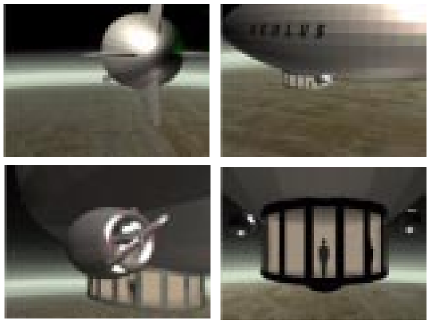
Animating the Camera

You can animate both the eyepoint and aimpoint of Mirai's camera. As you'll learn in this tutorial, these features give you a lot of flexibility in incorporating camera views into a script.



Estimated Time Required

30 Minutes

LEARNING GOALS

In this tutorial you will how to:

- Animate the camera's eyepoint.
- Animate the camera's aimpoint.
- Incorporate multiple camera views into a single script.

OVERVIEW

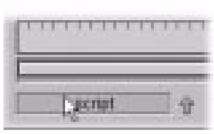
This tutorial will explore two Animation operations that control your view of the scene:

- The *Set View from Object* operation lets you orient the camera to any 3D object (that is, "see" the scene from that object's perspective).
- The *Set Aimpoint to Object Center* operation lets you aim the camera at any 3D object by putting the camera's *aimpoint* at the center of a specified object.

In combination, these two operations give you a lot of flexibility in controlling your camera view throughout an animation. For example, you can create a dynamic view of a scene by animating an object, then use the *Set View from Object* operation to inherit the view from that moving object. You can also combine this operation with a *Set Aimpoint to Object Center* operation to keep the camera aimed at a moving point of interest. You can create cuts simply by creating multiple *Set View from Object* operations and specifying a different object in each one.

ANIMATING THE PRACTICE SCENE

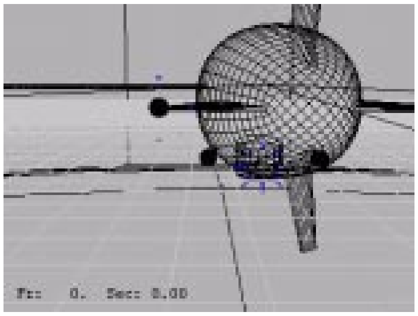
1. Load the practice scene entitled "animating-camera."
2. In one of your configurations, open up the following windows:
   - The Animation Viewer
   - The Animation Timeline
   - The Animation Mixer
   - The Script Graph
3. [L] in the script selection field in the lower-left-hand corner of the Timeline.

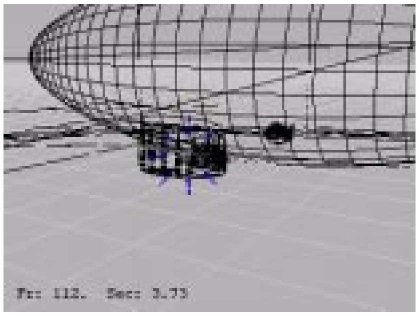


4. Select the "animate-camera" script from the dialog box that appears. The script's channels become visible in the Timeline.
5. In the Animation Viewer, use *Options>Render Domain>Mirai* to display the scene in the *Mirai* domain.
6. [L] on the Timeline's rewind button to display the first frame of the script.
7. Press the "Alt-w" hot key to view the scene in wireframe mode.

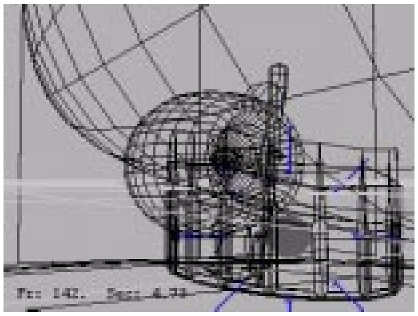
8 [L] on the Timeline’s Animate button to view the animation.

As the animation progresses, you’ll see that it is composed of three distinct camera views. The animation begins with a dynamic view of the blimp. The camera circles around the blimp, keeping its aimpoint on the propeller.

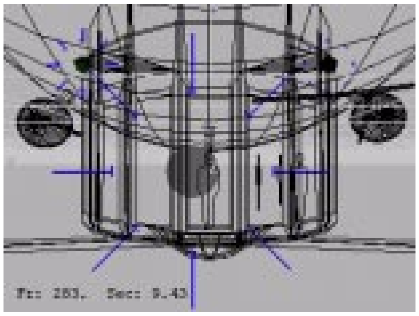




The animation then cuts to a view of the propeller.



Finally, the animation briefly cuts back to the dynamic view of the blimp, and then to a frontal view of the cockpit.



