14

Setting Lights & Cameras

Introduction

This chapter covers how to create and use lights and cameras. It includes descriptions of the different types of lighting and how you set the options for each. This chapter also describes the different camera types and settings and how to manipulate them to achieve dramatic camera angles.

Lighting & Cameras

Lighting

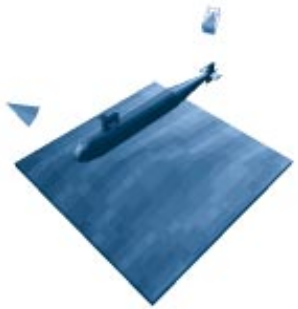
The appearance of objects in the Ray Dream Studio universe is determined greatly by the light in which they are viewed.

A good set of lighting conditions is an important step toward creating high quality artwork. The same scene rendered under different light can provide strikingly different results. For example, rendering with all lighting at zero brightness is like taking a photograph—without a flash—in the bottom of a coal mine. Conversely, too much lighting washes out subtle effects.

Ray Dream Studio also lets you create visible light spheres and cones. The visible light cone effect is like a searchlight cutting through the fog. These are rendering effects, for more information, refer to "Render Filters" on page 349.

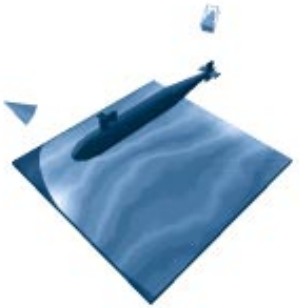
Where Lighting Effects Are Visible

In the default **Preview Quality** display mode, lighting effects specific to your scene are not visible. Instead, the appearance of objects is determined by an arbitrary, fixed light source not visible in the **Perspective** window. This ensures that you'll see the objects you manipulate clearly—even if you are working on a dark scene. This also helps make the **Preview** mode significantly faster than the **Better Preview** mode.



A scene in Preview Quality display mode.

The **Shaded Preview** and **Better Preview** modes use ambient light and your scene's specific light sources to show color, highlights, gel effects and depth shading. No other lighting effects (shadows or reflections) appear. If ambient light is your only source of light, you won't see the depth shading effect on objects.



A scene in Better Preview display mode.

When modeling in the **Mesh Form** or **Free Form** modeler view, the Shaded Preview and Better Preview use an arbitrary, fixed light source. This allows you to see details of the object's textures and geometry clearly, regardless of the scene's actual light settings.

When you render your scene using the Adaptive renderer or the Ray Tracer, that rendering will show color, shading, and all of the complex lighting effects selected in the renderer. These may include visible light and camera effects, reflection and refraction, shadows and transparencies.

Before launching the rendering process, use the **Render Preview** tool in the Standard toolbar to preview lighting and shading effects.

Use the Render Preview tool to preview lighting and shading effects.

For more information on rendering features, settings and procedures, refer to "Rendering" on page 339.

Cameras

Cameras provide viewpoints for the **Perspective** window and for renderings. As you build your scene, the cameras can be positioned to get the best view for working. You can place several cameras and switch among them to get alternate perspectives of your scene. You can even create a second **Perspective** window to view your scene from two different angles at once.

When you're ready to render, you can select a camera as the viewpoint. The camera's position and settings combined with the **Production Frame** position and rendering format to determine the scale and framing of the scene.

Ray Dream Studio also lets you create camera effects, like lens flare and depth of field. These effects help you achieve results you'd expect from photography. For more information on this and other rendering effects, refer to "Render Effects" on page 344.

Setting Lights

Ray Dream Studio supports two categories of lighting—ambient and specific. There is one ambient light setting, but there are several types of specific light sources.

The lighting you set up in your scene has a big effect on the look of your rendered illustration. All the different lighting controls combine to result in dramatically different effects. Experiment with different light settings to create the effects that you want in your 3D illustration.

Ambient Light

Ambient light is uniform through the scene. It has no specific origin and casts no shadows. It is the equivalent of daylight in a real world scene. It radiates in every direction, has no position and no origin point.

To set ambient light:

1. Choose **Windows menu▸ Scene Settings**. The **Scene Settings** window appears.
2. Click the **Effects** tab.

Use the Effects tab to set the ambient light controls.

3. Click the **Ambient Light** color swatch and use the color picker to set the color for the ambient light.
4. Use the **Brightness** slider to set the amount of ambient light.
5. To view your changes, choose **View menu▸ Better Preview** or **Shaded Preview**.

Note: You may also use the **Render Preview** tool in the **Standard** toolbar.

For deeper shadows and high contrast with lit areas, use a lower ambient light setting. As you increase the brightness of ambient light, the intensity of shadows and other effects generated by your other lights decreases. This "flattens" the image. To rely exclusively on your other lights, set ambient light at zero. For example, to create the dramatic effect of a spotlight on a theatre stage, use no ambient light.

Creating a New Light Source

You may create several types of specific lights. The standard lights are distant, bulb, and spot.

You may add as many lights as you like, but as the number increases, so does the time it takes to render your final 3D illustration. Most scenes can be lit with one, two, or at most three well placed lights.

By default spot light and bulb light previews are displayed in red. If you want, you may change the color of light objects in the Perspective window. Choose **File menu▸ Preferences**: **Color** and set your preference.

To create a new light source:

Drag the **Create Light** tool from the **Tools** toolbar into the **Perspective** or **Hierarchy** window.

Drag the Create Light tool into the Perspective or Hierarchy window to create a new light.

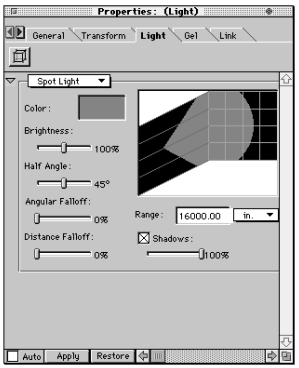
You can also choose **Edit menu▸ Insert▸ Light** to add a light at the center of the Universe (0,0,0).

If you want to create a light with the same settings as an existing light, you can select the existing light then **Copy** and **Paste**, or use the **Duplicate** command.

After creating a light, you can change its properties.

Setting Light Properties

Once you have created a new light, specify which type it is (distant, bulb, or spot) then, set its options on the **Properties palette: Light tab**. You can use these controls at any time and adjust the settings of a selected light.



Use the Light tab in the Properties palette to set the light properties.

To set a light's properties:

1. Select the light.
2. Display the **Properties palette: Light tab**.
3. Choose the type of light you want from the pop-up: **Bulb Light**, **Distant Light** or **Spot Light**.

   A **Distant Light** is outside of the scene universe . The light rays from a distant source are parallel as they enter your scene. An example of this is the way the sun lights the earth.

A **Bulb Light** radiates light in all directions.

A **Spot Light** casts light in a specific direction. The light rays of a spot light diverge based on parameters that you set, such as the **Half Angle** and **Distance Fall Off**.

