

# Transformations

Listed in Alphabetical Order

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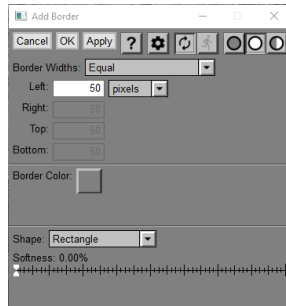
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## Add Border

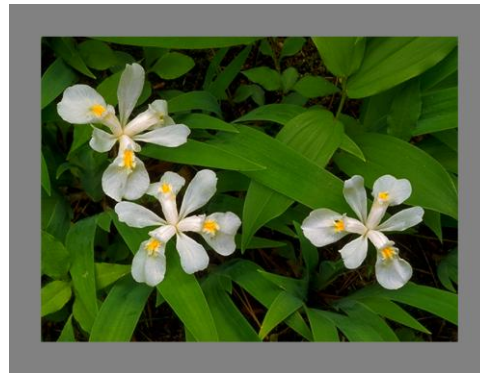
The Add Border transformation adds pixels around the input image to form a border. In the simplest case, it can be a solid color, rectangular border. Other options let you tile the border with an image or alter the shape of the border and the softness of the edge between the image and the border.



Input



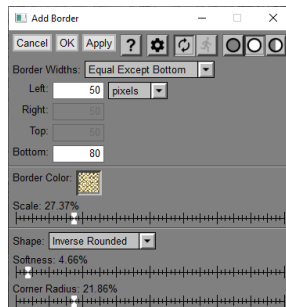
Add Border



Output



Input

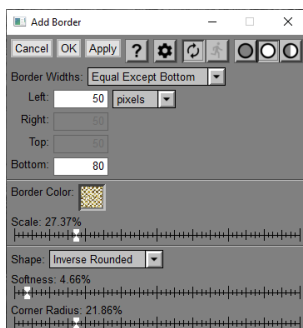


Add Border



Output

## Using the Add Border Transformation



### Border Widths

This control lets you select equal borders, unequal borders or equal except for the bottom border.

### Left/Right/Top/Bottom

This is where you enter the border width in pixels or physical units. Borders that are forced to be equal to other borders are grayed out.

### Border Color/Scale

This control lets you select a solid color for the border or an image. If you select an image, a Scale slider is also displayed to let you make the image larger or smaller when it is tiled to fill the border.

## Shape/Softness/Corner Radius

These controls let you select the shape of the border.



Rectangle

Rounded

Beveled

Indented



Inverse Rounded

Oval

Diamond

The Softness slider lets you control how much the border between the image and the border is blurred.



Depending on the shape you select, there may also be a Corner Radius slider to control how much corners are rounded.



0%

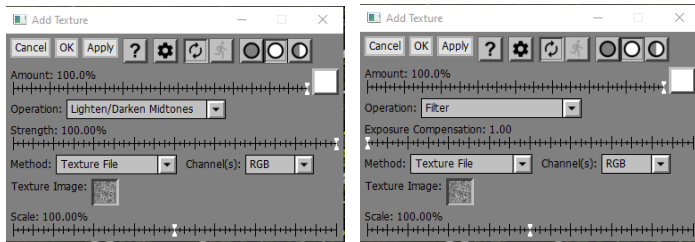
15%

30%

45%

# Add Texture

The Add Texture transformation adds noise or a repeating texture pattern to an image.



## Amount

The amount control blends a percentage of the input image with the output image to scale back the effect of the Add Texture transformation. If you create a mask, you can use the amount control to localize the effect of the transformation to parts of the input image.

## Method

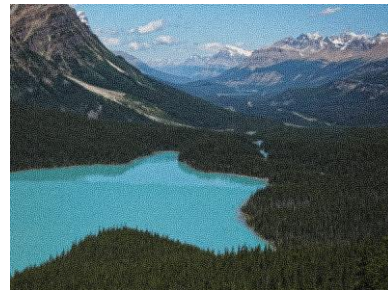
This controls lets you select the type of texture you want to add.



Uniform Random



Gaussian Random



Mezzotint Texture File

### Uniform Random

This option applies uniformly distributed random noise

### Gaussian Random

This option applies normally distributed random noise

### Texture File

This option applies a tiled texture image (see below)

## Channels

### HSV V

For color images, this option applies noise to the HSV V channel only. It does not affect hue or saturation.

### HSL L

For color images, this option applies noise to the HSL L channel only. It does not affect hue or saturation.

### RGB

For color images, this option applies noise to the red, green and blue channels independently.

## Operation

This control lets you select what method is used to apply the texture to the input image. Here are some examples of the different methods which are described below.



### Filter

This operation applies the texture image as a filter (like sandwiching transparencies). It makes the image darker where the texture is dark and leaves it unchanged where the texture is light. You can use the Exposure Compensation slider to lighten the output image. Use the Amount slider if you want to dial back the effect.

### Subtractive Filter

This operation applies the texture image as a subtractive filter (like a negative of sandwiched negatives). It makes the image lighter where the texture is light and leaves it unchanged where the texture is dark. You can use the Exposure Compensation slider to darken the output image. Use the Amount slider if you want to dial back the effect.

### Blend

This operation applies the texture image by averaging the two images (like a double exposure). Use the Amount slider if you want to dial back the effect.

### Lighten/Darken Midtones

This operation applies the texture image by lightening the image where the texture is light and darkening the image where the texture is dark. You can use the Strength slider to reduce the amount to lightening or darkening. You can also use the Amount slider to dial back the effect.

## Exposure Compensation

This slider is only displayed if Operation is set to Filter or Subtractive Filter. It lets you correct for the tendency of Filter to darken images or Subtractive Filter to lighten images.

## Strength

This slider is only displayed if Operation is set to Lighten/Darken Midtones. The strength slider lets you reduce how much texture is added.

## Texture Image and Scale

This image control and slider are only displayed if Method is set to Texture File. The image control lets you select the texture image file which should be an 8-bit or 16-bit black and white seamless tile. The Scale slider lets you adjust the coarseness of the texture. A number of texture files are distributed with Picture Window and others such as the Mezzotint textures illustrated above can be downloaded from our web site.



