

The ElectricImage™
Version 2.7.5
Supplement

(incorporates version 2.7)

A guide to the new features of the
ElectricImage™ Animation System

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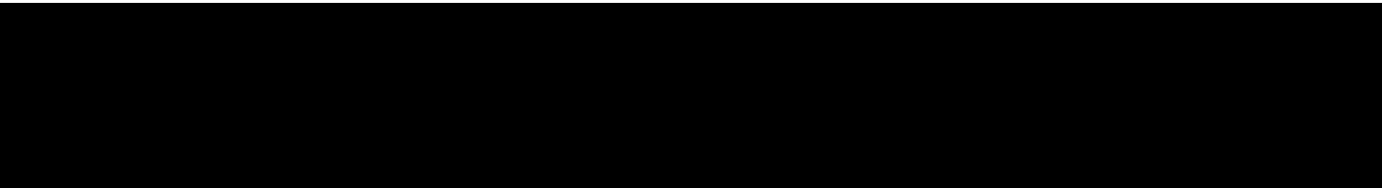
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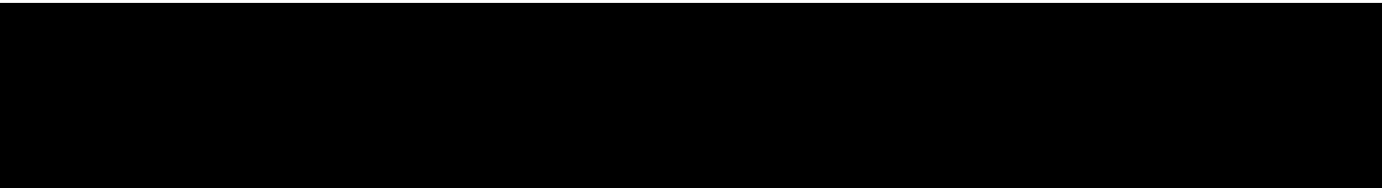
Chapter 1 Introduction



Chapter 1 Introduction

This supplement to the ElectricImage™ documentation covers the enhancements and new features for Version 2.7.5 of the ElectricImage™ Animation System and ElectricImage Broadcast.

Chapter 2 Project Window



Chapter 2 Project Window Enhancements

The Project Window contains a complete animation overview of your project. Original remarks for the Project Window can be found in the ElectricImage™ Reference Manual, Chapter 8. Several enhancements have been added for this version.

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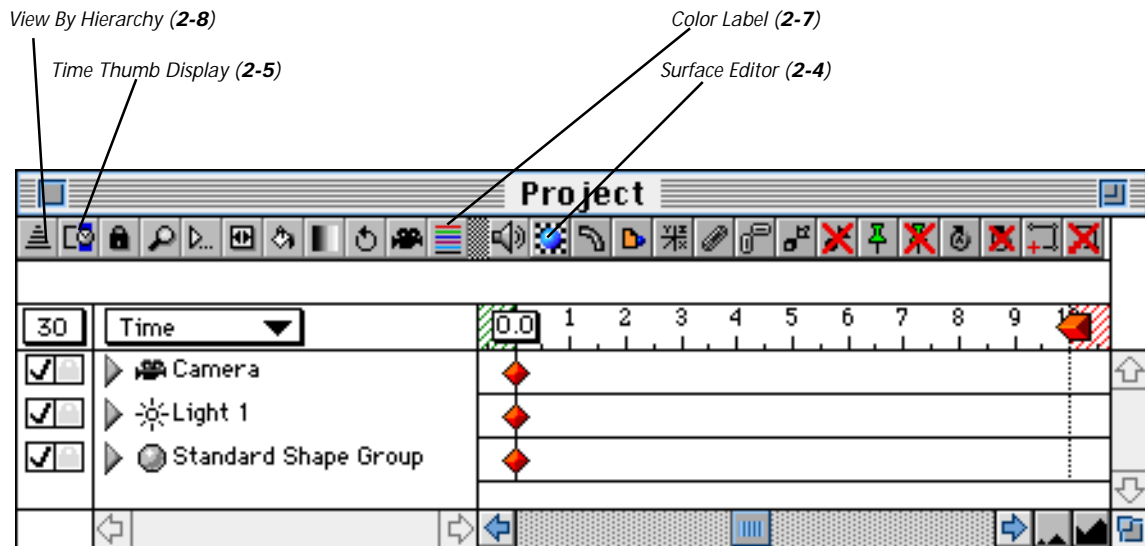


Figure 2.1 Project Window Overview

Functional Changes

There are two minor changes to the functionality of the Project Window of which to be aware.

When you change the visible and locking options of your objects in the Project Window, this does not automatically deselect them anymore.

You no longer have to hit the enter key to make the edit bar at the top of the project window active. Just click the mouse once in the edit box to make it active.

Frame Index Start

If you prefer that the first frame of your animation to be numbered 1 instead of 0, you can now change this in the Drawing Preference Window. All you have to do is set this parameter to 1.

World View Windows <input type="checkbox"/> Draw Group Extents <input type="checkbox"/> Draw Vertices <input checked="" type="checkbox"/> Draw Polygons <input type="checkbox"/> Draw Shaded Poly ▼	<input type="checkbox"/> Switch Color Depth Screen Colors: 256 ▼ Picture Cache: 128 Kbytes Activate drawing windows <input type="checkbox"/> when mouse is clicked in window content	<div>OK</div> <div>Cancel</div>
Camera View Window <input type="checkbox"/> Draw Group Extents <input type="checkbox"/> Draw Vertices <input type="checkbox"/> Draw Polygons <input checked="" type="checkbox"/> Draw Shaded Poly ▼ <input type="checkbox"/> Draw Lights <input type="checkbox"/> Draw Paths	<input type="checkbox"/> Suspend drawing while application in background <input checked="" type="checkbox"/> Show Grid while dragging <input type="checkbox"/> Show Recorded Image	
Group Windows <input checked="" type="checkbox"/> Draw Vertices <input checked="" type="checkbox"/> Draw Polygons	Mouse Drag Pause: 0.0 Key Entry Pause: 2.0 IK Convergence: 0.0333	
Miscellaneous <input checked="" type="checkbox"/> Use QuickDraw <input type="checkbox"/> Show Subpolygons <input type="checkbox"/> Use Normals	Frame Index Start: 0	

New preference

Figure 2.2 Drawing Preferences window highlighting Frame Index Start

Surface Editor Button



An additional button has been placed in the toolbar and at the top of the project window that immediately calls up the Surface Editor. When called up by this button, the All Keys and Current Time buttons will set the material for ALL selected groups currently highlighted in the project window.



For detailed information of the Surface Editor see Chapter 8, in the ElectricImage Reference Manual.



Time Thumb Display



The project window now supports the display of the Time Thumb in Seconds, Timecode or Frames. Select one of the three modes in the Time Thumb Display pulldown.



Figure 2.3 Time Thumb Display pulldown

To go to a particular second, time code or frame of your animation, just type in the value in the edit bar.

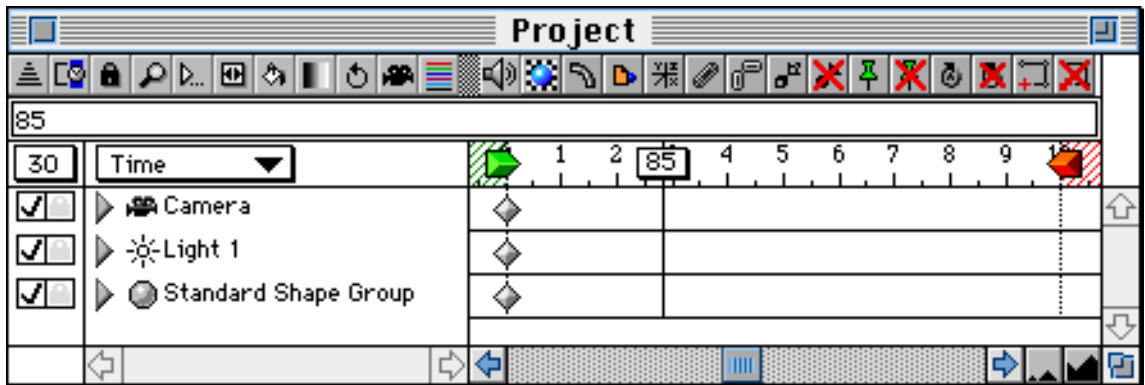


Figure 2.4 Project Window Time Mode

If the project is in interlace mode, you may enter interlace markers (a, b) as well as the frame number.

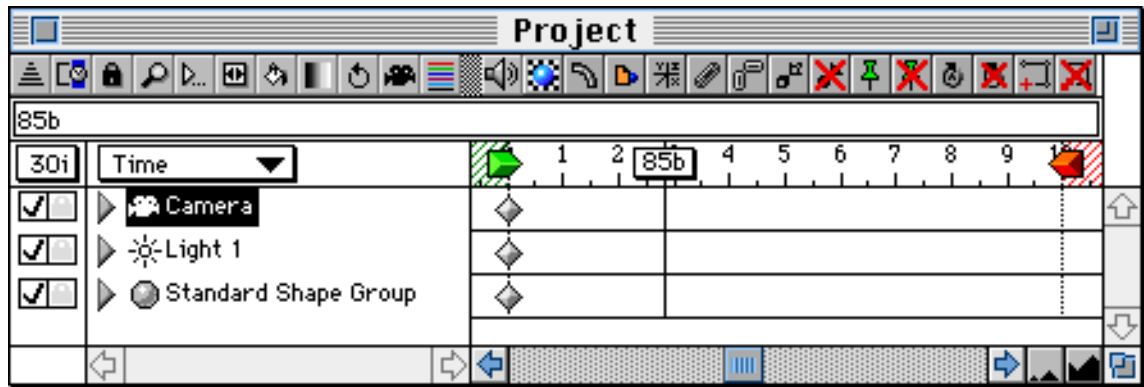


Figure 2.5 Project Window Time mode with Interlace

Color Labels



Groups or objects may now be given color labels (the color is applied to the name (text) of the group as displayed in the Project Window). These can be used to maintain a custom hierarchy and to select groups based on their labels

The Edit... selection is used to change the name assigned to each color in the pulldown menu.



Figure 2.6 Label Pulldown

View By Hierarchy



The Project Window now supports four different ways for ordering the objects in the list view.



Figure 2.7 Project View By Hierarchy Pulldown

Flat

Flat lists objects by seniority. The camera first, light second and all objects, etc. in order of when they were added to the project — first come, first list.



Holding down the option and command keys while clicking on the visibility or lock boxes in the project window will set the rest of the same type of objects down the list.



Hierarchy

Hierarchy also lists objects by seniority. However, linked objects appear in the parent/child relationship.



Holding down the option and command keys while clicking on the visibility or lock boxes in the project window will set the siblings and offspring of the object.



By Name

By Name lists the objects alphabetically.



Holding down the option and command keys while clicking on the visibility or lock boxes in the project window will set the rest of the same labeled objects down the list.



By Label

By Label lists the objects according to the color labels you have assigned them.



Holding down the option and command keys while clicking on the visibility or lock boxes in the project window will set the rest of the same labeled objects down the list.



Multiple Keyframe Control

Version 2.7.5 supports selecting, dragging and scaling multiple keyframes of one or more objects when the Project Window is set to Time View. Or, you can select and drag the entire animation track of a single object.

Selecting and Dragging Multiple Keyframes

Keyframes may be selected by dragging a marquee around a group of keyframes or by holding down the shift key and clicking the individual keyframes you wish to modify using the mouse. Keyframes, once selected, are shown in dark blue. Dragging one of the selected keyframes left or right will move all of them.

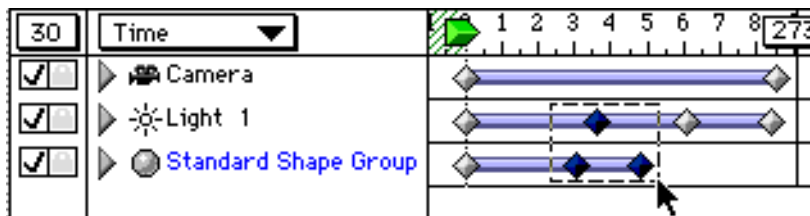


Figure 2.8 Dragging rectangle to select keyframes

Selecting and Dragging the Entire Animation Track

The entire animated track may be moved left and right by grabbing the violet bar in between two keyframes and dragging.

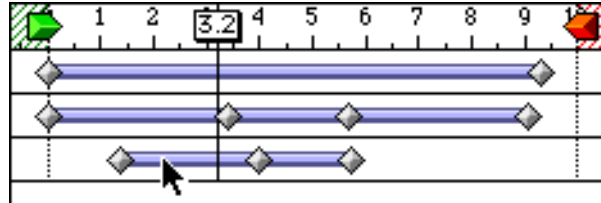


Figure 2.9 Dragging an animation track

Keyframe Dragging With Scale

To create a scaling region, hold down the control key and drag in the time line as shown below. The scaling region you have selected will be illustrated by the violet selected area as seen below.