When you change light type, the tab displays the parameters appropriate to that type.

Setting Common Light Characteristics

The characteristics of color, brightness, and shadow control are common to distant, bulb, and spot lights. You adjust these settings in the **Properties palette: Light tab**.

To set the color:

Click the color chip and use the color picker to choose a color.

To set the brightness:

Drag the slider to set the brightness.

To control shadow strength:

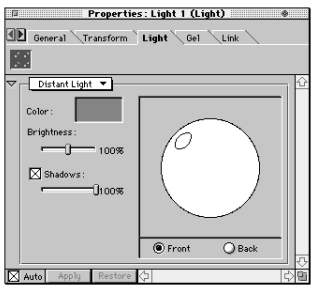
By default, all lights (except ambient) cast shadows. If you want to minimize the shadows from a particular light, drag the **Shadows** slider to a lower setting.

Use the **Render Preview** tool or render the image to view the changes. Shadows appear only in renderings.

For more control over shadows, refer to "Shadow Options" on page 279.

Setting Distant Light Direction

The direction of a distant light source is set indirectly—by moving the highlight on the surface of the sphere in the distant light's **Properties palette: Light tab**.



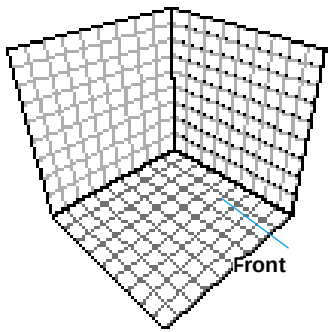
Use the Distance Light controls to set the direction of the lights.

To set the direction of a distant light source:

To set the position of the light, imagine the distance light sphere as a glass ball surrounding your scene. The highlight shows where the distant light shines through the glass, toward the center of your scene.

1. Drag the highlight on the surface of the sphere to position the light source.
2. To shine the light from behind, click the **Back** radio button.

The Front of the scene refers to the direction shown in the following figure when the working box is in its initial position, the Reference view.



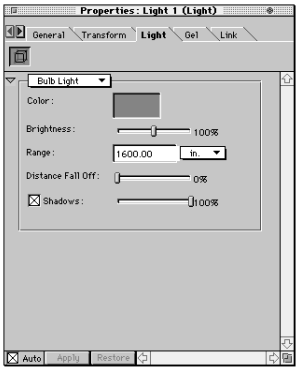
The Distant Light uses this convention for reference in the Perspective window.

As with ambient light, you can use a distant light to soften the shadows cast by your other light source. Position a distant light above your scene, then experiment with light settings to diffuse the shadows from your other lights.

Setting Bulb Light Characteristics

Bulb lights appear in the **Perspective** window. You can move them anywhere in the 3D workspace with any of the

positioning features, including the **Selection** tool, **Virtual Trackball**, and **Properties palette: Transform tab: Position** controls. Because bulb lights shine equally in all directions, you do not need to aim them.

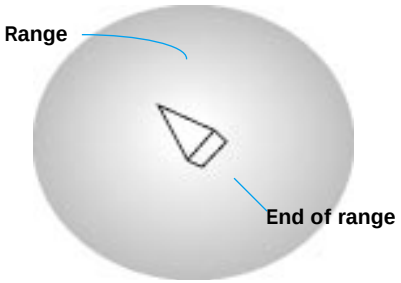


Use the Bulb light controls to set the range of the light source.

To set the range of the light source:

Enter a value. Use the pop-up to select your units.

The range is the distance from the light itself to the point where the light has no effect.



The bulb light range is the distance from the light to the point where the light has no effect.

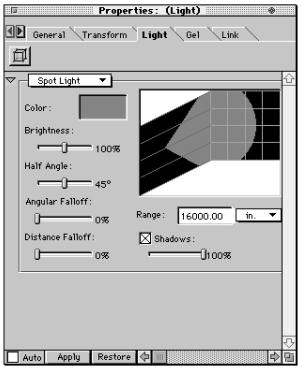
To set the distance fall-off:

Drag the **Distance Fall-off** slider.

The distance fall-off setting determines how the brightness of the light diminishes toward the edge of its range. A fall off of 10% means that the light has full intensity from the source through 90% of its range, then decreases linearly to the end of the range.

Setting Spot Light Characteristics

Your brightness, half angle and angular fall-off settings are previewed in real time in the diagram in the right side of the spot light controls.



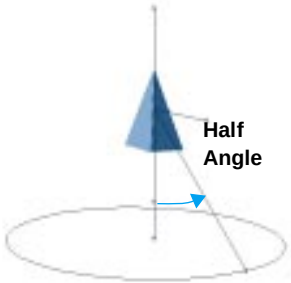
Use the Spot light controls to set the brightness, half angle and angular fall off settings.

To set the half angle of the light cone:

Drag the **Half Angle** slider.

Note: You may also use the **Direct Manipulation** controls to set this feature. Refer to "Controlling a Spot Light Directly" on page 277.

The half angle is the angle of the radius of the cone. A narrow angle creates a beam like that of a spotlight. A wide angle creates a beam like that of a flood light. (See the following diagram.)



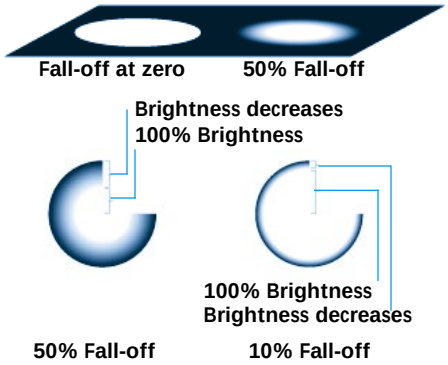
The spot light half-angle changes the diameter of the light cone.

To set the angular fall-off:

Drag the **Angular Fall-off** slider.

Note: You may also use the **Direct Manipulation** controls to set this feature. Refer to "Controlling a Spot Light Directly" on page 277.

Fall-off is how the brightness of the light diminishes toward the edge of the light cone. A fall off of 10% means that the light has full intensity from the center to 90% of the radius of the light cone, then decreases linearly to the edge of the cone.

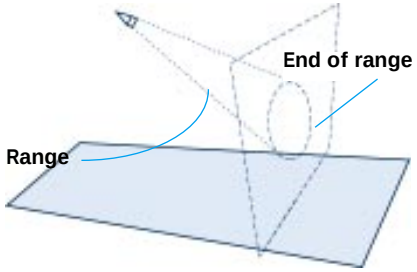


As you increase the fall-off percentage, you decrease the area that is 100% bright.

To set the range of the light source:

Enter a value. Use the pop-up to select your units.

The range is the distance from the light itself to the point where the light has no effect.



The range of the spotlight is distance between the light's point of origin and the point where the light has no effect.

To set the distance fall-off:

Drag the **Distance Fall-off** slider.

The distance fall-off setting determines how the brightness of the light diminishes toward the edge of its range. A fall off of 10% means that the light has full intensity from the source through 90% of its range, then decreases linearly to the end of the range.