NOTE: *You can also view a fully rendered version of this animation by downloading the QuickTime™ movie file that accompanies this tutorial from the Nichimen website.*

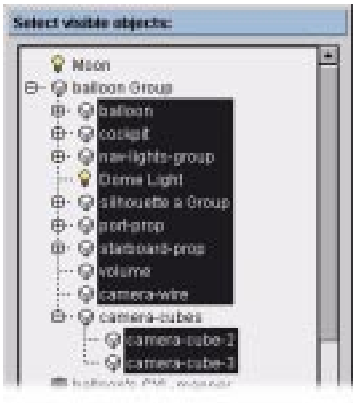
USING CAMERA OBJECTS

As discussed, the *Set View from Object* operation lets you orient the camera to any object in the scene. For the sake of brevity, this tutorial will refer to any object from which the camera inherits its view as a *camera object*. In the practice scene, there are three cubes which act as camera objects.

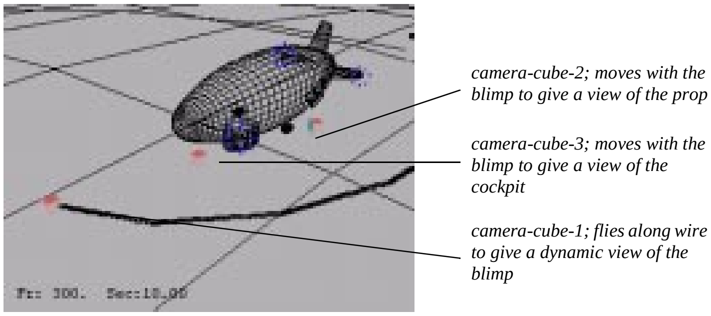
9 Make these cubes visible in the Animation Viewer:

- Ctrl [R] on the Animation Viewer, then [R] on the *Visibility* command.
- Ctrl [L] on the “camera-cube-1,” “camera-cube-2,” and “camera-cube-3” objects.
- Click on *Ok*.

NOTE: *The “camera-cube-2” and “camera-cube-3” have been restructured under the “balloon” group. In order to turn see these objects in the dialog, you will have to click on the plus sign next to “balloon” group, then click on the plus sign next to “camera-cubes.”*



10 If you truck the camera back and rotate it slightly around the global Y axis, you should now see three cubes.



camera-cube-2; moves with the blimp to give a view of the prop

camera-cube-3; moves with the blimp to give a view of the cockpit

camera-cube-1; flies along wire to give a dynamic view of the blimp

Each of these cubes acts as a camera object in the script. Because the “camera-cube-2” and “camera-cube-3” objects are restructured under the “blimp” group, they move with the blimp, providing views of the prop and cockpit at a constant distance. At the same time, the “camera-cube-1” object flies along the wire, providing a dynamic view of the blimp.

The function of these camera objects will become clearer if you take a closer look at the practice scene’s script.

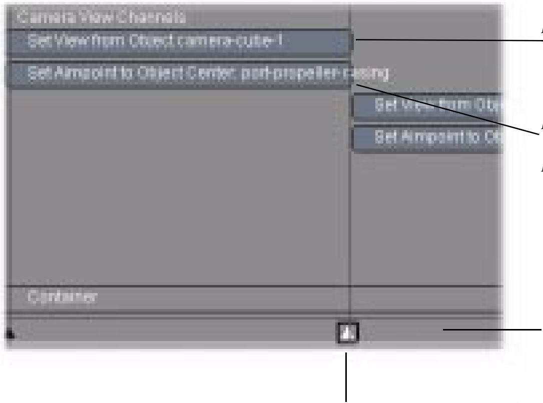
BREAKING DOWN THE SCRIPT

Look closely at the script channels listed in the Timeline. In brief, these channels function as follows:

- The *Make Visible Base* channel makes all necessary scene objects visible to the camera.
- The *Z Move Balloon Group* channel translates all of the objects in the “balloon” group along the Z axis. This provides the major motion of the blimp.

- The *Multiple Blend Material States* channel causes the navigation lights on the blimp's tail fins to flicker on and off.
- The *Rotate Port Propeller* and *Rotate Starboard Propeller* channels cause the two propellers to spin around their local Z axes.
- The *Camera-Cube-1 Move Along Wire: Camera Wire* channel moves the "camera-cube-1" object along the camera wire to provide a dynamic view of the blimp.
- The *Camera View Channels* container holds the channels which position the camera's eyepoint and aimpoint. You'll be looking at these channels in detail below.
- The *Make Invisible* channel holds the channels which make the "camera-cube-1," "camera-cube-2," and "camera-cube-3" objects invisible. Remember that any object that you animate at a given frame is made visible at that frame; if you use this technique, you need to be sure to make the camera objects invisible after they've been animated.

