KRONOS

AFTER EFFECTS USER GUIDE

VERSION 5.0V3

Kronos User Guide

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Contents

1 INTRODUCTION

Welcome to this User Guide for Kronos 5.0 on After Effects.

We hope you enjoy using the Kronos and MotionBlur plug-ins.

Note *Kronos 5.0 on After Effects contains both the Kronos and MotionBlur plug-ins in a single package. Kronos can be used to add motion blur, but for ease of use, MotionBlur is also supplied as a stand alone plug-in.*

About this User Guide

This User Guide tells you how to install and use Kronos 5.0 on After Effects. This guide assumes you are familiar with After Effects and the machine it is running on.

For the most up to date information, please see the Kronos product pages and the latest user guide on our web site at http://www.thefoundry.co.uk.

Release Notes

For information on system requirements, new features, improvements, fixed bugs, known bugs and workarounds, see "Appendix A: Release Notes" on page 43.

Example Images

Example images for use with the Kronos plug-in can be downloaded from our web site http://www.thefoundry.co.uk.

Installing Kronos

Please note that installing Kronos 5.0 will effectively overwrite any other versions of Kronos that have been installed to the default location.

On Windows

Kronos 5.0 is distributed as a software download from our web site at http://www.thefoundry.co.uk. To install Kronos on a computer running Windows, follow these instructions:

1. Download the correct installation file from our web site at www.thefoundry.co.uk.
2. Unzip the file and double-click on the EXE file to launch the installer. Follow the on-screen instructions to install Kronos.

On Mac

Kronos 5.0 is distributed as a software download from our web site at http://www.thefoundry.co.uk. To install Kronos on a Mac, follow these instructions:

1. Download the correct installation file from our web site at www.thefoundry.co.uk.
2. Double-click on the downloaded DMG file.
3. Double-click on the PKG file that is created.
4. Follow the on-screen instructions to install Kronos.

Licensing Kronos

You can licence, or activate, Kronos in one of two ways:

- **Licence Key**—a sequence of numbers and letters stored in a plain text file that unlocks Kronos.

  Using FLEXlm encryption, licence keys can be created for a particular computer enabling the software to run only on that computer. These are called node locked licences. We also supply floating licences that will unlock Kronos on any computer networked to a Foundry Licensing Tools (FLT) server.

  Here is an example node-locked (uncounted) licence that expires on 31 July 2010 for a computer running Kronos with a System ID of 00123fdb9e9f. Node-locked licences allow you to run Kronos on one machine only.

  ```
  INCREMENT kronos_ae_i foundry 1.0 31-jul-2010 uncounted \
  HOSTID=00123fdb9e9f ISSUED=30-jun-2010 TS_OK SIGN="030A 5EB4 \
  FC11 3D9C B47F 3C03 6AEE 88A5 3338 ADB9 6E00 BE55 FC97 6021 \
  7AAF 82CD D2F3 3833 E5D8 4CED A3CD"

  INCREMENT kronos_ae_r foundry 1.0 31-jul-2010 uncounted \
  HOSTID=00123fdb9e9f ISSUED=30-jun-2010 TS_OK SIGN="00C2 EE6A \
  9BBF EE0C FA43 45EB 282C 10B7 47FA 4FE3 8C01 FF47 7A39 F35E \
  8E65 8D65 7C52 3B07 E1A3 F39F 70D5"
  ```

  FLT tools and a user guide to install licence keys, manage floating licences, and diagnose licence problems can be downloaded from our web site, http://www.thefoundry.co.uk/licensing.

- **Activation Key**—a series of numbers and letters emailed to you that activates Kronos.

  Here is an example activation key:

  ```
  krae-0101-3733-eeda-8376-df83-7235
  ```

  To authenticate Kronos from the After Effects user interface:

1. Click the **Activation** button. See "Basic Controls" on page 15.

   You are automatically directed to The Foundry web site log in page.

Note *If you're logged in already, skip ahead to step 3.*

2. Log in as normal, or sign up if you do not have a log in ID and password.

   The **Product Activation** page displays.
3. Enter the activation key that was emailed to you in the first field provided.
4. Enter your System ID in the second field.

   It is very important to check the System ID matches your machine before continuing, as Kronos will only be licensed to the computer identified with this unique number.

Note *You can display your System ID by clicking on the **About** button of The Foundry plug-ins running on After Effects.*

5. Click **Create Licence Key**.

   You will receive an email containing the on-screen information.
6. Follow the on-screen instruction to install the Licence Key.

Other Foundry Products

The Foundry is a leading developer of visual effects and image processing technologies for film and video post production. Its stand-alone products include Nuke, Hiero, Mari, Katana, and Storm. The Foundry also supplies a suite of plug-ins, including Ocula, Furnace and FurnaceCore, Keylight, RollingShutter, Kronos, and CameraTracker for a variety of compositing platforms, including Adobe® After Effects®, Autodesk® Flame®, Avid® DS™, and Apple's Final Cut Pro®. For the full list of products and supported platforms, visit our website at http://www.thefoundry.co.uk.

Nuke is an Academy Award® winning compositor. It has been used to create extraordinary images on scores of feature films, including *Avatar, District 9, The Dark Knight*, *Iron Man*, *Quantum of Solace*, *The Curious Case of Benjamin Button*, *Transformers*, and *Pirates of the Caribbean: At World's End.*

Hiero is a collaborative, scriptable timeline tool that conforms edit decision lists and parcels out VFX shots to artists, allowing progress to be viewed in context, and liberating your finishing systems and artists for more creative tasks.

Mari is a creative texture-painting tool that can handle extremely complex or texture-heavy projects. It was developed at Weta Digital and has been used on films, such as *District 9*, *The Day the Earth Stood Still*, *The Lovely Bones*, and *Avatar*.

Katana is a look development and lighting tool, replacing the conventional CG pipeline with a flexible recipe-based asset workflow. Its node-based approach allows rapid turnaround of high-complexity shots, while keeping

artists in control and reducing in-house development overheads. Extensive APIs mean it integrates with a variety of renderers and your pre-existing shader libraries and workflow tools.

Ocula is a collection of tools that solve common problems with stereoscopic imagery, improve productivity in post production, and ultimately help to deliver a more rewarding 3D-stereo viewing experience.

Furnace and FurnaceCore are collections of film tools. Many of the algorithms utilise motion estimation technology to speed up common compositing tasks. Plug-ins include wire removal, rig removal, steadiness, deflicker, degrain and regrain, retiming, and texture tools.

Keylight is an industry-proven blue/green screen keyer, giving results that look photographed, not composited. The Keylight algorithm was developed by the Computer Film Company who were honoured with a technical achievement award for digital compositing from the Academy of Motion Picture Arts and Sciences.

RollingShutter is a plug-in that tackles image-distortion problems often experienced by users of CMOS cameras. The plug-in will often vastly improve the look of distorted footage, by either minimising or eradicating image distortions. Unlike solutions tied to camera stabilisation, that stretch the image as a whole, the RollingShutter plug-in compensates for local skewing and distortion in the scene, by correcting each object individually.

Kronos is a plug-in that retimes footage using motion vectors to generate additional images between frames. Utilising NVIDIA's CUDA technology, Kronos optimises your workflow by using both the CPU and GPU.

CameraTracker is an After Effects plug-in allowing you to pull 3D motion tracks and matchmoves without having to leave After Effects. It analyses the source sequence and extracts the original camera's lens and motion parameters, allowing you to composite 2D or 3D elements correctly with reference to the camera used to film the shot.

Storm is a product developed in-house at The Foundry to assist RED Digital Cinema camera production workflows from on-set to delivery. It acts as a hub, providing access to both metadata and original RAW image files throughout the production process.

Visit The Foundry's web site at http://www.thefoundry.co.uk for further details.

