of the Camera Info window contains check boxes which control two elements of the camera icon's display in the World View windows:

- the projection of the camera's viewing angle
- the fog effect

For more information on these elements, refer to the section "Window Elements" (page 6-7) in *Chapter 6: The World View Windows*.

Show Angle

This check box option enables the display of the camera's viewing angle (focal length projection) in the World View windows, as shown in Figure 10.2.

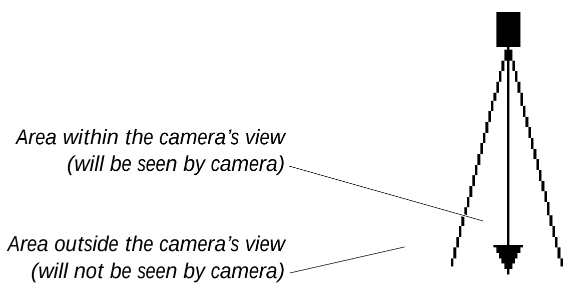


Figure 10.2 Camera icon's viewing angle projection

The viewing angle emanates from the center of the camera and projects two lines which define the maximum view area of the lens as indicated in the Focal Length edit box.

Show Fog

This check box option enables the display of a circular fog projection in the World View windows, assuming that fog has been set in the Render Control window.

W

This type of fog is used primarily for "depth cuing," in much the same way as atmospheric haze renders distant objects less distinct than objects close to the viewer's eye. For an explanation of the use of fog and the fog settings in the Render Control window, refer to the section "Fog Projection" (page 9-9) in Chapter 9: The Render Control Window.

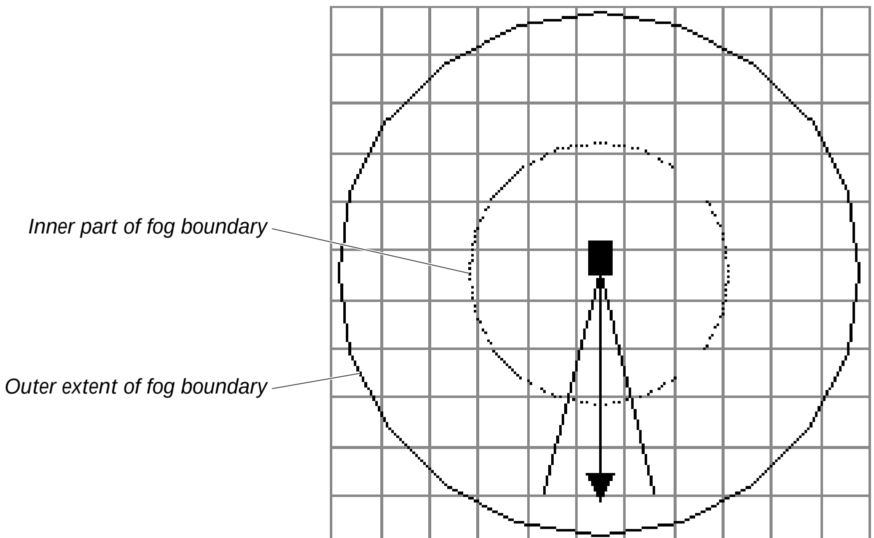


Figure 10.3 Camera icon's fog projection

As shown in Figure 10.3, the fog projection emanates from the center of the camera, and is defined by two circles:

- The dark circle shows the outer extent of the fog boundary.
- The lighter circle shows the inner part of the fog boundary.

Current Stats

The right side of the Camera Info window contains information about the camera's position in global space, it's direction and orientation (yaw, pitch and roll), and its lens' focal length and field of view. There is also an interactive control for setting the camera's roll.

Changing the values in this section of the window produces different results, depending on which editing mode is in effect when the camera is selected:

- In **Index** mode, changing the values updates the values for the current keyframe.
- In **Frame** mode, changing the values creates a custom frame that includes the new values. A custom frame is not affected by the interpolation of frames between keyframes, and can thus be used, for example, to create a glitch in the animation of the camera's position.
- In **Keyframe** mode, changing the values either updates the values for the current keyframe (if the selected frame coincides with an existing keyframe) or creates a new keyframe that includes the new values (if the selected frame does not coincide with an existing keyframe).
- In **Time** mode, changing the either updates the values for the current keyframe (if the selected point in time coincides with an existing keyframe) or creates a new keyframe at the selected point in time that includes the new values (if the selected point in time does not coincide with an existing keyframe).

W

The editing mode is set in the Project window. For an explanation of editing modes and the Project window, refer to Chapter 8: The Project Window.

Camera (X, Y and Z)

These edit boxes contain values for the camera's X, Y, and Z coordinates (its physical location in global space), at the current keyframe, frame or point in time (depending on the editing mode in effect).

Reference (X, Y and Z)

These edit boxes contain values for the X, Y and Z coordinates of the camera's reference point (the point at which the camera is aimed). The camera's reference point is represented in the World View windows by the arrow on the camera icon. As with the **Camera** edit boxes, above, the values in the **Reference** edit boxes are those for the current keyframe, frame or point in time (depending on the editing mode in effect).

Angles (Yaw, Pitch and Roll)

These edit boxes contain values, in degrees, for the camera's orientation at the current keyframe, frame or point in time (depending on the editing mode in effect), and are an absolute reference.

Camera Roll Control

This interactive control is used to set the camera's roll angle for the current keyframe, frame or point in time (depending on the editing mode in effect). It is an alternative method to entering a value in the **Roll** edit box, above. To induce a roll angle, drag in the control region. The Camera View window and Camera Roll edit box will update as the control is actuated.

Focal Length

This edit box contains a value for the focal length of the camera's synthetic lens at the current keyframe, frame or point in time (depending on the editing mode in effect), and is an absolute reference.

The number in this box is case sensitive, and is determined by the **Aspect Ratio** pop-up menu in the Render Control window. As the aspect ratio is changed the focal length of the camera would be recalculated accordingly. The focal length value is in millimeters if the aspect ratio is other than Computer (otherwise it is a scale value). For more information on aspect ratios and the Render Control window, refer to *Chapter 9: The Render Control Window*.

W

When using the cine aspect ratios, the focal length calculation corresponds to the recommendations found in the American Cinematographers Manual.

Field of View

This edit box contains a value, in degrees, for the view angle of the camera's synthetic lens. The text in this edit box always corresponds to the camera lens' focal length (contained in the **Focal Length** edit box, above). Either value can be changed at any time, and changing one automatically changes the other.

Focal Mode

This pop-up menu controls how the focal length is calculated. The menu choices are:

Vertical This option calculates the focal length based upon the frame's vertical dimension.

Horizontal This option (the default) calculates the focal length based upon the frame's horizontal dimension.

Diagonal This option calculates the focal length based upon the frame's diagonal dimension.

Chapter 11 The Light Info Window

Chapter 11 The Light Info Window

Overview

The Light Info window, as shown in Figure 11.1, contains permanent settings for the light's light type and shadow characteristics, current stats on the light's color, intensity, location in global space, directionality, and angle of coverage, and current settings for special effects such as glow and fog.

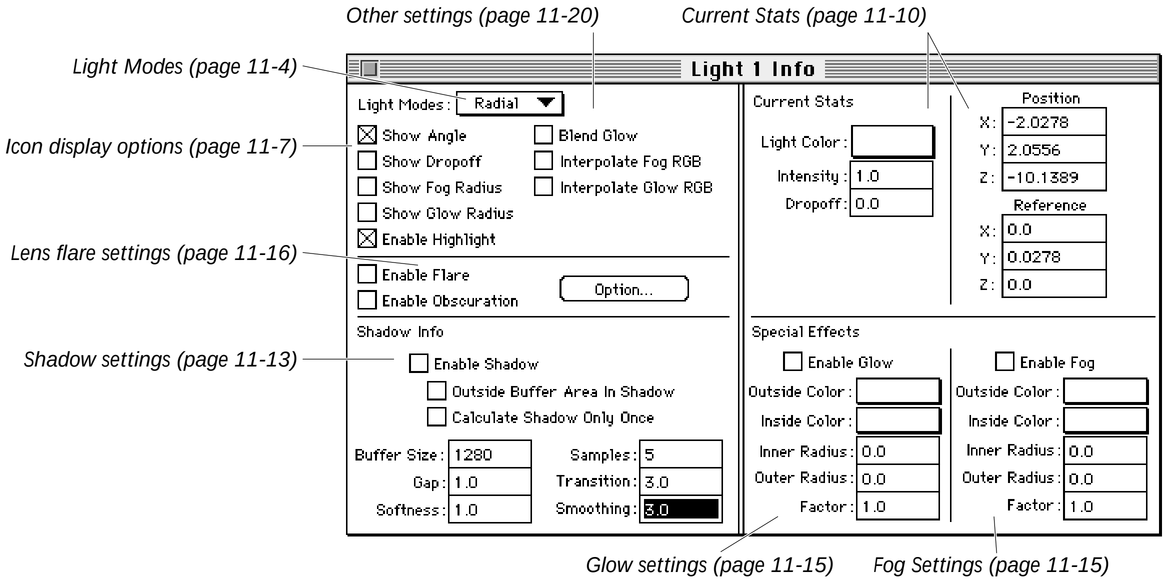


Figure 11.1 The Light Info window

Opening the Light Info Window

To open the Light Info window for a specific light, select the light, then choose **Light Info** from the File menu (or double-click on the light's icon).

Light Modes

This pop-up menu in the upper left side of the Light Info window is used to select the type of light. The available light modes are as follows:

Camera

This type of light simulates a point light that is attached to the camera itself. It is radial in nature (in that all beams of light from this source emanate from it’s center).

Parallel

This type of light simulates a light placed an infinite distance away. The light rays are parallel, providing an even illumination. Use this type for sunlight, stars, etc. This is the best light source for illuminating flat shaded scenes.

Radial

This type of light (the default) simulates artificial lights, by nature of the way the rays emanate radially, like the spokes of a wheel, from the center of the light. The light has no sense of direction, just location and dropoff.

W

Radial lights can also be set to be darklights. When a dropoff other than zero is specified in the Dropoff edit box (see below), a negative intensity can be used in the intensity box to create a subtractive lighting effect. Whatever color is specified in the Color Button (see below) will be subtracted from the scene.

Ambient

This type of light simulates a non-directional, overall illumination, much like you would see on a cloudy day. It is normally used so that objects don't shade to absolute black.

W

An ambient light, as with all lights (except for darklights), adds more light to the scene. This can result in images appearing to be overexposed. To compensate for a strong ambient light, drop the intensity value of your other lights accordingly. It takes some practice, but the ambient light can add tremendous realism to a scene when used properly.

The Ambient button in the Render Control window sets a minimum amount of light which falls onto any surface and will not over expose the image. For more information about the Ambient button and its use, refer to the section "Ambient" (page 9-19) in Chapter 9: The Render Control Window.

Spot

This type of light simulates a directional, limited area light, placing a pool of light over a specified area. The pool is circular in nature, and the lights contain several different variables, such as an inner and outer cone size (note that the inner cone is always smaller than the outer cone), which controls the umbra and penumbra of the light. The dropoff distance of the spotlight can also be set, as well as whether or not the effective dropoffs are calculated linearly or logarithmically.

W

Spotlights can also be set to be darklights. When a dropoff other than zero is specified in the Dropoff edit box (see below), a negative intensity can be used in the intensity box to create a subtractive lighting effect. Whatever color is specified in the Color Button (see below) will be subtracted from the scene.

Tube

This type of light simulates artificial lights from a tube-like source. A tube light is basically an elongated radial light (its length can be adjusted) which, when used as a fog or glow light, can create visual effects such as fluorescent bulbs or laser beams.

Icon Display Options

The upper left side of the Light Info window contains check boxes which control four elements of the light icon's display in the World View windows. For more information on these elements, refer to the section "Window Elements" (page 6-7) in *Chapter 6: The World View Windows*.

Show Angle

This check box option enables the display of the light's spotlight and/or shadow cone angle in the World View windows.

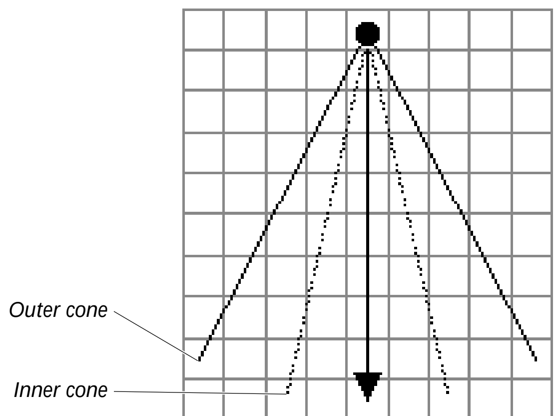


Figure 11.2 Light icon's angle display

As Figure 11.2 shows, the cone angle projection emanates from the center of the light toward the direction indicated by the reference point of the light. It will project four lines which define the maximum area of the cone as indicated in the Inner Cone and Outer Cone edit boxes, discussed below.

Show Dropoff

This check box option enables the display of the light's dropoff indicator, as shown in Figure 11.3, when the light is selected.

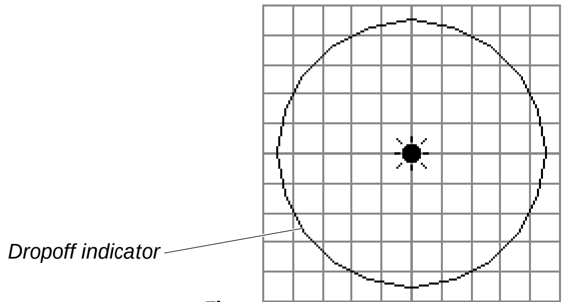


Figure 11.3 Light icon's dropoff display

Show Fog/Glow Radius

These check boxes enable the display of the light's fog and glow radii, as shown in Figure 11.4, when the light is selected.

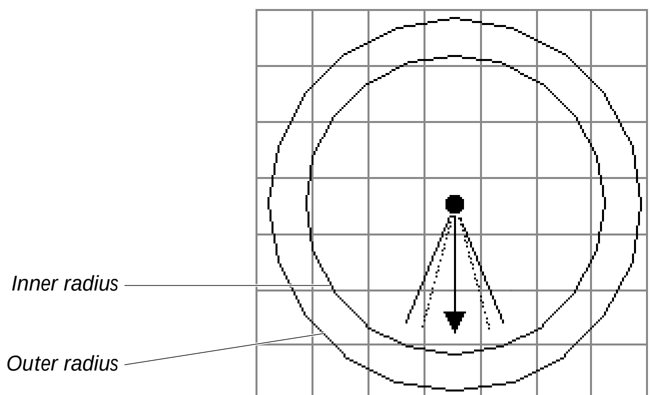


Figure 11.4 Light icon's fog radius display

W

For more information on the fog and glow effects, refer to the section "Special Effects (Glow and Fog)" (page 11-15).

Show Size

This check box option enables the display of the light's size, as shown in Figure 11.5, when the light is selected.

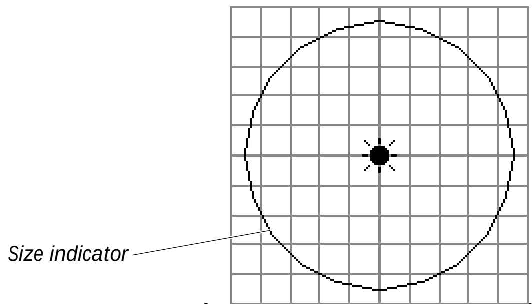


Figure 11.5 Light icon's size display

Show Flare

This check box option enables the display of the light's flare in the Camera View window, as shown in Figure 11.6.

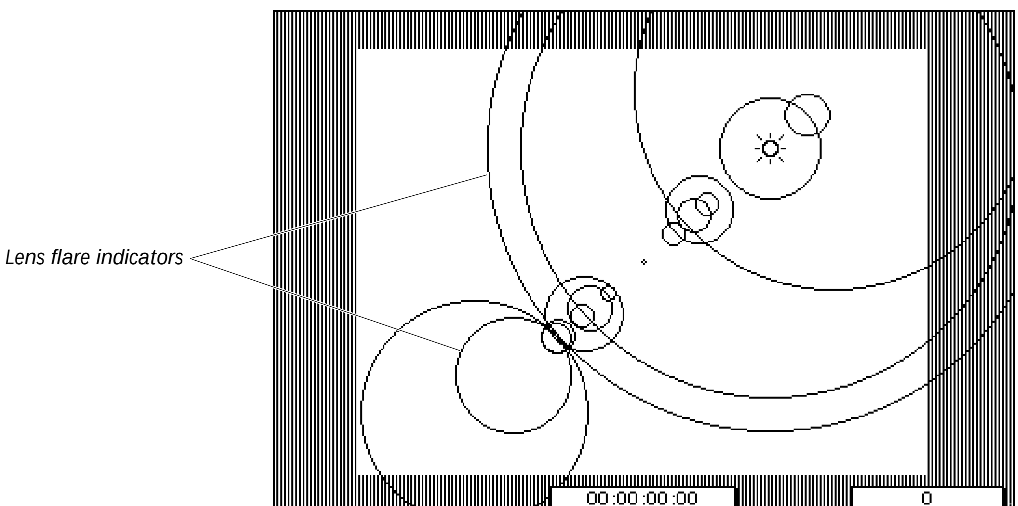


Figure 11.6 Lens flare shown in Camera View window

Current Stats

The upper right corner of the Light Info window contains information about the light's color, intensity, angle of coverage, position in global space and reference (direction).

Changing the values in this section of the window produces different results, depending on which editing mode is in effect when the light is selected:

- In **Index** mode, changing the values updates the values for the current keyframe.
- In **Frame** mode, changing the values creates a custom frame that includes the new values. A custom frame is not affected by the interpolation of frames between keyframes, and can thus be used, for example, to create a glitch in the animation of the camera's position.
- In **Keyframe** mode, changing the values either updates the values for the current keyframe (if the selected frame coincides with an existing keyframe) or creates a new keyframe that includes the new values (if the selected frame does not coincide with an existing keyframe).
- In **Time** mode, changing the either updates the values for the current keyframe (if the selected point in time coincides with an existing keyframe) or creates a new keyframe at the selected point in time that includes the new values (if the selected point in time does not coincide with an existing keyframe).

W

The editing mode is set in the Project window. For an explanation of editing modes and the Project window, refer to Chapter 8: The Project Window.

Light Color

This button selects the color of the light at the current keyframe, frame or point in time (depending on the editing mode in effect). When the color button is clicked, the Apple Color Picker comes forward for color selection. The color button will then change to the color of the light, and the center of the light icon will also change to the new color in the world view windows (when deselected).

Intensity

This edit box contains a value for the brightness of the light at the current keyframe, frame or point in time (depending on the editing mode in effect). The default intensity is 1. If it is necessary to increase the brightness of the light, then the Intensity value should be greater than 1. If a "darklight" effect is required (where light is subtractive rather than additive), then a negative value should be entered into the box.

Dropoff

This edit box contains a value for the dropoff distance of a light at the current keyframe, frame or point in time (depending on the editing mode in effect). Dropoff is not available for parallel lights or ambient lights. You can use the rulers (command-M) to see the actual scale of your scene, and to determine the dropoff distance you would like to use. To view the dropoff in the world view windows, click the **Show Dropoff** check box in the upper left corner.

Size

This edit box contains a value for the size of the light.

Outer Cone (for Spot mode only)

This edit box contains a value for the outermost diameter of the area illuminated by the spot light. The area outside the outer cone will not be illuminated by the light. The area between the outer and inner cones is a transition area between full illumination and none.

Inner Cone (for Spot mode only)

This edit box contains a value for the diameter of the area receiving the full illumination of the spot light. The light falls off between the inner and outer cones.

Factor (for Spot mode only)

This edit box contains a value for the rate at which the spot light falls off between the inner and outer cones. The default is 1.0, which provides an even transition. A higher number creates a sharper transition.

Position (X, Y and Z)

These edit boxes contain values for the X, Y, and Z coordinates of the light (its physical location in global space), at the current keyframe, frame or point in time (depending on the editing mode in effect).

Reference (X, Y and Z)

These edit boxes contain values for the X, Y and Z coordinates of the light's reference point (the point at which the light is aimed). The reference point of the light is represented in the World View windows by the arrow emanating from the center of the light icon. As with the **Position** edit boxes, the **Reference** edit boxes show the position of the light's reference point at the current keyframe, frame or point in time (depending on the editing mode in effect).

Shadow Info

The lower left side of the Light Info window contains information and settings that pertain to the light's shadow casting capability.

Enable Shadow

This check box option enables the light to cast shadows.

Outside Buffer Area in Shadow

This check box option, when enabled, causes the entire area of the image outside the outer cone angle (specified in the Outer Cone edit box) to be rendered in shadow (simulating the effect of a real spotlight).

Calculate Shadow Only Once

This check box option, when enabled, causes the shadow image to be calculated only once, as it appears in the initial frame of an animation. This feature saves rendering time when the shadow image does not change during an animation (such as when only the camera is moved).

Buffer Size

This edit box contains a value for the shadow buffer resolution. The larger the buffer size, the greater the rendering detail for the shadow, however greater memory is required to render the shadow. The default is set to 1280 pixels square, which creates good looking shadows but uses 6.5 mb of RAM.

Gap

This edit box contains a value for the minimum distance between a surface casting a shadow and the point at which a shadow first appears.

Softness

This edit box contains a value affecting how the shadow's edge appears. The larger the value, the softer or fuzzier the shadow's edge will appear. A value of 1 creates fairly crisp shadows.

Samples

This edit box contains a value for the number of shadow samples per pixel. A larger value reduces the noise around the edge of a shadow but takes longer to render.

Transition

This edit box contains a value for the fade-in distance between a surface casting a shadow and the surface upon which the shadow appears.

Smoothing

This edit box contains a value for the softness of shadow edges when viewed up close. Longer values can reduce the stairstep of shadow edges, but can also cause shadows to appear further away from the surfaces which cast them.

Special Effects (Glow and Fog)

The lower right corner of the Light Info window contains settings for the light's glow and fog effects, which make the light visible and can be animated. The rules for changing values in this section are the same as those discussed in the section "Current Stats" (page 11-10).

Enable Glow/Fog

This check box option enables the glow and fog special effects.

Outside Color

This button opens the color editor to select the color at the edge of the glow/fog. If the outside color is different than the inside color (see below), a blend will occur between the two.

Inside Color

This button opens the color editor to select the color at the center of the glow/fog. If the inside color is different than the outside color (see above), a blend will occur between the two.

Inner Radius and Outer Radius

These edit boxes contain values for the size of the effect. Within the inner radius it is opaque; the outer radius is where it becomes clear. To see these radii in the World View windows, click on the **Show Glow Radius** and/or **Show Fog Radius** check boxes (page 11-8).

Factor

This edit box indicates the rate (default is 1) at which the glow/fog will drop off between opacity at the inner radius and transparency at the outer radius. The higher the value, the greater the rate of drop off.

Lens Flare Effect

This section of the Light Info window contains settings to apply and control a lens flare effect from the light source.

Flare

This pop-up menu contains all available lens flare plug-ins contained in the EI Sockets folder (plus any additional lens flare plug-ins contained in the project but that are not found in the EI Sockets folder).

To enable a lens flare, choose the lens flare plug-in from the pop-up menu (which defaults to None).

Enable Obscuration

This check box option, when enabled, turns off the lens flare when the light source is obscured by an object during rendering.

W

The flare elements will turn off completely for those frame in which the light is obscured. There is no fade-in or fade-out of the effect.

Option...

This button opens the lens flare plug-in's dialog box for controlling the various elements of the flare.

W

If you are not using the ElectricImage lens flare plug-in, please refer to your plug-in developer's documentation.

The ElectricImage lens flare dialog box is shown in Figure 11.7 (page 11-17).

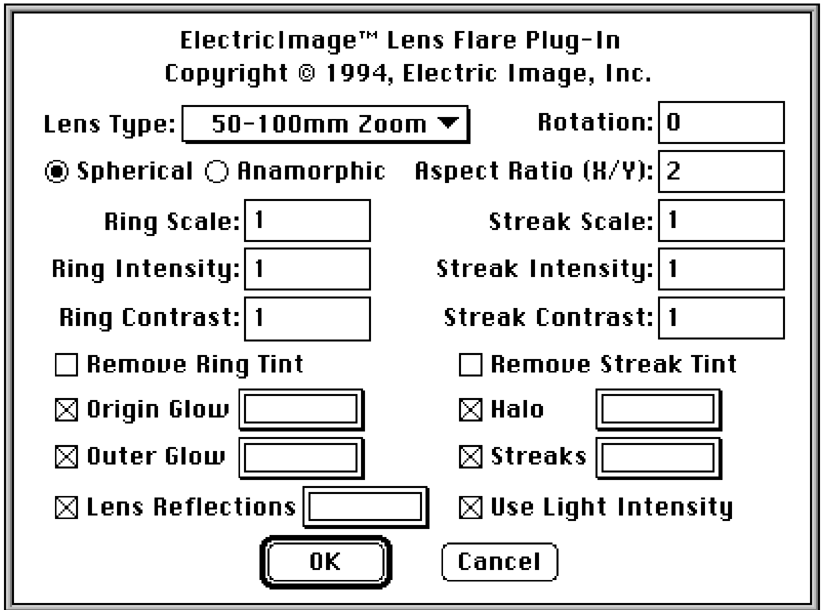


Figure 11.7 Dialog box used to set lens flare preferences

Lens Type

This pop-up menu provides a choice of two types of lens: **50-100mm Zoom** (the default) and **35mm Prime**. Each produces a different type of lens flare with different sets of ring and streak elements.

Spherical/Anamorphic

These radio buttons provide a choice between spherical and anamorphic lenses. A spherical lens produces circular rings and streaks. An anamorphic lens produces ovals and squashed streaks. The default is **Spherical**.

Rotation

This edit box contains a value in degrees for the angle of rotation for the streaks. This control can be used to simulate the spinning of a lens and to produce special effects. The default is 0.0 for no rotation.

Aspect Ratio

This edit box, used only in conjunction with anamorphic lenses, contains a value for the lens's aspect ratio. The default is 2 (2:1) because that is the aspect ratio of most anamorphic lenses.

Ring Scale

This edit box contains a value for the overall scale of the flare's ring elements. It defaults to 1 for standard-sized rings. The higher the value, the larger the rings.

Ring Intensity This edit box contains a value for the overall brightness of the flare's ring elements. It defaults to 1 for standard intensity rings. The higher the value, the brighter the rings.

Ring Contrast This edit box contains a value for the contrast in the flare's ring elements. It defaults to 1 for standard contrast rings. The higher the value, the higher the contrast.

Remove Ring Tint This check box, when enabled, changes all of the flare's ring elements to gray scale. This option makes them easier to color with the **Origin Glow**, **Outer Glow**, **Halo** and **Lens Reflections** color buttons, described below. It defaults to *off*.

Origin Glow This check box, when enabled, creates the flare's origin glow ring. It defaults to *on*. The adjacent color button opens the Apple Color Picker to adjust the color of this element. The color defaults to white (for no color adjustment).

Outer Glow This check box, when enabled, creates an outer glow ring around the flare's origin glow ring. It defaults to *on*. The adjacent color button opens the Apple Color Picker to adjust the color of this element. The color defaults to white (for no color adjustment).

Halo This check box, when enabled, creates a halo around the flare's origin glow ring. It defaults to *on*. The adjacent color button opens the Apple Color Picker to adjust the color of this element. The color defaults to white (for no color adjustment).

Lens Reflections This check box, when enabled, creates the flare's other ring elements. It defaults to *on*. The adjacent color button opens the Apple Color Picker to adjust the color of these element. The color defaults to white (for no color adjustment).

Streak Scale This edit box contains a value for the scale of the flare's streak elements. It defaults to 1 for standard-sized streaks. The higher the value, the longer the streaks.

Streak Intensity This edit box contains a value for the overall brightness of the flare's streak elements. It defaults to 1 for standard intensity streaks. The higher the value, the brighter the streaks.

Streak Contrast

This edit box contains a value for the contrast in the flare's streak elements. It defaults to 1 for standard contrast streaks. The higher the value, the higher the contrast.

Remove Streak Tint

This check box, when enabled, changes all of the flare's streak elements to gray scale. This option makes them easier to color with the **Streaks** color button, described below. It defaults to *off*.

Streaks

This check box, when enabled, creates the flare's streaks. It defaults to *on*. The adjacent color button opens the Apple Color Picker to adjust the color of the streaks. The color defaults to white (for no color adjustment).

Use Light Intensity

This check box, when enabled, uses the light source's intensity (page 11-11) to factor the intensity of the lens flare's elements. Lights with higher intensities will have brighter lens flares. It defaults to *on*.

Additional Settings

There are four additional check boxes in the upper left portion of the Light Info window:

Enable Highlight

This check box option enables the rendering of the specular highlight on objects illuminated by the light and for which the specular attribute has been set (in the Surface Editor).

Blend Glow

This check box option enables the blending of adjoining glow lights into a continuous glow light. Disabling this option will cause the overlapping areas of separate glow lights to increase in intensity, eventually going to white. **Blend Glow** defaults to *On* because it is more aesthetically pleasing.

Interpolate Fog RGB

This check box option, when enabled, specifies the use of RGB interpolation for the inside to outside color of the fog effect. Otherwise, HSV interpolation is used.

Interpolate Glow RGB

This check box option, when enabled, specifies the use of RGB interpolation for the inside to outside color of the glow effect. Otherwise, HSV interpolation is used.

Chapter 12 The Sound Info Window

Chapter 12 The Sound Info Window

Overview

The Sound Info window, as shown in Figure 12.1, contains controls for playing the selected soundtrack, along with settings for the selected soundtrack's start time in the project. It also contains settings for selections of the soundtrack and the creation and maintenance of cues (small sections of the soundtrack).

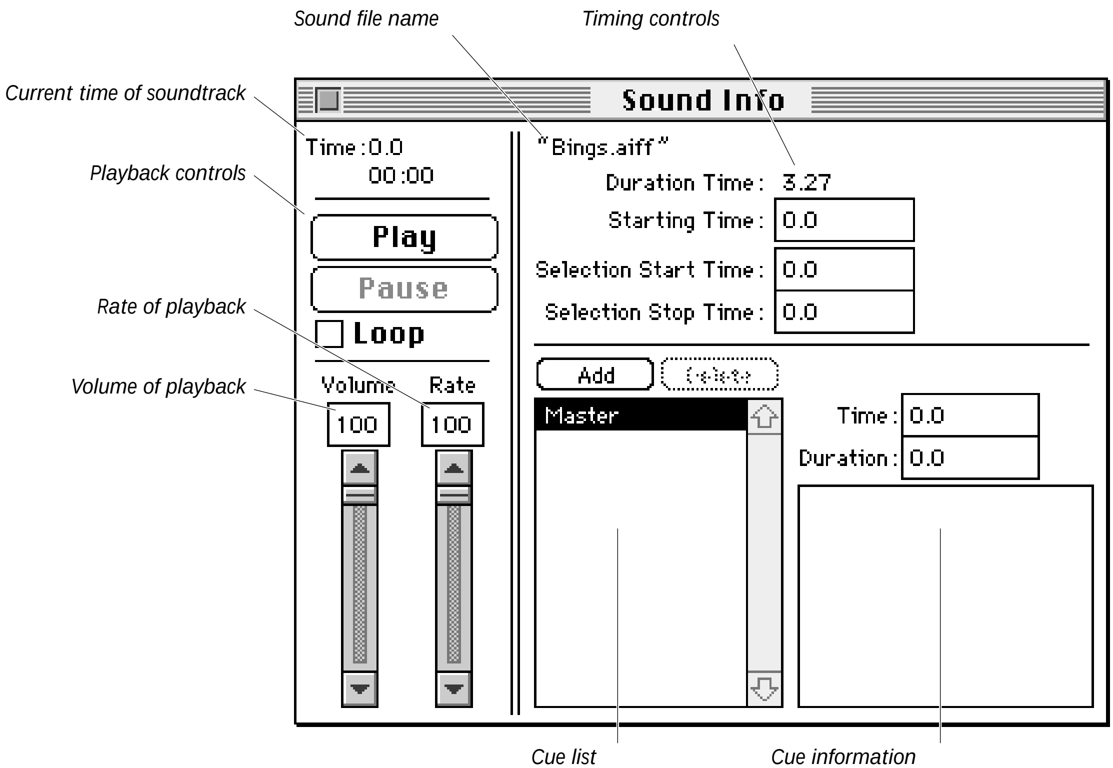


Figure 12.1 The Sound Info window

Opening the Sound Info Window

To open the Sound Info window, select the soundtrack in the Project window, then choose **Sound Info** from the File menu (or double-click on the soundtrack icon).

Playback Controls

The left side of the Sound Info window contains controls for playing the soundtrack.

Play This button, when clicked, plays the soundtrack. While the soundtrack is playing, the button changes to read **Stop**.

Pause This button, when clicked, pauses the soundtrack during play. While the soundtrack is paused, the button changes to read **Continue**.

Loop This check box, when enabled, causes the soundtrack to loop continuously during playback. It can be clicked on and off during playback.

Volume This edit box and slider bar sets the volume of playback relative to the volume setting of the **Sound** control panel. It defaults to full volume (100). If you do not hear the sound during playback, check the setting of the control panel.

Rate This edit box and slider bar sets the playback rate of the soundtrack. It defaults to full speed (100) and can be slowed down.

Timing Controls

The right side of the Sound Info window contains timing controls.

Duration Time

This number represents the overall duration of the sound file.

Starting Time

This edit box contains a value for the time in the project at which the sound starts.

Selection Start Time

This edit box contains a value for the time in the project at which the selected portion of the soundtrack starts.

W

A portion of the soundtrack can be selected in the Project window by clicking and dragging inside the waveform of the sound. For an illustration of how a selection appears in the Project window, refer to Figure 12.2 (page 12-5).

Selection Stop Time

This edit box contains a value for the time in the project at which the selected portion of the soundtrack stops.

Sound Cues

The lower right portion of the Sound Info window contains controls for creating and managing sound cues, which are segments of the soundtrack that can be recalled and located at any time.

Cue List This box contains a list of cues created by selecting a portion of the soundtrack and clicking the **Add** button, below.

Add This button is used to add a selected portion of the soundtrack to the cue list.

Delete This button is used to delete a selected cue from the cue list.

Time This edit box contains a value for the time at which the selected cue starts.

Duration This edit box contains a value in seconds for the duration of the selected cue.

Notes This edit box can be used to annotate the selected cue.

Figure 12.2 shows examples of how a soundtrack, a selection of the soundtrack, and the selection added as a cue, appear in the Project window.

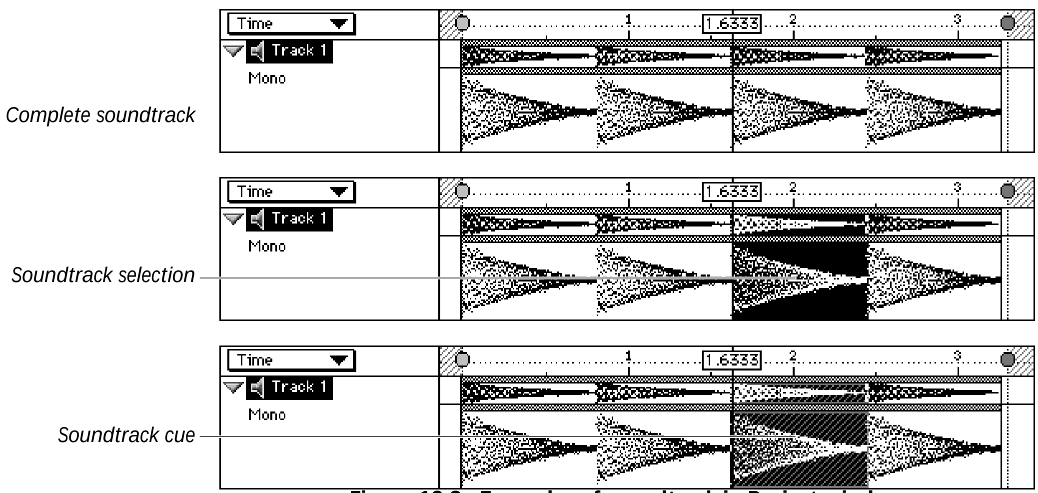


Figure 12.2 Examples of soundtrack in Project window

Chapter 13 The Group Info Window

Chapter 13 The Group Info Window

Overview

The Group Info window, as shown in Figure 13.1, contains two types of information for the selected group: permanent rendering settings for the group's shading, and current values for the group's location in global space, the location of its center point, its orientation in local space, and its scale.

There is also a button for opening the Surface Editor to set the group's color, ambient, diffuse, specular, luminance, reflectivity, transparency and edge density values, as discussed in *Chapter 18: The Surface Editor*.

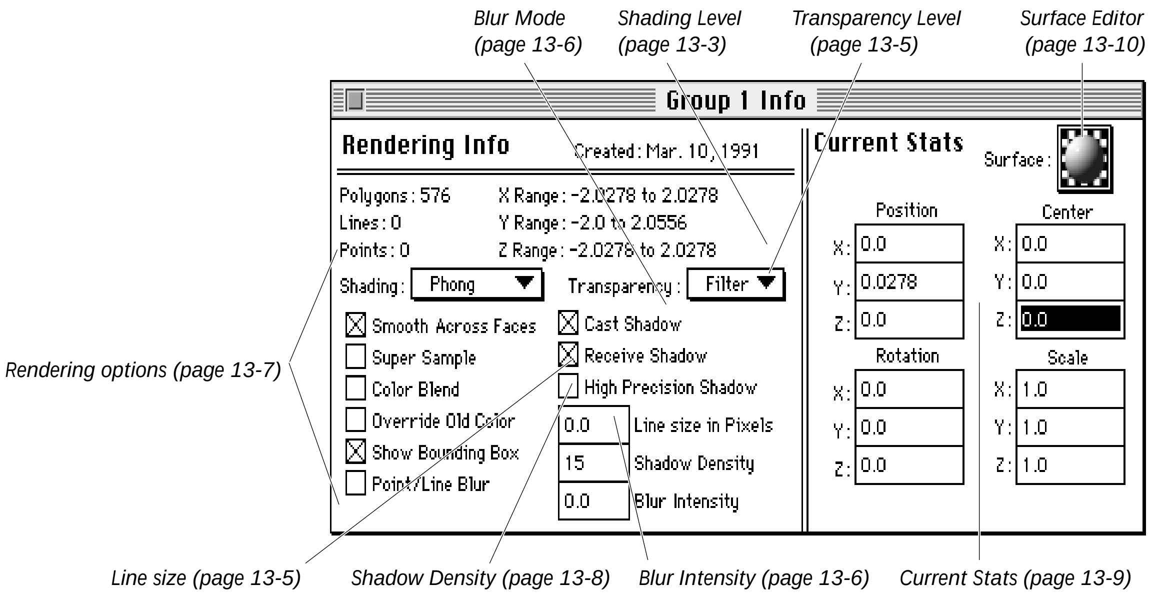


Figure 13.1 The Group Info window

Opening the Group Info Window

To open the Group Info window for a specific group, select the group, then choose **Group Info** from the File menu (or double-click on the group).