11 [L] on the container's inverted black triangle, so you can view its channels.


Camera View Channels
Set View from Object camera-cube-1
Set Aimpoint to Object Center: port-propeller-casing
Set View from Obj
Set Aimpoint to O
Container

puts camera's eyepoint inside "camera-cube-1"

puts camera's aimpoint inside the "port-propeller-casing"

marker track

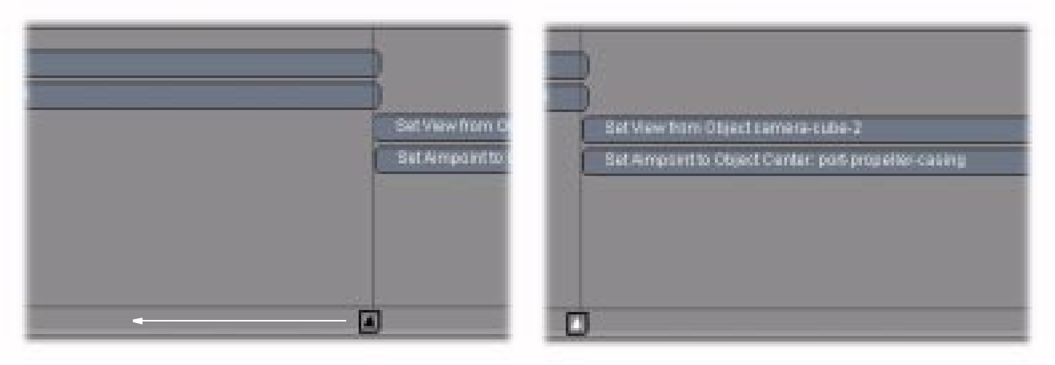
marker; links the end of the first set of channels with the beginning of the next

You can see that the container holds four sets of channels, each of which corresponds to one of the different camera views you saw when you animated the script. Each set of channels includes a *Set View from Object* channel and a *Set Aimpoint to Object Center* channel. As Mirai animates the script, it executes these channels in the order which it encounters them. Thus, the animation begins with camera's eyepoint inside "camera-cube-1" (the cube which flies along the wire) and its aimpoint inside the "port-propeller-casing" object. After approximately 90 frames, Mirai executes the next set of channels, setting the camera's eyepoint to "camera-cube-2" (the cube which follows the prop) and its aimpoint on the center of the "port-propeller-casing." After approximately 90 more frames, Mirai executes the next set of channels, and so on.

USING THE MARKER TRACK

As you can see, the container also includes a marker track with markers which tie together the beginnings and ends of adjoining sets of channels. These markers provide you with a handy way of adjusting the timing of camera view transitions (or other linked channels). For example, suppose for a moment that you've decided that the shot using the first camera view is too long.

12 Hold [L] on the second marker and drag it to the right until it's at approximately 60 frames in length. Notice as you drag the marker, the first set of channels shrink, while the second set stretches.


Set View from O
Set Aimpoint to
Set View from Object camera-cube-2
Set Aimpoint to Object Center: port-propeller-casing

13 [L] on the Animate button. You'll see that the first camera view is now approximately 30 frames shorter, while the second is approximately 30 frames longer.

14 Hold [L] on the second marker and drag it back to its original position at approximately 90 frames.

NOTE: *You can add a marker track to any channel. To do so, click [R] on the channel, then [L] on* *Add>Marker Track.*

ADDING A NEW CAMERA VIEW

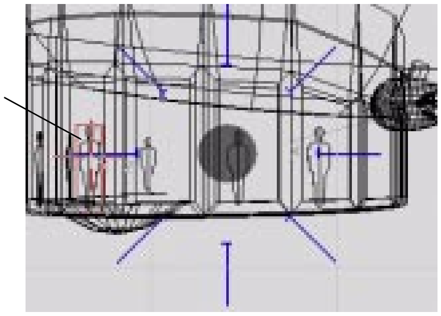
Now that you've had an overview of how the camera view channels function in this script, you're ready to add a new camera view. Suppose you would like to add a camera view that simulates the perspective of one of the crew members looking through the cockpit window. Follow the steps below to add the new view:

15 In your current configuration, open up a Geometry window and a Scene Graph.

16 Use the *Visibility* command to make all the objects in of the "balloon" group visible.

17 Aim the camera at the "cockpit" object.

18 Press "alt-x" to view the objects along the negative X axis. Look at the silhouettes inside the cockpit. Two are directly facing the camera. For this exercise, you'll be working with the leftmost silhouette which directly faces the camera.