2 GETTING STARTED

Overview

Kronos is designed to slow down, speed up, and add blur based on motion within After Effects. It works by calculating the motion in the sequence in order to generate motion vectors. These motion vectors describe how each pixel, or block of pixels, moves from frame to frame. Using accurate motion vectors, the software is able to generate additional images between frames at any point along the line of motion.

Note *Kronos 5.0 on After Effects contains both the Kronos and MotionBlur plug-ins in a single package. Kronos can be used to add motion blur, but for ease of use, MotionBlur is also supplied as a stand alone plug-in.*

Figure 2.1: Simple mix of two frames to create an in between frame.

Figure 2.2: Kronos vector interpolation of the same two frames.

By default, Kronos is set to perform a half speed slow down. This is achieved by generating a new frame at position 0.25 and 0.75 between the original frames at 0 and 1. Frames are created at a quarter and three quarters instead of zero (an original frame) and a half so as not to include any original frames in the re-timed sequence. This avoids the pulsing that would otherwise be seen on every other frame on a half speed slowdown.

When Kronos is used to retime, motion blur can be added to the footage during playback. Additionally, the separate MotionBlur plug-in can be used to manage blurring, or add blur to motion in real time independent of Kronos.

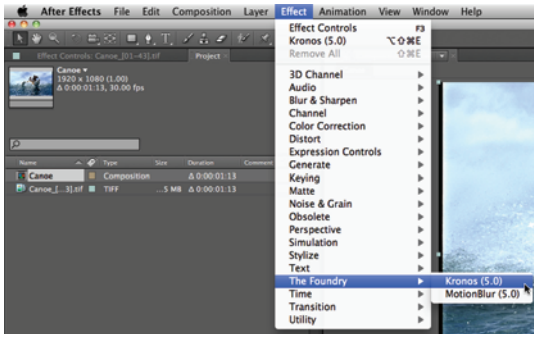
Kronos also contains a number of controls allowing you to trade off render time versus accuracy of vectors.

Launching Kronos or MotionBlur

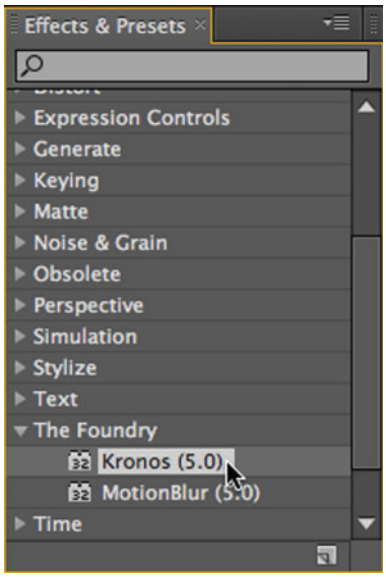
Kronos and MotionBlur on After Effects act like any other effects available on the user interface, and as such, you can access the controls from the **Effect** drop down menu or **Effects & Presets** panel.

To access Kronos or MotionBlur from the **Effect** menu, select **Effect** > **The Foundry** > **Kronos** or **MotionBlur**.

Note *In order to access Kronos or MotionBlur from the **Effect** menu, a layer must be selected in the **Viewer** or **Timeline**.*



To access Kronos or MotionBlur from the **Effects & Presets** panel, select **The Foundry** and double-click **Kronos** or **MotionBlur**.



When you apply Kronos or MotionBlur for the first time, you may experience some delay before you can access the plug-in settings. This delay is due to

the graphics processing unit (GPU) compiling some additional parallel thread execution (PTX) information to allow the plug-in optimisation to run.

Figure 2.3: Initial plug-in startup.

Once the progress bar shown in Figure 2.3 disappears, the plug-in is ready for use.

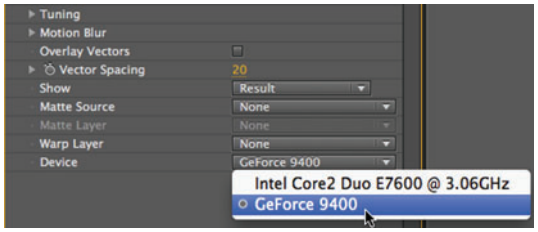
Optimising Kronos

Kronos features processing device selection as standard, optimising your work flow by assigning processor draining tasks to the graphics processing unit (GPU).

Kronos is set to use the GPU by default unless the GPU is underpowered or malfunctioning, at which point processing switches back to the CPU.

Note *Some high resolution layers may also cause Kronos to switch to the CPU when the GPU runs out of texture memory.*

To manually switch between processing devices, select the required device from the **Device** drop down menu.



You can view the processing rate in frames per second (fps) in the **Info** panel in the top right of the default After Effects interface. Figure 2.4 shows the improvement in processing performance between the CPU on the left and GPU on the right.

Note *The result you can achieve from swapping device is dependent on the GPU installed in your system—some laptop or older model GPUs may compute more slowly than the CPU.*

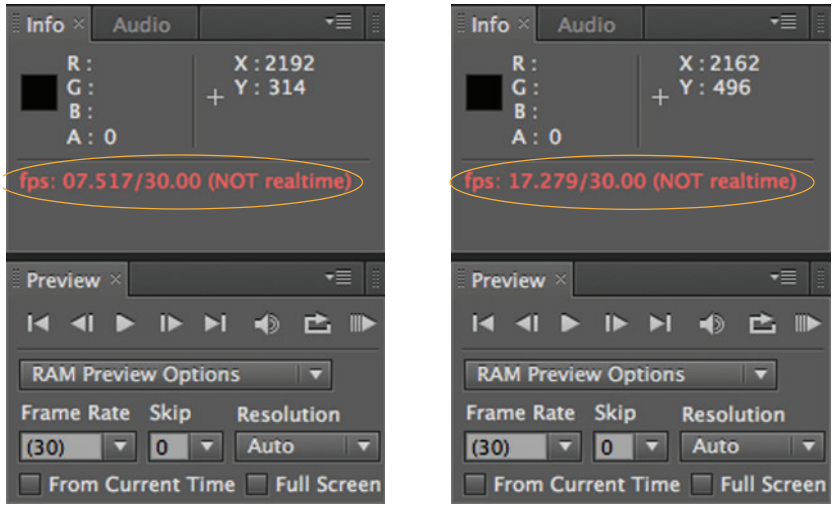


Figure 2.4: CPU and GPU processing times in fps.

Quick Start Retiming

For those of you who are familiar with After Effects, you may notice there are many similarities between the Kronos plug-in and Timewarp effects. As a general rule of thumb, if your retiming worked using Timewarp, there is a good chance that Kronos will reproduce the same result.

On the Kronos panel you can see that the default settings retime the currently selected layer to half speed.

Figure 2.5: The default Kronos panel.

One of the most basic functions of Kronos is to retime layers. You can accomplish this by simply altering the **Speed** value.

Increasing the **Speed%** value increases playback speed and vice-versa. For example, a value of 50% is half speed, 100% is real time, and 200% is double time.

Note *To get the best results from Kronos, you should use the **Speed** setting in conjunction with the other controls and methods outlined elsewhere in this User Guide.*

There are three ways to set the **Speed** value:

- Move the **Speed** slider left and right to alter the retime value.
- Hover the mouse pointer over the **Speed** value and click and drag left and right to alter the retime value.
- Click the **Speed** value and enter the required retime value directly in to the field using the keyboard.

For more detailed information on Kronos retiming, see "Using Kronos" on page 15.

Quick Start MotionBlur

Once again, for those of you who are familiar with After Effects, you may notice the similarities between the MotionBlur plug-in and Timewarp's Motion Blur effects.

Motion Blur drop down options on the Kronos panel are used to add blur effects to layers within After Effects.

Note *The settings within the MotionBlur stand alone plug-in are identical to those found in Kronos' Motion Blur parameter group.*

1. Click the reveal arrow to display the default **Motion Blur** settings.
2. Check **Enable Motion Blur** to enable the greyed out options.