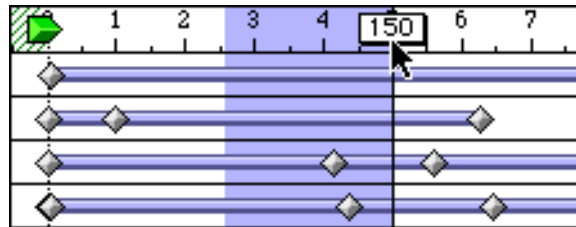


Figure 2.10 Selection of Scaling region by control-dragging the time bar

Once you have the scale region selected (Figure 2.11), dragging keys while holding down the control key will scale keys inside the scale region. Keys outside the scale region will be dragged until they enter the scale region where they will be scaled (if the control key is held down while dragging).

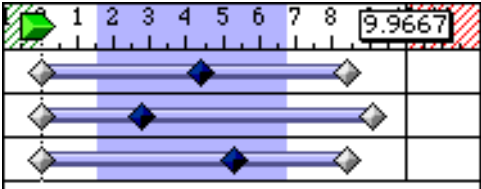


Figure 2.11 Selection of Keyframes and Scaling Region

If you initially drag from the left side of the scale region, the key times are scaled toward the right end of the scale region(Figure 2.12). If you initially drag from the right side of the scale region, the key times are scaled toward the left end of the scale region(Figure 2.13). If you initially drag from the inside of the scale region, the key times are scaled either way depending on the initial mouse movement (left is towards the start, right is towards the end)

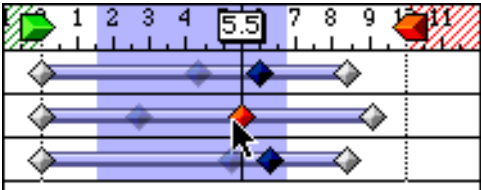


Figure 2.12 Control-Dragging from Left to Right

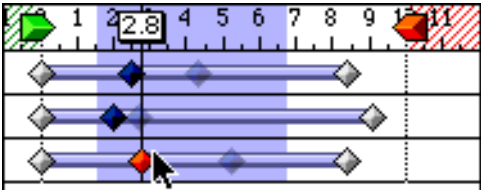


Figure 2.13 Control-Dragging from Right to Left

Duplicating Multiple Keyframes

To duplicate keyframes, select the desired keyframes, then option-drag. New keyframes will be created.

Time Palette

This new palette, available from the Windows pulldown menu (or as a shortcut using command-minus), allows you to change the project time without having to keep the Project Window open. The Time Palette also displays the range-of-frames start and stop times with two small flags. These flags may be dragged in the palette to change the range-of-frames. The time display can be changed to frames or timecode by holding down the option-key and selecting the time thumb.

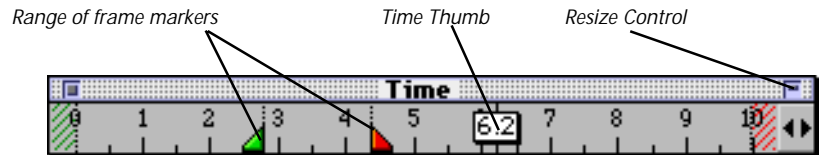


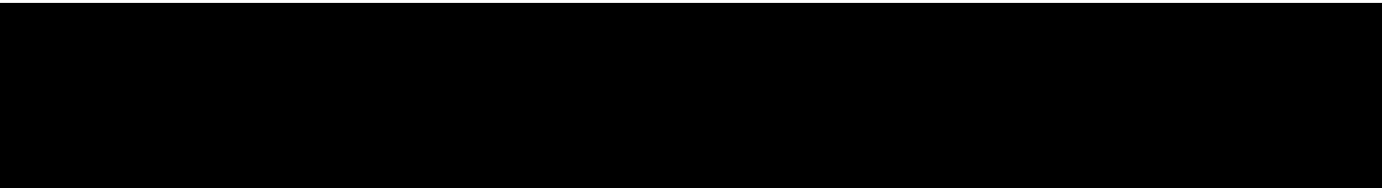
Figure 2.14 Time Palette



Command - Arrow keys moves the global time line by one frame. Command - Shift - Arrow keys moves the global time line ten frames.



Chapter 3 World View Windows



Chapter 3 World View Windows

The World View Windows are your workspace in ElectricImage™. You can view and make changes from top, side and front views. Original documentation for the World View windows can be found in the ElectricImage™ Reference Manual, Chapter 6.

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Previews

The following enhancements have been made to the preview system in the World Views:

- Animation previews are now supported in World View windows.
- Previews can show or suppress display or preview rendering of effectors and paths.
- Dragging the thumb back and forth during an animation preview will now cause the expected “jog” behavior.

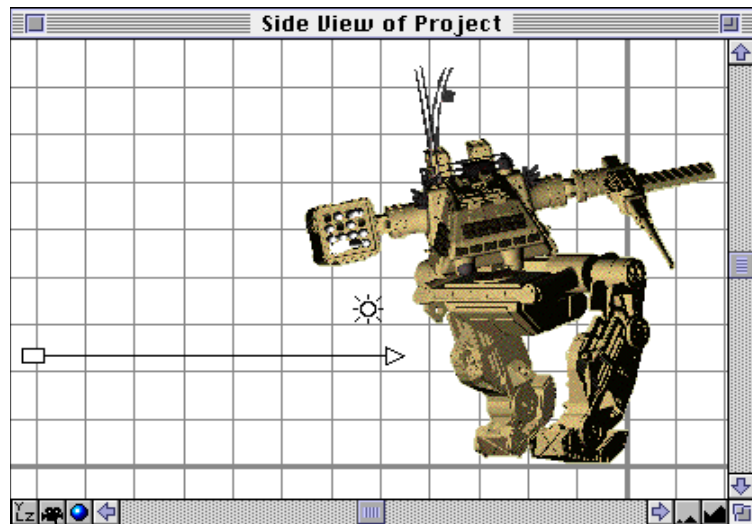


Figure 3.1 World View Window

Preview Button

Zooming

- You can Scale the window view content to match the window size by holding down the option key while you hit the Grow or Zoom buttons in the World View Window
- Option-Control-Zoom fits the window into the view of selected objects only

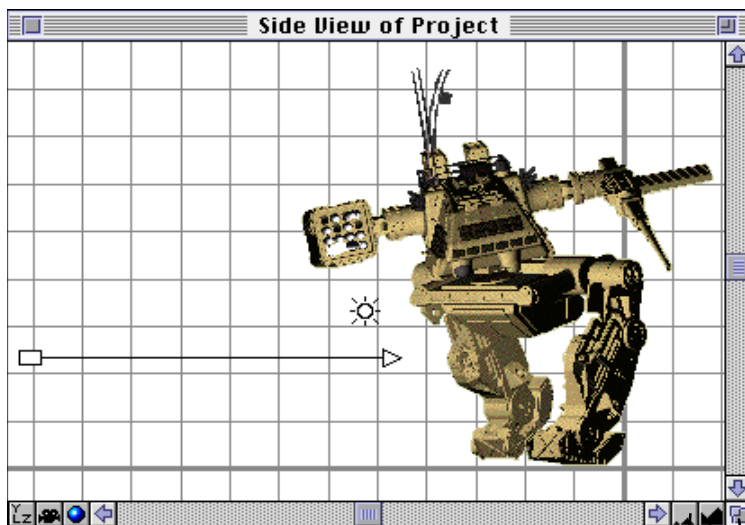
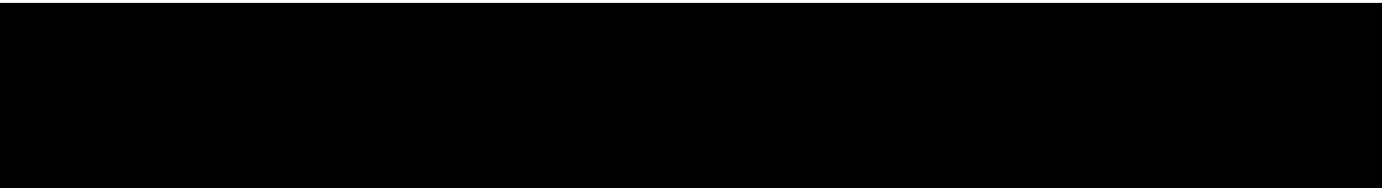


Figure 3.2 World View Window

Zoom Buttons
Grow Button

Chapter 4 Multiple Cameras



Chapter 4 Multiple Cameras

The Camera View window shows you what the your project looks like from the camera’s point of view for the selected frame. Original documentation for the Camera View window can be found in the ElectricImage™ Reference Manual, Chapter 7. Original documentation for the Camera Info Window can be found in the ElectricImage™ Reference Manual, Chapter 10.

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Changes to the Camera View Window

- Previews can show or suppress display or preview rendering of effectors, groups, lights, cameras, and paths
- Dragging the thumb back and forth during a preview will now cause the expected “jog” behavior.
- Objects can now be selected and moved in this window. The selection state of objects is also displayed.
- Move controls inside the camera view window for cameras and lights (when the Camera View has been set to look down the cone of a spotlight).

The Camera View move controls are:



None –This is the Default condition and allows no control in the camera view.



Orbit –Moves the camera about its reference point.

The modifier key for this operation is: Command-Spacebar



Pan –Moves the camera reference point up/down and left/right.

The modifier key for this operation is: Option-Spacebar



Dolly –Moves the camera toward/away from its reference point.

The modifier key for this operation is: Control-Spacebar



Track –Moves the camera and its reference point up/down and left/right.

The modifier key for this operation is: Spacebar



Zoom –Interactively changes the camera’s focal length

The modifier key for this operation is: Shift-Spacebar



Note: Zoom does not apply to light sources.



A velocity curve for Camera Focal Length has been added to the Camera’s velocity graph window. Original documentation for the Camera Velocity Window is available in the ElectricImage reference book page 17-9.



Changes to the Camera Info Window

Background Images

Control of background images has been moved to this window. In this way, each camera in the scene can have a different background image. The background image which is rendered into your project is dependent upon which camera is chosen for the rendering.

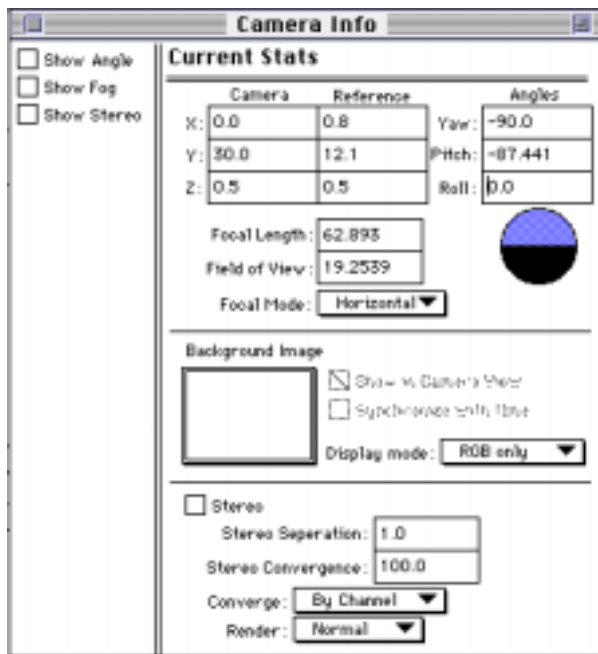


Figure 4.1 Camera Info Window

Stereoscopic Rendering

Stereoscopic rendering creates a “left eye” and “right eye” rendering for each frame in an animation. Finished still frames or animation files will have either (L) or (R) placed at the end of their names.

Stereo Checkbox	Enables stereo rendering system.
Stereo Separation	Separation in world units between the two cameras
Stereo Convergence	Distance in world units between the face of the cameras and the point where the view of the cameras converge.
Converge	Gives three choices in determining how the convergence point is determined. By Channel allows the Stereo Convergence value to be animated. By Reference uses the camera reference to set the convergence point. In Infinity causes no convergence to take place (the two cameras are parallel to each other).
Render	Four options for controlling the output rendering. Normal causes a non-stereo rendering to take place. Left Only causes only the left camera to be rendered at each frame. Right Only causes only the right camera to be rendered at each frame. Left/Right causes both cameras to be rendered at each frame. In this case, two separate still renderings or animation files will be created.

Multiple Cameras

Extra cameras can be added to the project using the File Menu >Add>Type>Camera command from the File pulldown menu, or by duplicating an existing camera. By holding down the option-key in the title bar of the Camera View Window, you can change the view to any existing camera. Only the camera currently viewed in the Camera View Window will be rendered. It is not possible to animate a switch from one camera to another.