Rendering Info

The left side of the window contains information and settings in pop-up menus, check boxes and edit boxes that control how the group will be rendered.

Statistics

This information includes the number of polygons, lines and points for the group, as well as the X, Y and Z values of the boundaries of the group's cubic extent.

Shading

This pop-up menu is used to set the shading type for the group. The menu choices are:

Wireframe This level of shading renders the group in wireframe (only the edges of polygons are rendered). The thickness of the wireframe is set in the **Line Size in Pixels** edit box, discussed below.

Flat This level of shading calculates a single color intensity across the surface of the entire polygon. When shading calculations are made, the orientation of the polygon relative to the lights illuminating it are factored into the defined color of the polygon. Flat shading uses only one normal per polygon to calculate shade. The resulting image has a very "faceted" appearance.

W

Flat shading is very fast, and is often used for basic lighting and positioning tests, as well as animated move tests. It can also be used for special effects, where a faceted look is desired.

Gouraud This level of shading calculates the shade of a polygon by linearly interpolating color intensity at the vertices of shared polygons, and then averaging the shade across the surface of the polygon. Instead of using the polygon normal, gouraud shading uses the normals at each vertex of the polygon. The resulting image is smooth shaded, but can have artifacting at the polygon boundaries, which is very noticeable if there is a highlight on the object.

Phong This level of shading (the default) takes the vertices of the polygons, and their associated normals, and interpolates the new normals across the surface of the polygon, and then uses the new normals to generate a shade for each pixel contained within the polygon. The resulting image takes longer to calculate than the other shading methods, but yields the highest quality results. Also, special features such as bump mapping and shadow casting are available only when phong shading is used.

W

Group shading settings can be overridden in the Render Control window, where the maximum shading level is set for all groups in the project, as discussed in the section "Global Shading Level" (page 9-4) in Chapter 9: The Render Control Window.

Transparency

This pop-up menu is used to select the type of transparency that will be used for the group (depending on the group's transparency attributes as set in the Surface Editor, discussed in *Chapter 18: The Surface Editor*). The menu choices are:

Dither This level of transparency provides 16 levels of transparency and no transparency mapping, but with very fast rendering times.

Filter Transparency This level of transparency (the default) provides 255 levels of transparency and transparency mapping, but with long rendering times.

W

Group transparency settings can be overridden in the Render Control window, where the maximum transparency level is set for all groups in the project, as discussed in the section "Global Transparency Level" (page 9-5) in Chapter 9: The Render Control Window.

Blur Mode

This pop-up menu provides a choice of motion blur techniques for the selected group. The menu choices are:

None This option (the default) renders the group without motion blur.

Point/Line This option enables the point/line motion blur technique for the group. In this mode, only the group's points and lines leave streaks behind them. Choosing this option adds another edit box for **Blur Intensity** to the Group Info window (see below).

W

The point-line technique is most suitable for motion blur of star streaks and particle systems.

Motion Vector This option enables the motion vector technique for the group. In this mode, all of the group's elements (points, lines and polygons) are blurred. Blurs are always linear—they are never curved when viewed as a single frame. This is a fast, versatile and very high quality blur technique.

W

The motion vector technique is most suitable for rendering single elements which can later be composited together to produce the final animation. An example of when not to use this technique is for spinning fan blades partially obscured by their stationary housing. This would produce undesirable results.

Blur Intensity

This edit box, used only in conjunction with the **Point/Line** motion blur technique, contains a value that controls the brightness of streaks left by the group's points and lines. A value of 0.0 (the default) imparts a constant value regardless of the length of the streaks. Large values produce brighter streaks. Smaller values produce dimmer streaks. In general, the longer the streak the dimmer the streak.

Other Rendering Options

Smooth Across Faces This check box option enables smooth shading for the group. If not checked, the group will have a faceted appearance when rendered.

Super Sample This check box option enables super sampling for the group (the group is shaded four times per pixel). This will make highlights on sharp edges and small bumps appear less jagged and will make textures appear sharper. Super sampled groups can take up to four times as long to render, so this option should be used sparingly.

Color Blend This check box option enables smooth blending of polygon colors across polygon edges (soft color transitions between polygons). This option is group bound; colors will not blend across groups.

Override Old Color This check box option is automatically enabled when a new color is set for the group in the Surface Editor (refer to *Chapter 18: The Surface Editor*). To restore the group's original color, unclick the check box.

Show Bounding Box This check box option enables the display of the group's cubic extent bounding box in the World View windows, explained in the section "Drawing…" (page 2-11) in *Chapter 2: The Edit Menu Commands*.

Cast Shadow This check box option enables the group to cast shadows onto other groups which can receive a shadow—if the other groups have **Receive Shadow** checked and the illuminating light has **Enable Shadow** checked in its Light Info window, as discussed in the section "Enable Shadow" (page 11-13) in *Chapter 11: The Light Info Window*.

Receive Shadow This check box option enables the group to receive shadows from other groups—if the other groups have **Cast Shadow** checked and the illuminating light has **Enable Shadow** checked in its Light Info window (page 11-13).

High Precision Shadow This check box option is used for precisely built models to make shadows appear closer to the objects that cast them.

W

This option may cause shadow artifacts on certain models. If you notice this happening, then disable this option. The shadows processed for this group will be less precise, but should show no shadow artifacts.

Line Size in Pixels

This edit box contains a value for the size of the wireframe lines, in pixels, when **Wireframe** is selected from the Shading pop-up menu as the shading type for the group (page 13-3).

Shadow Density

This edit box contains a value for the density of the shadows cast by the group. Values between zero and 15 create shadows of varying density (zero casts no shadows while density 15 casts solid shadows). A low value can simulate shadows cast from a transparent group.

Current Stats

The right side of the Group Info window contains information in edit boxes about the group's current position in global space, the current position of its center point, its current orientation in local space, and its current scale. There is also a button for opening the Surface Editor to assign surface attributes to the group.

Changing the values in this section of the window produces different results, depending on which editing mode is in effect when the group is selected:

- In **Index** mode, changing the values updates the values for the current keyframe.
- In **Frame** mode, changing the values creates a custom frame that includes the new values. A custom frame is not affected by the interpolation of frames between keyframes, and can thus be used, for example, to create a glitch in the animation of the camera's position.
- In **Keyframe** mode, changing the values either updates the values for the current keyframe (if the selected frame coincides with an existing keyframe) or creates a new keyframe that includes the new values (if the selected frame does not coincide with an existing keyframe).
- In **Time** mode, changing the either updates the values for the current keyframe (if the selected point in time coincides with an existing keyframe) or creates a new keyframe at the selected point in time that includes the new values (if the selected point in time does not coincide with an existing keyframe).

W

The editing mode is set in the Project window. For an explanation of editing modes and the Project window, refer to Chapter 8: The Project Window.

Surface

This button opens the Surface Editor, which is used to set the group's color, ambient, diffuse, specular, luminance, reflectivity, transparency and edge density values. For a complete description of the Surface Editor, refer to *Chapter 18: The Surface Editor*.

Position

These edit boxes contain values for the X, Y, and Z coordinates of the object (its physical location in global space), at the current keyframe, frame or point in time (depending on the editing mode in effect).

Center

These edit boxes contain values for the X, Y and Z coordinates of the object's center point, at the current keyframe, frame or point in time (depending on the editing mode in effect).

Rotation

These edit boxes contain values, in degrees, for the amount of the object's orientation in local space, by way of its X, Y and Z rotation, respectively, at the current keyframe, frame or point in time (depending on the editing mode in effect).

Scale

These edit boxes contain values that indicate, in relative terms, the X, Y and Z scale of the object, at the current keyframe, frame or point in time (depending on the editing mode in effect).

Chapter 14 The Group Texture Window

Chapter 14 The Group Texture Window

Overview

The Group Texture window, shown in Figure 14.1, is used to set texture and reflection mapping for a group.

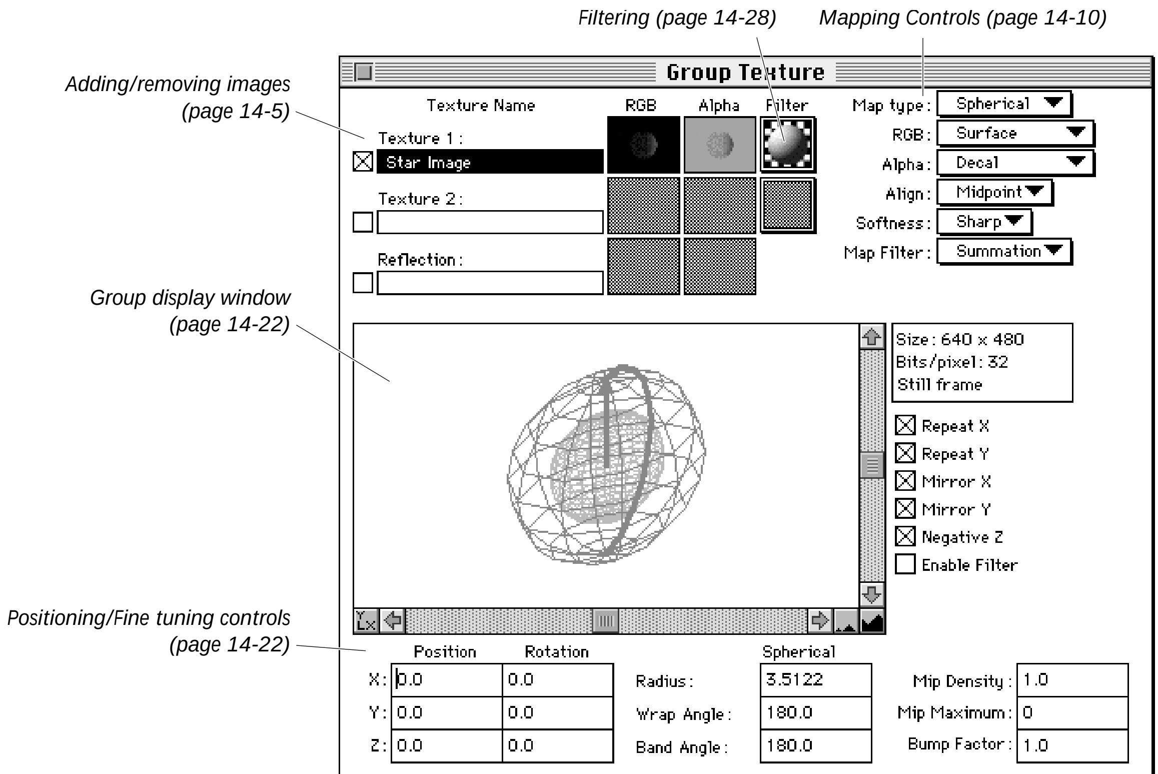


Figure 14.1 Group Texture Window

Opening the Group Texture Window

The Group Texture window can be opened in any of the following ways:

- Select the group and choose **Group's Texture** from the Tools menu, as discussed in the section "Group's Texture" (page 5-13) in *Chapter 5: The Tools Menu Commands*.
- Select the group and choose the **Group's Texture** tool from the Tool Palette, as discussed in the section"The Group's Texture Tool" (page 19-14) in *Chapter 19: The Tool Palette*.
- Select the group in the Project window and click the **Group's Texture** tool in the Project window's tool palette, as discussed in the section "Group's Texture" (page 8-26) in *Chapter 8: The Project Window*.
- Command-double-click on the group's icon in either the World View or Project windows.

Adding/Removing Images

Textures and reflections are created by assigning image files to the group. Two textures and one reflection are allowed per group, and these images must be in the Image file format (for information on converting files to Image format, refer to *The Projector Reference*).

The order of assignment is also important to consider, as textures are calculated in a back to front order (Texture 2 is applied on top of Texture 1, which is applied on top of the group's shading attributes).

The Texture Name boxes (Texture 1, Texture 2 and Reflection) are used to select the textures and reflection assigned to the group.

The Filter buttons to the right of each texture are used to open the Texture Editor for setting filtering attributes in much the same way the Surface Editor is used for setting shading attributes. The display sphere in the button indicates the current settings.

As shown in Figure 14.2, if a texture is assigned to the group, its name is shown in the Texture Name box, its RGB and alpha channels (if available) are shown in the RGB and Alpha windows, and the check box to the left of the Texture Name box is enabled (unless you disable it). Otherwise, the boxes and picture fields are empty.

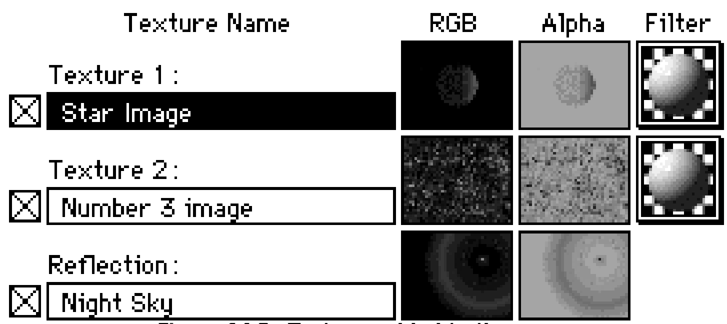


Figure 14.2 Textures added to the group

The procedures for adding and removing Image files for use as textures and reflections are presented on the following pages:

- Adding a texture (page 14-6)
- Adding a reflection (page 14-7)

Adding a Texture (Texture 1 or Texture 2)

To add a texture to the group:

1. Double-click on the empty Texture Name box.

   A directory dialog box, as shown in Figure 14.3, opens.

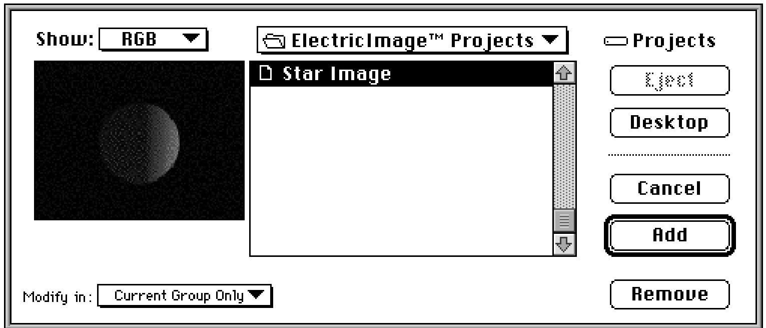


Figure 14.3 Directory dialog box used to add/replace/remove textures

2. Open the folder where the Image file is located (if necessary).
3. Click on the Image file to select it.

   When selected, the file's RGB channels are displayed in the window to the left of the file list.

   The **Show** pop-up menu above the display window can be used to also show the file's alpha channel (if it has one) and the file's image depth and dimensions in pixels.
4. Use the **Modify in** pop-up menu to select which group(s) are to be assigned the texture (defaults to **Current Group Only**).
5. Either click **Add** or press **Return**.

   The dialog box closes. The check box next to the Texture Name is enabled, the Texture Name box contains the name of the texture file, and the RGB and Alpha windows show the texture file's RGB and alpha channels (if available).

Texture Statistics

The right side of the window contains statistics for the currently selected texture: size of the texture in pixels (X by Y), the amount of frames in the texture, RGB color depth, and alpha depth.

Adding a Reflection

One of three types of reflections can be assigned to a group:

- Image file reflection

  When an Image file is applied to the group as a reflection, the Image file serves as the image reflected by the group.

- Environment reflection (environment mapping)

  When an environment reflection is applied to a group, ElectricImage maps a 360 degree view of the scene from the group's perspective and wraps that view around the group. The object will thus automatically reflect all of the other objects in the scene. The amount of reflection is determined by the group's reflectivity setting (as set in the Surface Editor). The image quality of the reflection is controlled by the Buffer Size edit box (discussed on page 6-192).

- Mirror reflection

  When a mirror reflection is applied to a group, a flat reflection of the group's environment is mapped to the group (as opposed to the cubic reflection of the environment reflection).

To add a reflection to the group:

1. Double-click on the empty Reflection Name box.

   A directory dialog box, as shown in Figure 14.4, opens.

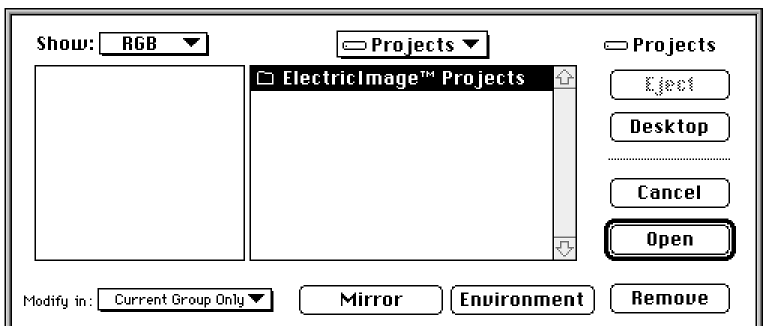


Figure 14.4 Directory dialog box used to add/replace/remove reflections

2. To add an environment reflection, click the **Environment** button.

   You are returned to the Group Texture window. The check box next to the Reflection Name box is enabled and the Reflection Name box contains the words "Automatic Environment." The RGB and Alpha windows remain blank.

3. To add a mirror reflection, click the **Mirror** button.

   You are returned to the Group Texture window. The check box next to the Reflection Name box is enabled and the Reflection Name box contains the words "Automatic Mirror." The RGB and Alpha windows remain blank.

4. To add an Image file reflection, open the folder where the Image file is located (if necessary).

5. Click on the Image file to select it.

   When selected, the file's RGB channels are displayed in the window to the left of the file list.

   The **Show** pop-up menu above the display window can be used to also show the file's alpha channel (if it has one) and the file's image depth and dimensions in pixels.

6. Use the **Modify in** pop-up menu to select which group(s) are to be assigned the texture (defaults to **Current Group Only**).

7. When done, either click **Add** or press **Return**.

   You are returned to the Group Texture window. The check box next to the Reflection Name box is enabled, the Reflection Name box contains the name of the reflection file, and the RGB and Alpha windows show the reflection file's RGB and alpha channels (if available).

Copying and Pasting Textures

Textures can be copied from one group and pasted to another group.

To copy the current texture:

1. Choose **Copy Texture Map** from the Edit menu.
2. Click on the icon of the group to which the texture is to be copied (in either the world view or Project windows),
3. Choose **Paste Texture** from the Edit menu.

Removing/Replacing Textures and Reflections

Textures and reflections can be removed and new textures and reflections can be applied to replace them.

To remove a texture or reflection:

1. Double-click on the text box with the name of the texture.

   A directory dialog box, as shown in Figure 14.3 for textures, and Figure 14.4 for a reflection, opens.

2. Click the **Remove** button.

   The dialog box closes and the Group Texture window's texture boxes are blank.

W

If you want to replace one texture or reflection with another, you do not need to remove the old texture or reflection. Selecting a new texture or reflection automatically replaces a previously assigned texture or reflection.

Mapping Controls

The pop-up menus in the upper right portion of the Group Texture window control the manner in which the assigned images are mapped to the group.

Map Type

This pop-up menu is used to select the projection style to be applied when the texture is mapped to the group. The menu choices are:

Flat

This option (the default) is best used for flat or flattish objects. If applied to a non-flat-object, the texture will streak along the sides of the object as it is projected onto all surfaces of the group along the texture's positive Z axis, as shown in Figure 14.5.

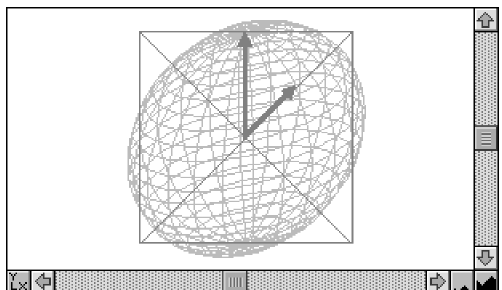


Figure 14.5 Flat projection display

The rectangle in the display represents the map and consists of an "x" shape through the center, and two arrows, one pointing to the top of the map, and the other pointing out from the center of the map to indicate the texture's positive Z axis.

The flat projection scale defaults to the group's extents. The scales of the projection are visible in the **X Scale**, **Y Scale**, and **Z Scale** edit boxes and can be changed by typing new values into the edit boxes.

Using a negative value for the Z scale will cause the projection to be reversed opposite the direction indicated by the gray arrow. Enabling the **Negative Z** check box will cause the texture to be projected into both the positive and negative Z directions.

Cylindrical

This option projects a cylindrical image around the group, as shown in Figure 14.6.

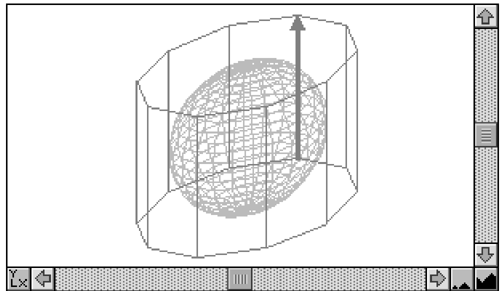


Figure 14.6 Cylindrical projection display

A cylinder is oriented around the center of the object, with an arrow pointing towards the top of the cylinder, and a line indicating where the seam will be. This is the best mapping type to use if the object is roughly cylindrical.

Cylindrical map types have two projection alignment controls, Wrap Angle and Height. The wrap angle controls the longitude projection, and the height factor controls the latitude projection of the cylinder. The wrap angle axis allows angles from 0˚ to 360˚. The default is 180˚.

The height factor allows a real number factor, with 1 being the default size.

Spherical

This option projects a spherical image around the group, as shown in Figure 14.7.

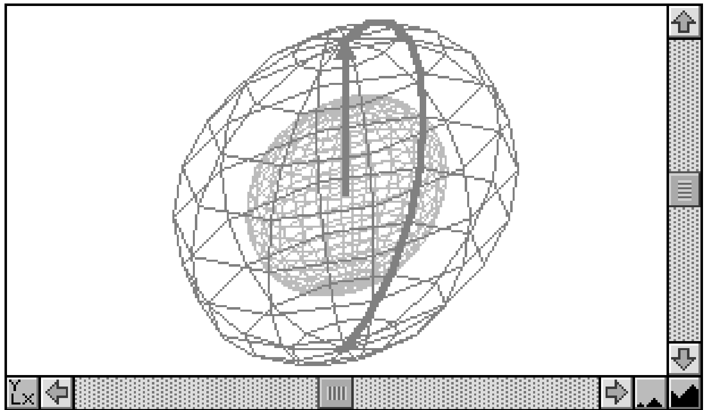


Figure 14.7 Spherical projection display

There will be a sphere centered around the group, with a line running along the sphere. This line is where the seam of the map will occur, and also points to the top of the map. This is the best mapping type if the object is roughly spherical.

The spherical texture type has two separate projection alignment controls, Wrap Angle and Band Angle. The wrap angle controls the longitude projection, and the band angle controls the latitude projection. The Wrap Angle axis is a circular axis allowing angles of 0˚ to 360˚.

The Band Angle axis is half circular, allowing for angles of 0˚ to 180˚.

Cubic This option projects a cube around the group, repeating the image for each side of the cube, as shown in Figure 14.8.

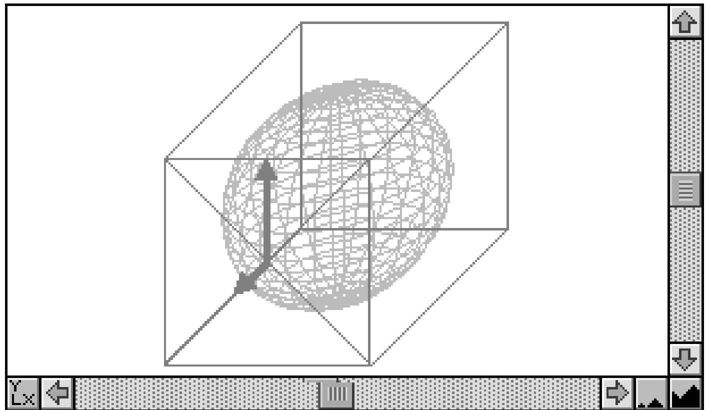


Figure 14.8 Cubic projection display

The front face of the cube will have an “x” through the center, much like the flat type. There will also be a line indicating the top of the map, as well as indicating the front direction of the map.

When this map is used with a cube-shaped group, all sides should project onto the group with minimal distortion. If this mapping type is applied to a curved group, the edges of the cubic map will be seen, appearing like a seam. Seaming also occurs when the projection is not properly aligned to a cube-shaped object.

The front face is the active face, which determines the overall mapping characteristics of the selected group. Use the active face to correctly scale the texture to the group, as well as to correctly orient the projection to the group’s coordinate space.

RGB

This pop-up menu determines how the RGB channel of the texture is treated when applied to the group. The menu choices are:

Disabled This option disables use of the RGB channel for any processing on this particular texture. The color channel of this texture will therefore not be visible.

Surface This option (the default) replaces the selected group's surface color values with the RGB channel of the texture.

Diffuse This option replaces the selected group's diffuse values with the RGB channel of the texture. If the Alpha mode for the texture is set to Decal, then only the opaque area of the texture would be affected by this setting—see "Alpha" (page 14-16).

Ambient This option replaces the selected group's ambient values with the RGB channel of the texture. If the Alpha mode for the texture is set to Decal, then only the opaque area of the texture would be affected by this setting—see "Alpha" (page 14-16).

Specular This option replaces the selected group's specular values with the RGB channel of the texture. If the Alpha Mode for the texture is set to Decal, then only the opaque area of the texture would be affected by this setting—see "Alpha" (page 14-16).

Reflectivity This option replaces the selected group's reflectivity values with the RGB channel of the texture. If the Alpha Mode for the texture is set to Decal, then only the opaque area of the texture would be affected by this setting—see "Alpha" (page 14-16).

Transparency This option replaces the selected group's transparency values with the RGB channel of the texture. If the Alpha Mode for the texture is set to Decal, then only the opaque area of the texture would be affected by this setting—see "Alpha" (page 14-16).

Luminance

This option replaces the selected group's luminance values with the RGB channel of the texture. If the Alpha Mode for the texture is set to Decal, then only the opaque area of the texture would be affected by this setting—see "Alpha" (page 14-16).

Edge Density

This option replaces the selected group's edge density values with the RGB channel of the texture. If the Alpha Mode for the texture is set to Decal, then only the opaque area of the texture would be affected by this setting—see "Alpha" (page 14-16).

Alpha

This pop-up menu determines how the alpha channel of the texture map is treated when applied to the group. The menu choices are:

Disabled This option disables use of the alpha channel for any processing on this particular texture.

Decal This option (the default) activates the RGB channel filters.

W

Decal is similar to a decal sheet often found in plastic model kits. For example, by positioning an image of the Stars & Bars with an alpha channel on the surface of an aircraft wing, the Stars & Bars would appear to be placed upon the surface of the wing when rendered, fully anti-aliased. This functions as if a real decal had actually been used on a real model airplane.

Replace This option forces the object to take on all characteristics of the texture map, including the alpha channel information.

W

For example, by mapping an image with an alpha channel with a circle shape in it onto a square, the resulting image when rendered would appear to be a square with whatever the background color was showing through the circle, as if it were a hole. Indeed, it is a hole, but not the kind of hole that might be expected. This hole exists in the alpha channel of the rendered image, so if a background was digitally composited into the image, that background would be seen coming through the hole. This is due to the special matting techniques for which alpha can be used. It is not likely that the "Replace" mode would be used too often, but it is nice to know that it is there.

Bump This option enables bump mapping, or "surface normal perturbation." Bump mapping uses the alpha channel to determine the amplitude (height) of the surface normal, with the white areas of the alpha channel being the highest points and the black areas being the lowest. If the texture has no alpha channel, a gray scale of the RGB channel is used.

Surface This option multiplies the alpha channel of the texture with the RGB color of the group's color. Wherever the alpha value of the texture is on (255, or white), the surface shade will be the group's color. Wherever the alpha value of the texture is off (0, or black), the surface shade will be black.

Diffuse This option multiplies the alpha channel of the texture with the diffuse value of the group to compute the diffuse value of the surface. This can be used to create a weathered effect on the surface. Lower alpha values will darken the surface.

Ambient This option multiplies the alpha channel of the texture with the ambient value of the group to compute the ambient value of the surface.

Specular This option multiplies the alpha channel of the texture with the specular value of the group in order to compute the specular value of the surface. Wherever the highlight occurs on the surface, the pattern formed by the alpha channel would be seen. This is very effective for simulating the way light would reflect off of surfaces with different reflective values.

Reflectivity This option multiplies the alpha channel of the texture with reflectivity value of the group to result in the reflectivity value of the surface. This setting would reflect where the reflectivity occurs on a surface. For instance, if there is a grid pattern in the alpha channel of a texture, and the group is 100% reflective, this setting would result in a surface which would appear to reflect only where the grid pattern would be.

Transparency This option multiplies the opaque transparency value of the group by the alpha channel of the texture map. This effect can be used to cut holes in a surface or to simulate cloud-like effects when the alpha is between zero and 255.

Luminance

This option multiplies the alpha channel of the texture with the luminance color of the group resulting in the luminance value of the surface. Wherever the alpha value of the texture is white (255) the surface would be the real value of the texture before shading. Wherever the alpha value of the texture is black (0), the surface would be the color of the texture after it had been shaded.

Edge Density

This option multiplies the opaque edge density value of the group by the alpha channel of the texture map. This can be used to add rough fringe effects around the edges of a group.

Align

This pop-up menu aids in the alignment of textures to the group.

W

The menu choice displayed on this pop-up menu at any given time will not necessarily indicate the current setting of the texture as it is being applied to the group. This is because the menu is a tool only and not an attribute indicator. The map projection in the View window is the best way to verify the alignment.

The menu choices are:

Midpoint This option (the default) aligns the texture to the center of the group. The aspect ratio of the texture map is maintained. Map Type projection should be used before using this option.

Front This option aligns the texture to the front of the group's cubic extent. Map Type projection should be set before using this option.

Back This option aligns the texture to the rear of the group's cubic extent. Map Type projection should be set before using this option.

Top This option aligns the texture to the top of the group's cubic extent. Map Type projection should be set before using this option.

Bottom This option aligns the texture to the bottom of the groups cubic extent. Map Type projection should be set before using this option.

Left This option aligns the texture to the left of the group's cubic extent. Map Type projection should be set before using this option.

Right This option aligns the texture to the right of the group's cubic extent. Map Type projection should be set before using this option.

W

The texture is projected on the object by way of the Map Type pop-up menu. The Map Type pop-up menu should be correctly set before the Texture Align pop-up menu is used.

Softness

This pop-up menu is used to soften or sharpen the texture map as it is applied to the object. The menu choices are:

None This option does not apply smoothing to the texture map. The map appears to be pixilated when it is scaled up large in a rendered image.

Sharp This option (the default) uses linear smoothing to remove pixilation from texture maps. It yields sharper texture maps and renders faster than the Soft mode. Aliasing within the texture map may be more visible in a rendered image, however, when this mode is selected.

Soft This option (not used with summation mapping—see below) uses cubic smoothing to remove almost all appearance of pixels within a texture map. It takes slightly longer to render than the Sharp mode and sharp edges within rendered textures appear softer. If aliasing is objectionable when using the other softness settings, this option is the solution.

Map Filter

This pop-up menu provides of choice of filtering (anti-aliasing) methods for the texture map, which are used to negate the moire and popping effects which occur when attempting to map a finite grid of pixels onto the surface of an infinitely resolvable model. The menu choices are:

None This option specifies that no anti-aliasing filter is used on the texture.

MIP This option specifies that MIP filtering is used.

W

MIP filtering can sometimes result in "blurry" images. The alternative is summation filtering (see below), which creates texture maps that appear sharper. Summation filtering requires more memory, however, than MIP mapping.

Summation This option (the default) specifies that summation filtering is used.

Enabling Mapping Functions

Located below the pop-up menus are a series of enable check boxes which allow for special processing of the selected texture.

Repeat X This check box option repeats the texture along the texture's X axis. Repeating the texture will place the texture side by side with itself, and will not hide seams if they are present.

Repeat Y This check box option repeats the texture along the texture's Y axis.

Mirror X This check box option mirrors the texture along the texture's X axis. Mirroring will flip the texture back and forth, so that all the seams will match.

Mirror Y This check box option mirrors the texture along the Y axis.

Negative Z This check box option projects the texture along the texture's positive and negative Z axis. Disabling this function projects the texture only along the positive Z axis.

Enable Filter This check box option enables the material filter for a texture. The texture's material filter is set by clicking the Filter button, as discussed in the section "Texture Surface Attributes" (page 14-28).

Positioning/Fine Tuning Controls

A number of controls are available to assist you in fine-tuning the position of the texture map.

Group Display Window

A group display window, as shown in Figure 14.9, is located in the center of the Group Texture window, and is used to assist in the alignment of the texture to the group.

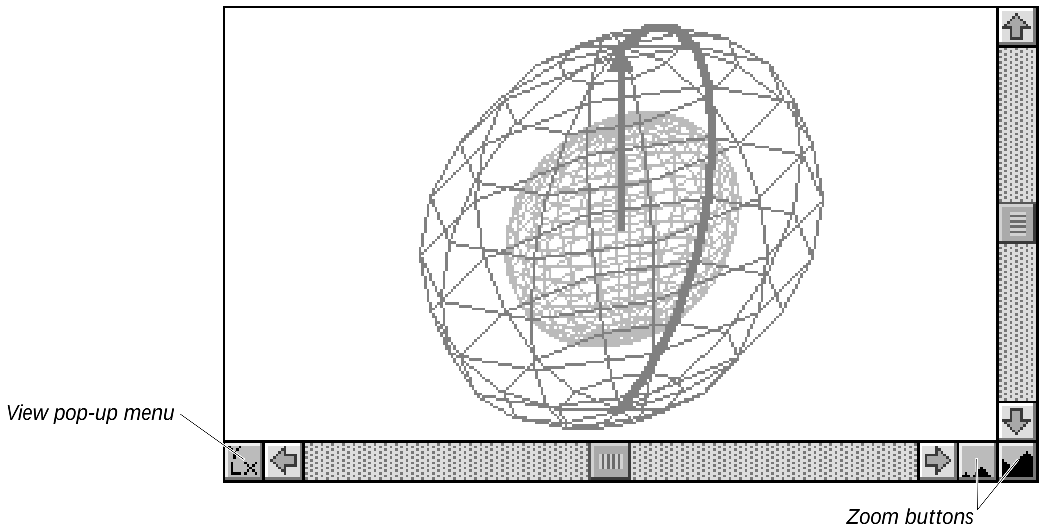


Figure 14.9 Window controls

The view can be changed in two basic ways:

- The area displayed can be changed by zooming in, zooming out and scrolling or dragging the window’s contents, as discussed in the section “Changing the Area Displayed” (page 14-23).
- The coordinate plane can be changed, effectively changing the view to top, side or front, as discussed in the section “Changing the View” (page 14-24).

Changing the Area Displayed

There are several ways of changing the area displayed inside the group display window. To zoom in and out:

- Use the zoom buttons in the lower right corner of the window. To zoom in, click on the right zoom button. To zoom out, click on the left zoom button. To zoom in or out to a view that includes all objects in the project, hold down the option key while clicking either one of the zoom buttons.
- Use the **Zoom Window** tool from either the Tool Palette or the Tools Menu. To zoom in, click on the area you wish to zoom in on with the Zoom Window tool. To zoom out, hold down the option key while clicking with the Zoom Window tool. For an explanation of the Zoom Window tool, refer to the section “The Zoom Window Tool” (page 19-9) in *Chapter 19: The Tool Palette,* or the section “Zoom Window” (page 5-8) in *Chapter 5: The Tools Menu Commands.*
- Hold down the option key and drag a rectangle around the area you wish to zoom in on.

To scroll the window’s contents:

- Use the vertical and horizontal scroll bars.
- Use the **Drag Content** tool from either the Tool Palette or the Tools menu to scroll the window’s contents. For an explanation of the Drag Content tool, refer to the section “Zooming in or out is done by a factor of 2 with each click of the mouse.” (page 19-9) in *Chapter 19: The Tool Palette,* or the section “Drag Content” (page 5-9) in *Chapter 5: The Tools Menu Commands.*

Changing the View

The information displayed in the window can be changed through the use of the View pop-up menu located to the left of the horizontal scroll bar at the bottom of the window. This pop-up menu gives you a choice of views, and its button indicates the current selection.

The menu choices are:

Camera

This option shows the object as the camera sees it.

Skew

This option (the default) shows the object at a skewed angle to represent a three-dimensional view. The detail to which the object is drawn can be set in the Drawing Preferences box, selectable from the Edit menu.

Top

This option shows the object in the Y/Z coordinate space.

Side

This option shows the object in the X/Z coordinate space.

Front

This option shows the object in the X/Y coordinate space.

RGB

This option shows the RGB channel of the object's texture map (if a texture map has been applied to the object). This can also be displayed by clicking the RGB picture in the texture assignment area. In this view, the texture image can be cropped, as discussed in the section "Cropping the Image" (page 14-25).

Alpha

This option shows the alpha channel of the object's texture map (if a texture map has been applied to the object that contains alpha channel information). This can also be displayed by clicking the alpha picture in the texture assignment area. In this view, the texture image can be cropped, as discussed in the section "Cropping the Image" (page 14-25).

Cropping the Image

The texture image can be cropped so that only a portion of the image is used. Selecting **RGB** or **Alpha** from the View pop-up menu (page 14-24) displays the image in the Group Display window with a crawling selection rectangle, as shown in Figure 14.10.

To crop the image, drag any of the sides or corners of the selection rectangle.