3. The default **Shutter Samples**, **Shutter Angle**, and **Shutter Sync%** values produce the following blur effect in real time (**Speed%** value 100).

Figure 2.6: Original footage.

Figure 2.7: Footage after a default blur is applied.

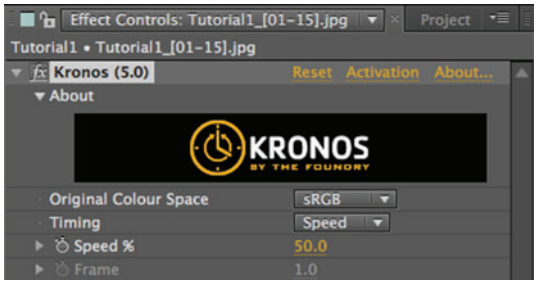
For more information on MotionBlur, see "Using MotionBlur" on page 29.

3 USING KRONOS

Getting the best results from Kronos involves more than simply applying a retime value to a layer and sitting back to enjoy the results. The following chapter aims to instruct you on using the tools included in the Kronos package to really improve your final output.

Basic Controls

Kronos' basic controls show effect information, provide an activation function for licensing purposes, and allow you to reset or turn effects on or off without removing them from layers.



Menu Bar

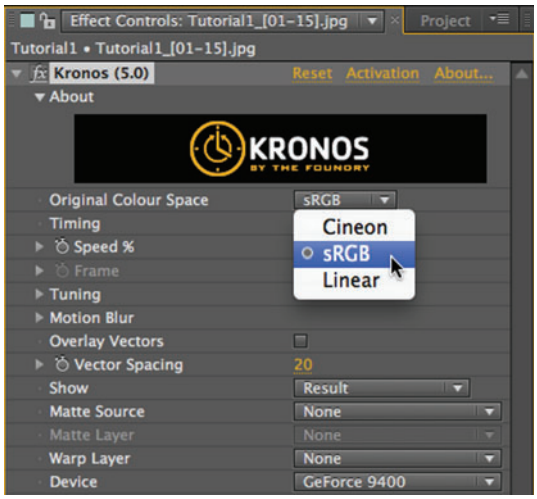
The menu bar at the top of the Kronos panel displays the current effect and file names as well as the following buttons.

Icon	Name	Description
	Reveal	Show or hide the current effect panel.
	Effect Toggle	Enable or disable the current effect to quickly view the results.
Reset		Return all Kronos settings to their default values.
Activation		Click to open a web page for activation of Kronos serial numbers. See "Licensing Kronos" on page 6.
About...		Displays the About window containing information on Kronos.

Selecting the Correct Colour Space

Colour Space describes the colour system that was used when your footage was captured. Setting the colour space correctly is the first thing that you should do before applying Kronos effects to a layer.

In most cases, motion vector calculation on imported footage will work well with the default **sRGB** setting within Kronos. If, however, you find that your results are not as expected, you could try the other settings to improve your output.



The following Original Colour Settings are supported:

- **Cineon**—a common colour space typically used for film images, for example **.dpx** file types.
- **sRGB**—the default setting, typically used by video cameras.
- **Linear**—this option effectively disables the colour space information associated with the footage to try and improve motion vector calculation.

Timing

One of the most fundamental functions of Kronos is retiming layers. The **Timing** drop down menu enables you to select the required retiming mode:

- **Speed**—causes Kronos to retime the layer using the **Speed%** value.
- **Frame**—causes Kronos to retime the layer using the **Frame** value.

The **Speed** and **Frame** settings are described below.

Speed Retiming

Altering the **Speed%** value causes the layer to playback at the retimed speed specified.

Increasing the **Speed%** value increases playback speed and vice-versa. For example, a value of 50% is equal to half speed, 100% to real time, and 200% to double time.

To retime a layer using the **Speed%** value:

1. Select **Timing** > **Speed**.
2. Move the **Speed%** slider left and right to alter the retime value,

   OR

   Hover the mouse pointer over the **Speed%** value and click and drag left and right to alter the retime value,

   OR

   Click the **Speed%** value and enter the required retime value directly in to the field using the keyboard.
3. Press **Play** to process and view the results.

The figures below represent frame 20 in a sequence with the **Speed%** value set at 50%, 100%, and 200% respectively. You can use the position of the oar to illustrate the retime effect speeding up the clip from left to right.



If you are new to Kronos and After Effects, you may find the Tutorials chapter useful for basic retiming methods. See "Tutorial 1: Speed Retiming" on page 34.

Frame Retiming

You can also retime a layer in terms of **Frames**. Instead of changing the layer's playback speed in terms of overall duration, you can describe the retiming by identifying which source frame is to play at which time. For example, to slow down a 50 frame clip by half, you can set the **Frame** value to 1 at frame 1, and to 50 at frame 100.

Note *You must set at least two keyframes to retime a layer using **Frame** retiming.*

To retime a layer using the **Frame** value:

1. Select **Timing** > **Frame**.
2. Select the frame in the timeline where you want the retime to begin.
3. Set the **Frame** value to the frame you want to appear at that output position by moving the **Frame** slider left and right to alter the retime value,

   OR

   Hover the mouse pointer over the **Frame** value and click and drag left and right to alter the retime value,

   OR

   Click the **Frame** value and entering the required retime value directly in to the field using the keyboard.
4. Select the frame in the timeline where you want the retime to finish and repeat step 3 to enter the **Frame** value.
5. Press **Play** to process and view the results.

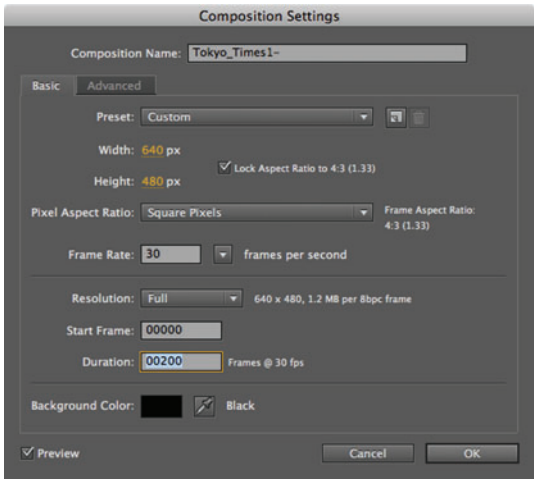
If you are new to Kronos and After Effects, you may find the Tutorials chapter useful for basic retiming methods. See "Tutorial 2: Frame Ramp Retiming" on page 37.

A Note on Retiming in After Effects

When slowing down a layer, for example by 50%, Kronos generates additional images between frames, causing the length of the clip to increase. Within After Effects, this means that half of your layer is displaced by the new Kronos frames, so in effect, you lose half of your footage.

Normally, you cannot extend layers past the last frame of footage, but to compensate for this:

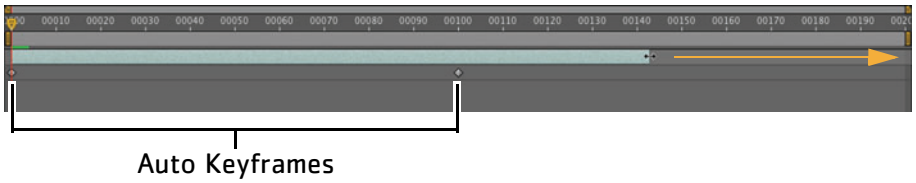
1. Navigate to **Composition** > **Composition Settings** and increase the length of your composition to accommodate the extra footage. For example, if you're using 50% speed, consider increasing the composition length by 100%.



2. Click **OK**.
3. Zoom out on the Timeline to show the entire composition, then navigate to **Layer** > **Time** > **Enable Time Remapping**.

Tip *After Effects places two keyframes on your layer, one at the first frame and one at the last frame. We recommend that you don't adjust these keyframes as they may have an adverse affect on the Kronos retiming.*

4. Use the layer handle to drag the layer to the new length of the composition.



Play through the footage to confirm no frames are missing from the end of your footage; you can always increase the composition size further.