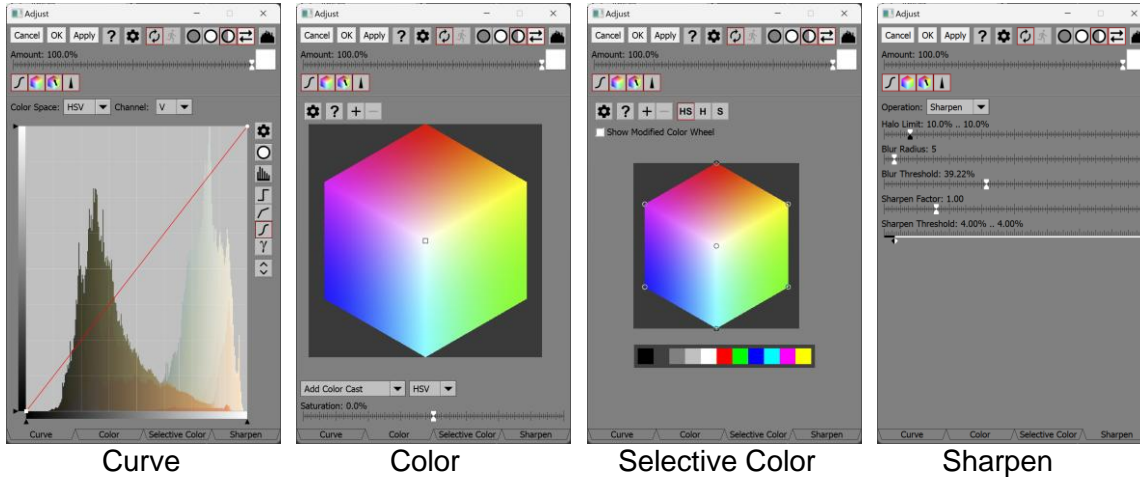
# Adjust

The Adjust transformation combines simplified versions of the Color Curves, Color Balance, Selective Color Correction, Multipass Sharpen and Gaussian Blur transformations. Sometimes the underlying properties of an image these different transformations adjust are interrelated, and it is useful to be able to play one off against the other without having to switch transformations. Adjust is also very powerful when used with masks to make targeted changes to parts of an image since with a single mask you can change several image attributes.

There is also a streamlined version of the Adjust transformation called Levels and Color that has fewer features but is easier to use.

## Using the Adjust Transformation

The Adjust dialog box has four tabs across the bottom that let you switch between four sets of controls:



## Amount

The amount control blends a percentage of the input image with the output image to scale back the effect of the Adjust transformation. If you create a mask, you can use the amount control to localize the effect of the transformation to parts of the input image.

## Tool Bar

The tool bar lets you enable or disable the effects of one or more of the tabs. When a button is depressed, the tab is active. By switching tabs on or off you can quickly check their results on the output image.

## Curve Tab

The Curve tab displays controls more or less identical to the Color Curves transformation.

## Color Tab

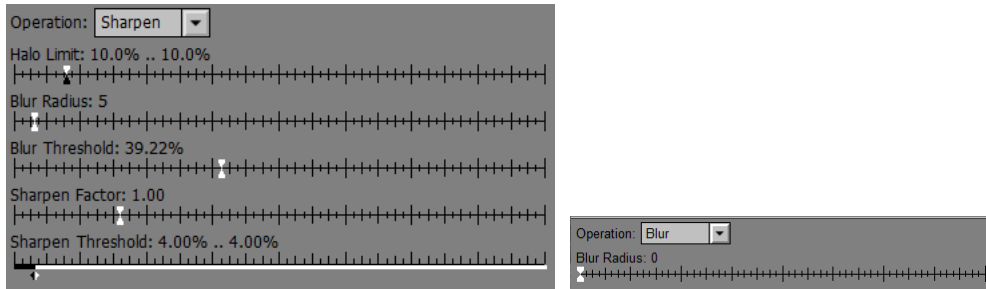
The Color tab displays a zoomable color hexagon to let you select a color to add to or remove from the input image. The effect is the same as in the Color Balance transformation. There is also a Saturation slider you can use to increase or decrease the saturation of the image.

## Selective Color Tab

The Selective Color tab displays a zoomable color hexagon you can use to make selective color corrections, just like the Selective Color Correction transformation.

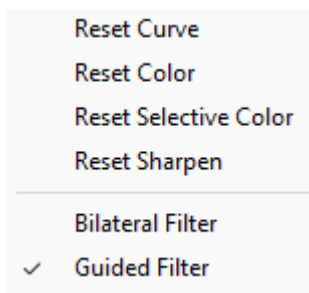
## Sharpen Tab

The Sharpen tab lets you sharpen or blur the image, depending on the operation you select.



The Sharpen settings are the same as those of the Multipass Sharpen transformation. The Blur settings do a Gaussian blur of the specified radius.

