

The manual for The Repair-collection V1.0

Reduce noise and repair damaged video

Read how to use the plugins of the Repair-collection and see for yourself how easy it is to repair damaged video

Noise Reduction V1.0

Get rid of noise and dust. Period!

It's as easy as it can be. Even though *Noise Reduction* is a very powerful tool, it only has four controls.

How does it work?

Noise Reduction is different to all the others de-noise tools out there. Most other tools simply apply a frame by frame blur over the video. And even if those tools omit edges, they will still just blur the video. If you want to get the noise back, you only have to apply a sharpen filter and your video is full of noise again. *Noise Reduction* works different, as it takes a completely different approach. *Noise Reduction* scans a certain timespan, compares all the frames of that timespan and evaluates mathematically what part of the video is real content and what part is noise that needs to be eliminated. By going that way you can get way better results as you have ever seen with Final Cut Pro.

There are only four controls:

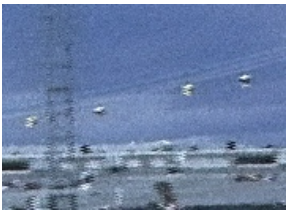
Noise (to eliminate)

Here you can set the maximum amount of noise you want *Noise Reduction* to eliminate. Note: Don't set this control too high. You might also eliminate content that should stay in your video.

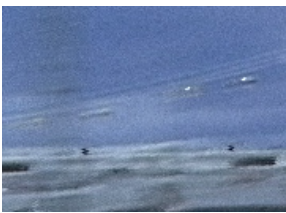
An example:



To demonstrate how the *Noise* parameter works, a really bad video will be chosen. A simple blur filter would have to give up on this one. Not *Noise Reduction*! In the background you can see some cable cars. To the left you can see a tower of a crane.



Now we set *Noise* to 15. You can see that the noise is nearly gone, but the content of the video is still there. You can clearly see the cable-cars and the tower. Even the cables of the cable cars are now visible.



Let's set *Noise* to 50. What happens now? *Noise Reduction* now also tries to eliminate the "noise" it can see in the moving cable cars and (due to the moving camera) the moving crane tower. In this case a value of 50 would be a little too much as it also eliminates the content of the video.

What we learn from this example is, that you have to be careful with the *Noise* value. Too high values can destroy the footage, too low values have no effect. Values from 2 to 20 are good in most cases depending on the video and the amount of noise. Higher values reduce more noise, but also might eliminate content of the video. If the value is set too low, you will still see your noise. Suggestion: Play with this slider. *Noise Reduction* always shows you the final rendered video in the canvas. Begin with lower values and evaluate the best setting.

Used Timespan

This slider tells *Noise Reduction* how much video should be taken into account for the detection of the noise. A longer timespan looks at more surrounding frames, but might also add a little motion-blur effect. Good values go from 10 to 40.

Sensitivity

This is a very special control. *Noise Reduction* works, because it takes surrounding frames into account for the evaluation of the existing noise. If the current scene of your video changes (i.e. due to a cut), it is not useful for *Noise Reduction* to use these frames for the evaluation. Therefore *Noise Reduction* calculates a value that describes the difference between the single frames. The higher the value, the more likely it is that the scene has changed. This is what *Sensitivity* is for. This slider determines a threshold and tells *Noise Reduction* the maximum allowed amount of the difference between the frames. You don't need to cut your footage into little scenes. *Noise Reduction* takes care of scene changes automatically and makes it possible to eliminate the noise of a whole film at once.

(C) 2006 by chv-electronics, The	
[General Settings]	
Noise (to eliminate)	<input type="range" value="20"/> 20
Used Timespan	<input type="range" value="34"/> 34
[Scene-change]	
Sensitivity	<input type="range" value="120"/> 120
Calc and show	<input type="checkbox"/>
www.chv-plugins.com, Christoph	
Noise Reduction V1.0	

If you check the **Calc and show** checkbox, you will see this additional info in the canvas:

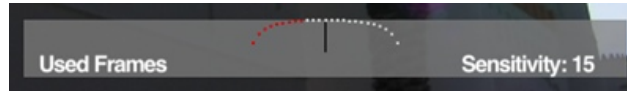


The black marker in the center marks the current frame. The white surrounding dots represent the surrounding frames. A white dot means that the frame is taken into account for the noise evaluation. A red dot means that the frame will not be used.

The *Sensitivity* value to the right is the calculated difference between the current frame and the next frame.



Here we can see some frames that are marked in red color. These frames will not be used for the noise evaluation, as they are too different from the current frame anyway.



