



CHAPTER **5**

Tutorials

**The following chapter contains 13 Lessons, which show how Commo-
tion can be used for a variety of different projects. These tutorials
include such topics as the basic Playing of clips, Painting and Onion
Skinning, AutoPaint, Super Cloning, Wire-Removal, Matte Painting,
Rotoscoping, and Motion Tracking.**



Introduction

The following tutorials demonstrate how Commotion can be used for different types of projects. We have included several clips that will serve as source and final footage for the projects you will be working on. This section contains the following tutorials:

- Lesson 1: Opening and Playing Clips
- Lesson 2: Paint Tools
- Lesson 3: Clone Tools (1)
- Lesson 4: Clone Tools (2)
- Lesson 5: Advanced Write-On Effects
- Lesson 6: Painting on Frames & Fields
- Lesson 7: The Timeline
- Lesson 8: Motion Tracking (1)
- Lesson 9: Motion Tracking (2)
- Lesson 10: Motion Tracking (3)
- Lesson 11: Using Rotosplines
- Lesson 12: The FX Brush
- Lesson 13: Electric Image 3D Pan and Tilt

Each tutorial makes use of a wide variety of Commotion commands, guiding you through them in a clear step-by-step fashion. This tutorial does not cover all of the functions in Commotion, but will give you an idea of how the program works.

The tutorials are designed to be done in order. Feel free to skip ahead, but if you find you're having trouble, go back and do the ones you missed. Good luck!

Lesson 1: Opening and Playing Clips

The ability to play back clips in realtime is what makes working in Commotion so exciting. In this lesson you will learn how to use the following features:

- Opening Clips
- The Player Palette
- Playing Footage - loop and rock & roll
- Adjusting the range of Live Frames
- Viewer Tool
- Drag-Shrink Clip
- Collapse and Resize the Clip Window

OPENING A CLIP

1. Launch Commotion by double-clicking on its icon in the Finder.
2. Choose *Open* from the File menu. The Open Dialog Box appears. Find the file *piggybank.mov* in the Lesson 1 folder. Click *OK*. The Load Frames dialog appears.
3. To load the maximum number of frames, leave all the settings at their default, and click *OK*.

KEYBOARD SHORTCUT

Command-O
Open

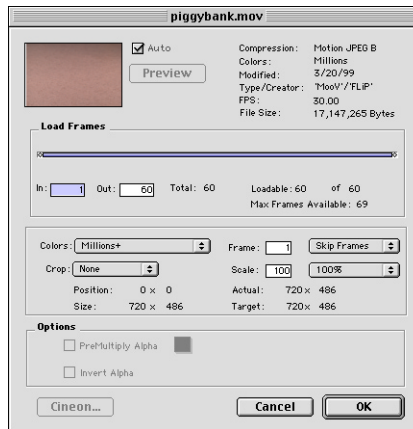


Figure 4:1 The Load Frames Dialog

4. You will see a progress bar as the movie loads. When it finishes the clip will open in Commotion.

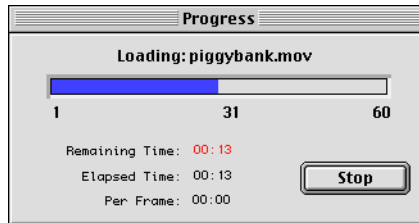


Figure 4:2 Loading the Movie

KEYBOARD SHORTCUT

F6
Show/Hide Player Palette

Space
Play

Space or Command-Period
Stop

Shift-Space
Play Selection Range

Page Up or Z
Reverse One Frame

Page Down or X
Forward One Frame

PLAYING THE CLIP

1. If it is not already visible, open the Player Palette by selecting it from the Window Menu or by pressing the F6 key.

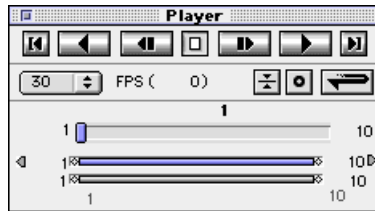




Figure 4:3 The Player Palette

2. Set the frame rate to 30 fps by selecting 30 from the Frame Rate popup in the Player Palette.
3.  Click on the Play button or press the Space bar to play the clip. The footage will play to the end and then loop back to the beginning and continue to play until you stop it.
4.  Click on the Stop button or press the Space bar to stop the footage.
5. Click on the Play Mode button. There are three different modes of play:
 - **Once-Though** plays footage once through and stops.



- **Loop** continually plays and loops footage until you press stop.



- **Rock and Roll** plays footage forward; when it reaches the end of the clip it plays the footage backward.

6. Use the Play Mode button to toggle through the different states, and play the footage with each setting to see the difference.

USING AUTO SPOOL

The frames of a clip that Commotion has loaded into RAM are called *Live Frames*. You have immediate access to Live Frames and can manipulate and play them instantly. As you advance through the clip to the end of the Live Frames, by default Commotion will loop back to the first Live frame.



If you would rather continue advancing the frames forward, turn on Auto Spool by clicking on the Auto Spool button in the Player palette. This will cache the first Live Frame to the scratch disk and load the next available frame into RAM.



If you are at the last Live frame in a clip and would like to advance forward to the next frame, click the Frame Advance button to move backward or forward one frame. Alternately you can use the *Z* and *X* or *Page Up* and *Page Down* keys.

KEYBOARD SHORTCUT

- Home**
Jump To First Live Frame
- End**
Jump To Last Live Frame

ADJUSTING THE LIVE FRAME RANGE

There are three ways to adjust the Live Frame range:

- Grab the top slider on the Player Palette. This is the indicator of the range of Live Frames.

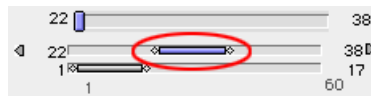


Figure 4:4 The Live Frame Range

- Slide it from side to side to load a different range of frames into RAM. If you did not load the maximum number of Live Frames when you opened the clip, you can stretch as well as shrink the range by click-dragging the end handle on the slider bar.
- Clicking on the arrow next to the Live Frames slider will load the next range of frames in the clip.
- Click on the number on either side of the Live Frames slider to bring up a dialog box to manually enter values for the range of frames you would like to load.

KEYBOARD SHORTCUT**V***Viewer***Shift-Drag***Add to Selection***Command-Drag***Subtract from Selection***USING THE VIEWER TOOL**

1. Select the Viewer tool from the Tool Palette.
2. Pick a small area you would like to view and make a selection around it by clicking and dragging.

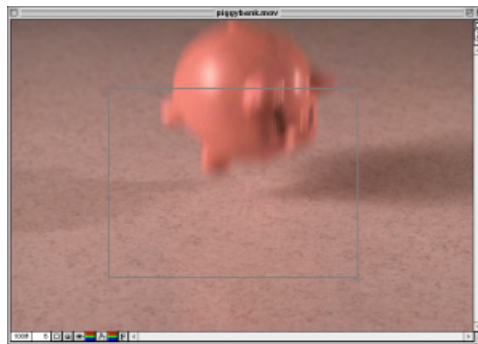


Figure 4:5 Selecting a View Region

3. Press Play. Only the part of the clip selected in the Viewer region plays.
4. With the clip playing, click inside the Viewer region and drag it to a different location.

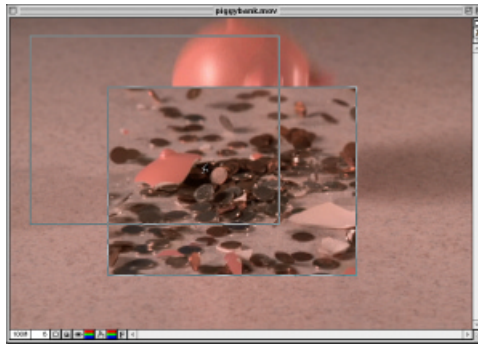


Figure 4:6 Moving the Viewer Region

5. Hold down the Shift key and make another selection. Both View regions now play.

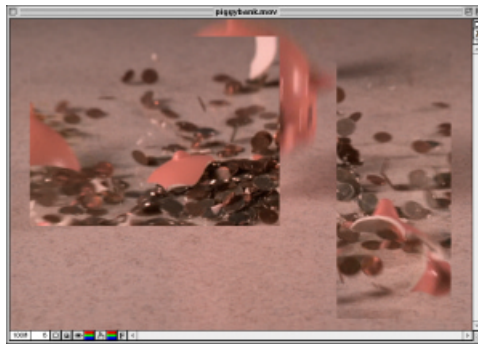


Figure 4:7 Multiple View Regions Playing Simultaneously

The Viewer tool works in the same way as the other selection tools do; Shift adds area to a selection, and Command deletes area from a selection.

If you have made a preexisting selection with one of the other selection tools (Marquee, Lasso, or Magic Wand), Commotion will keep that selection in memory while you are using the Viewer tool to view the footage.

6. Click Stop or hit the Space bar to halt playback.

KEYBOARD SHORTCUT

H
Hand
Control
Quick-Activate Hand Tool



RESIZING THE CLIP WINDOW

1. Use the Size Window handle in the bottom-right corner of the Clip window to drag in and shrink the size of the view area.
2. Press Play.
3. Select the Hand tool from the Tool palette, or hold down the Control key to temporarily select it. You can drag the clip around inside the newly sized viewing area.



Figure 4:8 Moving the Clip



4. Return the window to its original size by clicking on the resize window button in the upper-right corner of the Clip window.



If you have multiple windows open, you can turn the windows that you are not actively working on into thumbnails by clicking on the Collapse Window Button located at the top of the scroll bar on the right-hand side of the Clip Window.



Figure 4:9 Thumbnail

To return the thumbnail-sized image back to its original size, click anywhere within the small image.


KEYBOARD SHORTCUT

W
Close Window

5. Close the clip by clicking the Close button in the top left corner of the window, by selecting *Close* from the File menu, or use the keyboard shortcut. If prompted to save changes, select *Don't Change*.

POWER TIP!

If you have a compressed video card such as a Media100 you can use this feature to take advantage of the realtime playback capabilities of the compressed signal, and then open a selection into Commotion for effects work.

 Open Movies as QuickTime Movies

PREVIEWING A CLIP BEFORE OPENING IT

Commotion allows you to open clips as QuickTime movies and view them just like you would in Apple's MoviePlayer utility. This allows you to quickly preview a clip without having to first load it into RAM. While previewing it, you can select a specific range to load into Commotion as Live Frames.

1. Press Command-O or select *Open* from the File menu to bring up the Open dialog box.
2. Click the *Open Movies as QuickTime Movies* checkbox at the bottom of the window.
3. Select *piggybank.mov* and press *Open*. The clip will appear in a standard QuickTime window.
4. Shuttle back and forth by dragging the time indicator at the bottom of the clip to evaluate the footage. Keep in mind that this clip is not loaded into Commotion itself, and as such has no realtime playback capabilities. This feature is for previewing clips only.



Figure 4:10 Evaluating the Footage

LOAD A PREVIEW INTO LIVE FRAMES

Once you have previewed your clip and know what frames you want to load in to Commotion:

1. Move to the first frame you want to load, then hold down the Shift key and click or drag to the last frame you want to load.



Figure 4:11 Selecting the Preview Range

2. Select *Movie to Live Clip* from the File menu.
3. The Load Frames dialog will appear, with the range of frames you selected in the QuickTime window entered in the load frame fields.

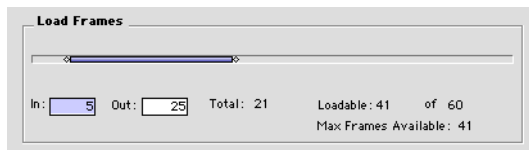


Figure 4:12 The Preview Range Becomes the Live Frame Range

4. Press *Cancel* and close the QuickTime preview window.

Lesson 2: Paint Tools

Now that you are familiar with Commotion's playback features, it's time to start painting. Commotion includes many familiar painting tools, as well as several unique ones that are designed specifically for animation.

In this lesson you will learn how to use the following features:

- Painting an Animation
- Onion Skinning
- Revert
- AutoPaint to create a *Write On* effect
- AutoPaint *Wiggle* effect
- AutoPaint *Stroke Only* effect

KEYBOARD SHORTCUT

Command-O
Open

Open Movies as QuickTime Movies

ANIMATING

The following steps will guide you through the creation of a simple animation.

1. Choose *Open* from the File menu. The Open Dialog Box appears.
2. If you just finished doing Lesson 1, the Open Movies as Quicktime Movies button will still be checked. make sure this is unchecked before proceeding.
3. Select the file *Golden Gate.mov* from the Lesson 2 folder. Click *OK*. When the Load Frames dialog appears, try and load in at least 30 frames of the clip.
4. Select the Paintbrush tool by clicking on it in the toolbar or pressing *B* on the keyboard.
5. Select a small brush with soft edges from the Brushes section of the Tool Options palette. If this section isn't visible, click on the triangle along the left of the Tool Options palette to open it.

KEYBOARD SHORTCUT

B
Paintbrush



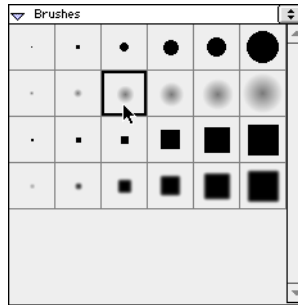


Figure 4:13 Selecting a Brush

6. Choose a yellow color from the Swatches section of the Color palette.

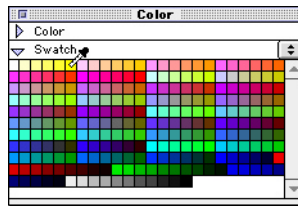


Figure 4:14 Select a Yellow Color

7. We're going to paint in a bolt of lightning striking the Golden Gate Bridge. Beginning on frame 1, paint a small line on the clip, like this:



Figure 4:15 Beginning to Paint

KEYBOARD SHORTCUT

Page Up or Z
Reverse One Frame
Page Down or X
Forward One Frame

- Advance to the next frame and paint the line in a slightly different position, so that the bolt of lightning begins to approach the bridge. Repeat this process for a couple of frames.
- At any time you can click the Play button (or press the Space bar) to see the results of your work.

ONION SKINNING

When animating it is often useful to see an overlay of the frames preceding the one you are currently working on. Traditionally, animators drew on semi-transparent paper to achieve this effect, called *Onion Skinning*, for the semi-transparent layers of an onion. Commotion's Onion Skinning feature provides you with the digital equivalent of this classic technique.

KEYBOARD SHORTCUT

O
Onion Skinning On/Off



- Turn on Onion Skinning by clicking on the Onion Skinning button along the bottom of the Clip window. You can also select *Onion Skinning* from the Mode menu, or press the *O* key.
- Continue to draw your lightning bolt as it strikes the bridge's towers. Use the previous frames to guide you as you animate.

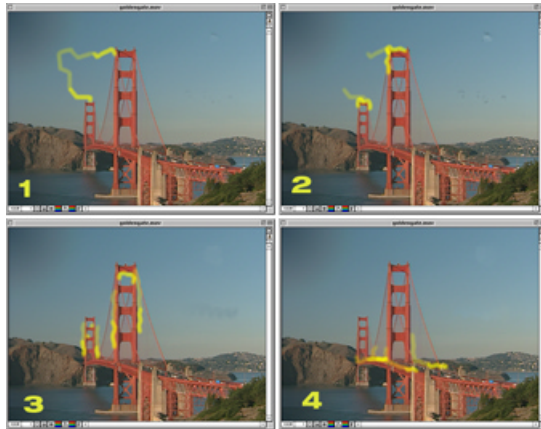


Figure 4:16 Lightning Steps

- When you are done, turn off Onion Skinning and playback the clip.

Congratulations! You have just completed your first animation in Com-motion.

REVERT

Before continuing, you may wish to return the clip to its original state. Com-motion's *Revert* command allows you to quickly return one or more frames to the way they were when they were last saved.

KEYBOARD SHORTCUT

Command-R
Revert

1. Select *Revert* from the File menu. The Revert Frames dialog will appear. You have the choice of reverting all the frames of the current clip, the frames in the Selection Range, or only the current frame.

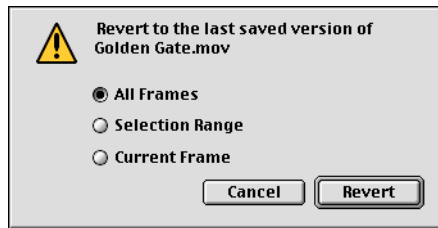


Figure 4:17 The Revert Dialog

2. Select *All Frames* and click *Revert*. There will be a short pause as the clip is reverted, and then you will be ready to continue.

AUTOPAINT

Using the AutoPaint controls (located at the top of the Tool Options palette) you can record your paint strokes and play them back on multiple frames.

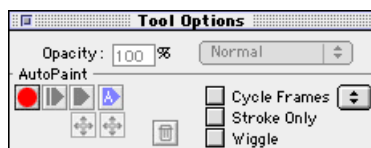


Figure 4:18 Autopaint Controls

CREATING A WRITE-ON EFFECT

First you will use AutoPaint to create a *write-on*, a commonly seen effect in which an image, often handwriting or a logo, appears to write itself onto the screen.

1. Select the Paintbrush tool.
2. In the Brush Control palette create a brush with the following settings:

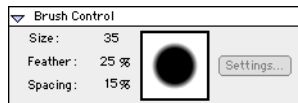


Figure 4:19 AutoPaint Brush 1

Feather: 25%

To adjust the Size, Feather, and Spacing values, use Commotion's *Rub Text* feature. Simply position your cursor over the name of the value you want to adjust until the cursor becomes a double-sided horizontal arrow. Drag right to increase the value, drag left to decrease it. You can use Rub Text on most values in Commotion.

