CHV-ELECTRONICS

The MotionTracker-collection

Tools for automatic content-tracking

General Information

With this collection you can automatically create a garbage matte, stabilize your video, insert clips and images into your project, distort certain parts of your clip and zoom into a specific area of your project.

There are up to 20 points that can be tracked depending on what you want to do.

All tracked points will be remembered by the plugins and even will be stored within your project. This makes it possible to make changes to the other settings without retracking the whole thing again. It is also possible to render the final clip directly, without prior tracking.

All plugins are using a field-rendering based image processing system in order to create perfect movements of the applied effects. This is most important to create the perfect illusion.

There are five plugins included within this collection:

MotionTracker Garbage Matte
With this tool you can create a high-quality garbage matte by cutting out moving objects. Up to 20 points can be tracked. The garbage matte can be post-processed with several functions like: Matte-feathering, border-creation, distortion and different compositing modes.

MotionTracker Image Insertion
Use this tool to overlay an image (or clip) onto your project. The image will follow the selected content and will appear as if it always had been there.

MotionTracker Point Distortion
This tool is made to distort certain parts of your project. Use it to make faces and number-plates unrecognizable or distort. Up to 10 points can be tracked simultaneously.

MotionTracker Image Stabilizer
The name does say it all: This plugin stabilizes your clip. Unlike the included image-stabilize-plugin of Final Cut Pro, this tool tracks the selected point even if the point swirls around the screen. You can choose between a "lock" onto the selected point or an automatic calculated "anti-shake" feature, which is similar to what we all know from cameras. Additionally you can zoom into the stabilized video.

MotionTracker Zoom
If you want to take a closer look at something specific of a shaky video, this plugin is the perfect choice. You can select an area which will be zoomed to fullscreen.

The MotionTracking-system

All five plugins are using the same MotionTracking-system. The only difference is the amount of points that can be tracked and what the plugin will do with the tracked points.

We want to do something with the video to the left. This video was shot at the EXPO 2000 in Hannover (Germany) while driving with something like a golf-cart on the exhibition area. The video is shaky and thus is perfect to demonstrate the abilities of the MotionTracker.

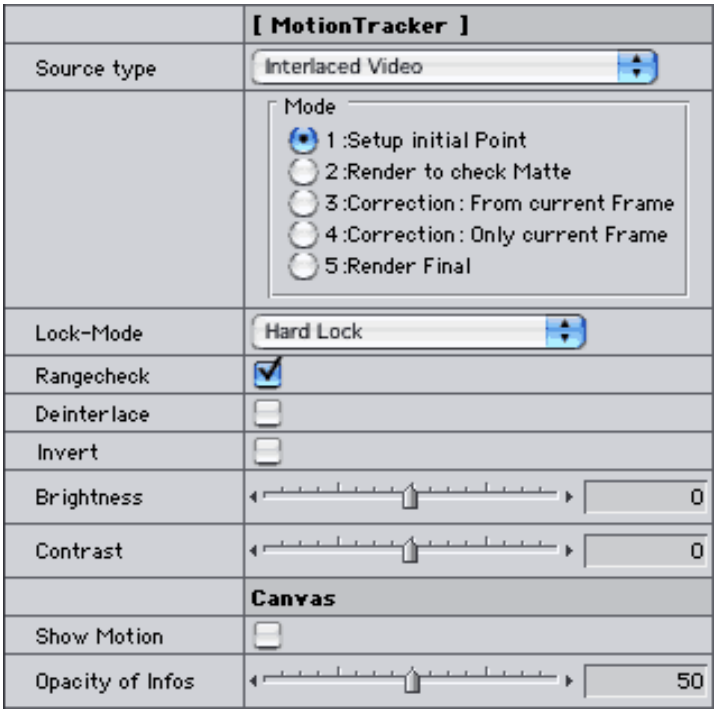
This is what we want to do with this clip:

-Insert a logo onto the grey area at the brown (Korea)-house in the background.

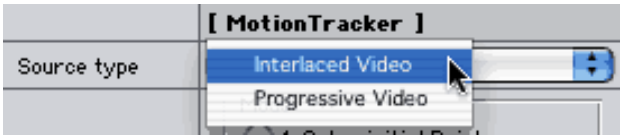
-Distort the word "Korea"

Lets start with the logo-insertion. To do this we apply the plugin "MotionTracker: Insert Video" to the clip, double-click the clip and open the "Filters"-tab within the Viewer.