Tuning

As the name suggests, the **Tuning** drop down menu is used to alter the fine detail within a layer. Often, you may have to make a series of value judgements before applying **Tuning** to a retime. As a general rule of thumb, **Tuning** can be seen as a trade off between accuracy and speed of processing.

Vector Detail

Vector Detail% is used to alter the density of a layer's vector field, and can be adjusted using the same three methods as the **Speed** and **Frame** values. A value of 100% will generate a vector at each pixel whereas a value of 50% will generate a vector at every other pixel.

Tip *Bear in mind that higher **Vector Detail%** values require longer to process, but can enhance your results in some cases. Try to evaluate your needs on a project by project basis so that you can strike a balance between quality and processing time.*

For some sequences, a high **Vector Detail%** value generates too much unwanted local motion detail (Figure 3.1). Kronos' default Vector Detail value is 20% because often, a lower value is more appropriate (Figure 3.2).

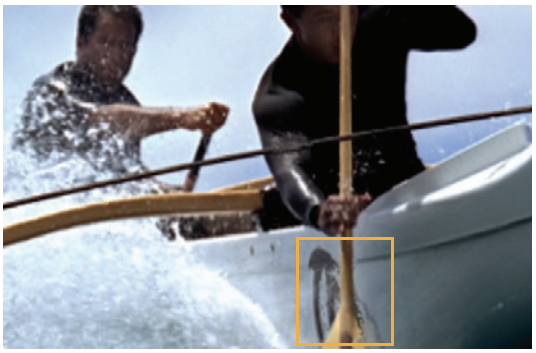


Figure 3.1: Areas of unwanted local motion detail.

Figure 3.2: Lower Vector Detail is more appropriate in this case.

Smoothness

Vector fields usually have two important qualities: they should accurately match similar pixels in one image to another and they should be smooth rather than noisy. Often, it is necessary to trade one of these qualities off against the other.

A low **Smoothness%** concentrates on matching detail, even if the resulting field is jagged (Figure 3.3). A high **Smoothness%** misses a lot of local detail, but is less likely to provide you with the odd spurious vector (Figure 3.4). The default value of 50% should work well for most sequences.

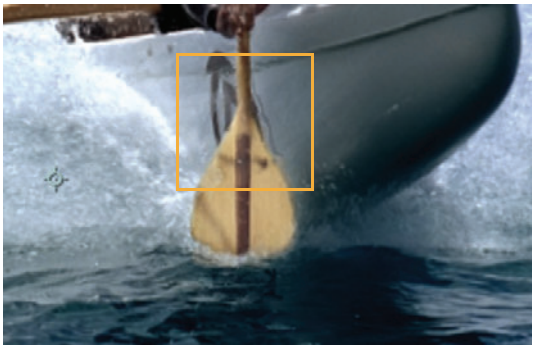


Figure 3.3: Jagging as a result of a low **Smoothness%** value.

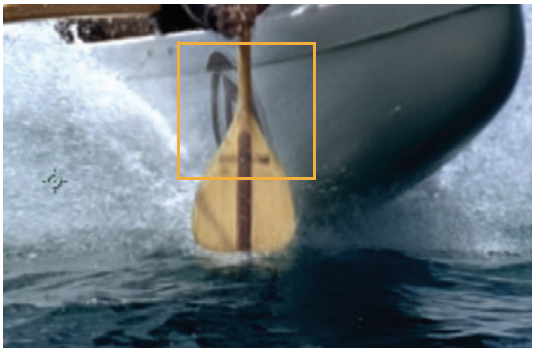


Figure 3.4: Minimal jagging as a result of a high **Smoothness%** value.

Flicker Compensation

Flicker Compensation is designed to take into account variations in luminance and overall flickering, which can cause problems with your output.

Examples of variable luminance include highlights on metal surfaces, like vehicle bodies, or bodies of water within a layer that reflect light in unpredictable ways.

Toggle the **Flicker Compensation** checkbox to allow Kronos to take account of overall brightness changes between frames.

Note *As with other tuning and effects, using **Flicker Compensation** increases rendering time.*

Weights

In order to reduce processing time, Kronos performs most luminance calculations using monochrome, largely ignoring colour channels. In most cases this is perfectly acceptable, but **Weights** allow you to concentrate on a particular feature in a layer by adding bias to individual colours.

Note *Adding **Weight** to a particular colour may adversely affect the rest of the layer.*

Kronos provides three separate **Weight** controls that can be used individually or collectively to achieve the required result.

Control Name	Range	Default
Weight Red%	0-100%	30%
Weight Green%	0-100%	60%
Weight Blue%	0-100%	10%

For example, you can increase the blue bias **Weight Blue%** to allow the algorithm to concentrate on getting the motion of a primarily blue object correct.

Overlay Vectors

Motion vectors can help you identify interactions between the background and the direction of movement for particular pixels or blocks of pixels within a layer. The **Overlay Vectors** checkbox allows you to quickly toggle vectors on or off without re-processing your layer.

Note *Motion Vectors displayed in the Viewer are added to your output if you don't turn off the overlay before rendering.*

The Kronos default vector space is 20, which produces the following vector overlay.

Vector Spacing

Adjusting the space between vectors displayed on a layer allows you to customise the way in which the vector data appears.

Layers with a great deal of motion may call for a lower **Vector Spacing** value to really highlight the many motion directions, whereas a high **Vector Spacing** value applied to the same layer may not supply a great deal of useful information.

Figure 3.5 and Figure 3.6 represent extremes of vector spacing. You may find that the default value or a value somewhere in between (Figure 3.7), provides the most useful data.

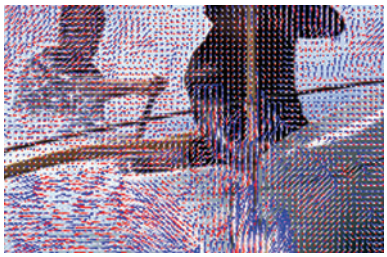


Figure 3.5: A **Vector Spacing** value of 4.

Figure 3.6: A **Vector Spacing** value of 100.

Figure 3.7: A **Vector Spacing** value of 40.

Changing Viewer Output

The **Show** drop down menu allows you to change what is output to the viewer from Kronos or MotionBlur. The different options are designed to help you refine your mattes by examining the result, foreground, and background motion vector calculations:

- **Result**—the default setting, shows the layer with any effects added, including the blend of foreground and background motion vectors if a matte has been applied (Figure 3.8).
- **Matte**—displays the position of the matte at the selected frame on the layer (Figure 3.9).

Note *If both the layer and matte are set to **visible** in a composition with a retime in effect, you may see two matte images if **Show** > **Matte** is selected—the original matte and the retimed matte.*

- **Foreground**—displays the layer calculated using only the foreground motion vectors (Figure 3.10).
- **Background**—displays the layer calculated using only the background motion vectors (Figure 3.11).

Figure 3.8: Result.

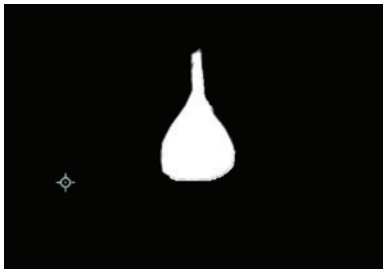


Figure 3.9: Matte.

Figure 3.10: Foreground.

Figure 3.11: Background.

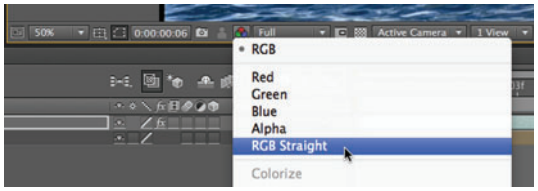
Using Mattes to Improve Results

Motion estimation algorithms can have difficulty making the distinction between foreground and background in a layer, resulting in pixel drag between overlapping objects. Masks or **Mattes** can assist the algorithm to recognise these differences, reducing drag and improving the appearance of the layer.