The spot light parameters interact with each other. For example, using a light colored light with a low brightness setting may generate a similar result as a darker colored light with a higher brightness setting. Experiment with various settings until you achieve the lighting you want.

Positioning and Aiming Spot Lights

Spot lights appear in the **Perspective** window. You can move them anywhere in the 3D workspace and change their direction with any of the positioning and orientation features, including the **Selection** tool, **Virtual Trackball**, and the **Properties palette: Transform tab** controls.

Ray Dream Studio offers several other methods of aiming lights, including the **Point At** command, the **Point At** behavior, and the **Direct Manipulation** controls.

Pointing a Light at an Object

The **Point At** command lets you point a light directly at an object.

To point a spot light at an object:

1. Hold down **Shift** and select the light and the object you want to point it at.

   You may select multiple lights, but only one object.

2. Choose **Arrange menu▸ Point At** or press **Command-M/Ctrl+M**.

   Ray Dream Studio reorients the light to point at the hot point of the selected object.

The **Point At** command does not link the light to the object selected. That is, if you move either element, the light no longer points at the object. If you want to maintain the relationship between a light and the object it points at, place them together in a group. For more information, refer to "Grouping Objects" on page 256. If you want the light to follow the object, apply the **Point At** behavior, described below.

To direct a light to a particular area in your scene, you can create a temporary object for the light to point at, then delete the object. Remember that the light points at the hot point of the object selected.

You can check where the light is cast by actually viewing your scene through the light. Use the Position pop-up in the Camera Properties dialog to select the light source from which you will view the scene.

The Point At Behavior

The **Point At** behavior sets a light to aim at an object. If the object moves, the light automatically reorients itself to point at the object in its new position.

To have a light follow an object:

1. Select the spot light you want to use.
2. Display the **Properties palette: Behavior tab**.
3. Click the **Plus sign** icon.
4. Select **Point At** from the dialog and click **OK**.
5. Enter the name of the target object—the one you want the light to follow.
6. Leave the axis option as it is. The axis option sets which axis of the object should point at the target. For a light, you only want to use the axis that emits the light.
7. Click **Apply** to send your changes to the light.

   From now on, whenever you move the target object, this light reorients to point at it.

Controlling a Spot Light Directly

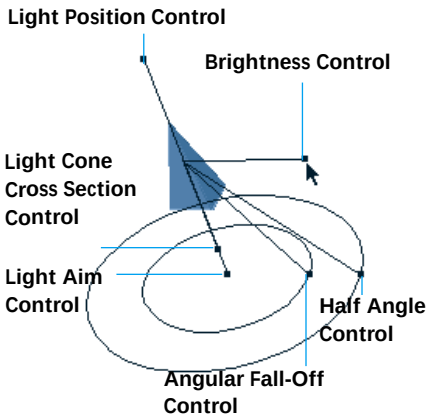
The Direct Manipulation controls for a light provide an on-screen description of the light's aim and properties. You can drag a light's control handles to change light properties.

To display the Direct Manipulation controls on a spotlight:

1. Select a spot light.
2. Make sure this light is visible in the **Perspective** window. For best results, you'll want all planes visible so you can work with the projections.
3. Display the **Properties palette: Light tab**.
4. Click the **Direct Manipulation** button to display the control handles on the selected light.

   The controls appear as a set of wires with "handles" at certain points. Each handle represents a control you can drag to set properties.

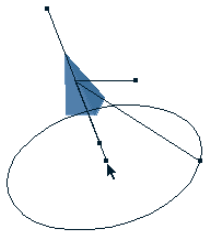
Note: The **Direct Manipulation** controls require **Auto Apply** enabled.



Drag the control handles to aim the spot light and set its properties.

To aim the light:

Drag the control handle in front of the light cone. The handle will move parallel to the active plane. Hold down the **Option**/**Alt** key to drag the handle perpendicular to the active plane.



Drag the Light Aim control to set the point where the light aims at.

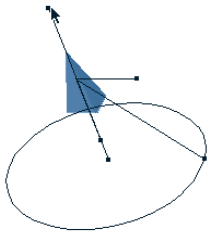
You can drag the handle out, extending it all the way to the point you want to aim at. The wire shows the angle of the light beam.

You may also aim the light with respect to a given plane by dragging the corresponding handle on one of the light's projections.

The light rotates to aim where you place the handle.

To move the light:

Drag the handle behind the light cone.



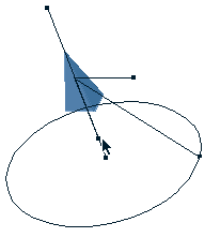
Drag the light's position control to move the light along a given plane.

You may also move the light with respect to a given plane by dragging the corresponding handle on one of the light's projections

The light moves to the new position and orients itself to point at the target.

To check the light cone diameter at a given point:

Drag the handle that's on the direction wire, centered in the ring.



Drag the Light cone cross section control to help you visualize the diameter of the light cone in the Perspective window.

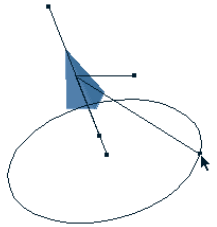
The ring around the direction wire describes the cone diameter at that point. Notice that as you drag the handle closer to the target, the ring expands.

Note: The cross section control is to help you visualize the diameter of the light cone at different ranges. It does not change any of the light's properties.

To change the cone half angle:

Drag the handle on the ring perimeter to change the light's half angle.

Hold down the **Command**/**Ctrl** key when you drag in (toward the center of the ring) to keep the Angular Fall Off and Half Angle together.

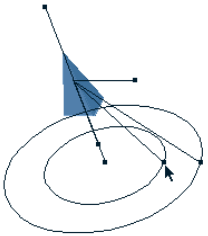


Half angle control to adjust the light's half angle.

Note: If you have the **Properties palette: Light tab** displayed, you can see the effect of your changes in the preview and settings.

To change the angular fall-off:

1. Drag in (toward the center of the ring) on the ring handle to separate the angular fall off ring from the half angle ring. (The fall off ring is always on the inside.)



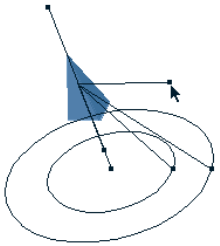
Drag the Angular fall-off control to set the light's angular fall-off.

2. Drag the fall-off ring handle to set the fall off you want. The gap between the two rings describes the fall-off.

Note: If you have the **Properties palette: Light tab** displayed, you can see the effect of your changes in the preview and settings.

To change the light's brightness:

Drag the handle on the wire that extends from the light perpendicular to the direction wire.



Drag the Brightness control to set the light's brightness.

Drag away from the light to increase the brightness, or towards the light to decrease brightness.

Note: If you have the **Properties palette: Light tab** displayed, you can see the effect of your changes in the preview and settings.