## Settings Menu



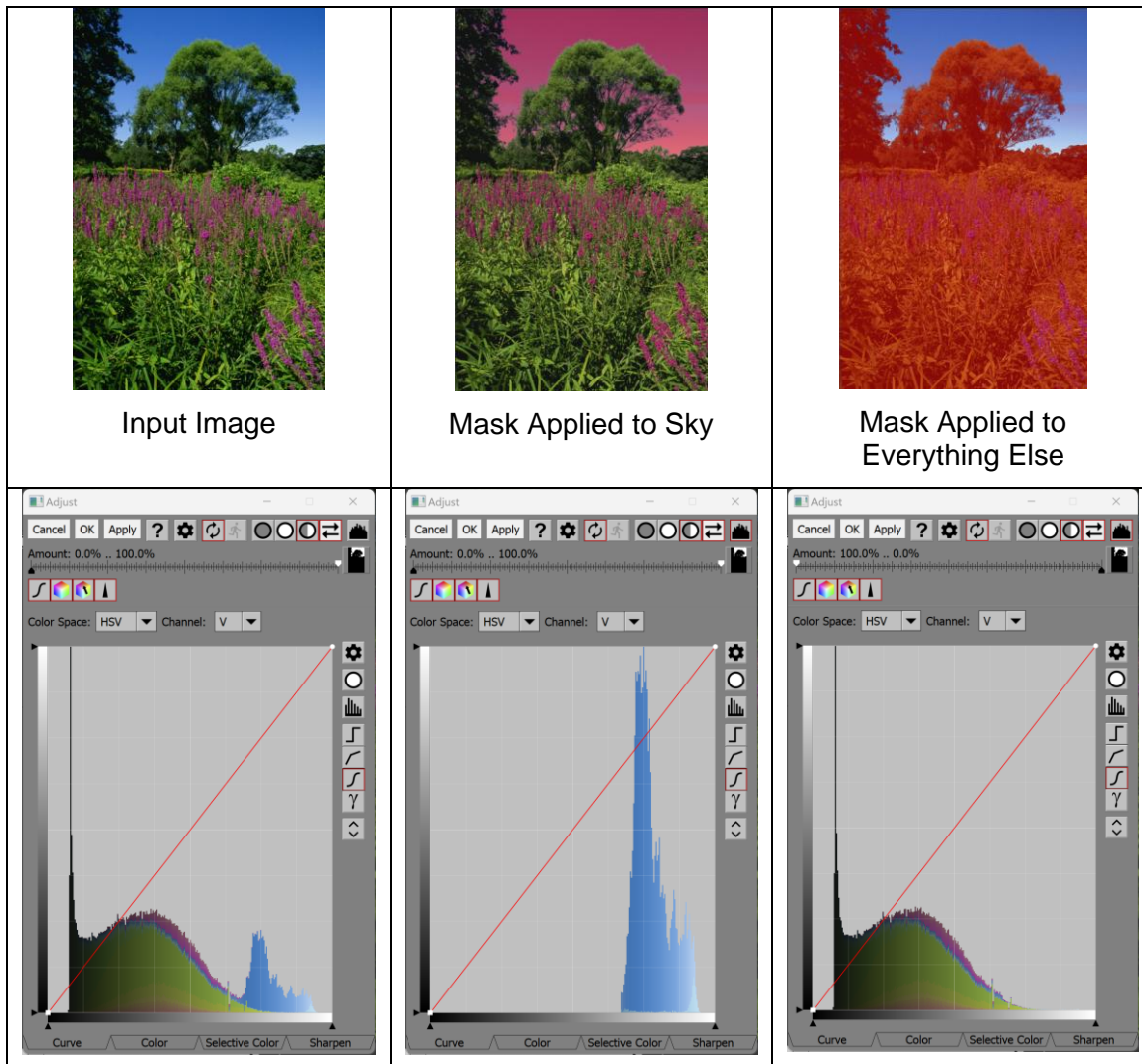
The Reset commands let you reset the settings in one of the four tabs while leaving the other settings unchanged.

You have a choice of Bilateral or Guided filtering as the edge-preserving blur method. The results are very similar, but Bilateral is slower than Guided, especially when using a large radius, and also slightly more prone to artifacts. Bilateral is provided mostly for compatibility with older scripts – the more modern Guided option is usually preferable.

## Histogram Button

The Histogram button located in the upper right corner of the dialog box comes into play when you use a mask with the Adjust transformation. When it is depressed, the histogram displayed in the Curve control in the Curve tab is computed using only the pixels where the mask is present. Partially masked pixels make fractional contributions to the histogram. This lets you see the histogram of just the parts of the image to which the transformation will be applied. Based on this restricted histogram you can more easily create curves that modify the brightness or contrast of the masked area.

### Histogram Button Example





# Advanced Sharpen

The Advanced Sharpen transformation works in three stages: noise reduction, speck removal and sharpening. These three operations are applied sequentially to the input image to produce the output image.

- **Noise Reduction**

In this phase, the image is blurred in such a way as to reduce noise without softening edges. This feature is very useful for reducing film grain artifacts in scanned images or noise in digital camera images, especially in smooth regions such as clouds or clear skies. The blurring algorithms incorporate special thresholding techniques to prevent softening sharp edges and other high contrast detail.

- **Speck Removal**

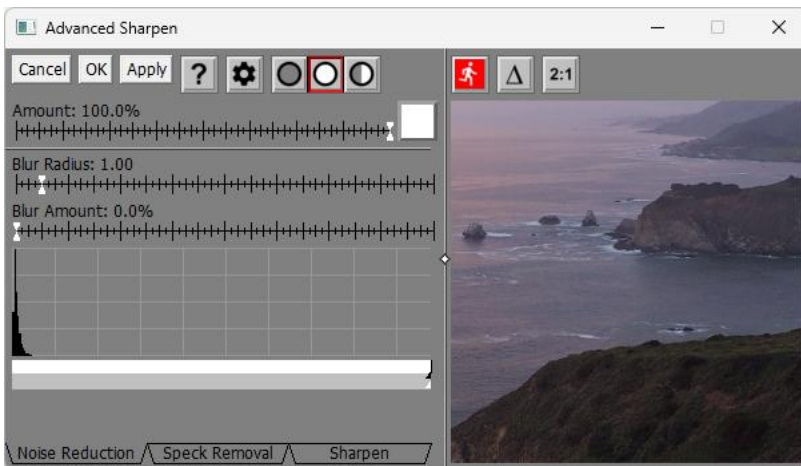
Isolated pixels or small clusters of pixels significantly lighter or darker than the surrounding area are called specks. Specks can be caused by dust or imperfections in the film, camera or scanner. While the noise reduction phase does not remove specks, it does make them easier to detect by smoothing the area around them. Several parameters can be adjusted to control the speck removal process so you can eliminate specks without losing significant image detail.

- **Sharpening**

Once the preceding two phases are complete, the image is ready to be sharpened. Since sharpening amplifies noise and exaggerates specks, the preceding two phases make it possible to sharpen images that might otherwise break up when sharpened. The sharpening phase can be controlled using selectable thresholds to sharpen high contrast detail without amplifying low contrast detail.