Matte Pitfalls

There are a couple of things to be aware of before you get started with mattes that will hopefully stop you becoming frustrated.

1. The first thing to understand is that After Effects has a number of Channel and Colour Management filters that you can apply to the viewer.



The **RGB** and **RGB Straight** modes display mattes in different ways. While not disastrous, the differences between the two can be extremely confusing.

Figure 3.12: A matte around the canoeist's oar in **RGB** mode.

Figure 3.13: The same matte when viewed in **RGB Straight**.

The reason for this is that **RGB Straight** uses the bounding box alpha instead of the matte alpha.

2. You **MUST** pre-compose your matte layer before you use it or Kronos uses the source layer without any effects that you apply.

   When you're happy with your matte, go to **Layer** > **Pre-compose**.

Applying Mattes

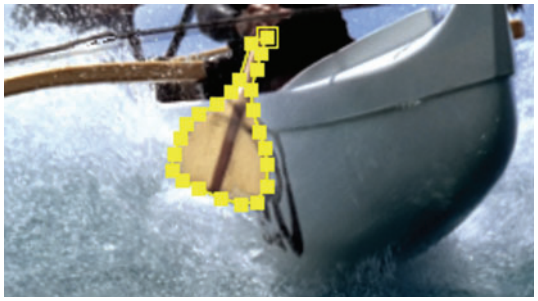
When applying mattes, white areas of the matte are considered to be foreground, and black areas background. Grey areas are used to attenuate between foreground and background. When the **Matte Layer** field contains an appropriate layer, the **Matte Source** parameter controls how the pixel

values in the matte are used to do the masking.

- **None**—no matte is applied.
- **Source Alpha**—use the alpha of the source layer.
- **Source Inverted Alpha**—use the inverted alpha of the source layer.
- **Matte Luminance**—use the luminance of the matte layer.
- **Matte Inverted Luminance**—use the inverted luminance of the matte layer.
- **Matte Alpha**—use the alpha of the matte layer.
- **Matte Inverted Alpha**—use the inverted alpha of the matte layer.

To use a matte on a layer:

1. Create a suitable animated matte and add it as a layer in the project. In this case, the matte will be used to mask the oar. See your After Effects User Guide for more information on creating and using mattes.



2. Pre-compose the matte layer by navigating to **Layer** > **Pre-compose**.
3. Select **Move all attributes into the new composition** and click **OK**.
4. Select an appropriate **Matte Source** from the drop down menu, depending on the matte you are using.
5. Select the matte you created from the **Matte Layer** drop down menu.

Note *You cannot select a **Matte Layer** without first specifying a **Matte Source**.*

6. Press **Play** to preview the results.

Figure 3.14: Background pixel drag around the motion of the oar.

Figure 3.15: Pixel drag removed using **Matte**.

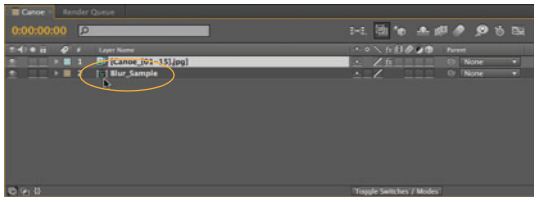
Warping Layers

When Kronos or MotionBlur is added to a layer in After Effects, all motion vector calculation and application occurs within that layer by default.

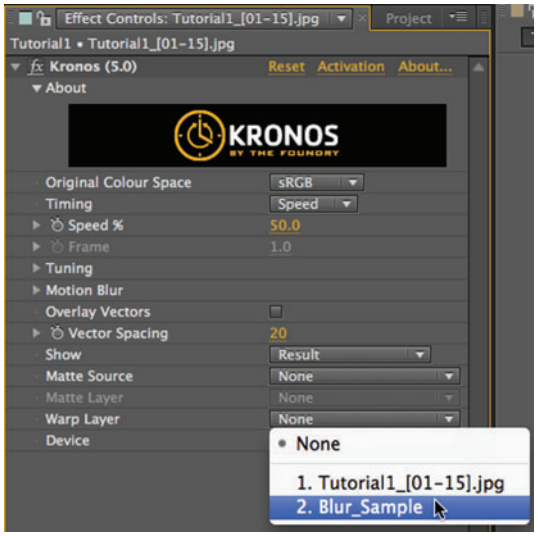
The Warp Layer function allows you to Warp the current layer with motion vectors from another source layer, for instance if you want to add motion blur to a layer based on the movement in another layer.

To apply a Warp Layer, ensure that the layer you want to use as the source is added to your composition.

Note *The source layer must be pre-composed using **Layer** > **Pre-Compose** before you can use it as the Warp Layer.*



Click on the **Warp Layer** drop down menu and select the source layer from the list.



The effect is applied to the current layer.

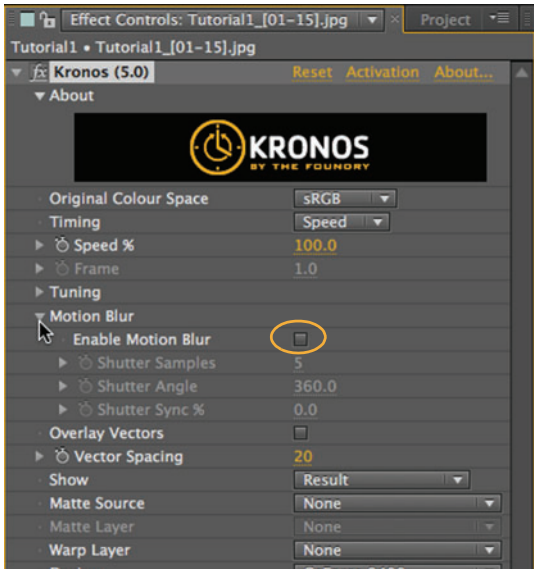
4 USING MOTIONBLUR

The following chapter aims to instruct you on using the tools that the Kronos and MotionBlur plug-ins provide. There are no right and wrong settings for MotionBlur—the output depends entirely on the results you are looking to achieve.

Note *The settings within the MotionBlur stand alone plug-in are identical to those found in Kronos' Motion Blur parameter group.*

To begin using MotionBlur:

1. Click the reveal arrow to display the default **Motion Blur** settings.
2. Check **Enable Motion Blur** to enable the available settings.



Shutter Samples

The **Shutter Samples** value determines the number of images generated between frames during the specified **Shutter Angle** to create motion blur. A higher value results in smoother motion blur, but requires more processing time.

Figure 4.1 and Figure 4.2 show graphical representations of low and high **Shutter Samples**.

Figure 4.1: A **Shutter Samples** value of 2.

Figure 4.2: A **Shutter Samples** value of 20.

In real terms, with **Speed** at 100 and **Shutter Angle** at 360, the **Shutter Samples** values 2, 5, and 20 are represented in Figure 4.3. Notice that the higher value produces smoother blur around the canoeist.

Figure 4.3: Applied **Shutter Samples** value of 2, 5, and 20.

Shutter Angle

Modifying the **Shutter Angle** is the Kronos equivalent to changing the shutter angle of the frame. **Shutter Angle** values 0, 180, and 360 degrees represent the shutter as closed, half open, and completely open. In practice, a shutter open to 360 degrees would be open constantly and all motion in the image would be blurred.

Note *Kronos also gives you the option of increasing the Shutter Angle past 360 degrees, which is not possible in actual movie cameras.*

In real terms, with a **Speed%** value of 100 and **Shutter Samples** value of 15, the **Shutter Angle** values 360 and 1080 produce motion blur similar to that shown in Figure 4.4 and Figure 4.5. Notice that the higher value produces greater blur around the motion in the frame.