KEYBOARD SHORTCUT

- Shift-R**
Record/Pause
- Shift-P**
Play Back on Current Frame



3. Click the Record button to begin recording.
4. Using the Paintbrush, write your name across the screen.



Figure 4:20 Writing Your Name



5. Click the record button again to pause recording. Any strokes made when recording is paused will not be recorded.

Before playing the strokes back you will need to remove your signature from the current frame. What we are going to do is have your name write back over a range of frames. Writing your name on this frame was simply to record the brush stroke, and we want to remove the writing before we continue.

6. Once again, you will use the Revert command. Select *Revert* from the File menu.
7. Select *Current Frame* and press Revert.

You are now ready to apply the write-on effect.



8. Click the *Playback Animated* button. Make sure you press the blue button with the A on it and not the black button next to it.

The recorded strokes will play back over the current Selection Range. The amount of the strokes played back will gradually increase on each frame.



Figure 4:21 The Stroked Play Back

9. When AutoPaint playback has completed, Play the clip to see your finished write-on.
10. Before continuing, select *Revert* and revert all frames.

CREATING A WIGGLE EFFECT

AutoPaint can also be used to add motion to your breaststroke using the *Wiggle* option. Wiggle slightly varies the recorded strokes each time it applies them, creating a loose, animated look.

1. From the AutoPaint popup menu, select *Wiggle Settings*.

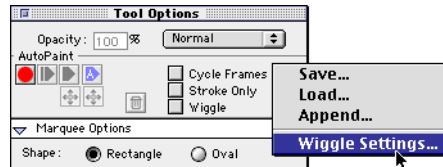


Figure 4:22 The AutoPaint Popup Menu

2. In the Wiggle Settings dialog, set both the vertical and horizontal values to 4, then click *OK*



Figure 4:23 Wiggle Settings

3. Turn on Wiggle by clicking on the Wiggle checkbox in the AutoPaint controls.
4. Click the *Paint Over Range* button. This is the black button next to the blue *Animate Play* button you pressed earlier.

The recorded strokes will play back over the current Selection Range. On each frame the recorded strokes will be played back in their entirety, but varied slightly by the Wiggle.



Figure 4:24 The Wiggle Effect

5. When AutoPaint playback has completed, Play the clip to see the finished effect.
6. Before continuing, select *Revert* and revert all frames.

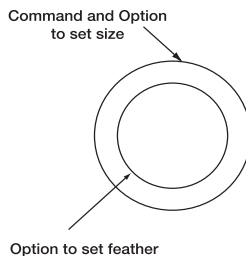
USING STROKE ONLY

Normally AutoPaint remembers all your tool settings when playing back strokes. However, the *Stroke Only* feature allows you to playback strokes using the current tool settings instead of the recorded ones. You can change the color, brush size – even select an entirely different tool.

1. Turn on *Stroke Only* by clicking on the Stroke Only checkbox. If *Wiggle* is still checked, click it to turn it off.
2. Select the Paintbrush. This time, rather than select a brush and then modify it in the Brush Control palette, we're going to create a realtime brush.

To create a realtime brush:

- Hold down *Command* and *Option* while dragging with the mouse.



KEYBOARD SHORTCUT

Command-Option

Enter Mode/Set Size

Option

Set Feather

- To add a feather (soft edge) to a brush you are making, release the Command key while still holding down Option and drag toward the center of the circle; the farther inward you drag, the greater the feather added to the brush you create.
- Release the mouse button when the brush size and softness is set how you want it

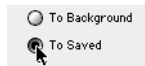
Give the brush a size of around 90, with a feather of around 40%

3. Change the Foreground color to a bright yellow, by using the sliders in the Color Palette.



4. Click on the *Paint Over Frame* button. This is the button to the immediate right of the Record button. It functions the same as the Playback Range button, except it only plays back the brush stroke to the current frame.

- The recorded strokes will play back onto the current frame, using your new brush and color.
5. Select the Eraser tool, and create a realtime brush with a size of around 32 and a feather around 20%.



6. When you selected the Eraser tool, the Eraser Options came up in the Tool Options palette. Set the Eraser to *Erase to Saved*. This causes the Eraser to function like a selective Revert by painting directly from the Undo buffer, restoring their areas that you paint back to the last version saved to disk.



7. Click on the *Paint Over Frame* button again. The recorded strokes will play back again, this time using the Eraser and the smaller brush.



Figure 4:25 Erase To Saved

You've now completed the Painting tutorial, and have seen how AutoPaint can be used to achieve a nearly unlimited number of creative effects. At this point you may want to spend some additional time experimenting with AutoPaint and Commotion's painting tools. When you're ready to move on, close this clip and proceed to the next lesson.

Lesson 3: Clone Tools (1)

In addition to its painting tools, Commotion also provides unparalleled tools for retouching moving imagery. In this lesson you will use one of the most flexible of them, the SuperClone tool, to seamlessly remove a large boat from a shot of an eagle flying over a lake.



Figure 4:26 Lesson 3

In this lesson you will learn how to use the following features:

- Clone
- SuperClone
- AutoPainting to Save Time

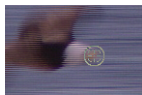
KEYBOARD SHORTCUT

C
Clone
Option
Select Clone Region

CLONE

First, let's take a look at the Clone tool. Clone lets you paint in one area of a frame using pixels from another area of the frame. To illustrate this, do the following:

1. Open the *eagle.mov* file. If your system will allow, load the entire clip into RAM.
2. Select the *Clone* tool from the Tool palette.
3. Option-click on the eagle's beak. This defines that point as the clone source; the area that you will be cloning from.



- Now begin painting elsewhere in the frame. Notice how the Clone tool is applying pixels from the area you defined as your clone source.



Figure 4:27 Cloning the Eagle

- Before continuing, Revert this frame.

KEYBOARD SHORTCUT

S
Superclone
F1 through F4
Select Clone Source

SUPERCLONE

Unique to the Commotion product line, the *SuperClone* tool is similar to the Clone tool, with the added ability to clone from other frames in a clip, or from other clips altogether.



- Double-click on the SuperClone tool icon in the Tool menu. This will select the SuperClone tool and open the Clone Source palette. This is where you choose the file and frames you want to paint with.

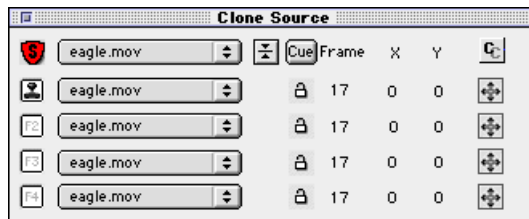


Figure 4:28 The Clone Source Palette

KEYBOARD SHORTCUT

Page Up or Z
Reverse One Frame

Page Down or X
Forward One Frame

2. Play the clip. Use the Current Frame slider in the Player palette to scrub back and forth through the clip, noting exactly when the boat in the background is visible and when it isn't. Alternately, you can use the Z and X keys to single-frame advance forward and backward through the clip.
3. The first frame that the boat is visible is frame 5, and the last frame it is visible is frame 17. The next frame, frame 18, is a *clean plate*, in the sense that there is no boat in that frame. In order to paint out our boat, will begin by painting on frame 5 with the boat-free pixels from frame 18.
4. Go to frame 5. In the Clone Source palette, click on the frame number for the first Clone Source. This brings up the Clone Source dialog:

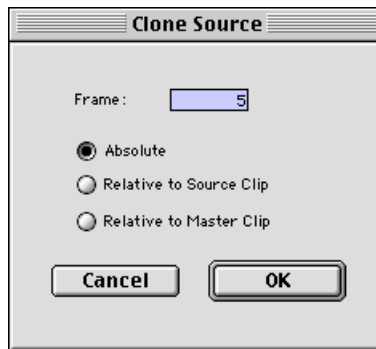


Figure 4:29 The Clone Source Dialog

5. Make sure that you are on frame 5. Enter frame 18 in the Clone Source dialog, select *Absolute*, and click *OK*.

Once set, the SuperClone tool will maintain the same temporal (*time*) relationship between your current frame and your source frame.

6. Using the X key, advance one frame to frame 6 while looking at the Clone Source palette. Notice that the frame number for the Clone Source has also advanced one frame to 19. The SuperClone source

will maintain the same temporal relationship, which in this case is a 13-frame offset between the source frame and the target frame.

7. Go back to frame 5. Create a new brush large enough to cover the area between the wing and the top of the screen, setting the size of the feathering to about 50% of the size of the brush.



Figure 4:30 Creating a Brush

8. Starting in the top right corner of the window, paint a single stroke from right to left and back again across the top of the frame.



Figure 4:31 Painting Out the Boat

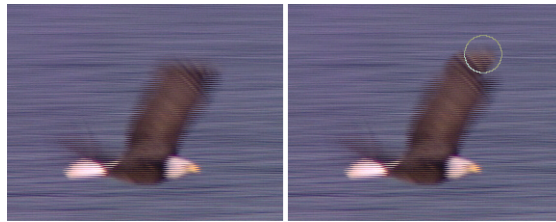


Figure 4:32 Painting the Wingtip Back from the Undo Buffer

KEYBOARD SHORTCUT

Command-Paint
Paint From Undo Buffer

9. Try to avoid the eagle's wingtip. If you happen to erase part of the wing, you can temporarily paint from the undo buffer by holding down the *Command* key. Drag out a small brush, paint the wing back in, and drag the large brush back out again.

The boat disappears seamlessly because you are painting over the boat pixels in frame 5 with the water pixels from frame 18. While you could perform this retouching frame by frame, let's take a look at a much easier method.

SAVING TIME WITH AUTOPAINT

You've already used AutoPaint to create painting effects; now you will see how it can be used to save time. To finish this shot you'll only need to paint out the boat on one frame —AutoPaint will do the rest.

1. Advance to frame 6.
2. Before we record our stroke, make sure that any previous AutoPaint data has been cleared from the brush buffer. If there is a previous brush stroke still in memory, the trash can icon in the AutoPaint palette will be active. When pressed the brush buffer clears and the trash can is grayed out.

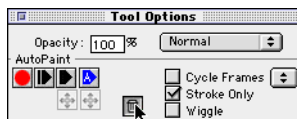


Figure 4:33 Clearing the Brush Buffer

3. With the brush buffer clear, click on the Record button.
4. Using the SuperClone tool, paint a single stroke from right to left and back again, just like you did for frame 5.



Figure 4:34 Painting Out the Boat

5. Click on the Stop button once the stroke is complete.
6. To paint out the boat, you'll need to play the stroke back over the remaining frames where the boat appears. To do this we will set the *Selection Range* slider in the Player Palette to range from frame 7 to frame 18.
7. Advance to frame 7 and press the minus key (“-”). This will set frame 7 as the *in* frame of the Selection Range.
8. Set the *out* frame by clicking and dragging the right point of the Selection Range slider to frame 18. You are now ready to automatically paint out the boat from these frames.

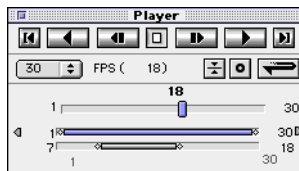


Figure 4:35 The Selection Range

9. Click on the *Paint Over Range* button in the AutoPaint panel and watch Commotion do the rest!
10. When the AutoPaint playback is finished, play the clip to preview the shot.



Figure 4:36 *The Boat Wake*

11. In the first four frames of the clip you can see the white wake from the boat. Use the SuperClone or Clone tool to paint out the wake and complete the shot.

Lesson 4: Clone Tools (2)

The footage for this section of the tutorial was based on a commercial on which Commotion was used. When the initial storyboards were presented for the commercial, they featured a good idea. However, they were in need of pizzazz. The director of the commercial decided to use abstract, changeable backgrounds which flowed continuously throughout the spot and helped to strengthen the ad's message. A variety of richly-textured, unusual objects were filmed, of which psychedelic undulation pin cushions, desiccated plots of earth, and wide-eyed wedding dolls were just a few.

Because of the organic, amorphous nature of the backgrounds, experimentation was essential. Continual changes and adjustments to the backgrounds were required up until the very end of the production cycle. Commotion, with its uncompressed realtime playback on the desktop made this process possible as well as painless.

Commotion's paint over time features were also used to perfect various shots in the spot. One of the backgrounds used in the final commercial consisted of rippling concentric rings of water. Due to the way the shot was lit, the drop of water which caused the rings translated into highly visible white streaks and splashes. With Commotion, the digital artist was able to quickly and efficiently paint out the water droplet over a series of frames. In the same way, the process of removing dirt and rendering artifacts from the various backgrounds was also effectively performed using Commotion.

This tutorial expands upon the skills learned in Lesson 3. In this lesson you will learn and use the following features:

- Super Clone
- Wire Removal Tool
- Playback

WATER RINGS

To preview the final footage:

1. Open the movie file *water-cleaned.mov*.

If you do not have enough RAM to load all the frames into the Live Frames, use the scale popup menu to scale it to a small enough size so that all of the frames can be loaded.

2. Play the footage. Note the way the water ripples look without highlights.
3. Stop the playback and close the window.

REMOVING THE DROPLET

1. Open the file *water-ripples.mov* from the CD.
2. There are 50 frames in this clip. For the purpose of this exercise you really only need frames 1 through 20, but try and load as many frames as you can. Leave all of the other settings as they are and click *OK*.

WIRE REMOVAL TOOL

The first part of the film that you will be cleaning up is frames 2 through 5, the falling drops of water that appear bright white on the film. We will use the Wire Removal tool to get rid of some of these long streaks.

1. Go to frame 4. There is a white streak going down the middle of the screen where the water droplet is in motion.



2. Click on the Wire Removal Tool in the Tools palette type, or type Q on the keyboard to activate it.
3. In the Wire Removal Tool options panel, located in the Tool Options palette, set the width to 10. Leave all the other values as they are.

The Wire Removal tool operates like the Line tool found in most drawing packages; click to set a point, click-drag out a line, and release the

mouse button to create the second point. For precise line placement, hold down Shift while dragging to turn the cursor to a crosshair; press Caps Lock and it will stay that way.

4. Position the tool at the top of the streak. Drag out a line down its length, and release the mouse. Like magic, the streak simply disappears!

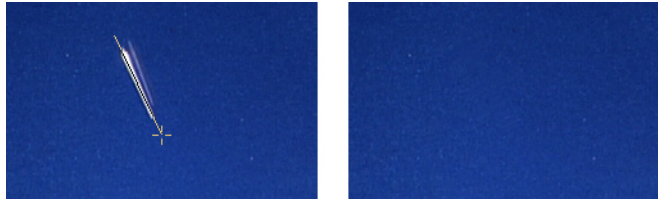


Figure 4:37 The Wire Removal Tool In Action

5. Do the same thing for the other two streaks in frame 4, then do frames 1-3 and 5.
6. Frame 6 is the first *splash* frame. You will still use the Wire Removal Tool for the streaks in this frame, but not for the splash itself; SuperClone will take care of that. Apply the wire removal tool to all streaks in frames 6-14. It is extremely important that you get rid of every streak, no matter how small.
7. Preview your work.

USING SUPERCLONE

We will be using the SuperClone tool to paint out the highlights from the water ripple, all the while leaving the ripple itself completely intact.

Before you begin, scrub through the first few frames of the clip. Notice now that the first 5 frames are completely clear. Until frame 6, (the first frame with a splash,) we have 5 frames to use as a clean clone source.

KEYBOARD SHORTCUT

S
Superclone



1. Go to frame 6.
2. Select the SuperClone tool by clicking it's icon in the Tool palette, or press S on your keyboard.
3. Select a small brush from the brush palette, or create a Realtime Brush.



Figure 4:38 Creating the SuperClone Brush

You will be painting out drops of water that are several pixels wide, so ensure that your brush is not too small, or it will increase the time it takes to paint out the flaws.

Before we paint, scrub through the length of the clip and notice the way the highlights move. Frames 6-10 have the actual water splash in them. Around frame 11 the highlight essentially splits into two pieces. In the next few steps we will remove the outer highlight.

4. As noted earlier, the first 5 frames can be used as *clean frames*. Make sure you are on frame 6. Open the Clone Source palette, and set your clone source to be frame 1. Position your brush over the outer highlight and paint it out, as in Figure 4:39

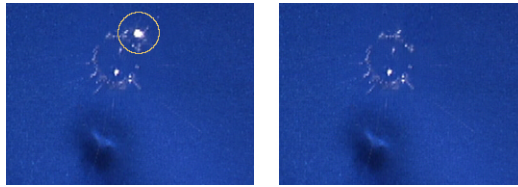


Figure 4:39 Before and After

5. Frame 7 doesn't really have two separate highlights so skip it and go to frame 8. Paint out the outer highlight in frames 8 through 18.
6. Preview your work.

This is a tricky clip to touch up because of the motion of the water rings. There is no exact way to do it. It will most likely take you a few times to get it right.

Keep in mind as you paint that in order to preserve the integrity of the water rings you are going to want to capture the different shades of blue. It is easiest to do this using short strokes (or even single mouse clicks) and resampling the area being used as the source.

If you make a mistake or carry a stroke too far there is no need to undo all the way from the last time you picked up your brush. Hold down the Command key and paint over the area you wish to replace. This allows you paint directly from the undo buffer.