At first we take a closer look at the controls of the Tracker. The top section of each MotionTracker-plugin carries the same controls:

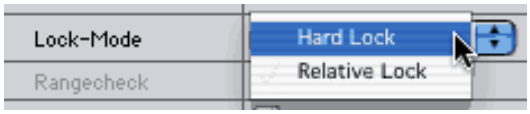


Source Type



At first you have to tell the tracker if the source-clip is an interlaced video or a progressive video. Most video shot with a standard video-camera uses the interlaced-system, so you don't have to change this setting. If you use progressive-video you have to switch to "Progressive Video". The difference is that the render subroutines will use the field based rendering subroutines to generate a smooth animation. If you set this setting to "Progressive Video" and you use an interlaced video clip, the rendered video will look good, but the motion of the tracked points will appear shaky.

Lock-Mode



There are two modes the tracker can use: A "Hard-Lock" and a "Relative Lock".

Normally you should use the "Hard-Lock" setting. With this mode the tracker tries to lock directly onto the given point by comparing the current frame with the frame where you have set the initial point. If the point that should be tracked changes dramatically over time you should use "Relative Lock"

With the setting "Relative Lock" the tracker can be locked onto shapes that change dramatically over time. The tracker will compare consecutive frames and wont be fooled by the new shapes.

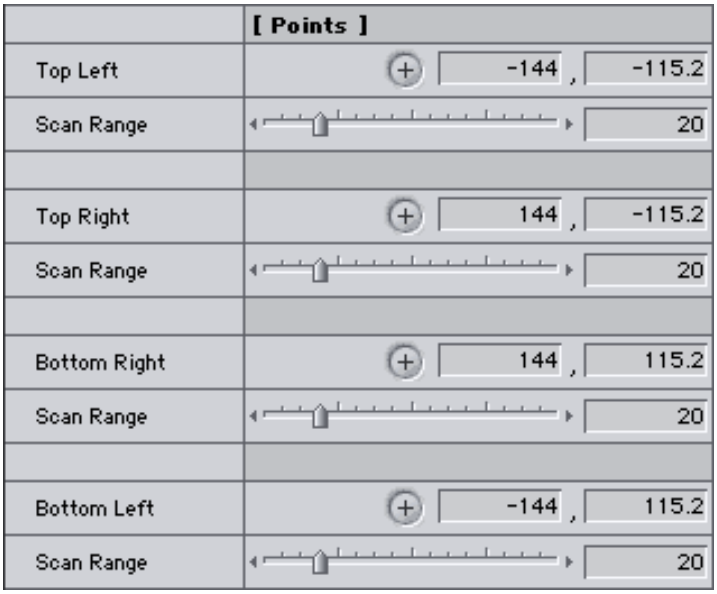
Rangecheck

With each point you can tell the tracker the range where the tracker should look out for the new position of the shape. If the search of the tracker is unsuccessful or out of range, the result might be off track. This is normally corrected by the plugin by interpolating the current motion of the shape. Uncheck this option if you want to deactivate the rangecheck. Normally you don't have to change this option.

If the tracker fails, the frame around the point which represents the searchrange, will be shown in red. A white frame tells you that the tracking was successfull.

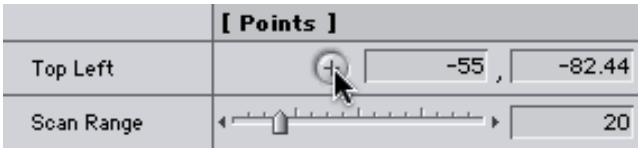
Each plugin carries a Points-section. Each point carries a "Scan Range"-slider. This control tells the tracker which area has to be searched for the new position of the point that needs to be tracked. If the area is to big in size, the tracker might find several occurences of the initial shape. If the area is too small, the point may have already left the scan-area and the tracker does not know where the new position of the point should be.

Set the "Scan-Range" as small as possible, but as large as needed! This slider also can be keyframed to improve tracking.