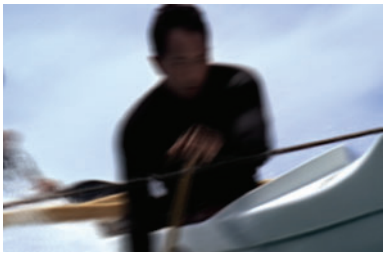


Figure 4.4: Applied **Shutter Angle** value of 360.

Figure 4.5: Applied **Shutter Angle** value of 1080.

Shutter Sync

Kronos uses **Shutter Sync%** to look at where each pixel moves in the previous and the following frame. Negative **Shutter Sync%** values sample frames from before the current frame on the timeline and positive values from frames after the current frame.

Assuming that you're using the default **Shutter Samples** value of 5, Figure 4.6 shows a hypothetical object and the effect that differing **Shutter Sync%** values produce, where the black rectangle represents the current frame.

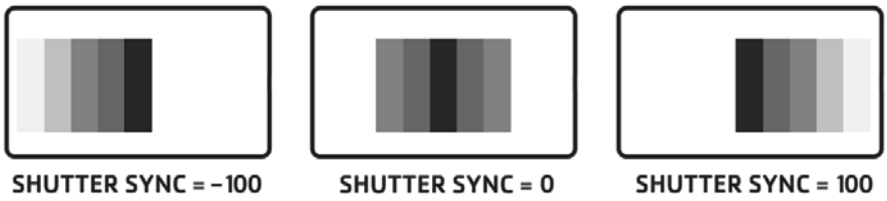


Figure 4.6: The effect of differing **Shutter Sync%** values.

The values represented in Figure 4.6 are shown in real terms in Figure 4.7. Even though the same frame is shown in each image, **Shutter Sync%** negative values sample frames from before the current frame and positive values from frames after the current frame. Notice the position of the second canoeist changes from left to right as the **Shutter Sync%** value increases.

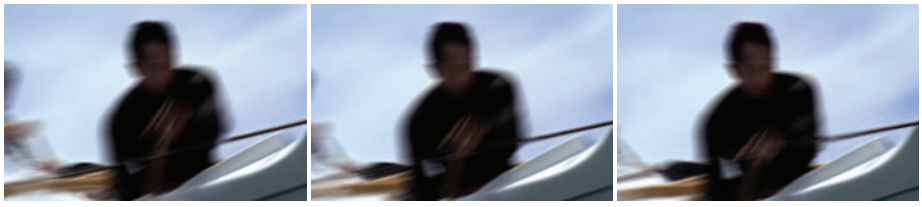


Figure 4.7: Shutter Sync values of -100%, 0%, and 100%.

Tip *The **Overlay Vectors** setting is useful for viewing your changes, as it can help you see any significant differences between the vectors from each direction.*

If you are new to Kronos and After Effects, you may find the Tutorials chapter useful for basic motion blur methods. See "Tutorial 3: Adding MotionBlur" on page 40.

5 TUTORIALS

Introduction

Welcome to the Kronos and MotionBlur Tutorials! If you've reviewed the other chapters in this guide—which we highly recommend—you already know something about the software's capabilities. These tutorials show how to pull everything together through a series of practical examples.

Note *These tutorials assume that you are reasonably familiar with the After Effects interface and basic compositing theory.*

The Projects

- **Tutorial 1: Speed Retiming**—a basic run-through of retiming layers within your projects using the **Speed%** value.
- **Tutorial 2: Frame Ramp Retiming**—increasing and decreasing layer speed over time using keyframes.
- **Tutorial 3: Adding MotionBlur**—applying motion blur and managing output quality.

Example Images

Before you continue, download the tutorial files from The Foundry web site http://www.thefoundry.co.uk and move them to a directory you'll create, called "Kronos_Tutorials".

Note *You may need to unzip the files before you can use them.*

It's up to you where you put the tutorial files, but bear in mind that you'll need them during these practical exercises.

Tutorial 1: Speed Retiming

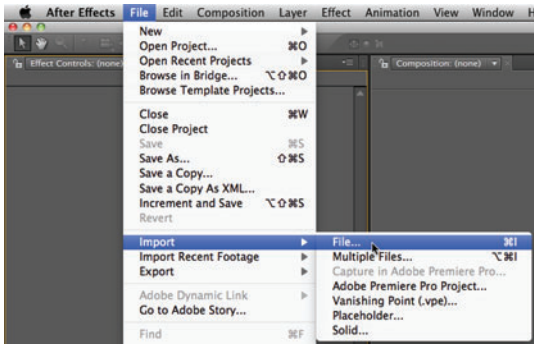
Simple speed retiming causes the entire current layer to playback at the retimed speed specified. Increasing the **Speed%** value, increases playback speed and vice-versa. For example, a value of 50% is equal to half speed, 100% to real time, and 200% to double time.

In this tutorial, you'll import some footage, apply Kronos as an effect, and apply a basic retime to decrease the playback speed.

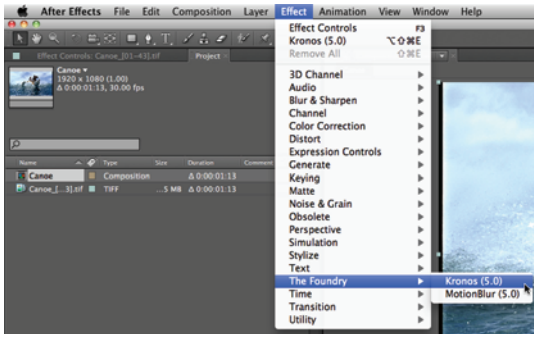
Preparing the Workspace

First, you'll set up the workspace and apply Kronos as an effect on a layer:

1. Launch After Effects as normal and navigate to **File** > **Import** > **File**.



2. Navigate to the folder containing the tutorial files and open **Tutorial1_01.jpg** (After Effects imports the entire contents of the folder automatically).
3. Drag and drop the content from the **Project** tab to the **Viewer** and click the image to select the layer.
4. Navigate to **Effect** > **The Foundry** > **Kronos**.

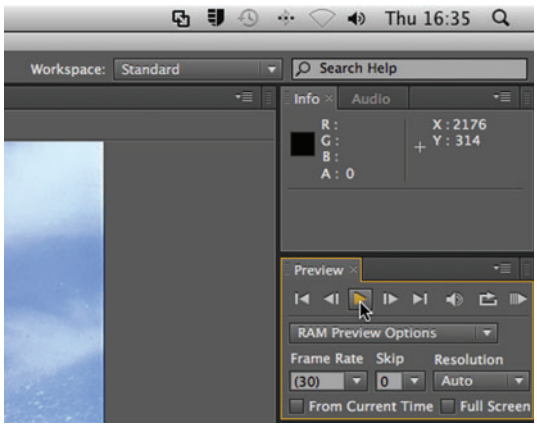


5. The Kronos panel displays in the **Effects Control** tab.

Constant Retiming

Let's try reducing the playback speed to 3/4 normal speed for the entire layer:

1. Click the **Speed%** reveal arrow to show the slider control.
2. Drag the slider to 75% and press **Play** in the **Preview** panel to preview the retime.



For some projects, simply retiming and rendering the layer with the default settings is sufficient.

You may notice, however, that in frame 7 there is considerable distortion present around the paddle.

You can try to remove this distortion using the **Tuning** settings. Let's try altering the **Vector Detail%** and **Smoothness%** values.

3. Click the **Tuning** > **Vector Detail%** and **Smoothness%** reveal arrows to show the slider controls.
4. Drag the **Vector Detail%** slider to **80%** and the **Smoothness%** slider to **90%**.
5. Press **Play** in the **Preview** panel to preview the retime.

   Move the playhead to frame 7 and you should see that the distortion is reduced, but some blurring has crept in around the paddle blade.

You can experiment with the tuning settings to try and improve the results, although sometimes trading off improvements in one area against another is necessary.