KEYBOARD SHORTCUT

Option-Shift

Access/Reposition Clone Source Overlay

Option-O

Toggles Overlay On and Off

Arrow Keys

Nudge X/Y Offset 1 Pixel

Shift-Arrow Keys

Nudge X/Y Offset 10 Pixels

USING CLONE SOURCE OVERLAY

Now comes the really tricky part. We now have to remove the highlights from the splash area itself. Rather than constantly trying to precisely match up our clone brush strokes to the shape of the splash and rings, we're going to use Commotion's *Clone Source Overlay* feature to visually set an offset for our SuperClone brush.

1. Go to frame 18 and create a medium-to-small realtime brush. Your brush should be around 50 pixels wide and have a lot of Feather, at

least 60%.

2. Click on the frame number in the Clone Source palette and set an Absolute value of 20. We are now going to paint in frame 18 with pixels from frame 20.
3. In the top right corner of the Clip window, click the Clone Source Overlay button. This feature adds a reduced opacity view of your clone source (frame 20) over your current frame (frame 18.) Figure 4:40 shows Frame 18 before and after turning on Clone Source Overlay.

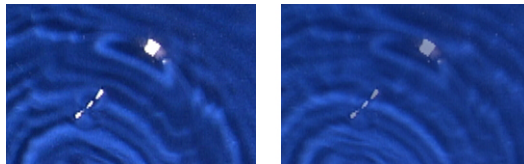


Figure 4:40 Frame 18 Without/With Clone Source Overlay

To set an offset, you have three options:

- Hold down the Shift key, then click and drag over the image. This will interactively set the X/Y offset for your source.
- Use the arrow keys to nudge the source by 1 pixel at a time, or Shift+arrow to nudge by 10 pixels at a time.
- Manually set the X/Y offset by clicking on one of the X/Y values in the clone source palette and entering values in the following dialog:

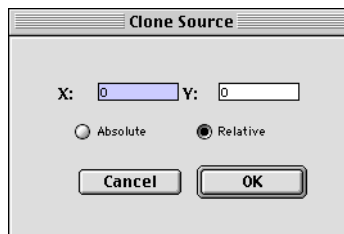


Figure 4:41 The Clone Source Offset Dialog

4. Use the first option and interactively set your offset. Hold down Option and Shift and drag the overlay down and to the left, so that the outer ring of the ripple on frame 20 lines up with the highlighted ring in frame 18.

If you look at the Clone Source palette your X/Y offset should be somewhere in the neighborhood of -1,32.

What we now have is a clean part of the ripple from frame 16 directly over the highlighted ripple on frame 18. Now we just have to paint.

5. Turn off Clone Source Overlay, and simply paint right over the top of the highlight.

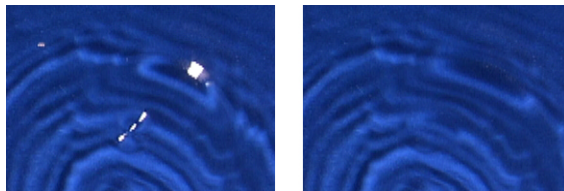


Figure 4:42 Before and After, Frame 18

Because we could see an overlay of our clone source we were able to perfectly line up the clean ripple from frame 20 with the highlighted ripple in frame 18.

FINISHING

Using Clone Source Overlay to change your clone offset as needed, paint out the rest of the highlights and complete the project. When finished, compare your work to that found in *water-cleaned.mov*

Lesson 5: Advanced Write-On Effects

Commotion's AutoPaint feature, combined with the SuperClone tool, enables the quick creation of *write-on* effects. The write-on effect is often used in broadcast commercials and film titles.

In this lesson you will learn and use the following features:

- SuperClone
- AutoPaint

CREATING THE TEXT

1. Start by creating a new document in Adobe Photoshop (or any other image editor with a text tool). Make the background white and set the dimensions to the same resolution as your final movie. Use the text tool to type out the word(s) you want to write over time. This text should be black. If you like, you can use the file *text.pict*, located in the Lesson 5 folder.



Figure 4:43 The Text

2. On the white background layer with the black text, Select All and choose Copy from the Edit menu. In the Channels palette, create a new channel (Alpha 1) and Paste in the information from the clipboard. Save this file as a PICT file.

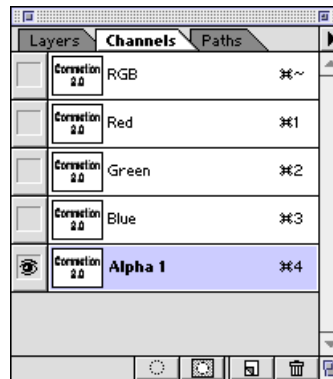


Figure 4:44 The Alpha Channel

Next you need to choose what type of Write-On effect you want to create. You can either write this text on as black text or select another color or moving video footage. Or, you can simply write it on over time against white, and use it as a lumikey in another application.

WRITING ON BLACK TEXT IN COMMOTION

1. Open the file *goldengate.mov*. This will be the background image that the write-on effect will be applied to.
2. Since we're going to write-on the image in the PICT file over the first 30 frames of this clip, set the Selection Range from 0-30.
3. Open the one frame PICT file of the text. If you like, click the Collapse Window button to minimize the PICT file, as we only need it as a source file.

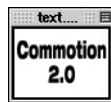


Figure 4:45 PICT Window

4. With *goldengate.mov* selected in the foreground, set the Super-Clone tool to clone from the text image.

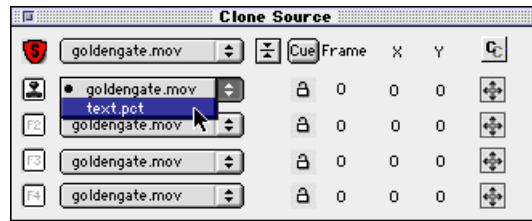


Figure 4:46 The Clone Source Palette

When you clone, you will be cloning in information from the text file, including the white background.

5. Set the transfer mode to Darker in the Tool Options palette. This will allow the paintbrush to treat the white background as a transparency and paint on only the black text.

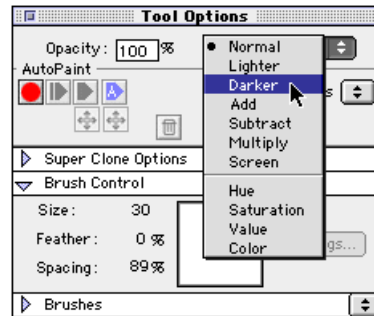


Figure 4:47 Selecting Darker

KEYBOARD SHORTCUT

Option-Shift

Access/Reposition Clone Source Overlay

Option-O

Toggles Overlay On and Off

Arrow Keys

Nudge X/Y Offset 1 Pixel

Shift-Arrow Keys

Nudge X/Y Offset 10 Pixels

6. Turn on the Clone Source Overlay. Hold down the Option and Shift keys to offset the position of the overlay.



Figure 4:48 The Clone Source Over the Golden Gate Clip

Overlay Opacity:

You can adjust the opacity of the overlay in the Tool Options palette.

7. To begin recording the write-on effect, choose a soft edged brush that will cover the thickest part of the text and click on the Auto-Paint Record button in the Tool Options palette. Trace over the text with the SuperClone tool. When you finish, press the Stop button to stop recording, then Revert the current frame.
8. Click on the *Playback Animated* button to paint the text on over time.

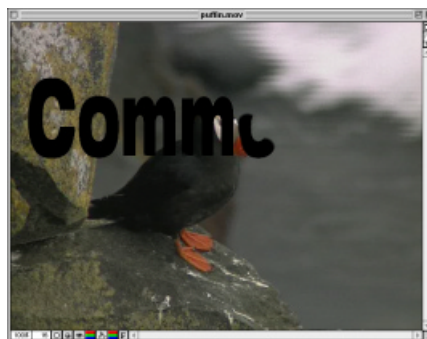


Figure 4:49 Playing Back the Effect

TECHNIQUE OPTIONS

Writing On Color Text in Commotion:

Use the same technique as mentioned above, except create the Write-On effect into the alpha channel of a new Commotion file. Make the RGB of this new Commotion file the color of the desired text. For this to work correctly, the black text must be contained in the Alpha Channel of the original PICT file. After applying the write-on effect to the Alpha Channel, composite this clip on top of a background to produce the final colored write-on effect.

Writing On Text of Video Footage in Commotion

Use the same technique as writing on color text, except instead of writing it into the alpha of a new clip, animate it into the alpha of the video footage you want to write on. For example, writing the text on over time into the alpha of fire footage will produce text made out of animated fire.

Writing On Text To Use As A Lumi-Key in Another Application:

Simply write on the black text over time into a new Commotion document. Save the file out and use it as a lumikey in your compositing application. This provides a lot more flexibility, since the matte can easily be controlled for feathering, drop shadows, glows, etc.

Lesson 6: Painting on Frames & Fields

Commotion has a number of features to support field based operations for both NTSC and PAL video clips, including realtime painting on field based material, allowing you to quickly perform field-accurate painting without rendering.

What are Fields and why do they occur?

Television monitors are *interlaced*, meaning that every frame is divided into two groups of horizontal lines – odd and even – called fields. Unlike computer monitors, which draw every line one after the other, television monitors draw the lines in one field first, and then draw the lines in the second field. Thus, a 30 frame per second NTSC broadcast signal actually contains 60 fields per second.

Video as a source was initially criticized as being too clean because it does not capture the natural motion blur that occurs on film. To compensate for this, video cameras capture motion on each field in a similar manner to how a film camera would capture motion on each frame. In this manner much of the smooth motion lost in video is recaptured with fields.

Because motion occurs between individual fields in video footage, it is often necessary to work with individual fields when creating source for broadcast use. The following lesson will show you how to use Commotion to paint on fields.

In this lesson you will use Commotion's Field Mode capability to quickly and accurately paint on field based footage. You will use the following features:

- Field Mode
- Field Blending

FIELD MODE

1. Open the file *tshirt.mov* from the Lesson 6 folder. Load a portion of the clip.



Figure 4:50 *tshirt.mov*

2. Play the clip.
3. Use the Z and X keys to step through the first few frames to examine the blurring around the rapper's arms and the lettering on his T-shirt.



Figure 4:51 *Interlaced Fields*

This clip was shot with a digital video camera. The camera recorded 60 fields of information representing 60 distinct moments in time. These

fields are interlaced together in the video signal, causing a tearing or blurring effect, as each frame contains two different moments in time.



Figure 4:52 The Upper Field and The Lower Field

PAINTING ON FIELDS

Because the words *Porn Star* are not desired for the final clip we will need to paint out the words from the T-Shirt in all 90 frames of the shot. However, the interlaced fields make accurate painting impossible.



Figure 4:53 Porn Star Interlaced

In order to paint on this rapidly moving image we must split the frame into fields. Commotion makes this possible with the Field Mode.

KEYBOARD SHORTCUT

/
Toggle Field and Frame Mode

1. Click the Field Mode button at the bottom of the clip window or use the keyboard shortcut.

When in field mode, Commotion duplicates the current field so that the image is still full-height in the clip window.



Figure 4:54 Porn Star Upper Field

2. Play the clip in field mode. The playback speed will be considerably slower due to the full-height adjustment for each field. On each new field, Commotion is de-interlacing and field doubling the image on the fly!

KEYBOARD SHORTCUT

Page Up or Z
Reverse One Frame
Page Down or X
Forward One Frame



Now as you single-frame advance through the clip you will see the upper field and then the lower field—indicated by the upper/lower field indicator in the Field Mode button.

While in Field Mode, advancing forward/backwards will advance one field, instead of a whole frame. Clicking on the field indicator will toggle through the modes.

While in field mode, all painting operations will only affect the current field. In Figure 4:55, the two images on the left show two brush strokes applied to the upper and lower field, respectively. The image on the right shows those fields combined into a single frame. Note that half the paint information in each field is discarded when interlaced. In the example below, the only place where there is a “solid” paint stroke is where the lines intersect.



Figure 4:55 Upper, Lower, and Interlaced Example

3. Select the T-Shirt color using the eyedropper, then select the Paint-brush tool, and begin painting out the words *Porn Star* from the field.

KEYBOARD SHORTCUT

I
Eyedropper
Option-Click
Quick-Access Eyedropper

This works for all tools except Rotospline, Clone, and SuperClone



Figure 4:56 Painting Out Porn Star

As you move through the clip painting on the T-Shirt, you will need to paint areas that are in shadow and ripples on the t-shirt which are slightly darker than the white color. Try to use a limited palette of colors (3-4 shades) so that you don't introduce unnecessary chatter between frames.

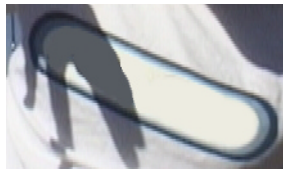


Figure 4:57 Shadows and Light

4. Remember that all of Commotion's painting tools work while in Field Mode, so you may choose to Clone or SuperClone certain frames.
5. Painting out the word *Porn Star* in the entire 90 frames shouldn't take more than 1 hour. If you would like to see the finished shot, open the *tshirt-painted.mov* file from the Lesson 6 folder. If you move through the painted file, you will notice that a relatively low precision level is all that is necessary to paint out the image. This is because when the image is shown on an NTSC monitor, the small tonal differences between whites and shadows are not evident at all.

When in field mode, the field dominance determines the order in which the fields play back (whether the upper or lower field comes first in

time). The field dominance can be changed from the Display Preferences window.

(For more information see Display Preferences on page 89.)

INTERLACE/DEINTERLACE

The Interlace/Deinterlace calculation (under the Calculate menu) will take a 30/25 fps frame based clip and generate a 60/50fps field based clip so that you can perform rotoscope work or composite in a 60fps mode; when you are done, the same filter will reinterlace the image back to 30/25 fps. This feature does one of two things:

- rips apart a clip's fields and creates a new clip that is twice as long
- takes a clip that is field based and brings it back to interlaced mode (half as long).

(For more information see Interlace/Deinterlace on page 115.)

FIELD BLENDING

Field Blending can be used to actually soften the differences from two fields or eliminate a field altogether.

When selected, the filter will either double fields by duplication or blend two fields together by interpolation, effectively removing the 60 field time base permanently.

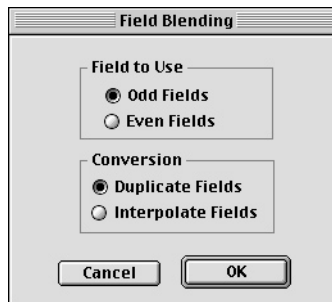


Figure 4:58 The Field Blending Dialog

The advantage of using this filter is that you simplify your clip and limit your timebase to 30fps. If you were to apply this filter to the T-Shirt clip, you would have half as many frames to paint on.

The disadvantage is that it eliminates half the temporal resolution of your clip – working on all 60 fields will yield a much higher quality result.

(For more information see Field Blending on page 118.)

REVERSE FIELD DOMINANCE

Reverse Field Dominance is a quick solution to swapping field dominance on a clip. Field dominance settings may vary between your camera, capture method, and off-line editor. This filter will quickly reverse the order of the fields to match the equipment you are using. This is accomplished by taking the selected in-out frame range and reversing the even and odd (upper/lower) fields within each frame.

(For more information see Reverse Field Order on page 119.)

Lesson 7: The Timeline

This main purpose of this lesson is to provide you with a general overview of the Timeline. Since this is a new feature to 2.0 we have not made this lesson incredibly detailed, as users coming from previous versions can use it to quickly acquaint themselves with this new feature.

In this tutorial you will create a matte with Rotosplines and apply a filter effect to a clip. Both these topics are covered in greater detail in later lessons.

In this lesson you will learn how to use the following features:

- The Timeline
- The Rotospline Palette
- Rendering a Rotospline Matte
- Filter Effects

In this lesson, we will add a Photon Torpedo being shot through the Golden Gate Bridge. To create the torpedo effect we will use Knoll Lens Flare Pro, a plug-in sold separately by Puffin Designs. If you do not already own this plug-in, you can use the demo version found on the 2.0 CD. You can get more information on Knoll Lens Flare Pro and other Puffin Designs products by visiting our website at <http://www.puffindesigns.com>.

SET UP THE SCENE

1. Open up 30 frames of the QuickTime file *Golden Gate.mov* from the

Lesson 7 folder.



Figure 4:59 Golden Gate.mov

In order to create an effect later in the tutorial we need a matte of the front half of the bridge, and to do this we'll use Rotosplines. We've created the splines for you in this instance; you'll learn about creating mattes with splines in a later lesson.

KEYBOARD SHORTCUT

P
Pen
F7
Show/Hide Rotospline Palette
F12
Load All Paths



2. Open the Rotospline palette by double-clicking its icon in the Tool palette or by pressing F7.
3. Load in the Rotospline file *Golden Gate.splines* from the Lesson 7 folder by selecting Load All Paths from the Rotospline popup menu by pressing the button in the top right corner of the Rotospline palette.

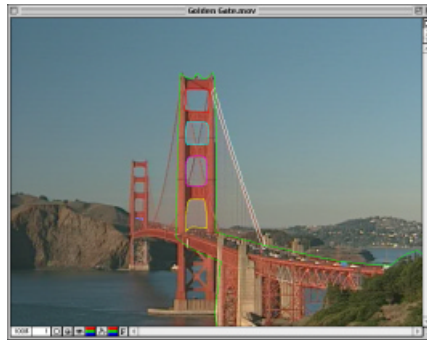


Figure 4:60 Bridge With Paths

The splines appear in both the Rotospline palette and the Clip window.