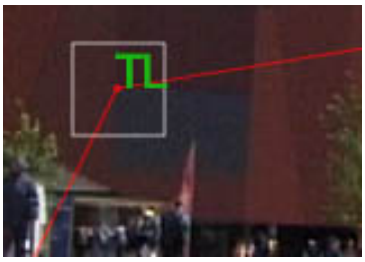


Mode
With this radio-buttons you tell the plugin what you want to do now. There are five modes:

Mode 1: Setup initial Point(s)
This mode is only used to tell the MotionTracker the initial position of the points that have to be tracked. Trackable is such content of a video that has a shape of any kind. Flat areas are not good. Corners, shapes, edges and similar content are good to go. In the bottom section of the controls you can see a list of points.



Important: Make sure the canvas is already open and visible on the screen. At first we set the "Top Left"-Point. To do so click once on the (+), go to the canvas and click the position where you want to set the selected point. Now you see this in the canvas:



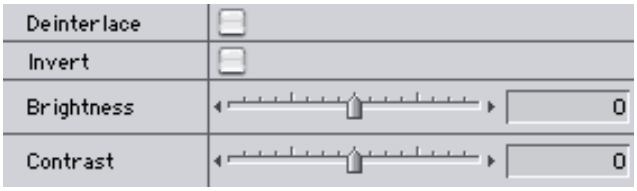
("TL" means "Top Left").

Now do the same to the remaining three points and you should see this:

That's it for *Mode 1*. The next step will be done with *Mode 2*.

Mode 2: Render to check Matte

Actually we only should have to select the clip in the timeline and hit Apple-R to render the clip. But we can "help" the tracker to make sure that the tracker will stay on track. The chosen area of the video is not very bright and the contrast of the grey area relative to the surroundings is very low. In order to improve tracking we can modify the clip with these controls:



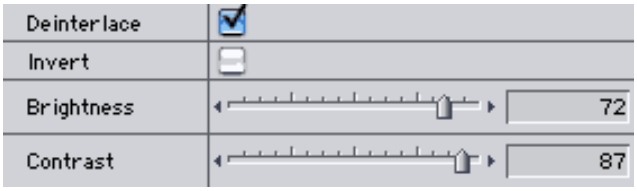
These four controls are only used in *Mode 2 and 5*. They have no effect on the rendered clip.

Deinterlace: In some cases it is possible that the tracker doesn't "see" a moving object if it moves very fast and it's position does change rapidly from field to field. Activate this checkbox to deinterlace the clip for the tracking to ensure that the tracker stays on track.

Invert: So far I have seen it once that the tracker was able to follow a moving object better after the clip was inverted. But in most cases this checkbox is not needed.

Brightness and *Contrast*: Use these two controls to change the brightness and the contrast of the clip. A higher contrast ensures that the tracker stays on track.

In our example it is good to change the contrast and brightness of the clip. If you change these controls you will see the changes image immediately in the canvas.



With a higher contrast-setting and more brightness the grey area is now clearly visible. Additionally Deinterlace is switched on. Now it's render-time. Click the clip once in the timeline and hit Apple-R to start the tracking. After rendering you will receive a clip where the four points will follow the positions of the grey area. Play the clip and check if the result of the tracker was successfull. If not: Use *Mode 3* and *Mode 4* to make changes to the tracked paths. If it was successfull, you can go straight to *Mode 5*.

Mode 3: Correction: From current Frame

This mode is used to make changes to the result of the tracker. If the tracker was not able to track a point completely and the point "runs away", you can use this mode to bring the tracker back on track manually.

Do this:

- Go to the position in the timeline where the tracker got off track.
- Hit (+) of the corresponding point that got off track.
- Click in the canvas at the position where the actual position of the tracked point should be.
- All following tracked positions of the corrected point will be invalid, thus you have to render the clip again. This time rendering will takes less time, because the other points, which are already tracked, don't have to be rendered again.
- Repeat this procedure until everything is ok.

Mode 4: Correction: Only current Frame

This mode is very similar to *Mode 3*. This mode is very usefull if the tracker has created a "spike" in the track. The difference to *Mode 3* is that you don't have to render the clip again after you have repositioned a point, because only the current position of the point will be corrected.