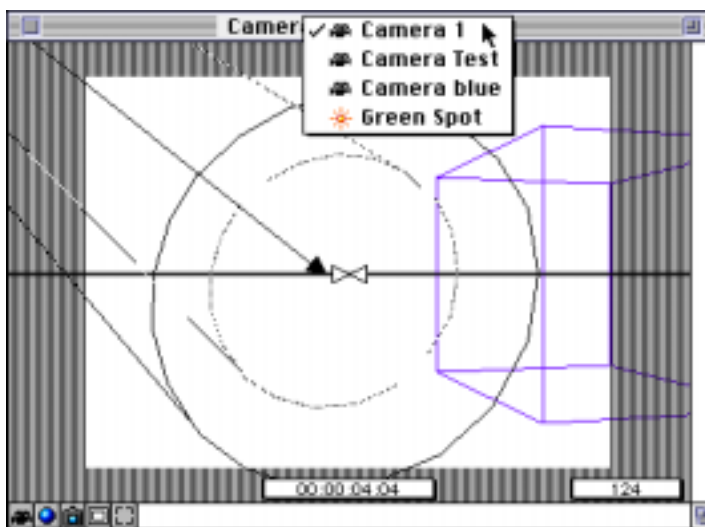


Figure 4.2 Option-selecting in title bar of camera view window

Multiprocessing Camera

The multiprocessor (MP) version of Camera has been shipped with version 2.7.5. It is contained in a folder, MP Camera, in the ElectricImage folder on the CD. This version of Camera supports the Apple MP API and will run on any computer or plug-in card that supports this API.

MP Camera works by splitting up a single frame of an animation into segments (threads) and sending each one to a different processor on a single computer. It does not support rendering a separate frame on each of the processors in a single computer.

MP Camera will use all processors present. This means that it will also run on a single processor computer. It is important to remember that different versions of Camera may yield slightly different imagery. If you plan to render on multiple computers that includes at least one MP, use the MP camera on all those computers - even if some of them only have a single processor. This will insure continuity between the segments of an animation rendered on the different computers.

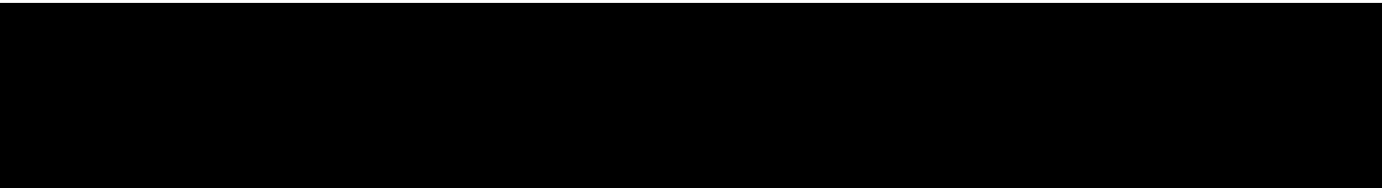
The Apple MP API does not support symmetrical multiprocessing (SMP). This means that the individual threads cannot gain access to the hard drive. Therefore, Camera must load all texture maps, shadow buffers, reflection maps and 3D geometry into RAM before rendering can begin. Thus, it may require considerably more memory to render using the MP Camera.

The performance that you see when using the MP Camera will vary considerably based on your project files. Items that take the longest time to render, Smoke for instance, will get the largest performance gain. But a 100,000 polygon model with a single light source may see little or no improvement.

The large variation in performance is due to the asymmetrical nature of Apple's multiprocessing API. Electric Image does not see any way to make additional improvements to MP Camera until the Apple O/S supports SMP. We are eager to create versions of our software that can handle tremendous numbers of polygons and print-resolution texture maps. In

the future, we may decide to sacrifice MP support under the Mac O/S to enable these important features.

Chapter 5 Select Menu Additions



Chapter 5 Select Menu Additions

The Select Menu was added in Version 2.5, replacing the Model List menu. It allows you to select objects in the World View and Project windows. Original remarks for the Select menu can be found in the ElectricImage™ Version 2.5 Supplement, Chapter 10.

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Select Menu Additions

The Select Menu has been reorganized for easier use and one new selection type has been added, By Label.

Select	
All ⌘A	
None	
Inverse	
Find... ⌘F	
Find Again ⌘G	
Find All...	
By Attribute ▶	
By Type ▶	
By Model ▶	
By Hierarchy ▶	
By Label ▶	

Select	
All + Locked ⌘A	
None	
Inverse	
Find... ⌘F	
Find Again ⌘G	
Find All...	
By Attribute ▶	
By Type ▶	
By Model ▶	
By Hierarchy ▶	
By Label ▶	

Figure 5.1 The Select Menu (at left) and the Select Menu with Option Key (at right)

Command	Sub-Command	Description
All		Selects all unlocked objects (same as previous Edit menu command).
None		Deselects all selected objects.
Inverse		Deselects all selected objects while selecting all other objects that are not locked.
Find		Opens a dialog box to enter a search string (same as previous Edit menu command). Wildcards may now be used to control the search. Selects the first object in the project window list that matches the search string.
Find Again		Selects next object matching the search string previously entered with the Find command (same as previous Edit menu commands).
Find All...		Similar to the Find command except that all objects matching the search strings are selected.
By Attribute	–	
	Visible	Selects all objects with visibility check boxes on
	Locked	Selects all objects with lock check boxes on.
	Hidden	Selects all objects hidden in the Project window.
By Type	–	
	Camera	Selects the Camera.
	Lights	Selects all lights.
	Groups	Selects all groups.
	Effectors	Selects all effectors.
	Sounds	Selects sound tracks.
	Smoke	Selects smoke objects
By Hierarchy	–	
	Parent of Selected	Selects the immediate parent of the currently selected object.

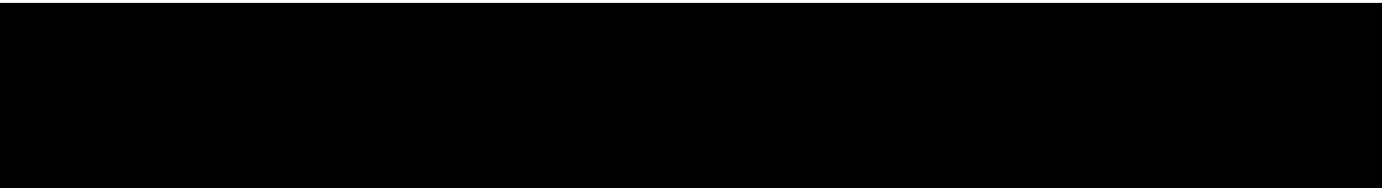
Command	Sub-Command	Description
	Children of Selected	Selects the immediate children of the currently selected object.
By Label		Gives you the ability to select objects based on the color labels that you assign your objects.
	Edit...	Allows you to change the names assigned to the different colors.
By Model		Selects objects based on the names of the models that have been added to the project. Note: the name of the model file may not be the same as the group name in the project window.

Choosing the **Select** menu while the **Option** key is held down reveals several commands, listed in the table below:

.

Command	Sub-Command	Description
All + Locked		Selects every object in the project.
By Hierarchy	–	
	Ancestors of Selected	Selects all parents up the hierarchy.
	Offspring of Selected	Selects all children down the hierarchy.

Chapter 6 File Menu Changes



Chapter 6 File Menu Changes

The add and save submenus in the File Menu have been updated for easier use and added functionality. Original documentation for the File Menu can be found in the ElectricImage™ Reference Manual, Chapter 1.

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File Menu Changes

The File menus add and save > model commands have been reorganized for easier use. In addition, new commands for reloading the texture and color data from fact files (to override the information stored in the project file) has been included.

ElectricImage™ supports Truetype fonts and Postscript Type 1 fonts.

Command	Sub-Command	Description
Add > Model	FACT	Adds a new FACT model to the current project.
Add > Model	Font	Adds a Type 1 Postscript or TrueType font to the project.
Add > Model	Other	Brings up the model import window.
Add > Sound	File	Adds and AIFF or QuickTime sound file to the project.
Add > Sound	Record	Brings up the sound recording window.
Add > Type	Camera	Adds an additional camera to the project.
Add > Type	Light	Adds and additional light to the project.
Add > Type	Smoke	Adds a smoker to the project.
Add > Type	Effector	Adds an effector (empty group) to the project.
Add > Type	Skeleton	Adds a skeleton effector to the project.
Add > Motion Data..	-	Imports a .bva, .bvh, or .obm motion file.
Export > Model	FACT	Saves the selected groups as a FACT file.
Export > Model	Other	Brings up the file export window to save the selected groups.
Export > Motion*	BioVision Flat	Saves out motion data from the selected groups in .bva format.
Export > Motion*	BioVision Hierarchical	Saves out motion data from the selected groups in .bvh format.
Export > Motion*	ElectricImage Motion	Saves out motion data from the selected groups in .obm format.

Command	Sub-Command	Description
	-	
Reload > Textures	-	Reloads the texture map placement data from a FACT file already loaded into the project.
Reload > Colors	-	Reloads the color data from a FACT file already loaded into the project.

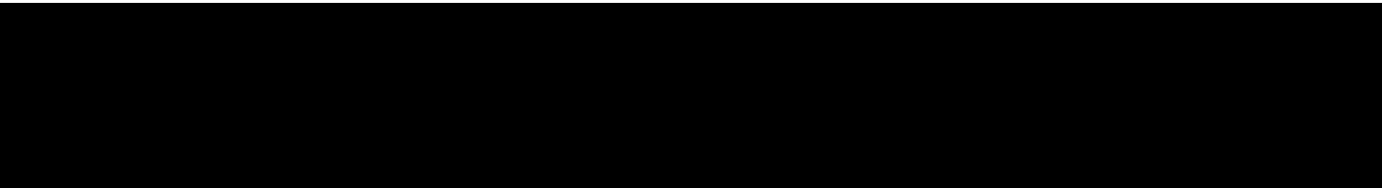
*Motion Data Capture is a feature of the ElectricImage Animation System. This feature is available to ElectricImage Broadcast users as an option. Please contact sales or customer service for more information.



The Reload>Texture and Reload>Color commands are used to override the texture and color information in the project file with the original information stored in the FACT file for the selected group(s). This can be used to exchange texture and color data between separate projects or between several animators working on a single project.



Chapter 7 Model Import/Export



Chapter 7 Model Import/Export

Two changes have been made to improve 3D model import and export. Models in Wavefront .OBJ format now have their normals read in and 3DMF binary files can now be imported and exported.

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Wavefront .OBJ Import

Normals are now read in for Wavefront .OBJ files. This makes a dramatic improvement in the shading quality for these models. If you are planning to purchase models from one of the many model vendors, your best bet is to choose models in this format, and to specify that normals are to be included with the model. Important: just because the format is .obj, does not mean normals are included.

3DMF

ElectricImage™ now imports and exports 3DMF binary models. We have tested this feature against a wide array of sample models, but please keep in mind that 3DMF is a relatively new format and is still subject to various interpretations. This means that models exported from another modeling or animation package may not always be imported with the same material or other characteristics intact.

A new preference dialog has been added to the model importation window.

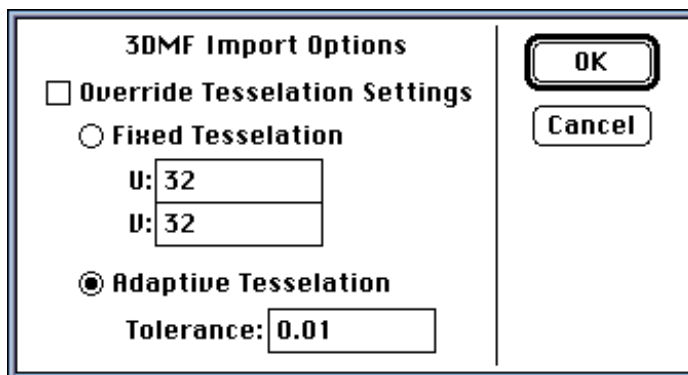
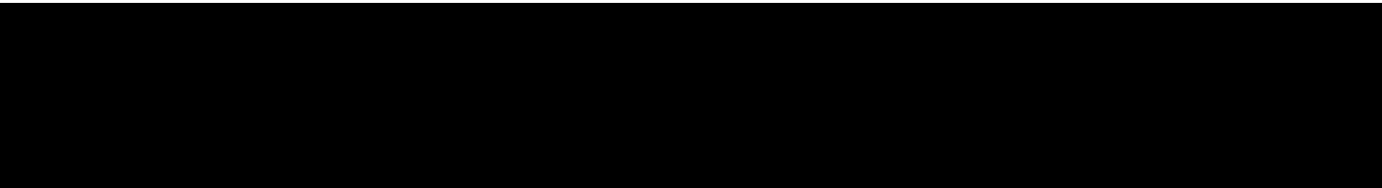


Figure 7.1 3DMF import preferences

Override Tessellation Settings	3DMF models can contain information describing how they should be tessellated (broken up into polygons). Checking this box causes ElectricImage™ to replace these built-in settings with either the Fixed or Adaptive settings below.
Fixed Tessellation	This option breaks up the surfaces evenly by the number of steps shown in the U: and V: edit boxes. If the model does not seem to have enough polygons you can increase the mesh density by increasing the U: and V: parameters.
Adaptive Tessellation	This option breaks up the surfaces according to curvature, providing more polygons in the curved portion of the surface. If the breakup seems to be creating too few polygons or if the object's curvature does not seem to be preserved, make the value in the Tolerance edit box smaller.