KEYBOARD SHORTCUT

F15

Preview Splines

Shift-F15

Spline Preview Options

Preview

4. To preview the matte press the Preview button in the Rotospline palette. To end the preview click anywhere in the clip window.

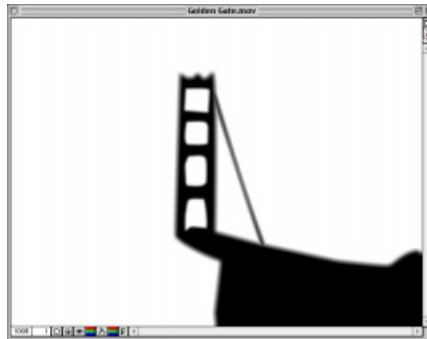


Figure 4:61 Previewing the Matte

Render

5. To render the matte to the alpha of current clip press the Render button located in the Rotospline palette.
6. When the Render Options for Splines dialog appears, select *To Alpha of Current Clip* and press *OK*.

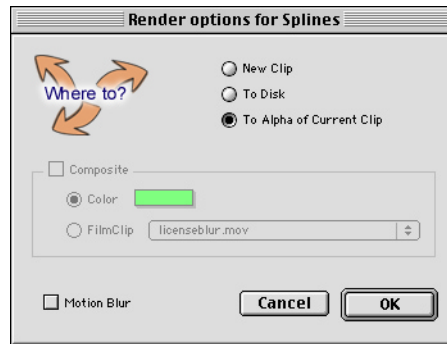


Figure 4:62 Render Options for Splines

ADD THE FLARE

1. In the Filter menu, scroll down to the Knoll menu and select *Lens Flare Pro*. The Timeline window appears.

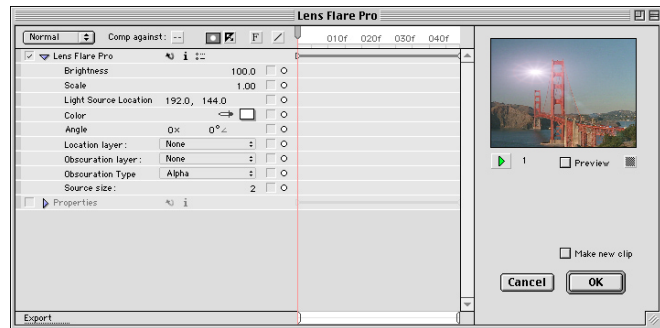
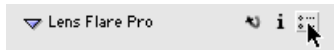


Figure 4:63 The Knoll Lens Flare Pro Timeline Window

The only difference between Knoll Lens Flare Pro and the Demo version is the demo will preview and render with green lines through the clip.



Figure 4:64 Knoll Demo Preview Window



2. If it is not already there, drag the Current Time Marker, (the vertical red line,) to frame 1.
3. Leave all the settings at the top of the timeline at their defaults. Next to the words *Lens Flare Pro* press the *Options* button.
4. The Lens Editor appears.

The Options button will bring up options for any plug-in with a built-in editor or options window.

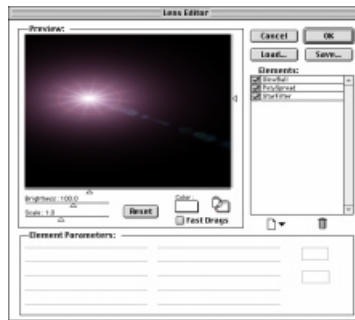


Figure 4:65 Lens Flare Pro Lens Editor

5. In the Lens Editor, choose *Load*. An Open dialog appears. Locate the file *Photon Torpedo.lfp* in the Lesson 7 folder and click *OK*. Your flare changes to look like Figure 4:66

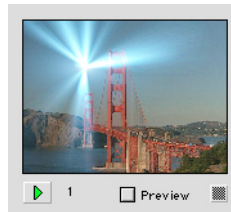


Figure 4:66 Photon Torpedo is Added

POWER TIP!

If you hold down Option while dragging, you will see a realtime update in your preview window.

- In the Timeline, hold down the Option key and position your cursor over the Brightness parameter until it becomes a double sided arrow. Click and drag back and forth to set the Brightness value to about 45.

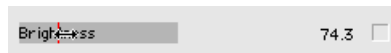


Figure 4:67 Adjusting the Brightness

- Set the Scale value to about 0.40.
- Position your cursor over the Light Source Location value until it becomes a set of crossed arrows. Option-drag to the upper left part of the screen. Set the values to approximately 3, 11.
- Set keyframes for the parameters Brightness, Scale, Light Source Location, and Angle on frame 1. To set the keyframes, click on the white circle at the end of the property.

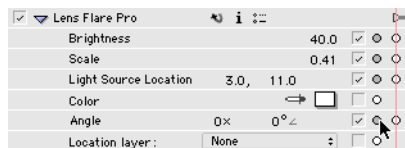


Figure 4:68 Setting the Keyframes

- Drag the Current Time Marker to frame 30.
- Option-drag the Light Source Location until it ends up in approximately the position 479, 225. A keyframe is automatically created.

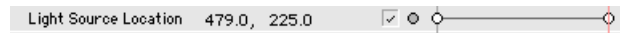


Figure 4:69 Keyframes are Automatically Created

12. Set the Angle parameter to 30. This will make the torpedo *spin* as it moves.
13. Click the Play button underneath the Preview Window to view the animation.

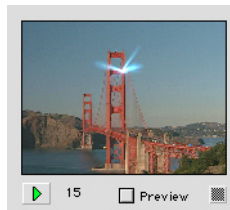


Figure 4:70 Previewing the Effect

Notice that the flare travels in front of the bridge. We want it to appear as if it is going *behind* the bridge.

14. To have the flare be obscured by the bridge, we need to set up an Obscuration Layer. Under the Obscuration Layer pull down, choose the *Golden Gate.mov*.
15. Press Play again to preview the effect. Now notice how the flare is obscured as it is passes over the area masked in the alpha channel, thus giving the appearance of going behind the bridge.

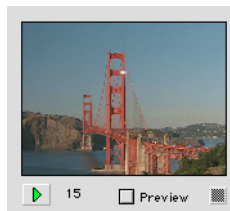


Figure 4:71 The Torpedo is Obscured

16. Hit *OK* to render this effect into the clip.

Lesson 8: Motion Tracking (1)

Motion Tracking provides Commotion users with several new production techniques for creating mattes and automating paint work. Commotion can have an unlimited number of trackers. Each tracker is a search window that will follow a region of your image as it moves through a frame. Bear in mind that *motion* in a scene can be *objects moving* or *camera movement* which creates apparent motion in this section:

For this tutorial we will track several objects in the Boat Shake movie, and then use the motion tracker data to:

- Stabilize the camera shake in the shot
- Apply the motion to rotosplines to automate rotoscoping
- AutoPaint strokes to automate some paint work
- Reintroduce the camera shake to the shot.

In this lesson you will learn how to use the following features:

- Motion Tracking
- Stabilizing a Shot
- Applying Track Data to Rotosplines
- Applying Track Data to AutoPaint
- Destabilizing a Shot

ANALYZING THE BOAT SHAKE MOVIE

1. Open the file *boatshake.mov*. It is not necessary to load the entire frame range of the clip, but if you have enough RAM, load all 60 frames. For the tutorial we will assume you have all frames loaded.



Figure 4:72 The Boat shake Clip

2. Play the clip. Notice that the camera is moving up and down ever so slightly. This slight drift from the hand-held camera will greatly complicate any rotoscoping or paint work. To create a matte for the boat, it would require several keyframes to animate a roto spline to match the movement.

TRACKING THE WHITE DOCK POST

Now, we will use the motion tracker to analyze the camera movement.

KEYBOARD SHORTCUT

- T**
Motion Tracker
- F7**
Show/Hide Rotospline Palette



1. Open the Motion Tracker palette. The palette can be reached by double clicking on the Motion Tracker tool or by selecting the Motion Tracker from the Windows menu.
2. Create a new motion tracker by clicking on the New Motion Tracker button in the bottom right corner of the Motion Tracker palette.
3. Cue the clip to frame 1. When you set up a tracker, make sure you are at the beginning or end of the frame range that you wish to track.

4. Move the Track Target and Track Region markers to select the area to track.

POWER TIP!

The *Track Region* is a *RELATIVE* search area; this means that if an object (black dot) is moving across screen from left to right over a series of 100 frames, the *Track Region* only needs to be as big as the greatest movement from one frame to the next, not as big as the entire frame.



Figure 4:73 Selecting the Track Object

The *Track Target* is the inner rectangle and represents the pixel pattern that the tracker will search for. The *Track Region* is the outer rectangle and represents the region to search for on each frame.

Picking the best Track Target and Region is the trick to good motion tracking. Here are some tips:

- Track Targets should be high contrast areas of the image that stay relatively constant in size and appearance so that they can be recognized as they move. If you have problems tracking an object, try changing the size and position of your Track Target.
- When possible, try not to pick objects that are obscured halfway through a shot or that move offscreen. Commotion does have features to track objects like this, but it will require additional steps.

(For more information see The Motion Tracker on page 270.)

- Track Regions should be just large enough to include the entire range of possible motion from frame to frame since the size of the track region greatly affects the performance of the motion tracking.

KEYBOARD SHORTCUT

- 1**
1:1 Magnification
- 2**
2:1 Magnification
- 3**
4:1 Magnification
- 4**
8:1 Magnification
- 5**
16:1 Magnification

5. Place the Track Target over the white tip of the post on the dock. This area has very discernible contrast with the background, and remains in clear view throughout the shot.
6. Fine tune the positioning by turning on tracker magnification. You can activate the magnification by hitting 1-5 on the keyboard while the Tracker Tool is selected, or by selecting a magnification from the Tracker Zoom popup in the lower left corner of the Tracker Palette.



Figure 4:74 Fine Tuning the Track Target

While the Tracker Target is magnified, it is easier to evaluate the pixels that you are targeting for your track. You can reposition or resize the Track Target while magnification is turned on. You can quickly toggle between a magnified view by pressing 1-5 on the keyboard.

7. Once you are satisfied with the Track Target, hit the Track Button in the Tracker Floating Palette. The Motion Tracking dialog appears.



Figure 4:75 The Motion Tracking Dialog

8. There are many settings to control how the motion tracking will take place. These controls allow you to fine tune how Commotion analyzes the motion in the image. Make sure the SubPixel Accuracy is set to 1/16th and hit *OK* to begin tracking.

(For more information see Motion Tracking Dialog on page 276.)

9. Once the track is complete, a crosshair will appear along with a path indicating the motion of the dock post. For a better view, zoom in on the region where the track took place.

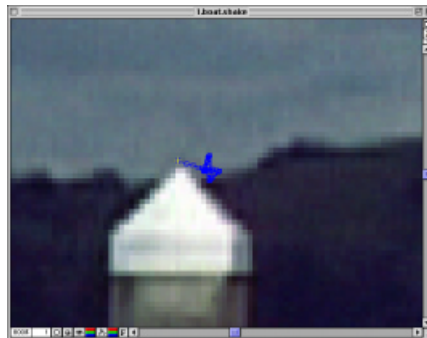


Figure 4:76 Zoomed in on the Tracked Point



You can toggle the path and crosshair visibility by clicking the C and P settings in the Motion Trackers palette. For playback, turn off the Path

(P) and hit play. You will see a crosshair follow the post around as it moves in the frame.

10. Commotion's realtime performance allows you to immediately see any slippage or misalignment in your track. If the tracker had gone off target, you can cue to the frame and either re-track the region or manually correct the tracker by manipulating the path. For example, turn on the Path (P), and select any point in the tracker's path. You can move this point or multiple points around, or select a point and hit delete to remove the points and have Commotion interpolate the motion for a series of frames.

KEYBOARD SHORTCUT

Command-
Zoom Out to 100%

11. Zoom out to full resolution and continue analyzing the tracker data at full speed.

APPLYING TRACKER DATA TO ROTOSPLINES

Now we can use the tracked data to automate the creation of a matte for the boat.

1. Load the *boat.spline* rotospline from the tutorial disk. Open the Rotospline palette by double clicking on the Rotospline tool and select *Load All Paths* from the popup menu in the top right corner of the palette. Alternately, you can create your own new spline by drawing a rotospline around the boat.



Figure 4:77 The Boat Rotospline

2. Play the clip. Notice that while the boat rotospline matches the boat perfectly on frame 1, the boat slides about uncontrollably beneath the spline throughout the rest of the shot.

Apply Tracker

3. Select the spline by clicking on it's name in the Rotospline palette, then apply the motion tracker data to the boat spline by pressing the *Apply Tracker* button.

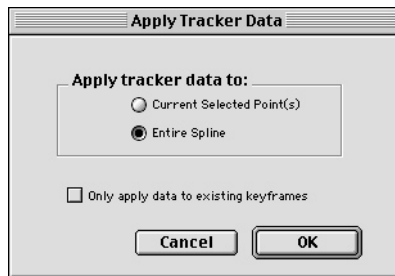


Figure 4:78 The Apply Tracker Data Dialog

In the Apply Tracker Data dialog, indicate whether you wish to apply the tracker data to the Current Selected Point(s) or to the Entire Spline (or multiple splines if more than one spline is selected). Choose *Entire Spline* and hit *OK*.

4. Select the tracker you want to use from the popup menu. (There is only one selection, Track 0.) The default settings assume you want to apply both X and Y position movement to the spline.

If you had a second tracker selected, you could also choose to have rotation and scale information applied to your spline. (This will be covered in the Lesson 8.)

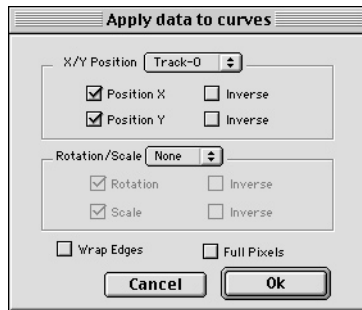


Figure 4:79 Apply Data to Curves

5. Play the clip. Notice that the boat roto spline is now in synch with the camera movement. You just saved yourself a *boat-load* of time creating a matte.

STABILIZE THE SHOT

Now we will apply the motion tracked data to remove the camera movement. By *stabilizing* the shot, we will remove the motion in the shot, effectively making it appear as if it was shot with a locked down camera. This will allow us to alter the shot much more readily. Then, once we have completed the work on the shot, we will reintroduce the camera motion.

1. Play back the footage again and notice how the white post moves back and forth in the shot. Turn off the Rotospline and Tracker visibility by clicking on the eyeball icons.
2. Click the Stabilize button in the Motion Tracker palette. This brings up the Stabilize Dialog.

Stabilize

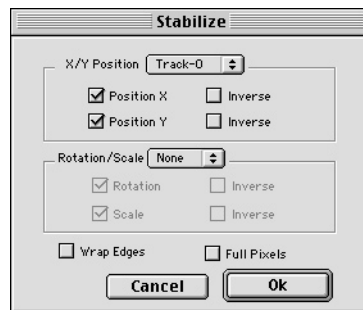


Figure 4:80 The Stabilize Dialog

3. Select the tracker(s) and type of stabilization. Since the camera was mostly moving up/down and left/right (X,Y) and not rotating or zooming in or out, one tracked point is all we will need to stabilize this shot.
4. Since we are going to eventually add the stabilized motion back into the shot, check *Wrap Edges*. This will wrap the edge pixels around to the opposite side when they are pushed outside the limits of the clip.

Stabilization works by applying the inverse values of the tracked data to it's position. When we destabilize the shot we will want to move the image in the opposite manner to when we stabilized it; essentially we will be applying the inverse of the inverse, or simply reintroducing the motion. By having the edge pixels wrap around we won't lose any data from the edges of the clip.

5. Hit *OK* and wait while Commotion renders the stabilization.
6. Play back the footage to analyze the quality of the tracked data. If the tracked data is accurate, the white post should be perfectly still. You can zoom in slightly and use the Viewer tool to select a viewing region just around the post. When you play the footage the only thing moving should be the grain from the film.

ALTERNATIVE STABILIZATION METHODS

Commotion provides you with two alternative methods of stabilization.

Export the Motion Tracker data to Adobe After Effects:

Most artists will want to use motion tracker data from Commotion in a variety of ways. While Commotion offers image stabilization (as we've just seen), it can be very useful to integrate motion tracked data for stabilization and further compositing directly within After Effects. After stabilizing within Commotion and analyzing the results, you can easily export the data to After Effects.

1. Select the tracker to export to After Effects.
2. Select the *Export AE Data to Clipboard* command from the Motion Trackers popup menu in the upper right corner of the palette.
3. Select the type of data you wish to export and hit *OK*. The keyframe information is now copied to the clipboard. You can paste this information directly into an After Effects layer within a composite, or you paste it to the Notepad or a Simpletext document for temporary storage.

Alternately, you can save tracker data in After Effects format which will simply create a text file containing the information.

(For more information see Export AE Data To Clipboard on page 286.)

Use one of Commotion's Stabilize Filters:

Commotion comes with three different filters with which you can use motion track data to position another image:

- Corner Pin
- Match Move
- Stabilize

We will be using the Stabilize filter later in this exercise to reintroduce the camera motion.

(For more information see *The Stabilize Menu* on page 188.)

PAINT OUT THE SEAGULL

We will now use motion tracker data to automate some paint work and then remove the seagull which is seen flying through this shot.

1. Track the seagull using a new motion tracker. If you need help, refer to see *Tracking the White Dock Post* on page 378. to review the steps we used to track the white post.