Note: On a bulb light, brightness is the only control available with Direct Manipulation.

Shadow Options

Objects block light and, therefore, cast shadows on other surfaces. For each light, you can choose between two shadow types—Ray Traced Shadows and Soft DRT Shadows.

To set shadow options for a light:

1. Select the light you want to set.
2. Display the **Properties palette: Shadows tab**.
3. Use the pop-up to choose the type of shadow you want for this light.

   Ray-Traced Shadows is the default. The edges of the shadows end abruptly. The transition from complete shadow to full light is immediate. Ray-traced shadows are considered "hard shadows."

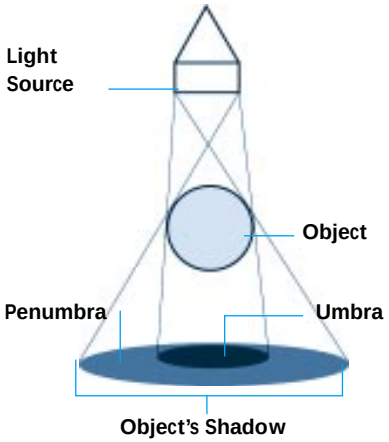
   Soft RTD Shadows let you create a penumbra at the shadow edge. The shadow has a soft transition between complete shadow and full light. Soft shadow options are described below.

Note: Distant Lights are restricted to Hard shadows.

Setting Soft RTD shadow options:

1. Enter a value in the **Diameter** field to set the size of the light source.

A larger light source creates a wider penumbra.



The penumbra width depends on the diameter of the light source and the proximity of the source, object and shadow surface. The behavior follows what you'll experience in the real world, so you can experiment with a light source (lamp), object (your hand) and surface (wall or desk) to see the penumbra-umbra transition in action.

2. Drag the **Quality** slider to set the number of samples.

   The range is from 16 to 128. Higher values improve shadow quality, but increase render time.

Each sample represents a point on the light source that is used as the origin for ray tracing rays. The points are spaced evenly around the perimeter and across the surface of the light.

3. Enable the **Optimize** option if you want to speed up a rendering.

- When **Optimize** is disabled, the system will check every sample of the Quality setting.
- When **Optimize** is enabled, Ray Dream Studio checks the condition of the first seven samples.

  If all seven samples are "in the umbra," Ray Dream Studio assumes that the remainder (up to the Quality setting) are also and skips them.

  If all seven samples are "in full light," the system assumes that the remainder (up to the Quality setting) are also and skips them to save time.

  If the first seven samples have any combination of umbra and light, Ray Dream Studio recognizes that this pixel is in the penumbra and finishes checking all samples of the Quality setting to ensure shadow quality.

Note: Using the **Optimize** option may produce erroneous results with a light source of large diameter and objects that are small and relatively close to either the light or the shadow surface.

Using Gels

You may place an image as a mask or transparency in front of a light to project complex patterns and images on your scene. The image you place in front of the light is called a gel.

If the gel is a 1-bit image, it becomes a mask. White regions of the mask transmit the light and black regions block it. Bitmap gels can create intricate effects, such as the shadow of a chain-link fence, or the dappled shade under a tree.

Grayscale or color images create transparencies when used as a gel. Their image is projected into your scene, just as a slide projector sends an image across the room. With a color image, you can achieve many effects, like sunlight filtering through a stained glass window. An 8-bit gel will probably provide all the color you need.

Two gels types—**Blinds** and **Gradient**—are built-in gels. You may also load a texture map or movie to use as a gel.

As you adjust the settings for these gels, a preview displays to the right. Specific blend controls are described later in this chapter.

To place a gel on a light:

1. Select a light.

   Gels are generally used on distant or spot lights. Your choice depends on the effect you want.

2. Display the **Properties palette: Gel tab**.

3. Choose the type of gel from the pop-up.

   None is the default. The light has no gel.

   Blinds creates horizontal or vertical stripes—venetian blinds, prison bars, etc.

   Gradient uses a blend of two colors as a gel. A gradient gel can be vertical or circular.

   Map uses a bit-mapped image file as the gel. This is the best choice when you want specific imagery in the gel.

   Formula uses a mathematical formula to create colors and patterns in the gel. You can devise your own formula to create a new pattern.

   Movie uses a sequence of images in the gel. This option only makes sense when you are creating an animation.

Blinds Controls

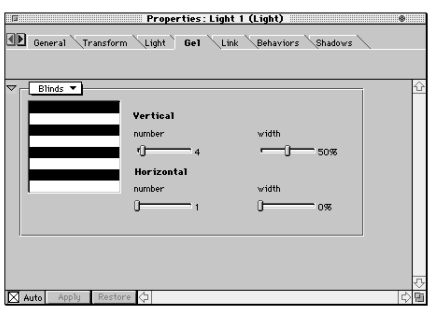
Use the Blinds controls to create a gel that projects stripes onto an object.

To set blinds options:

1. Select a light.

2. Choose **Windows menu▸ Properties palette: Gel tab**.

3. Choose **Blinds** from the pop-up.The blind controls appear in the **Gel** tab.



Choose Blinds from the Gel tab pop-up to use Blinds.

4. Drag the **Vertical number** slider to set the number of vertical slats.

5. Drag the **Vertical width** slider to set the width of the vertical slats. The width is expressed as a percentage of the gel frame.

6. Drag the **Horizontal number** slider to set the number of horizontal slats.

7. Drag the **Horizontal width** slider to set the width of the horizontal slats. The width is expressed as a percentage of the gel frame.

8. Click **Apply** to apply your selections.

Formula Controls

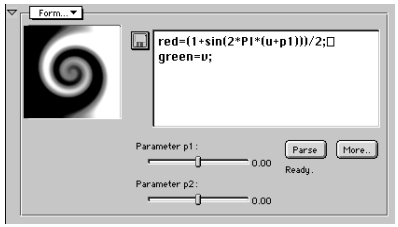
Use the Formula controls to create a gel that projects a pattern onto an object.

To select a formula for the gel:

1. Select a light.

2. Choose **Windows menu▸ Properties palette: Gel tab**.

3 Choose **Formula** from the pop-up. The formula controls appear in the **Gel** tab.



The preview displays the result of the current formula.

4 If the current formula uses the **Parameter** sliders, you can adjust them to change the formula result.

5 To load a new formula, click the **Disk** icon and choose **Open** from the pop-up.

Use the **Open** dialog to locate and open an appropriate formula. Look in the Ray Dream Studio CD: Samples: Formulas directory for some samples to get you started.

6 If you want to edit the formula or create your own, click **More** to open the **Formula Editor**.

Ray Dream Studio uses the **Formula Editor** in several places. Use of the editor is common, but the type of formula you're creating determines the valid input and output variables. Refer to the "Using Formulas in Ray Dream Studio 5 PDF" on the Ray Dream Studio 5 CD for details on using the **Formula Editor**.

Formula editing becomes technical quickly. You can learn a lot by loading the sample files.