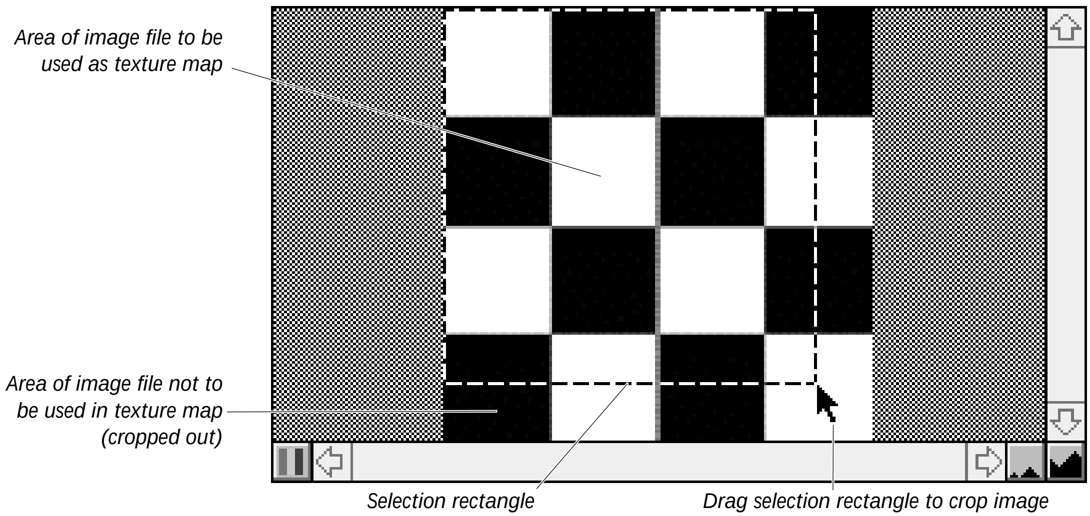


Figure 14.10 Example of cropping a texture map image

Edit Boxes

Below the group display window are edit boxes that affect the placement and orientation of the selected texture relative to the group.

X, Y and Z Position and Rotation

These edit boxes contain the texture's X, Y and Z position and rotation. As the various settings in the **Align** pop-up menu are selected, these boxes are updated with new coordinates automatically. The values can be changed by typing in the edit boxes.

Optional Edit Boxes

To the right of the Position and Rotation edit boxes are a set of case-sensitive, optional edit boxes. As the various settings in the **Align** pop-up menu are selected, these boxes are updated with new values automatically. The values can be changed by typing in the edit boxes.

Depending on the map type of the selected texture or reflection (as set in the **Map Type** pop-up menu), the column heading for the edit boxes is set to the name of the map type, and the edit boxes pertain to the specific map type:

- If the map type of the selected texture is Flat (page 14-10), the optional edit boxes contain the texture's X, Y and Z scale values.
- If the map type of the selected texture is Cylindrical (page 14-11), the optional edit boxes contain the texture's radius, wrap angle and height values.
- If the map type of the selected texture is Spherical (page 14-12), the optional edit boxes contain the texture's radius, wrap angle and band angle values.
- If the map type of the selected texture is Cubic (page 14-13), the optional edit boxes contain the texture's X, Y and Z scale values.
- If a reflection is selected and the reflection is Automatic Environment, the optional edit box contains the buffer size value for the map.

Map Filter Controls

In the lower right corner of the Group Texture window are edit boxes used for map filtering.

MIP Density

This edit box contains a value that controls the blurriness of the texture maps. The default setting is 1, providing the most sharpness without aliasing. Values lower than 1 will induce aliasing and are therefore not recommended. The higher the number, the more blurred the image.

MIP Maximum

This edit box contains a value that sets the maximum blurriness for the selected map. This is used to reduce excessive blurring at the poles of spheres and cones. A value of 0 (the default) disables the feature. Values less than 20 are not recommended because they will induce aliasing.

W

MIP Density and MIP Maximum affect summation filtering as well as MIP filtering.

Bump Mapping Control

In the lower right corner of the Group Texture window is an edit box used for bump mapping.

Bump Factor

This edit box contains a value that is used when the Alpha pop-up menu is set to Bump (page 14-16). It determines the amplitude, or height, of the bump map. The default factor is set to 1. To make a bump map seem higher, increase the number of the bump factor. To invert a bump map, type a negative number into this edit box.

Texture Surface Attributes

Once a texture is assigned to a group, it can have its own surface attributes assigned (color, diffuse, ambient, specular, reflectivity, luminance, transparency and edge density) in much the same manner as a group's surface attributes are set in the Surface Editor.

W

For example, if you have a non-reflective group to which you want to map a reflective decal (such as lettering), set the Alpha mode to Decal. Then use this feature to assign reflectivity to the texture. That attribute will override the group's reflectivity setting where the texture's alpha channel is white.

Attributes set for Texture 2 will override attributes set for both Texture 1 and the group where the textures overlap.

To assign a texture's surface attributes:

1. Click the **Enable Filter** check box (page 14-21) to enable the Filter.
2. Click on the **Filter** button (page 14-5) for the texture.

   The Texture Editor dialog box, as shown in Figure 14.11, opens.

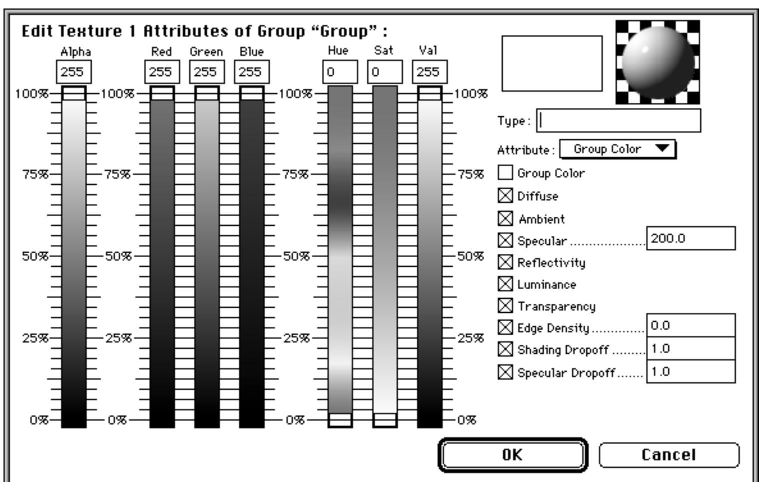


Figure 14.11 Texture Editor

The Texture Editor is organized and used for filtering texture images in the same manner as the Surface Editor is used for setting a group's surface attributes. For an explanation of the Surface Editor and its controls, refer to Chapter 18: The Surface Editor.

3. Use the controls to set the surface attributes for the texture. By default, these settings (accept for group color) will override individual surface attributes set at the group level. If you do not want any specific attributes to override the group level settings, be sure to disable the check boxes for those attributes.

   Figure 14.12 shows two examples of mapping with texture surface attributes replacing the surface attributes of the group. In both cases, the alpha channel is set to **Decal**. In the example on the left, an image of the letters EIAS with a band of color is mapped onto a solid color cube; the surface color attributes of the map replace the surface color attributes of the cube. In the example on the right, the RGB channel is set to **Disable**; the reflectivity attributes of the map are set to a maximum and replace the reflectivity attributes of the cube (which were set to a minimum) where the letters appear.

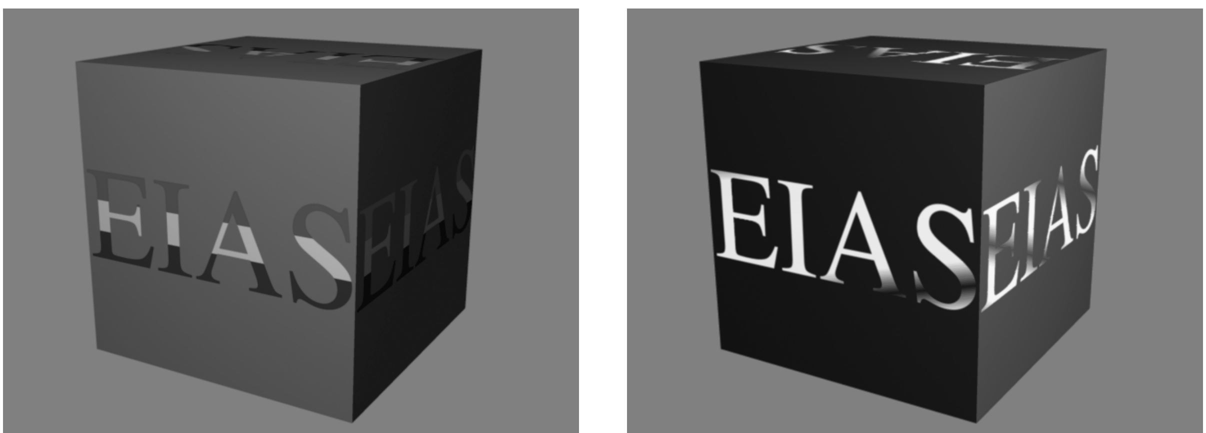


Figure 14.12 Examples of applying a color decal (left) and a reflective decal (right)

4. Click **OK** or press **Return** when done.

Chapter 15 The Group Link Window

Chapter 15 The Group Link Window

Overview

The Group Link window, shown in Figure 15.1, is used to set linking and rotation information for the selected group.

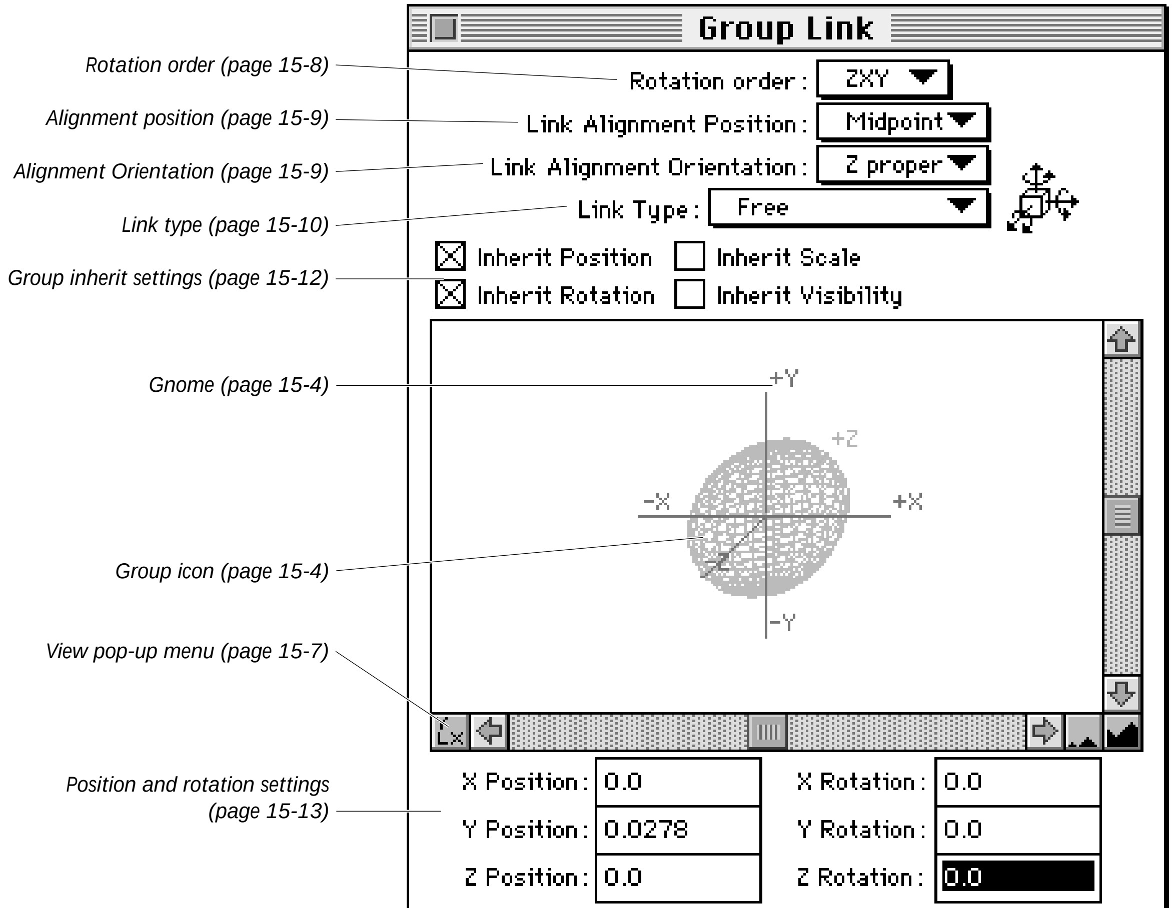


Figure 15.1 Group Link window

Each group can have its own link type and location. A link is the pivot point of the group, and the type determines how the pivot point will react relative to the parent of the group. The pivot point is oriented so that correct movement is achieved, as defined by the link type. Certain link types use the Z axis as the major axis, or the axis on which motion is achieved.

The Group Link window also contains check boxes to establish the selected group's relationship with a group hierarchically ordered above it (if applicable). These options can be used to control whether or not the selected group will inherit position, rotation, scale, visibility and deformation attributes from its parent group.

Opening the Group Link Window

The Group Link window can be opened in any of the following ways:

- Select the group and choose **Group's Linkage** from the Tools menu, as discussed in the section "Group's Linkage" (page 5-14) in *Chapter 5: The Tools Menu Commands*.
- Select the group and choose the **Group's Linkage** tool from the Tool Palette, as discussed in the section"The Group's Linkage Tool" (page 19-15) in *Chapter 19: The Tool Palette*.
- Select the group in the Project window and click the **Group's Linkage** tool in the Project window's tool palette, as discussed in the section "Group's Linkage" (page 8-26) in *Chapter 8: The Project Window*.

Window Elements

The display area in the center of the window, as shown in Figure 15.2, shows the group and its pivot point.

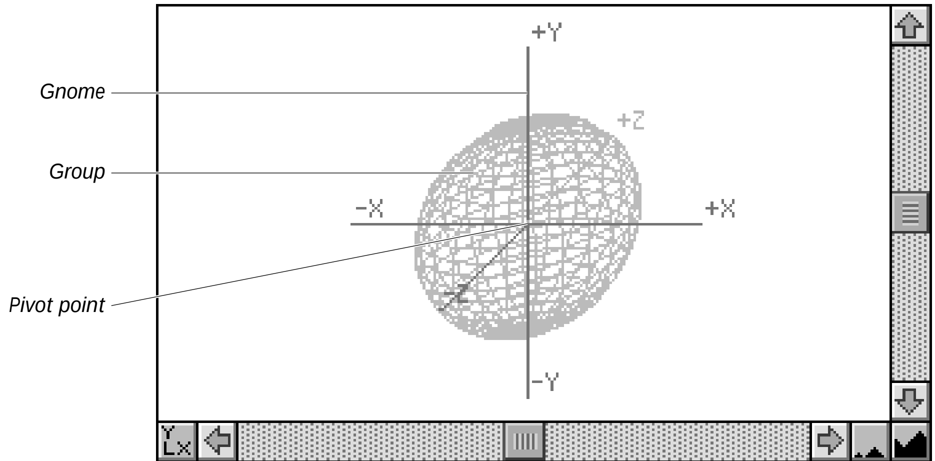


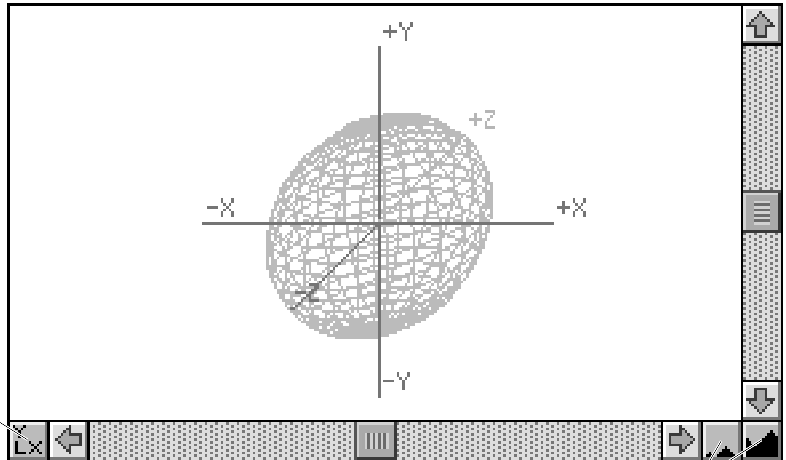
Figure 15.2 Window elements

The pivot point is indicated by the gnome, which is a three dimensional crosshair icon, with each axis labeled. This crosshair is used to assist in the alignment of the group's pivot point.

Window Display Controls

In using the Group Link window, there are several controls that you can use to manipulate the view, as shown in Figure 15.3.

View pop-up menu (page 15-7)



Zoom buttons (page 15-6)

Figure 15.3 Window controls

The view can be changed in two basic ways:

- The area displayed can be changed by zooming in, zooming out and scrolling or dragging the window’s contents, as discussed in the section “Changing the Area Displayed” (page 15-6).
- The view can be changed, as discussed in the section “Changing the View” (page 15-7).

Changing the Area Displayed

There are several ways of changing the area displayed inside a World View window. To zoom in and out:

- Use the zoom buttons in the lower right corner of the window. To zoom in, click on the right zoom button. To zoom out, click on the left zoom button. To zoom in or out to a view that includes all objects in the project, hold down the option key while clicking either one of the zoom buttons.
- Use the **Zoom Window** tool from either the Tool Palette or the Tools Menu. To zoom in, click on the area you wish to zoom in on with the Zoom Window tool. To zoom out, hold down the option key while clicking with the Zoom Window tool. For an explanation of the Zoom Window tool, refer to the section “The Zoom Window Tool” (page 19-9) in *Chapter 19: The Tool Palette*, or the section “Zoom Window” (page 5-8) in *Chapter 5: The Tools Menu Commands*.
- Drag a rectangle around the area you wish to zoom in on.

To scroll the window’s contents:

- Use the vertical and horizontal scroll bars.
- Use the **Drag Content** tool from either the Tool Palette or the Tools menu to scroll the window’s contents. For an explanation of the Drag Content tool, refer to the section “Zooming in or out is done by a factor of 2 with each click of the mouse.” (page 19-9) in *Chapter 19: The Tool Palette*, or the section “Drag Content” (page 5-9) in *Chapter 5: The Tools Menu Commands*.

Changing the View

The view of the Group in the display area can be changed through the use of the pop-up menu located to the left of the horizontal scroll bar in the lower left corner of the window, as shown in Figure 15.3. The menu choices are:

Camera This option shows the object as the camera sees it.

Skew This option (the default) shows the object at a skewed angle to represent a three-dimensional view. The detail to which the object is drawn can be set in the Drawing Preferences box, selectable from the Edit menu.

Top This option shows the object in the Y/Z coordinate space.

Side This option shows the object in the X/Z coordinate space.

Front This option shows the object in the X/Y coordinate space.

Positioning the Pivot Point

The pivot point can be dragged in the display area to the desired position relative to the group (only in the Top, Side and Front views, though it can be rotated in a skew view).

For more precise positioning, there are edit boxes below the display area that affect the placement and orientation of the pivot point relative to the group, as discussed in the section “Position and Rotation” (page 15-13).

Pivot Point and Rotation Controls

Rotation Order

This pop-up menu is used to select the order, according to XYZ coordinates, in which the group rotates about its pivot point. The menu choices are:

XYZ

XZY

YXZ

YZX

ZXY (the default)

ZYX

XYX (z)

XZX (y)

YXY (z)

YZY (x)

ZXZ (y)

ZYZ (x)

The letters in parentheses indicate the coordinate channel that controls the last rotation in the order. For example, XYX (z) indicates an X rotation, then a Y rotation, then another X rotation controlled by the Z coordinate channel.

Link Alignment Position

This pop-up menu is used to select the position of the group's pivot point (denoted by the gnome in the display area, as shown in Figure 15.2 on page 15-4).

The position of the pivot point can be further modified by either typing in coordinates in any of the position or rotation boxes located under the display area, as discussed in the section "Positioning the Pivot Point" (page 15-7), or by use of the X, Y and Z Rotate tools in the Tool Palette, as discussed in *Chapter 19: The Tool Palette*.

The menu choices are:

Midpoint This option (the default) positions the pivot point at the group's midpoint.

Front This option positions the pivot point at the group's front.

Back This option positions the pivot point at the group's back.

Top This option positions the pivot point at the group's top.

Bottom This option positions the pivot point at the group's bottom.

Left This option positions the pivot point at the group's left side.

Right This option positions the pivot point at the group's right side.

Link Alignment Orientation

This pop-up menu is used to re-orient the group's coordinates (if so desired). The menu choices are:

Z proper This option (the default) maintains the group's coordinates.

Z is X This option swaps the group's Z and X coordinates so that the Z coordinate becomes the X coordinate.

Z is Y This option swaps the group's Z and Y coordinates so that the Z coordinate becomes the Y coordinate.

Link Type

This pop-up menu is used to select which link type will be assigned to the pivot point of the group. Some link types use the Z axis as the major axis. The menu choices are:

Custom… This option opens a dialog box, shown in Figure 15.4, that enables you to set locks on the position and rotation of the group for a customized link type.

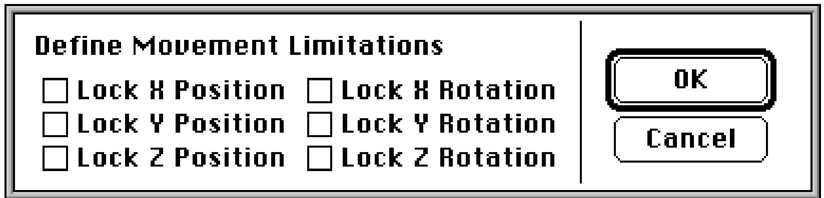


Figure 15.4 Dialog box used to create a customized link type

Free This link type allows total freedom of movement. This is the default link type for parent groups and if the object is to be included in the project without any hierarchy.

Ball Planar This link type allows front and side directional motion, and rotation of all three axes.

Cylinder Planar This link type allows rotation around the top and side axes, and directional motion along the front and side. No up and down motion is allowed.

Planar This link type allows directional motion along the front and side axes, with rotation along the top axis only.

Socket This link type allows rotation on all three axes only.

Cylinder This link type allows back to front motion and rotation only.

Universal This link type allows rotation along the top and side axes only.

Slide This link type allows up and down motion along the Z axis only. Position the Z axis of the pivot point (as indicated by the gnome) along the correct axis of movement for the group.

Pin This link type allows rotation along the Z axis only. Position the Z axis of the pivot point (as indicated by the gnome) along the correct axis of movement for the group.

Lock This link type does not allow motion of any kind.

Inherit Characteristics Controls

The check boxes under the pivot point and rotation pop-up menus control what characteristics the group inherits from its parent group hierarchically ordered above it (if it is linked to a parent group).

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Preferences for inherit options can also be pre-configured using the* Import... *command in the Edit menu, as discussed in the section “Import...” (page 2-33) in Chapter 2: The Edit Menu Commands.

Inherit Position

This check box option, when enabled, links the position of the group to its parent group hierarchically ordered above it. As the parent moves, the group will move with it.

Inherit Rotation

This check box option, when enabled, links the rotation of the group to its parent group hierarchically ordered above it. As the parent rotates, the group will rotate with it.

Inherit Scale

This check box option, when enabled, links the scaling of the group to its parent group hierarchically ordered above it. As the parent is scaled, the group will be scaled with it.

Inherit Visibility

This check box option, when enabled, links the visibility of the group to its parent group hierarchically ordered above it. As the parent’s visibility is switched off and on, the group’s visibility will be switched off and on accordingly.

Inherit Deformation

This check box option, when enabled, links the deformation of the group to its parent group hierarchically ordered above it. As the parent is deformed, the group will be deformed as well.

Position and Rotation

The edit boxes at the bottom of the window contain values for the pivot point’s X, Y and Z position coordinates and rotation angles. As the various settings in the pivot point and rotation control pop-up menus are selected, these boxes are updated with new values automatically and can then be used to “fine tune” the pivot point’s position and rotation.

Chapter 16 The Group Deformation Window

Chapter 16 The Group Deformation Window

Overview

The Group Deformation window, as shown in Figure 16.1, is used to apply a variety of geometrical transformations to a group.

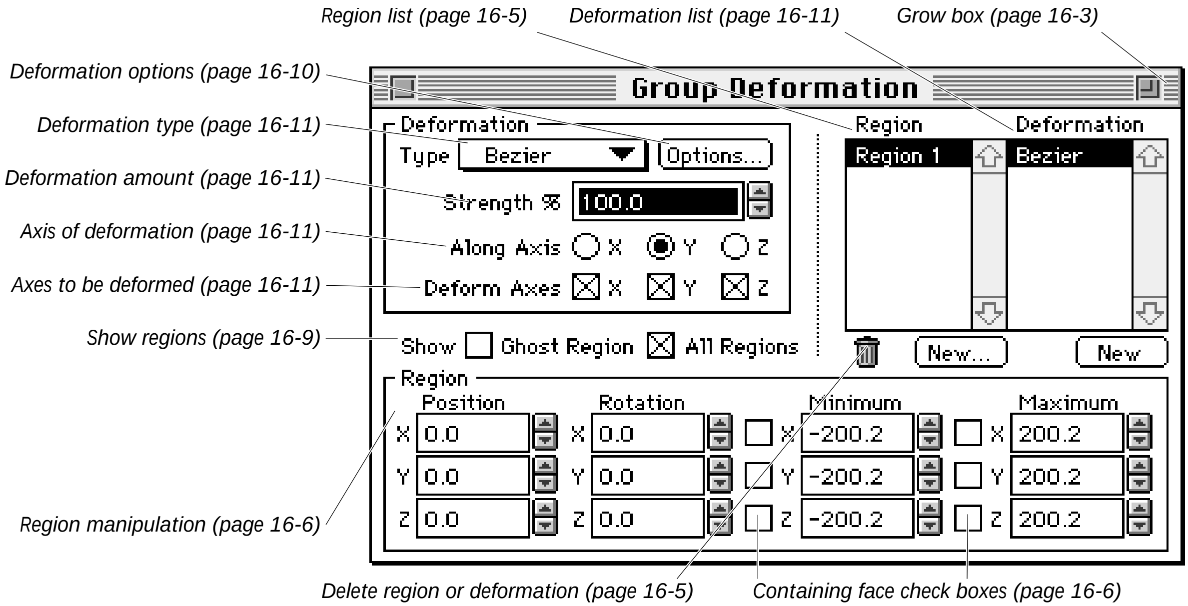

Figure 16.1 The Group Deformation window

Deformations, which alter the shape and structure of the group, can be applied singly or in combination, and can be animated. The process of applying a deformation is basically a two-step process:

- Defining a region, or area, of the group in which the deformation will occur. This region defaults to the entire group, but can be assigned to a part of the group and, therefore, multiple regions can be defined for different parts of the group.
- Assigning a deformation to the selected region. There are various types of deformations available, and they can be controlled in terms of the amount of deformation and the axes of the deformation region that are affected. Multiple deformations can be assigned to the same region.

The types of deformations available are:

- Scale (page 16-13)
- Shear (page 16-14)
- Twist (page 16-15)
- Taper (page 16-16)
- Bend (page 16-18)
- Bulge (page 16-19)
- Linear Wave (page 16-21)
- Circular Wave (page 16-23)
- Stretch (page 16-25)
- Bezier (page 16-27)

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Deformations work best on models that are broken up into a large number of small polygons.

Opening the Group Deformation Window

The Group Deformation window can be opened in any of the following ways:

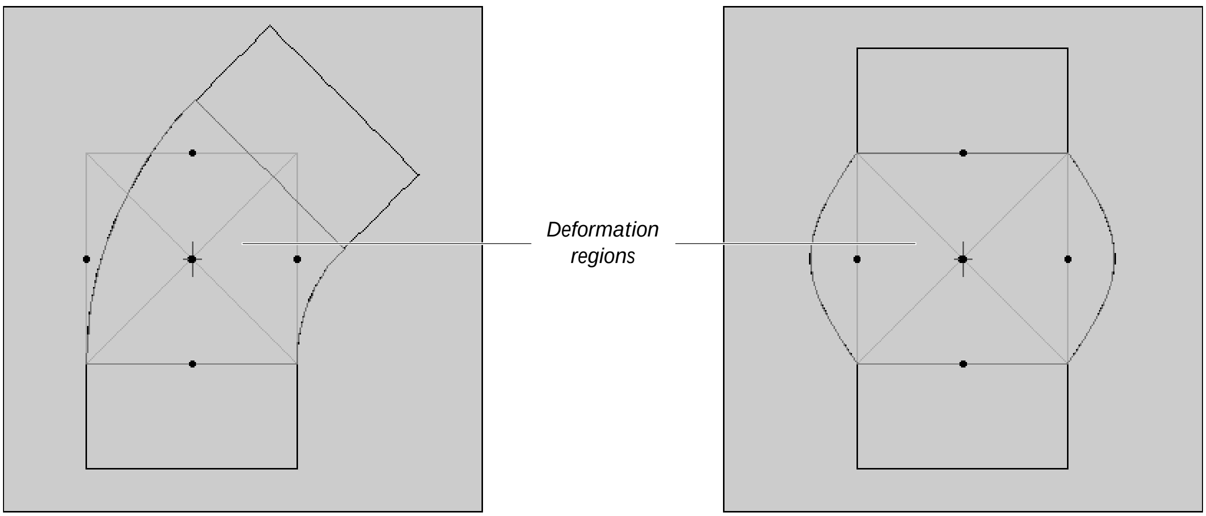
- Select the group and choose **Group Deform** from the Tools menu, as discussed in the section "Group Deform" (page 5-12) in *Chapter 5: The Tools Menu Commands*.
- Select the group and choose the **Group Deform** tool from the Tool Palette, as discussed in the section"The Group Deform Tool" (page 19-13) in *Chapter 19: The Tool Palette*.
- Select the group in the Project window and click the **Group Deform** tool in the Project window's tool palette, as discussed in the section "Group Deform" (page 8-26) in *Chapter 8: The Project Window*.
- Command-Control-Double Click on the group.

The bottom portion of the window can be hidden and redisplayed by clicking the grow box in the upper right corner of the window.

Deformation Regions

Deformations are applied to a group within regions that are created in the Group Deformation window and configured either numerically in the window or by direct manipulation in the World View windows.

When a deformation is applied to a group, the group's vertices are deformed. Regions allow for control over which vertices are deformed. However, depending on the type of deformation applied, vertices outside the region may be affected. Figure 16.2 shows an example of a deformation that affects vertices outside the region alongside an example of a deformation that is completely contained within the region.



A simple bend (affects vertices outside the region) *A simple bulge (affects only vertices within the region)*

Figure 16.2 Examples of deformations that occur both outside and completely inside the defined region

Defining a Region

The first step in applying a deformation to a group is to define the deformation region.

To define a region:

1. Click the **New…** button under the Region list.

   A dialog box, as shown in Figure 16.3, opens to allow you to name the deformation region.

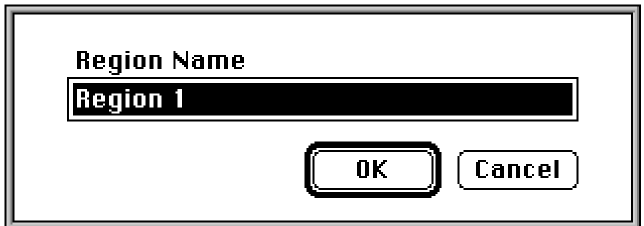


Figure 16.3 Dialog box used to name a deformation region

2. Type a name for the region (if not using the default).
3. Either click **OK** or press **Return**.

   The name of the region appears in the Region List and the Region and Deformation controls become active.

4. Configure the region's position, rotation and minimum and maximum dimensions (relative to the center point of the group) by using either the numerical controls at the bottom of the window or by clicking and dragging the region's handles in the World View windows. The "ghost region" (page 16-9) must be visible to directly manipulate the region.

   For an explanation of how to manipulate the region, refer to the section "Manipulating the Region" (page 16-6). If you want to define a deformation for the region in its current configuration, refer to the section "Creating a Deformation" (page 16-11).

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To delete a region you have defined, drag the region from the Region list to the trash can icon below the list.

Manipulating the Region

There are two ways to manipulate the region: through numerical manipulation in the Group Deformation window, and by direct manipulation in the World View windows.

Numerical Manipulation

The bottom portion of the window, as shown in Figure 16.4, contains text entry boxes that allow you to control the position, orientation and size of the region relative to the center point of the group.

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Every text entry box in the window has a corresponding animation channel in the Project window, as discussed in Appendix C: Group Data Channels.

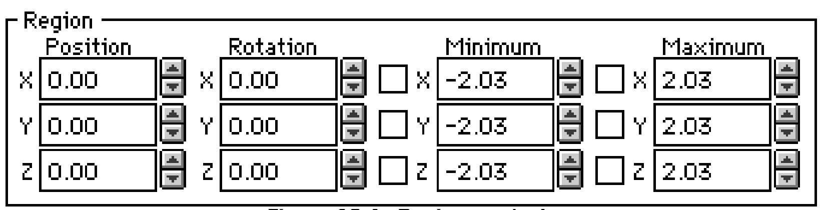

Figure 16.4 Region controls

To the right of each text entry box is a rocker button that allows incremental adjustments to the value in its text entry box. By default, a rocker button changes its value in increments of 1/100 (0.01). However, the increment increases by a factor of ten for each modifier key that is held down while the mouse is clicked on the rocker button. For example, if the Shift and Option keys were both down, then the value would change by increments of 1.0. If the Shift, Option and Command keys were down then the value would change by increments of 10.0.

There are also six check boxes that determine whether each face of the deformation region will be a “containing face” or not. Containing faces allow greater control over which vertexes are affected by a deformation and are discussed below (page 16-7).

Direct Manipulation

Almost every parameter that can be controlled through the Group Deformation window can also be controlled through direct manipulation of the deformation region in a World View window. Figure 16.5 shows an undeformed active deformation region as it is displayed in a World View window.

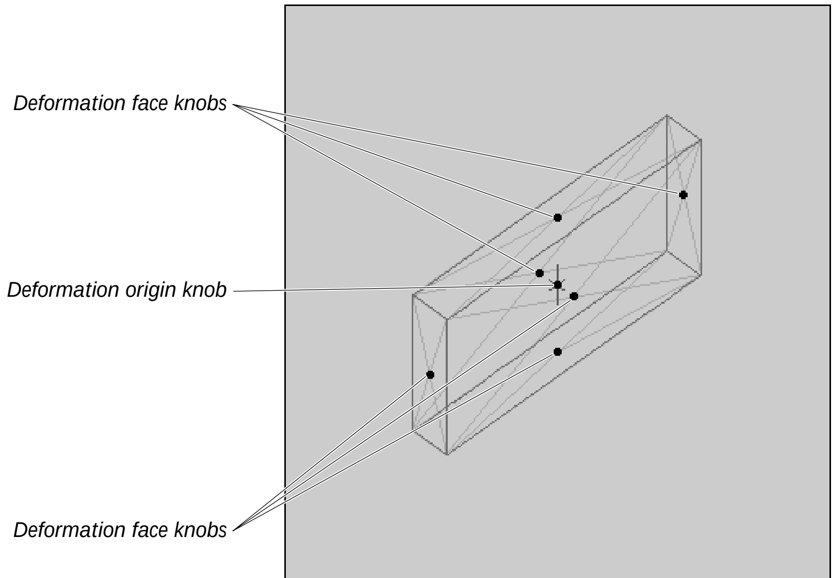

Figure 16.5 Deformation region in a World View window

The origin knob indicates the origin of the deformation region's space. The user can reposition the region by dragging the origin knob. The red lines extending from the origin indicate the current deformation's axis of deformation (the longer red line) and the axes being deformed (the shorter red lines). The axis of deformation and the axes being deformed can only be changed in the Group Deformation window.

The six deformation face knobs allow the user to change the size of the deformation by clicking and dragging. Additionally, a command-click on a face knob toggles the "containing face" attribute of the face. If a face is a containing face, then a criss-cross is drawn through the face. In Figure 16.5, all the faces are containing faces.

Finally, if you click and drag anywhere inside the deformation region but not on any of the knobs, then you can interactively change the deformation amount in increments of 1.0 by dragging horizontally. By double-clicking in the deformation region away from the knobs, you can bring up the deformation's custom options dialog box (if one exists for the selected deformation). These options are discussed in the sections for each deformation, following.

To directly manipulate the active deformation region's orientation in the manner of a trackball, you must hold down the control key. Upon pressing the control key, a virtual sphere is drawn around the active region as shown in Figure 16.6.

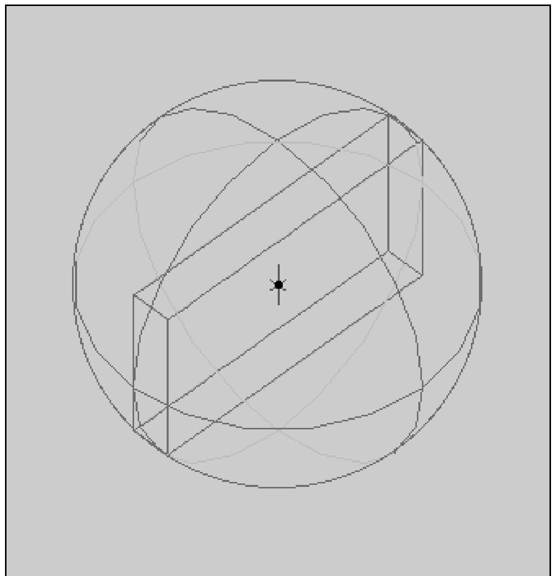

Figure 16.6 Rotating sphere (trackball)

Dragging the mouse anywhere in a World View window while the Control key is down allows you to rotate the active region around two of its axes. To constrain rotation to just one axis, you can also hold down the command and/or option keys. The convention for rotating deformations regions is the same as for rotating groups in ElectricImage, the only difference being the appearance of the virtual sphere.

Displaying Regions

Two check boxes in the center of the Group Deformation window control how the deformation regions are displayed in the World View windows.

Show Ghost Region

This check box option determines if the active (selected) deformation region's "ghost image" is displayed or not. The ghost image shows the deformation region in its original undeformed position. It provides direct manipulation of the deformation region's position and size from within the World View windows. Figure 16.7 shows an example of a ghost region.