The Advanced Sharpen transformation is designed to do a more precise and thorough job of sharpening than Picture Window's main blurring, speck removal and sharpening tools. Consequently, Advanced Sharpen has a somewhat more complicated interface and executes quite a bit slower. When properly used, however, the results make the extra time and effort worthwhile.

## Using the Advanced Sharpen Transformation



The Advanced Sharpen dialog box consists of a fixed upper panel and a variable bottom panel. At the bottom of the dialog box are three tabs that let you select the three phases—Noise Reduction, Speck Removal and Sharpening. Clicking the corresponding tab switches the variable part of the dialog box to show the relevant controls for the phase you have selected.

For faster response time, Advanced Sharpen has its own preview area.

You can increase the size of the preview by dragging one of the corners of the dialog box. If you widen the dialog box, you can drag the white diamond in the center of the vertical separator bar between the controls and the preview area to enlarge one while making the other smaller.



### -- Preview Button

To preview the effect on the entire output image, click the button just above the preview area. To re-center the preview, click on the input image in the main image area. You can also scroll the preview area by clicking and dragging on it.

The preview image displays the results of the current phase and its preceding phases only, so you are only seeing the final preview when you select the Sharpening tab.



### -- Difference Button

When the Difference button is depressed, the preview area displays the difference between the input image and the preview image.



### -- Magnify Preview Button

When the Magnify Preview button is depressed, the central portion of the preview area is magnified by a factor of two, making it easier to see fine details. Clicking the button a second time restores the normal 1:1 display.

If you wish to bypass a phase, just click one of the other tabs leaving the settings for the phase you want to skip defaulted to take no action.

The fixed portion of the dialog box consists of the standard Picture Window Amount

When Advanced Sharpen is active, its probe is also active and clicking and dragging on the input image displays a red, vertical marker in the histogram display for the current phase. The position of the marker corresponds to the histogram value for the part of the image at the current cursor location. If you hold down either Shift key while clicking and dragging on the input image, a red marker is displayed just below the histogram showing the range of values in the input image. To clear the range display, simply click on the input image without the Shift key depressed.

## Noise Reduction

Noise reduction is performed one pixel at a time using modified Gaussian blurring. Gaussian blurring works by replacing each pixel with a weighted sum of the pixels in a roughly circular region surrounding it. Nearby pixels are assigned greater weights than distant pixels following a Gaussian distribution curve. There are several noise reduction parameters you can control.

### Blur Radius

The larger the radius, the broader the distribution, and the more surrounding pixels are included in the neighborhood, resulting in a blurrier image. Using a larger radius also increases the amount of computation and consequently runs slower.

### Blur Amount

This setting controls how much of the selected blur is applied to the image. When set to zero, no blurring is performed—as the amount increases, blurring is also increased. This is done by computing a weighted average between the original image and the fully blurred image.

### Histogram

The histogram display just below the Blur Amount slider lets you perform selective blurring by including only those neighboring pixels in the computations that differ by less than a given threshold amount from the pixel you are sharpening.

Unlike histograms used in the Brightness Curve transformation, the Noise Reduction histogram reflects not the tonality of the image, but rather the roughness of its texture. Bars at the left end of the histogram correspond to pixels in very smooth areas of the image, namely areas of nearly solid color.

Bars further to the right in the histogram indicate the presence of pixels whose neighbors exhibit more variation. Pixels that are near prominent edges or in areas that have a lot of fine detail will thus contribute to histogram bars to the right of pixels that are in the middle of a smooth textured feature such as a cloud

or clear sky. By distinguishing between these two types of pixel, Advanced Sharpen can smooth areas of low detail while leaving edges and image details intact.

Traditional Gaussian blurring does a very good job of smoothing out noise, but also softens edges and smooths out fine detail. To prevent this, Picture Window excludes all pixels from the blurring computation that differ by more than a specified threshold from the central pixel. Consider for example two areas of more or less solid color that meet at a sharp edge. When blurring pixels on one side of the edge, if the threshold is set properly, only similar neighbors are included in the weighted sum, thus preventing pixels from the other side of the edge from being included in the computation (and thus blurring) the edge.

Rather than implementing a sharp cutoff, Picture Window lets you set two thresholds—one below which all pixels are included and one above which all pixels are excluded. Between the two thresholds, pixels make a partial contribution to the blurring computations. This method helps reduce artifacts from the sudden switchover.

In order to let you make an intelligent decision about how to set the thresholds, Picture Window computes and displays a histogram of the differences between nearby pairs of pixels in the image. Markers are displayed below the histogram to indicate the current threshold settings, and you can adjust these by dragging the markers. Also, when you click and drag on the input image, the corresponding location in the histogram is highlighted so you can see what difference values are present in each part of your image.

For best results, try to apply just enough blurring to remove noise while preserving as much image detail as possible—this usually means setting the radius and thresholds to the minimum values that still eliminate noise in smooth areas of the image.

## **Speck Removal**

Isolated single pixels or small groups of pixels that are either darker or lighter than the surrounding pixels are called specks. Since they represent a large local variation from their neighbors, specks are not removed by the noise reduction phase.

Speck removal operates by first detecting and then removing specks from the results of the preceding noise reduction phase. There are several settings to help you control the process.

### **Speck Size**

This setting controls how large a speck will be removed. Try to use the smallest value that removes the specks you want to eliminate. Setting this value too large may cause a loss of image detail. Speck detection works by looking at a region twice the diameter of the speck size. It first computes the average value in the ring of pixels surrounding the speck and then compares this to the pixels in the center.

### **Remove Light/Remove Dark**

These settings tell the speck detector to search for specks that are lighter and/or darker than the background. If neither checkbox is checked, no action is taken. If your specks are primarily black (as is the case with dust on scanned positives), select Remove Dark. If your specks are primarily white (as for dust on scanned color negatives), select Remove White. If you have both kinds of specks, select both.

### **Speck Difference Threshold**

This slider tells the speck detector to ignore specks that are lighter or darker than the surrounding area by less than a given threshold amount. Set this slider as high as possible to remove specks without removing too much image detail.