Here we can see a typical scene change. The *Sensitivity* value for this frame to the next frame is 15. This means that there did not change a lot between those two frames. But there is a big change to some earlier frames. This is a typical display after a scene change.

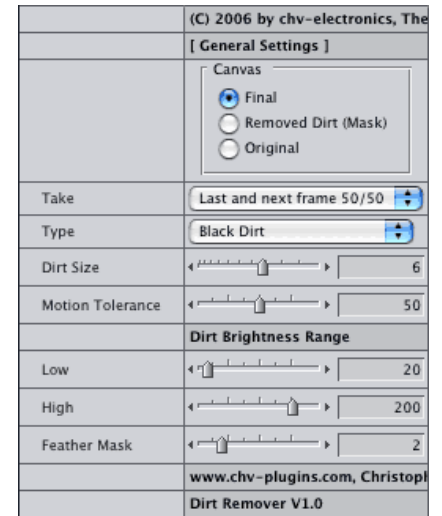
Hint: Remember that the noise will also show up in the *Sensitivity* value as it boosts up the value by the amount of the current noise. Even if you have a completely static scene, you will see that the *Sensitivity* value is not at zero. The value you see at that frame represents the actual noise and can be used to determine a good value for the *Noise (to eliminate)* slider.

Dirt Remover V1.0

Remove black and white spots from your video automatically.

Dirt Remover is made to eliminate dark and bright spots from your video and replace them with content taken from nearby frames. You can choose between the elimination of black, white or both types of spots at once. The rendered video can be previewed in the canvas and you can see it at a monitor you have hooked up to the DV connector (Firewire) of your Mac (additional DV converter needed if your monitor does not directly support Firewire connection).

In order to do this *Dirt Remover* has to look at nearby frames to find out if a certain spot is really a spot or a freckle or a moving object. If a spot has been identified, it will be replaced by the content from the last or the next frame or a combination of both. Therefore *Dirt Remover* creates a mask where all identified spots can be seen. You can preview the mask in the canvas.

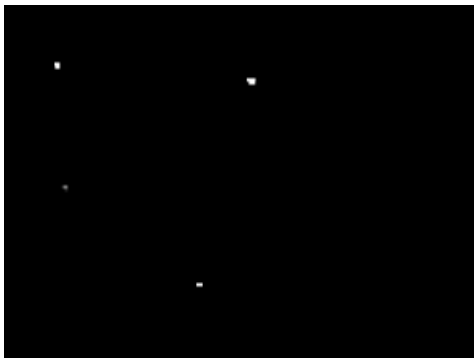


There are three modes for the canvas:



Mode: Original

The canvas shows you the unchanged footage. This is very useful to see if you have used good settings that only took care of the dirt. In this case we can see a video with some dark spots within this frame.



Mode: Removed Dirt (Mask)

Here we see the spots taken from the video. This will be used as a mask for the replacement with content from nearby frames.



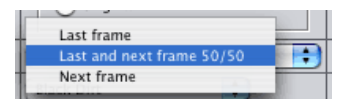
Mode: Final

The canvas shows the actual rendered footage. You don't need to switch to this setting if you want to render the image. For the final render process *Dirt Remover* automatically switches to this option.

Take

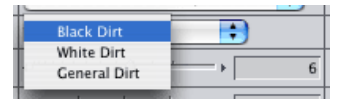
This popup is used to tell *Dirt Remover* which frames should be used to overlay onto the areas where spots have been detected.

The option *Last and next frame 50/50* will add up the previous and the next frame. This option is the best way to be sure to remove a spot completely by original content. If i.e. the video changes its brightness during that time, the 50/50 option adds up the surrounding frames and so creates a frame that carries the exact brightness that got lost by the unwanted spot.



Type

Use this popup to determine if you want to remove black or white spots or both at once.



Dirt Size

Here you can fix the maximum size of the spots you want to have removed. Only spots smaller than the given size will go away. All other spots will stay. This value is most important. Try to imagine the following: You have a very fast moving video where the content changes rapidly. A hand appears for only three frames. In the first frame the hand is visible on the left side of the video, in the second frame in the center and in the third frame on the right side. *Dirt Remover* must now determine if the hand in those frames is really some content that should stay or a spot that needs to be removed. This is done by telling *Dirt Remover* the maximum size of a spot. Usually such a fast moving object is way bigger than a spot you want to get rid of. By setting the *Dirt Size* slider to the maximum size of the spots, you can ensure that only spots will be removed and such a fast moving hand will stay where it is.