Chapter 8 Light Info Window



Chapter 8 Light Info Window Changes

The Light Info Window contains the permanent settings for a selected light or lights. Original comments for the Light Info window can be found in the ElectricImage™ Reference Manual, Chapter 11. Several enhancements have been developed.

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Smoke Objects

Smoke objects can now be used with Radial lights. Light Rays are not supported with Radial Lights. One use for this feature would be dust clouds in a desert or smoke rising out of a chimney.

Yaw, Pitch, and Roll

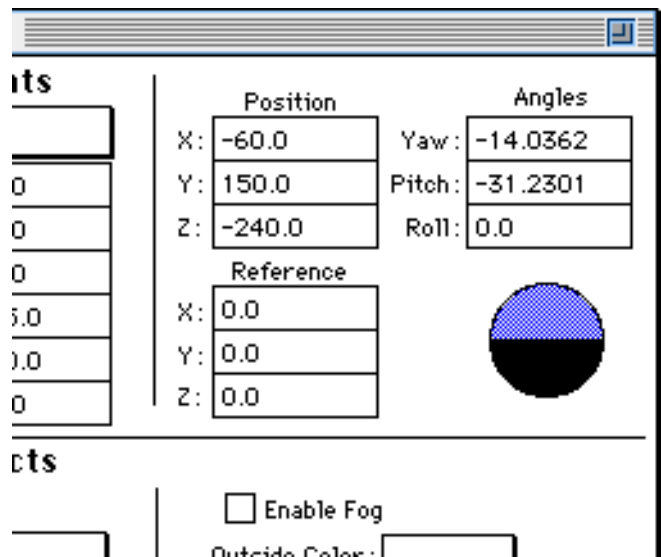


Figure 8.1 Light Info Window

Yaw, Pitch and Roll controls have been added for the Parallel, Radial, Spot and Tube lights. These controls operate the same as the Camera controls. Children attached to these lights will now inherit this information.

Shadows

Shadow Color

The Shadow Color button is used to add colors to the shadow buffer. In previous versions of ElectricImage™ shadows were always black (an absence of light).

This feature may be used to implement a transparent object casting a shadow of a similar hue, or contrasting shadows where an object casts an unrelated color onto a differently colored surface. It also allows better control for matching CameraMaps and textures upon which the shadow falls.

Shadow Buffer

A light's shadow buffer now has a separate X and Y value. This allows non-square shadow buffers to be created. This feature is an important memory-saving device.

Shadows are calculated in pixels. The 'Buffer Size' is really a technical name for the number of pixels in the shadow map. The quality of the shadow is in direct relation to the size of the light's cone and the buffer size, the size of receiving object relative to the buffer/cone.

As an example, consider a project containing a cube of 2 units resting on a ground plane of about 200 units. The project also contains a shadow casting light with the default buffer(1280) and cone size(45), and the light's cone only covers the cube. When rendered, the quality of the shadows will be excellent. Now, increase the light's cone angle to 150 degrees so that it is covering the entire ground plane. The resulting image will have washed out blurry shadows. This is because the shadow map is being stretched over too large an area, and its resolution is not high enough to capture all the detail. So to fix the problem the cone angle must be decreased or the buffer size increased. If the buffer size is increased it will take up more memory, so the logical choice is to tighten the cone.

The memory usage of a shadow is calculated by multiplying the pixel width by the pixel height to derive the total number of pixels. Then multiply that by 4, representing 4 bytes per pixel. And then divide that by 1024 to convert it into a kilobyte number.

$X \text{ buffer} * Y \text{ buffer} * 4 / 1024$

The default buffer size:

$1280 * 1280 * 4 / 1024 = 6,400 \text{ Kilobytes} = 6.4 \text{ Megabytes}$

Double the default size:

$2500 * 2500 * 4 / 1024 = 25,000 \text{ Kilobytes} = 25 \text{ Megabytes}$

As suggested before, the logical solution is to narrow the light's cone to encompass only the object that will be casting the shadow. This is easy to do in 2.7.5.

1. Position the light and the reference roughly in the position desired.
2. While holding the Option key click on the title bar of the Camera View to select the shadow casting light. This will change the Camera View to the Light View.
3. Use the orbit, pan, etc. to more accurately position the light.
4. Open the light information window.
5. Now the cone and buffer sizes can be changed to fit the object(s) in view. Try to tighten the light's cone and buffer very close to the boundaries of the object(s).
6. Change the Light View back to a Camera View by once again holding down Option, clicking in the title bar and selecting 'Camera'.

With the ability to change both the height and width, there is no portion of the buffer wasted.



Be sure that the 'outside of buffer area' is disabled for parallel and radial lights when casting shadows. This will ensure that light casts evenly throughout the scene, while shadows remain confined to the cone region.



Shadow Info Channels

Shadow Info channels are now available in the project window and animatable. Make changes as you would any other aspect of your project and settings will be recorded for each keyframe.

Enable Illumination

An Enable Illumination checkbox has now been added. This checkbox, which defaults on, can be used to inhibit illumination for lights when only light-effects are desired (glows, rays, etc.). For example, if you wish to have the engine of a jet airplane glow bright blue and also contain a lensflare with obscuration, but not contaminate the surrounding engine duct with blue light, set up a blue glow light with the lensflare and turn off Enable Illumination.

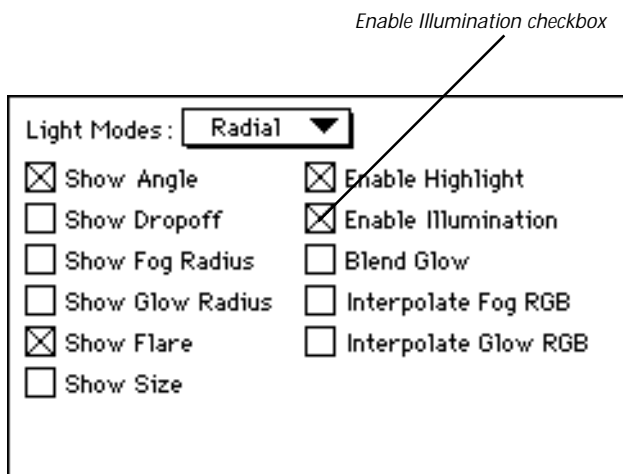


Figure 8.2 Enable Illumination Checkbox

LensFlare Plug-In

Two new checkboxes have been added to the LensFlare control window, “Use Light Size” and “Use Light Rotation”.

In previous versions of the plug-in, the “Light Size” edit box in the Light Info Window has been used to show the effective size of the lens flare’s Origin Glow. This Origin Glow can be considered a visible light in a manner similar to glow lights. Obscuration prevents the flare effect from being visible if the area within the Light Size is not visible to the camera.

Version 2.7.5 improves the function of the lens flare’s Light Size by actually applying a distance calculation which determines the size of the origin glow in a given rendered frame (this is enabled using the Use Light Size checkbox in the LensFlare plug-in interface). If the light is moving away from the camera, the origin glow gets smaller in frame. If the light is moving closer to the camera, the origin glow gets larger in frame.

Turning on the “Use Light Size” checkbox causes the Light Size in the Camera Info Window to be used for both obscuration size and the lens flare’s glow radius. Under certain situations, this will cause difficulties. For example, if you want a very large glow radius, but a small obscuration radius (a small light bulb in a foggy room might need these settings), a single light size won’t work. In this case, use the Ring Size edit box in the LensFlare plug-in interface as a scale for the glow radius. The Light Size edit box in the Light Info Window will set the obscuration radius.

For example, if you set your light’s size to 2 in the Light Info Window, and experience effects, you might wish to reduce the size of your light to .2 and then set the Ring Size in the LensFlare plug-in interface to 10 (because the light is now ten times smaller than it was prior to the setting change).

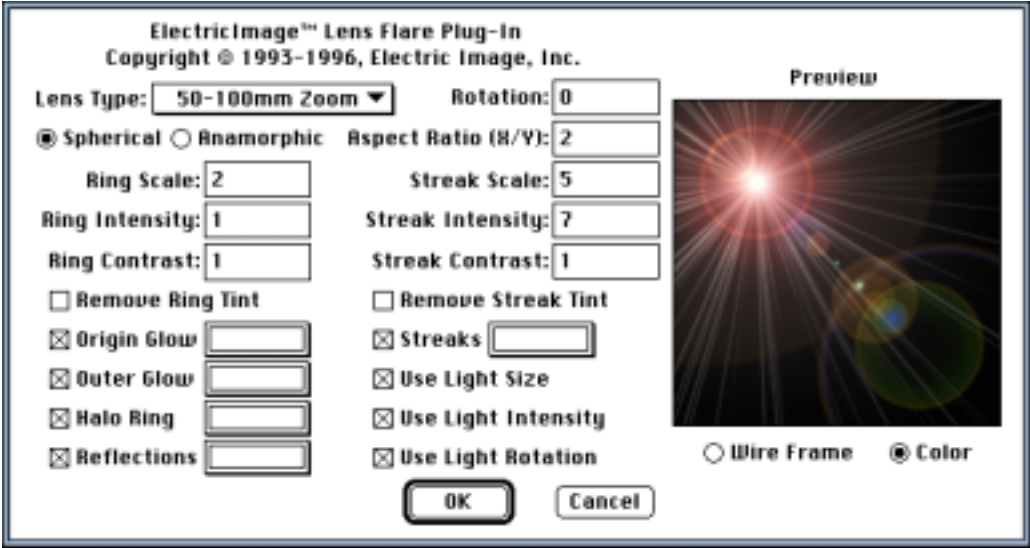


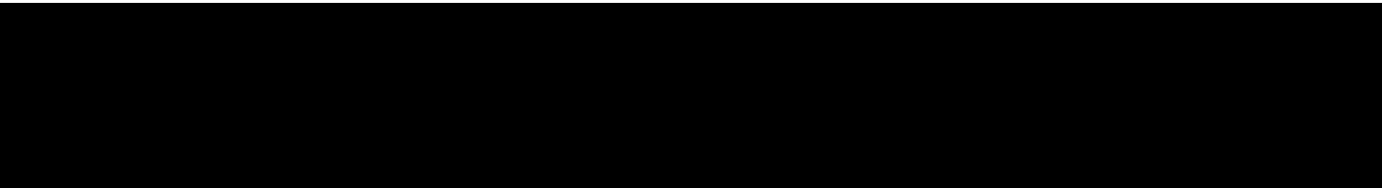
Figure 8.3 LensFlare Dialog Box)

- Use Light Size

Scales the lens flare’s inner glow radius to match the lightsource’s radius in the vertical direction (before rotation). The outer glow radius is then scaled to match the inner glow radius. If the light radius is 0.0 or the “Use Light Size” option is disabled, the flare will appear at its default size.
- Use Light Rotation

Rotates the lens flare rings and spikes in 2D to match the light source rotation. This rotation angle is summed with the lens flare’s own rotation value. When the light is linked to another object, the lens flare will be rotated by the combination of the light and object matrices. In addition, the Camera’s transformation matrix (including its roll value) will affect the light rotation angle.

Chapter 9 Surface Editor



Chapter 9 Surface Editor Changes

The Surface Editor is the dialog box used to change or modify the shading characteristics of any group in a model. Original comments for the Surface Editor can be found in the ElectricImage™ Reference Manual, Chapter 18.

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Surface Editor Window Is Now Non-Modal

The Surface Editor is now a non-modal dialog box (it remains open while not selected). This makes it easier to toggle back and forth between other project windows and the Surface Editor.

Because it is non-modal, it will remain open even after you have made changes by selecting “All Keys” or “Current.” To close the Surface Editor Window, click on the box in the upper right hand corner of this dialogue box. Be sure you have selected “All Keys” or “Current” to save the changes you have made BEFORE closing the Surface Editor Window.

Single Characteristic Color Copy/Paste

The Material Editor now supports single characteristic color copy/paste.