## **Sharpening**

Once blurring and speck removal are completed, you may find that relatively little sharpening is needed. In any case, there are several settings you can use to control how much and what parts of the image is sharpened. Sharpening is performed by first blurring the image and then comparing the original image to the blurred version and exaggerating the differences between them. Thus, pixels that stand out from their neighbors will stand out even more in the result image while pixels that are close to the average of their neighbors will be changed relatively little.

## Sharpen Radius

This setting controls how much the image will be blurred in preparation for sharpening. For best results, this setting should be smaller for images that are already relatively sharp and larger for images that are softer.

## Sharpen Amount

This setting controls how much the differences between pixels in the original image and the blurred image are exaggerated. Higher settings increase the sharpening effect, but if you over-sharpen you will start to see light halos around dark objects and dark halos around light objects. These halos can be reduced however by setting the Max Overshoot/Undershoot (see below).

## Halo Limits

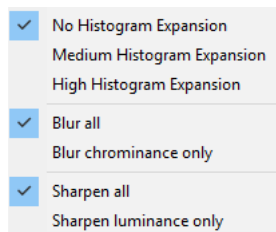
These settings are useful for controlling light or dark halos that occur around distinct edges. The white slider limits the maximum amount a pixel can be lightened when sharpening and the black slider limits how much it can be darkened. Setting max overshoot or undershoot to 0% suppresses all sharpening while setting them to 100% performs no halo suppression. Use the lowest value that produces acceptable halos.

## Histogram

The histogram display just below the Sharpen Amount slider lets you perform selective sharpening by including only those neighbor pixels in the computations that differ by more or less than a given threshold amount from the pixel you are sharpening. Raising the lower limits helps prevent amplifying fine texture or noise. Lowering the upper limits helps reduce halos.

## Settings Menu

There is also a settings menu available by clicking the  button at the top of the dialog box.



This menu lets you select various advanced options:

### No/Medium/High Histogram Expansion

These settings let you control how much expansion is applied to the histogram display. The default setting of no expansion displays histograms normally. The more expansion you select, the more lower histogram values are boosted. Histogram expansion can make it easier to see small variations that would otherwise be swamped by large peaks.

### Blur All/Chrominance Only

This setting applies only to the Noise Reduction Phase. Normally, the red, green and blue channels are all blurred equally. Optionally, the image can be split into two parts: a brightness component and a pair of color components collectively referred to as chrominance. By blurring chrominance only, brightness variations remain unchanged while just the color information is blurred. This type of blurring can be helpful for reducing color noise in digital camera images.

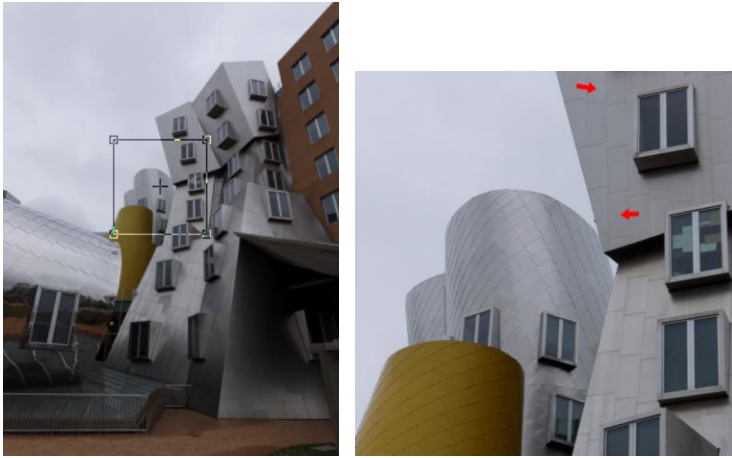
### Sharpen All/Luminance Only

This setting applies only to the Sharpening phase. Normally, the red, green and blue channels are all sharpened equally. Optionally, the image can be split into two parts: a brightness or luminance component and a pair of color components. By sharpening the luminance only, color variations remain untouched while just the brightness information is sharpened. This can help sharpen images without amplifying color noise.

## Example

### The Original Image

Here is the starting point—a small cropped region extracted from an unsharpened raw file from a digital camera.



There are several things you might notice about this image. First it is a little soft as is common with digital camera images viewed at a 1:1 zoom factor. Also, there is some low-level noise and also a couple of specks as indicated by the red arrows. For the purposes of this example, we will treat the specks as artifacts to be removed and not as image detail.

### Sharpening without Noise Reduction and Speck Removal

Here is what happens if you sharpen the image without halo limits and without first doing noise reduction and speck removal:

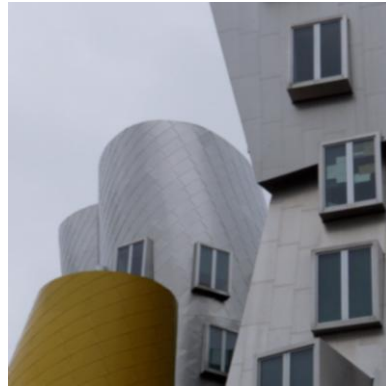
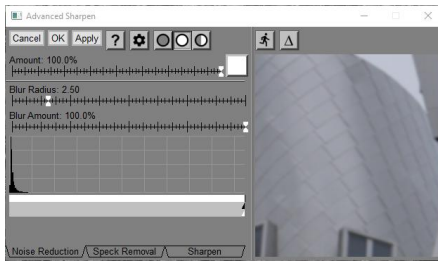


While this improves the sharpness of the image, it also exaggerates the camera noise, makes two specks more prominent and produces obvious halos at well-defined edges.

### Noise Reduction

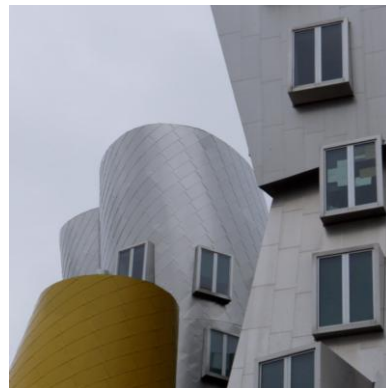
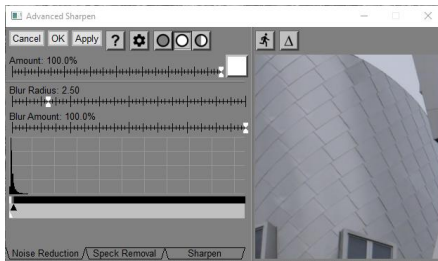
Now let's return to the original image and see how noise reduction works. The goal of noise reduction is to remove most of the noise from the image without losing too much fine detail.