Motion Tolerance

In order to get a good grip on real spots, *Dirt Remover* has to take a good look at the video. It is very easy for *Dirt Remover* to see where a spot appears if there is no motion in the video. But if the video has a very fast motion, it is quite complicated to figure out if a specific object is a spot or just a fast moving freckle. This is why there is the *Motion Tolerance* control. The higher you set this value, the less *Dirt Remover* will take care of the motion of the objects in the video and it is possible that some objects will be removed. Make sure not to set this value too high. Values between 1 and 40 are good in most cases.

Dirt Brightness Range

Dirt does not always look the same. In addition each video might have a different black and white level. Use these two controls *Low* and *High* to tell *Dirt Remover* the brightness range of the video. Don't narrow the brightness range too much. *Dirt Remover* needs to have a chance to look at the whole video. A too narrow range is contra productive and should be avoided.

Important:

- *Dirt Remover* will not be able to find the spots anymore, if the speed of the video has been changed. Please make sure to remove the spots first, before you change the speed.

Feather Mask

This additional control might help in some cases when you get borders around the repaired spots. With this control you can feather the mask in order to eliminate those borders.

Some Hints:

- It is important that spots are visible for one frame only. Spots that are visible for longer than one frame, will not be considered as a spot and wont be removed.

- If you experience very big spots or damages in your video, you might want to use either *Dead Pixel* or *Dropout Eliminator* to repair them.

Dropout Eliminator V1.0

Repair even the worst dropouts with content from nearby frames.

Dropout Eliminator is made to repair damages like dropouts or burn holes. If your video contains big damages in a single frame or field, you can replace the lost content with the content of a nearby frame. As a requirement your video must have a similar frame close to the damaged frame. You might understand that there is not even a chance for this plugins to repair a big dropout if there is nothing that can be used to fill the damaged hole.

At first you have to determine if the damaged area is visible only in a single field or in a full frame. If you use interlaced footage it is most likely that the damage is only visible on a single field. Film usually gets damaged by the full frame. This determination is important, because the correct version of *Dropout Eliminator* must be used for best results. There is a version for interlaced material and a version for progressive material included in the Repair-collection. Both versions are clearly marked. The only difference between the two versions is, that the version for interlaced material holds an additional popup, where you can select the desired field to repair. The version for progressive material does not have this control and always uses the full frame.

The description below explains how to use the interlaced version. The procedure is the same for progressive material, except the field controls selection. Don't use the interlaced version for progressive video. You could, but you would have to do everything twice, because the interlaced version repairs only one field at once.

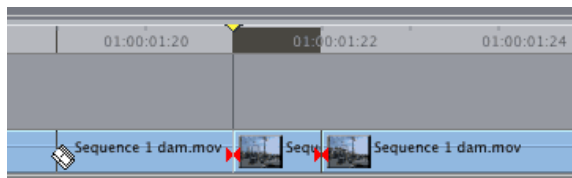
If you have more than one damage in a single frame, you can also apply the filter twice in order to repair the second damage.

Let's take a look at our damaged example:



As you can see, the damage is clearly visible. The magnification to the right shows that only one field is damaged. So we choose the interlace version of *Dropout Eliminator* to repair the damage.

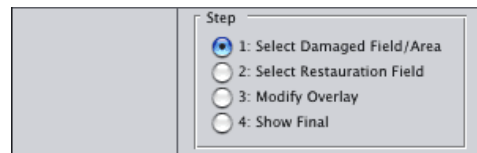
Now you have to isolate the frame that contains the damage. Take the blade-tool (press B) and make a cut at the left and right side of the damaged frame.



Now drop *Dropout Eliminator (Interlace)* onto the single frame you have just isolated. Double-click the frame and select the Controls-tab in the viewer.

Step-by-Step

To repair your video *Dropout Eliminator* uses a 4-step method. Just follow the four steps and the damage is gone. First you have to select the damaged field and area. Then you have to select a field that looks similar to the damaged one. It might be possible that a field from a nearby frame fits better. So take a look around and select an appropriate field. The next step is to modify the inserted field to match motion and color. At last you can look at the repaired field and render it.