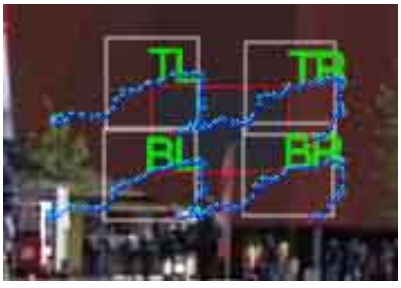
Mode 5: Render Final

This mode applies the wanted effect. Use this mode to render the final clip. Depending on which MotionTracker-plugin you have used the steps you have to take now are very different. Take a look into the next sections to see what you have to do to complete the job.

If you like, you can also use *Mode 5* directly after setting up the initial positions with *Mode 1*. In this case the tracker will also be started and will do the tracking and the final rendering in one step. Do this if you are confident that the tracking will be successfull. But even if the tracker runs of track with one of the points, you can still do the necessary corrections with *Mode 3* and *Mode 4*. Remember that the Brightness-, Contrast, Invert- and Deinterlace-settings will also be used if you use *Mode 5* to track the points.

The last two options only concern the Canvas:

Show Motion
Enable this option to see the result of the tracker. Of course you have to track the points with *Mode 2* at first to render this option usefull. The blue line represents the motion of the tracked points.



Opacity of Infos
With this slider you can control the opacity of the tracker-informations shown in the canvas. Nothing more, nothing less.

What can you do with the tracked points ?

All five MotionTracker-plugins take advantage of the same tracking-system. At first you have to track the wanted points. The tracked path(s) will be remembered by the plugin and will be automatically stored within your project. Just make sure that you save your project and all tracked information will be safe.

There are five things you can do with the tracked information:

MotionTracker Image Insertion
Insert a clip or image in your project.

MotionTracker Garbage Matte
Create a garbage matte.

MotionTracker Point Distortion
Distort certain parts of your project.

MotionTracker Image Stabilizer
Stabilize your clip.

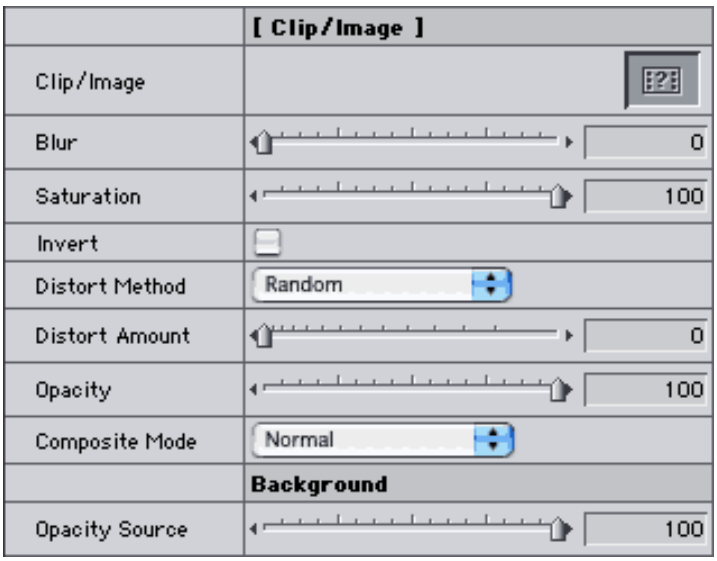
MotionTracker Zoom
Zoom into the tracked area.

MotionTracker Insert Image

Use this tool to overlay an image (or clip) onto your project. The image will follow the selected content and will appear as if it always had been there.

After tracking the initial points, you now have to tell the plugin what it should do with the tracked information. To do this you have to go to *Mode 5*.

Lets take a closer look at the two special sections of the "Insert Image"-tool:



Clip / Image
Drag the clip or image you want to insert into your project here.

Blur
Use this setting to adjust the sharpness of the inserted image. If the inserted image is too clear relative to the original video, you can blur the image to make it look alike.

Saturation
If the image you want to apply has a different saturation than the clip in the timeline, you can use this slider to change the saturation of the inserted image.

Invert
Check this checkbox to invert the applied image.