Tip *The **Tuning** settings are very useful, but use them sparingly as too much tuning can affect other areas of the layer, introducing localised motion that wasn't visible in the original footage.*

Tutorial 2: Frame Ramp Retiming

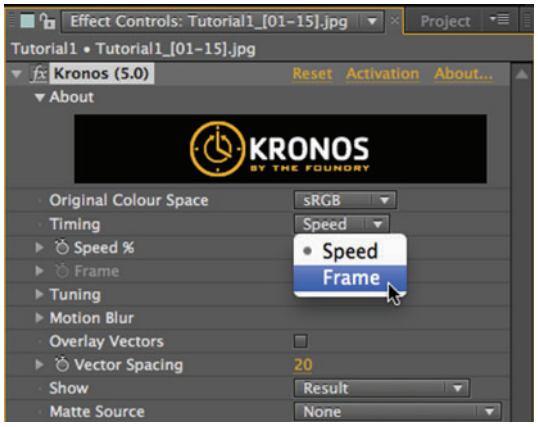
Frame ramp retiming uses keyframes to alter playback speed up and down over time. For this retiming method, we'll need to change the **Timing** mode and add some keyframes.

If you haven't done so already, prepare your workspace as described in "Preparing the Workspace" on page 34.

Gradual Retiming

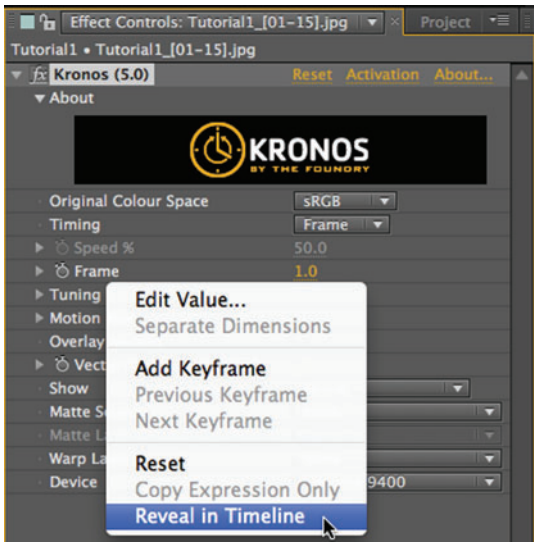
Let's try reducing the playback speed over 8 frames then increasing it back to the original speed towards frame 14:

1. Navigate to the **Timing** drop down menu and select **Frame**.

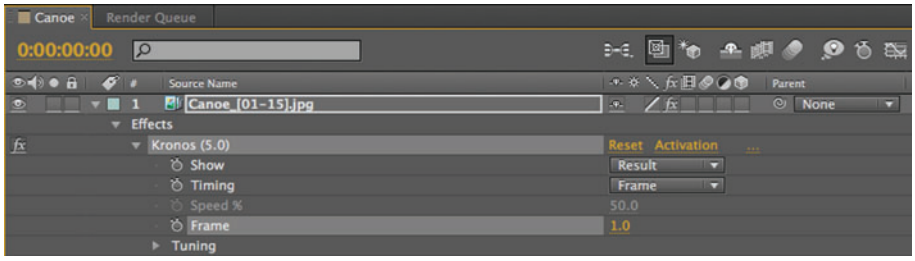


Notice that the **Speed** panel is grayed-out and the **Frame** panel is activated.

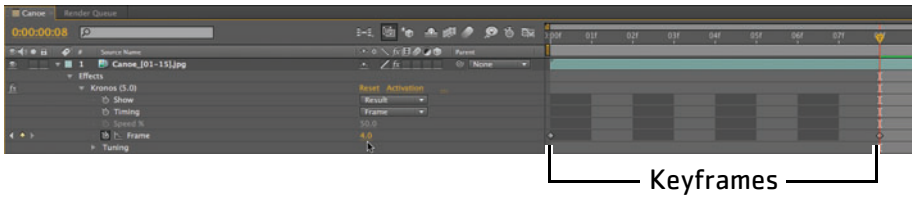
2. Right-click on the **Frame** panel and select **Reveal in Timeline**.



After Effects adds the Kronos controls to the left Timeline panel. The default Frame setting is 1.0, which sets the first frame on the Timeline to frame 1 of the layer.

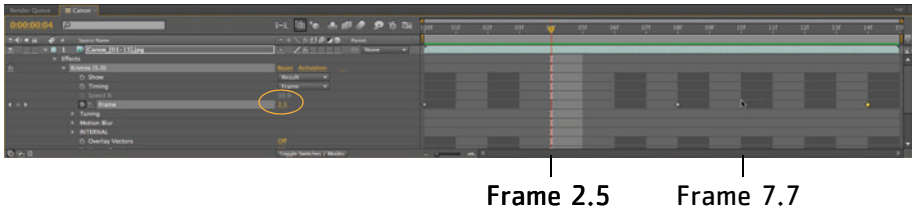


3. Click the stopwatch icon next to **Frame** to set a keyframe at the first frame on the Timeline.
4. Move the playhead to frame 8 and set the **Frame** value to 4.0. Kronos sets frame 8 on the Timeline to frame 4 of the layer, effectively reducing the playback speed by half leading up to frame 8.



5. Move the playhead to frame 14 and set the Frame value to 15.0. Kronos sets frame 14 on the Timeline to the last frame of the layer, effectively returning the playback speed to normal at frame 14.
6. Press **Play** in the **Preview** panel to preview the retime.

   Once the process has completed, you should be able to see the result of the retime. In reality, the length of the clip is a little too short to see clearly.
7. Return to the beginning of the layer and play through each frame with the **Next Frame** arrow in the **Preview** panel. You should notice that the **Frame** value in the Timeline panel changes overtime—slowly up to frame 8 and more quickly toward the final frame.



The retime can be represented by the graph shown in Figure 5.1.

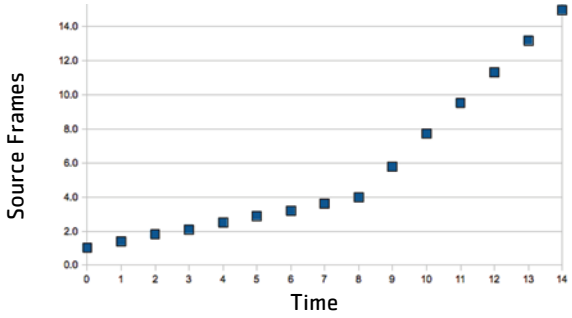


Figure 5.1: Graph showing a retime ramping up to real time at frame 14.

Notice the marked speed increase after frame 8 as the retime approaches realtime at frame 14.

Try your own frame ramp retime on some longer sequences to really see the retime results!

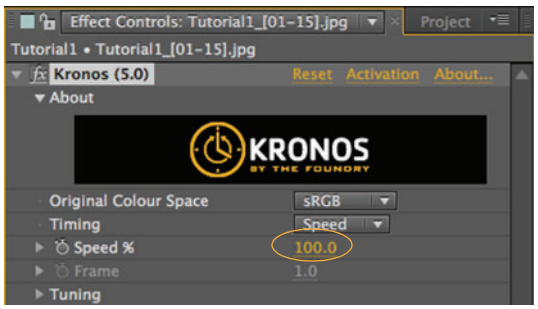
Tutorial 3: Adding MotionBlur

MotionBlur can be used to add realism to moving footage, for example the perception of speed in Formula 1 cars, or in the case of this tutorial to add a more dreamlike feel to the layer.

If you haven't done so already, prepare your workspace as described in "Preparing the Workspace" on page 34.