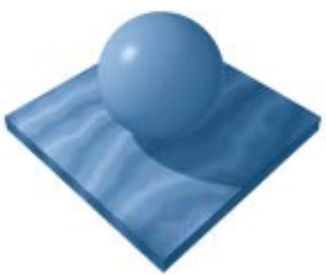
7 When you're done with the **Formula Editor**, click **OK**.

8 To save a formula, click the **Disk** icon and choose **Save As** from the pop-up.

Use the **Save** dialog to name the file and select a disk location.

9 Click **Apply** to apply the selections.

Gradient Controls



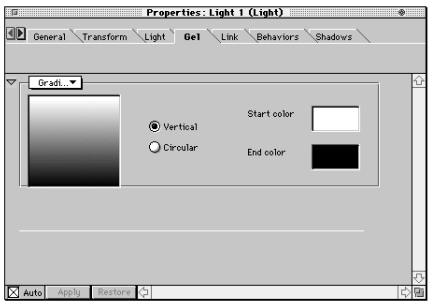
Use the Gradient controls to create a gel that projects a pattern containing color transitions onto an object.

To set gradient options:

1 Select a light.

2 Choose **Windows menu▸ Properties palette: Gel tab**.

3 Choose **Gradient** from the pop-up.The gradient controls appear in the **Gel** tab.



Choose Gradient from the Gel tab pop-up to set the gradient options.

4 Select a **Vertical** or **Circular** gradient pattern.

5 Click the **Start color** chip and select a color from the color picker.

6 Click the **End color** chip and select a color from the color picker.

7 Click **Apply** to apply the selections.

Map Controls

Use the Map controls to create a gel that projects an image onto an object.

The **Map** option lets you load an image to use as a gel.

To create a map image:

1. Use any 2D art program to create an image for the gel.

   You might scan a photograph and use filters to accentuate or nominalize some aspects of the image.

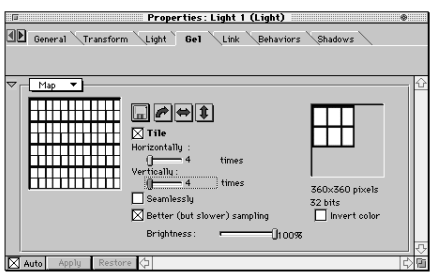
   The gel does not need to be high resolution. If you intend to use this gel on a bulb light, create the image at an aspect ratio of 2:1. If you are going to use this gel on a spot or distant light, use an aspect ratio of 1:1.

2. Save the image file in a format that Ray Dream Studio supports and in a convenient folder.

For a list of the image file types that Ray Dream Studio supports, see the section on software support for your system in Chapter 1, "Installation."

To load the map image as a gel:

1. Select a light.
2. Choose **Windows menu▸ Properties palette: Gel tab**.
3. Choose **Map** from the pop-up.The map controls appear in the **Gel** tab.



Choose Map from the Gel tab pop-up to set the map options.

4. Click the **Disk** icon and choose **Open** from the pop-up.
5. Use the **Open** dialog to locate and open the map image you saved.

To set map controls:

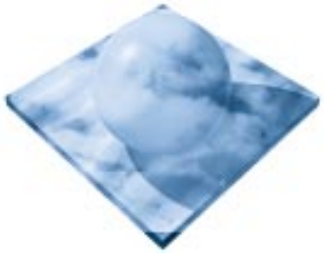
1. Click the directional buttons next to the **Disk** icon to change the image's orientation.
2. Drag the **Brightness** slider to adjust the image's brightness.
3. Enable the **Better (but slower) sampling** option to view a more precise preview.
4. Enable the **Invert Color** option if you want to invert the image's colors.
5. If you want the image to repeat, enable the **Tile** option.

   Use the **Horizontally** and **Vertically** sliders to set the number of tiles in each direction.

   Enable the **Seamlessly** option to smooth the transitions between tiles.

6. Click **Apply** to apply the selections.

Movie Controls



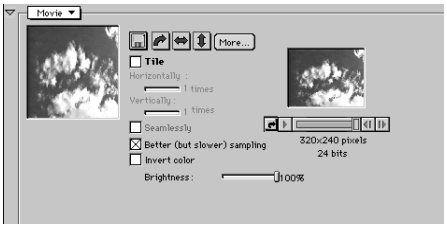
Use the Movie controls to create a gel that projects a movie image onto your object.

Movies create sophisticated gels for your animations. For example, you might capture some video of a tree blowing in the wind. With a little preparation, you can load it as a gel to create a moving shadows in your scene.

A gel movie frame for a bulb light should have an aspect ratio of 2:1. A gel movie frame for a spot or distant light should have an aspect ratio of 1:1.

To select a movie for the gel:

1. Select a light.
2. Choose **Windows menu▸ Properties palette: Gel tab**.
3. Choose **Movie** from the pop-up.The movie controls appear in the **Gel** tab.



Choose Movie from the Gel tab pop-up to set the movie options.

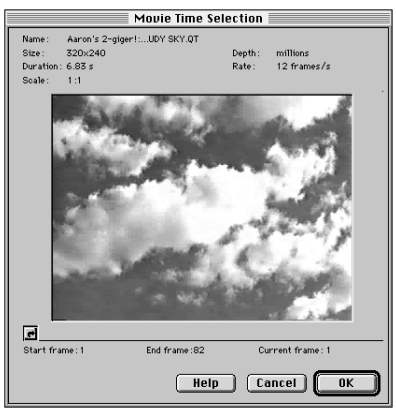
4. Click the **Disk** icon. Ray Dream Studio displays the **Open** dialog.
5. Locate and open a movie file.

   When you've opened a movie, a preview player appears. This is the control that lets you synchronize the gel movie with the animation. See "Synchronizing Movie Frames with the Animation and Looping" on page 335 for more information.
6. Click the directional buttons next to the **Disk** icon to change the movie's orientation.
7. Drag the **Brightness** slider to adjust the movie's brightness.
8. Enable the **Better (but slower) sampling** option to view a more precise preview.
9. Enable the **Invert Color** option if you want to invert the movie's colors.
10. If you want the frame to repeat, enable the **Tile** option. The tiled movie appears in the right preview.

    Use the **Horizontally** and **Vertically** sliders to set the number of tiles in each direction.

    Enable the **Seamlessly** option to smooth the transitions between tiles.
11. You can get more information on this movie by clicking **More**.

    Ray Dream Studio opens a window that provides technical information and a movie preview player.



Use the More movie controls to get more detailed information about your movie.

12. When you're done with the **Movie Time Selection** window, click **OK**.

13. Click **Apply** to apply the selections.

To preview a movie in the Gel tab:

1. Click **Play** at the bottom of the dialog.

2. Click **Stop** when you want to stop the movie.

   You can also click **Loop** to have the movie play continuously.