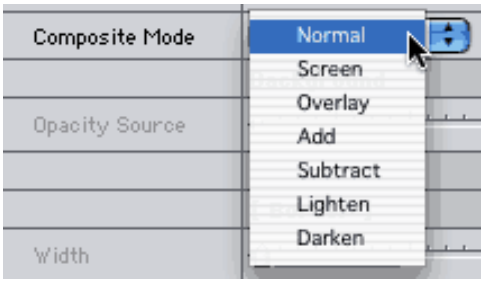
Distort Method
Distort Amount
If you like you can distort the image that will be applied.

"Distort Method": "Random" will distort the image with a scattered noise. "Static" will add a static noise, as if you look through a heavily rippled glass.

"Distort Amount" controls the amount of the distortion.

Opacity
Use a setting below 100 to make the applied image transparent.

Composite Mode
With this popup-menu you can choose the desired composite-mode. This is most usefull if (for example) you rather want to apply a shadow than an image, or you want to create the impression of a virtual video-projection.



Opacity Source
With this slider you can control the visibility (transparency) of the original clip.

With the next section you can create a border around the tracked area.

	[Border]
Width	0
Feather	30
Color	
Opacity	100

These four self-explaining controls define the appearance of the border.



The bottom section contains the four points and their corresponding Scan-Range.

	[Points]
Top Left	-144 , -115.2
Scan Range	20
Top Right	144 , -115.2
Scan Range	20
Bottom Right	144 , 115.2
Scan Range	20
Bottom Left	-144 , 115.2
Scan Range	20

These controls have different functions depending on the currently selected mode. Please read the description of the five modes of MotionTracker for better understanding.

MotionTracker Garbage Matte

This tool creates an animated Garbage Matte.

After tracking the initial points, you now have to tell the plugin what it should do with the tracked information. To do this you have to go to *Mode 5*.

Mode 5 activates the controls of the "Garbage Matte"-tool:

	[Matte]
	Modify Matte
Feather Matte	10
Invert Matte	
Opacity Matte	100
	Distort Content
Blur	0
Saturation	100
Invert	
Distort Method	Random
Distort Amount	0
	Background
Opacity Source	50
	[Border]
Width	0
Feather	30
Color	
Opacity	100

These controls will modify the garbage matte.

Feather Matte
Here you can feather the matte.

Invert
Check this checkbox to invert the garbage matte.

Opacity
Use a setting below 100 to make the garbage matte transparent.

The next five controls with distort the content of the matte.

Blur
Use this slider to blur the image contained within the garbage matte.

Saturation
With this slider you can change the saturation of the image contained within the garbage matte.

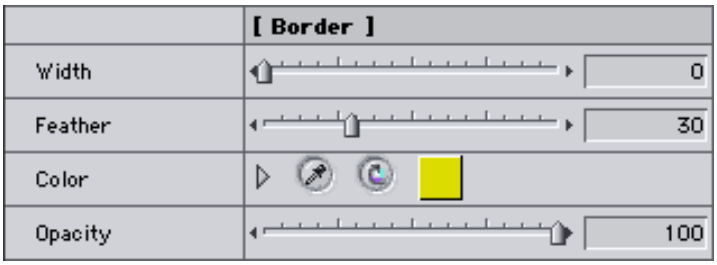
Distort Method
Distort Amount
If you like you can distort the content of the matte.

"Distort Method": "Random" will distort the image with a scattered noise. "Static" will add a static noise, as if you look through a heavily rippled glass.

"Distort Amount" controls the amount of the distortion.