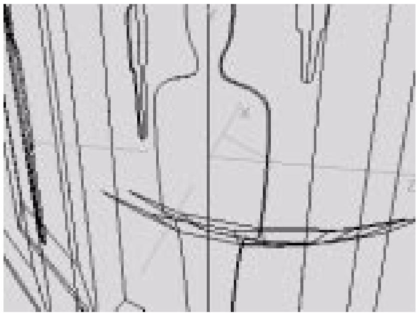
work with this object

19 [L] on the object element sensitivity icon, then [L] this object. In the upper-left corner of the Geometry window, the name of the object will appear. It should read "silhouette-b."

20 With the object selected, press "a" to aim the camera at the silhouette, then truck the camera in for a close-up view.

Now you need to make the local axes of the silhouette visible, so you can determine its orientation. This will let you aim the camera down the appropriate axis. Unlike the other camera views in this scene, the one which you are creating will not have a fixed aimpoint. Rather than following a particular point on the ground, you simply want the camera to capture the whole of the ground as it passes below.

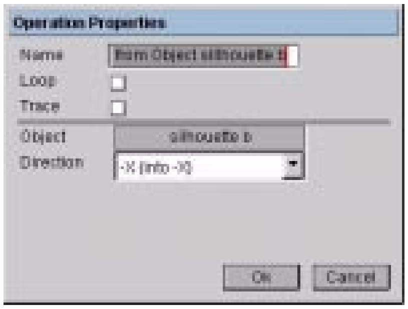
21 Ctrl [R] on the Geometry window, then *Local Axes* [L] and [L] on *"balloon" group>crew-members-group>silhouette-b*. Its local axes will appear.



You can see that you will need to aim the camera toward the negative X axis in order to simulate the passenger's viewpoint of the ground below.

22 [L] on the *Camera View Channels* container in the Animation Timeline, then [R] on the container and select *Add Operation* from the popup menu.

23 In the list of operations, [L] on *Camera>Set View from Object*. The Operations Properties dialog appears.



Operation Properties

Name: from Object silhouette b

Loop □

Trace □

Object: silhouette b

Direction: -X (into -X)

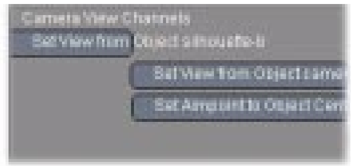
- [L] on the *Object* field and select the "silhouette-b" object.
- [L] on the *Direction* field and select the negative X axis from the pulldown menu. As you determined above, this is the appropriate axis for viewing the scene from inside the cockpit.
- Click on *Ok*.

24 [R] again on the *Camera View Channels* container and select *Reorder* from the popup menu. Drag the *Set View from Object Silhouette-B* channel to the top of the list, so that this view will be the first in the animation. Click on *Ok*.

25 Drag the marker track's first marker to frame 30. This will make room for your new camera view by shortening the channels associated with the second camera view.

26 [L] on the right end of the *Set View from Object silhouette-b* channel and drag it to frame 30.

The first few channels of the container should now look like this:


Camera View Channels
Set View from Object silhouette-b
Set View from Object camer
Set Aimpoint to Object Cent

27 Now you need to link the new channel's endpoint with the first marker:

- [R] on the first marker in the container's marker track, then select *Copy* from the popup menu.
- [R] on the end of the *Set View from Object silhouette-b* channel, then select *Link to Marker* from the popup menu.

28 Drag the marker back and forth across a few frames. You'll see that it now keeps the end of the first channel and the beginning of the second and third channels in sync.

29 Return the marker to its original position at frame 30.

30 Rewind the animation to the first frame, then [L] on the next button to animate the script by just one frame. Your Animation viewer should now show the scene from the perspective of the silhouette.

31 This may be difficult to see in wire frame, so press "Ctrl-r" to render a test frame. You should see something like this:

32 Animate the script from beginning to end. You'll see that your new camera view is now incorporated into the script. There are now four different camera views in the script.

REVIEW

- The *Set View from Object* and *Set Aimpoint to Object Center* operations let you animate the eyepoint and aimpoint of the camera by placing each of these points inside 3D objects in the scene.
- You can animate an object then inherit its view in order to achieve a dynamic view of the scene.
- By inheriting camera views from several objects in sequence, you can incorporate multiple camera views into a single script.
- To easily edit the timing of multiple camera views, you can use a container with a marker track. Use each marker to keep the end of one set of channels in sync with the beginning of the next.