The first step is to set the Blur Amount to 100% and adjust the Blur Radius slider until the texture of the noise disappears in the preview. In this example, this happens at a radius of about 2.5 pixels. At this stage, the building will also get very soft, but we will deal with that next.



If you look at the histogram at the bottom of the dialog box, you will see a large spike at the bottom that falls off to the right. The spike corresponds to the fine texture of the image and this is the part we need to blur. You can confirm this by shift-clicking and dragging over the sky in the input image as this will display a red marker at the corresponding location in the histogram.

To blur the flat areas, we need to drag the black and white markers to the left as shown below:



In this case, the black and white markers have been positioned so that the white part of the bar spans the histogram peak and it fades to black along the steep part of the histogram just to the right of the peak. If you don't cover the peak with the white part of the bar, fine texture will not be blurred; if you cover too much beyond the peak, you will start to lose detail in the building. In any case, noise reduction neither sharpens the building nor removes specks—these tasks will be performed by the next two phases.

## Speck Removal

The next step is to click on the Speck Removal tab. This performs noise removal on the entire input image and switches the dialog box to display the speck removal parameters.

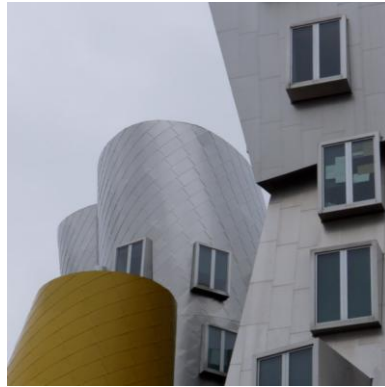
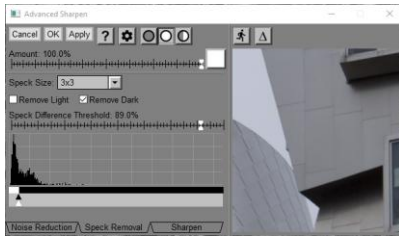
Since this image has black specks only, check the Remove Dark checkbox.

Next, set the speck size large enough to remove most of the specks. Often it is better to keep this parameter small as this increases the probability of removing image detail instead of specks, and a few large specks are not much trouble to remove manually.

Finally, adjust first the Speck Difference Threshold slider and then the markers below the histogram so that you are removing as many specks as possible without removing image detail. To set the Speck Difference Threshold slider, slowly move it to the left until specks start to reappear and then back off a bit. Then set the markers (the black and white markers are permanently locked together in this phase), so the white area under the histogram spans the area from which we want to remove specks. Again, move the slider to the right until specks start to reappear in the preview.

Here is the result of setting the speck removal settings:



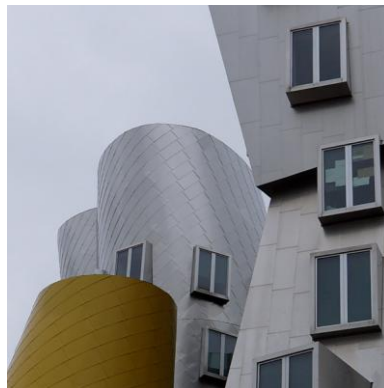
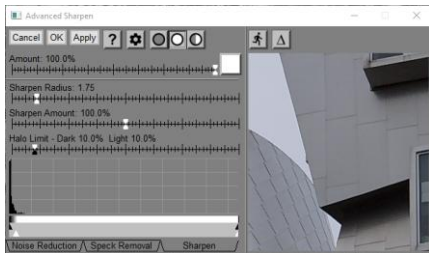


## Sharpening

To advance to the final sharpening phase, click on the Sharpening tab at the bottom of the dialog box.

First set the Sharpen Radius and Sharpen Amount to achieve the desired sharpening effect on the area you want to sharpen. At this stage you can ignore undesired halo effects and amplified noise. The softer the original image, the larger the radius you need to select. For a given radius, the Sharpen Amount slider lets you control how much sharpening you want. Over-sharpening produces an unnatural effect and can cause blocking of highlights and shadows and should be avoided in most cases.

Next, adjust the Halo Limit sliders to remove unwanted light and dark halos. Going too far will also reduce the sharpening effect, so only move the sliders as far left as necessary.



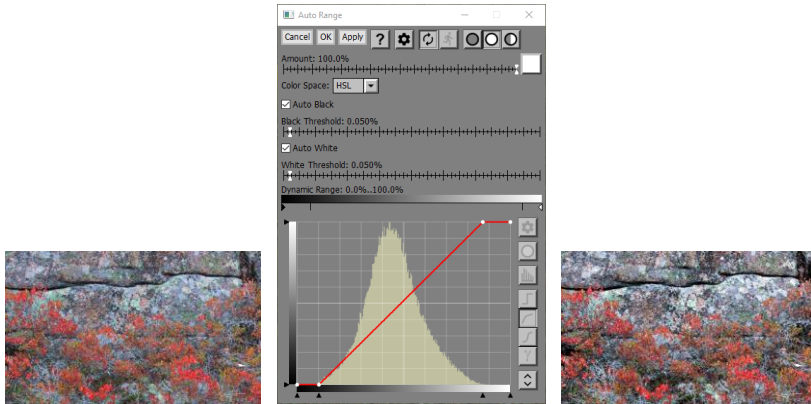
Finally, adjust the markers below the histogram so the white area of the bar is under the part of the histogram you want to sharpen. In this case it will be everything except where the large spike is. If you watch what is happening in the preview image as you move the markers you can see where to set them for the most sharpening of the building with the least amplification of noise.

## Tips

Trying to remove too much noise from an image usually results in a loss of detail as well. Usually it is better to under-correct noise as it is often invisible when the image is viewed at a normal scale rather than zoomed in to 1:1.