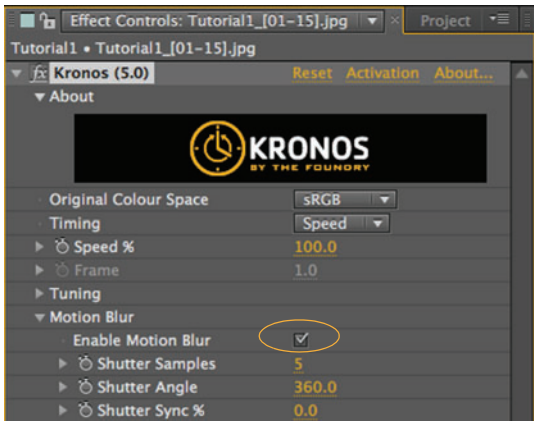
For the duration of this tutorial, we're going to assume that no retime effect is required, so the first thing you need to do is set the **Speed%** value to 100%, or realtime.

Note *If you launch MotionBlur independently, this step is not required.*



Let's try creating a dreamlike feel for the example layer:

1. Click the Motion Blur reveal arrow to display the available parameters and select the **Enable Motion Blur** checkbox.



2. You can see immediately that the default MotionBlur settings have applied some blur to the layer.

Figure 5.2: Original layer at frame 8.

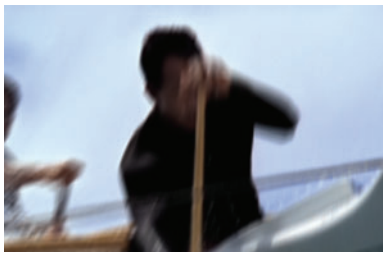
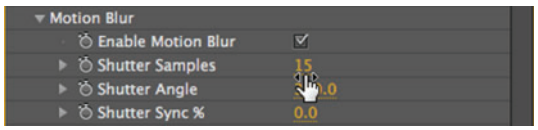


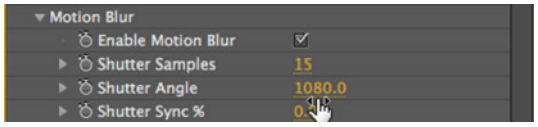
Figure 5.3: Default MotionBlur settings applied to the same frame.

For the purposes of this tutorial, however, we're looking for something a little more dramatic!

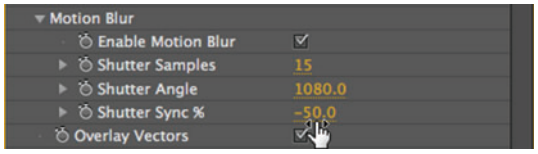
3. Let's increase the **Shutter Samples** to 15, so that MotionBlur creates more frames for a smoother blur.



4. Increase the **Shutter Angle** to 1080, so that MotionBlur produces a large amount of blur across the image.



5. Reduce the **Shutter Sync%** to -50%, so that MotionBlur samples frames from before the current frame to create a drag effect.



These settings produce the exaggerated dreamlike quality shown in Figure 5.4. In practice, you might never set the parameters so high, but they illustrate some of the effects you can achieve using MotionBlur.

Figure 5.4: Exaggerated settings applied to frame 8.

You can also use MotionBlur in conjunction with keyframes in exactly the same way as described in Tutorial 2.

APPENDIX A: RELEASE NOTES

Release Notes

This appendix describes the requirements, new features, improvements over previous versions, fixed bugs, and known bugs and workarounds in Kronos.

Kronos 5.0v3

This is a maintenance release that adds support for After Effects CS6 and fixes one bug.

Release Date

July 2012

Requirements

1. Either:
    - After Effects CS6 on Mac OS X 10.6.8 or 10.7 64-bit, or
    - After Effects CS6 on Windows 7 64-bit, or
    - After Effects CS5 or CS5.5 on Mac OS X 10.5.8 or 10.6 64-bit, or
    - After Effects CS5 or CS5.5 on Windows 7 64-bit.
2. Foundry Licensing Tools (FLT 7.0v1 or later) for floating licences.

Requirements for CUDA Accelerated Rendering (CPU fallback available):

1. A GPU that supports CUDA technology. The following cards have been tested with Kronos:
    - GeForce GTX 285 (Windows and Mac OS)
    - Quadro FX 3800 (Windows)
    - Quadro FX 4800 (Windows and Mac OS)
    - Quadro FX 5800 (Windows)
2. Ensure that you have the correct CUDA compatible drivers installed for your GPU. Contact support@thefoundry.co.uk for more information.

New Features

There are no new features in this release.

Feature Enhancements

There are no enhancements to existing features in this release.

Fixed Bugs

- BUG ID 27446 – Running Kronos on CS6 rendered the first frame repeatedly for the entire sequence.

Known Bugs and Workarounds

There are currently no known bugs or workarounds.

Kronos 5.0v2

This is a maintenance release that adds support for After Effects CS5.5 and fixes one bug.

Release Date

April 2011

Requirements

1. Windows 7 (64-bit) or Mac OS X 10.6.4 and above (64-bit).
2. After Effects CS5 or CS5.5 on Windows or Mac OS X.
3. Foundry FLEXlm Tools (FFT 5.0v1 or later) for floating licences.

Requirements for CUDA Accelerated Rendering (CPU fallback available):

1. A GPU that supports CUDA technology. The following cards have been tested with Kronos:
    - GeForce GTX 285 (Windows and Mac OS)
    - Quadro FX 3800 (Windows)
    - Quadro FX 4800 (Windows and Mac OS)
    - Quadro FX 5800 (Windows)
2. Ensure that you have the correct CUDA compatible drivers installed for your GPU. Contact support@thefoundry.co.uk for more information.

New Features

There are no new features in this release.

Feature Enhancements

There are no enhancements to existing features in this release.

Fixed Bugs

BUG ID 16354 – Kronos produced unexpected results on 12-core machines.

Kronos 5.0v1

This is a new release for Kronos on After Effects. There are two plug-ins in this release: Kronos and MotionBlur.

Release Date

10 August 2010

Requirements

1. Windows 7 64-bit or Mac OS X 10.6.4 64-bit.
2. After Effects CS5 on Windows or Mac OS X.
3. Foundry FLEXlm Tools (FFT 5.0v1 or later) for floating licences.

Requirements for CUDA Accelerated Rendering (CPU fallback available):

1. A GPU that supports CUDA technology. The following cards have been tested with Kronos:
    - GeForce GTX 285 (Windows and Mac OS)
    - Quadro FX 3800 (Windows)
    - Quadro FX 4800 (Windows and Mac OS)
    - Quadro FX 5800 (Windows)
2. Ensure that you have the correct CUDA compatible drivers installed for your GPU. Contact support@thefoundry.co.uk for more information.

New Features

This section will describe new features in future releases.

Feature Enhancements

This section will describe feature enhancements in future releases.

Fixed Bugs

This section will describe fixed bugs in future releases.

Known Bugs and Workarounds

There are currently no known bugs or workarounds.

APPENDIX B: THIRD PARTY LICENSES

Third Party Licences

This appendix lists third party libraries used in Kronos, along with their licences.

Library	Description	Licence
Boost	Source code function / template library	Boost Software Licence - Version 1.0 - August 17th, 2003 Permission is hereby granted, free of charge, to any person or organization obtaining a copy of the software and accompanying documentation covered by this licence (the "Software") to use, reproduce, display, distribute, execute, and transmit the Software, and to prepare derivative works of the Software, and to permit third-parties to whom the Software is furnished to do so, all subject to the following: The copyright notices in the Software and this entire statement, including the above licence grant, this restriction and the following disclaimer, must be included in all copies of the Software, in whole or in part, and all derivative works of the Software, unless such copies or derivative works are solely in the form of machine-executable object code generated by a source language processor. THE SOFTWARE IS PROVIDED "AS IS", WITHOUT WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, TITLE AND NON-INFRINGEMENT. IN NO EVENT SHALL THE COPYRIGHT HOLDERS OR ANYONE DISTRIBUTING THE SOFTWARE BE LIABLE FOR ANY DAMAGES OR OTHER LIABILITY, WHETHER IN CONTRACT, TORT OR OTHERWISE, ARISING FROM, OUT OF OR IN CONNECTION WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS IN THE SOFTWARE.
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INDEX

A–Z