Click on the Color Preview Rectangle (the box to the left of the big Material Ball) to select it for copying or pasting. This gives you the ability to copy/paste the color from any characteristic to another characteristic (e.g. copy Group Color — paste to Reflectivity Color) or another group’s characteristic.

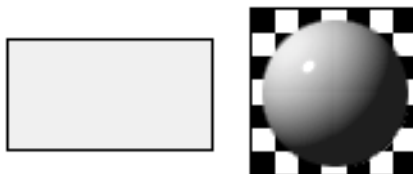


Figure 9.1 Color Preview Rectangle selected



The entire material can be copied or pasted by selecting the Material Ball to the right of the Color Preview Rectangle.



Accessing the Surface Editor from the Project Window



An additional button has been placed in the toolbar and at the top of the project window that immediately calls up the Surface Editor. When activated by this button, the All Keys and Current Time buttons will set the material for ALL selected groups (currently highlighted in the project window). The title bar for the window will read: Material Of Selected Groups. Since the changes made using this window apply only to the current selected groups, the Modify in: pulldown has been removed.

The Material Of Selected Groups window effectively acts as a single-entry material scrapbook. When it is first opened, it will contain the material of the first object that is currently selected. Select other objects and press All Keys to apply this material to those objects.

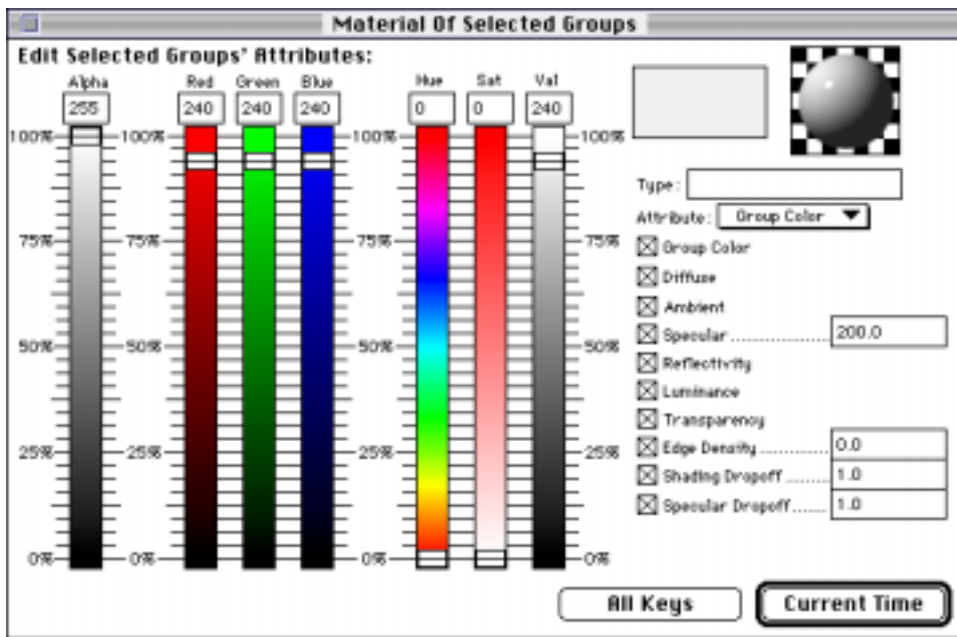


Figure 9.2 Material of Selected Groups

The traditional ElectricImage™ material window can still be activated as before through the material button in the Group Info Window. The Material Window title bar will be: (Group Name) Model Material when it is opened in this manner.

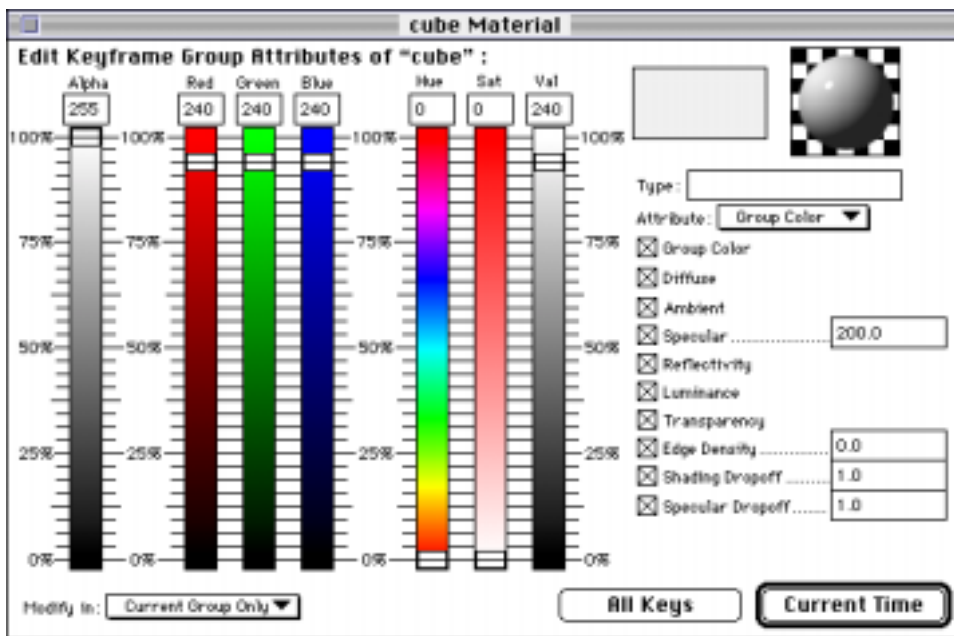
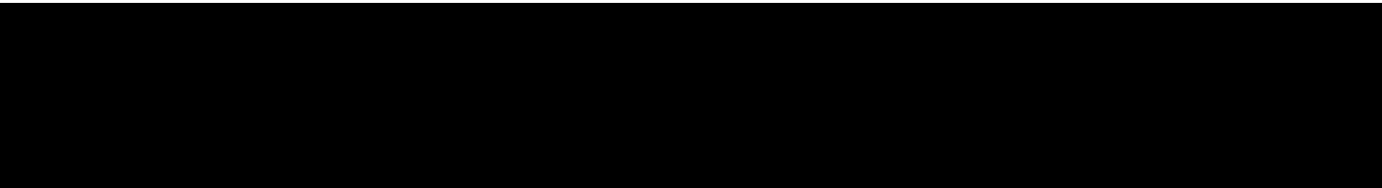


Figure 9.3 Model Material window

Chapter 10 Image Display Additions



Chapter 10 Image Display Additions

The Image Display window is utilized for previewing QuickTime movies and image files. Original documentation for the Image Display window can be found in the ElectricImage™ Version 2.5 Supplement, Chapter 6.

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Display Image / PICT Command

In the previous version there was a long delay in displaying each frame in an animation file.

ElectricImage™ will now index the entire movie when it is first opened. This allows you to navigate quickly to any frame. This approach provides much better access to each image of an animation without the time delay.

Eyedropper Tool

The Image/PICT display system has been improved in this release by adding an Eyedropper Tool.

The Eyedropper gives you the ability to copy the RGB channels of the pixel under it to the clipboard. This information can then be pasted into the scrapbook, or better yet, into the Surface Editor. If you hold down the Option Key while the mouse button is pressed, the Alpha Channel will also be copied. While the cursor is moved across the image, the color and (A)RGB values are displayed in the lower left hand corner of the image. The Alpha(A) value is only displayed while the Option Key is held down.

You can use this tool to copy color information from your texture maps into the material editor of your groups.



Figure 10.1 Eyedropper Tool

Previewsnap Images

All previewsnap image files are now rendered into a folder called “EI Snapshots.” All preview images are automatically placed here for your reference.

Before the application quits, all image file and PICT files located within the EI snapshots folder are automatically deleted.

If you wish to make your preview snap shots permanent, go into the Preview/Render preferences and click the “Make Images Permanent” button. All snap shots then will be directed into the application folder not “EI Snapshots” and will not be deleted when the application quits.

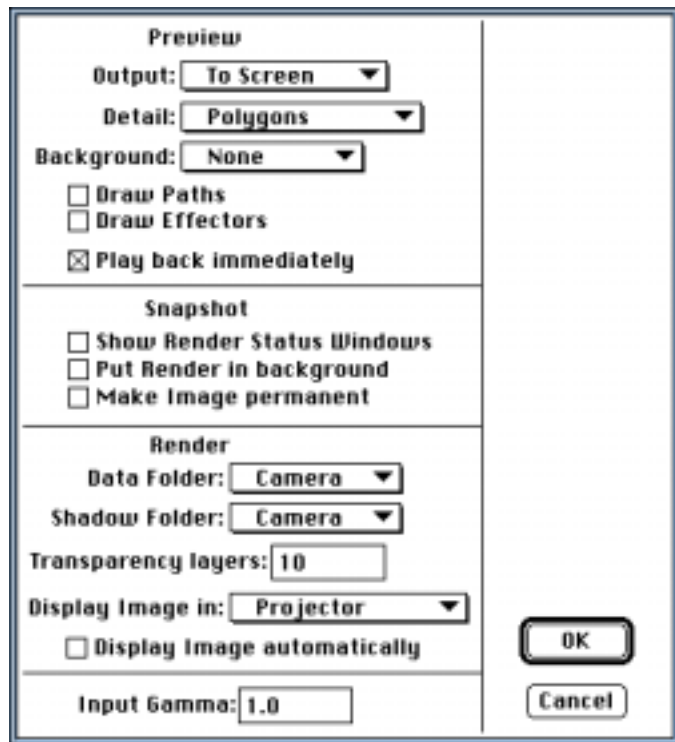
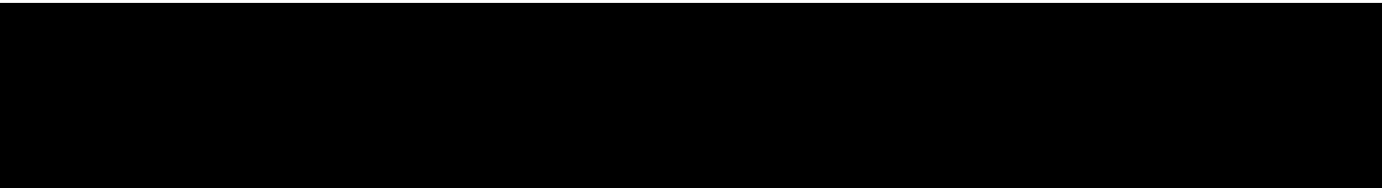


Figure 10.2 Preview/Render Preference Dialog

Chapter 11 Inverse Kinematics



Chapter 11 Inverse Kinematics

The Inverse Kinematics features of ElectricImage™ have been enhanced through the addition of AutoIK. AutoIK implements a constraint system to allow Inverse Kinematic chains to be tied to objects outside their hierarchies.

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Introduction

Complex inverse kinematics often requires that certain objects remain locked in a specific position, while moving other hierarchically related objects. This may be a foot sticking to the ground plane or a hand holding an object. AutoIK makes this easier by making an object follow the movement of another object.

In effect, this acts as a constraint to restrict the movement of any object in a hierarchy. Other objects in the chain will be forced to accept this restriction and will be adjusted based on the position of the constraint object and the other objects in the chain.



Figure 11.1 Without Auto IK

Figure 11.1 is an example of AutoIK using a hydraulic hose constrained to a mechanical arm. The diagrams show the result of moving the arm. In Figure 11.1, the arm is being moved without AutoIK applied to the hose. Notice that without AutoIK, the end of the hose does not attempt to maintain its relationship with the arm.



Figure 11.2 With AutoIK

Figure 11.2 shows the same movement with AutoIK constraining the hose to the arm. With AutoIK applied, however, the hose is forced to maintain the constraint's position. If the hose is pulled farther than the chain can reach, it will stretch out as far as possible.

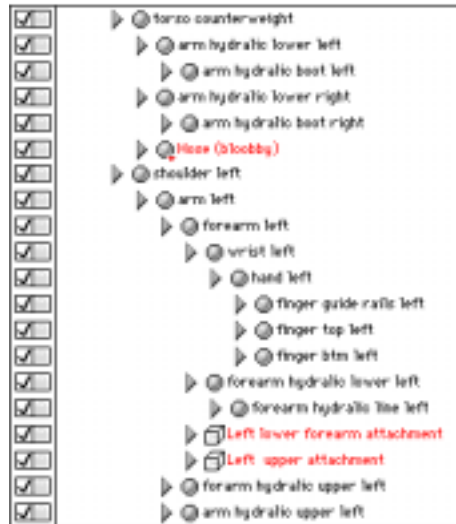


Figure 11.3 Arm Hierarchy

Using AutoIK

Preparation



In order to use AutoIK some form of a hierarchy is needed. The hierarchy should already be linked and properly jointed. But the two most important elements are:

1. A child object to constrain. Any child, and any number of children may be used with AutoIK.
2. A constraint. The constraint could simply be an effector. The position of the constraint will determine the position of the child (there is no offset between the child and constraint).