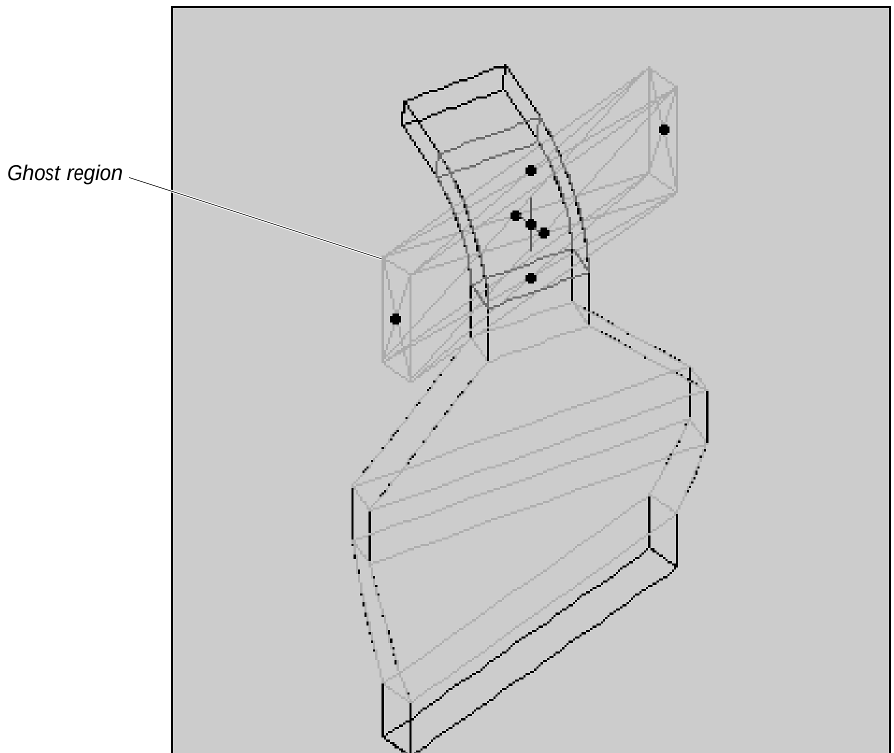

Figure 16.7 A group with three deformation regions (twist, taper and bend)

Show All Regions

This check box option determines whether or not the group's inactive (not selected) deformation regions are displayed.

Deformations

ElectricImage provides the following deformations, selectable from the **Type** pop-up menu once a region for them has been defined:

- Scale (page 16-13)
- Shear (page 16-14)
- Twist (page 16-15)
- Taper (page 16-16)
- Bend (page 16-18)
- Bulge (page 16-19)
- Linear Wave (page 16-21)
- Circular Wave (page 16-23)
- Stretch (page 16-25)
- Bezier (page 16-27)

Depending on which type of deformation is selected, the **Options...** button to the right of the pop-up menu activates to select further options for controlling the deformation.

Creating a Deformation

To create a deformation (for the active region):

1. Select the type of deformation from the **Type** pop-up menu.

   The name of the deformation appears in the Deformation list to the right of the Region list.

2. Set the amount of deformation by either entering a value in the **Amount** edit box or using the rocker buttons.

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   The actual label for the Amount edit box changes according to the type of deformation being applied. For Twist, Bend and Shear deformations, the edit box is labeled "Angle." For Scale, Taper and Bulge deformations, the edit box is labeled "Percentage." For Stretch and Bezier deformations, the edit box is labeled "Strength."

3. Select the axis along which the deformation will be calculated (X, Y or Z) by clicking the appropriate **Along Axis** radio button. For an illustration of the various effects to be achieved by selecting different "Along Axis" settings, see Figure 16.8 (page 16-12).

4. Select which axis (or axes) to deform by clicking the applicable **Deform Axes** check box(es). For an illustration of the various effects to be achieved by selecting different "Deform Axes" settings, see Figure 16.8 (page 16-12).

   You can view the results of your settings in the World View and Camera View windows.

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If you are applying deformation(s) to a group that has been previously scaled, the effect of deformations will be scaled as well. It is therefore preferable, if you need to scale a group to which you will be applying deformations, to scale the group first using the Scale deformation, as discussed in the section "Scale" (page 16-13).

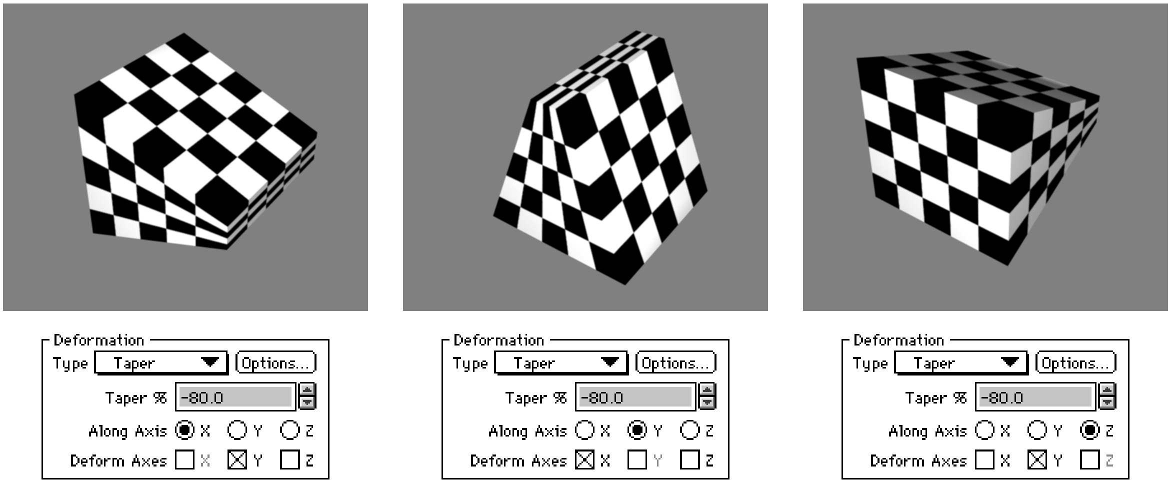


Figure 16.8 Examples of Along Axis settings (X, Y and Z)

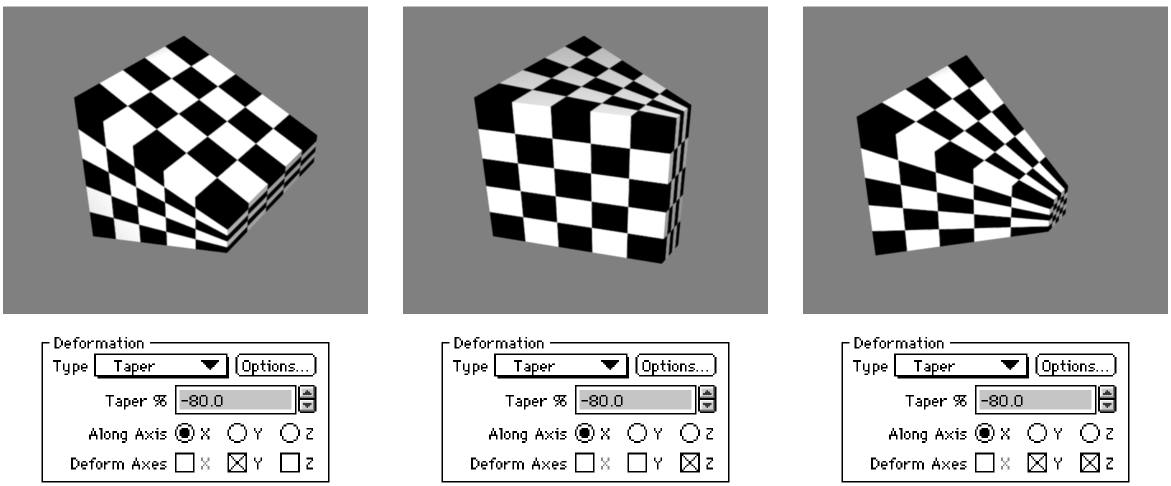
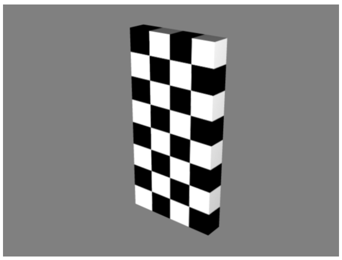


Figure 16.9 Examples of Deform Axes settings (Y, Z and YZ)

Scale

The Scale deformation is used to uniformly shrink or expand either all or part of a group in one, two or three dimensions. A one-dimensional scale is similar to extruding a shape along an arbitrary axis. Figure 16.10 shows an example of two one-dimensional scale deformations. One negative scale compresses part of the group while the other positive scale expands a different part of the group.



Original Shape

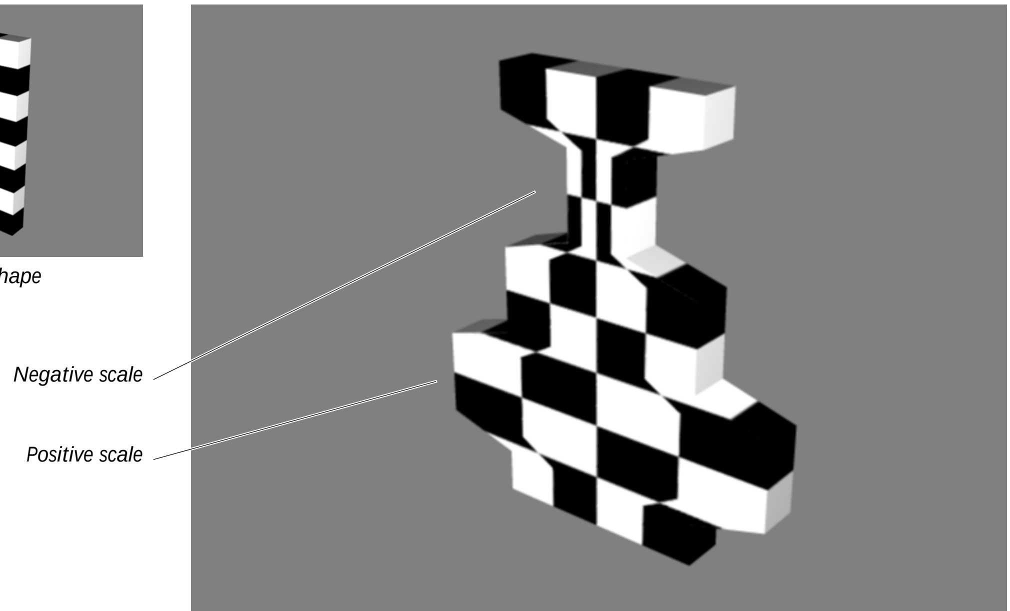
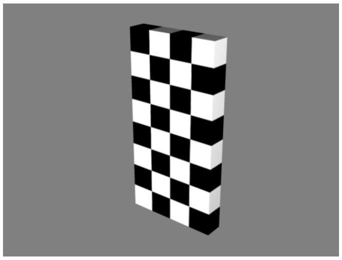


Figure 16.10 Example of Scale deformation

The scale deformation works by moving vertexes either toward or away from the origin of deformation depending on the deformation amount. The deformation amount acts like a percentage. If -100.0% is entered as the deformation amount, then all vertexes affected by the deformation move all the way to the origin. If 100.0% is entered, then vertexes move twice as far from the origin as their original position. A deformation amount of 0.0 indicates no deformation.

Shear

The Shear deformation is used to “shear” the group, as shown in Figure 16.11. Shearing is typically done in one direction rather than two.



Original Shape

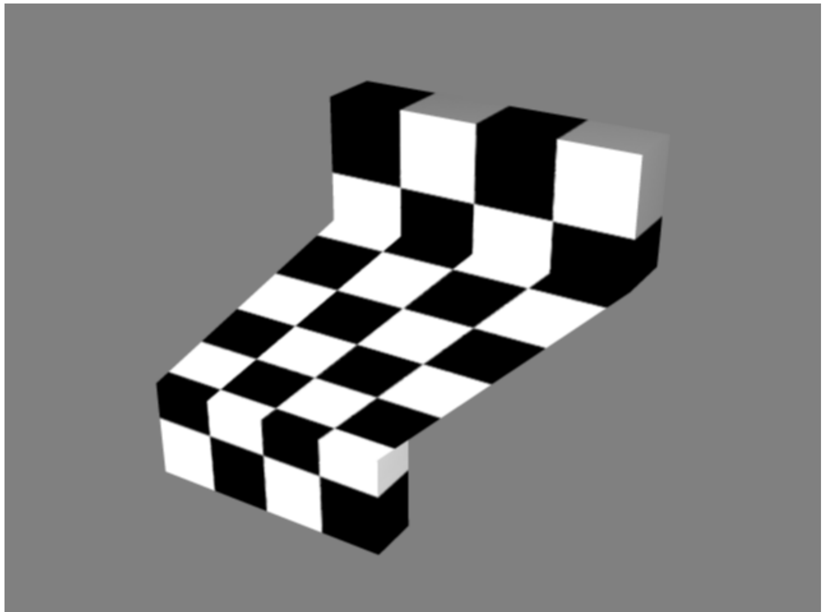
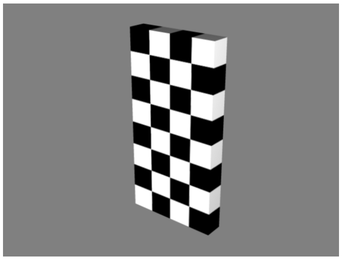


Figure 16.11 Example of Shear deformation

Twist

The Twist deformation is used to “twist” the group, as shown in Figure 16.12. The deformation amount for a twist corresponds to the angle of the twist in degrees.

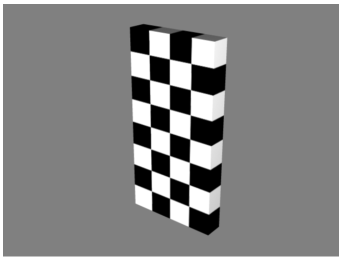


Original Shape

Figure 16.12 Example of Twist deformation

Taper

The Taper deformation is used to “taper” the group. The amount value for tapering is a percentage similar to Scale deformations. A taper of -100.0% tapers an object down to nothing in one or two dimensions. A taper of 100.0% doubles the object’s size in one or two dimensions. Figure 16.13 shows an example of two negative, one-dimensional tapering deformations.



Original Shape

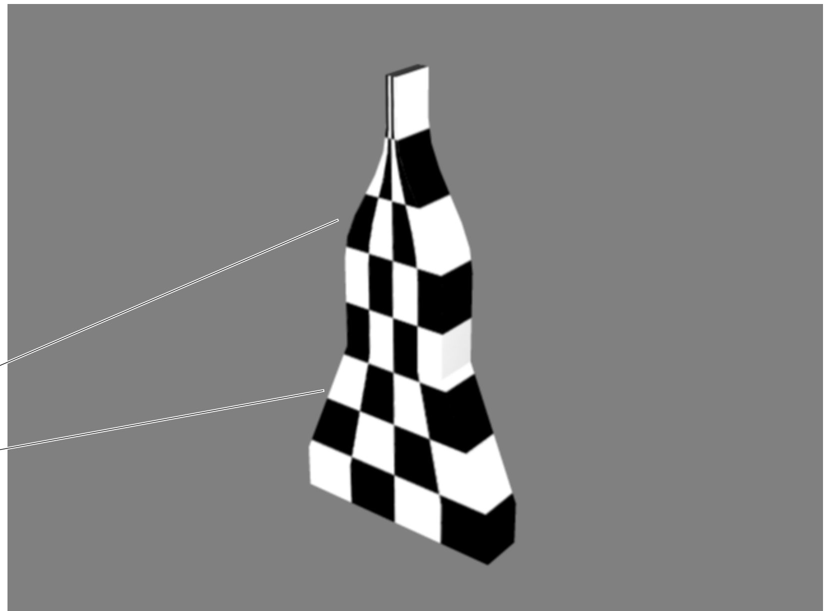


Figure 16.13 Example of Taper deformation

In Figure 16.13, the upper taper has smooth transitions while the lower taper has hard corners. The smooth transitions are created by filleting the taper, an optional function of the Taper deformation.

To fillet a taper:

1. Click the **Options...** button next to the **Type** pop-up menu.

   A dialog box, as shown in Figure 16.14, opens to allow you to specify filleting.

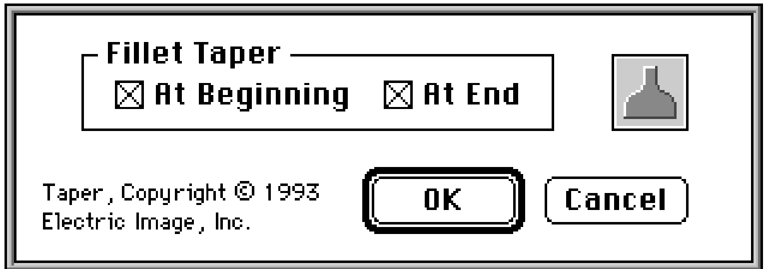
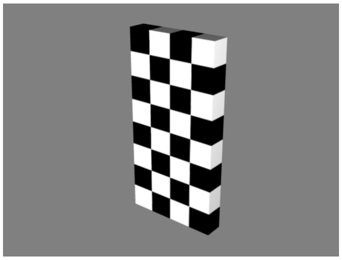


Figure 16.14 Dialog box used to create filleted taper

2. Use the check box options and the display window to set the filleting option you prefer.
3. Either click **OK** or press **Return**.

Bend

The Bend deformation is used to “bend” the group. Bending typically works best in one dimension rather than two. The deformation amount for a bend corresponds to the angle of the bend in degrees. Figure 16.15 shows an example of two 90° bends applied to an object.



Original Shape

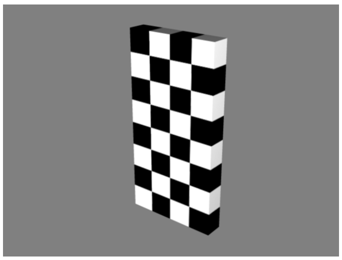
Figure 16.15 Example of Bend deformation (two 60° bends)

Bending deformations can create some of the most visually interesting effects, but must be used carefully when combined with other deformations. Because a bend can move the vertexes above the deformation regions substantially, unnatural results occur when a bend is followed by another deformation in the same region. A good rule of thumb when combining multiple deformations in the same region is to place any bend(s) at the end of the list of deformations.

An interesting jello-effect can be achieved by applying a slight bend along the length of an object, and then animating rotation of the deformation region around the axis being deformed (be sure to turn off the “containing faces” to get this effect).

Bulge

Bulge deformations are useful for implementing the classic "squash and stretch" motion commonly used in character animation. The deformation amount for a bulge corresponds to the percentage of bulge. Figure 16.16 show s a -100% bulge with the origin of deformation moved away from the object being deformed. In order to deform vertexes outside the region of deformation, the region's "containing faces" check boxes must be unchecked (the default).



Original Shape

Figure 16.16 Example of Bulge deformation

As with Taper deformations, Bulge deformations can be filleted.

To fillet a bulge:

1. Click the **Options...** button next to the **Type** pop-up menu.

   A dialog box, as shown in Figure 16.17 (page 16-20), opens to allow you to specify filleting.

2. Click the **Filleted Bulge** check box to select a filleted bulge.

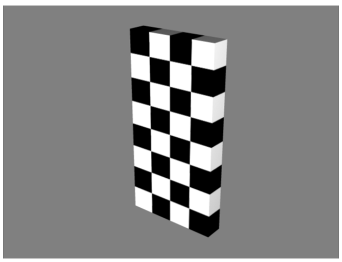
   The little display window indicates your selection.

Figure 16.17 Dialog box used to create filleted bulge

3. Either click **OK** or press **Return**.

Linear Wave

The Linear Wave deformation allows you to send a sine wave through the vertexes within the deformation region. The wave travels along the axis of deformation, and the amplitude of the wave extends in the direction of the axis being deformed. Typically only one axis is deformed for Linear Wave deformations. The amplitude of the wave is determined by the deformation amount value. The frequency and phase of the wave are set in the wave deformation's custom options dialog box shown below. Amplitude, frequency and phase can all be animated using the Project window. Figure 16.18 shows an example of a simple Linear Wave along the vertical axis.



Original Shape

Figure 16.18   Example of Linear Wave deformation

Settings for the frequency and phase of the wave form, and a choice between a sine wave and modified cosine wave are available as options for the Linear Wave deformation.

To set Linear Wave deformation options:

1. Click the **Options...** button next to the **Type** pop-up menu.

A dialog box, as shown in Figure 16.19, opens to allow you to set wave options.

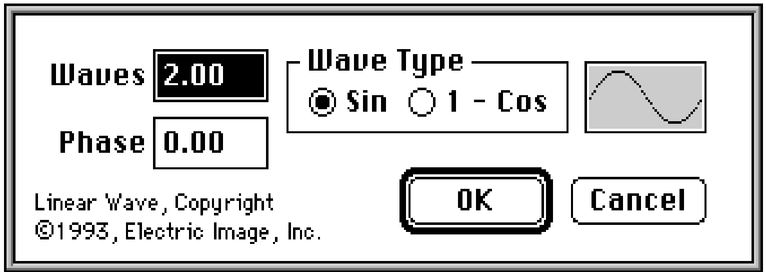


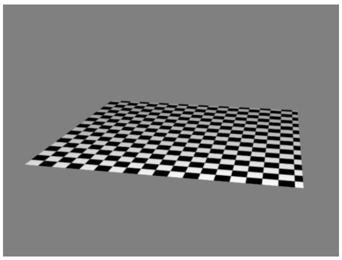
Figure 16.19 Dialog box used to set Linear Wave options

2. Type values for the number of waves and the phase of the wave form in the **Waves** and **Phase** edit boxes respectively.
3. Select a wave type by clicking the appropriate **Wave Type** radio button.

   The little display window indicates your settings.
4. Either click **OK** or press **Return**.

Circular Wave

The Circular Wave deformation, as shown in Figure 16.20, is used to simulate the concentric waves created when an object strikes a liquid surface. The amplitude of a Circular Wave extends along the axis of deformation and is determined by the height of the deformation region along the “Along Axis.” The deformation amount can thus be used to animate the outer radius of the concentric waves, while the height of the region can be used to dampen the wave as it disperses.



Original Shape

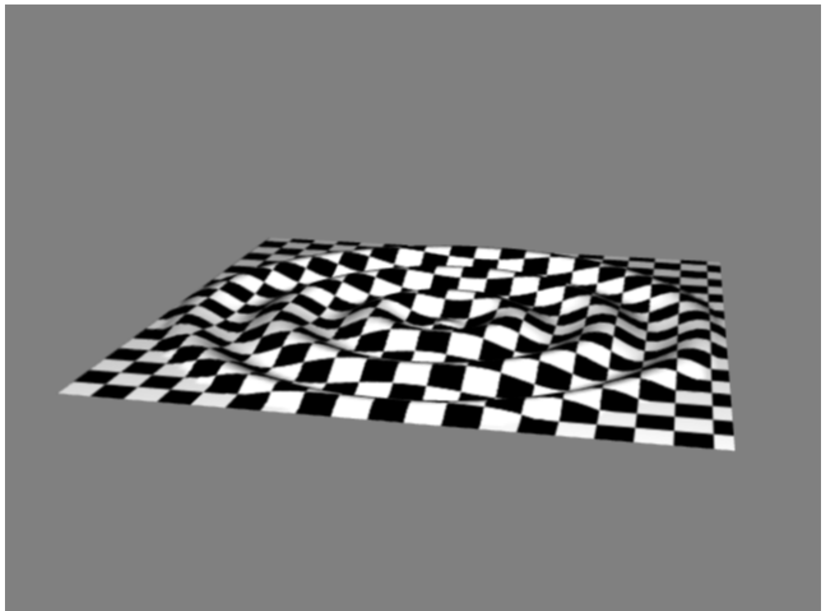


Figure 16.20 Example of Circular Wave deformation

The **Deform Axes** check boxes are ignored by the Circular Wave deformation.

In Figure 16.21 (page 16-24), notice that the deformation region extends beyond the dimensions of the object being deformed. The Circular Wave deformation uses the size of the deformation region to determine the distance from the Circular Wave’s outer radius to its inner radius which in turn determines the frequency of the waves (along with the number of waves which is set in the custom options dialog).

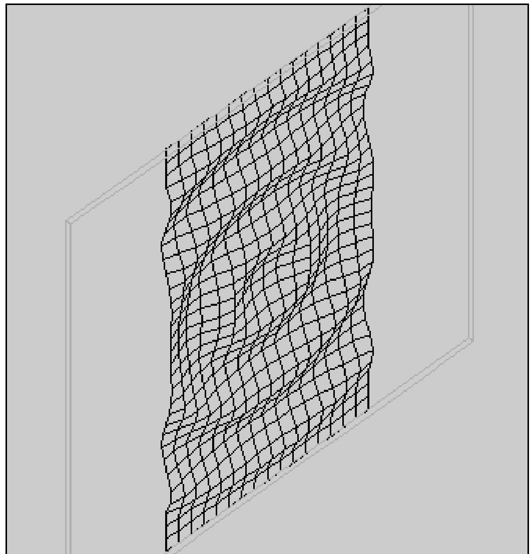


Figure 16.21 Circular Wave deformation region

A setting for the number of rings in the deformation is available as an option for the Circular Wave deformation.

To set the number of rings:

1. Click the **Options...** button next to the **Type** pop-up menu.

   A dialog box, as shown in Figure 16.22, opens to allow you to set wave options.

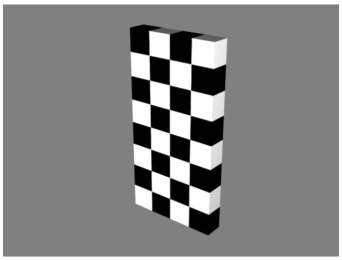
Figure 16.22 Dialog box used to set the Circular Wave's number of rings

2. Type a value for the number of rings in the **Number of Rings** edit box.

3. Either click **OK** or press **Return**.

Stretch

The Stretch deformation is used to "grab a hold" of a region of vertexes and move, rotate, contract or expand them however you want by moving, rotating and resizing the region of deformation. You can also specify a "blend factor" that allows vertexes surrounding the deformation region to be blended toward those being warped. Figure 16.23 shows an example of a stretch in which the captured vertexes are moved, rotated and blended to the undeformed vertexes.



Original Shape

Figure 16.23 Example of Stretch deformation

A Stretch deformation is unlike any of the other deformations. Rather than apply a deforming function to vertexes, you simply grab hold of the vertexes and then animate the position, orientation and size of the deformation region. In order to make this work, you must first "capture" the vertexes to be warped. Capturing the vertexes is like taking a snapshot of them in their undeformed state.

To capture the vertexes:

1. Click the **Options...** button next to the **Type** pop-up menu.

   A dialog box, as shown in Figure 16.24, opens.

Figure 16.24 Dialog box used to set blend factor and capture vertexes

2. Click the **Capture Vertexes** button.

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Typically, vertexes are captured at frame zero of an animation, but they can be captured at any frame. No deforming occurs until the "Capture Vertexes" button is pressed.

3. If you want to create a blend, set the blend factor by typing a value in the **Blend Factor** edit box.

   A blend factor of 0.0 will not blend the vertexes surrounding the deformation at all. A blend factor of 1.0 will blend vertexes that are within an area twice the size of the deformation region. The larger the blend factor, the larger the area surrounding the stretch region that is affected.

4. Either click **OK** or press **Return**.

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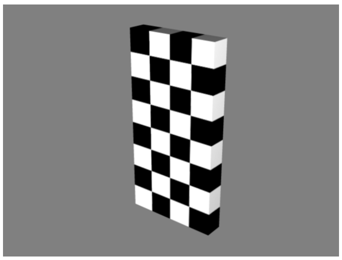
The deformation amount for a Stretch deformation can be used to specify the strength of the warping region in a magnet-like fashion. A Stretch deformation is basically a linear interpolation of vertexes from a starting position to a warped position. Instead of animating the position, orientation and size of the deformation region, you may choose to capture the vertexes and then reposition the region all in the same frame, and then animate the strength of the warp to simulate a magnet.

Bezier

The Bezier deformation is used to deform a group in a “free-flowing” manner through the use of Bezier control arms. These control arms work in much the same way as curves are manipulated by popular Macintosh drawing programs such as Aldus Freehand®, Adobe Illustrator® and Canvas™. As you move these control arms, the group’s vertexes follow. Figure 16.25 shows an example of a simple Bezier deformation.



Original Shape

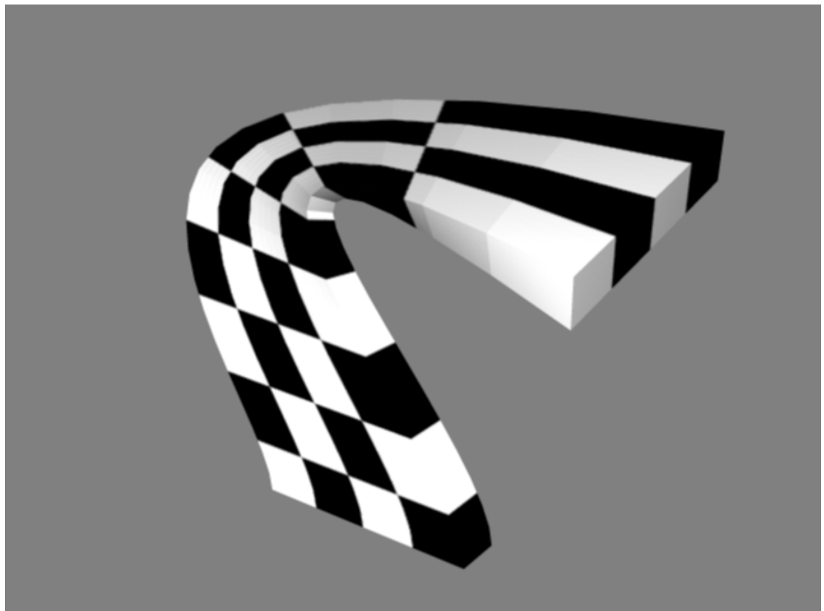


Figure 16.25 Example of simple Bezier deformation

Each Bezier control arm is comprised of three points, an “anchor” point, a “control” point, and a “spin” point.

In Figure 16.26 (page 16-28), the anchor points are surrounded by a circle, the control points are at the end of the longer arms, and the spin points are at the end of the shorter arms. Each of the points can be animated independently, however ElectricImage will make sure that three points always form a 90° angle by adjusting the spin point as necessary.

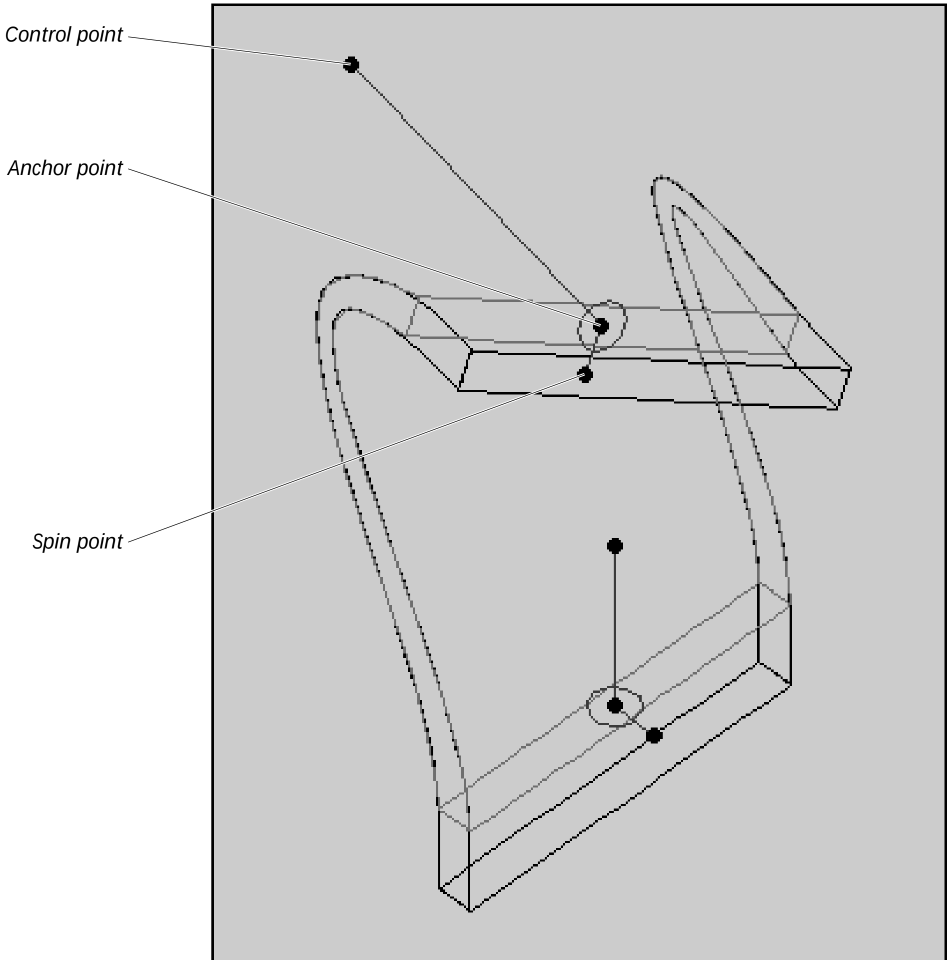


Figure 16.26   Bezier deformation with control elements

The points can be manipulated in the World View windows, or numerical values can be entered.

To enter numerical values for the anchor, control and spin points:

1. Click the **Options...** button next to the **Type** pop-up menu.

   A dialog box, as shown in Figure 16.27, opens.

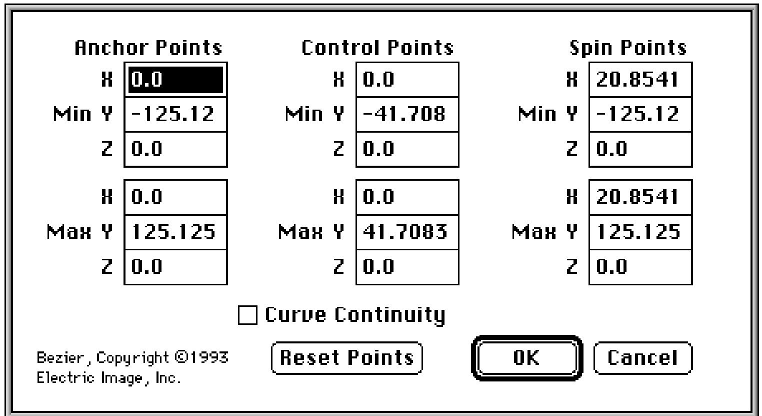


Figure 16.27 Dialog box used to set Bezier deformation options

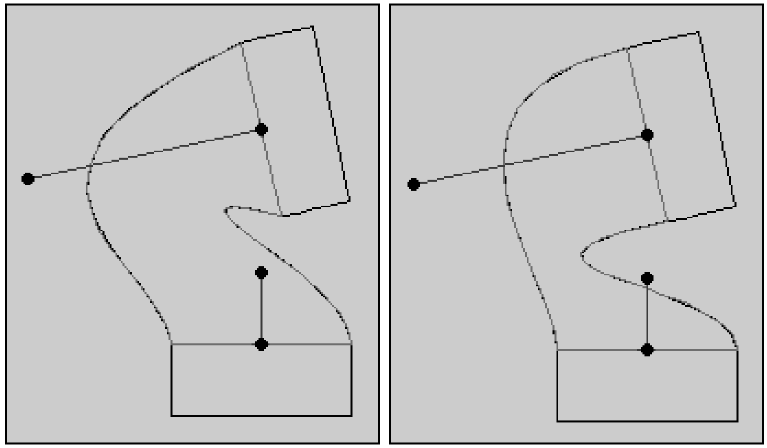
2. Enter coordinates in the edit boxes.

   To reset the coordinates to their original, undeformed positions, click the **Reset Points** button.

W

You can also set the type of Bezier deformation to specify whether or not continuity is maintained at the edge of the deformation. The default Bezier deformation minimizes the amount of pinching that occurs during tight bends, however it may create discontinuous corners if the deformation is not applied to the entire group. Figure 16.28 (page 16-30) shows examples of default and continuous deformations.

3. If you want to use the continuous Bezier deformation that maintains continuity at the edge of the deformation, click the **Curve Continuity** check box.



Default Bezier deformation *Continuous Bezier deformation*

Figure 16.28 Examples of default and continuous Bezier deformations

4. Either click **OK** or press **Return**.

W

Bezier deformations should generally not overlap geometrically with other deformations in the same group, as the results can be difficult to predict.

Chapter 17 The Velocity Windows

Chapter 17 The Velocity Windows

Overview

The Velocity windows for the camera, lights and models contain graphs that chart the changes in velocity of animated data and provide controls for adjusting the velocity, as shown in Figure 17.1.

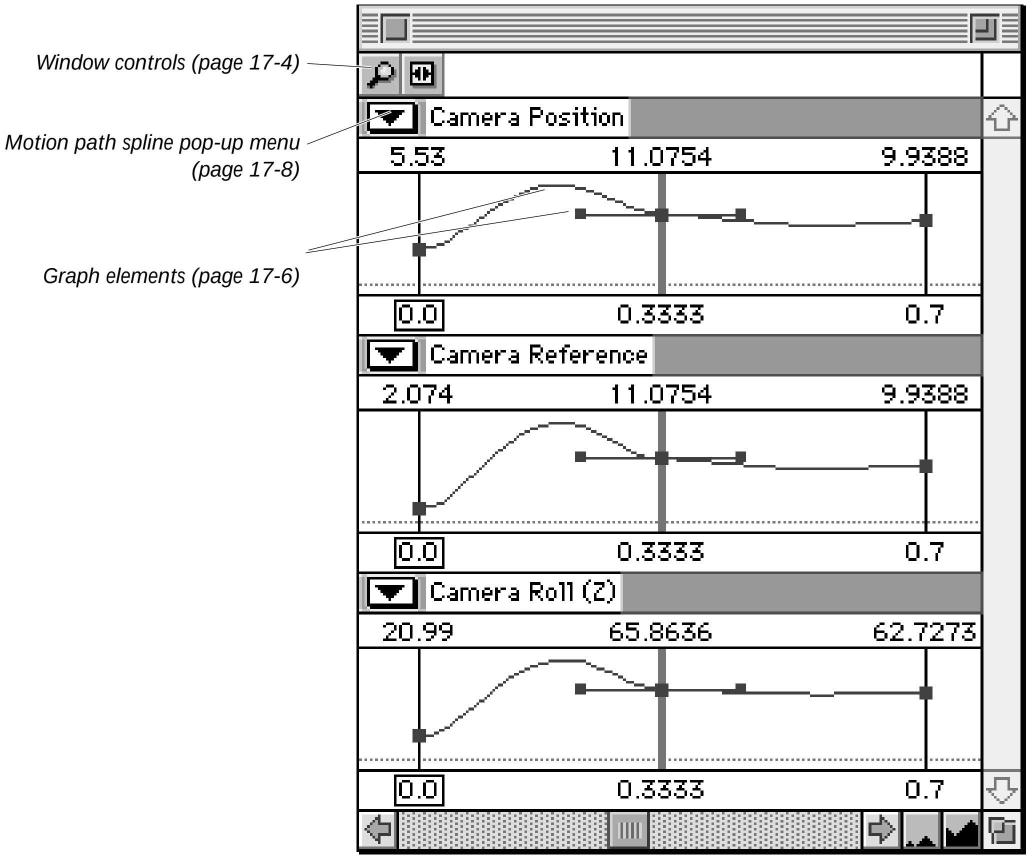


Figure 17.1 Velocity window for the camera

W

The Velocity windows are best used as a tool in conjunction with the motion path spline, and the timing of the individual keyframes. When taken as a whole, these different approaches will yield the most control over an animated sequence.