Alternately, you can load a precooked tracker set by loading the *boat.shake.trackers* file from the tutorial CD. To load a tracker, select *Load All Trackers* from the Motion Tracker popup menu.

You should now have a set of tracker data following the seagull's motion through the frame.



Figure 4:81 *The Tracked Seagull*

2. Create a *clean plate* on frame 1. The goal is to remove the seagull from frame 1, so that we can then use it as a *bird-free* clone source with which we can paint out the seagull on all subsequent frames.

The easiest way to clean up the bird on frame 1 is to use the SuperClone brush and to clone from frame 15. You should end up with a frame 1 that looks like Figure 4:82.



Figure 4:82 *The Clean Plate*

Next we'll record a brush stroke using SuperClone, then apply tracker data to it to automatically paint out the bird on frame 2.

3. Cue to frame 2. Then set the SuperClone Brush settings to be locked to frame 1. (Frame 1 is now our clean plate.)
4. From the Autopaint panel in the Tool Options palette, turn on recording by clicking on the record button. (If you've been recording any brush-strokes prior to this, make sure you delete the brush buffer by pressing the trash can icon in the AutoPaint area.)

Once recording, make a brush stroke with the SuperClone brush to remove the seagull from frame 2. Make sure the stroke is relatively big and covers an area slightly bigger than the bird in frame 2 (as the bird moves, her wingspan increases).



5. Have Commotion automatically repeat the brush stroke following the tracked seagull by pressing the *Play Range With Tracker Data* button, (the button underneath the Play Range button in the Tool Options palette.) Commotion will apply the brush strokes that are in the AutoPaint buffer along the seagull's tracked motion path.

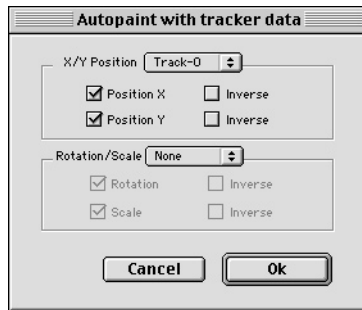


Figure 4:83 AutoPaint with Tracker Data

6. Play back the clip to evaluate your work. The seagull should now be removed from the shot!

REINTRODUCING THE CAMERA MOTION

The final step in this lesson is to reintroduce the original camera motion back into our clip. To do this we will be using the Stabilize filter from under the Filters Menu.

1. Select *Filters > Stabilize > Stabilize*. The Stabilize window appears.

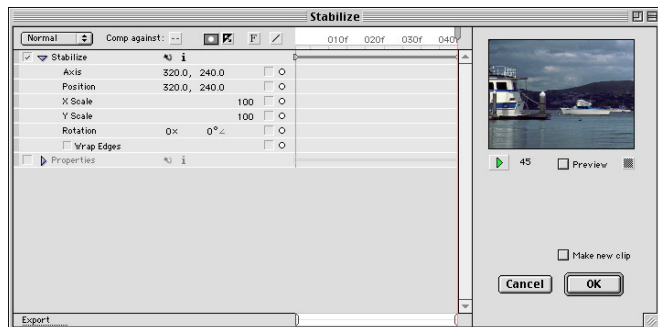


Figure 4:84 The Stabilize window

2. Since we want to restabilize the data, make sure that *Wrap Edges* is checked.

- Control-click on the Position value. This will bring up the Timeline Contextual Menu. Select *Apply Tracking Data*. This will allow us to apply tracking data to the position value.

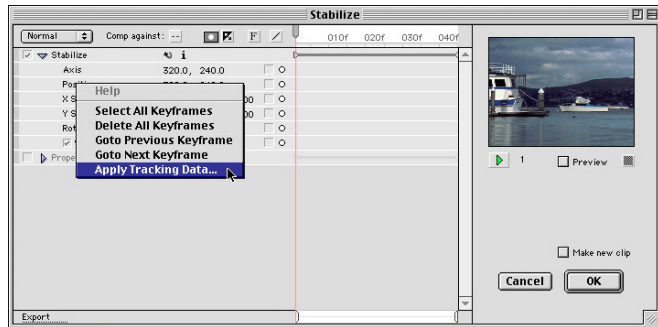


Figure 4:85 Applying the Tracking Data

- The Apply Tracker Data dialog appears. This is exactly the same window we used earlier when stabilizing the shot. The only difference is that instead of accessing it from the Motion Tracker palette we are accessing it here, through the popup menu in the Timeline.

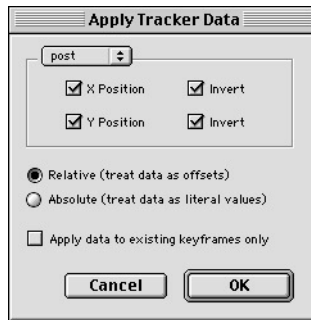


Figure 4:86 Apply Tracker Data Dialog

Destabilizing the shot is the opposite of stabilizing it. As such, we now want to apply the opposite (or inverse) of stabilization. Select your post motion data, make sure X Position and Y Position are checked, then check *Inverse* for both values.

5. Click *OK* to apply the motion data.

Once applied, the new motion data shows up as keyframes in the Timeline window.

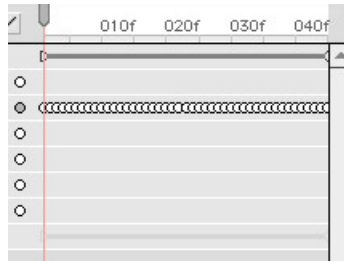


Figure 4:87 Position Keyframes

6. From the Preview Window, press play to preview the effect.



Figure 4:88 Previewing the Effect

The boat clip plays back with its original motion.

7. Press *OK* to apply the filter to the clip.

Lesson 9: Motion Tracking (2)

Commotion's ability to attach motion tracked data to Rotosplines allows artists to easily isolate elements as they move around the frame. In this example, we will blur the license plate on the car so the numbers can not be identified.

In this lesson you will learn how to use the following features:

- Tracking multiple points simultaneously
- Applying track data to a Rotospline
- Scaling a Rotospline with track data
- Creating a matte from A Rotospline
- Applying a Filter effect

TRACKING THE LICENSE PLATE

1. Open the file *licenseblur.mov*. Open the Motion Tracker and Rotospline palette by either double clicking on their tool icons, or by selecting their palettes in the Window menu. Playback the clip and notice that the license plate is moving in position and scale as it gets closer to the camera.
2. On the last frame, set up two motion trackers on either side of the license plate. Shift click on both of the trackers and click on the *Track* button.

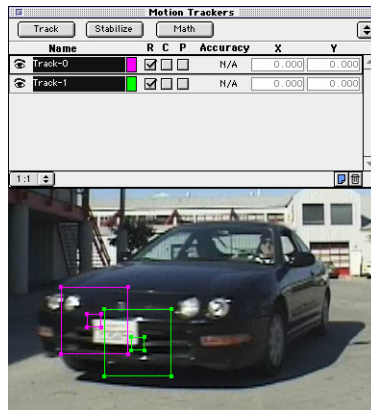


Figure 4:89 Both Trackers Selected

3. The Motion Tracker dialog comes up. Use the default settings with the exception of the *Track in Reverse* option, and choose a sub-pixel accuracy of 1/32. Click OK to track.



Figure 4:90 The Motion Tracking Dialog

Once completed, the track should look like Figure 4:91.



Figure 4:91 The Completed Track

CREATING AND SCALING THE SPLINE

4. Go back to the first frame and create a new Rotospline around the license plate. Zooming in will help with the precision. Alternately you can load in the *license plate.path* file in the tutorial folder.



Figure 4:92 The License Plate Path

5. Assigning the tracked data to the Rotospline will cause the rotospline to follow the motion path, as well as scale appropriately. Click on the *Apply Tracker* button in the Rotospline palette to attach the tracked data.
6. Select *Entire Spline* and click *OK*

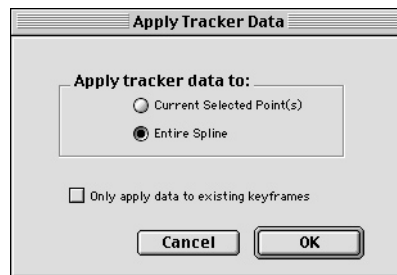


Figure 4:93 The Motion Tracker Data Dialog

7. Choose *Track-0* for X and Y Position, and *Track-1* for Scale.

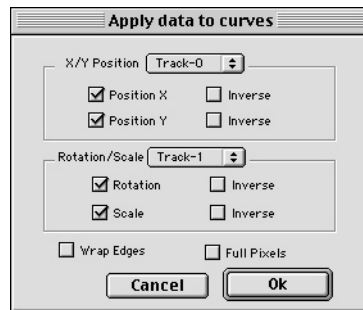


Figure 4:94 Apply Data to Curves

This will cause the spline to scale based on how far *Track-1* moves away from *Track-2*.

8. Now play back the clip, and you'll see that the rotospline is moving an scaling correctly with the license plate.

CREATING THE MATTE

9. Give the spline a nice soft edge by entering a Feather Setting of 5.

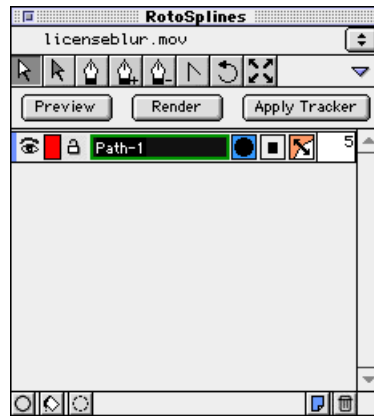


Figure 4:95 The Rotospline Palette

10. Click on the *Render* button to render the spline into the Alpha Channel of the current clip.

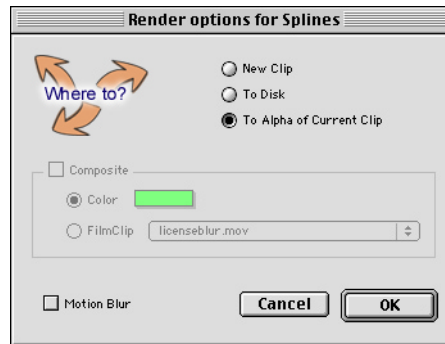


Figure 4:96 Render Options for Splines

APPLYING THE FILTER

11. From under the Filter menu, select *ICE Blur* from the Blur & Sharpen submenu.

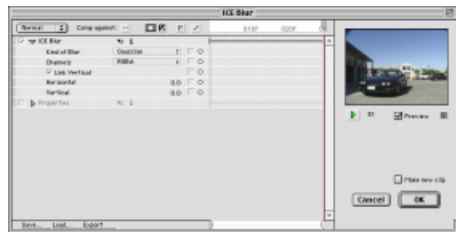


Figure 4:97 The ICE Blur Window



Comp against: --

12. Depress the *Alpha On* button to enable the alpha channel, so that the effect is applied only to the unmasked area.
13. From the *Comp Against* menu, select *licenseblur.mov*. When the blur effect is applied, the blurred license plate will be composited against the non-blurred clip.

(For more information see *Compositing and Alpha Controls* on page 132.)

14. Make sure *Link Vertical* is checked, and set a *Horizontal* value of around 5 pixels.
15. Click *OK* to render the effect.



Figure 4:98 The Completed Shot

The license plate will be blurred over the full range of frames, changing position and scale as the car comes closer to the camera.

Lesson 10: Motion Tracking (3)

For this tutorial we will track several objects on a ferry boat. This footage was provided to us by Adventure Pictures.

In this lesson you will learn and/or use the following features:

- Tracking multiple points simultaneously
- Applying track data to a Rotospline
- Using Clone Source Overlay
- Applying Track Data to a SuperClone

TRACKING OBJECTS

1. Open the file *ferry.mov*.

It is not necessary to load the entire frame range of the clip, but if you have enough RAM, load all 50 frames. For the tutorial we will assume you have all frames loaded.

2. Open the Motion Tracker palette and create two new motion trackers.
3. Move the Track Target and Track Region markers to select the area to track. Position one tracker over the smoke stack and place the other over the lifesaver on the right.

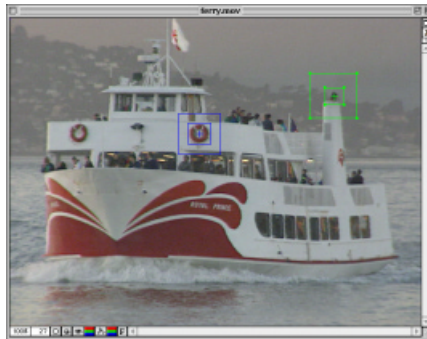


Figure 4:99 Positioning the Trackers

Remember, you can magnify a tracker and move it around to precisely position your trackers by pressing 1-5 on the keyboard.

4. Once you are satisfied with the Track Target, shift-select both trackers in the Motion Trackers palette and then click on the Track Button. For this track, choose Luminance and make sure SubPixel Accuracy is set to 1/16th. Click OK to begin tracking.

APPLYING TRACKING DATA TO ROTOSPLINES

1. If it is not already open, press F7 to open the Rotospline palette. Select *Load All Paths*.
2. Load the file *lifesaver.path*. This file contains a Rotospline for the lifesaver on the side of the boat.
3. Go to frame 1 and select the lifesaver spline in the Rotospline palette. Click on the *Apply Tracker* button in the rotospline palette. In the Apply Tracker Data dialog, choose *Entire Spline* and hit *OK*.
4. When the Apply Tracker to Curves dialog appears, select the tracker that you used to track the lifesaver and click *OK*.
5. Play the clip. Notice that the lifesaver Rotospline is now correct throughout the shot.

Before proceeding, hide the lifesaver spline by clicking the eyeball next to it in the Rotospline palette.

APPLYING TRACK DATA TO CLONE SOURCES

1. Open *explosion.mov*. In the Load Frames dialog, select frame 1 by entering 1 in both the In and Out fields. You only need to load the first frame because the SuperClone tool can pull frames from disk as well as from RAM.
2. Once *explosion.mov* has loaded, collapse its window by clicking the collapse button





Figure 4:100 The Collapsed Movie

3. Next you will need to set up the SuperClone tool. Bring the boat clip to the front and open the Clone Sources palette by pressing F8.
4. Select *explosion.mov* as the first Clone Source.
5. Hold down the Shift key while clicking and dragging in the clip window to position the explosion so that it appears to be coming from the smoke stack.



Figure 4:101 Positioning the Flame Clip

6. Once you have done this, use the Current Frame Slider in the Player palette to advance to frame 20. Notice that the explosion no longer lines up with smoke stack due to the motion of the boat. You will now compensate for this by applying the tracker data you previously created to the Clone Source.
7. Go back to frame 1. Click on the *Apply Tracker Data* button to the right of the first Clone Source.

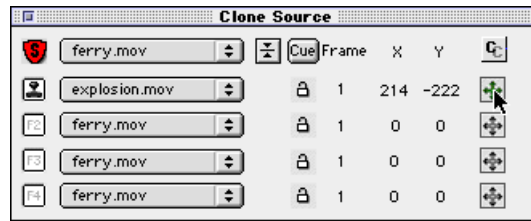


Figure 4:102 Applying the Track Data

8. When the *Apply Tracker to Clone Source* dialog appears, use the upper popup menu to select the tracker that you tracked the smoke stack with. Make sure that the lower popup menu is set to *none* and click *OK*.
9. Return to frame 20. Notice how the Clone Source is now correctly aligned with the smoke stack. Return to frame 1.



Figure 4:103 The Clone Source at Frame 20

10. Create a brush approximately 140 pixels in size, with a feather value of 80%. Select *Screen* from the Transfer Mode popup at the top of the Tool Options palette and turn on *AutoPaint* recording.
11. Paint in the explosion around the smoke stack. Remember, this stroke will need to be large enough to paint in all of the explosion as it grows larger, so make it big.

12. Click the *Apply Tracker Data* button in the AutoPaint panel. Com-motion automatically applies the recorded stroke on each frame of the clip, following the tracker data as it goes.
13. Now play the clip back and view your results!



Figure 4:104 The Finished Shot

Lesson 11: Using Rotosplines

In this tutorial you will use several techniques to generate mattes and touch up a plate.

- Rotosplines, creating multiple splines for different purposes.
- Painting to the alpha channel directly to create an articulate matte.
- Using the Composite command to preview a composite while painting in an alpha channel.
- Using the Super Clone brush to tweak the final composite to make the shot perfect.

INTRODUCTION

This tutorial will show you how to use one of Commotion's most powerful features, Rotosplines. We'll be using Commotion's painting and compositing tools to create a fast action stunt effect shot., which called for the actor to appear dangerously close to a speeding car. To keep the actor's risk of injury at a minimum, two separate shots were taken: one of the car and one of the actor running. Both shots were taken with a locked off camera on a tripod to ensure that the backgrounds would match perfectly.



Figure 4:105 The Rotosplining Shot

PREVIEWING THE SHOT

Before beginning the project let's take a look at the completed shot. This will give you a better idea of what we are trying to accomplish with this tutorial, and allow you to better understand why we'll take the steps we take to achieve the desired effect.

Open the file named *Stunt Chase (final).mov* in Commotion and play it a few times. Notice that there are two separate movements where the stunt actor passes in front of the car: in the first 50 frames of the shot he runs in front of the car from right to left, and then in frames 50-90 he runs back across from left to right.