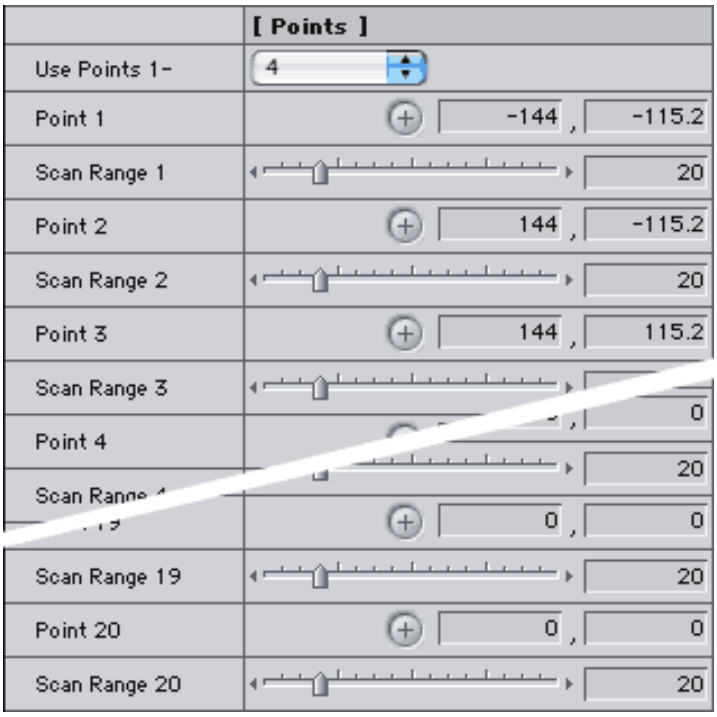
Opacity Source
This slider controls the opacity of the areas outside the garbage matte. A setting of 0 will make the area complete transparent.

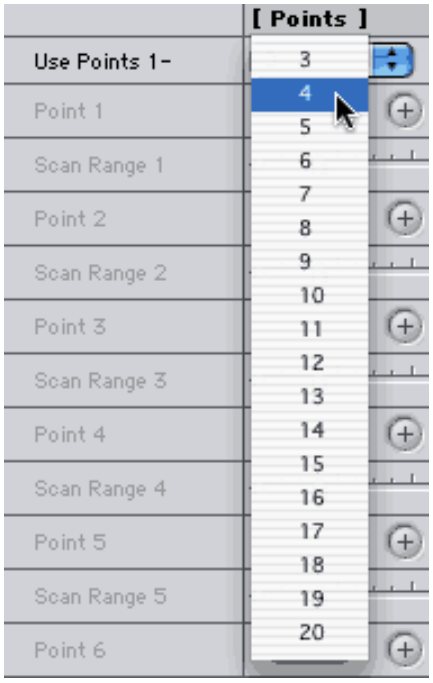
With the next section you can create a border around the garbage matte.



These four self-explaining controls define the appearance of the border.

The garbage matte can carry up to 20 points.





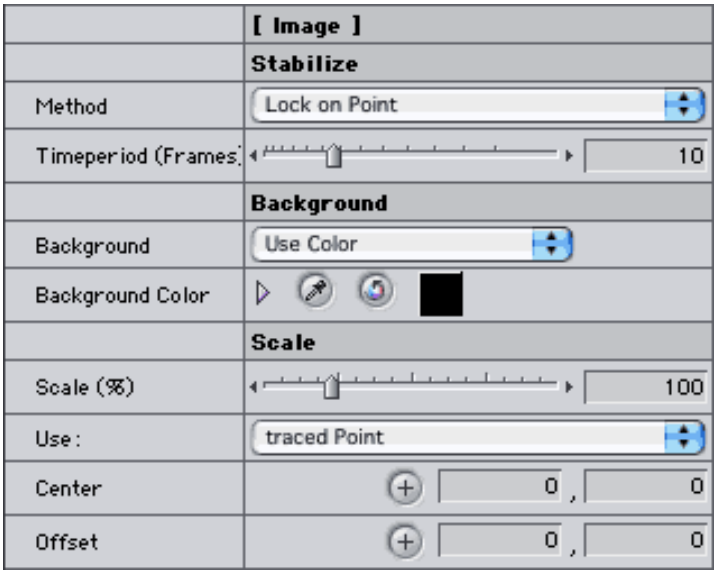
Define how many points you like to use for the garbage matte with the "Use Points 1-"-popup-menu. At least 3 points are needed to create a matte. Please define how many points you like to use, before you tell the MotionTracker the initial positions of the points.

MotionTracker Image Stabilizer

Use this tool to stabilize your clip. Unlike the included image-stabilize-plugin of Final Cut Pro, this tool tracks the selected point even if the point swirls around the screen. You can choose between a "lock" onto the selected point or an automatic calculated "anti-shake" feature, which is similar to what we all know from cameras. Additionally you can zoom into the stabilized video.

After tracking the initial points, you now have to tell the plugin what it should do with the tracked information. To do this you have to go to *Mode 5*.