Opening the Velocity Windows

To open the Camera Velocity window, select the camera, and choose **Camera Velocity** from the Windows menu, as discussed in the section “Camera Velocity” (page 3-10) in *Chapter 3: The Windows Menu Commands*.

To open the Light Velocity window for a specific light, select the light, then choose **Light Velocity** from the Windows menu, as discussed in the section “Light Velocity” (page 3-11) in *Chapter 3: The Windows Menu Commands*.

To open the Model Velocity window for a specific model, select the model, then choose **Model Velocity** from the Windows menu, as discussed in the section “Model Velocity” (page 3-12) in *Chapter 3: The Windows Menu Commands*.

Window Controls

The data channels displayed in a velocity window and the height of the data channel display can be customized through the use of the two controls in the upper left corner of the window.

Channel Display

This pop-up menu is used to select which data channels are displayed in the graph. By default, all data channels are displayed. This control enables you to restrict the display to only those data channels you wish to see.

To customize the display:

1. Choose **Custom…** from the Channel Display pop-up menu.

   A dialog box, as shown in Figure 17.2, opens, to enable you to configure the display.

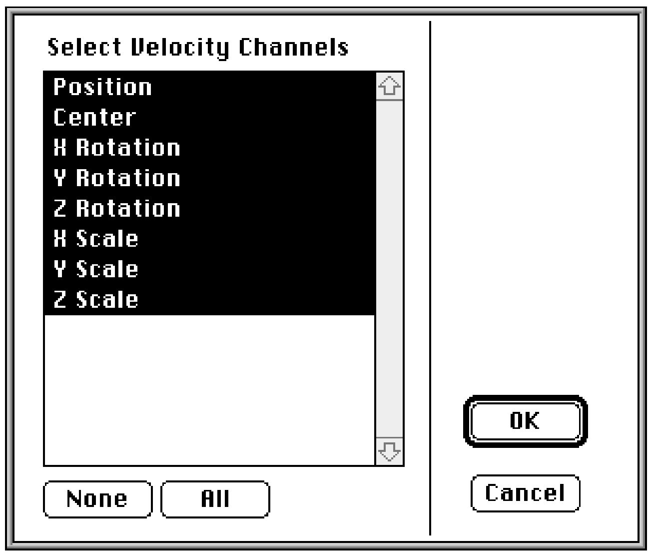


Figure 17.2 Dialog box used to select velocity channels to display

2. Select which channels you wish to display.
3. Either click **OK** or press **Return**.

Graph Size

This pop-up menu is used to set the size of the data channels in the display. The smallest possible size is the default, and this control can be used to increase the height of the data channels.

To change the height of the data channels:

1. Choose **Size…** from the Graph Size pop-up menu.

   A dialog box, as shown in Figure 17.3, opens, to enable you to set the graph size.

Figure 17.3 Dialog box used to set graph size

2. Type a value for the data channel height in the **Graph Size** edit box.
3. Either click **OK** or press **Return**.

Graph Elements

Figure 17.4 shows the basic elements of the velocity graph.

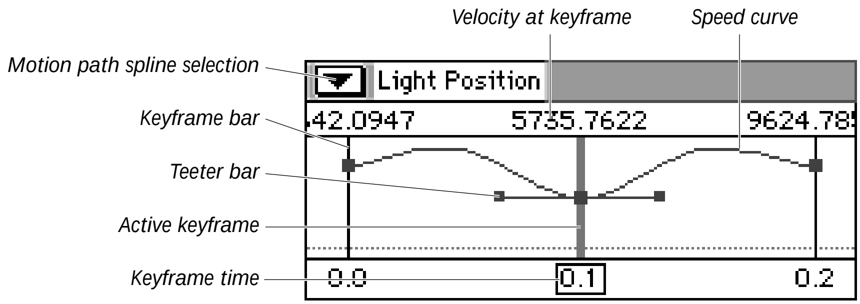


Figure 17.4 Graph elements

- The active keyframe is drawn as a vertical red line while the other keyframes bars are drawn in black.
- The actual velocities for the keyframes are at the top of each graph channel.
- The speed curve is drawn in blue, as is the teeter bar.

Graph Controls

To change the camera’s velocity at a specific keyframe (and thus the curve of the graph), select the keyframe and drag the center of the teeter bar up or down, as shown in Figure 17.5.

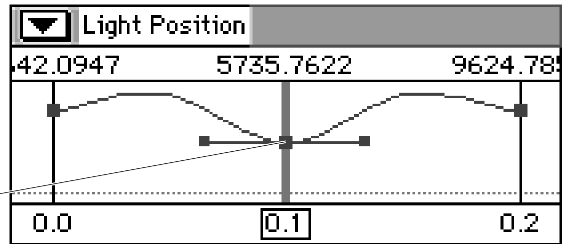


Figure 17.5 Changing the velocity at a specific keyframe

To change the acceleration (and thus change the bias of the curve), drag either teeter bar handle up or down, as shown in Figure 17.6.

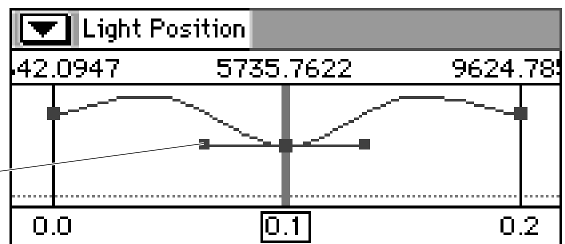


Figure 17.6 Creating an irregular motion

To change the time of a keyframe, drag the keyframe bar left or right, as shown in Figure 17.7.

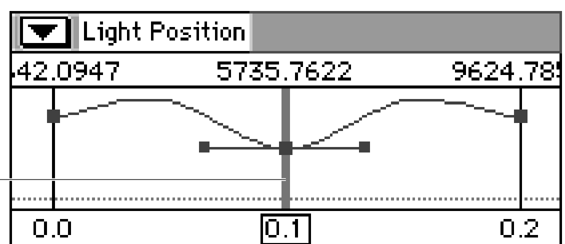


Figure 17.7 Changing the time of a keyframe

Motion Path Splines

A pop-up menu next to the channel name, as shown in Figure 17.4 (page 17-6), is used to select the motion path spline for the channel. This is an alternative to selecting the spline type in the Project window. The different spline types available in ElectricImage are:

Linear Splines

These are not actually splines, but rather a simple line. All motion using linear interpolation results in a very mechanical (sometimes awkward) motion.

Natural Cubic

These splines give a very fluid motion, and are the best to use if you do not care about the precision of object placement, since editing one keyframe along the spline will change the whole curvature of the spline.

Hermite Splines

These splines are more versatile to use but require greater effort to control. Unlike the natural cubic spline, editing one keyframe along the spline will not change the whole curvature of the spline, and thus the curve can be manipulated with greater precision.

Bezier Splines

These splines are the same splines used by popular Macintosh drawing programs such as Aldus Freehand®, Adobe Illustrator® and Canvas™, however ElectricImage Bezier splines are 3-dimensional.

Camera Velocity

The velocity graphs for the camera chart the changes in velocity of positional movement, reference direction and roll angle when the camera is animated.

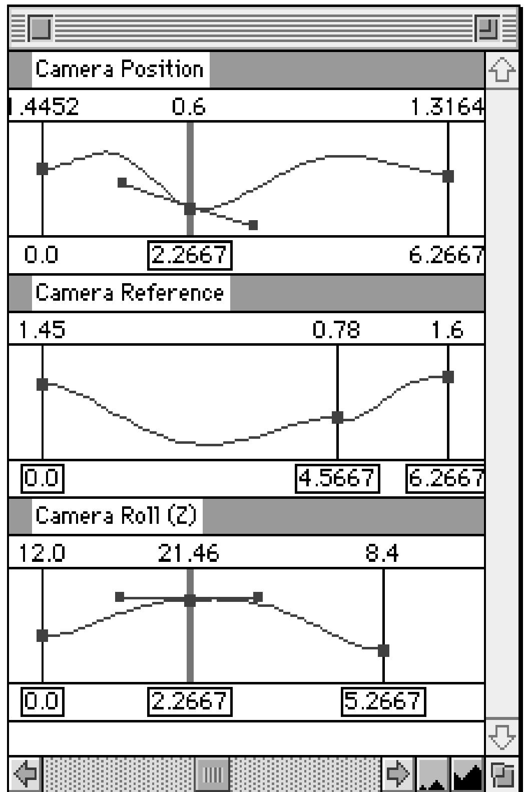


Figure 17.8 Camera Velocity window

As shown in Figure 17.8, the window shows three data channels:

Camera Position This channel shows the change in velocity of the combined X, Y, and Z position of the camera.

Camera Reference This channel shows the change in velocity of the combined X, Y, and Z position of the camera reference point.

Camera Roll This channel shows the change in velocity of the camera's roll axis.

Light Velocity

The velocity graphs for lights chart the changes in velocity of positional movement and reference direction when lights are animated.

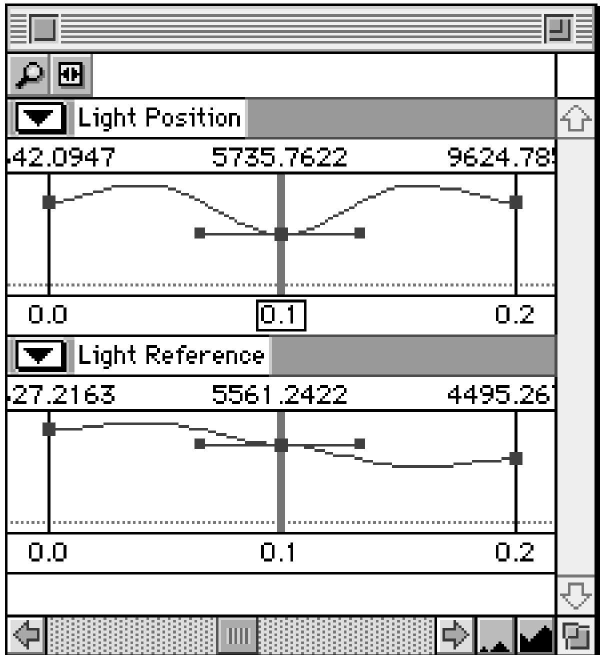


Figure 17.9 Light Velocity window

As shown in Figure 17.9, the window shows two data channels:

Light Position This channel shows the change in velocity of the combined X, Y, and Z position of the light.

Light Reference This channel shows the change in velocity of the combined X, Y, and Z position of the light reference point.

Model Velocity

The velocity graphs for models chart the change in velocity of positional movement, rotation and scale when models are animated.

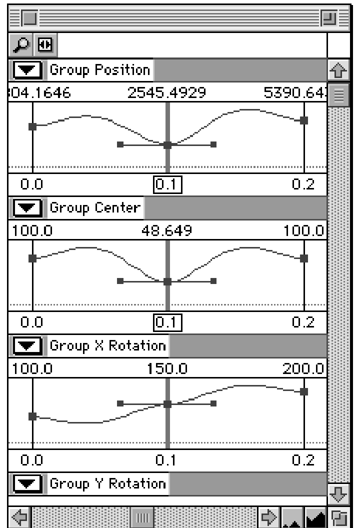


Figure 17.10 Model Velocity window

As shown in Figure 17.10, the window shows eight data channels:

Position This channel shows the change in velocity of the combined X, Y, and Z positions.

Center This channel shows the change in velocity of the center point. Velocity is zero if the center of the group has not been animated.

X Rotation This channel shows the change in velocity of the X axis rotation.

Y Rotation This channel shows the change in velocity of the Y axis rotation.

Z Rotation This channel shows the change in velocity of the Z axis rotation.

X Scale This channel shows the rate of change for scale on the X axis.

Y Scale This channel shows the rate of change for scale on the Y axis.

Z Scale This channel shows the rate of change for scale on the Z axis.

Chapter 18 The Surface Editor

Chapter 18 The Surface Editor

Overview

The Surface Editor, as shown in Figure 18.1, is a dialog box used to change or modify the shading characteristics for the surface of any group in a model.

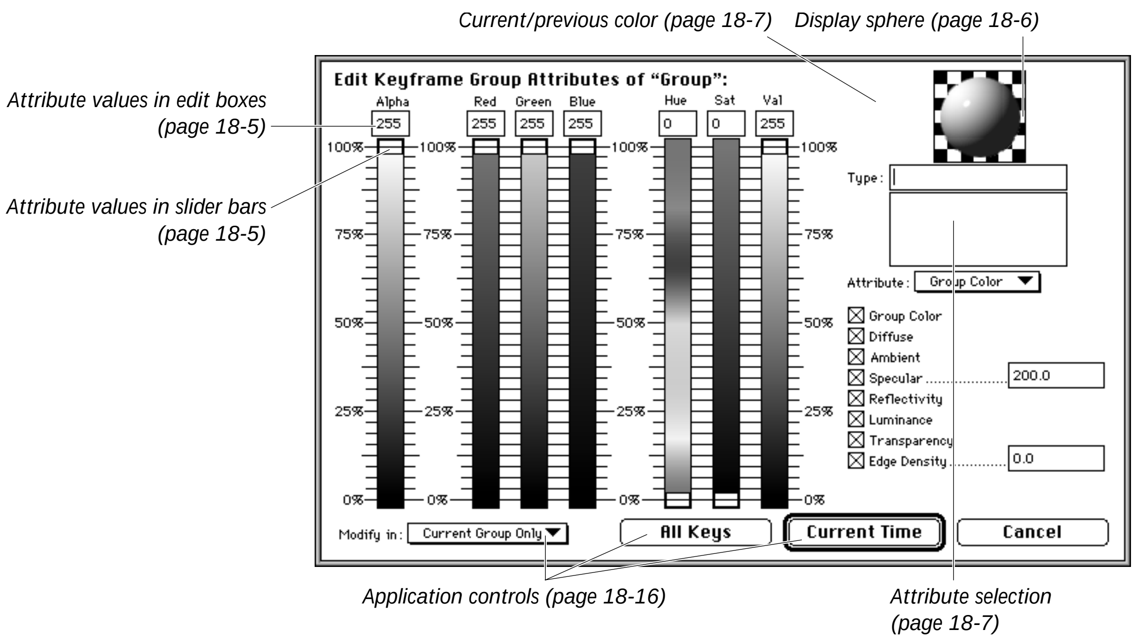


Figure 18.1 The Surface Editor

W

Depending upon which editing mode is in effect (as set in the Project window), shading characteristics can be set for specific frames, keyframes or times, or for all frames, keyframes or times. For a discussion of editing modes and the Project window, refer to Chapter 8: The Project Window.

Opening the Surface Editor

The Surface Editor can be opened in either of two ways:

- Open the Group Info window for the group and click on the **Surface** button located in the Group Info window, as discussed in *Chapter 13: The Group Info Window*. The Surface button is actually a miniature representation of the surface settings for the selected group.
- Open the Project window (in Keyframe, Frame or Index modes) and double-click on the group's attribute channel, as discussed in *Chapter 8: The Project Window*.

Editor Controls

Slider Bars and Edit Boxes

The left side of the Surface Editor, as shown in Figure 18.2, contains seven slider bars which are used to set the component values of various shading attributes.

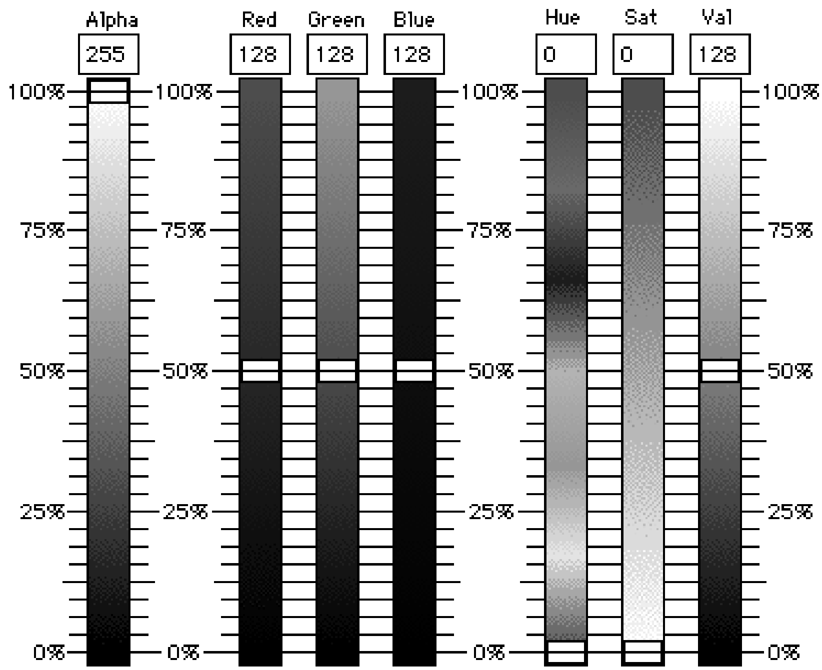


Figure 18.2 Slider bars and Edit boxes for Group Color attribute

Above each bar is the name of the component which it controls, as well as an edit box which contains the current value of the component (and in which a value can be typed).

The appearance of the slider bars and the components they control are case sensitive, depending upon which shading attribute has been selected from the **Attribute** pop-up menu, as discussed in the section “Surface Attributes” (page 18-8).

Display Sphere

This display is used as a visual aid in setting the group's shading attributes, and thus indicates the effect of the settings on the group. The sphere shows all of the attribute settings at all times. As you make changes to the settings, the display is updated in real time to indicate the changes.

W

You can copy a group's surface attributes for pasting to another group by clicking the display sphere to select it (a border appears around the display to indicate that it is selected), and then choosing* Copy Surface Color *from the Edit menu.

The background of the display defaults to the black & white checker pattern, however a solid color background can be employed. This feature is helpful when you want to preview the effect of surface attributes settings against a specific solid color background.

To change the background of the display sphere:

1. Hold down the Option key and click anywhere in the display area (without the Option key, clicking selects the display).

A pop-up menu, as shown in Figure 18.3, opens.

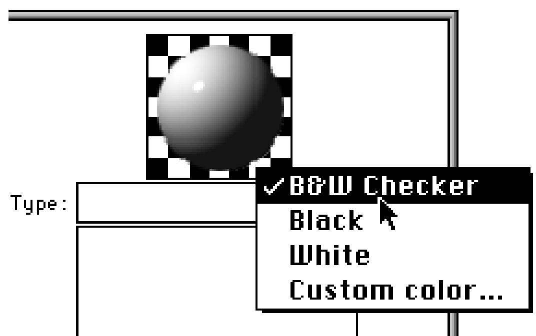


Figure 18.3 Display sphere background pop-up menu

2. Choose one of the options (shown in Figure 18.3).

Selecting Custom color… opens the Apple Color Picker. The color you select becomes the background for the display.

Type

This edit box is used to name the settings in the Surface Editor as a whole material value. The settings can then be copied into the scrapbook and pasted into other groups by use of the **Copy** and **Paste** commands in the Edit menu. The scrapbook can thus be used as a library of materials (when the material is copied into the scrapbook, the sphere and type name are shown in the scrapbook window). Note that the name is for scrapbook reference only and will not normally be visible in this field.

Current/Previous Color Display

This display is similar to the one found in the Apple color picker. The top of the box will update to the new color value in real time, while the bottom of the box shows the color of the group before any changes.

Attribute

This pop-up menu determines which surface attributes you are editing while in the Surface Editor. There are eight surface attributes available for editing, and there is an enable check box for each, located beneath the pop-up menu.

These check boxes are enabled by default, and can be individually turned off (by clicking in the check box) should you not wish to have a particular attribute rendered.

The Specular and Edge Density attributes also have edit boxes for setting specific shading dropoff and specular dropoff values. For an explanation of these and the other surface attributes, refer to the section “Surface Attributes” (page 18-8).

Surface Attributes

There are eight surface attributes available for editing, and there is an enable check box for each, located beneath the pop-up menu. The attributes can be edited by using either the slider bars or the edit boxes atop the slider bars. In addition, there are edit boxes on the right side of the Surface Editor which further control shading, specular highlight and edge density.

Group Color

This attribute controls the base color of the group. When selected, the Surface Editor appears as in Figure 18.1 (page 18-3).

The controls for this attribute are as follows:

Alpha This control sets the group's matte channel density.

Red, Green, Blue These controls fine tune the group's surface color.

Hue This control sets the base color of the group's surface.

Sat(uration) This control sets the amount of color added to the group's surface.

Val(ue) This control determines the degree to which the color is adjusted towards black or white.

Shading Dropoff This edit box contains a value for the rate of fall-off in illumination from the area of the group that is illuminated to the area that is not, thus affecting the size of the transition area.

W

Modeling systems can create objects with more than one color in a group. Should you change the group color in this situation, all of the polygons in the group will be changed to the new color.

Diffuse

This attribute controls the group's diffuse sensitivity, which determines the amount and color of light scattered from the group. When selected, the Surface Editor appears as in Figure 18.4.

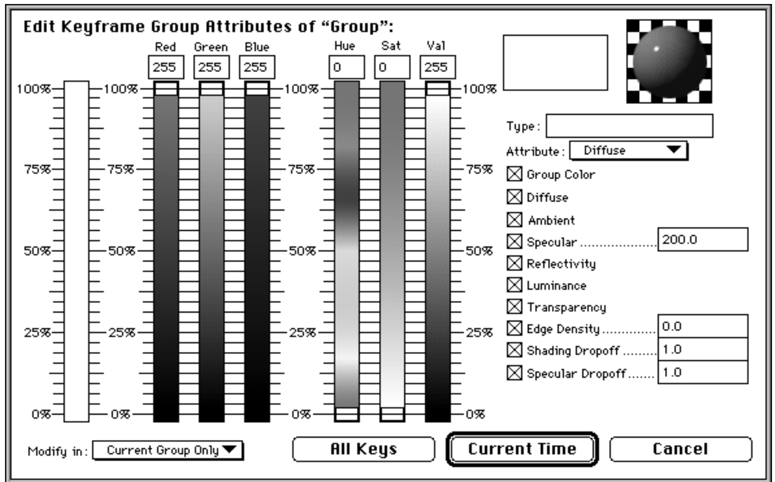


Figure 18.4 Surface Editor with Diffuse attribute selected

Red, Green, Blue These controls fine tune the color value of the group's diffuse sensitivity.

Hue This control sets the base color of the group's diffuse sensitivity.

Sat(uration) This control sets the amount of color added to the group's diffuse sensitivity.

Val(ue) This control sets the level of diffuse sensitivity. A small value produces a very shiny, but dark surface; a high value produces a very dull, but brightly lit surface (the default setting is 255).

W

When rendering transparent objects, it is preferable to lower the diffuse value to avoid having the object appear overexposed. Also, the diffuse value does not affect the reflectivity value, so an object with an apparently dull surface can appear highly reflective.

Ambient

This attribute controls the group's ambient light sensitivity, which determines the amount and color of ambient light reflected by the group. When selected, the Surface Editor appears as in Figure 18.5.

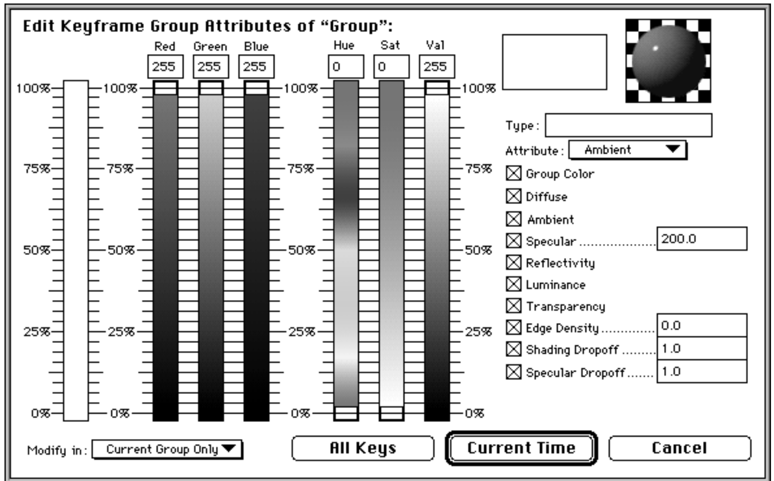


Figure 18.5 Surface Editor with Ambient attribute selected

Red, Green, Blue These controls fine tune the color value of the group's ambient sensitivity.

Hue This control selects the base color of the group's ambient sensitivity.

Sat(uration) This control sets the amount of color added to the group's ambient sensitivity.

Val(ue) This control sets the amount of ambient sensitivity of the group. The default setting is 255, which results in the object reflecting the full amount of ambient light determined by the global Ambient value set in the Render Control window, as discussed in *Chapter 9: The Render Control Window*.

Specular

This attribute controls the size and color of highlights in the group's surface—if highlights are enabled for the illuminating light, described in "Enable Highlight" (page 11-20) in *Chapter 11: The Light Info Window*. When selected, the Surface Editor appears as in Figure 18.6.

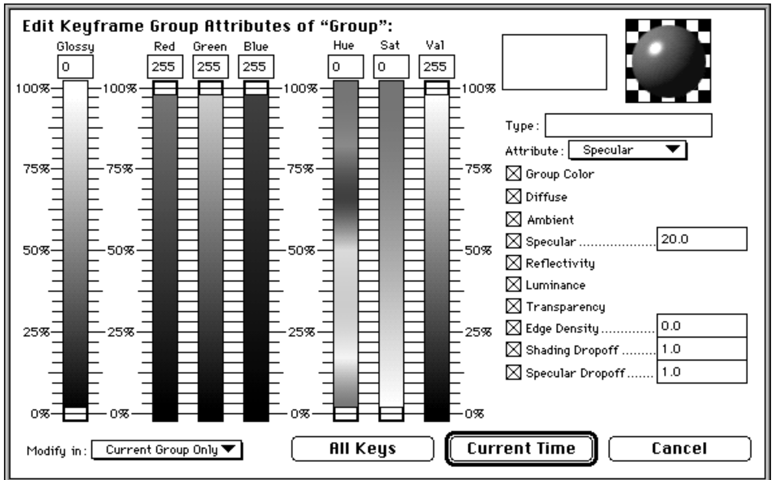


Figure 18.6 Surface Editor with Specular attribute selected

Glossy This control adds light to the group to achieve apparent glossiness.

Red, Green, Blue These controls fine tune the color value of the group's highlights.

Hue This control selects the base color of the group's highlights.

Sat(uration) This control sets the amount of color added to the group's highlights.

Val(ue) This control sets the amount of specularity (how much highlight reflects off of the group.

Specular This edit box contains a value for the size of the highlight. The greater the value, the smaller the highlight will appear.

Specular Dropoff This edit box contains a value for the rate of fall-off from the highlight to its surrounding region, thus controlling the relative smoothness or hardness of the highlight.

Reflectivity

This attribute controls the amount of reflectivity and the color bias of the group's reflection.

W

These settings do not automatically cause the group to reflect its surroundings. They only enable and modify a reflection image which must be assigned and defined in the Group Texture window, as discussed in Chapter 14: The Group Texture Window.

When selected, the Surface Editor appears as in Figure 18.7.

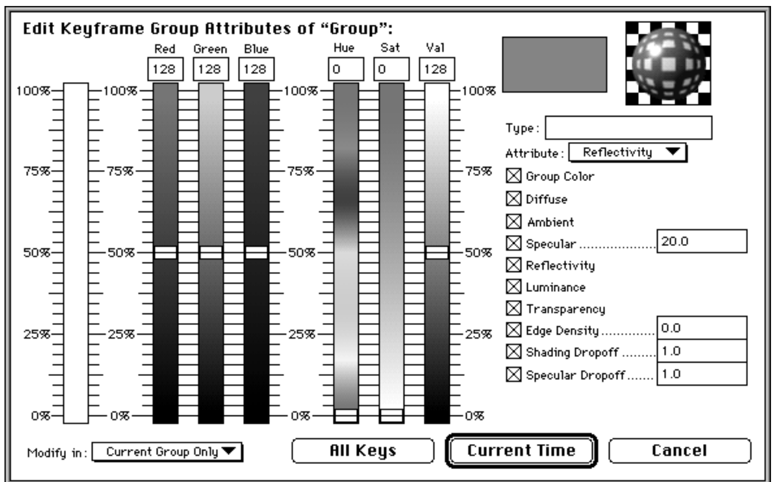


Figure 18.7 Surface Editor with Reflectivity attribute selected

Alpha This control is not used for this attribute.

Red, Green, Blue These controls fine tune the color value of the group's reflection.

Hue This control selects the base color of the group's reflection.

Sat(uration) This control sets the amount of color added to the group's reflection.

Val(ue) This control sets the amount of reflectivity for the group. The greater the value, the brighter the reflection image is rendered.

Luminance

This attribute controls the *apparent* luminance of the group. It does not actually cause the group to emit light, but rather it determines the amount of shading to be considered when the group is rendered. When selected, the Surface Editor appears as in Figure 18.8.

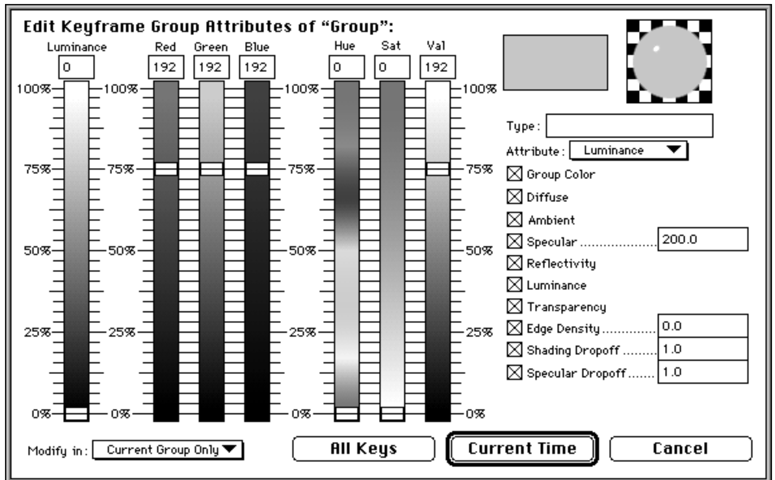


Figure 18.8 Surface Editor with Luminance attribute selected

Luminance This control determines the amount of shading to be considered when the group is rendered. It forces an amount of shading for the whole group and affects the whole surface of the group, regardless of the group's specular or reflectivity settings. Glow lights will not be visible in front of groups using this setting.

Red, Green, Blue These controls fine tune the color value of the group's luminance.

Hue This control selects the base color of the group's luminance.

Sat(uration) This control sets the amount of color added to the group's luminance.

Val(ue) This control provides an alternative to the Luminance control, above. The specular highlight and reflectivity of the group will not be affected by the luminance calculation, and instead will shade normally. This can provide a translucent effect.

Transparency

This attribute controls the transparency rendering of the group. When selected, the Surface Editor appears as in Figure 18.9.

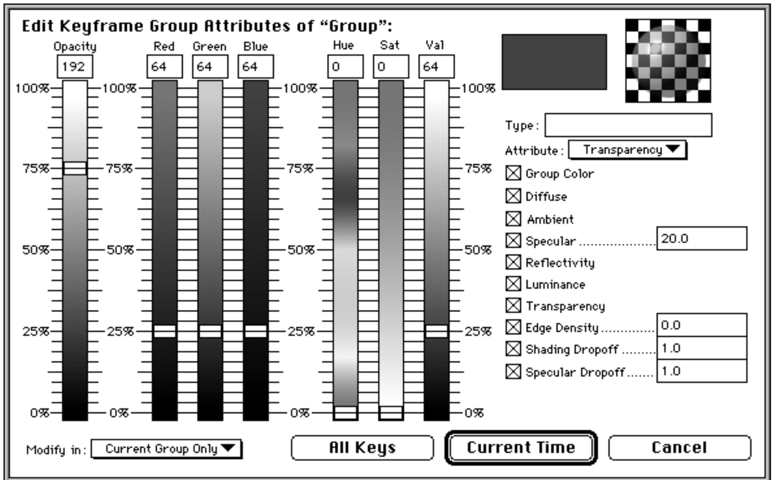


Figure 18.9 Surface Editor with Transparency attribute selected

W

There are two transparency modes: Filter, with 255 levels and transparency mapping capability; and Dither, with 16 levels and no transparency mapping (but faster rendering). The mode is set in the Group Info window, as discussed in the section “Transparency” (page 13-5) in Chapter 13: The Group Info Window.

Opacity This control sets the level of transparency for the Dither mode.

Red, Green, Blue These controls fine tune the color value of the group’s transparency rendering.

Hue This control selects the base color of the group’s transparency rendering.

Sat(uration) This control sets the amount of color added to the group’s transparency rendering.

Val(ue) This control sets the level of transparency for the Filter mode.

Edge Density

This attribute adjusts the density of a transparent group’s edges. When used with the Transparency attribute (page 18-14), the effect of decreased transparency through the group’s edges can be achieved. When selected, the Surface Editor appears as in Figure 18.10.

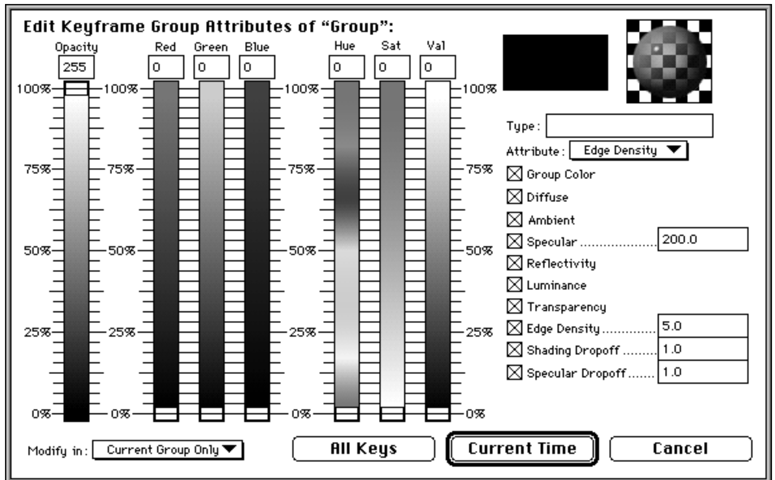


Figure 18.10 Surface Editor with Edge Density attribute selected

Opacity This control sets the level of edge density for Dither transparency mode—see the note on transparency modes (page 18-14).

Red, Green, Blue These controls fine tune the color value of the group’s edge density.

Hue This control selects the base color of the group’s edge density.

Sat(uration) This control sets the amount of color added to the group’s edge density.

Val(ue) This control sets the level of edge density for Filter transparency mode.

Edge Density This edit box contains a value for the rate of fall-off from transparency in the group’s center to opacity at its edges. The greater the value, the faster the rate of transition from transparency to opacity, and the greater the area of density around the group’s edges.

Applying the Attribute Settings

The controls at the bottom of the surface editor are used to apply the attribute settings and to specify how the attribute settings are to be applied.

W

To cancel any modifications made since opening the Surface Editor, click the Cancel button.

Modify in:

This pop-up menu is used to select the group or groups to which the various attributes are to be applied. The menu choices are:

Current Group Only This option (the default) applies the attribute settings to the current group only.

All Children This option applies the attribute settings to all children of the current group (groups ordered hierarchically below the current group).

All Groups This option applies the attributes to all groups within the current group's model.

Dialog Buttons

These dialog buttons complete the process of applying attributes. They are case sensitive, depending on the editing mode in effect:

Time Mode

In Time mode, the buttons appear as follows:

All Keys

Clicking this button applies the settings to the entire sequence (all keyframes).

Current Time

Clicking this button (the default) applies the settings at the current time only.

Keyframe or Frame Mode (if not on a keyframe)

In Keyframe and Frame modes (if not on a keyframe), the buttons appear as follows:

All Frames

Clicking this button applies the settings to all frames in the project.

Current Frame

Clicking this button (the default) applies the settings at the current frame only.

Keyframe or Frame Mode (if on a keyframe)

In Index and Keyframe modes (if on a keyframe), the buttons appear as follows:

All Keys

Clicking this button applies the settings to all keyframes in the project.

Current Key

Clicking this button (the default) applies the settings at the current keyframe only.

Chapter 19 The Tool Palette

Chapter 19 The Tool Palette

W

The tools in the Tool Palette duplicate the commands in the Tools menu, which are discussed in greater detail in Chapter 5: The Tools Menu Commands. The Tool Palette thus provides an alternate means of using the same functions. Also, some of these tools are available in the Project window's tool palette, as discussed in the section* "The Tool Palette" (page 8-26) *in Chapter 8: The Project Window.

Overview

The Tool Palette contains tools used to control the display, rotate and scale objects, hierarchically link groups together, and more. It is a “floating palette;” that is, it floats above the other windows, as long as it is visible.

When initially opened, the Tool Palette is configured in a horizontal display, as shown in Figure 19.1.

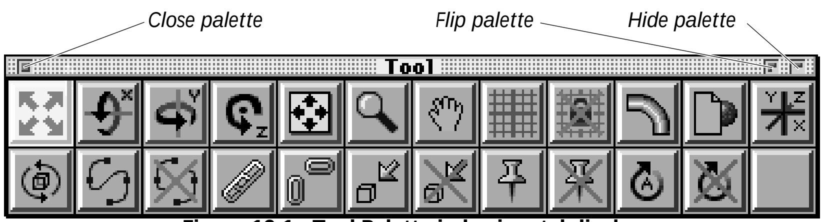


Figure 19.1 Tool Palette in horizontal display

Opening and Configuring the Palette

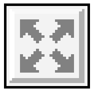
To open the Tool Palette, choose **Tool Palette** from the Windows menu, as discussed in the section “Tool Palette” (page 3-2) in *Chapter 3: The Windows Menu Commands.*

To change the orientation of the palette from horizontal to vertical, click the flip palette button, located in the upper right of the drag bar, as shown in Figure 19.1.

To hide the palette, click the hide palette button, located in the upper right of the drag bar, as shown in Figure 19.1.

To close the tool palette, click in the palette’s close box, located in the upper left of the drag bar, or choose **Tool Palette** from the Windows menu again.

The Move Tool



This tool (the default) allows you to move a selected object in any direction by dragging the object's icon in a World View window, as shown in Figure 19.2.