In the first instance the actual area of overlap between the car and the actor is very small. Go to frame 9, the first frame of contact between the two. Now move forward to frame 27, the last frame of contact. Slowly scrub back and forth between these two frames and notice how much of the runner actually obscures the car. It's not much, really; basically his waist to his ankles. The amount of screen space taken up by this action is relatively small, too, probably around 150x150 pixels.

Because of these factors we don't have to be as precise as we will when the actor is in the foreground, so we'll create an articulate (hand-painted) matte for his right-to-left movement by painting directly into the alpha channel. Then, in the second part of the shot, when the actor's legs and torso are full-frame, we will use Rotosplines to extract a much more precise matte, thus ensuring a better, more believable composite.

MAKING A SPLINE FOR THE CAR

We've decided to create an articulate matte for the right to left movement of the runner. First we'll create an animated spline to outline the car. Then we'll import that spline into our clip of the actor to use as a placeholder for the car while we paint our articulate matte.

Don't worry if this sounds a little confusing. As we go along you'll quickly see how it all fits together.

ROTOSPLINES

Commotion has two different types of splines: *Bezier* and *Natural*.

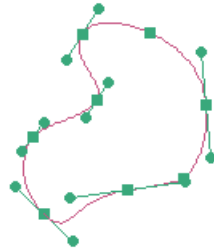


Figure 4:106 Bezier Splines

Bezier splines function identically to their counterparts in such programs as Adobe Photoshop and Adobe Illustrator. Bezier splines are controlled by keypoints and tangent handles. Adjusting these handles controls the intensity of the curvature of an individual point.

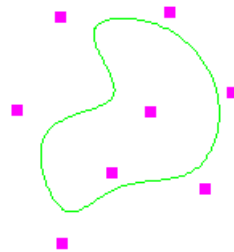


Figure 4:107 Natural B-Splines

Natural splines, otherwise known as B-splines, are defined only by keypoints. The curvature of the spline is determined by how close the keypoints are to one another. While you may not be familiar with Natural splines, they can be significantly easier to manipulate, especially in a

situation where you have a great many points (which can happen a lot in rotoscoping!)

USING NATURAL SPLINES

1. If you haven't done so already, close the open clip. Open *Stunt Chase (BG).mov* and load in at least 15 frames beginning at frame 1. (You're going to be loading in more frames later, so don't max out!)
2. Double-click on the Pen tool to bring up the Rotosplines palette.

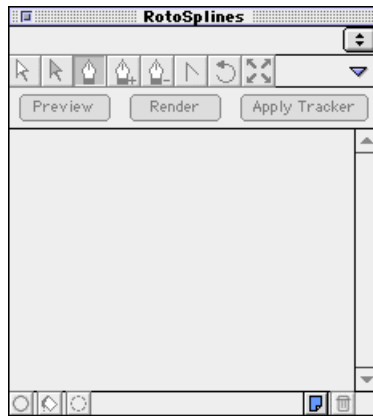


Figure 4:108 The Rotosplines Palette



Look down in the bottom right corner of the window and you will see a small button with a blank page icon in either blue or orange. This is the *New Spline* button. The color of the New Spline button indicates the type of spline it will create: blue for a Bezier spline, or orange for a Natural spline. There are two ways you can change the type of splines you work with. The first is to select *Curve Options* from the popup menu located in the top right corner of the window, which brings up the Curve Options window.

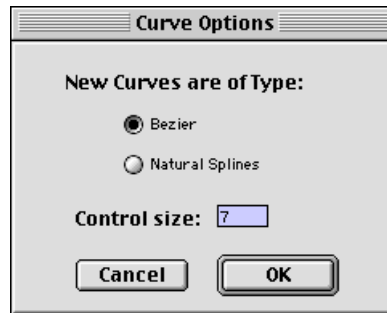


Figure 4:109 The Curve Options Dialog

Here you can select either Bezier or Natural Splines. Alternately you can Option-click on the New Splines button, which will cause it to alternate between being blue or orange in color.

3. Set the spline type to Natural (orange), and click the New Spline button to create an untitled spline.

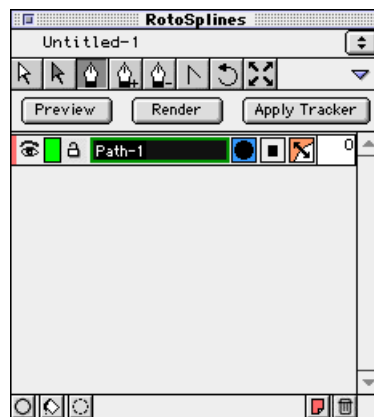


Figure 4:110 A New Spline is Created

The orange border next to the eye icon, on the far left of the spline name, indicates that this spline is a Natural spline. If it were a Bezier spline this border would be blue in color. This feature really comes in handy when working with multiple splines of both types.

You may be wondering about the color box to the right of the eye icon. This is the *Spline Color* box and, as its name suggests, it determines the color of the spline.



Figure 4:111 *Spline Color*

Since we haven't created our spline yet let's leave it set to its default color. Once we have created a spline you can change it to another color if you wish.



4. Okay, now we're ready to actually create a spline. Don't worry about being super accurate here, this is just a test, so you can get the hang of working with Natural splines. First make sure that the Pen tool is highlighted in the Rotospline palette.

Set your clip to any frame you wish. Then, using a series of clicks, draw a spline around the edge of the car. You'll find that you'll generally plot more points with a Natural spline than you would with a Bezier spline, but you will quickly learn to appreciate the greater degree of control.

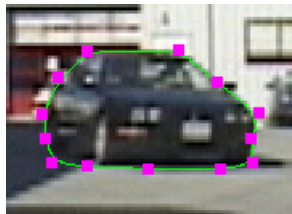


Figure 4:112 *The Outlined Car*

To close the shape, click on the first point you created. If you wish to make an unclosed (open) path, hit the Escape (ESC) key.

5. Select the Pointer tool and manipulate the points on the Natural spline path.

Pick a control point and push or stretch the path in any direction to fit the shape of the car. Get a feel for how the points interact. Marquee-select multiple points and move them all at once. Take a moment or two and play around with the spline to get the hang of it.

THE SPLITTER TOOL

For the most part the tools function identically between Bezier and Natural splines. The only exception is the Splitter tool, which functions a little differently.

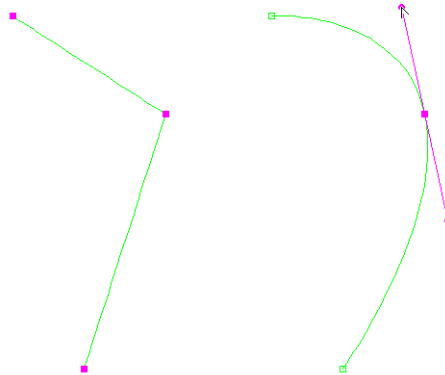


Figure 4:113 Splitter Tool on Bezier Splines

On a Bezier spline, click once on a point with the Splitter tool to activate it, then click and drag to reveal the tangent handles. To remove the handles click once on the point again to return it to its original state.

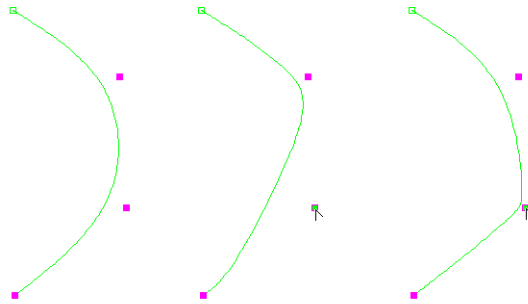


Figure 4:114 Normal, Loose, and Tight

Natural splines, on the other hand, don't require any dragging. Just click to toggle between the three point tension settings: *Normal*, *Loose*, and *Tight*. As you can see, these settings have a great deal of impact on the curvature of the spline. As with Bezier splines you can add and subtract points to Natural splines, keyframe the position of the points to animate the spline over time, and instantly play them back over moving footage to evaluate your work in progress.

CREATING THE CAR SPLINE

Now let's do some real roto work. First we're going to accurately outline the motion of the car. But first let's delete the practice spline you have been messing with. Make sure that Path-1 is highlighted in the Rotospline palette, then click the little trash can icon in the bottom right corner of the window. This is the *Delete Path* icon and it will, you guessed it, delete any selected paths.

1. Set your clip to frame 1. Create a new Natural spline, and using the

spline tools outline the car.

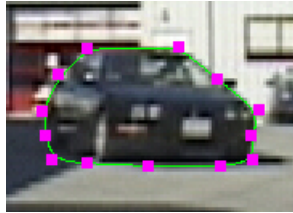


Figure 4:115 Outlining the Car

- Go to frame 50. If frame 50 isn't live, take the Live Frame selection slider in the Player palette and move the range forward so frame 50 is the last live frame.

A progress bar will appear and the new frames will load in.

- Now we want to select all the points on the spline to animate them to the position of the car on frame 50.

There are three ways to select all points:

- Marquee-drag over the whole spline
- Option-click any point on the spline
- Type Command-A.

KEYBOARD SHORTCUT

Command-A
Select All

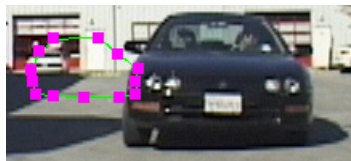


Figure 4:116 The Clip at Frame 50

Once all the points are selected, drag the spline over to where the car is now located by dragging any of the selected points.

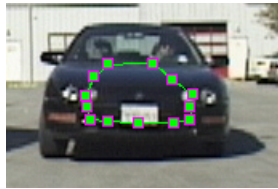


Figure 4:117 Moving the Spline

4. As you can see in Figure 4:117, the car is now larger than the area of the spline. To fix this we're going to scale up the spline to more closely match the outline of the car.



Select the Scale tool from the Rotospline palette. The first thing you need to do is determine the point around which the spline will scale. Click somewhere in the center of the spline to make the selection. Notice that the cursor changes once you have done so. Then drag any of the points to scale the spline. You'll notice it doesn't fit exactly - just make it reasonably close. (If you like you can use the keyboard arrow-left and arrow-right keys to nudge the scale.)

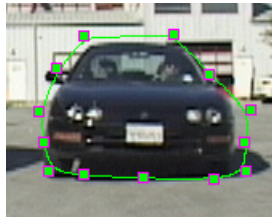


Figure 4:118 The Scaled Splines

5. Then, using the Pointer tool, make fine adjustments to the spline to make it fit around the car.



Figure 4:119 The Adjusted Spline

THE KEYFRAME EDITOR

1. Play the frames you have worked on to review the spline movement. You may notice on frames 20-49 that the spline gets too big too quickly before the car moves into place. You can adjust this by going into the Rotosplines Keyframe Editor which you access by clicking the arrow tab in the upper right corner of the Rotospline palette.

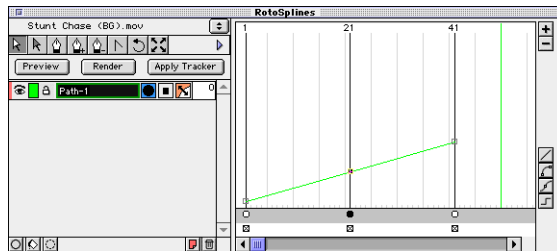


Figure 4:120 The Rotospline Keyframe Editor



2. In the Keyframe Editor you can change the rate of interpolation for the splines. Select the first keyframe by clicking the selection box directly below Keyframe 1.
3. To change the keyframe interpolation type, choose the Easy Curve type from the Keyframe Type Buttons on the right.
4. While the clip is playing, adjust the spline interpolation and get immediate feedback to how that will effect the spline tracking. Adjust the tracking until you get the spline to roughly follow the outline of the car through frames 20-50, but don't worry if it is not perfect.
5. Adjust the matte by adding new keyframes anywhere along the clip; modify a shape and a keyframe will automatically be added.

You should definitely practice using the keyframe editor and setting keyframes until you are comfortable with doing so, as these two tasks are at the heart of getting successful results using roto splines. Once you have done so, and have a good animated Rotospline outlining the car, you can save it out for use the second part of this tutorial. In the

interest of time, however, we have provided a completed spline for you to use instead.

PAINTING A MATTE

Before we begin this section, go ahead and close the car clip you have been working in. Then go to the Rotospline palette, and with Path-1 highlighted, click the trash can icon in the bottom right corner of the palette to delete it.

1. Open the file *Stunt Chase (FG).mov* and load in as many frames as possible.
2. From the pulldown menu in the Rotospline palette, pick *Load Single Path* and choose the file *Car Path.spline*.
3. Play the clip. The spline you created in the car clip is now being used as a placeholder in the actor clip. If you like, press F1 to toggle the visibility of the keypoints to *Off*. Notice where the actor and the car spline paths cross between frames 9 and 27. Using the car path as a guide you'll create a matte of the actor in this clip's Alpha channel.

KEYBOARD SHORTCUT



Option-O

Toggles Overlay On and Off

Option-3

Paint Alpha

The next step is to paint into the Alpha channel while viewing that Alpha channel overlaid with the RGB channel. There are three ways to set these modes:

- Click the mode buttons at the bottom of the Clip window
 - Type Option-O to overlay the matte
 - Type Option-3 to paint on the Alpha channel
4. Select the brush tool and black as your foreground color. Since the background is the same in both shots, rough strokes can be used to paint the actor's matte.

The car spline will serve as a guide to where you need to be precise along the edges of the matte you are painting. (The overlaid alpha is shown here as red.)



Figure 4:121 Painting the Matte

5. You can also look at your matte while you paint it by hitting command-4.



Figure 4:122 Viewing the Matte

Notice in Figure 4:122 how the matte areas inside the car spline are very precise, while the areas outside the spline are more sloppy and quickly-drawn.

6. You will only need to paint accurate edges from frames 9-27; from frames 1-8 and 28-50, paint a sloppy quick matte. Remember to paint the actor's shadow as well, since you will want to composite it into the final shot.

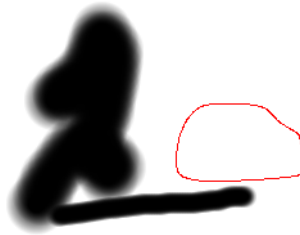


Figure 4:123 *The Sloppy Matte*

PERFECTING THE MATTE EDGE

The alpha that you just painted should be checked. We'll use Compton's composite command to do a preview of the composite, and we'll tweak the matte edges and see how they affect the composite.



1. Set your View Mode so that you are viewing only the RGB channels.
2. Load frames 15-25 of the *Stunt Chase (BG).mov* file.
3. With the *Stunt Chase (FG).mov* clip active, option-click on the Composite Button in the clip window, or select *Composite* from the Calculate window.



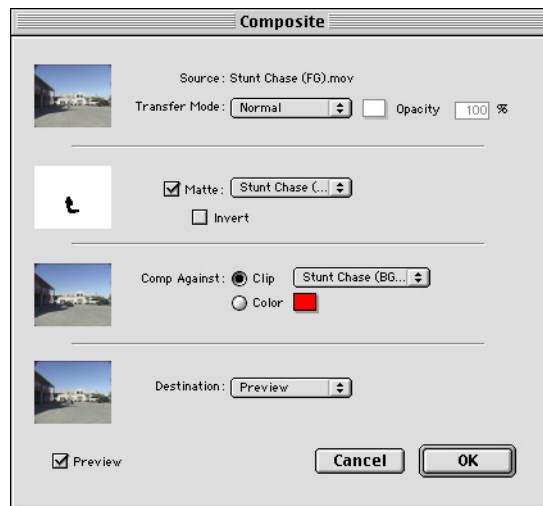


Figure 4:124 The Composite Dialog

In the Composite Window, assign the following settings:

- Leave the Transfer Mode set to Normal.
- Click the checkbox next to Matte, and select Source Image from the popup menu.
- Set Comp Against to Clip and choose *Stunt Chase (BG).mov* from the popup menu.
- Set your Destination to *Preview*.
- If you like, click the Preview checkbox in the lower left corner of the window to see a preview of your composite.

You will now see your foreground clip composited against the background clip using the alpha you have painted. With your paint mode set to Alpha (Option-3) you can continue painting with black or white ink into the alpha, and get immediate feedback on how the composite will look.

ROTSCOPE USING MULTIPLE SPLINES

Commotion has the ability to create multiple splines, and for the next section this is exactly what we're going to do. For complex, moving shapes (such as our runner) using more than one spline offers a much more flexible solution than trying to create a single master shape with one spline only. When you have multiple splines, (think of them as a stack of layers, with one spline on each layer, with the first spline being on the top layer,) you can adjust the stack order of the splines in the Rotospline palette.

1. With the *Stunt Chase (FG).mov* clip, move your Live Frame range to include frames 50-90 (or as many of these frames as possible).
2. To continue the matte you painted by hand up to frame 50, make a *garbage matte* of the actor using a Natural spline. Create a rough outline of his entire body on frame 50, then move to frame 60 and make another shape. Check the interpolation from 50-60 to make sure the shape never touches the actor's body.



Figure 4:125 Frames 50-60

Once the actor intersects the car mask for the second time (frame 60) you will want to make precision mattes for every part of the actor's body that come in contact with the car matte. For this exercise we will use multiple splines to achieve the tightest mattes.

3. Start off by making a rotospline for the actor's left thigh using a Natural spline.

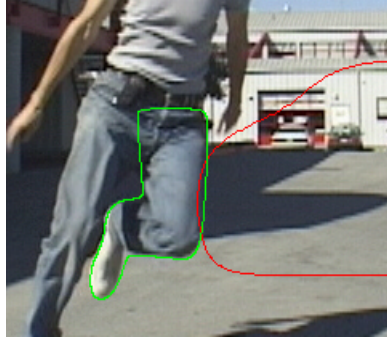


Figure 4:126 The Leg Spline

You can use a combination of Natural and Bezier splines if you like. You'll want to maintain as much precision as possible when the actor's legs are overlapping the car.