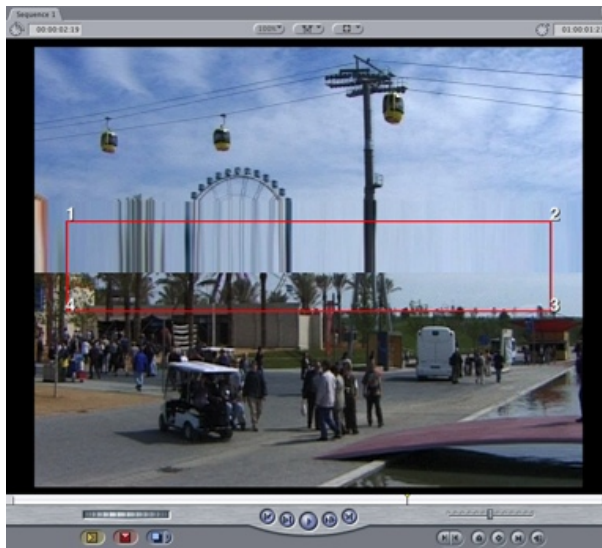


Step 1: Select Damaged Field/Area

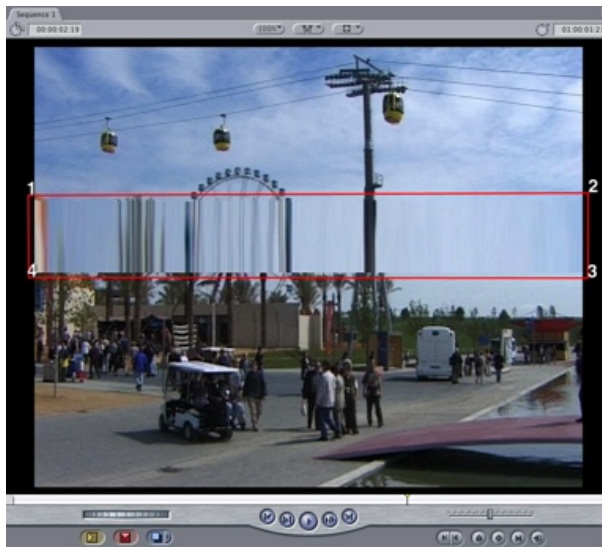
At first you have to select the damaged field. In our case it's field 1



[1: Select Damaged Field/Area]	
Select Field	Field 0
Corner 1	+ -288 , -57.6
Corner 2	+ 288 , -57.6
Corner 3	+ 288 , 57.6
Corner 4	+ -288 , 57.6



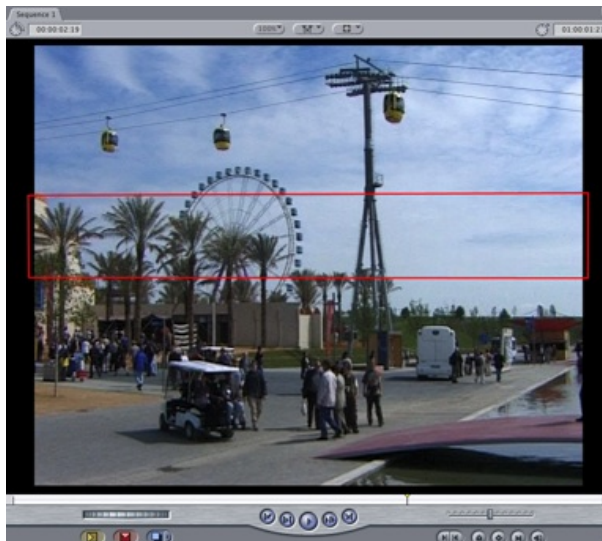
Now you have to mark the damaged area with the four *Corner* controls. You might want to make the area a little bigger than the actual damage. If you do so, you can feather the mask in a later step without getting the damaged area back.



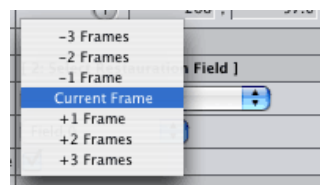
Step 2: Select Restoration Field

At next you have to select a field that is not damaged. We have seen (in this example) that field 1 is damaged. So let's see if field 0 is ok:

[2: Select Restoration Field]	
Used Frame	Current Frame <input type="button" value="⌵"/>
Select Field	Field 0 <input type="button" value="⌵"/>
Frame Damaged Area	<input checked="" type="checkbox"/>



Field 1 is ok. If it also would have been damaged or if the content does not fit, we can choose a different frame to select a field from. You can select a frame (and field) from the 6 surrounding frames (and fields).



Step 3: Modify Overlay

Here you can modify the insert. You don't have to do anything if your video did not change over time between the damaged field and the inserted field.

But if the camera has moved, the brightness, contrast or color did change between those two field, you can compensate the difference by doing the proper modifications in this section.

You can also find the *Feather Overlay* slider in this section. If the field used for the restoration does not fit by 100%, you can feather the edges of the overlay in order to "hide" the little difference and to avoid that you will be able to see it.