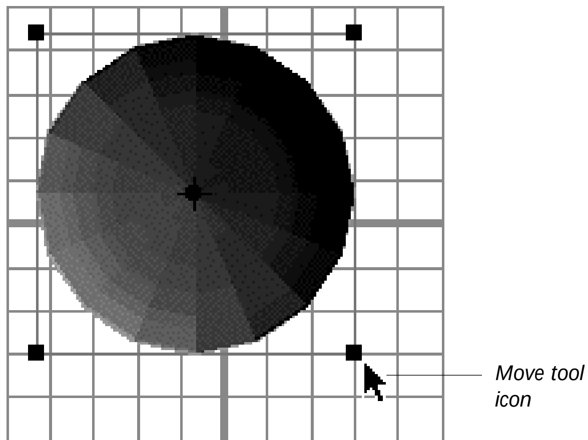
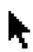


Figure 19.2 Move tool icon in a World View window

Movement can be constrained in the horizontal, vertical and diagonal directions by repeatedly pressing the Tab key and cycling through a series of changes to the Move tool icon:



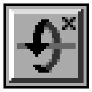
When the Move tool has this icon, movement will not be constrained.

When the Move tool has this icon, movement will be horizontally constrained.

When the Move tool has this icon, movement will be vertically constrained.

When the Move tool has this icon, movement will be diagonally constrained (to a 45° angle).

The X Rotate Tool



This tool enables you to rotate a selected object around its X axis. In the case of the camera or a parallel or spot light, an added benefit is the ability to rotate around the look–at point (the case for all rotational modes). Double clicking this button preserves this mode until another button is clicked.

The **X Rotate** tool allows you to rotate a selected object around its X axis by dragging the object's icon in a World View window, as shown in Figure 19.3.

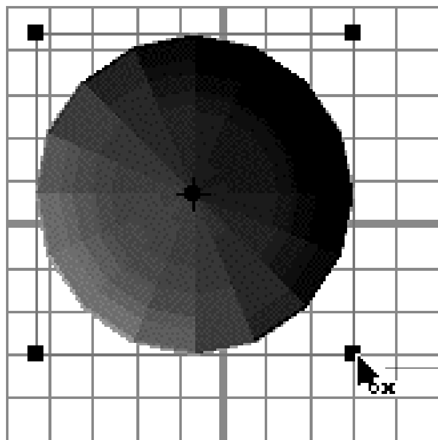


Figure 19.3 X Rotate tool icon in a World View window

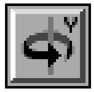
W

In the case of the camera or a parallel or spot light, an added benefit is the ability to rotate around the look–at point (the case for all rotational modes).

W

You can also rotate an object around its X axis with the Move tool (page 19-4) by pressing the Option and Control keys while dragging.

The Y Rotate Tool



This tool enables you to rotate a selected object around its Y axis by dragging the object's icon in a World View window, as shown in Figure 19.4.

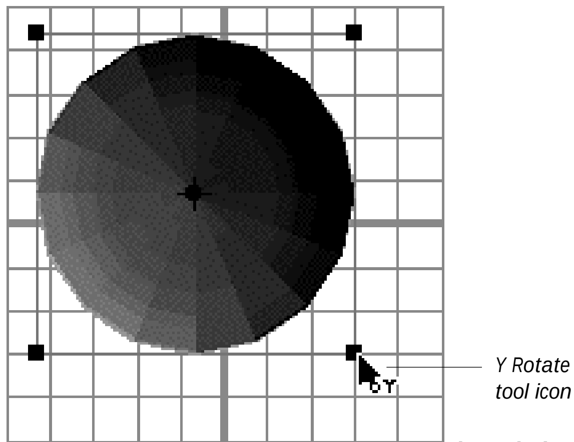
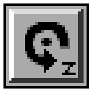


Figure 19.4 Y Rotate tool icon in a World View window

W

You can also rotate an object around its Y axis with the Move tool (page 19-4) by pressing the Command and Control keys while dragging.

The Z Rotate Tool



This tool enables you to rotate a selected object around its Z axis by dragging the object's icon in a World View window, as shown in Figure 19.5.

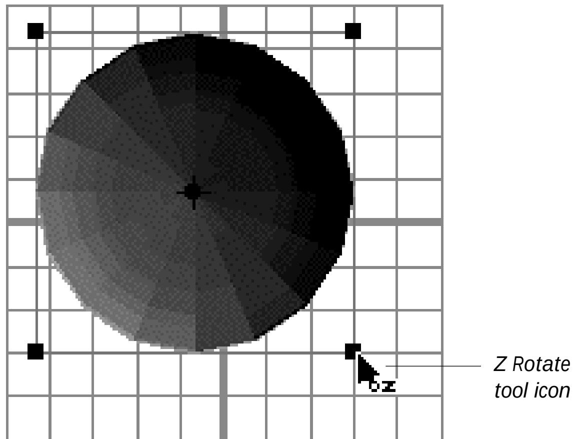
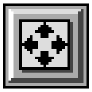


Figure 19.5 Z Rotate tool icon in a World View window

W

You can also rotate an object around its Z axis with the Move tool (page 19-4) by pressing the Command, Option and Control keys while dragging.

The Scale Tool



This tool enables you to scale a selected object uniformly by dragging the object's icon in a World View window, as shown in Figure 19.6.

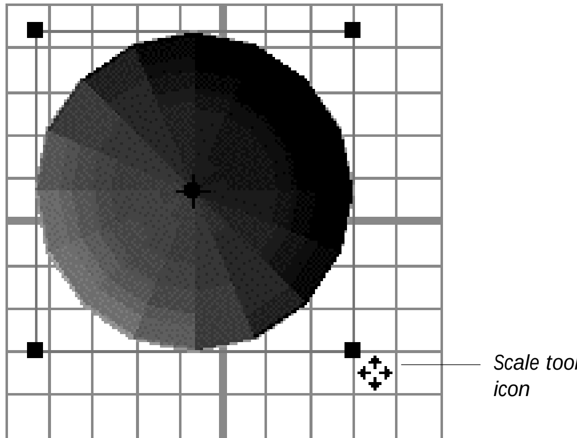
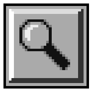


Figure 19.6 Scale tool icon in a World View window

W

The Scale tool applies only to geometric objects, not cameras or lights.

The Zoom Window Tool



This tool enables you to zoom in or out on an area of a window, centered on the point over which the tool's magnifying glass icon is placed.

- Zooming in is the default, as indicated by a plus (+) symbol in the magnifying glass icon (as shown in Figure 19.7).
- To zoom out, hold down the option key, which changes the plus symbol to a minus (-) symbol.

W

Zooming in or out is done by a factor of 2 with each click of the mouse.

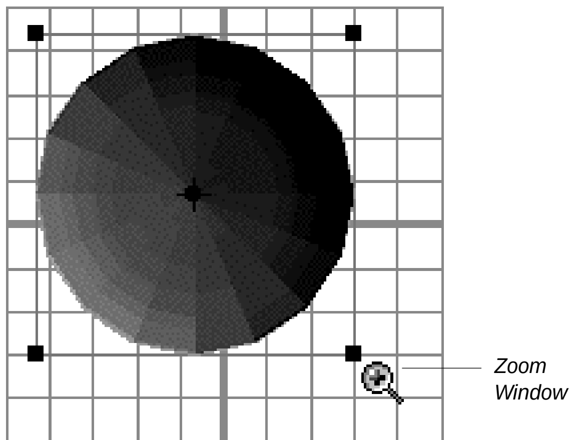
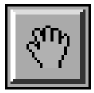


Figure 19.7 Zoom Window tool icon in a World View window

W

You can also zoom in on an area of the window by pressing the Option key while dragging a rectangle around the area.

The Drag Content Tool



This tool enables you to scroll the contents of a World View window (top, front or side) by clicking and dragging in the window, as shown in Figure 19.8.

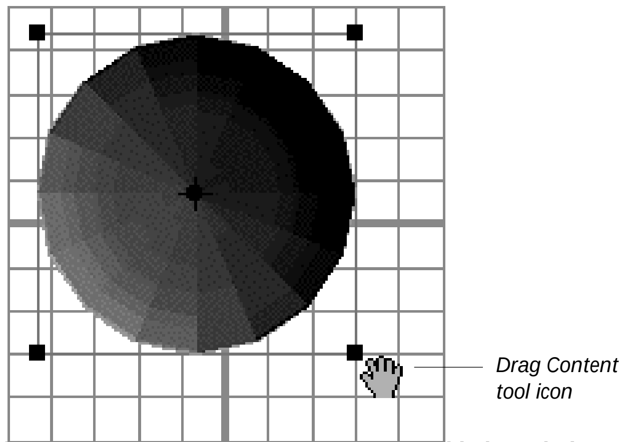
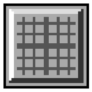


Figure 19.8 Drag Content tool icon in a World View window

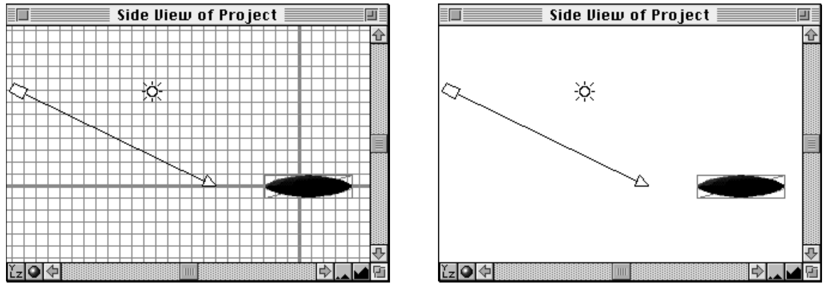
W

You can also scroll the contents of a World View window with the Move tool (page 19-4) by pressing the space bar while dragging.

The Visible Grid Tool



This tool toggles the visible grid on or off in the World View and Camera View windows, as shown in Figure 19.9.



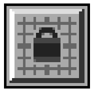
Visible Grid On *Visible Grid Off*

Figure 19.9 Examples of a World View window with visible grid on and off

W

Preferences for the dimensions and use of the visible grid are set with the **Grid & Scale** ***command in the Edit menu, as discussed in the section*** **"Grid & Scale…" (page 2-17)** ***in Chapter 2: The Edit Menu Commands.***

The Snapping Grid Tool



This tool toggles the invisible snapping grid on or off in the World View windows. The snapping grid is used to align objects to pre-determined positions—they will "snap" to a position when moved.

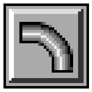
W

Preferences for the dimensions and use of the snapping grid are set with the* Grid & Scale *command in the Edit menu, as discussed in the section* "Grid & Scale…" (page 2-17) *in Chapter 2: The Edit Menu Commands.

W

You can also toggle the snapping grid by pressing the Caps Lock key.

The Group Deform Tool



This tool opens the Group Deformation window for the selected group.

The Group Deformation window, shown in Figure 19.10, is used to deform the group's shape in various ways, including bending, twisting, tapering, bulging, etc.

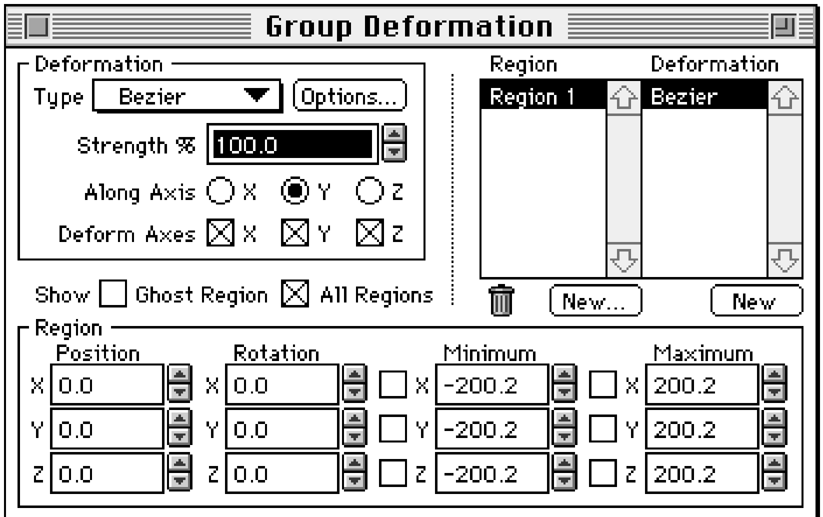
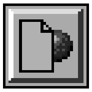


Figure 19.10 Group Deformation window

W

For an explanation of the Group Deformation window and its use, refer to Chapter 16: The Group Deformation Window.

The Group’s Texture Tool



This tool opens the Group Texture window for the selected group.

The Group Texture window, shown in Figure 19.11, is used to set texture and reflection mapping for the group.

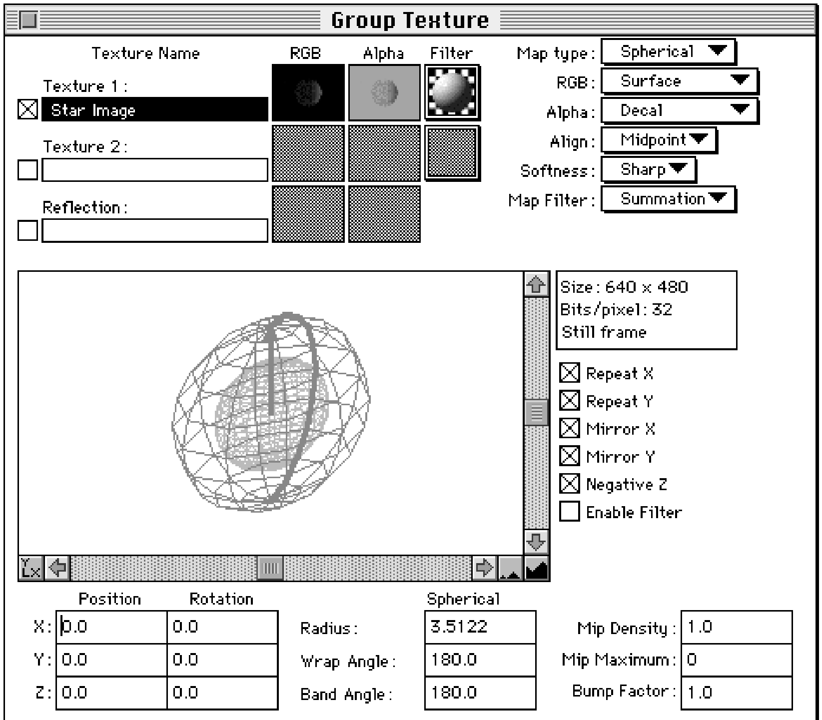


Figure 19.11 Group Texture window

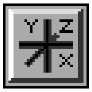
W

For an explanation of the Group Texture window and its use, refer to Chapter 14: The Group Texture Window.

W

You can also open the Group Texture window for a group by pressing the Command key while double-clicking the group’s icon.

The Group's Linkage Tool



This tool opens the Group Link window for the selected group.

The Group Link window, shown in Figure 19.12, is used to set pivot points and rotation information for the group.

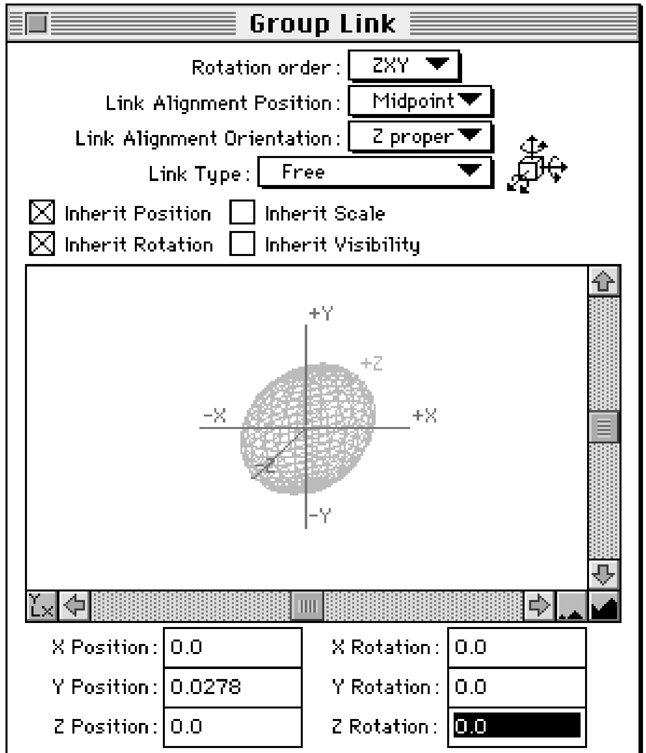


Figure 19.12 Group Link window

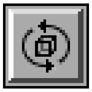
W

For an explanation of the Group Link window and its use, refer to Chapter 15: The Group Link Window.

W

You can also open the Group Link window for a group by pressing the Command and Option keys while double-clicking the group's icon.

The Group’s Modification Tool



This tool opens the Modify Axes window for the selected group.

The Modify Axes window, shown in Figure 19.13, is used to change the orientation of the group in local space (i.e., exchanging or reversing axes to, for example, make the top become the bottom, the front become the back, etc.).

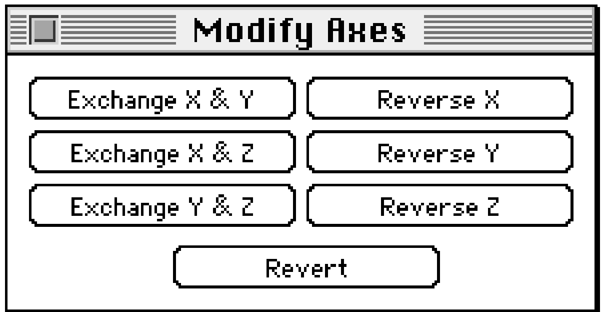
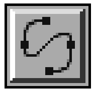


Figure 19.13 Modify Axes window

The Show Motion Path Tool



This tool displays the path of motion for the selected object, as shown in Figure 19.14. No path is shown if the object has no keyframes, or has not changed position at all.

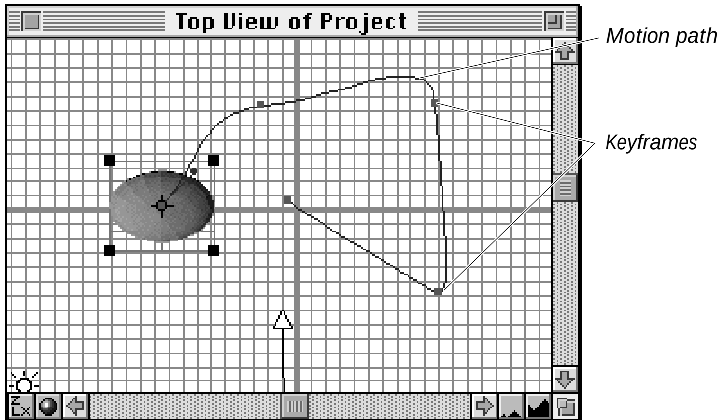
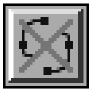


Figure 19.14 Motion path visible in a World View window

The Hide Motion Path Tool

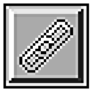


This tool hides the selected object's path of motion (assuming its path is visible).

W

To show the motion path for a select object, use the* Show Motion Path *tool (page 19-17).

The Link to Parent Tool



This tool enables you to choose a new parent for the selected object(s). If many objects are selected, the new parent will apply to all the selected objects.

To link an object to a new parent object:

1. Select the object to be linked (the child object) in either a World View or the Project window.
2. Click the **Link to Parent** tool in the Tool Palette.

   An instruction appears in the menu bar, as shown in Figure 19.15.

Figure 19.15 Instruction in menu bar

3. To complete the operation, click on the object to be the parent in either a World View or the Project window.

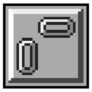
   To cancel the operation, use the menu bar instruction as you would a menu and choose **Terminate Operation**, as shown in Figure 19.16.

Figure 19.16 Canceling the operation

W

To unlink an object from its parent object, refer to the section "The Unlink from Parent Tool" (page 19-20).

The Unlink from Parent Tool

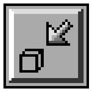


This tool removes parentage from all selected objects.

W

To link an object to a parent object, refer to the section "The Link to Parent Tool" (page 19-19).

The Look at Object Tool



This tool forces the selected object to look at another object.

- If the selected object is the camera or a light, its reference point will be locked to the object it is looking at.
- If the selected object is a group, its rotation will be affected by the object it is looking at.

Use of this tool will generate custom frames for the selected object's reference (or rotation) channel.

To force an object to look at another object:

1. Select the object to be forced, in either a World View or the Project window.

   An object can be forced to look at another object at any time in the animation, and for any range of frames.

2. To apply the command at a specific time, set the Project window to Time mode and move the time selector to the time at which the command is to start.

   To apply the command for a range of frames, set the Project window to Keyframe or Frame mode and select the range of frames to be affected.

3. Click the **Look at Object** tool in the Tool Palette.

   An instruction appears in the menu bar, as shown in Figure 19.17.

   Figure 19.17 Instruction in menu bar

4. To complete the operation, click on the object to be looked at, in either a World View or the Project window.

   To cancel the operation, use the menu bar instruction as you would a menu and choose **Terminate Operation**, as shown in Figure 19.18.

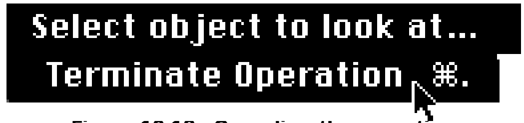
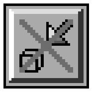


Figure 19.18 Canceling the operation

W

To remove the Look at Object function, refer to the section "The Cancel Look at Tool" (page 19-23).

The Cancel Look at Tool

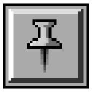


This tool removes the **Look at Object** function (page 19-21) from the selected object (but does not recalculate custom frames).

W

To force an object to look at another object, refer to the section "The Look at Object Tool" (page 19-21).

The Attach to Object Tool



This tool forces the selected object to maintain its position relative to the position of another object. As the other object changes position, the selected object will change position.

W

Use of this tool will generate custom frames for the selected object's position and reference (or rotation) channels.

To attach an object to another object:

1. Select the object to be attached, in either a World View or the Project window.

   W

   An object can be attached to another object at any time in the animation, and for any range of frames.

2. To apply the command at a specific time, set the Project window to Time mode and move the time selector to the time at which the command is to start.

   To apply the command for a range of frames, set the Project window to Keyframe or Frame mode and select the range of frames to be affected.

3. Click the **Attach to Object** tool in the Tool Palette.

   An instruction appears in the menu bar, as shown in Figure 19.19.

Figure 19.19 Instruction in menu bar

4. To complete the operation, click on the object to attach to, in either a World View or the Project window.

   To cancel the operation, use the menu bar instruction as you would a menu and choose **Terminate Operation**, as shown in Figure 19.20 (page 19-25).

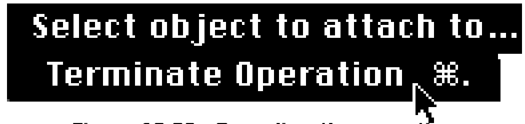
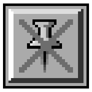


Figure 19.20 Canceling the operation

W

To remove the Attach to Object function, refer to the section "The Detach from Object Tool" (page 19-26).

The Detach from Object Tool

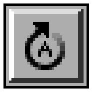


This tool removes the **Attach to Object** function (page 19-24) from the selected object (but does not recalculate custom frames).

W

To attach an object to another object, refer to the section "The Attach to Object Tool" (page 19-24).

The Auto Rotate Object Tool



This tool forces a moving object to follow the line of its motion path, rotating on its local axes and always “looking” in the direction of the path.

W

Use of this tool will generate custom frames for the selected object’s rotation channels.

To automatically rotate an object on its motion path:

1. Select the object to be automatically rotated, in either a World View or the Project window.

   W

   An object can be automatically rotated at any time in the animation, and for any range of frames.

2. To apply the command at a specific time, set the Project window to Time mode and move the time selector to the time at which the command is to start.

   To apply the command for a range of frames, set the Project window to Keyframe or Frame mode and select the range of frames to be affected.

3. Click the **Auto Rotate Object** tool in the Tool Palette.

If the Auto Rotate sequence is for the camera or a light, you can override the length of the object’s reference vector.

To modify the reference vector:

1. Set the Project window to Keyframe mode and double-click on a cell in the Auto-Rotate channel, as shown in Figure 19.21.

   W

   Auto rotation sequences are numbered (AR #1, AR #2, etc.), permitting multiple auto rotation sequences for an object during the course of the animation.

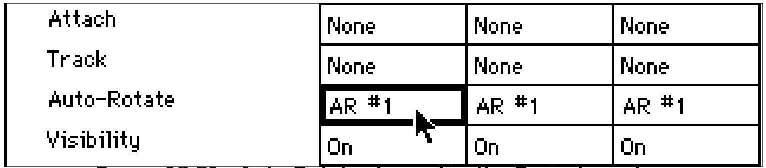


Figure 19.21 Auto-Rotate channel in the Project window

A dialog box, as shown in Figure 19.22, opens.

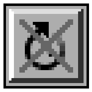
Figure 19.22 Dialog box used to set auto rotation options

2. Enter a value in the **Reference Length** edit box. The value corresponds to the scale of the rulers in the World View windows.

W

To cancel the Auto Rotate function, refer to the section "The Cancel Auto Rotate Tool" (page 19-29)

The Cancel Auto Rotate Tool



This tool removes the Auto Rotate function from the selected object (but does not recalculate custom frames).

W

To use the Auto Rotate function, refer to the section "The Auto Rotate Object Tool" (page 19-27)

Chapter 20 The Object Palette

Chapter 20 The Object Palette

Overview

The Object palette is used to perform such tasks as adding models, sounds and lights to the project. It is a “floating palette;” that is, it floats above the other windows, as long as it is visible.

W

The tools in the Object Palette parallel the* Add > *commands in the File menu, as discussed in Chapter 1: The File Menu Commands.

When initially opened, the Object Palette is configured in a horizontal display, as shown in Figure 20.1.

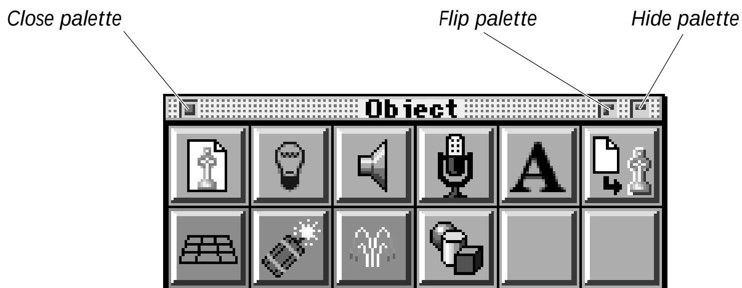


Figure 20.1 Object Palette in horizontal display

W

When object plug-ins are stored in the EI Sockets folder, they are also accessible from the Object Palette. This chapter documents only the ElectricImage plug-ins (whose icons are visible in the bottom row of the palette in Figure 20.1). If you add another developer’s plug-ins to the EI Sockets folder, refer to that developer’s documentation for the use of those plug-ins.

Opening and Configuring the Palette

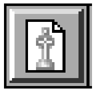
To open the Object palette, choose **Object Palette** from the Windows menu, as discussed in the section “Object Palette” (page 3-4) in *Chapter 3: The Windows Menu Commands.*

To change the orientation of the palette from horizontal to vertical, click the flip palette button, located in the upper right of the drag bar, as shown in Figure 20.1.

To hide the palette, click the hide palette button, located in the upper right of the drag bar, as shown in Figure 20.1.

To close the palette, click in the palette’s close box, located in the upper left of the drag bar, or choose **Object Palette** from the Windows menu again.

The Add Model Tool

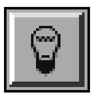


This tool is used to add a FACT format model to the current project. Clicking it is equivalent to choosing **Add > Model...** in the File menu. For information on how to use this command, refer to the section “Add > Model…” (page 1-12) in *Chapter 1: The File Menu Commands*.

W

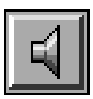
This tool will not work for models that are not in the FACT format. To add a non-FACT-format model to the current project, use the Import Model tool (page 20-5) which will convert the model to FACT format and then add it to the project.

The Add Light Tool



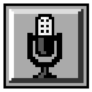
This tool is used to add a light to the current project. Clicking it is equivalent to choosing **Add > Light...** in the File menu. For information on how to use this command, refer to the section “Add > Light…” (page 1-16) in *Chapter 1: The File Menu Commands*.

The Add Sound Tool



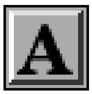
This tool is used to add a sound file to the current project. Clicking it is equivalent to choosing **Add > Sound...** in the File menu. For information on how to use this command, refer to the section “Add > Sound…” (page 1-14) in *Chapter 1: The File Menu Commands*.

The Record Sound Tool



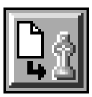
This tool is used to record a sound and add it to the current project. Clicking it is equivalent to choosing **Add > Record Sound…** in the File menu. For information on how to use this command, refer to the section “Add > Record Sound…” (page 1-15) in *Chapter 1: The File Menu Commands*.

The Add Font Tool



This tool is used to create a font model and add it to the current project. Clicking it is equivalent to choosing **Add > Font…** in the File menu. For information on how to use this command, refer to the section “Add > Font…” (page 1-17) in *Chapter 1: The File Menu Commands*.

The Import Model Tool

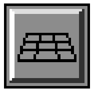


This tool is used to import a non-FACT format model into the current project, converting the file to the FACT format required by ElectricImage. Clicking it is equivalent to choosing **Add > Import…** in the File menu. For information on how to use this command, refer to the section “Add > Import…” (page 1-22) in *Chapter 1: The File Menu Commands*.

W

If the model you wish to add to the project is already in the FACT format, you do not need to use this tool. Instead, use the Add Model tool, discussed above.

The Mesh Generator



This tool adds the Mesh Generator to the project. The Mesh Generator is used to animate various shape transformations, primarily a plane into a sphere (or vice versa).

This icon will only appear in the Object Palette if the Mesh Generator plug-in is stored in the EI Sockets folder.

To add the Mesh Generator to the project:

1. Click the **Mesh Generator** icon in the Object Palette.

   A dialog box, as shown in Figure 20.2, opens.

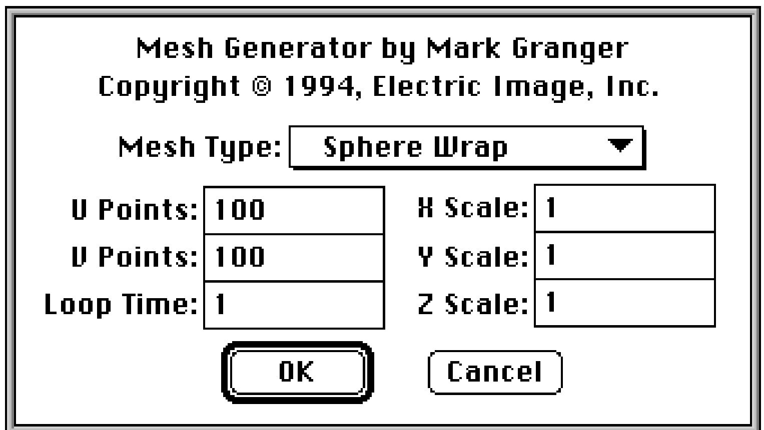


Figure 20.2 Mesh Generator dialog box

2. Use the controls of the dialog box to configure the mesh to your preferences. For an explanation of these controls, refer to the section “Mesh Generator Controls” (page 20-7).

3. Either click **OK** or press **Return**.

Mesh Generator Controls

Mesh Type This pop-up menu provides a choice of five different animated mesh objects. The menu choices are:

Flat

This option creates a flat, two-dimensional mesh grid.

Sine Wave

This option creates a mesh object containing animated circular waves.

Breathing Cylinder

This option creates a cylinder that expands and contracts as if breathing.

Screw Thread

This option creates an object that simulates a screw thread which reverses its threads inwards and outwards over time.

Sphere Wrap

This option (the default) creates an object that transforms itself from a plane into a sphere (and back again).

U Points This edit box contains a value for the number of horizontal grid segments.

V Points This edit box contains a value for the number of vertical grid segments.

Loop Time This edit box contains a value in seconds for the amount of time it will take for one complete transformation. In the case of a Sphere Wrap, for example, the loop time would be the amount of time it will take for the plane to transform into a sphere (before transforming back into a plane).

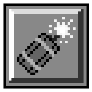
X, Y and Z Scale

These edit boxes contain values for the scale of the object along the X, Y and Z axes. For a Sine Wave object, you can use the Y Scale value to control the height of the waves.

W

Once the object is added to the project, this dialog box can be reopened to modify your preferences. To do so, open the Group Info window for the object and click the **Options...** ***button.***

Mr. Nitro™



This tool adds the Mr. Nitro™ special effect to the project. Mr. Nitro™ is used to animate realistic explosions of models.

W

This icon will only appear in the Object Palette if the Mr. Nitro™ plug-in is stored in the EI Sockets folder.

To add the Mr. Nitro™ special effect to the project:

1. Click the **Mr. Nitro™** icon in the Object Palette.

   A dialog box, as shown in Figure 20.3, opens.

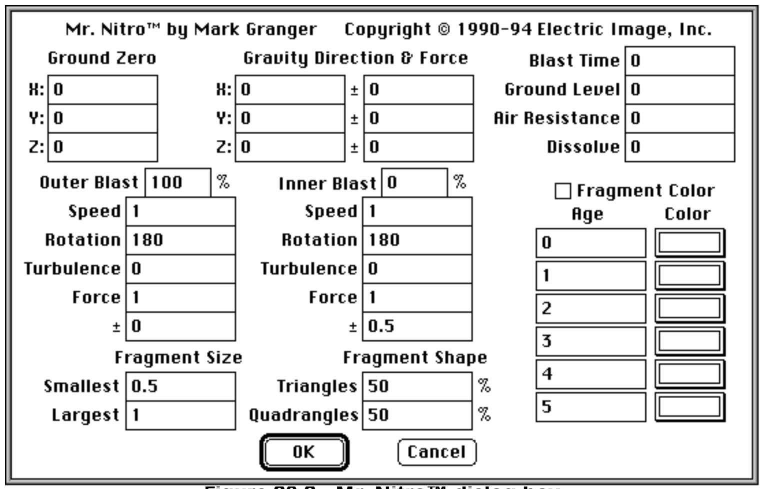


Figure 20.3 Mr. Nitro™ dialog box

2. Use the controls of the dialog box to configure the blast to your preferences. For an explanation of these controls, refer to the section “Mr. Nitro™ Controls” (page 20-10).

3. Either click **OK** or press **Return**.

   The Mr. Nitro™ effect is added to the project as an object.

4. Link the group(s) to be exploded to the Mr. Nitro™ object. For an explanation of how to link groups, refer to the section “The Link to Parent Tool” (page 19-19) in *Chapter 19: The Tool Palette*.

Mr. Nitro™ Controls

Ground Zero

These edit boxes contain values for the X, Y and Z coordinates of the blast's origin, or "ground zero." This is the point from which the shock wave of the blast originates, emanating in all directions. By positioning ground zero farther away from the group(s) to be exploded, you can create more of a "wall-shaped" shockwave.

W

To position and configure the blast to your requirements, you should first check the coordinates and size of the group(s) to be blasted in their respective Group Info windows. You can then set Mr. Nitro's values accordingly.

Gravity Direction & Force

These edit boxes contain values for the direction and force of gravity which will affect the manner and speed in which the blast fragments fall. The ± edit boxes enable you to impart a variability to each value so that some fragments are more affected by gravity than others.

Blast Time

This edit box contains a value for the time in the project at which the shock wave will commence. A negative value will result in the shock wave originating prior to the start of the animation.

You will need to use a negative blast time value when ground zero is far away from the group(s) to be exploded—otherwise the moment of impact will occur long into the animation. For the blast to occur in the first frame of the animation, blast time should be set according to the following formula:

Blast Time = - distance from Ground Zero to group ÷ Speed

For example, if ground zero is a distance of 1000 from the group and the blast speed (see **Speed** edit box, below) is 10, blast time would be -1000 ÷ 10, or -100 seconds.

Ground Level

This edit box contains a value for the Y axis coordinate of an invisible ground plane below which blast fragments disappear as they fall.

Air Resistance

This edit box contains a value for the amount of air resistance which will affect the manner in which the blast fragments fall. The higher the value, the more air resistance slowing the fragments.

Dissolve This edit box contains a value for the amount of time in seconds for blast fragments to dissolve after being hit by the shockwave. A value of 0 (the default) prevents fragments from dissolving.

Outer Blast These edit boxes control the speed, rotation, turbulence and force of the initial shockwave of the blast. An explosion can have two shockwaves, the outer blast (first) and the inner blast (second).

% This edit box contains the percentage value for the outer blast (initial shockwave). It defaults to 100, so that there is only the outer blast. To create two shockwaves, assign a value less than 100% to the outer blast and the Inner Blast % edit box will be adjusted accordingly (so that they add up to 100%).

Speed This edit box contains a value for the speed (distance per second) of the shockwave. When used in conjunction with the Blast Time value (page 20-10), this value can control the moment when the shockwave hits the group(s).

Rotation This edit box contains a value in degrees for the maximum amount of rotation of the flying blast fragments. Fragments rotate around random axes.

Turbulence This edit box contains a value for the amount of air turbulence which will affect the manner in which the blast fragments rotate. With a value of zero, fragments rotate around their centers. A value other than zero will cause fragments to rotate off-axis.

Force This edit box contains a value for the force of the shockwave. The greater the force, the faster the fragment will move in the direction of the shockwave. A force of 1.0 will cause fragments to move at the same speed as the shockwave. The ± edit boxes enable you to impart a variability to the value so that some fragments fly faster than others.

Fragment Size These edit boxes contain size values for the smallest and largest blast fragments, relative to the size of the exploding group. To have all fragments of approximately the same size, enter the same value in both the Smallest and Largest edit boxes.

W

Setting a minimum size value that is too small will generate a very large number of fragments, which will take too long to generate and may also cause you to run out of memory. As a starting point for the minimum size, try using a value that is 1/10 the longest dimension of the group; for the maximum size, use a value that is twice the minimum size.

Fragment Shape

These edit boxes contain values for the percentage of fragments that are to be triangles versus quadrangles. The default is 50% for each. Changing one value will adjust the other value accordingly (to add up to 100%).

Fragment Color

This check box, when enabled, allows you to assign a color to the blast fragments, overriding the surface color setting of the group. The color of the blast fragments can be animated over time through the use of the Age Color buttons, discussed below.