Note: A child cannot be constrained to a parent or vice-versa.



AutoIK Tools



Figure 11.4 Buttons to apply and remove AutoIK Constraint

AutoIK is implemented much like the Attach, LookAt, and AutoRotate features. There is a button to apply AutoIK and a button to remove AutoIK. These can be found on the Tool Palette, in the Project Window, and in the Tool Menu.

Applying AutoIK

1. Set the time slider in the Project Window to frame 0.
2. Select the child object to constrain.
3. Press the AutoIK 'apply' button.
4. Select the object to follow (the constraint object).

To cancel the process a temporary menu will appear at the top of the screen. Just select **Terminate Operation** if you don't want to apply AutoIK. Choosing to cancel will not inflict any changes to the project. This menu will remain until the constraint group is selected.

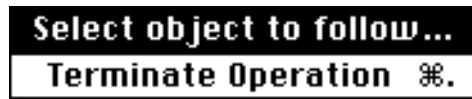
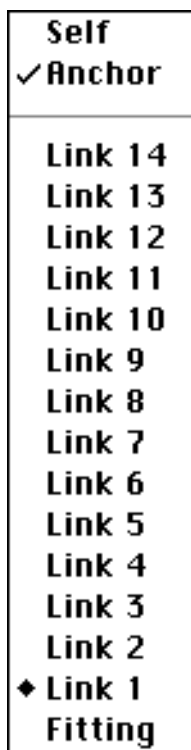


Figure 11.5 Terminate Operation

Specifying Termination



When using IK, the user must specify which groups in a hierarchy are affected. Because AutoIK does not take into account pre-selected objects before moving an AutoIK constraint, it must be predetermined which objects are to be affected. In order to do this, there is an AutoIK pulldown menu. This is found in the constrained object's AutoIK channel in **Keyframe Mode** of the **Project Window** next to the Attach and LookAt channels.

To the left is the AutoIK menu for the Hydraulic Hose example. The constrained object is the child of 'Link 14', and the root parent is 'Fitting.' Each consecutive object from top to bottom of the list is the parent of the previous. So link 14 is the child of 13 and 13 of 12, etc.

The 'diamond' in the left margin of the pulldown menu represents the termination. This tells the AutoIK to affect all groups in the chain up to the 'Fitting' group. This means that 'Fitting' will not be affected and will remain stationary.

If 'Self' is specified, the group will maintain its rotation despite other AutoIK constraints. This is used to override AutoIK in parts of a chain that need more specific control.

Important Note: Any groups that are affected by AutoIK cannot be moved or rotated in any other way. Example: If the termination is set to 'Ball,' then the user would not be able to move the 'Ball' group or anything else in the chain, because they are all affected by the constraint.

Overlapping Constraints

Avoid overlapping constraints. An overlap is when two or more constraints are applied to the same groups in a chain. Any two constraints that affect the same groups in a chain will conflict. To avoid this, groups must be carefully hierarchical throughout the chain so the constraining objects only affect a specified portion of the chain.

Animating AutoIK

1. AutoIK Tool

AutoIK can be turned on and off, and reassigned to other objects throughout an animation. This is accomplished by using the AutoIK 'apply' and 'remove' tools.

These buttons can be used anywhere from start to stop to reassign the AutoIK to another object. Wherever this is done on the time line, a keyframe will be created for the new assignment. In the same way, the 'remove' button can be used to set a keyframe which will cause the constraint to 'let go' at that keyframe.

2. Constraint Object

One of the most powerful ways of animating an IK chain is through constraint objects. These objects have the ability to indirectly animate the IK chain by creating simple motion paths. Wherever a constraint is located, the IK chain will try to modify itself to match that position.

In effect, the constraint objects can be used as control handles for otherwise very complex IK movements.

3. Hierarchy

The hierarchy can also be animated by using the move tool. Because the child will try to maintain its position, the hierarchy can be animated while the child stays in place. These types of movements occur when a character squats, jumps, walks, etc.

This could be combined with moving the constraint object to produce even more sophisticated movements.

4. Chain to Chain

Because multiple chains can be constrained to the same object, it is possible to virtually link multiple chains to each other. An example of this type of effect is seen when a person rides a bike. The crank and pedal would be one chain, and the leg of a character would be another chain. Effectors can be linked to the pedal to define foot positions for the

character. The characters foot could then be constrained to those effectors. This would cause the characters legs to bend when the bike is pedaled.

Tips and Techniques

Effectors



Child Effector

Effectors can be used to fine-tune the Auto IK alignments. AutoIK aligns an object to another by matching up the link points. Because this is not normally desired, effectors can be used as connection points.

Remember that AutoIK requires two things in order to work; a child and a constraint. Both can be created with effectors.

Constraint Effector

An effector can be positioned (as crosshair) at the end of the chain defining the 'connection point' for the constraint. For a ball and chain, the effector would be located on the bottom of the very last link, and would also be the last child on the chain. The joint type of this effector would be 'locked'.

A duplicate of the Child Effector with a joint type of 'free' can be used as the constraint object. Using an exact duplicate of the Child for the Constraint will ensure that the chain is not prematurely altered and that the placement of the constraint is accurate. Be sure that the effector is first removed from the hierarchy. Furthermore, if the chain is to follow another chain or group, the Constraint Effector can be a child of another chain.

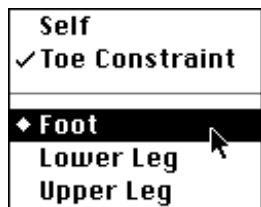
Avoiding Joint Lock

Joint lock occurs when a joint remains straight and will not bend. Usually this happens in ‘pin’ joints such as a knee or elbow. When the joint is straight, directly applied force will not make the joint bend.

This can be fixed by adding a slight bend to the joint. To do this, reset the Joint Limits in the Group Link Window to numbers other than 0, 90, and 180. A better choice might be 1, 89, and 179 degrees.

Another helpful feature in fighting joint lock is viscosity, also set in the Group Link Window. Viscosity will make joints more resistant to movement. Joints with less viscosity are more likely to bend. For a human character, the knee and elbow joints should be given a low amount of viscosity, such as ‘0’, while the wrist and shoulder may have a viscosity of ‘100’. This will make the knee and elbow joints more willing to bend.

Tilt and Rotation



When using AutoIK, constrained objects will have a tendency to tilt. With an animation such as a walk cycle, it is important that the feet lay flat on the ground with each step taken.

To correct this there is an option on the Kinematics Palette to “Keep World Orientation.” When turning this option on, the last object on the chain will not only match the position on the constraint, but will also match rotation. So with a walk cycle, the rotation of the foot can be controlled by simply rotating the constraint object or effector.

Controlling Updates

AutoIK is based on custom frames like the Attach, LookAt and AutoRotate features. A custom frame is animation data that is independent of keyframes and individual to each frame. A custom frame value will override keyframe interpolation. When the Project Window is in Keyframe Mode a custom frame is denoted by an underline, but is not visible in time mode. Tools that create custom frames are: AutoRotate, Attach, LookAt, Spring, Jolt, Randomize, Fill, Blend and all Repeats.

ElectricImage™ must recalculate the custom frames whenever a change is made. The amount of processing time it takes for recalculation depends on the number of frames there are in the animation. Recalculation time may pose an inconvenience. If it does, there is a preference to turn off the auto-calculate and allow the user to manually calculate AutoIK.



Figure 11.6 Compute Automatically Preference

To do this, select '**Keyframe**' from the **Edit Menu**. At the bottom of the **Keyframe Preferences** is a check box. If this is turned off, AutoIK will not recalculate until the user forces an update.

An update is forced by pressing **Command + U**, or selecting '**Calculate Auto Frames**' from the **Keyframe Menu**.

Removing AutoIK

Because AutoIK uses custom frames, there are several precautions to take when removing AutoIK.

1. Move the time marker to '0' before removing AutoIK. This will ensure that the hierarchy is not left posed at some arbitrary point in the animation.
2. Select the object(s) to remove AutoIK from.
3. Next, press the AutoIK 'remove' button from the **Tool Palette** or at the top-right corner of the **Project Window**. This will cause the AutoIK channel to change to 'none' for all frames.
4. Select **Clear All Keyframes** from the **Keyframe Menu**. This will delete all of the keyframes ensuring that no AutoIK keyframes remain.
5. Because AutoIK is based on custom frames, custom frames will be generated in the rotation and position channels of all objects affected. Removing the AutoIK from the constrained object will not remove custom frames. This will cause a ghosting effect to occur where the custom frames from the last calculation are still present in the animation. To clear the custom frames, select the objects to reset, hold down the **Shift** key, and then select **Recalculate All Frames** from the **Keyframe Menu**. This will recalculate frames for the selected objects only, clearing all custom data.

Troubleshooting AutoIK

Object is not remaining locked to constraint object.

1. Turn off **Global Gravity** on the **Kinematics Palette** and **Local Gravity** in the **Group Link Window**. This causes the constrained object to lag and not always connect with the constraint object correctly.
2. AutoIK will do it's best to maintain the child's position, but if the problem is simply that the chain cannot reach, then there is little that can be done. AutoIK will not break the constraints of the chain, so in order to maintain a connection either the chain or the constraint object must be moved.
3. Check the link positions of the child and the constraint in the working windows. If the links are in the same position, then it is working correctly and will likely need some adjustment from the **Group Link Window**.
4. Check the constraints termination. If the constraint overlaps and interferes with another constraint, then the hierarchy must be reorganized or the termination levels must be reset.

Long Calculating Times

1. The calculation can be turned off to allow the user control.
2. The stop time can be changed to shorten the length of the animation. This can be a temporary change until rendering the final animation. Do not change the start time. This will disrupt all custom frames and may destroy some of the animation in the project.

Constraint Error

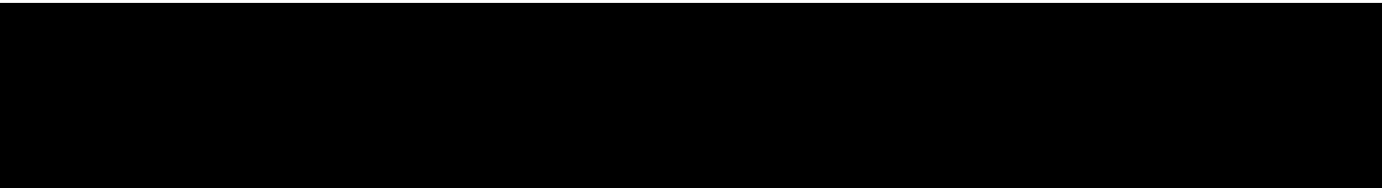
"Can't constrain to effector because it creates circular hierarchical relationships"

This error message results when a parent object is linked to a child. This will also occur with AutoIK any time a child is constrained to a parent. This error occurs when circular hierarchies cannot be created.

Object is not Remaining Locked to Constraint Object

Make sure to “Keep Object Orientation” on, if the object is to follow the rotation of the constraint. If “Keep World Orientation” is off, then only the position of the object is met.

Chapter 12 QuickTime and QTVR Rendering Features



Chapter 12 QuickTime and QTVR Rendering Features

The renderer, Camera, supports rendering to any QuickTime CODEC (hardware or software), rendering to the PICT file format, rendering to QTVR Panorama, or rendering to a warped Image or warped PICT file.

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QuickTime and PICT Support

The Format pulldown now lets you set the output rendering to Image, QuickTime or PICT files. If PICT is chosen and there is more than one frame to be rendered, Camera will output a series of numbered PICT files.

Choosing either QuickTime or PICT brings up a window that lets you choose a hardware or software compression CODEC.

Please remember that the CODEC must be present on any slave machines that will be used to render the animation.

The CODEC window also lets you override the bits per pixel and frames per second settings that you chose in the Render Control Window.

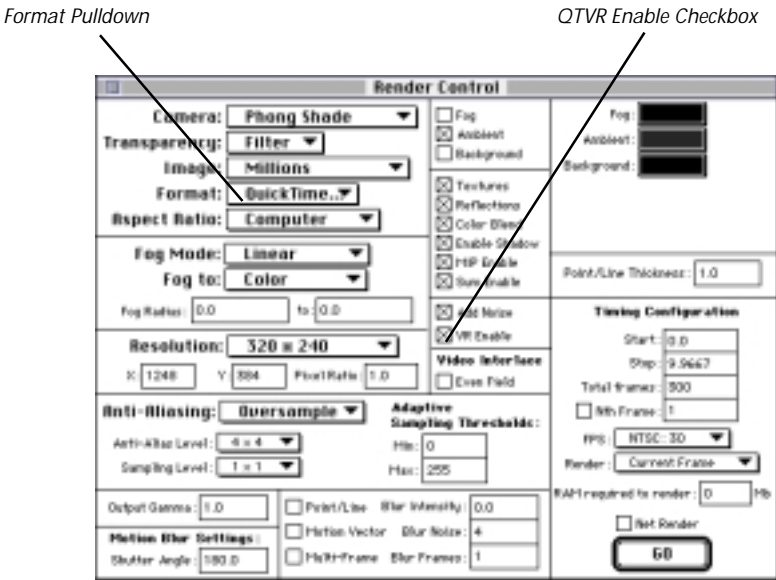


Figure 12.1 Render Control Window

QuickTimeVR Panorama

Version 2.7.5 allows you to render directly to a finished QTVR panorama, to a warped PICT, or to a warped Image file. The VR Enable checkbox in the Render Control Window turns on the QTVR system. The Format pulldown in the Render Control Window controls the output file format (QTVR – QuickTime, warped PICT – PICT, or warped Image– Image).