These are the controls of the "Image Stabilizer"-tool:

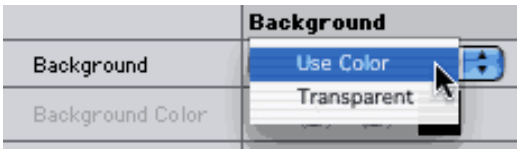


Method
There are two stabilize-modes:

"Lock on Point": The stabilizer keeps the selected (and tracked) point motionless. This mode can be used to focus on a specific area of the scene.

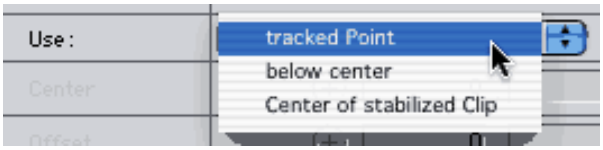
"Use Average over Time": The stabilizer will calculate a motion that counteracts with the movement of the camera. This function is very similar to the stabilizing-capabilities of several cameras. The tracked point will not stay where it was initially as described in the "Lock on Point" description. The movement of the point will be used to calculate the current motion of the camera. This gives the onlooker the impression of a "smoother ride". **"Timeperiod (Frames)"** will be used to average the camera movement. Longer timeperiods will make the movement smoother.

Background
As the Image Stabilizer counteracts with the movement of the camera and you don't zoom (scale) the clip, it is unavoidable that the border of the clip will come across the screen. Here you can define how the border should look like. You can either select a color of the border or make it transparent.



Scale
If you want to avoid that the border of the clip comes across the screen, you can scale the clip to keep the border off screen.

Use
Here you can choose which point should be used as the center to scale the point. Try all three methods to see which one you like best.



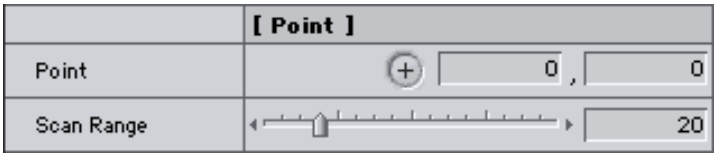
"Tracked Point": Use the point which was tracked by the MotionTracker.

"Below Center": Use the below defined center.

"Center of stabilized Clip": Use the center of the clip itself.

Offset
Additionally you can move the clip manually with this control.

The stabilizer only uses one point.



MotionTracker Point Distortion

This tool is made to distort certain parts of your project. Use it to make faces and number-plates unrecognizable or distort. Up to 10 points can be tracked simultaneously.

After tracking the initial points, you now have to tell the plugin what it should do with the tracked information. To do this you have to go to *Mode 5*.

These are the controls of the "Point Distortion"-tool:

	[Matte]
	Modify Matte
Feather	10
Invert Matte	
Opacity Matte	100
	Distort Content
Blur	0
Saturation	100
Invert	
Distort Method	Random
Distort Amount	30
	Background
Opacity Source	100

The first three controls will modify the calculated matte.

Feather Matte
Here you can feather the matte.

Invert
Check this checkbox to invert the matte.

Opacity
Use a setting below 100 to make the matte transparent.

The next five controls with distort the content of the matte.

Blur
Use this slider to blur the image contained within the matte.

Saturation
With this slider you can change the saturation of the image contained within the matte.