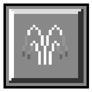
Age Color

These buttons invoke the Apple Color Picker to enable you to set different colors for the blast fragments at different stages of the blast. The age values are all in seconds and can be edited.You can change the color of the fragments before they are hit by the shockwave by setting the first age value to less than zero.

W

Once the Mr. Nitro object is added to the project, this dialog box can be reopened to modify your preferences. To do so, open the Group Info window for the Mr. Nitro object and click the* Options... *button.

The Particle Generator



This tool adds the Particle Generator to the project. The Particle Generator is used to animate special effects such as sparks, jets of fire, and fountains or streams of water.

W

This icon will only appear in the Object Palette if the Particle Generator plug-in is stored in the EI Sockets folder.

To add the Particle Generator to the project:

1. Click the **Particle Generator** icon in the Object Palette.

   A dialog box, as shown in Figure 20.4, opens.

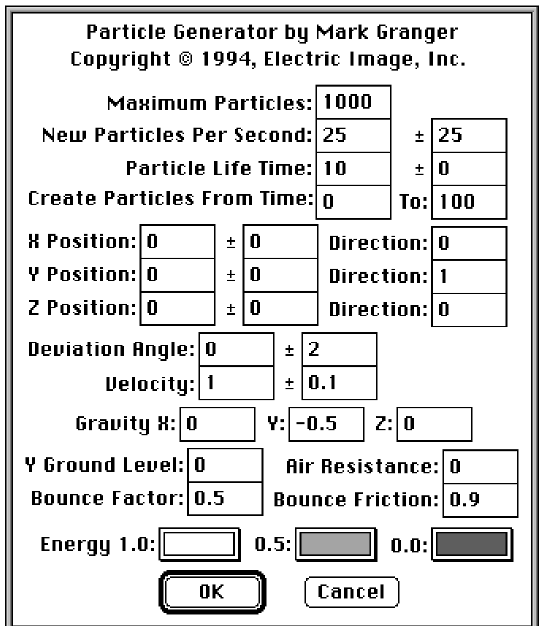


Figure 20.4 Particle Generator dialog box

2. Use the controls of the dialog box to configure the particle stream to your preferences. For an explanation of these controls, refer to the section "Particle Generator Controls" (page 20-14).

3. Either click **OK** or press **Return**.

Particle Generator Controls

Maximum Particles This edit box contains a value for the maximum number of particles in existence at any particular time during the effect.

New Particles Per Second This edit box contains a value for the number of new particles to be created each second for the duration of the effect. The ± edit box enables you to impart a variability to the value so that the number of new particles generated each second will vary.

Particle Life Time This edit box contains a value in seconds for the duration of time a particle can exist before disappearing. The ± edit box enables you to impart a variability to the value so that some particles will last longer than others.

Create Particles From Time These edit boxes contain values for the start and end times of the animation during which particles will be generated.

X Position and Direction The Position edit box contains a value for the X coordinate position of the emission point (the point from which particles are emitted). The ± edit box enables you to impart a variability to the coordinate value so that particles are emitted at varying positions to the right and left of the X Position coordinate.

The Direction edit box contains a value for the X component of the particles' initial direction vector. The default direction for particles is along the Y axis (like a fountain), hence the default value for the X direction is zero.

Y Position and Direction The Position edit box contains a value for the Y coordinate position of the emission point (the point from which particles are emitted). The ± edit box enables you to impart a variability to the coordinate value so that particles are emitted at varying positions above and below the Y Position coordinate.

The Direction edit box contains a value for the Y component of the particles' initial direction vector. The default direction for particles is along the Y axis (like a fountain), hence the default value for the Y direction is 1.

Z Position and Direction

The Position edit box contains a value for the Z coordinate position of the emission point (the point from which particles are emitted). The ± edit box enables you to impart a variability to the coordinate value so that particles are emitted at varying positions in front of and behind the Z Position coordinate.

The Direction edit box contains a value for the Z component of the particles' initial direction vector. The default direction for particles is along the Y axis (like a fountain), hence the default value for the Z direction is zero.

Deviation Angle

This edit box contains a value in degrees for the angle at which particles can deviate from their initial direction vector. The ± edit box enables you to impart a variability to the deviation value so that some particles will deviate more than others.

Velocity

This edit box contains a value for the speed at which particles will be emitted from the generation point. The ± edit box enables you to impart a variability to the speed so that some particles will travel faster than others.

Gravity

These edit boxes contain values for the direction and force of gravity which will affect the manner and speed in which the particles fall. The ± edit boxes enable you to impart a variability to each value so that some particles are more affected by gravity than others. A negative gravity value for the Y axis (the default) causes the particles to fall downward (as in a fountain).

Y Ground Level

This edit box contains a value for the Y axis coordinate of an invisible ground plane upon which the fragments land or bounce.

Bounce Factor

This edit box contains a value for the amount of bounce given to particles. A value of zero prevents particles from bouncing—they land and stick to the ground plane. Values less than one cause particles to bounce with ever-decreasing height. Values greater than one cause particles to bounce with ever-increasing height.

Air Resistance

This edit box contains a value for the amount of air resistance which will affect the manner in which the particles fall. The higher the value, the more air resistance slowing the particles.

Bounce Friction This edit box contains a value for the amount of friction which will affect the distance over which particles bounce. The higher the value, the more friction to reduce the distance of each bounce.

Energy These three color buttons enable you to animate the color of particles over time, from the higher energy level at the start of a particle's life (1.0) to the midpoint of its life (0.5) to its end (0.0). Clicking a button opens the Apple Color Picker.

W

Once the particle generator object is added to the project, this dialog box can be reopened to modify your preferences. To do so, open the Group Info window for the object and click the* Options... *button.

Standard Shapes

This tool adds a standard shape (or primitive) to the project. Standard shapes include planes, cubes, cylinders, cones and spheres.

W

This icon will only appear in the File menu if the Standard Shapes plug-in is stored in the EI Sockets folder.

To add a standard shape to the project:

1. Click the **Standard Shapes** icon in the Object Palette.

   A dialog box, as shown in Figure 20.5, opens.

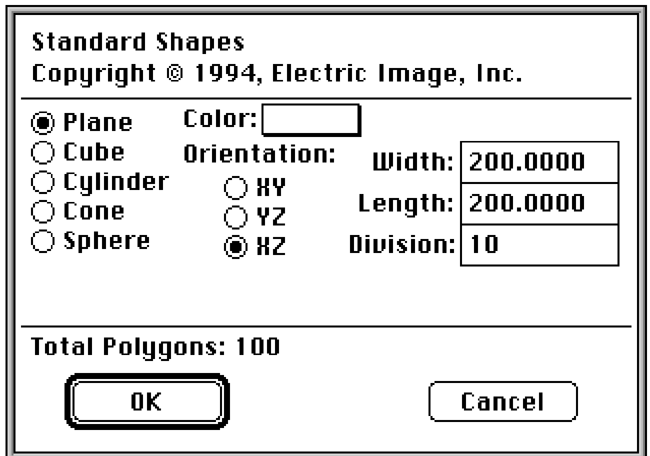


Figure 20.5 Standard Shapes dialog box

2. Use the controls of the dialog box to configure the shape to your preferences. For an explanation of these controls, refer to the section “Standard Shapes Controls” (page 20-18).

3. Either click **OK** or press **Return**.

W

Once a standard shape is added to the project, its form can be bent, tapered, stretched, bulged, rippled and otherwise deformed through the use of the Group Deformations window. For information, refer to Chapter 16: The Group Deformation Window.

Standard Shapes Controls

Shapes

These radio buttons provide a choice of five standard shapes:

- Plane
- Cube
- Cylinder
- Cone
- Sphere

Click the button for the type of shape you wish to create.

Color

This button is used to set the color of the object. Clicking it opens the Apple Color Picker.

Orientation

These radio buttons, for planes only, provide a choice of how the plane is to be oriented in 3-D space. The choices are:

- XY (oriented along the X and Y axes)
- YZ (oriented along the Y and Z axes)
- XZ (the default) oriented along the X and Z axes)

Dimensions

These edit boxes are case sensitive, changing according to the type of shape selected. They contain values for the dimensions of the object according to the current scale of the project.

Divisions

These edit boxes are case sensitive, changing according to the type of shape selected. They contain values that refer to the number of divisions in a mesh to be generated for each face of the object (effectively breaking each face into a number of polygons). If you plan to deform the object, it is necessary to create it with at least the default number of divisions.

W

Once the object is added to the project, this dialog box can be reopened to modify your preferences. To do so, open the Group Info window for the object and click the* Options... *button.

Chapter 21 The Location Palette

Chapter 21 The Location Palette

Overview

The Location Palette indicates the cursor's global coordinates as it is moved within any of the World View windows, as shown in Figure 21.1. It is a "floating palette;" that is, it floats above the other windows, as long as it is visible.

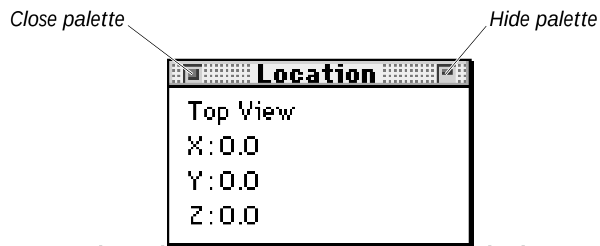


Figure 21.1 Location Palette indicating cursor's position in the Top View window

Opening and Configuring the Palette

To open the Location Palette, choose **Location Palette** from the Windows menu, as discussed in the section "Location Palette" (page 3-3) in *Chapter 3: The Windows Menu Commands.*

To hide the palette, click the hide palette button, located in the upper right of the drag bar, as shown in Figure 21.1.

To close the palette, click in the palette's close box, located in the upper left of the drag bar, or choose **Location Palette** from the Windows menu again.

The ElectricImage Camera

Chapter 22 The ElectricImage Camera

Chapter 22 The ElectricImage Camera

Overview

The Camera application is the rendering engine of the ElectricImage Animation System, and it is automatically launched when an ElectricImage project is rendered.

All four windows in the Camera interface default to open when Camera is launched, as shown in Figure 22.1.

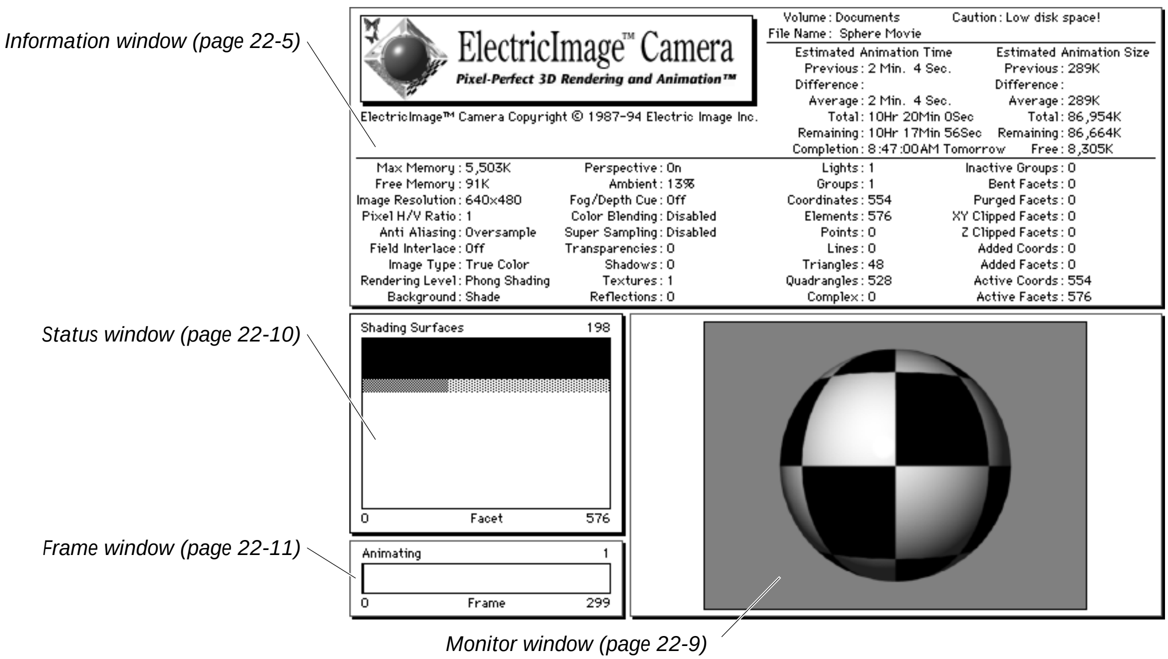


Figure 22.1 Camera interface

The Windows menu can then be used to close and re-open the four windows, together or individually.

The File Menu Commands

The File menu is used to pause/continue and quit rendering. If these options are not utilized during processing, the project will render until completion, the Camera application will close and the Projector application will be launched. The commands are:

Pause This command temporarily suspends processing. To restart the rendering, select Continue from the File menu.

Continue This command causes processing to resume after Pause had been selected from the File menu.

Quit This command cancels processing and re-launches the ElectricImage application (a dialog box reminds you that rendering was not completed and gives you the opportunity to not quit and resume rendering).

The Windows Menu Commands

The Windows menu is used to hide or show the four windows of the Camera application. The commands are:

Hide All Windows This command hides all currently open windows.

W

Hiding the windows can reduce rendering time since the processor does not need to update information in the windows while it is also rendering.

Show All Windows This command opens all four of the Camera windows.

Information This command toggles the display of the Information window, described in the section “The Information Window” (page 22-5).

Monitor This command toggles the display of the Monitor window, described in the section “The Monitor Window” (page 22-9).

Status This command toggles the display of the Status window, described in the section “The Status Window” (page 22-10).

Frame This command toggles the display of the Frame window, described in the section “The Frame Window” (page 22-11).

The Information Window

The Information window displays descriptive data for the project being rendered, as shown in Figure 22.2.

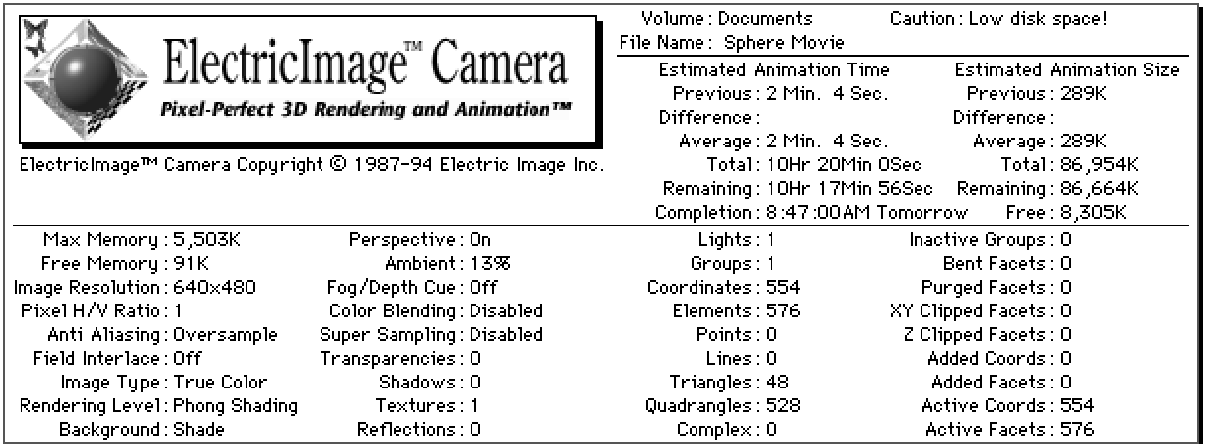


Figure 22.2 The Information window

Figure 22.3 (page 22-6) is a table of definitions for the data displayed in the upper half of the window.

Figure 22.4 (page 22-7) is a table of definitions for the data displayed in the lower half of the window.

Figure 22.3 Table of Information window data (upper half of window)

Label	Description
Volume	The volume name where the output Image file is being written.
File Name	The file name of the output Image file.
Estimated Animation Time	An estimate of the rendering time for the animation. The completion time can vary significantly during the progress of an animation and should be considered a rough approximation.
Previous	The time required to render the previous frame of the animation.
Difference	The difference in rendering times between the previous two frames.
Average	The average time per frame for the completed frames of the animation.
Total	The estimated total rendering time for this animation.
Remaining	The estimated time required to complete the remaining frames of the animation.
Completion	The estimated time of completion of the rest of the frames in the animation.
Estimated Animation Size	An estimate of the disk space required to store the animation. The total size can vary significantly during the progress of an animation and should be considered a rough approximation.
Previous	The size in bytes of the previous rendered frame.
Difference	The size difference in bytes between the previous two rendered frames.
Average	The average size in bytes of all rendered frames.
Total	The estimated total file size for this animation.
Remaining	The estimated size in bytes of remaining frames of the animation.
Free	The free disk space on the volume where the animation is being written. If the free disk space falls below the estimated remaining animation size, a warning will appear in the top right corner of the window.

Figure 22.4 Table of Information window data (lower half of window)

Label	Description
Max Memory	The total memory available for rendering.
Free Memory	The free heap space available after the rendering memory has been allocated. This value should never fall below 32KB.
Image Resolution	The horizontal/vertical pixel resolution of the current frame.
Pixel H/V Ratio	The horizontal/vertical pixel aspect ratio of the current frame.
Anti Aliasing	The anti-aliasing quality of the current frame. This can be none, averaged or oversampled.
Field Interlace	Field interlace status. This can be off, fast or super.
Image Type	The color depth of the current frame. This can be black and white, gray scale, 256 colors and true color (millions of colors).
Rendering Level	The maximum rendering level for the current frame. This can be wireframe, flat, Gouraud or Phong.
Background	Description of the current frame’s background. This can be a color or an Image file.
Perspective	Shows whether perspective is turned on or off for the current frame.
Ambient	The scene ambient value for the current frame.
Fog/Depth Cue	Fog or depth cue status. This can be off, to color, to background or to alpha.
Color Blending	The total number of color blended groups in the current frame. Disabled indicates that color blending has been disabled.
Super Sampling	The total number of super sampled groups in the current frame. Disabled indicates that super sampling has been disabled.
Transparencies	The number of groups in the current frame containing filter transparencies. “Disabled” indicates that filter transparencies have been disabled.
Shadows	The number of shadow casting light sources in the current frame. “Disabled” indicates that shadows have been disabled.
Textures	The total number of texture and bump maps in the current frame. Disabled indicates that texture mapping has been disabled and no texture maps or bump maps will be rendered.
Reflections	The total number of reflection and environment maps in the current frame. Disabled indicates that reflection mapping has been disabled and no reflection maps or environment maps will be rendered.

Figure 22.4 Table of Information window data (lower half of window) *(continued)*

Label	Description
Lights	The total number of light sources in the current frame.
Groups	The total number of groups in the current frame.
Coordinates	The total number of vertex coordinates in the current frame.
Elements	The total number of points, lines, triangles and quadrangles in the current frame.
Points	The total number of points in the current frame.
Lines	The total number of lines in the current frame.
Triangles	The total number of triangles in the current frame.
Quadrangles	The total number of quadrangles in the current frame.
Complex	The total number of complex polygons (polygons containing more than four sides) in the current frame.
Inactive Groups	The number of invisible groups in the current frame.
Bent Facets	The number of quadrangles which were broken into two triangles for rendering because they were not flat.
Purged Facets	The number of points, lines, triangles and quadrangles which were purged because they were behind the camera.
XY Clipped Facets	The total number of points, lines, triangles and quadrangles which are completely outside the edges of the current frame.
Z Clipped Facets	The number of lines, triangles or quadrangles which lay partially behind the camera.
Added Coords	The number of additional vertex coordinates which were generated whenever a line, triangle or quadrangle lay partially behind the camera.
Added Facets	The number of triangles which were generated whenever a quadrangle was broken into two parts because it lay partially behind the camera or because it was not flat.
Active Coords	The total number of active vertex coordinates which are to be used to render the current frame.
Active Facets	The total number of active points, lines, triangles and quadrangles which are to be used to render the current frame.

The Monitor Window

The Monitor window shows the image as it is being rendered, as shown in Figure 22.5.

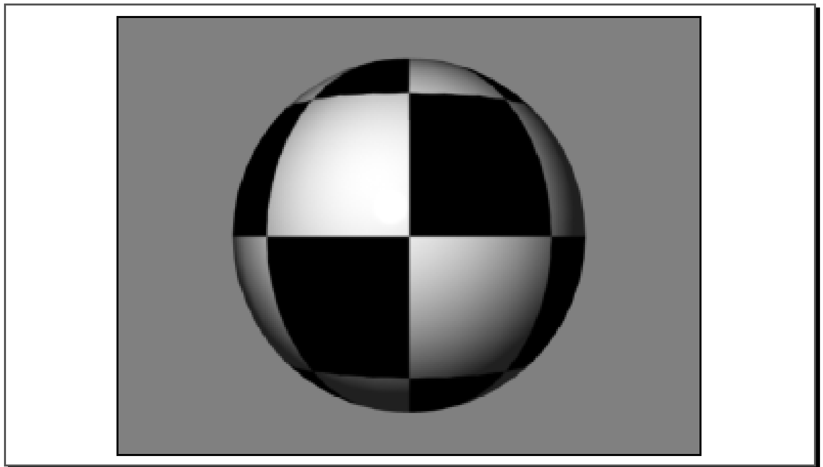


Figure 22.5 The Monitor window

W

The image in the window is not saved when the window is obscured or hidden (to conserve memory and speed rendering time). When subsequently made visible or uncovered, the window will display black until the next frame or part of a frame is completed.

The Status Window

The Status window shows, in a graphic display, the status of the current rendering operation, as shown in Figure 22.6.

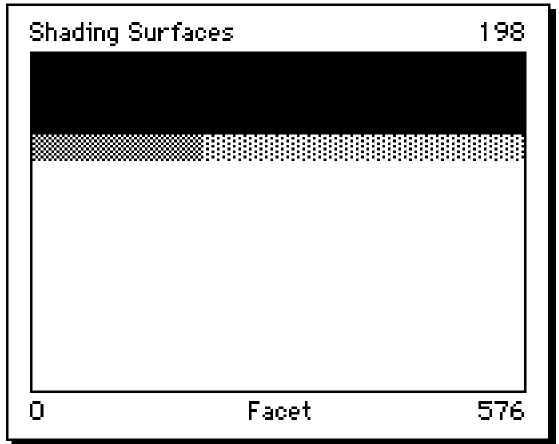


Figure 22.6 The Status window

The rendering operations displayed include:

- Reading (Facets, Coordinates, Polygons, etc.)
- Hiding Surfaces
- Shading Surfaces
- Sampling Pixels
- Storing Image
- Computing Motion Blur
- Expanding Motion Blur
- Drawing Motion Blur
- Converting Motion Blur
- Writing Image
- Converting Image (to 256 colors)

The Frame Window

The Frame window shows, in a graphic display, the progress of the animation processing in frames, as shown in Figure 22.7.

Figure 22.7 The Frame window

- The number in the upper right corner of the window is the number of the frame currently being rendered.
- The number in the lower left corner of the window is the first frame number of the animation.
- The number in the lower right corner of the window is the last frame number of the animation.

Appendices

Appendix A Camera Data Channels

Appendix A Camera Data Channels

Listing of Camera Data Channels

This appendix lists the data channels available for the camera, as they appear in the Project Window. For information on the Project window and its use, refer to *Chapter 8: The Project Window*.

W

Values for camera attributes can also be displayed and set in the Camera Info window, as described in Chapter 10: The Camera Info Window, and in the Camera Velocity window, as described in Chapter 17: The Velocity Windows.

Attach	This channel contains the name of the object, for a given frame, to which the camera is attached (if any). The camera is attached to other objects with the Attach to Object tool, discussed in the section “The Attach to Object Tool” (page 19-24) in *Chapter 19: The Tool Palette*
Track	This channel contains, for a given frame, the name of the object at which the camera is forced to look (if any). The camera is forced to look at other objects with the Look at Object tool, discussed in the section “The Look at Object Tool” (page 19-21) in *Chapter 19: The Tool Palette*.
Auto-Rotate	This channel contains the name of the camera’s auto rotation sequence in effect (if any) for a given frame. Auto rotation is set with the Auto Rotate Object tool, discussed in the section “The Attach to Object Tool” (page 19-24) in *Chapter 19: The Tool Palette*.
Visibility	This channel indicates whether or not the camera will be visible for a given frame. You can control the visibility on a frame by frame basis. **This function actually has no effect when rendering an animation because the camera is recording the scene. It does, however, affect all other object classes (i.e., groups, lights).**

Position	These channels contain the following values for the camera's position:			
	Motion Path	A pop-up menu provides a choice of four types of motion path spline:		
		Linear	These are not actually splines, but rather simple lines, resulting in a very mechanical (sometimes awkward) motion.	
		Natural Cubic	These splines give a fluid motion, but have limited precision since editing one keyframe along the spline will change the whole curvature of the spline.	
		Hermite	These splines also give a fluid motion, but are more versatile and precise than natural cubic splines because editing one keyframe along the spline will not change the whole curvature of the spline. The following values are available for editing:	
			Hermite Tension	This value determines the tautness (tension) of the segment between keyframes.
			Hermite Bias	This value determines how much the segment leans (is biased) toward one end or the other.
			Hermite Continuity	This value determines the smoothness (continuity) of the connection between the path and its endpoints.
		Bezier	These splines are the same splines used by popular Macintosh drawing programs such as Aldus Freehand®, Adobe Illustrator® and Canvas™, however ElectricImage Bezier splines are 3-dimensional.	
	Velocity	The relative velocity of the camera's position. The value is equivalent to the height of the teeter bar in the Camera Velocity window, described in the section "Graph Elements" (page 17-6) in *Chapter 17: The Velocity Windows*.		
	Acceleration	The acceleration of the camera's position. The value is equivalent to the bias of the speed curve in the Camera Velocity window, described in the section "Graph Elements" (page 17-6) in *Chapter 17: The Velocity Windows*.		
	X	The camera position's X coordinate.		
	Y	The camera position's Y coordinate.		
	Z	The camera position's Z coordinate.		

Reference	These channels contain the following values for the camera's reference point:		
	Motion Path	A pop-up menu provides a choice of four types of motion path spline:	
		Linear	See "Linear" on page -3 for an explanation.
		Natural Cubic	See "Natural Cubic" on page -3 for an explanation.
		Hermite	See "Hermite" on page -3 for an explanation.
		Bezier	See "Bezier" on page -3 for an explanation.
	Velocity	The relative velocity of the camera's reference point. The value is equivalent to the height of the teeter bar in the Camera Velocity window, described in the section "Graph Elements" (page 17-6) in *Chapter 17: The Velocity Windows*.	
	Acceleration	The acceleration of the camera's reference point. The value is equivalent to the bias of the speed curve in the Camera Velocity window, described in the section "Graph Elements" (page 17-6) in *Chapter 17: The Velocity Windows*.	
	X	The camera reference point's X coordinate.	
	Y	The camera reference point's Y coordinate.	
	Z	The camera reference point's Z coordinate.	
Roll (Z)	These channels contain the following values for the camera's roll angle (Z axis rotation):		
	Motion Path	A pop-up menu provides a choice of three types of motion path spline:	
		Linear	See "Linear" on page -3 for an explanation.
		Natural Cubic	See "Natural Cubic" on page -3 for an explanation.
		Hermite	See "Hermite" on page -3 for an explanation.
	Velocity	The relative velocity of the camera's roll. The value is equivalent to the height of the teeter bar in the Camera Velocity window, described in the section "Graph Elements" (page 17-6) in *Chapter 17: The Velocity Windows*.	
	Acceleration	The acceleration of the camera's roll. The value is equivalent to the bias of the speed curve in the Camera Velocity window, described in the section "Graph Elements" (page 17-6) in *Chapter 17: The Velocity Windows*.	
	Data	The camera's angle of roll (Z axis rotation) in degrees.	
Focal Length	A value for the camera lens' focal length.		

Appendix B Light Data Channels

Appendix B Light Data Channels

Listing of Light Data Channels

This appendix lists the data channels available for lights in the project, as they appear in the Project Window. For information on the Project window and its use, refer to *Chapter 8: The Project Window*.

W

Values for light attributes can also be set in the Light Info window, as described in Chapter 11: The Light Info Window, and the Light Velocity window, as described in Chapter 17: The Velocity Windows.

Attach	This channel contains the name of the object, for a given frame, to which the light is attached (if any). Lights are attached to other objects with the Attach to Object tool, discussed in the section "The Attach to Object Tool" (page 19-24) in *Chapter 19: The Tool Palette*.
Track	This channel contains, for a given frame, the name of the object at which the light is forced to look (if any). Lights are forced to look at other objects with the Look at Object tool, discussed in the section "The Look at Object Tool" (page 19-21) in *Chapter 19: The Tool Palette*.
Auto-Rotate	This channel contains the name of the light's auto rotation sequence in effect (if any) for a given frame. Auto rotation is set with the Auto Rotate Object tool, discussed in the section "The Attach to Object Tool" (page 19-24) in *Chapter 19: The Tool Palette*.
Visibility	This channel indicates whether or not the light will be visible for a given frame. You can control the visibility on a frame by frame basis, as discussed in the section "The Object Status Panel" (page 8-17) in *Chapter 8: The Project Window*.

Position				These channels contain the following values for the light’s position:
	Motion Path			A pop-up menu provides a choice of four types of motion path spline:
		Linear		These are not actually splines, but rather simple lines, resulting in a very mechanical (sometimes awkward) motion.
		Natural Cubic		These splines give a fluid motion, but have limited precision since editing one keyframe along the spline will change the whole curvature of the spline.
		Hermite		These splines also give a fluid motion, but are more versatile and precise than natural cubic splines because editing one keyframe along the spline will not change the whole curvature of the spline. The following values are available for editing:
			Hermite Tension	This value determines the tautness (tension) of the segment between keyframes.
			Hermite Bias	This value determines how much the segment leans (is biased) toward one end or the other.
			Hermite Continuity	This value determines the smoothness (continuity) of the connection between the path and its endpoints.
		Bezier		These splines are the same splines used by popular Macintosh drawing programs such as Aldus Freehand®, Adobe Illustrator® and Canvas™, however ElectricImage Bezier splines are 3-dimensional.
	Velocity			The relative velocity of the light’s position. The value is equivalent to the height of the teeter bar in the Light Velocity window, described in the section “Graph Elements” (page 17-6) in *Chapter 17: The Velocity Windows*.
	Acceleration			The acceleration of the light’s position. The value is equivalent to the bias of the speed curve in the Light Velocity window, described in the section “Graph Elements” (page 17-6) in *Chapter 17: The Velocity Windows*.
	X			The light position’s X coordinate.
	Y			The light position’s Y coordinate.
	Z			The light position’s Z coordinate.

<table>
<tr><td rowspan="12">Reference</td><td colspan="3">These channels contain the following values for the light’s reference point:</td></tr>
<tr><td rowspan="5">Motion Path</td><td colspan="2">A pop-up menu provides a choice of four types of motion path spline:</td></tr>
<tr><td>Linear</td><td>See “Linear” on page B-3 for an explanation.</td></tr>
<tr><td>Natural Cubic</td><td>See “Natural Cubic” on page B-3 for an explanation.</td></tr>
<tr><td>Hermite</td><td>See “Hermite” on page B-3 for an explanation.</td></tr>
<tr><td>Bezier</td><td>See “Bezier” on page B-3 for an explanation.</td></tr>
<tr><td>Velocity</td><td colspan="2">The relative velocity of the light’s reference point. The value is equivalent to the height of the teeter bar in the Light Velocity window, described in the section “Graph Elements” (page 17-6) in Chapter 17: The Velocity Windows.</td></tr>
<tr><td>Acceleration</td><td colspan="2">The acceleration of the light’s reference point. The value is equivalent to the bias of the speed curve in the Light Velocity window, described in the section “Graph Elements” (page 17-6) in Chapter 17: The Velocity Windows.</td></tr>
<tr><td>X</td><td colspan="2">The light reference point’s X coordinate.</td></tr>
<tr><td>Y</td><td colspan="2">The light reference point’s Y coordinate.</td></tr>
<tr><td>Z</td><td colspan="2">The light reference point’s Z coordinate.</td></tr>
<tr><td colspan="3" style="display:none"></td></tr>
<tr><td>Inside Angle (Spot mode)</td><td colspan="3">This channel contains a value, in degrees, for the size of the angle within which is the area of full illumination from the spot. The area between the inner and outer angles is a transition between full illumination and none.</td></tr>
<tr><td>Outside Angle (Spot mode)</td><td colspan="3">This channel contains a value, in degrees, for the size of the angle within which is the area of illumination from the spot. The area outside this angle will not be illuminated by the spot. The area between the outer and inner angles is a transition area between full illumination and none.</td></tr>
<tr><td>Dropoff Radius</td><td colspan="3">This channel, for all light modes except Parallel and Ambient, contains a value for the distance at which the light’s illumination drops off.</td></tr>
<tr><td>Dropoff Factor</td><td colspan="3">This channel contains a value for the rate at which the light’s illumination drops off from full illumination to none.</td></tr>
<tr><td>Intensity</td><td colspan="3">This channel contains a value for the light’s brightness. It is used to control the intensity of the light, especially useful when multiple lights are being used.</td></tr>
<tr><td rowspan="4">Color</td><td colspan="3">These channels contain the following values for the light’s color:</td></tr>
<tr><td>Red</td><td colspan="2">256 levels of red (0-255)</td></tr>
<tr><td>Green</td><td colspan="2">256 levels of green (0-255)</td></tr>
<tr><td>Blue</td><td colspan="2">256 levels of blue (0-255)</td></tr>
</table>

<table>
<tr><td rowspan="4">Glow Outside Color</td><td colspan="2">These channels contain the following values for the glow effect’s outside color:</td></tr>
<tr><td>Red</td><td>256 levels of red (0-255)</td></tr>
<tr><td>Green</td><td>256 levels of green (0-255)</td></tr>
<tr><td>Blue</td><td>256 levels of blue (0-255)</td></tr>
<tr><td rowspan="4">Glow Inside Color</td><td colspan="2">These channels contain the following values for the glow effect’s inside color:</td></tr>
<tr><td>Red</td><td>256 levels of red (0-255)</td></tr>
<tr><td>Green</td><td>256 levels of green (0-255)</td></tr>
<tr><td>Blue</td><td>256 levels of blue (0-255)</td></tr>
<tr><td>Inside Glow Radius</td><td colspan="2">This channel contains a value for the distance from the center of the glow to the outer edge of its opaque region, where the glow starts to transition from opacity to transparency.</td></tr>
<tr><td>Outside Glow Radius</td><td colspan="2">This channel contains a value for the distance from the center of the glow to the outer edge of its transparent region, beyond which it is no longer visible.</td></tr>
<tr><td>Glow Exponential</td><td colspan="2">This channel indicates the rate at which the glow effect transitions from opaque to transparent.</td></tr>
<tr><td rowspan="4">Fog Outside Color</td><td colspan="2">These channels contain the following values for the fog effect’s outside color:</td></tr>
<tr><td>Red</td><td>256 levels of red (0-255)</td></tr>
<tr><td>Green</td><td>256 levels of green (0-255)</td></tr>
<tr><td>Blue</td><td>256 levels of blue (0-255)</td></tr>
<tr><td rowspan="4">Fog Inside Color</td><td colspan="2">These channels contain the following values for the fog effect’s inside color:</td></tr>
<tr><td>Red</td><td>256 levels of red (0-255)</td></tr>
<tr><td>Green</td><td>256 levels of green (0-255)</td></tr>
<tr><td>Blue</td><td>256 levels of blue (0-255)</td></tr>
<tr><td>Inside Fog Radius</td><td colspan="2">This channel contains a value for the distance from the center of the fog to the outer edge of its opaque region, where the fog starts to transition from opacity to transparency.</td></tr>
<tr><td>Outside Fog Radius</td><td colspan="2">This channel contains a value for the distance from the center of the fog to the outer edge of its transparent region, beyond which it is no longer visible.</td></tr>
<tr><td>Fog Exponential</td><td colspan="2">This channel indicates the rate at which the fog effect transitions from opaque to transparent.</td></tr>
</table>

Shadow Buffer Size	This channel contains a value for the light's shadow buffer resolution.
Shadow Gap	This channel contains a value for the minimum distance between a surface casting a shadow and the point at which a shadow first appears.
Shadow Transition	This channel contains a value for the fade-in distance between a surface casting a shadow and the surface upon which the shadow appears.
Shadow Softness	This channel contains a value affecting how the shadow's edge appears.
Shadow Smoothing	This channel contains a value for the softness of shadow edges when viewed up close.
Shadow Samples	This channel contains a value for the number of shadow samples per pixel.

Appendix C Group Data Channels

Appendix C Group Data Channels

Listing of Group Data Channels

This appendix lists the data channels available for groups in the project, as they appear in the Project window. For information on the Project window and its use, refer to *Chapter 8: The Project Window*.

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Values for group attributes can also be set in the Group Info window, as described in Chapter 13: The Group Info Window, the Surface Editor, as described in Chapter 18: The Surface Editor, the Group Deformation window, as described in Chapter 16: The Group Deformation Window, and the Model Velocity window, as described in the section "Model Velocity" (page 17-11) in Chapter 17: The Velocity Windows.

Attach	This channel contains the name of the object, for a given frame, to which the group is attached (if any). Groups are attached to other objects with the Attach to Object tool, discussed in the section "The Attach to Object Tool" (page 19-24) in *Chapter 19: The Tool Palette*.
Track	This channel contains, for a given frame, the name of the object at which the group is forced to look (if any). Groups are forced to look at other objects with the Look at Object tool, discussed in the section "The Look at Object Tool" (page 19-21) in *Chapter 19: The Tool Palette*.
Auto-Rotate	This channel contains the name of the group's auto rotation sequence in effect (if any) for a given frame. Auto rotation is set with the Auto Rotate Object tool, discussed in the section "The Attach to Object Tool" (page 19-24) in *Chapter 19: The Tool Palette*.
Visibility	This channel indicates whether or not the group will be visible for a given frame. You can control the visibility on a frame by frame basis, as discussed in the section "The Object Status Panel" (page 8-17) in *Chapter 8: The Project Window*.