Using the Keyframe Editor you can turn mattes on and off at specific frames, so that you can transition mattes in/out as needed. For example, you can use a garbage matte for 10 frames, then have it disappear.

4. To complete the rotospline work we have included the rest of the splines you would make for the actor's movements. Load the splines called *actor.splines* into the clip from the Rotospline option pulldown menu. Notice that several splines were used for the actor's right leg, but only one spline was used for the left leg. The splines below the torso are very precise, while the upper body and head are less accurate (since the sky edge is the same in both clips).



Figure 4:127 The Actor's Splines



To view or hide all of your splines Option-click on one of the Hide/Show spline icons

5. Pressing F15 or hitting the Preview button lets you see a preview of the mattes.

If you wish, experiment with using edge feathering and/or motion blur with the splines.

(For more information see The Rotospline Palette on page 289.)

6. Click the Render button and select *To Alpha of Current Clip*. This renders the grayscale matte to the alpha channel of the current clip.

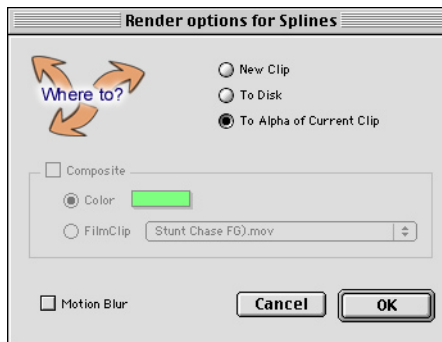


Figure 4:128 Spline Render Options

COMPOSITING THE CLIPS

1. If it is not already open, open *Stunt Chase (BG).mov*.
2. To composite the clips together for the final effect, once again bring up the composite dialog from under the Calculate menu.

Commotion's Composite command is capable of this type of direct foreground/background composite. Puffin Designs, however, recommends Adobe After Effects, an excellent compositing software package.

3. In the Composite window set *Stunt Chase (FG).mov* as your foreground and *Stunt Chase (BG).mov* as the background. Use the same settings as you did before. When you are ready to render the composite, choose *Flatten* as your destination.

FIXING PROBLEMS WITH SUPER CLONE

For this last portion of the lesson you can either use the clip you have composited or you can use the clip called *Stunt Chase (near final).mov* that we have provided for you. (If you use your own clip be sure to change the file name to something other than *Stunt Chase (FG).mov*)

1. Now that you have one complete clip to work with you can look for imperfections that may have occurred. Go to frame 63 and notice that the actor's shadow cuts into the car's shadow due to an oversight on the rotoscoping.



Figure 4:129 The Shadow Error

2. Go to frame 73 and you will notice the actor's leg blocks out the image of the car incorrectly.



Figure 4:130 The Leg Error

3. Choose the Super Clone tool from the tool palette. In the Super Clone window make *Stunt Chase (BG)* be your clone source. You only need 1 frame loaded from the *Stunt Chase (BG)* plate (load frame 1); as additional frames are needed they will be loaded automatically by the Super Clone Brush.
4. Now you can paint in the shadow for the car. You will want to do touch ups for frame 73 so change your absolute frame to 73 and paint the car back into the shot.

Lesson 12: The FX Brush

This tutorial will take you through the steps necessary to create and use the FX Brush.

BEFORE WE BEGIN

It is important to note that as soon as you make any changes to an existing brush, a *new* brush is created. You must save this brush in order to keep it; otherwise those settings will only be saved until you select a new brush. If the brush is not saved at this point, you will lose it.

To save an FX brush:

1. Shift-click on a blank brush space in the bottom of the Tool Options palette.

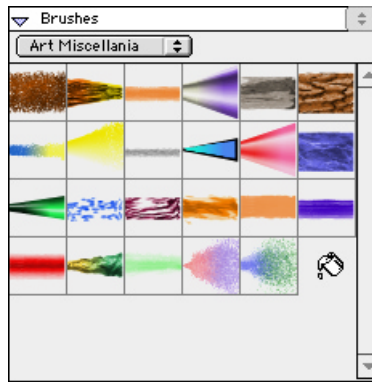


Figure 4:131 Shift-Click to Add a Brush

The cursor becomes a paint bucket. When you click the blank space the Save FX Brush dialog comes up.

2. Create a name for your brush.



Figure 4:132 The Save FX Brush Dialog

3. The new FX Brush is added to the Brushes palette.

CREATING AN FX BRUSH

1. With black as the background color in the Tool Options palette, create a new clip:
 - 640 x 480
 - 30 frames.
 - Save it as a Quicktime movie: Animation compressor, Best quality.

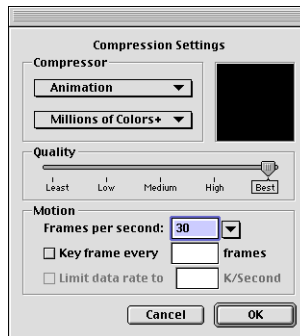


Figure 4:133 QuickTime Settings



2. Choose the FX Brush in the Tool Palette. It does not matter which brush is selected.
3. In the Brush Controls, choose *Settings*. This brings up the FX Brush Settings window, which is where you will build your FX Brush.



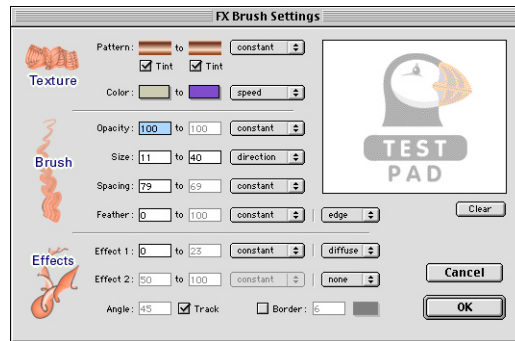


Figure 4:134 FX Brush Settings Window

4. Click on the tile to the right of the word *Pattern*. This brings up a load dialogue.
5. Go to the *Lesson 12* folder on the Commotion 2.0 CD and load the file *tube.pict*. This texture is what we will base the brush on.

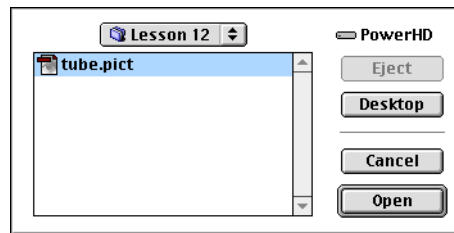


Figure 4:135 Load tube.pict

6. Make sure the popup menu next to the second pattern reads *Constant*.

Constant means the brush will only use the first pattern. This is an important concept for FX Brushes, as it is true for all the parameters. With any setting other than Constant, the parameter will ramp between the two settings. This ramp effect can be based on four parameters:

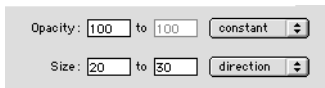
- Speed
- Pressure

- Direction
- Tilt

If you have an Wacom Intuos or Art Pad tablet, you're able to use all four parameters, including *Pressure* and *Tilt*. If you only have a mouse, don't worry; you can still use *Direction* and *Speed* to ramp between parameters.



7. Check the *Tint* checkbox and click on the color box below it and select a deep blue color.
8. Next move down to the Brush section. Next to Opacity, lets set it to 100% and *Constant*.
9. Now set the Size to 20 in the first box, 30 in the second. Set the pop up to *Direction* for a mouse; if you have a tablet, feel free to experiment with *Pressure* or *Tilt*.



The pop up must be on something other than Constant to choose a second parameter.

10. Now move the cursor over the scratch pad and paint a little. Experiment with your stroke, based on what parameter you chose, to see the Size ramping from your first setting to your next. Clear the scratch pad.

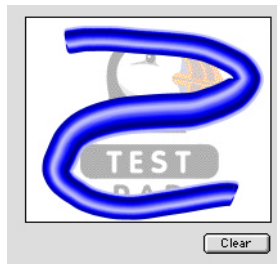


Figure 4:136 Testing the Brush

11. Make sure the Spacing is set to 100/Constant.



12. Lets ramp the Feather from about 50 to 100, and have it also base itself on Direction. If you set up a different parameter earlier you may want to set this to the same one, essentially *locking* the effects together as you paint. Go to the scratch pad and paint. If its not feathered enough for you, then set the first Feather number up. Now paint again to see the change. Set to the *Edge* type of Feather. If you want to see what the other types of Feathering do, simply select each of them and paint on the scratch pad, clearing it each time.

13. Now to the *Effects* section. This is where we can have some fun. Set the first parameter to about 25 and leave on *Constant* for now. Scroll through each of the effect popups, painting each time. Get a feel for what each of these do. *Diffuse*, *Bleed*, *Spin*, and *Shake*. They are each their own animal, so take some time and get a feel for each one. Once done, lets leave this brush on *Shake*. Set the first value to 10, and the second to 35. Have it ramp based on *Speed*. Lets leave the second Effect option off for now, but we encourage you to experiment with two effects on a brush.

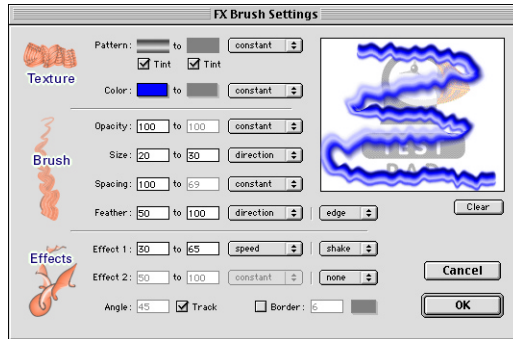
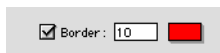


Figure 4:137 Brush Settings

14. To see what *Track* does, check and uncheck Track and paint in the scratch pad. When done, lets leave it off to get more of a *writing* look, as we want our brush to look like it being written.



15. Lets also set a Border. Making sure it is checked, leave the default value to 10, click on the color box and select a bright red.

16. Now take a last pass at the scratch pad to make sure your brush is painting the way you desire. Once it is, click *OK* to go back to the Clip.

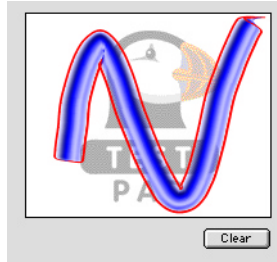


Figure 4:138 Final Brush Test



17. Immediately Save your brush by Shift-clicking on an open space in the Brushes section of the Tool Options palette
18. Now its time to use the FX Brush, choosing from one of several ways to paint inside Commotion. Paint frame to frame for the most precise effects. Stroke splines to create some different looks with the FX Brushes, and to automate the process. Or, use AutoPaint!

AUTOPAINT

1. Turn on Record in the AutoPaint section.
2. Paint a *write-on* effect—a word or name—on the first frame. Turn off Record and Revert the current frame.
3. Select the *Animate Playback* button in the AutoPaint section, making sure the selection range in the Player palette is from frames 1 to 30.
4. Hit Play after the stroke is animated and watch it play back!

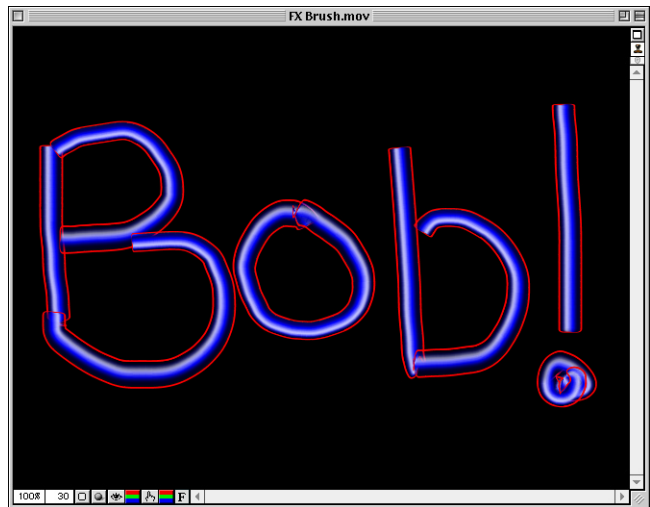


Figure 4:139 The Completed Write-On

5. We could stop here, but to really give it some life, let's build this up with a few more brushes. Go to the *Lighting* FX Brush set and choose the strangely-named *Blue Flare* brush.

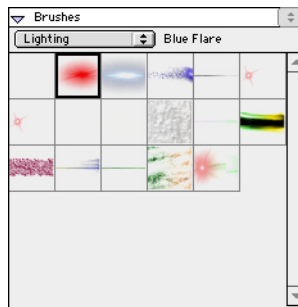


Figure 4:140 Choosing Blue Flare

6. Turn on *wiggle* and open the Wiggle Settings under the pulldown menu. Set both vertical and horizontal to 1. Set the *Brush Size* to 110 and the *Spacing* to 92. Now click Animate again. This will add a sparkly glow in front of our write on.

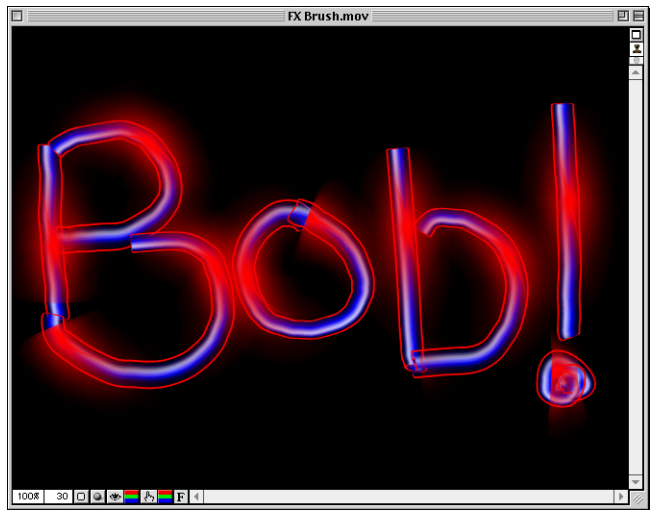


Figure 4:141 Sparkly Glow

7. Select an FX Brush of your choosing and write it over the top of the clip.
8. Congratulations!

Lesson 13: Electric Image 3D Pan and Tilt

This Lesson details exporting 3D Pan and Tilt motion data from Commotion into Electric Image Animation System in order to create a classically fake UFO shot. This tutorial is only of benefit to users of both Commotion and ElectricImage. You can find information on the Electric Image Animation System at <http://www.electricimage.com>.



Figure 4:142 The Project

ENCOUNTER AT FRONT ROYAL

By John Sledd

Compositing 3D artwork with preshot film or video footage is among the most valuable postproduction tricks in the book. While wonderful examples of this technique are plentiful, there is one problem that still plagues artists who work on such projects—camera motion matching, commonly referred to as *matchmoving*.

If you really take a look at many of these composites, there is often very little, if any, camera movement in the preshot footage. The reason for this is that it's just damn difficult to match the motion of your 3D application's virtual camera to the motion of the real-world camera. I've read

a bit about rigs that will record and store their motion for import into your 3D application, but these are not exactly mainstream solutions yet.

Thankfully, much of the work involved in this motion matching doesn't have to be quite so difficult anymore thanks to Commotion's *3D Pan and Tilt* data export feature. As a matter of fact, it's almost *too* easy.

I designed the following project to illustrate the power of this feature. Sure, I could have used a better-quality, more professional-looking project, but what better way to test a tracking feature than by trying track the jerky haphazard flailings of the average weekend crappy-camcorder warrior, caught up in the excitement of filming his first UFO?

OK, so maybe I didn't have a choice about the jerky haphazard part... or the crappy camcorder part either, but you get the idea.

THE LESSON

Basically what we're going to do here is open some source footage in Commotion, track an area within this footage, and then export the tracking information. We will then use this information to *stabilize* our 3D elements in ElectricImage, so they appear to be part of the video footage instead of dancing around on top of it. You will need either ElectricImage 2.9 or an earlier version with Biovision Import enabled. This tutorial was created with 2.9 so if you want to use the project files, you will need EI 2.9. Besides, it's just a great version so you should have it anyway.

With that said, let's move on.

SETTING UP THE PROJECT

1. Give Commotion as much RAM as you can spare.

For this tutorial, it doesn't really matter if you can view the entire clip at once. It'll help you preview the effects of the tracking at the end but that's about it. The tracking function will go through all of the frames whether they are live or virtual. I gave Commotion 175 megs which was

slightly more than I needed to keep all of the frames live. If you don't have 175 megs to spare, don't worry about it. Just give it what you can.

2. Launch Commotion, and open the clip called *Saucer Source.mov* from the Source Files folder. The Load Frames dialog appears.