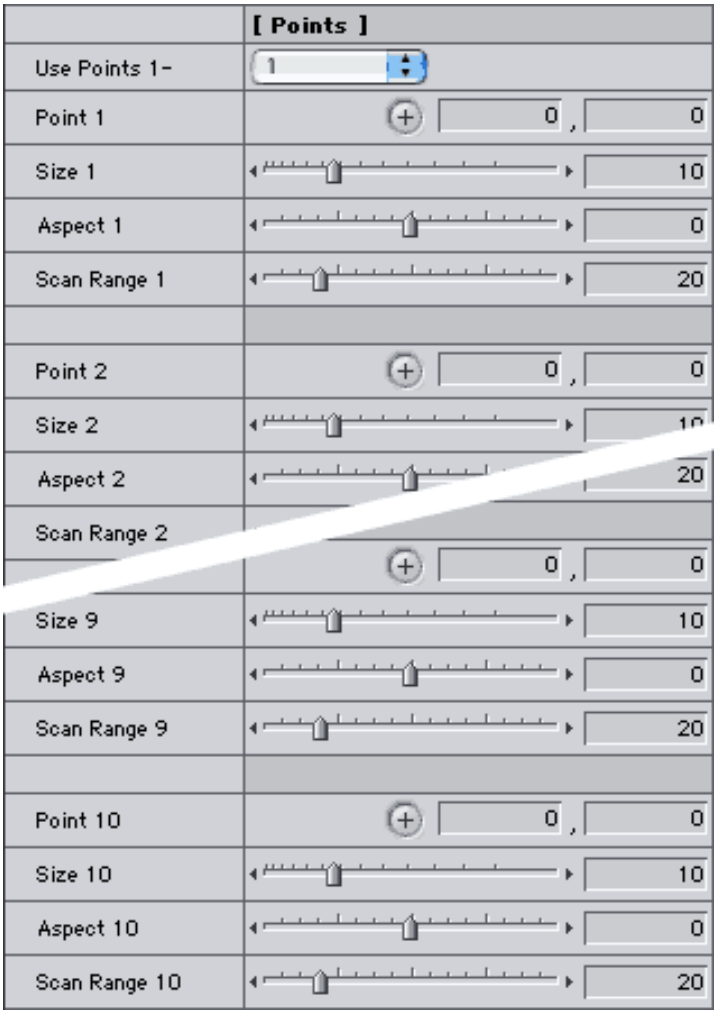
Distort Method
Distort Amount
If you like you can distort the content of the matte.

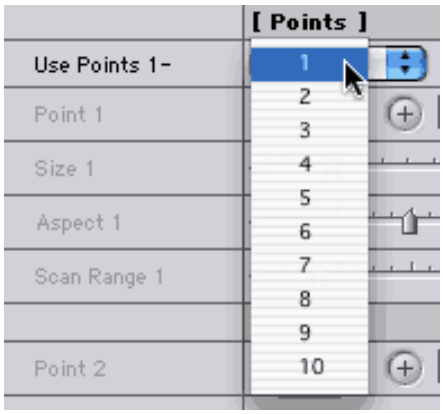
"Distort Method": "Random" will distort the image with a scattered noise. "Static" will add a static noise, as if you look through a heavily rippled glass.

"Distort Amount" controls the amount of the distortion.

Opacity Source
This slider controls the opacity of the areas outside the matte. A setting of 0 will make the area complete transparent.

Up to 10 point can be distorted simultaneously.

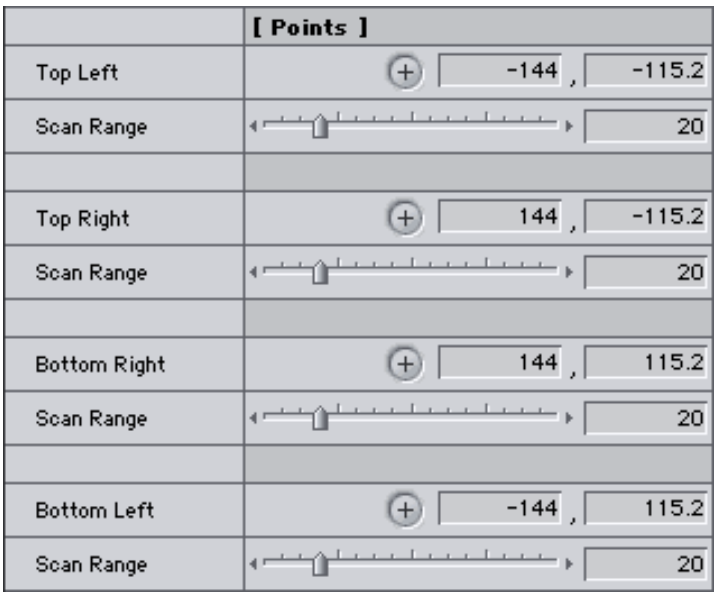




Define how many points you like to distort with the "Use Points 1-"-popup-menu. Please define how many points you like to use, before you tell the MotionTracker the initial positions of the points.

MotionTracker Zoom

If you want to take a closer look at something specific of a shaky video, use can this plugin.



The four points represent the four corners of the area, which will be scaled up to fullscreen.