Remember: *Dropout Eliminator* can only do a good job, when you have some content that can be used to overlay the damaged area. If the damage is too big and you don't have any content to insert, even *Dropout Eliminator* won't be able to help you. In this case it is usefull to extract the damaged field and use a photo editing tool to repair the damage manually. But experience showed that usually there is enough footage that fits into the damaged area.

Step 4: Show Final

This is the last step. Look at the final result and decide if the repaired area is good to go.

[3: Modify Overlay]	
Frame Damaged Area	<input checked="" type="checkbox"/>
Move Horizontally	<input type="text" value="0"/>
Move Vertically	<input type="text" value="0"/>
Rotate	<input type="text" value="0"/>
Zoom Horizontally	<input type="text" value="1"/>
Zoom Vertically	<input type="text" value="1"/>
Feather Overlay	<input type="text" value="0"/>
Black&White	
Brightness	<input type="text" value="0"/>
Contrast	<input type="text" value="0"/>
Red	
Brightness	<input type="text" value="0"/>
Contrast	<input type="text" value="0"/>
Green	
Brightness	<input type="text" value="0"/>
Contrast	<input type="text" value="0"/>
Blue	
Brightness	<input type="text" value="0"/>
Contrast	<input type="text" value="0"/>

Dead Pixel V1.0

The intelligent tool to repair dead pixels and spots.

Actually this is the most useful single spot restoration tool ever. *Dead Pixel* is able to reconstruct damaged areas with a size of up to 16 x 16 pixels. Normally you will use this tool to repair footage that has been shot with a digital camera with dead pixels. Such footage is actually useless and in most cases you can't bring it back. If you have such footage, *Dead Pixel* will be a life saver.

At first you have to apply the filter to the footage. Now open the controls of *Dead Pixel* and select if you use interlaced or progressive video.

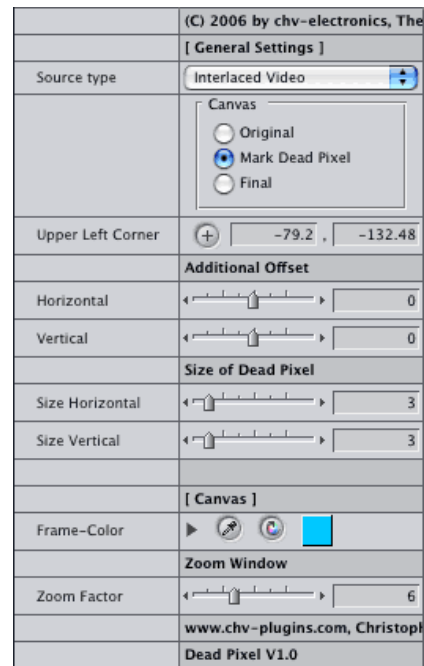


Now you have to mark the pixel you want to repair. Use the control *Upper Left Corner* to set the marker as close as you can to the damaged pixel (or area). A handy magnification window in the canvas shows you a scaled up view of the place where you have set the control *Upper Left Corner*.

Remember to set the canvas to 100%. If you use a smaller size, you won't see the whole video resolution and you probably won't be able to place the marker at the right spot.

Additional Offset

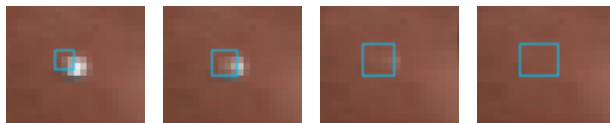
Don't worry if you could not set the marker at the perfect spot right away. The *Additional Offset* controls enable you to shift the marker closer to the desired spot pixel by pixel. The additional magnification window in the canvas also helps a lot. There you can see if you have set the marker correctly.



At the top left corner of the canvas you can see the magnification window

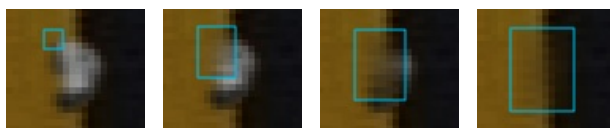
Size of Dead Pixel

Here you can determine the actual size of the dead pixel (or damaged area). If you have set the marker at the upper left corner of the damaged area, you will see that the damage goes away while you are adjusting the size of the marker.



The restoration progress can be monitored while adjusting the size of the marker.

If you have footage with a single dirty spot, you can also use *Dead Pixel* to repair it. Isolate the damaged frame with the blade-tool (press B) and make a cut at either side of the damaged frame. Apply *Dead Pixel* and go to the controls. Move the marker to the damaged area and adjust its size. You will see that even bigger damages (up to 16 x 16 pixel) can be repaired.



Take a close look. As you can see even the damaged edge has been fully reconstructed.