# Autorange

The Autorange transformation examines its input image to determine its black and white points and then lets you reset the black and white points to a new dynamic range. By default, the new dynamic range runs from pure black to pure white, in which case, assuming the input image does not already occupy the full dynamic range, this will increase the contrast by making sure the shadows are as dark as they can be and the highlights are as bright as then can be, without significant clipping. By adjusting the dynamic range sliders, you can reduce the contrast by compressing the dynamic range either for shadows, highlights or both.



Identifying the black and white points is not as simple as just scanning the input image for the darkest and lightest pixel. For example, if an image is mostly mid-level gray but has one black pixel and one white pixel, it would use the full dynamic range, even though the black and white pixels might be virtually invisible in the photograph. For this reason, the black and white points are determined by averaging a percentage of the darkest and lightest pixels. The number of pixels averaged is set by the Black Threshold and White Threshold sliders, so you can control how much shadow and highlight clipping you are willing to allow. Thresholds determine what percentage of the pixels in the image are used to determine the black or white point. The curve applied to the input image is displayed for reference.

The Auto Black and Auto White check boxes let you enable or disable setting the black and white points in case you want to do only one or the other.

## Amount

The amount control blends a percentage of the input image with the output image to scale back the effect of the Autorange transformation. If you create a mask, you can use the amount control to localize the effect of the transformation to parts of the input image.

## Color Space

This control is only displayed if the input image is color. It lets you choose which measure of brightness you want to adjust (HSV or HSL).

## Ignore Unselected

If you have created an Amount mask (see above), then if this box is checked, the parts of the input image that correspond to where the mask is black are ignored when computing the black and white points. This can be useful, for example, if the input image has a border that you want to ignore.

## Auto Black

If this box is checked, the black point of the input image is determined automatically based on the Black Threshold. If not, the black point is assumed to be pure black.

## Black Threshold

This slider lets you adjust what percentage of the pixels in the input image are used to determine its black point. The lower the threshold, the fewer shadow pixels are clipped. The higher the threshold, the greater the output image contrast.



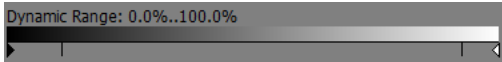
## Auto White

If this box is checked, the white point of the input image is determined automatically based on the White Threshold. If not, the white point is assumed to be pure white.

## White Threshold

This slider lets you adjust what percentage of the pixels in the input image are used to determine its white point. The lower the threshold, the fewer highlight pixels are clipped. The higher the threshold, the greater the output image contrast.

## Dynamic Range



The tic marks below the gray correspond to the automatically determined black and white points of the input image. The black and white markers let you set the dynamic range of the output image. If you leave them in their default positions at the ends of the range, the output image will run from pure black to pure white. If you move them, the dynamic range is compressed accordingly.

## Curve

This control displays the curve that Autorange applies to the input image to produce the output image. It is displayed for information purposes only and cannot be edited.

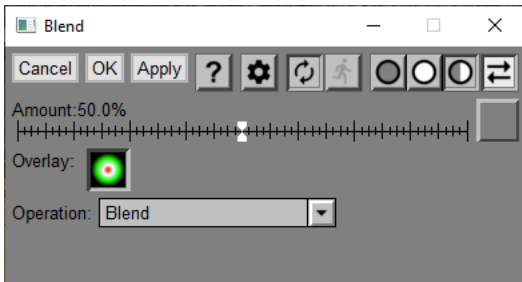
## Bilateral Sharpen

This transformation has been renamed to Multipass Sharpen since the bilateral filter it was built around has been largely supplanted by the superior Guided filter. For compatibility, older scripts using bilateral sharpening will continue to use the same bilateral algorithm and thus produce the same results as before, but you can update the transformations to use Guided filtering if you wish. When loading script or workspace script files, references to Bilateral Sharpen are automatically converted to Multipass Sharpen.

# Blend

The Blend transformation can combine its input image with an overlay color or image in various ways to produce its result. The input image and the overlay image, if any, must have the same dimensions in pixels but they can be different types.

The Composite transformation is a more powerful but more complicated version of Blend that can also align images, handle different size images, and has more masking options.

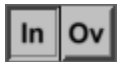


## Amount

The amount control blends a percentage of the input image with the output image to scale back the effect of the Blend transformation. If you create a mask, you can use the amount control to localize the effect of the transformation to parts of the input image.

## Overlay

This control lets you select the overlay image or solid color. The overlay image must be the same size in pixels as the input image.



-- this tool bar at the top of the dialog box lets you display either the input (In) or the overlay (Ov) image. If the overlay image is set to a solid color instead of an image, the second button is grayed out. If the display is set to show only the output image, the entire tool bar is hidden.

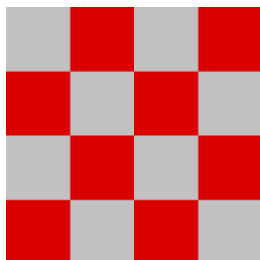
The other way to switch between inputs is to use the image browser. To select the input image, click the Blend thumbnail in the image browser. To select the overlay image, click the smaller Overlay thumbnail just to the right of the Blend thumbnail in the image browser.

## Operation

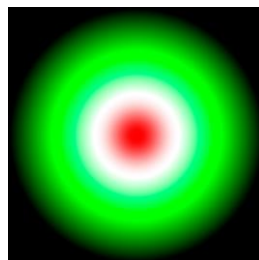
This control lets you select the way the two images are combined. Depending on the operation you select, an additional slider may be displayed at the bottom of the dialog box.

### Blend

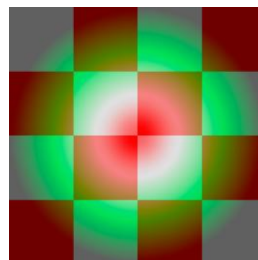
The Blend operation creates the output image as a weighted average of the input and overlay images. The slider in the Amount control determines the relative amounts of the two images – an Amount of 0% yields the input image, an Amount of 100% yields the output image and intermediate values yield a combination of the two images similar to a multiple exposure.