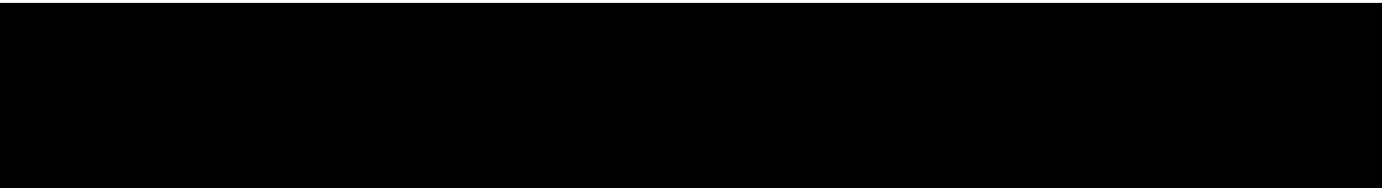
Warped PICT files are used with multimedia authoring tools because many do not accept QTVR movies directly. The process of adding nodes is done with warped PICT files.

QTVR has several rules regarding output resolutions. The X dimension must be evenly divisible by 96 and the Y dimension evenly divisible by 4. Common output resolutions include: 2496 by 768 and 1248 by 384.

Camera renders the QTVR in four panes, each with a 90 degree horizontal field-of-view (FOV). Make sure that the horizontal FOV is set to 90 degrees in the Camera Info Window. One of these panes will be displayed in the Camera View Window when QTVR is enabled. Once the horizontal FOV has been set to 90 degrees, the vertical FOV will automatically reflect the proper value for the output warped file or QTVR.

During render time, all four views will be automatically rendered, rotated and properly warped. If QuickTime has been selected as the format in the Render Control Window, the output image will be diced and compressed into a QTVR using the chosen CODEC.

Chapter 13 3D Map Projection Plug-In



Chapter 13 Camera Map Projection Plug-In

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Introduction

Camera Map Projection is the ability to project a flat texture map from an arbitrary angle across multiple model groups. If you were to view the scene from the same point in space from which the map is projected, the scene would look exactly like the image you are mapping. If viewed from a differing angle, however, the scene appears to have a new depth and perspective. This phenomenon can be used to make a photo or painting appear as if it really exists in three dimensions.



Figure 13.1 CameraMap Icon From The Object Palette

There are a few requirements to consider:

First, the model geometry that is receiving the projection map must somehow approximate the visual content of the map. For example, if you were using a photograph of some downtown high rises, you would need to create some simple geometry that would approximate the major shapes in the photo. You will also want to include a background plane, and a floor plane as well, to catch the non-modeled components of the photo.

Second, you can move off axis, and in and out of the original framing of the photo, within reason. At some point, the effect will become visible for what it is, ruining your shot. Trial and error define these parameters, as each shot is different. You can push this effect very far, however.

Third, you will typically want to make groups receiving the Camera Map Projection 100% luminant. This will keep Camera from applying any shading to the groups - all shading will be provided by the map. Failure to do so will result in additional shading, which may result in unwanted effects (this is up to you.)

Fourth, the map should be somewhat larger than the resolution which you are rendering to, as this gives you more leeway in moving the camera

within the shot. If the map is large enough, you can push in quite a ways before interpolation begins to take place, giving away the effect.



For sharper maps, you can deactivate the map smoothing feature by setting the softness popup in the group's Texture Map Window to "none." Aliasing will increase slightly, but may not be objectionable if using Oversample image anti-aliasing, or by setting the sample rates of the groups receiving the Camera Map Projection to 8x8 or higher (this will lengthen your rendering time, of course.)



When To Use Camera Map Projection

Use this technique when you need to create an environment quickly, but don't have the time (or the memory) to build complex models to achieve the effect you are going after. You can, for example, create an ancient Egyptian city with a high degree of detail by the following method:

First, create a city out of simple shapes, like cuboids, cylinders and pyramids. Create a ground plane and sky backdrop, either as a plane, or as a cyclorama (a sheet which surrounds the city, which may or may not be curved at the bottom).

Next, render a good angle for a painting. Setup your lighting to approximate the lighting in the final shot. This rendering will be used to paint the actual map. Please be sure to note the location of the camera, in both position, rotation and focal length, as this information is necessary for the Camera Map Projection to work properly.

Now comes the hard part. Load the rendering into Photoshop or Painter, and paint on top of the rendering, making the scene appear as you would like (Hopefully, you are a good artist!) You may wish to create elements on different layers, such as a separate sky and ground plane. Isolating elements like this can give you a little more freedom of camera movement later, as these elements can be applied separately in ElectricImage™.

After you have finished the painting to your satisfaction, you then must go back to ElectricImage. In the same project, add the CameraMap plug-in. Parent the groups that were used to create the simple city to the plug-in (the groups are now children of the plug-in). Set the luminance attribute of the groups to 100% (that's the far left slider bar in the Material Editor.) Now, add the painting that you created as a texture map to the CameraMap group. Lastly, copy the information from the original camera position into the Camera Map plug-in via the options button in the CameraMap's option window.

CameraMap by Mark Granger
Copyright © 1993-1996 Electric Image, Inc.

Camera X:	0	Reference X:	0
Camera Y:	0	Reference Y:	0
Camera Z:	0	Reference Z:	1

Roll: 0 Field Of View: 36.86

Pixel Ratio: 1

OK **Cancel**

Figure 13.2 CameraMap Dialog Box

Render the scene. It should look identical to your painting (allowing for image filtering.) Now, create an animation with the camera itself (not the CameraMap!) moving off axis, either inwards or around the scene. Render and watch the result. If everything went well, you should see a fantastic dimensional vista coming to life! At some point in the movie, the effect may show itself, in the form of some stretching distortion. Should that occur, you have just observed the limits of how far you can push the effect for this particular shot.

An alternative approach would be to work with an existing photograph or painting. This requires more planning, as you must align your models and camera to match the perspective of the original shot. It's not too hard (hey, we did it for Terminator 2!) but can be tedious. Once you have done it a couple of times, its not so bad.

Benefits Of Camera Map Projection

Traditionally in special visual effects, the matte painting has been a great tool in adding scope, establishing a location or time, but has always suffered the curse of being flat. Over the years, creative artists like Albert Whitlock, Peter and Harrison Ellenshaw, and many others have added lateral camera movement, foreground models and various optical effects to hide the painted nature of the shot. This worked for decades, but never really fooled the sophisticated viewer. When Star Wars entered our lexicon, the fascination with the creation of visual effects prompted many different outlets of technical information. That information led to the public exposure of many “tricks of the trade”, matte paintings among them. Until the advent of computer graphic effects, it was difficult to make the matte paintings more realistic.

Camera Map Projection can change all of that. As illustrated previously, a painting can now appear to exist in three dimensions (within reason!) and again allow for the suspension of disbelief that is so necessary when creating special visual effects.

On the technical 3D rendering side, Camera Map Projections offers many benefits:

Far fewer individual texture maps. As one map can be used across many groups, the amount of maps needed is reduced.

Lower resolution maps. Even though the scene is viewed in perspective, the texture map is kept aligned with the film plane of the synthetic camera (within reason.) This allows far less scaling of individual pixels in the map, and requires far less pixels in the overall map. Because distortion is kept to a minimum, the simple flat projection works very well. The relationship of texture map pixels to screen pixels is much closer to 1:1 than any other mapping style. Simply put, you get more for less.

More complexity for less modeling. Traditionally, it has always been easier to paint a picture than to build a model. This is especially true with many of the computer modeling programs available today. A simple stroke of the brush is just that in a painting, but the same thing translated to a model can cost thousand of polygons. With Camera Map Projection, you get the best of both worlds.

Drawbacks of Camera Map Projection

Unfortunately, there are a few (but only a few!) The first one is one that you have already encountered: You do have a limited range of movement.

Memory is also a consideration. Although you are saving large amounts of memory by making the textures more efficient, CameraMap plug-in needs to load all attached groups into memory at once in order to work. That means that more memory is required to render models with a large number of polygons. Once you get a feel for it, however, you should be fine.



For groups linked to the CameraMap plug-in, break up large polygons into smaller ones. This will increase the distance that the Camera can be moved before the effect begins to break down. A large polygon is one which takes up more than about 1/8th of the screen.



Uses of Camera Map Projection

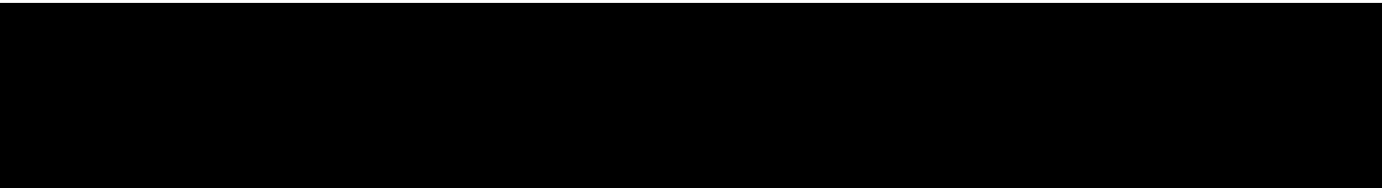
Multiple CameraMap plug-ins can be used in a single scene. As the perspective of the original painting is fixed, a final shot may be larger in scope than the painting can convey. Using multiple Camera Maps can solve this dilemma. Also, a particular effect may not require one full screen resolution Camera Map, but rather many small ones.

When using a “sky plane” in the background of an interior shot (looking out of a window), the Camera Map Projection can add much more realism to this typically flat look. And, because the window allows only a small portion of the overall map to be seen, you can push the effect much farther.

Mixing regular models and Camera Mapped models together often results in the most realistic shot. The effect is virtually impossible to detect when

there are other components in the scene which help to disguise it. These same components can also help to blend multiple camera maps together.

Chapter 14 Value Modification



Chapter 14 Value Modification System Additions

A simple system to enter percentage and relative numerical value changes to the Project Window cells, and the edit boxes of most modal and non-modal windows was added in Version 2.5. Original comments for the Value Modification System can be found in the ElectricImage™ Version 2.5 Supplement, Chapter 11. Two new symbols have been added.

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Additions to the Value Modification System

For Version 2.7.5 we have added two new symbols:

! converts the current cell to the opposite (positive or negative) value.

returns the absolute value of the current cell or the entire channel.

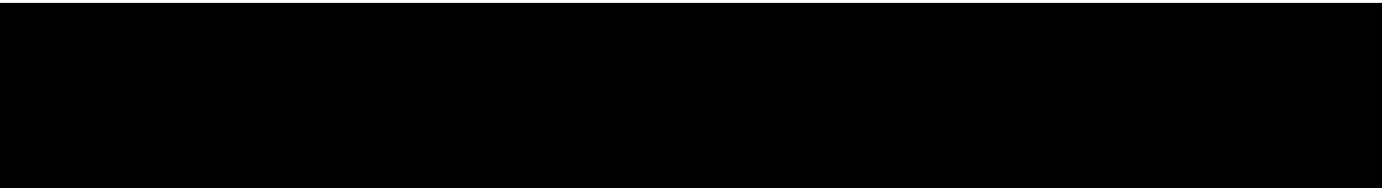
Usage Examples:

Original Value	Formula	Returns the Value
5.0	@!	-5.0
-5.0	@!	5.0
0.0	@!	0.0
-5.0	@#	5.0
5.0	@#	5.0
0.0	@#	0.0

All Symbols that are currently supported:

Symbol	Action
!	Pos/Neg function
#	Absolute value
+	Add
-	Subtract
*	Multiply
/	Divide
^	Exponential (to the power of...)
%	Percentage

Chapter 15 Motion Data Import/Export



Chapter 15 Motion Data Import/Export*

ElectricImage™ Animation System supports importing and exporting motion capture data. This feature is optional for ElectricImage Broadcast users (for more information please contact sales or customer service.). Three different formats are supported. All data is read in as custom keyframes.