Using Cameras

Just as a photographer strategically places cameras for different views, you will set up various cameras for viewing your scene. After the scene is finished, you can frame the view of your scene that you want to render. Framing a scene is similar to looking through a camera's viewfinder.

The position and orientation of a camera is called a viewpoint. When you select a preset view, such as a top view of your scene, your active camera (the current camera) is moved directly to that viewpoint: over your scene and pointed downward in the case of a top view.

You may create multiple cameras, positioned anywhere in your scene, and shift the view to any of them. Using multiple viewpoints can be quite useful.

What you see in the **Perspective** window is the projection of the scene through the lens of the current camera. At any given time, only one camera is selected as the viewpoint for the **Perspective** window. If you open more than one **Perspective** window, each has its own current camera.

The Camera's Field of View

A camera's settings and position determine its field of view. The field of view of the current camera does not necessarily equal what you see in the **Perspective** window. The display in the **Perspective** window is also determined by the size of the window and its level of magnification. You can use the scroll bars or hand tool to adjust the region of the field of view that the **Perspective** window currently displays.

The camera's field of view is not affected by zooming (the **Zoom** tool) or panning (with the **Hand** tool or the scroll bars).

The portion of the camera's field of view that is used for the rendering is identified by the Production Frame. The Production Frame is similar to a real-world camera's viewfinder. By default, the production frame appears as a green rectangle on top of your perspective view.

The inner, dashed line rectangle is called the Safe Frame Margin. It's an "out of bounds warning" for objects that approach the edge of the frame. This reference can be particularly useful for animators who are developing for video output. Because the edges of the video frame are often cut off, the Safe Frame Margin can help in keeping objects fully within the visible area when the animation is displayed on video.

You can adjust the margin by choosing File> Preferences: Perspective and adjusting the Safe Frame Margin percentage. You'll probably need to experiment a few times to find the setting that's right for your video output system.

For more information on the Production Frame and Render Settings, refer to "Rendering" on page 339.

Creating a New Camera

To create a new camera:

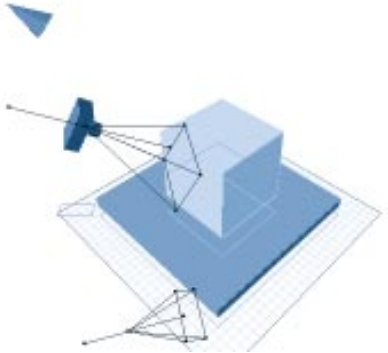
Drag the **Create Camera** tool from the **Tools** toolbar to the area of the **Perspective** window where you want it placed. You may also drag it into the **Hierarchy** window to add the camera at the center of the Universe.

You may also choose **Edit menu▸ Insert▸ Camera** to add the camera at the center of the Universe.

Note: If you choose **Windows menu▸ New Perspective** to create another view of your scene, Ray Dream Studio gives you the option of creating a new camera to provide that view.

About the New Camera

The new camera appears in your scene as a blue 35 mm camera that faces downward. The camera is an object that has projections.



New cameras appear in your scene as a blue camera.

You can move the camera as you would any other object. You'll learn about special features for moving and orienting cameras later in "Positioning and Aiming Cameras in the Scene" on page 287.

If you want, you may change the color of camera objects in the Perspective window. Choose **File menu▸ Preferences**: **Color** and set your preference.

In the Hierarchy, cameras are represented by numbered camera icons. You can, of course, rename a camera just like any object.

Note: The current camera is not visible in the **Perspective** window. Because you are viewing the scene through it, it is not visible within the scene.

If you set up several cameras, you might want to name them according to their viewpoints. This makes it easy to select the view you want.

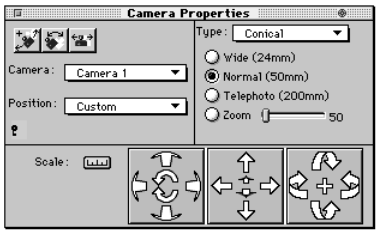
Setting the Camera Lens

You can change the properties of the current camera using the controls on the Camera Properties palette.

To change a camera's lens:

1. Select the camera you want to change.

2 Choose **Windows menu▸ Camera Properties**. The **Camera Properties** palette appears.



Use the Camera Properties palette to change the characteristics of the selected camera.

Note: For convenience, the camera lens controls are also provided on the **Properties palette: Camera tab**.

3 Use the **Type** menu to select the camera you want: **Conical**, **Isometric** or **IVRM Spherical**.

The **Conical** camera has four settings: **Normal**, **Wide**, **Telephoto** and **Zoom**.

If you select **Zoom**, the slider lets you set a focal length between 6 and 500 mm.

The Ray Dream Studio perspective camera is patterned after the standard 35mm SLR camera.

The **Isometric** camera provides a view in which object size is not related to distance from the camera (that is, there is no vanishing point.)

The **Zoom** slider adjusts the field of view.

Note: With an isometric camera, use a Backdrop not a Background.

The **IVRM Spherical** camera creates a spherical rendering to be used with a virtual reality viewer, like the RealSpace Traveler. For instructions on creating your scene, using the IVRM Spherical Camera and using the viewer, refer to "Using the RealSpace Spherical Camera" on page 292.

Positioning and Aiming Cameras in the Scene

Cameras (other than the current camera) appear in the **Perspective** window as an object.

You can move them anywhere in the 3D workspace and change their angle with any of the standard positioning and orientation features.

Pointing a Camera at an Object

The **Point At** command is usually the easiest way to aim a camera in the general direction of an object. Then, you can make precise adjustments to the camera's position and aim using the navigating tools.

To point a camera at an object:

1 If you want to aim the current camera, select the object you want to point at. You'll probably find it is easiest to select it in the **Hierarchy** window.

If you want to aim a camera other than the current one, select the camera and the object you want to aim it at.

Note: You cannot point a camera at a light.

2 Choose **Arrange menu▸ Point At**.

The **Point At** command does not link the camera to the object selected. That is, if you move either element, the camera no longer points at the object.

To direct a camera to a particular area in your scene, you can create a temporary object for the camera to point at, then delete the object. Remember that the camera points at the hot point of the object.

The Point At Behavior

If you want the camera to follow an object, apply the **Point At** behavior.

To have a camera follow an object:

The Point At behavior sets a camera to aim at an object. If the object moves, the camera automatically reorients itself to point at the object in its new position.

1. Select the camera you want to use.
2. Display the **Properties palette: Behavior tab**.
3. Click the **Plus sign** icon.
4. Select **Point At** from the dialog and click **OK**.
5. Enter the name of the target object—the one you want the light to follow.
6. Leave the axis option as it is. The axis option sets which axis of the object should point at the target. For a camera, you only want to use the axis with the viewing lens.
7. Click **Apply** to send your changes to the camera.

   From now on, whenever you move the target object, this camera reorients to point at it.

Controlling a Camera Directly

The Direct Manipulation controls for a camera provides an on-screen description of the camera's aim. You can drag control handles to change the camera's properties.