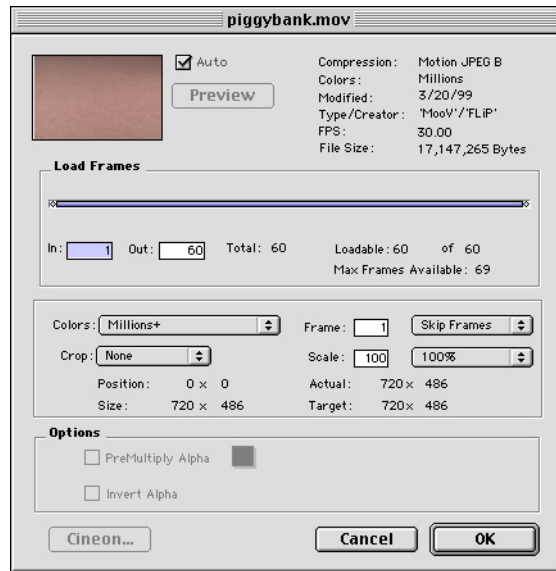
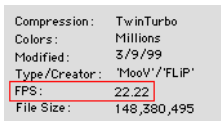


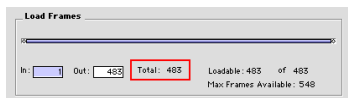
Figure 4:143 The Load Frames Dialog



Take a moment and inspect the clip information at the top right of the dialogue box and note the frame rate of the clip (FPS.) Commotion really doesn't care about frame rates, only frame numbers, but you'll need this information in EI to keep things the proper speed when we do our composite.

3. Make a note that this clip is 22.22 fps. (I know that's a strange number but it's what the Apple Video Player gave me when I captured this footage on my 8500, so I just left it alone. This is supposed to be a budget production anyway, right?)

4. So now let's move down to the Load Frames section, located in the middle of the screen in Figure 4:143. Right beside the note you took



about the 22.22 FPS, (you *did* write that down didn't you?), jot down the total number of frames: 483.

5. Commotion will automatically offer to open as many frames as possible so just accept the defaults here and click *OK*. The rest of the settings should be fine.



6. When the clip opens, click the Play Forward button as shown in Figure 4:144, or simply hit the space bar. Check out the bouncy motion of the clip.

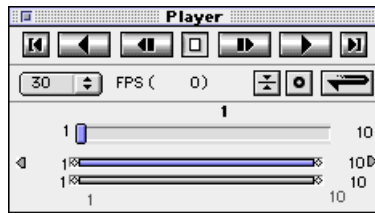


Figure 4:144 The Player Palette

7. It'll probably be playing a bit fast, which doesn't really matter for this tutorial, but if bothers you, click on the FPS pop-up menu in the top left corner of the Player Palette (Figure 4:144) and select the *VAR* option. This brings up the Speed dialogue (Figure 4:145.)



Figure 4:145 Variable Speed Dialog

8. Enter 22 and click *OK*. Why not 22.22 as we wrote down earlier? Because Commotion does not support decimal places for frame rates.

This is not an issue, though, since you'll probably never again be working on such a goofy frame rate; just let it ride and let's move on.

TRACKING THE MOTION

Next we're going to track this bouncy motion so we can eventually apply it to our camera in EI. I chose the location of this particular shot for the big smoke stack in the background. I thought it would be make a good trackable object, which it did. Okay, let's get tracking!

1. To track the stack, we first need to open the Motion Tracker palette. There are three ways to do this:

- Select *Motion Tracker* from the Windows menu
- Press Shift-F8
- Double-click the Motion Tracker tool in the Tool palette.



Once you do this, the Motion Tracker palette appears.

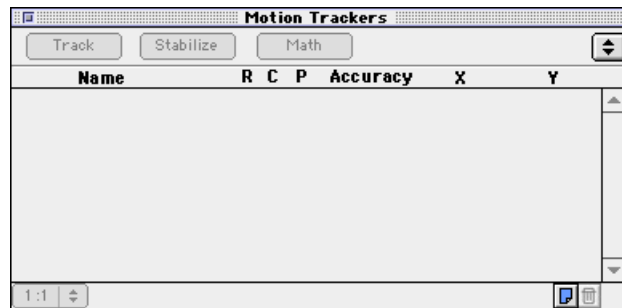


Figure 4:146 The Motion Tracker Palette



2. To add a tracker, click on the New Motion Tracker Button at the bottom of the Motion Tracker Palette. This will add an item to your Motion Tracker palette called *Track-0*. If you'd like to rename this tracker to something else, simply double-click on it and type a new name in the dialog box.

3. When you created the tracker it also added a couple of blue boxes to your Clip Window, as seen in Figure 4:147.

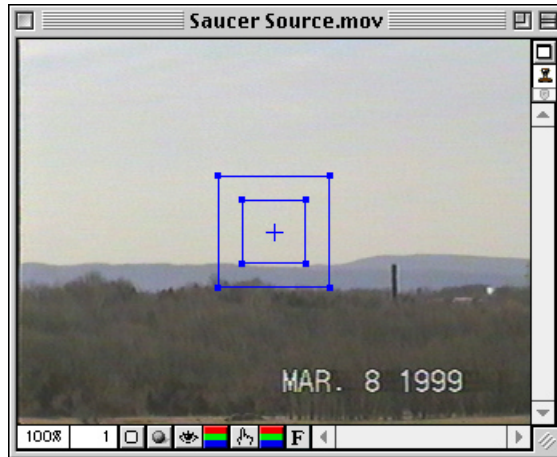


Figure 4:147 The Default Motion Tracker Regions

About these two blue boxes:

- The inner box is the *Track Target*. It tells Commmotion what to track.
- The outer box is the *Track Region*. It tells Commmotion how far around the tracked object to track it between frames.

This does not mean that the track region has to be as big as the total area that the stack will travel; it simply means that it needs to encompass the area that the stack will travel between any two given frames. If the Track Region is small and the stack moves slowly, you should be fine, but if the stack moves abruptly and travels outside of the Track Region, you will lose the target. (I made this mistake the first time around with this project, so let's try not to do it this time.)

4. Our goal for this step is to set up the Track Target to tell us exactly what to track, and set the Track Region to encompass the largest range of motion between any two frames (but not too big, if you can help it.) If you set your Target and Region up as shown in Figure 4:148, you should be fine.

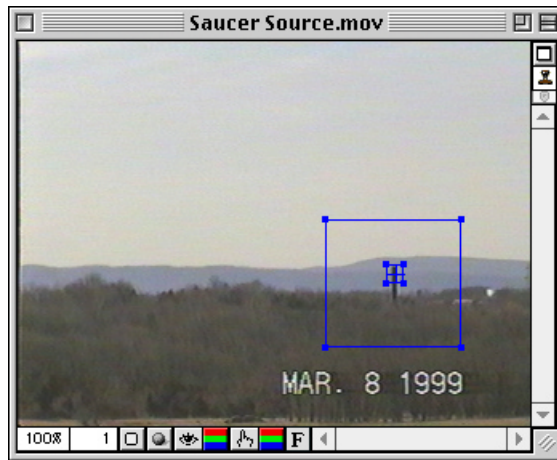


Figure 4:148 The Tracked Region

5. With that set up, simply click on the Track button at the top of the Motion Tracker palette. The Track Options dialog appears.

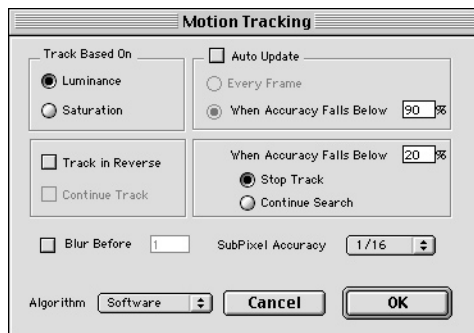


Figure 4:149 Track Options Dialog

6. For this project we're just going to use the default settings, so click *OK* and watch the magic. At this point your two blue boxes should be replaced by a crosshair, which should follow the smoke stack throughout the animation.

While you are waiting for the object to be tracked, I should point out that typically it's a good idea to make sure that your tracked object

doesn't leave the frame, or be obscured by other objects in the scene. For this tutorial, however, the tracked object does move off-screen at the end, but since it's at the end, it doesn't really matter; the important part is already taken care of. So, when your crosshair gets lost at the end, *don't worry*.

If it gets lost anytime before the end, however, it's probably an indication that you need to make your Track Region larger. There are a couple of places where the stack moves a good distance between frames, and if it moves outside of the Track Region the crosshair will just freak out and start wandering around.

If you do lose your track, you have two options:

- Just enlarge your Track Region and track the stack again
- Load the file called *stack.tracker* from the Cheater Files folder. It contains the exact tracker I used for the tutorial.

OK. We'll assume you've either successfully tracked the stack or wimped out and used mine. Either way, we can now move on.

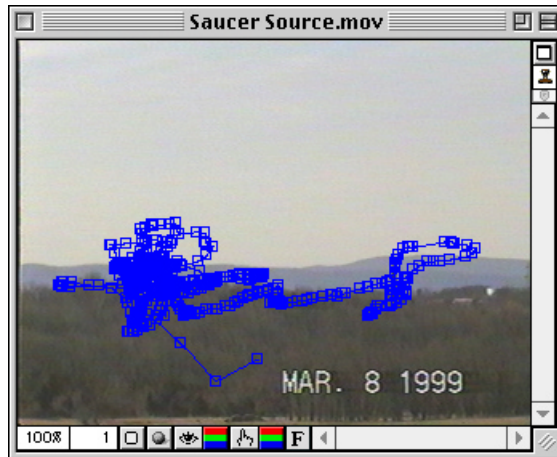


Figure 4:150 The Completed Track

Once you're done tracking the stack, you should wind up with a nice motion path as shown in Figure 4:150. This is the info we're going to export to Electric Image.

EXPORTING THE DATA

1. To export the tracking info as data that EI will understand, choose *Save All Trackers* from the Motion Tracker palette's pop-up menu.

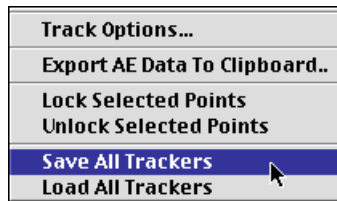


Figure 4:151 Save All Trackers

2. Name the file something creative like *My Stack Tracker* and choose *3D Pan and Tilt* from the pop-up menu.

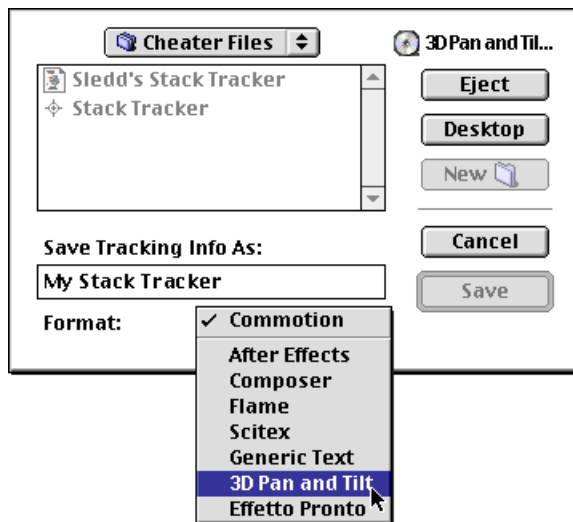


Figure 4:152 Exporting the Data

Once you do that, the *Export to 3D* dialogue will appear.



Figure 4:153 Export to 3D Dialog

3. All of your settings should be the same as in Figure 4:153, but if they aren't, change them to correspond and click **OK**.

Now you should get another 3D Tracker Export dialogue asking you for your camera's Horizontal Field of View (FOV). This should be the same as both your EI Camera's FOV and your original shooting camera's FOV.

4. Enter 36.8699 in this field. This is what I used for this particular tutorial, and it also happens to be EI's default FOV. If you're doing this for your own project, you should take notes on these settings from your shooting camera.

Congratulations! We're now done with our tracking and exporting. Quit Commotion and open EI (or just open EI if you have the RAM,) and let's proceed to the next step.

SETTING UP THE EIAS FILE

I've already done most of the work on the ElectricImage project file for you. (I'm already on page nine of this tutorial and I don't want anyone

falling asleep on me.) Besides, I figure you probably already know how to set up an EI project, so there's no sense in a rehash.

1. Open EI and open the project file called *No Track.eias* in the Project Files folder. This may take a moment to open, so don't freak out if it looks like your computer locked up for 30 seconds or so.

This is our saucer project all set up with one main thing missing—our motion data. The background is shaking around like crazy and our camera is stationary. If you rendered this project right now, it would look like a bad 60s sci fi f/x shot. To see what I mean, check out *No Track.mov* in the Finished Movies folder.

The goal here is to use the motion data we just got out of Commotion to control our camera which will, in turn, match our 3D motion to our live-action footage. This is almost as easy as easy gets but there is one huge thing you have to pay attention to first and that is the FPS setting in EI.

2. Pull up the Render Info Window by typing Command-R, and click on the *Timing* tab.

EI defaults to an FPS of 30, and since our footage was recorded at 22.22 fps, this will cause problems when importing the motion data. Why? Because the motion data comes in as custom frames, and the frame counts must match up for this to work.

A 21.7 second animation at 30 fps creates 652 frames, while the same animation at 22.22 fps creates 483 frames. (483 just happens to be the number of frames of our source footage I asked you to write down earlier.) The frame count must always match with the motion data frame count for custom frames to work properly.

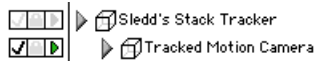
3. So, without beating this into the ground anymore than we have to, change the FPS to 22.22 and your number of frames should automatically change to 483.

Now we're ready to import our data.

IMPORTING THE MOTION DATA

1. Let's import our motion data by choosing *File>Add>Motion Data*. Navigate to the 3D Pan and Tilt file we created earlier. (You were supposed to call it something like *My Stack Tracker*.)

You can also use *Sledd's Stack Tracker* in the Cheater Files folder, if you're feeling lazy and just skipped the first part of this tutorial.



2. Once you find your file, click *Open* and choose *Yes* for all four dialogue boxes you are presented with. What you'll wind up with here are two effectors in the center of your scene. The parent effector controls the position of your motion data and the child effector controls the actual pan and tilt data.

Now all you need to do is apply this data to your camera and you're done.

3. To apply this data to your camera, open up your Camera Info window (Figure 4:154), and the Effector Info window for the parent effector (Figure 4:155).

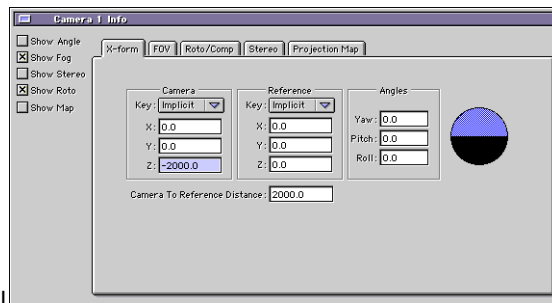


Figure 4:154 The Camera Info Window

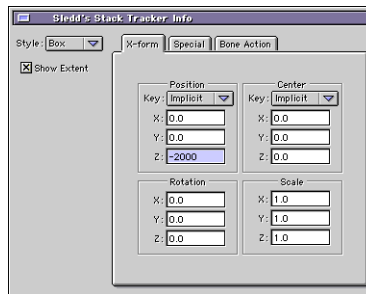


Figure 4:155 The Effector Info Window

4. What you'll want to do here is copy the Camera's position info into the Effector's Info Window. Since I've kept this scene pretty simple, the Camera is positioned at 0,0,-2000. All you really have to do is enter a value of -2000 in the Effector's Z position field. This will position your effector in the same space as your camera.
5. With that done, simply link your camera to your newly imported motion data's child effector as shown in Figure 4:156.



Figure 4:156 Linking the Camera to the Motion Data

6. And that's it!

If you've set everything up correctly, you should now be able to render and get a movie very similar to Encounter.mov, which you can find in the Finished Movies folder.

Now if you're trying to get the Men In Black interested, I'd suggest adding things like shadows, motion blur and sound, but at least you'll have a good start on getting the motion right.

END NOTES

Since I really pretty much glazed over the setup of the EI file, I wanted to point out a few things that might make your life easier when you go to work on your own file.

Know your camera distance:

For starters, it's a good idea to know how far away your camera was from your target object so you can be more accurate with your sizes and distances. If you can get that data directly from the source that is certainly the best way, but this often won't be the case. In this instance, I had no idea how far away I was from the smoke stack. I guessed at about 1/2 mile, but to test that theory, I took another approach.

- I decided to take a guess at the diameter of the stack. My guess was about 20 feet, so I added a standard shape sphere to the project with a radius of 10 units. This gave me a sphere that was, supposedly, the same diameter as the smoke stack. From here, guesstimating the distance of the camera to the stack was a breeze.
- Since I hadn't moved the camera, the sphere was directly in the middle of the camera view window. I simply dollied out until my sphere was about the same size as the smoke stack. That gave me a good estimate of right around 2000 units (which I was using as feet,) so I just evened it off at -2000 on the Z axis.
- Once I had the distance down, I changed the sphere to be 400 units in diameter, did my actual data import and linking, and used a stationary sphere to test the motion of the camera and make sure everything was synching up properly. You can see this test render by checking out *Still Sphere.mov* in the Finished Movies folder.
- After that, I used the sphere to map out my animation path and fog level for the saucer and did another test render. Only after I was happy with the motion and the fog level did I import the saucer, line it up with and link it to the sphere. I then turned the sphere off and rendered the final animation.

This project used a very simple scene layout with a completely straight forward camera shot to keep the complexity down, but it doesn't have to be that way.

If you require a more complex angle for your camera position:

- Position the camera for your shot using the background image as reference
- Once you are happy with the position of the camera, send the effector to the camera's position
- Link the camera to the effector. All motion from that point will be based on the camera's current position and rotation.

And that's the end of our 3D Pan and Tilt data tutorial. Good luck!

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