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Using the Motion Data Export Feature.....	15-4

*Motion Data Capture is a feature of the ElectricImage Animation System. This feature is available to ElectricImage Broadcast users as an option. Please contact sales or customer service for more information.

Motion Capture Data

ElectricImage™ now imports and exports motion capture data from three different file formats. These three formats include the group names for the models that will receive the motion data in their file headers. If matching groups are found in your project during motion capture importation, the data will be added to those groups. If not, ElectricImage™ will offer you the opportunity to create a model using a new form of effector, the skeleton effector.

.bvh

The BioVision Hierarchical format, .bvh, is the preferred format for motion data importation. It includes a header that accurately describes the model hierarchy. By using this format you insure that the lengths of the links between groups will be taken into account when the data is imported.

.bva

The BioVision Flat format, .bva, should only be used for groups that are not in a hierarchy.

Information on the BioVision formats along with sample data can be found at <http://www.biovision.com> or directly from BioVision, Inc. 1590 California St. San Francisco, CA 94109 415-292-0333

.obm

The ElectricImage™ Motion format, .obm, is designed to exchange camera motion data between different animation programs or between ElectricImage™ and a motion control system. This format can accept group names with spaces in them. The .bva and .bvh formats do not.

Using the Motion Data Import Feature

The Motion Data import feature is available through the File Menu >Add >Motion Data... submenu. There is no need to select (highlight) groups before issuing the command. ElectricImage™ compares the group names in the header of the motion data file to those in the project file and adds the data to the matching groups.

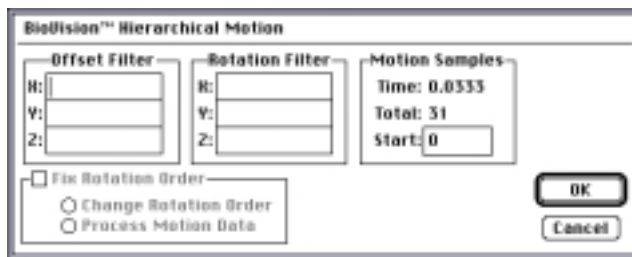


Figure 15.1 Motion import dialogue

Offset Filter	Adds an offset to the position data during importation.
Rotation Filter	Adds an offset to the rotation data during importation.
Motion Samples: Time	Duration of each sample (one over the number of samples per second).
Motion Samples: Total	Number of samples present in the motion capture file.
Start	Controls which sample to begin with when data is imported.
Fix Rotation Order	Enables a change in the rotation order, either the groups rotation order or the rotation order of the motion data.
Change Rotation Order	Changes the rotation order of the groups to force them to conform to the rotation order in the capture file.
Process Motion Data	Changes the rotation order in the capture file to conform to the current groups' rotation order.

Using the Motion Data Export Feature

The Motion Data Export feature is available through the File Menu >Export >Motion submenus. Select (highlight) the groups you wish to export motion from before issuing the command.

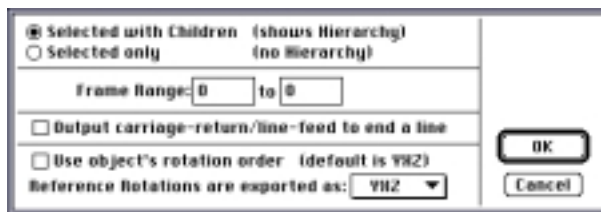
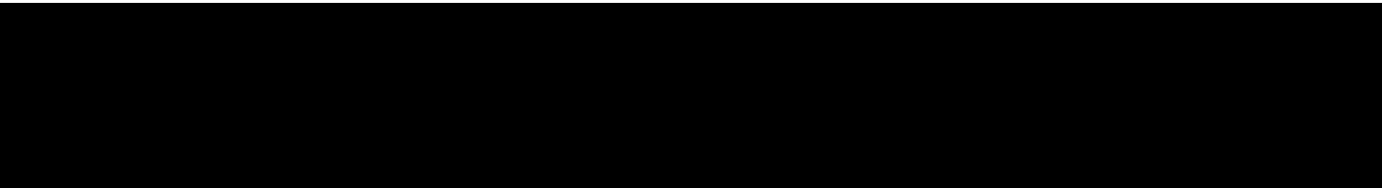


Figure 15.2 Motion export dialogue

Selected with Children	Motion data is written out for selected groups and all groups linked to them.
Selected Only	Motion data is written out for selected groups only.
Frame Range	Selects the range of frames for which motion data is written out.
Output carriage-return/line-feed to end a line	Alternate line termination for systems requiring CR/LF.
Use Objects Rotation Order	Uses the rotation order of each object when writing out the file. The default is to use YXZ as the rotation order for all groups
Reference Rotations are exported as	Objects with references (cameras and spotlights) are exported using specified rotation order.

Appendix A Keyboard/Mouse Commands



Appendix A Keyboard/Mouse Commands

This Appendix contains all of the Keyboard and Mouse commands available in ElectricImage™. This appendix replaces Appendix E in the original Reference Manual.

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Conventions


Keyboard Symbols

The following symbols are used to represent specific keys:

 Command key

 Option key

 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 A.1 lists keyboard/mouse actions available for use in the World View windows**









Figure A.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.
 CTRL	Click Zoom Button	Fits all selected objects into the window.
	Click and drag a rectangle.	Zoom to selected area.
Spacebar	Click and drag in window.	Drag the window's view.
CTRL	Click and drag object part	Rotate object using best rotation for the view.
 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 A.2 lists keyboard/mouse actions available for use in the Camera View window.

Figure A.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.
	Click Fieldchart button.	Open pop-up menu for fieldchart preferences.
Spacebar	Click and drag in Camera Window.	Track the Camera or Light.
 Spacebar	Click and drag in Camera Window.	Orbit the Camera or Light.
 Spacebar	Click and drag in Camera Window.	Pan the Camera or Light.
 Spacebar	Click and drag in Camera Window.	Dolly the Camera or Light.
 Spacebar	Click and drag in Camera Window.	Zoom the Camera.
	Click in the title bar	Pull down view object menu (Camera and shadow lights).

Project Window Controls

Figure A.3 lists keyboard/mouse actions available for use in the Project window.

Figure A.3 Project window keyboard/mouse controls
























Press Key(s)	+ Mouse Action	Result
	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.

Figure A.3 Project window keyboard/mouse controls

Press Key(s)	+ Mouse Action	Result
	Double-click group.	Open Group Texture window for group.
 	Double-click group.	Open Group Link window for group.
 	Double-click group.	Open Group Deformation window for group.
	Click in data cell.	Select all data cells in row.
	Click in data cell.	Select row and columns fro last selection to new selection.
 	Click in data cell.	Include/exclude whole row(s) in the selection.
 Up Arrow	Click in data cell.	Include/exclude row above.
 Down Arrow	Click in data cell.	Include/exclude row below.
 Left Arrow	Click in data cell.	Include/exclude column to the left.
 Right Arrow	Click in data cell.	Include/exclude column to the right.
	Click and drag in the time line.	Select keyframe time scaling region.
	Click and drag selected keyframes.	Interactive keyframe time scaling.
	Click individual keyframes.	Select multiple keyframes for dragging or scaling.
	Click and drag time thumb.	Drag time thumb while displaying time code.
	Click and drag sound track lines.	Include/exclude cue time duration.
	Clicking visibility or lock boxes.	Set all objects following to new state.

QuickTime Window Controls

Figure A.4 lists keyboard/mouse actions available for use in the QuickTime display window.






Figure A.4 QuickTime window keyboard/mouse controls

Press Key(s)	+ Mouse Action	Result
	Click in title bar.	Select new QuickTime option.

Velocity Window Controls

Figure A.5 lists keyboard/mouse actions available for use in the Velocity windows.









Figure A.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 A.6 lists keyboard/mouse actions available for use in the Light Info window.

Figure A.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 A.7 lists keyboard/mouse actions available for use in the Group Info window.**

Figure A.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.
	Click material's preview ball.	Select background color for shading ball
	Click material's preview ball.	Select background color for shading ball
	Click material's preview color field.	Select color using the Macintosh color picker
	Click material's preview color field.	Select color using the Macintosh color picker

Group Link Window Controls **Figure A.8 lists keyboard/mouse actions available for use in the Group Link window.**

Figure A.8 Group Link window keyboard/mouse controls


































Press Key(s)	+ Mouse Action	Result
  	Click and drag gnome.	Rotate Z axis.
 	Click and drag gnome.	Rotate Y axis.
 	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.

Figure A.8 Group Link window keyboard/mouse controls

Press Key(s)			+ Mouse Action	Result
⌘	⌘	⬆	Click button/pop-up.	Set all children to value.
	⌘	⬆	Click button/pop-up.	Set immediate children to value.

Group Texture Window Controls **Figure A.9 lists keyboard/mouse actions available for use in the Group Texture window.**





Figure A.9 Group Texture window keyboard/mouse controls

Press Key(s)		+ Mouse Action	Result
	 	Click and drag gnome.	Rotate Z axis.
		Click and drag gnome.	Rotate Y axis.
		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 A.10 lists keyboard/mouse actions available for use in the Tool and Object Palettes.



Figure A.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 A.11 lists keyboard/mouse actions available for use in the Render Control Window.

Figure A.11 Render Control window keyboard/mouse controls

Press Key(s)	+ Mouse Action	Result
	Click Go.	Select remote camera (EI will not shut down).
	Click Go.	Automatically save the project before launching Camera.

File Menu Controls

Figure A.12 lists keyboard/mouse actions available for use with the File menu.

Figure A.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.
 	Choose Group Info.	Open Group Deformation window for selected group.
 	Choose Group Info.	Show Plug-in interface dialog if available.
	Choose Light Info.	Select light color.

Figure A.12 File menu keyboard/mouse controls

Press Key(s)	+ Mouse Action	Result
 	Choose Light Info.	Show Link window for the selected light.
 	Choose Camera Info.	Show Link window for the camera.
 	Choose Effector Info.	Show Link window for the selected Effector.
 	Choose Smoker Info.	Show Link window for the selected Smoker.
	Choose Sound Info.	Play/stop selected soundtrack.
	Choose Projector.	Launch Projector without exiting ElectricImage™.
	Choose Save.	Saves project without asking permission to override.
	Choose Export submenu item.	Saves a model for every frame in the animation.
	Choose Alphabet button in Mr. Font.	Brings in 255 characters as sample.



Edit Menu Controls **Figure A.13 lists keyboard/mouse actions available for use with the Edit menu.**

Figure A.13 Edit menu keyboard/mouse controls

Press Key(s)	+ Mouse Action	Result
	Choose Default Preferences.	Reset window defaults only.
  C	---	Select Special Copy




Keyframe Menu Controls **Figure A.14 lists keyboard/mouse actions available for use with the Keyframe menu.**

Figure A.14 Keyframe menu keyboard/mouse controls

Press Key(s)	+ Mouse Action	Result
	Select Recalculate All Frames	Recalculates frames for selected groups
	---	Changes Calculate Autoframes selection into Force to Calculate Autoframes.









Select Menu Controls **Figure A.15 lists keyboard/mouse actions available for use with the Select menu.**

Figure A.15 Select menu keyboard/mouse controls

Press Key(s)	+ Mouse Action	Result
	Choose All.	Selects all objects including the locked ones.
	Choose Select by Hierarchy>Parent.	Selects all ancestors.
	Choose Select by Hierarchy>Children.	Selects all offspring.






Windows Menu Controls **Figure A.16 lists keyboard/mouse actions available for use with the Windows menu.**

Figure A.16 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 A.17 lists keyboard/mouse actions available for use in the Tool Menu and Tool Palette.**

Figure A.17 Tools menu controls

Press Key(s)	+ Mouse Action	Result
	Choose Translation.	Show custom drag angle when in custom drag mode.
	Choose Deformations.	Globally disable any deformations.
	Choose Unlink from Parent.	Reset prerotations when unlinking.
	Choose remove Autorotation	Removes all autorotate intervals
	Choose remove AutoIK Constraint	Remove all constraint intervals

Special Controls **Figure A.18 lists keyboard/mouse actions available for use in certain specific situations.**

Figure A.18 Special controls
















Press Key(s)	+ Mouse Action	Result
 .	---	Exit ElectricImage™ while application is loading.
 Q	---	Exit ElectricImage™ while application is loading.
  1	---	Select top view of frontmost World View window.
  2	---	Select side view of frontmost World View window.
  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.
Tab	---	Shift translation cursor from none-horizontal-vertical-user defined and back again.
Home	---	Fit world content into window view.

Figure A.18 Special controls

Press Key(s)	+ Mouse Action	Result
 Page-Up	---	Page rather than scroll the drawing windows.
 Page-Down	---	Page rather than scroll the drawing windows.
	While dragging end of chain with IK tool.	Interactively changes the third axis not available from the current window projection (front-z, side-x, top-y).

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