Note: These features are not available for the current camera. You must view the camera as an object to control it directly.

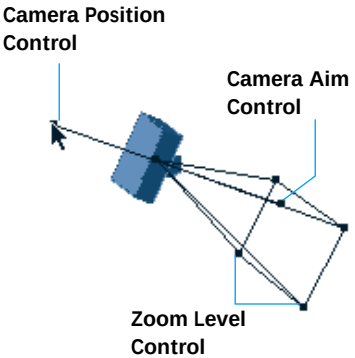
To display the Direct Manipulation controls on a camera:

1. Select a camera.
2. Make sure this camera is visible in the **Perspective** window. For more control, you'll want all working box planes visible so you can work with the projections.
3. Display the **Properties palette: Camera tab**.
4. Click the **Direct Manipulation** button to display the controls on the selected camera.

Use the Direct Manipulation button to display controls for the selected camera.

The controls appear as a set of wires with "handles" at certain points. Each handle represents a control you can drag to set properties.

Note: The **Direct Manipulation** controls require **Auto Apply** enabled.



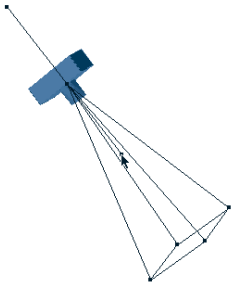
Drag the wireframe and projection "handles" to aim the camera and set its properties.

Tip: You might want to aim the camera with the Direct Manipulation controls while simultaneously seeing the result in that camera's view. You can do this by opening a second Perspective window and arranging them side-by-side.

To aim the camera:

Drag the handle in front of the camera. The target handle will move parallel to the active plane. Hold down the **Option**/**Alt** key to drag the target perpendicular to the active plane.

You can drag it out, extending the wire all the way to the point you want to aim at. The wire shows the angle of the camera's aim.



As you drag the Camera Aim control, the camera rotates around the Camera Position control.

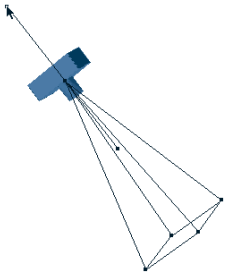
- You can also aim the camera with respect to a given plane by dragging the corresponding handle on one of the camera's projections.

The camera rotates to aim where you place the handle.

To move the camera:

Drag the handle behind the camera preview.

You may also move the camera with respect to a given plane by dragging the corresponding handle on one of the camera's projections.



As you drag the Camera Position control, the camera rotates around the Camera Aim control.

The camera moves to the new position and orients itself to point at the target.

To change the zoom:

Drag a corner of the rectangle in front of the camera to change the zoom. Drag toward the target object to zoom in.

The Rectangle in front of the camera represents the Production Frame.

Drag the Zoom control to adjust the camera's zoom level.

Note: You can change the zoom level for the Conical or Isometric cameras.

Changing your Perspective on the Scene

You may choose to work with one camera or several. If you are working with one, you can move it to another position whenever you want a different viewpoint on your scene.

If you're working with several cameras, you can simply switch the viewpoint of the **Perspective** window to a different camera by selecting from your available cameras using the **Camera Properties** dialog.

Moving the Current Camera to a Preset Position

You can choose **View menu▸ Preset** to change the current camera's view to the top, bottom, left, right, front or back. To

return to the original view of your **Perspective** window, select the Reference position.

If you have saved your own position presets, they're also available from this menu. See "Saving Position Presets" on page 292 for more information.

To choose a preset position:

Choose **View menu▸ Preset Position▸** and select the position you want.

You can also use the **Camera Properties palette: Position pop-up**.

Whenever the camera position and orientation is not at one of the presets, the **Camera Properties palette: Position pop-up** displays **Custom**.

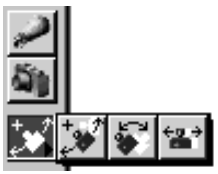
When you Jump Into an object or group using any of the default preset positions, the camera goes with you—that is, it establishes the preset position and orientation relative to the local universe you've jumped into. A custom position, on the other hand, is kept "as is" when you Jump In. This could result in an empty window when you Jump Into a group. Choose a default preset or select an object and Point At it to see the contents of the group.

Navigating the Current Camera

Ray Dream Studio allows you to directly manipulate the current camera using the Dolly, Pan, and Track tools and with the Navigation panel on the Camera Properties palette.

Note: You may also select the current camera in the hierarchy and use the **Properties palette: Transform tab: Position** and **Orientation** controls to move and aim the camera numerically.

The navigation tool icons share a space on the **Tools** toolbar. Press on whichever one is visible to "pop-up" the others and choose the one you want.



Use the camera navigation tools to interactively adjust the position of a camera.

Whenever one of these navigation tools is selected, a green rectangle, the production frame, automatically appears in the **Perspective** window.

The production frame acts as a viewfinder to help you frame your scene properly. It automatically disappears once you switch back to any non-navigation tool. If the production frame is not visible at first sight, reduce your magnification level in the **Perspective** window to the standard (1:1) ratio.

To rotate around an object:

1. Select the object you want to rotate around. If you deselect all objects, the current camera will rotate around the origin of the Universe.
2. Click the **Dolly** tool. The Dolly tool moves the camera while keeping it pointed at the same spot in the scene.

The camera changes position and orientation.

3. Drag in the **Perspective** window to dolly the camera.

The behavior is similar to the **Virtual Trackball**, except in this case, it's the camera that moves.

To pan the camera:

1. Click the Pan tool. The Pan tool rotates the camera on its own axis.

2. Drag in the **Perspective** window to pan the camera.

   Hold down the **Shift** key to constrain panning to the vertical or horizontal.

   The camera changes orientation only.

   To visualize panning, imagine standing in place and looking through your camera's viewfinder. Turn side-to-side and tilt up and down.

Note: If you pan the camera, then decide you want to level its view, you can use **Arrange menu▸ Align on Gravity**.

To track the camera:

Click the Track tool. The Track tool moves the camera up, down, left, or right in the plane parallel to the monitor screen.

The camera changes position only.

The tracking directions are in relation to the camera's current attitude—not to the axes of the Global Universe or working box

To track in or out:

- When using any of the three navigation tools, hold down the **Command/Ctrl** key and drag upward to move the camera forward.
- Hold down the **Command/Ctrl** key and drag downward to move the camera back from your subject.

  The camera changes position only.

Unlike zooming using the Magnifying glass, tracking in and out actually moves the camera toward or away from your subject, effectively changing your field of view and perspective if you are using a non- isometric camera.

Using the Navigational Panel

The **Camera Properties palette: Navigation panel** lets you click buttons to incrementally dolly, pan, and track the camera.