<table>
<tr><td rowspan="14">Position</td><td colspan="4">These channels contain the following values for the group’s position:</td></tr>
<tr><td rowspan="8">Motion Path</td><td colspan="3">A pop-up menu provides a choice of four types of motion path spline:</td></tr>
<tr><td>Linear</td><td colspan="2">These are not actually splines, but rather simple lines, resulting in a very mechanical (sometimes awkward) motion.</td></tr>
<tr><td>Natural Cubic</td><td colspan="2">These splines give a fluid motion, but have limited precision since editing one keyframe along the spline will change the whole curvature of the spline.</td></tr>
<tr><td rowspan="4">Hermite</td><td colspan="2">These splines also give a fluid motion, but are more versatile and precise than natural cubic splines because editing one keyframe along the spline will not change the whole curvature of the spline. The following values are available for editing:</td></tr>
<tr><td>Hermite Tension</td><td>This value determines the tautness (tension) of the segment between keyframes.</td></tr>
<tr><td>Hermite Bias</td><td>This value determines how much the segment leans (is biased) toward one end or the other.</td></tr>
<tr><td>Hermite Continuity</td><td>This value determines the smoothness (continuity) of the connection between the path and its endpoints.</td></tr>
<tr><td>Bezier</td><td colspan="2">These splines are the same splines used by popular Macintosh drawing programs such as Aldus Freehand®, Adobe Illustrator® and Canvas™, however ElectricImage Bezier splines are 3-dimensional.</td></tr>
<tr><td>Velocity</td><td colspan="3">The relative velocity of the group’s position. The value is equivalent to the height of the teeter bar in the Model Velocity window, described in the section “Graph Elements” (page 17-6) in Chapter 17: The Velocity Windows.</td></tr>
<tr><td>Acceleration</td><td colspan="3">The acceleration of the group’s position. The value is equivalent to the bias of the speed curve in the Model Velocity window, described in the section “Graph Elements” (page 17-6) in Chapter 17: The Velocity Windows.</td></tr>
<tr><td>X</td><td colspan="3">The group position’s X coordinate.</td></tr>
<tr><td>Y</td><td colspan="3">The group position’s Y coordinate.</td></tr>
<tr><td>Z</td><td colspan="3">The group position’s Z coordinate.</td></tr>
</table>

Center	These channels contain the following values for the group’s center point:		
	Motion Path	A pop-up menu provides a choice of four types of motion path spline:	
		Linear	See “Linear” on page C-3 for an explanation.
		Natural Cubic	See “Natural Cubic” on page C-3 for an explanation.
		Hermite	See “Hermite” on page C-3 for an explanation.
		Bezier	See “Bezier” on page C-3 for an explanation.
	Velocity	The relative velocity of the group’s center point. The value is equivalent to the height of the teeter bar in the Model Velocity window, described in the section “Graph Elements” (page 17-6) in *Chapter 17: The Velocity Windows*.	
	Acceleration	The acceleration of the group’s center point. The value is equivalent to the bias of the speed curve in the Model Velocity window, described in the section “Graph Elements” (page 17-6) in *Chapter 17: The Velocity Windows*.	
	X	The center point’s X coordinate.	
	Y	The center point’s Y coordinate.	
	Z	The center point’s Z coordinate.	
X Rotation	These channels contain the following values for the group’s X axis rotation:		
	Motion Path	A pop-up menu provides a choice of three types of motion path spline:	
		Linear	See “Linear” on page C-3 for an explanation.
		Natural Cubic	See “Natural Cubic” on page C-3 for an explanation.
		Hermite	See “Hermite” on page C-3 for an explanation.
	Velocity	The relative velocity of the group’s X axis rotation. The value is equivalent to the height of the teeter bar in the Model Velocity window, described in the section “Graph Elements” (page 17-6) in *Chapter 17: The Velocity Windows*.	
	Acceleration	The acceleration of the group’s X axis rotation. The value is equivalent to the bias of the speed curve in the Model Velocity window, described in the section “Graph Elements” (page 17-6) in *Chapter 17: The Velocity Windows*.	
	Data	The group’s angle of X axis rotation in degrees.	

Y Rotation	These channels contain the following values for the group's Y axis rotation:		
	Motion Path	A pop-up menu provides a choice of three types of motion path spline:	
		Linear	See "Linear" on page C-3 for an explanation.
		Natural Cubic	See "Natural Cubic" on page C-3 for an explanation.
		Hermite	See "Hermite" on page C-3 for an explanation.
	Velocity	The relative velocity of the group's Y axis rotation. The value is equivalent to the height of the teeter bar in the Model Velocity window, described in the section "Graph Elements" (page 17-6) in *Chapter 17: The Velocity Windows*.	
	Acceleration	The acceleration of the group's Y axis rotation. The value is equivalent to the bias of the speed curve in the Model Velocity window, described in the section "Graph Elements" (page 17-6) in *Chapter 17: The Velocity Windows*.	
	Data	The group's angle of Y axis rotation in degrees.	
Z Rotation	These channels contain the following values for the group's Z axis rotation:		
	Motion Path	A pop-up menu provides a choice of three types of motion path spline:	
		Linear	See "Linear" on page C-3 for an explanation.
		Natural Cubic	See "Natural Cubic" on page C-3 for an explanation.
		Hermite	See "Hermite" on page C-3 for an explanation.
	Velocity	The relative velocity of the group's Z axis rotation. The value is equivalent to the height of the teeter bar in the Model Velocity window, described in the section "Graph Elements" (page 17-6) in *Chapter 17: The Velocity Windows*.	
	Acceleration	The acceleration of the group's Z axis rotation. The value is equivalent to the bias of the speed curve in the Model Velocity window, described in the section "Graph Elements" (page 17-6) in *Chapter 17: The Velocity Windows*.	
	Data	The group's angle of Z axis rotation in degrees.	

<table>
<tr><td rowspan="8">X Scale</td><td colspan="3">These channels contain the following values for the group’s X axis scale:</td></tr>
<tr><td rowspan="4">Motion Path</td><td colspan="2">A pop-up menu provides a choice of three types of motion path spline:</td></tr>
<tr><td>Linear</td><td>See “Linear” on page C-3 for an explanation.</td></tr>
<tr><td>Natural Cubic</td><td>See “Natural Cubic” on page C-3 for an explanation.</td></tr>
<tr><td>Hermite</td><td>See “Hermite” on page C-3 for an explanation.</td></tr>
<tr><td>Velocity</td><td colspan="2">The relative velocity of the group’s X axis scale. The value is equivalent to the height of the teeter bar in the Model Velocity window, described in the section “Graph Elements” (page 17-6) in Chapter 17: The Velocity Windows.</td></tr>
<tr><td>Acceleration</td><td colspan="2">The acceleration of the group’s X axis scale. The value is equivalent to the bias of the speed curve in the Model Velocity window, described in the section “Graph Elements” (page 17-6) in Chapter 17: The Velocity Windows.</td></tr>
<tr><td>Data</td><td colspan="2">The group’s X axis scale value.</td></tr>
<tr><td rowspan="8">Y Scale</td><td colspan="3">These channels contain the following values for the group’s Y axis scale:</td></tr>
<tr><td rowspan="4">Motion Path</td><td colspan="2">A pop-up menu provides a choice of three types of motion path spline:</td></tr>
<tr><td>Linear</td><td>See “Linear” on page C-3 for an explanation.</td></tr>
<tr><td>Natural Cubic</td><td>See “Natural Cubic” on page C-3 for an explanation.</td></tr>
<tr><td>Hermite</td><td>See “Hermite” on page C-3 for an explanation.</td></tr>
<tr><td>Velocity</td><td colspan="2">The relative velocity of the group’s Y axis scale. The value is equivalent to the height of the teeter bar in the Model Velocity window, described in the section “Graph Elements” (page 17-6) in Chapter 17: The Velocity Windows.</td></tr>
<tr><td>Acceleration</td><td colspan="2">The acceleration of the group’s Y axis scale. The value is equivalent to the bias of the speed curve in the Model Velocity window, described in the section “Graph Elements” (page 17-6) in Chapter 17: The Velocity Windows.</td></tr>
<tr><td>Data</td><td colspan="2">The group’s Y axis scale value.</td></tr>
</table>

<table>
<tr><td rowspan="7">Z Scale</td><td colspan="3">These channels contain the following values for the group’s Z axis scale:</td></tr>
<tr><td rowspan="4">Motion Path</td><td colspan="2">A pop-up menu provides a choice of three types of motion path spline:</td></tr>
<tr><td>Linear</td><td>See “Linear” on page C-3 for an explanation.</td></tr>
<tr><td>Natural Cubic</td><td>See “Natural Cubic” on page C-3 for an explanation.</td></tr>
<tr><td>Hermite</td><td>See “Hermite” on page C-3 for an explanation.</td></tr>
<tr><td>Velocity</td><td colspan="2">The relative velocity of the group’s Z axis scale. The value is equivalent to the height of the teeter bar in the Model Velocity window, described in the section “Graph Elements” (page 17-6) in Chapter 17: The Velocity Windows.</td></tr>
<tr><td>Acceleration</td><td colspan="2">The acceleration of the group’s Z axis scale. The value is equivalent to the bias of the speed curve in the Model Velocity window, described in the section “Graph Elements” (page 17-6) in Chapter 17: The Velocity Windows.</td></tr>
<tr><td></td><td>Data</td><td colspan="2">The group’s Z axis scale value.</td></tr>
</table>

Color	These channels contain color values for the group’s surface attributes, equivalent to the color settings made in the Surface Editor, as described in the section “Editor Controls” (page 18-5) in *Chapter 18: The Surface Editor*.		
	Surface	These channels contain values for the group’s surface color:	
		Red	256 levels of red (0-255)
		Green	256 levels of green (0-255)
		Blue	256 levels of blue (0-255)
		Alpha	256 levels (0-255)
	Diffuse	These channels contain values for the color bias of the group’s diffuse value:	
		Red	256 levels of red (0-255)
		Green	256 levels of green (0-255)
		Blue	256 levels of blue (0-255)
	Ambient	These channels contain values for the color bias of the group’s ambient value:	
		Red	256 levels of red (0-255)
		Green	256 levels of green (0-255)
		Blue	256 levels of blue (0-255)
	Specular	These channels contain values for the color bias of the group’s specular value:	
		Red	256 levels of red (0-255)
		Green	256 levels of green (0-255)
		Blue	256 levels of blue (0-255)
		Alpha	256 levels (0-255)
	Transparency	These channels contain values for the color bias of the group’s transparency value:	
		Red	256 levels of red (0-255)
		Green	256 levels of green (0-255)
		Blue	256 levels of blue (0-255)
		Alpha	256 levels (0-255)

	Reflectivity	These channels contain values for the color bias of the group's reflectivity value:	
		Red	256 levels of red (0-255)
		Green	256 levels of green (0-255)
		Blue	256 levels of blue (0-255)
	Luminance	These channels contain values for the color bias of the group's luminance value:	
		Red	256 levels of red (0-255)
		Green	256 levels of green (0-255)
		Blue	256 levels of blue (0-255)
		Alpha	256 levels (0-255)
	Edge	These channels contain values for the color bias of the group's edge density value:	
		Red	256 levels of red (0-255)
		Green	256 levels of green (0-255)
		Blue	256 levels of blue (0-255)
		Alpha	256 levels (0-255)
	Specular Index	This channel contains a value for the size of the group's specular highlight.	
	Edge Index	This channel contains a value for the rate of fall-off from transparency in the center of the group to opacity at its edges (when Edge Density is applied).	
	Terminator	This channel contains a value for the rate of fall-off in illumination from the area of the group that is illuminated to the area that is not, thus affecting the size of the transition area.	
	Hilight Dropoff	This channel contains a value for the rate of fall-off from the specular highlight to its surrounding region, thus controlling the relative softness or hardness of the highlight.	

Deformation	These channels contain values for the various deformation attributes, equivalent to the settings made in the Group Deformation window, as described in *Chapter 16: The Group Deformation Window*. These channels appear in the Project window only if a deformation has been defined for the group.				
	Region	For each defined region (Region 1, Region 2, etc.), the following data channels are available:			
		Position	These channels contain the following values for the deformation region’s position (relative to the center of the group):		
			Motion Path	A pop-up menu provides a choice of four types of motion path spline:	
				Linear	See “Linear” on page C-3.
				Natural Cubic	See “Natural Cubic” on page C-3.
				Hermite	See “Hermite” on page C-3.
				Bezier	See “Bezier” on page C-3.
			Velocity	The relative velocity of the deformation region’s position. The value is equivalent to the height of the teeter bar in the Model Velocity window, described in the section “Graph Elements” (page 17-6) in *Chapter 17: The Velocity Windows*.	
			Accelera-tion	The acceleration value of the deformation region’s position. The value is equivalent to the bias of the speed curve in the Model Velocity window, described in section “Graph Elements” (page 17-6) in *Chapter 17: The Velocity Windows*.	
			X	The deformation region’s X coordinate position, relative to the center point of the group.	
			Y	The deformation region’s Y coordinate position, relative to the center point of the group.	
			Z	The deformation region’s Z coordinate position, relative to the center point of the group.	

		Xrot	These channels contain the following values for the deformation region's X axis rotation (relative to the center of the group):		
			Motion Path	A pop-up menu provides a choice of three types of motion path spline:	
				Linear	See "Linear" on page C-3.
				Natural Cubic	See "Natural Cubic" on page C-3.
				Hermite	See "Hermite" on page C-3.
			Velocity	A value for the relative velocity of the deformation region's X axis rotation.	
			Accelera-tion	A value for the acceleration of the deformation region's X axis rotation.	
			Data	A value in degrees for the deformation region's rotation on its X axis.	
		Yrot	These channels contain the following values for the deformation region's Y axis rotation (relative to the center of the group):		
			Motion Path	A pop-up menu provides a choice of three types of motion path spline:	
				Linear	See "Linear" on page C-3.
				Natural Cubic	See "Natural Cubic" on page C-3.
				Hermite	See "Hermite" on page C-3.
			Velocity	A value for the relative velocity of the deformation region's Y axis rotation.	
			Accelera-tion	A value for the acceleration of the deformation region's Y axis rotation.	
			Data	A value in degrees for the deformation region's rotation on its Y axis.	

		Z rot	These channels contain the following values for the deformation region’s Z axis rotation (relative to the center of the group):		
			Motion Path	A pop-up menu provides a choice of three types of motion path spline:	
				Linear	See “Linear” on page C-3.
				Natural Cubic	See “Natural Cubic” on page C-3.
				Hermite	See “Hermite” on page C-3.
			Velocity	A value for the relative velocity of the deformation region’s Z axis rotation.	
			Accelera-tion	A value for the acceleration of the deformation region’s Z axis rotation.	
			Data	A value in degrees for the deformation region’s rotation on its Z axis.	
		Min	These channels contain the following values for the deformation region’s minimum face coordinates:		
			Motion Path	A pop-up menu provides a choice of four types of motion path spline:	
				Linear	See “Linear” on page C-3.
				Natural Cubic	See “Natural Cubic” on page C-3.
				Hermite	See “Hermite” on page C-3.
				Bezier	See “Bezier” on page C-3.
			Velocity	A value for the relative velocity of the region’s minimum face coordinates.	
			Accelera-tion	A value for the acceleration of the region’s minimum face coordinates.	
			X	A value for the region’s minimum face X coordinate position, relative to the center point of the region.	
			Y	A value for the region’s maximum face Y coordinate position, relative to the center point of the region.	
			Z	A value for the region’s maximum face Z coordinate position, relative to the center point of the region.	

		Max	These channels contain the following values for the deformation region's maximum face coordinates:		
			Motion Path	A pop-up menu provides a choice of four types of motion path spline:	
				Linear	See "Linear" on page C-3.
				Natural Cubic	See "Natural Cubic" on page C-3.
				Hermite	See "Hermite" on page C-3.
				Bezier	See "Bezier" on page C-3.
			Velocity	A value for the relative velocity of the region's maximum face coordinates.	
			Accelera-tion	A value for the acceleration of the region's maximum face coordinates.	
			X	A value for the region's maximum face X coordinate position, relative to the center point of the region.	
			Y	A value for the region's maximum face Y coordinate position, relative to the center point of the region.	
			Z	A value for the region's maximum face Z coordinate position, relative to the center point of the region.	

		Scale	If a Scale deformation is defined, as discussed in the section “Scale” (page 16-13) in *Chapter 16: The Group Deformation Window*, these channels are available:		
			Percent-age	These channels contain values for the percentage amount of the Scale deformation:	
				Motion Path	A pop-up menu provides a choice of three types of motion path spline: **Linear** (see “Linear” on page C-3 for an explanation). **Natural Cubic** (see “Natural Cubic” on page C-3 for an explanation). **Hermite** (see “Hermite” on page C-3 for an explanation).
				Velocity	The relative velocity of the deformation percentage.
				Accelera-tion	The acceleration value of the deformation percentage.
				Data	The percentage of deformation.
		Shear	If a Shear deformation is defined, as discussed in the section “Shear” (page 16-14) in *Chapter 16: The Group Deformation Window*, these channels are available:		
			Angle	These channels contain values for the angle amount of the Shear deformation:	
				Motion Path	A pop-up menu provides a choice of three types of motion path spline: **Linear** (see “Linear” on page C-3 for an explanation). **Natural Cubic** (see “Natural Cubic” on page C-3 for an explanation). **Hermite** (see “Hermite” on page C-3 for an explanation).
				Velocity	The relative velocity of the deformation angle.
				Accelera-tion	The acceleration value of the deformation angle.
				Data	The angle of deformation.

<table>
<tr><td rowspan="12"></td><td rowspan="12"></td><td rowspan="6">Twist</td><td colspan="3">If a Twist deformation is defined, as discussed in the section “Twist” (page 16-15) in Chapter 16: The Group Deformation Window, these channels are available:</td></tr>
<tr><td rowspan="5">Angle</td><td colspan="2">These channels contain values for the angle amount of the Twist deformation:</td></tr>
<tr><td>Motion Path</td><td>A pop-up menu provides a choice of three types of motion path spline:
Linear (see “Linear” on page C-3 for an explanation).
Natural Cubic (see “Natural Cubic” on page C-3 for an explanation).
Hermite (see “Hermite” on page C-3 for an explanation).</td></tr>
<tr><td>Velocity</td><td>The relative velocity of the deformation angle.</td></tr>
<tr><td>Accelera-tion</td><td>The acceleration value of the deformation angle.</td></tr>
<tr><td>Data</td><td>The angle of deformation.</td></tr>
<tr><td rowspan="6">Taper</td><td colspan="3">If a Taper deformation is defined, as discussed in the section “Taper” (page 16-16) in Chapter 16: The Group Deformation Window, these channels are available:</td></tr>
<tr><td rowspan="5">Percent-age</td><td colspan="2">These channels contain values for the percentage amount of the Taper deformation:</td></tr>
<tr><td>Motion Path</td><td>A pop-up menu provides a choice of three types of motion path spline:
Linear (see “Linear” on page C-3 for an explanation).
Natural Cubic (see “Natural Cubic” on page C-3 for an explanation).
Hermite (see “Hermite” on page C-3 for an explanation).</td></tr>
<tr><td>Velocity</td><td>The relative velocity of the deformation percentage.</td></tr>
<tr><td>Accelera-tion</td><td>The acceleration value of the deformation percentage.</td></tr>
<tr><td>Data</td><td>The percentage of deformation.</td></tr>
</table>

		Bend	If a Bend deformation is defined, as discussed in the section “Bend” (page 16-18) in *Chapter 16: The Group Deformation Window*, these channels are available:		
			Angle	These channels contain values for the angle amount of the Bend deformation:	
				Motion Path	A pop-up menu provides a choice of three types of motion path spline: **Linear** (see “Linear” on page C-3 for an explanation). **Natural Cubic** (see “Natural Cubic” on page C-3 for an explanation). **Hermite** (see “Hermite” on page C-3 for an explanation).
				Velocity	The relative velocity of the deformation angle.
				Accelera-tion	The acceleration value of the deformation angle.
				Data	The angle of deformation.
		Bulge	If a Bulge deformation is defined, as discussed in the section “Bulge” (page 16-19) in *Chapter 16: The Group Deformation Window*, these channels are available:		
			Percent-age	These channels contain values for the percentage amount of the Bulge deformation:	
				Motion Path	A pop-up menu provides a choice of three types of motion path spline: **Linear** (see “Linear” on page C-3 for an explanation). **Natural Cubic** (see “Natural Cubic” on page C-3 for an explanation). **Hermite** (see “Hermite” on page C-3 for an explanation).
				Velocity	The relative velocity of the deformation percentage.
				Accelera-tion	The acceleration value of the deformation percentage.
				Data	The percentage of deformation.

		Linear Wave	If a Linear Wave deformation is defined, as discussed in the section “Linear Wave” (page 16-21) in *Chapter 16: The Group Deformation Window*, these channels are available:		
			Amplitude	These channels contain values for the amplitude amount of the Linear Wave deformation:	
				Motion Path	A pop-up menu provides a choice of three types of motion path spline: **Linear** (see “Linear” on page C-3 for an explanation). **Natural Cubic** (see “Natural Cubic” on page C-3 for an explanation). **Hermite** (see “Hermite” on page C-3 for an explanation).
				Velocity	The relative velocity of the deformation amplitude.
				Accelera-tion	The acceleration value of the deformation amplitude.
				Data	The amplitude of the deformation.
			Frequency	These channels contain values for the frequency of the Linear Wave deformation:	
				Motion Path	A pop-up menu provides a choice of three types of motion path spline: **Linear** (see “Linear” on page C-3 for an explanation). **Natural Cubic** (see “Natural Cubic” on page C-3 for an explanation). **Hermite** (see “Hermite” on page C-3 for an explanation).
				Velocity	The relative velocity of the deformation frequency.
				Accelera-tion	The acceleration value of the deformation frequency.
				Data	The frequency of the deformation.

			Phase	These channels contain values for the phase of the Linear Wave deformation:	
				Motion Path	A pop-up menu provides a choice of three types of motion path spline: **Linear** (see “Linear” on page C-3 for an explanation). **Natural Cubic** (see “Natural Cubic” on page C-3 for an explanation). **Hermite** (see “Hermite” on page C-3 for an explanation).
				Velocity	The relative velocity of the deformation phase.
				Accelera-tion	The acceleration value of the deformation phase.
				Data	The phase of the deformation.
		Circular Wave	If a Circular Wave deformation is defined, as discussed in the section “Circular Wave” (page 16-23) in *Chapter 16: The Group Deformation Window*, these channels are available:		
			Outer Radius	These channels contain values for the outer radius of the Circular Wave deformation:	
				Motion Path	A pop-up menu provides a choice of three types of motion path spline: **Linear** (see “Linear” on page C-3 for an explanation). **Natural Cubic** (see “Natural Cubic” on page C-3 for an explanation). **Hermite** (see “Hermite” on page C-3 for an explanation).
				Velocity	The relative velocity of the outer radius.
				Accelera-tion	The acceleration value of the outer radius.
				Data	The outer radius of the deformation.

		Stretch	If a Stretch deformation is defined, as discussed in the section "Stretch" (page 16-25) in *Chapter 16: The Group Deformation Window*, these channels are available:		
			Strength	These channels contain values for the strength of the Stretch deformation:	
				Motion Path	A pop-up menu provides a choice of three types of motion path spline: **Linear** (see "Linear" on page C-3 for an explanation). **Natural Cubic** (see "Natural Cubic" on page C-3 for an explanation). **Hermite** (see "Hermite" on page C-3 for an explanation).
				Velocity	The relative velocity of the strength.
				Accelera-tion	The acceleration value of the strength.
				Data	The strength of deformation.
			Blend Factor	These channels contain values for the blend factor of the Stretch deformation:	
				Motion Path	A pop-up menu provides a choice of three types of motion path spline: **Linear** (see "Linear" on page C-3 for an explanation). **Natural Cubic** (see "Natural Cubic" on page C-3 for an explanation). **Hermite** (see "Hermite" on page C-3 for an explanation).
				Velocity	The relative velocity of the blend factor.
				Accelera-tion	The acceleration value of the blend factor.
				Data	The blend factor of the deformation.

		Bezier	If a Bezier deformation is defined, as discussed in the section “Bezier” (page 16-27) in *Chapter 16: The Group Deformation Window*, these channels are available:		
			Strength	These channels contain values for the strength of the Bezier deformation:	
				Motion Path	A pop-up menu provides a choice of three types of motion path spline: **Linear** (see “Linear” on page C-3 for an explanation). **Natural Cubic** (see “Natural Cubic” on page C-3 for an explanation). **Hermite** (see “Hermite” on page C-3 for an explanation).
				Velocity	The relative velocity of the strength.
				Accelera-tion	The acceleration value of the strength.
				Data	The strength of deformation.
			Min Anchor Point	These channels contain values for the minimum anchor point of the Bezier deformation:	
				Motion Path	A pop-up menu provides a choice of four types of motion path spline: **Linear** (see “Linear” on page C-3 for an explanation). **Natural Cubic** (see “Natural Cubic” on page C-3 for an explanation). **Hermite** (see “Hermite” on page C-3 for an explanation). **Bezier** (see “Bezier” on page C-3 for an explanation).
				Velocity	The relative velocity of the minimum anchor point.
				Accelera-tion	The acceleration value of the minimum anchor point.
				Data	The minimum anchor point of the deformation.

			Min Control Point	These channels contain values for the minimum control point of the Bezier deformation:	
				Motion Path	A pop-up menu provides a choice of four types of motion path spline: **Linear** (see “Linear” on page C-3 for an explanation). **Natural Cubic** (see “Natural Cubic” on page C-3 for an explanation). **Hermite** (see “Hermite” on page C-3 for an explanation). **Bezier** (see “Bezier” on page C-3 for an explanation).
				Velocity	The relative velocity of the minimum control point.
				Accelera-tion	The acceleration value of the minimum control point.
				Data	The minimum control point of the deformation.
			Min Spin Point	These channels contain values for the minimum spin point of the Bezier deformation:	
				Motion Path	A pop-up menu provides a choice of four types of motion path spline: **Linear** (see “Linear” on page C-3 for an explanation). **Natural Cubic** (see “Natural Cubic” on page C-3 for an explanation). **Hermite** (see “Hermite” on page C-3 for an explanation). **Bezier** (see “Bezier” on page C-3 for an explanation).
				Velocity	The relative velocity of the minimum spin point.
				Accelera-tion	The acceleration value of the minimum spin point.
				Data	The minimum spin point of the deformation.

			Max Anchor Point	These channels contain values for the maximum anchor point of the Bezier deformation:	
				Motion Path	A pop-up menu provides a choice of four types of motion path spline: **Linear** (see "Linear" on page C-3 for an explanation). **Natural Cubic** (see "Natural Cubic" on page C-3 for an explanation). **Hermite** (see "Hermite" on page C-3 for an explanation). **Bezier** (see "Bezier" on page C-3 for an explanation).
				Velocity	The relative velocity of the maximum anchor point.
				Accelera-tion	The acceleration value of the maximum anchor point.
				Data	The maximum anchor point of the deformation.
			Max Control Point	These channels contain values for the maximum control point of the Bezier deformation:	
				Motion Path	A pop-up menu provides a choice of four types of motion path spline: **Linear** (see "Linear" on page C-3 for an explanation). **Natural Cubic** (see "Natural Cubic" on page C-3 for an explanation). **Hermite** (see "Hermite" on page C-3 for an explanation). **Bezier** (see "Bezier" on page C-3 for an explanation).
				Velocity	The relative velocity of the maximum control point.
				Accelera-tion	The acceleration value of the maximum control point.
				Data	The maximum control point of the deformation.

			Max Spin Point	These channels contain values for the maximum spin point of the Bezier deformation:	
				Motion Path	A pop-up menu provides a choice of four types of motion path spline: **Linear** (see “Linear” on page C-3 for an explanation). **Natural Cubic** (see “Natural Cubic” on page C-3 for an explanation). **Hermite** (see “Hermite” on page C-3 for an explanation). **Bezier** (see “Bezier” on page C-3 for an explanation).
				Velocity	The relative velocity of the maximum spin point.
				Accelera-tion	The acceleration value of the maximum spin point.
				Data	The maximum spin point of the deformation.

Appendix D Sound Data Channels

Appendix D Sound Data Channels

Table of Sound Data Channels

This appendix lists the data channels available for soundtracks in a project, as they appear in the Project Window. For information on the Project window and its use, refer to *Chapter 8: The Project Window*.

Mono	This channel displays the digitized sound wave for a monaural signal. The horizontal axis is time and the vertical axis is amplitude.
Stereo Left	This channel displays the digitized sound wave for the left channel of a stereo signal. The horizontal axis is time and the vertical axis is amplitude.
Stereo Right	This channel displays the digitized sound wave for the right channel of a stereo signal. The horizontal axis is time and the vertical axis is amplitude.
Other channels	If the signal contains additional channels, they are assigned the names **Center**, **Surround Left**, **Surround Right**, and **Subwoofer**.

Appendix E Keyboard/Mouse Commands

Appendix E Keyboard/Mouse Commands

Conventions

Keyboard Symbols

The following symbols are used to represent specific keys:

⌘ **Command key**

⌥ **Option key**

CTRL **Control key**

⇧ **Shift key**

Using the Tables

To achieve the desired result as listed in the right column, press the key(s) shown in the left column while performing the mouse action described in the middle column (if any). When two or more keys are shown, hold down the keys simultaneously.

World View Window Controls

Figure E.1 lists keyboard/mouse actions available for use in the World View windows

Figure E.1 World View window keyboard/mouse controls

Press Key(s)	+ Mouse Action	Result
⌥	Click zoom button.	Fit world size into window.
⌥	Click Zoom Window tool.	Zoom out.
⌥	Click and drag rectangle.	Zoom to selected area.
CTRL	Click and drag object part (camera and lights only).	Constrain movement along the reference vector.
⌥ CTRL	Click and drag object part.	Rotate object on X axis.
⌘ CTRL	Click and drag object part.	Rotate object on Y axis.
⌘ ⌥ CTRL	Click and drag object part.	Rotate object on Z axis.
CTRL	Click and drag group center.	Drag group center.
Arrow key		Move selection in frontmost window by 1 pixel.
⇧ Arrow key		Move selection in frontmost window by 10 pixels.
⌥	Click Shading button.	Open pop-up menu for drawing preferences.
⌥	Click Preview button.	Open pop-up menu for preview preferences.
⌘	Double-click group.	Open Group Texture window for group.
⌘ ⌥	Double-click group.	Open Group Link window for group.
⌘ CTRL	Double-click group.	Open Group Deformation window for group.
⌘	Double-click light.	Select light color.
⌥	Click in title bar.	Select new projection.
CTRL	Click and drag Bezier handle.	Dolly the handle.
⌘	Click and drag Bezier handle.	Realign handles to create continuous curve.
⌘ ⌥	Click and drag Bezier handle.	Break handles to create non-continuous curve.

Camera View Window Controls

Figure E.2 lists keyboard/mouse actions available for use in the Camera View window.

Figure E.2 Camera View window keyboard/mouse controls

Press Key(s)	+ Mouse Action	Result
⌥	Click Shading button.	Open pop-up menu for drawing preferences.
⌥	Click Preview button.	Open pop-up menu for preview preferences.

Project Window Controls

Figure E.3 lists keyboard/mouse actions available for use in the Project window.

Figure E.3 Project window keyboard/mouse controls

Press Key(s)	+ Mouse Action	Result
⌘	Click in data cell.	Select all data cells in row.
⌥	Click zoom button in Time mode.	Fit timing size into window.
⌥	Click flags in status panel (flat view).	Set elements down the list in the same class to the toggled value.
⌥	Click flags in status panel (hierarchical view).	Set children to the toggled value.
⌘	Double-click soundtrack icon.	Play/stop selected soundtrack.
⌘	Double-click group.	Open Group Texture window for group.
⌘ ⌥	Double-click group.	Open Group Link window for group.
⌘ CTRL	Double-click group.	Open Group Deformation window for group.

QuickTime Window Controls

Figure E.4 lists keyboard/mouse actions available for use in the QuickTime display window.

Figure E.4 QuickTime window keyboard/mouse controls

Press Key(s)	+ Mouse Action	Result
⌥	Click in title bar.	Select new QuickTime option.

Velocity Window Controls

Figure E.5 lists keyboard/mouse actions available for use in the Velocity windows.

Figure E.5 Velocity window keyboard/mouse controls

Press Key(s)	+ Mouse Action	Result
⌥	Click zoom button.	Fit velocity size into window.
⌘	Click zoom out button.	Shrink velocity graph size.
⌘	Click zoom in button.	Expand velocity graph size.
⌥	Click and drag on keyframe bar.	Drag without snap to frame.
⇧	Click and drag intersection of keyframe and teeter bars.	Drag time and velocity.

Light Info Window Controls

Figure E.6 lists keyboard/mouse actions available for use in the Light Info window.

Figure E.6 Light Info window keyboard/mouse controls

Press Key(s)	+ Mouse Action	Result
⌥	Click button/pop-up.	Set all lights to value.
⌘ ⌥	Click button/pop-up.	Set remaining lights to value.
⌘ ⌥ ⇧	Click button/pop-up.	Set all children to value.
⌥ ⇧	Click button/pop-up.	Set immediate children to value.

Group Info Window Controls

Figure E.7 lists keyboard/mouse actions available for use in the Group Info window.

Figure E.7 Group Info window keyboard/mouse controls

Press Key(s)	+ Mouse Action	Result
⌥	Click button/pop-up.	Set all groups to value.
⌘ ⌥	Click button/pop-up.	Set remaining groups to value.
⌘ ⌥ ⇧	Click button/pop-up.	Set all children to value.
⌥ ⇧	Click button/pop-up.	Set immediate children to value.

Group Link Window Controls

Figure E.8 lists keyboard/mouse actions available for use in the Group Link window.

Figure E.8 Group Link window keyboard/mouse controls

Press Key(s)	+ Mouse Action	Result
⌘ ⌥ CTRL	Click and drag gnome.	Rotate Z axis.
⌘ CTRL	Click and drag gnome.	Rotate Y axis.
⌥ CTRL	Click and drag gnome.	Rotate X axis.
⌥	Click zoom button.	Fit world size into window.
⌥	Click Zoom Window tool.	Zoom out.
⌥	Click and drag rectangle.	Zoom to selected area.
⌘	Click in content.	Create new selection area if in texture.
⌥	Click button/pop-up.	Set all groups to value.
⌘ ⌥	Click button/pop-up.	Set remaining groups to value.
⌘ ⌥ ⇧	Click button/pop-up.	Set all children to value.
⌥ ⇧	Click button/pop-up.	Set immediate children to value.

Group Texture Window Controls

Figure E.9 lists keyboard/mouse actions available for use in the Group Texture window.

Figure E.9 Group Texture window keyboard/mouse controls

Press Key(s)	+ Mouse Action	Result
⌘ ⌥ CTRL	Click and drag gnome.	Rotate Z axis.
⌘ CTRL	Click and drag gnome.	Rotate Y axis.
⌥ CTRL	Click and drag gnome.	Rotate X axis.
⌥	Click zoom button.	Fit world size into window.
⌥	Click Zoom Window tool.	Zoom out.
⌥	Click and drag rectangle.	Zoom to selected area.
⌘	Click in content.	Create new selection area if in texture.
⌥	Click button/pop-up.	Set all groups to value.
⌘ ⌥	Click button/pop-up.	Set remaining groups to value.
⌘ ⌥ ⇧	Click button/pop-up.	Set all children to value.
⌥ ⇧	Click button/pop-up.	Set immediate children to value.

Tool and Object Palette Controls

Figure E.10 lists keyboard/mouse actions available for use in the Velocity windows.

Figure E.10 Palette keyboard/mouse controls

Press Key(s)	+ Mouse Action	Result
⌘	Click Translation icon.	Show custom drag angle when in custom drag mode.
⌘	Click Deformations tool.	Toggle deform enable bit.
⌘	Click a plug-in icon.	Show plug-in information.
⌥	Click Unlink icon.	Reset prerotations when unlinking.

Render Control Window Controls

Figure E.11 lists keyboard/mouse actions available for use in the Velocity windows.

Figure E.11 Render Control window keyboard/mouse controls

Press Key(s)	+ Mouse Action	Result
CTRL	Click Go.	Select remote camera.

File Menu Controls

Figure E.12 lists keyboard/mouse actions available for use with the File menu.

Figure E.12 File menu keyboard/mouse controls

Press Key(s)	+ Mouse Action	Result
⌘	Choose Add > Plug-in.	Show plug-in information.
⌘	Choose Group Info.	Open Group Texture window for selected group.
⌘ ⌥	Choose Group Info.	Open Group Link window for selected group.
⌘ CTRL	Choose Group Info.	Open Group Deformation window for selected group.
⌘	Choose Light Info.	Select light color.
⌘	Choose Sound Info.	Play/stop selected soundtrack.
CTRL	Choose Projector.	Launch Projector without exiting ElectricImage.

Edit Menu Controls

Figure E.13 lists keyboard/mouse actions available for use with the Edit menu.

Figure E.13 Edit menu keyboard/mouse controls

Press Key(s)	+ Mouse Action	Result
⌥	Choose Default Preferences.	Reset window defaults only.
⌘ ⇧ C	---	Select Special Copy

Windows Menu Controls

Figure E.14 lists keyboard/mouse actions available for use with the Windows menu.

Figure E.14 Windows menu keyboard/mouse controls

Press Key(s)	+ Mouse Action	Result
⌥	Choose Top View.	Reset Top View window to default position and size.
⌥	Choose Front View.	Reset Front View window to default position and size.
⌥	Choose Side View.	Reset Side View window to default position and size.
⌥	Choose Camera View.	Reset Camera View window to default position and size.
⌥	Choose Project.	Reset Project window to default position and size.
⌥	Choose Model Velocity.	Reset velocity window to default position and size.
⌥	Choose Camera Velocity.	Reset velocity window to default position and size.
⌥	Choose Light Velocity.	Reset velocity window to default position and size.

Tools Menu Controls

Figure E.15 lists keyboard/mouse actions available for use in the Velocity windows.

Figure E.15 Tools menu controls

Press Key(s)	+ Mouse Action	Result
⌘	Choose Translation.	Show custom drag angle when in custom drag mode.
⌘	Choose Deformations.	Toggle deform enable bit.
⌥	Choose Unlink from Parent.	Reset prerotations when unlinking.

Special Controls

Figure E.16 lists keyboard/mouse actions available for use in certain specific situations.

Figure E.16 Special controls

Press Key(s)	+ Mouse Action	Result
⌘ .	---	Exit ElectricImage while application is loading.
⌘ Q	---	Exit ElectricImage while application is loading.
⌘ CTRL 1	---	Select top view of frontmost World View window.
⌘ CTRL 2	---	Select side view of frontmost World View window.
⌘ CTRL 3	---	Select front view of frontmost World View window.
⌘ [	---	Zoom in on frontmost World View window.
⌘]	---	Zoom out of frontmost World View window.
⌘ =	---	Fit to window frontmost World View window.
⌘ H	---	Toggle hide children flag of selected objects.
Caps Lock	---	Lock dragging to grid values.

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