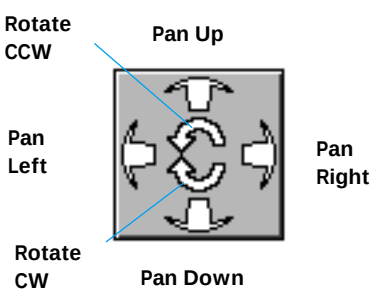
To use the Camera Properties palette's Navigation panel:

1. Choose **Windows menu▸ Camera Properties**. The **Camera Properties** palette appears.
2. If necessary, click the **Key** icon to expand the palette and show the **Navigation** panel.
3. Click the buttons to move or rotate the camera incrementally.

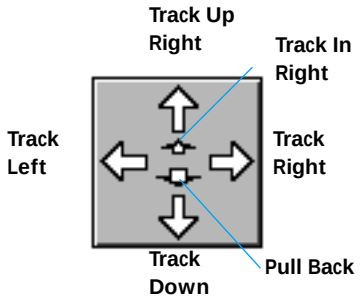
   The following diagrams describe the function of each button. Refer to the tool descriptions for more information on dolly, pan and track.
4. If you like, you can change the distance or rotation amount for each click.
5. Click the **Scale** icon to open the **Increments** dialog.

Click the Scale icon to edit the camera's position

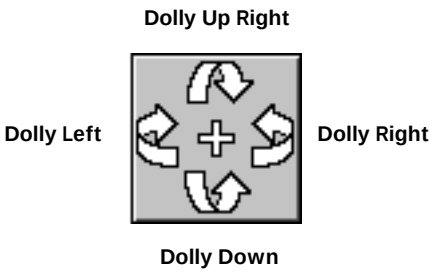
6. In the dialog, set the amount and units for position controls. Set the degrees for rotation controls.



The Pan controls



The Track controls.



The Dolly controls.

Saving Position Presets

If you set a camera position that you particularly like, you may add it to the presets. Your saved position will be available on the **View menu▸ Preset Position** sub-menu in all of your scene files.

To save a position as a preset:

1. Select the camera with the position and orientation you like.
2. Display the **Camera Properties** palette.
3. Choose **Position pop-up▸ Save Position**.
4. Select whether to save just the **Position and Orientation**, the **Type and Parameters** or **All** aspects of this camera.
5. Type a name for this camera position and click **OK**.

To remove a preset from the list:

1. Choose **Position pop-up▸ Delete Position**.
2. Select the position you wish to remove, and click **OK**.

Working with Multiple Cameras

Multiple cameras can help you arrange your objects by providing different views of your scene that you can switch between or use simultaneously. When you are ready to create a rendering, you'll select one of the cameras as the viewpoint to render from.

To switch the view between cameras:

Choose **View menu▸ Camera** and select the camera you want to use.

To view your scene from two cameras at once:

1. Open a second **Perspective** window.
2. Choose **Windows menu▸ New Perspective**. The **New Perspective Window** dialog appears.
3. Select the camera you want or create a new one.

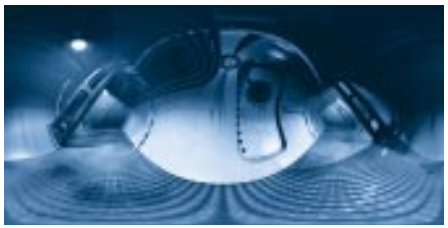
Each Perspective window you open increases demand on your computer, its RAM, and the hard disk—especially when the level of display detail is high (that is, in Preview, Shaded Preview or Better Preview mode). This might slow you down. For better efficiency, use fewer windows or switch several of them to fast preview modes (bounding box or wireframe).

4. Click **OK**.

Using the RealSpace Spherical Camera

The IVRM spherical camera produces a rendering that includes every viewpoint radiating from its position—a "spherical image." The image is actually rectangular, but a special viewer program will wrap it onto the inside of a sphere, where you can look at it and turn to see every angle of your scene.

The RealSpace Traveler viewer is provided with Ray Dream Studio, so you can create and view these virtual reality views of your Ray Dream Studio scenes.



Scene viewed using the IVRM Camera.

To use the IVRM Spherical camera:

1. Create a scene, centered at the origin of the Universe. Don't forget to account for lighting in all directions.

   For best results, you should create objects on all sides, above and below.

2. Drag the **Create Camera** tool into the **Hierarchy** window to add a camera at the origin (0, 0, 0) of the Universe.

3. Choose **Windows menu▸ Camera Properties** or press **Command-E**/**Ctrl+E**. The **Camera Properties** palette appears.

4. Choose **Type pop-up▸ IVRM Spherical**.

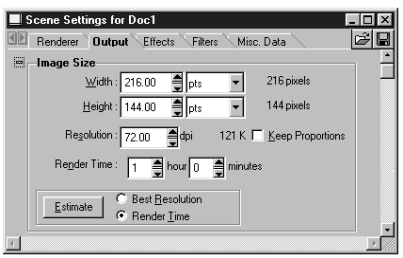
   You're now ready to set rendering options.

To set output options IVRM spherical camera rendering:

1. Choose **Windows menu▸ Scene Settings**. The **Scene Settings** window appears.

2. Click the **Output** tab.

3. Click the triangle next to **Image Size**. The image size controls appear.

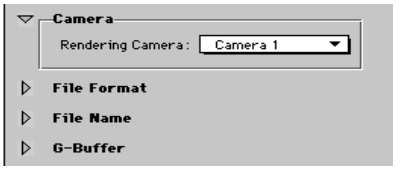


Click on the triangle/plus sign next to Image Size to display the options.

4. Define the aspect ratio. The aspect ratio of the rendering must be 2:1, but you may use whatever resolution you like—for example, 1000 pixels wide by 500 high.

Although a higher resolution rendering may produce better results, it will also require more RAM to view successfully.

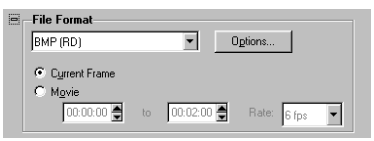
5. Click the triangle next to **Camera**. The the camera controls appear.



Click on the triangle/plus sign next to Camera to display the options.

6. Choose the IVRM Spherical camera from the list of cameras in the scene.

7. Click the triangle next to **File Format**. The **File Format** controls appear.



Click on the triangle/plus sign next to File Format to display the options.

8. Choose **JPEG** as the file format from the pop-up.

9. Click the **Options** button and use the dialog to set your choice for JPEG compression quality.

10. Save the scene file and close the document.

To render with the IVRM spherical camera:

1. Choose **Render menu▸ Batch Queue**.

   Ray Dream Studio displays the **Batch Queue** window. For complete information on using the Batch Queue, refer to "Rendering" on page 339.

2. Click **Add**.

3. Use the dialog to locate and select the scene you want to render.

4. Click **Open** to add it to the queue.

5. Click **Done** to close the dialog.

6. In the **Batch Queue** window, click **Launch**.

   When Ray Dream Studio finishes rendering, you'll find two new files in the folder with your scene: a JPEG file and a VRML file. Use the VRML file with the Traveler viewer.