Input Image



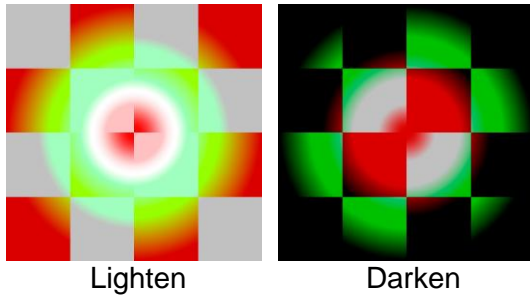
Overlay Image



50% Blend

## Lighten/Darken

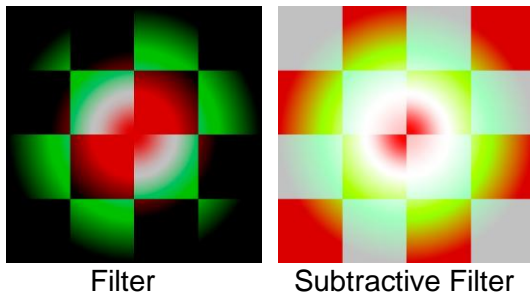
These operations create the output image by selecting the lightest or darkest of the two images at every pixel location.



## Filter/Subtractive Filter

Filter creates the output image by multiplying the two images at every pixel location. The effect is like sandwiching two transparencies. Subtractive filter (also known as Screen) is similar except it inverts the two images before multiplying them and also inverts the result. Filter always darkens the image and subtractive filter always lightens it. The Exposure Compensation slider that is visible only when either of these operations is selected can be used to lighten the filter image or darken the subtractive filter image.

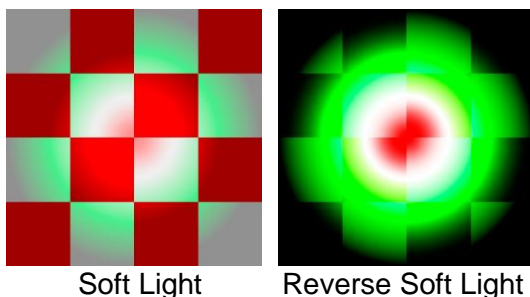
Filter is also known as Multiply and Subtractive Filter is also known as Screen.



## Soft Light/Reverse Soft Light

Soft Light darkens or lightens the colors in the input image, depending on the overlay image color. The effect is like shining a diffused spotlight on the image. If the overlay color (light source) is lighter than 50% gray, the image is lightened as if it were dodged. If the blend color is darker than 50% gray, the image is darkened as if it were burned in. Applying pure black or white produces a distinctly darker or lighter area but does not result in pure black or white.

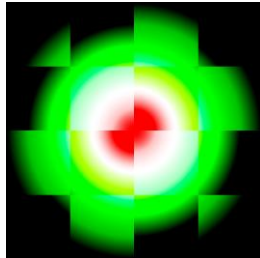
Reverse Soft Light is the same as Soft Light but with the input and overlay images swapped.



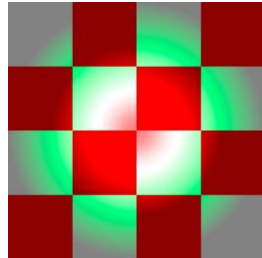
## Hard Light/Reverse Hard Light

Filters or subtractive filters the colors, depending on the overlay color. The effect is similar to shining a harsh spotlight on the image. If the overlay color (light source) is lighter than 50% gray, the image is lightened, as if it were subtractive filtered. This is useful for adding highlights to an image. If the blend color is darker than 50% gray, the image is darkened, as if it were filtered. This is useful for adding shadows to an image. Applying pure black or white results in pure black or white.

Reverse Hard Light is the same as Hard Light but with the input and overlay images swapped. Reverse Hard Light is also known as Overlay.



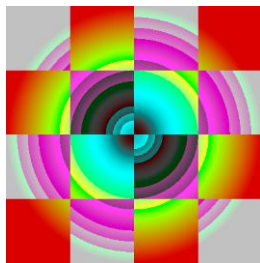
Hard Light



Reverse Hard Light

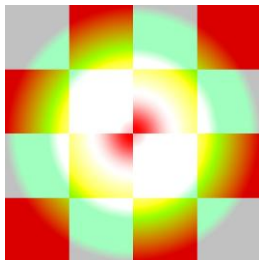
## Negative

Negative combines the input and overlay images using the exclusive-or operation. This is a special effect and not useful for general photo editing.



## Add

Add creates the output image by adding the input and overlay images. Highlights are clipped to white if they exceed the maximum pixel value. This operation is also known as Linear Dodge.

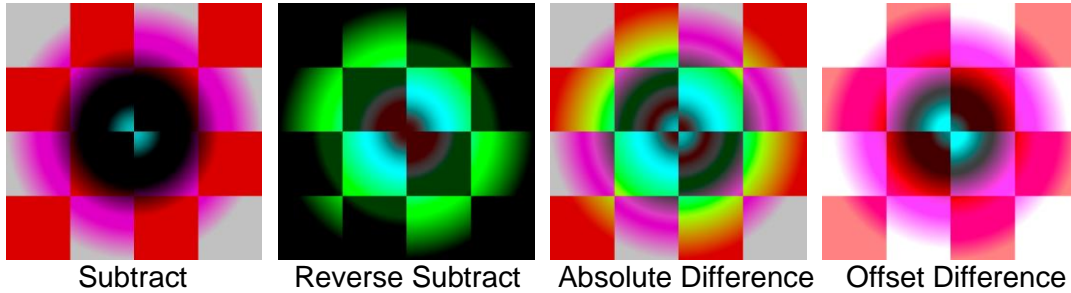


### Subtract/Reverse Subtract/Absolute Difference/Offset Difference/Increase Difference

Subtract creates the output image by subtracting the overlay image from the input image at every pixel location. Reverse Subtract is similar except that it subtracts the input image from the overlay image. In either case, negative values are clipped as black. Absolute difference subtracts the two images but makes any negative values positive. Offset difference is like Subtract but with a mid-level gray added.

These operations are useful when you want to determine where two similar images are different.

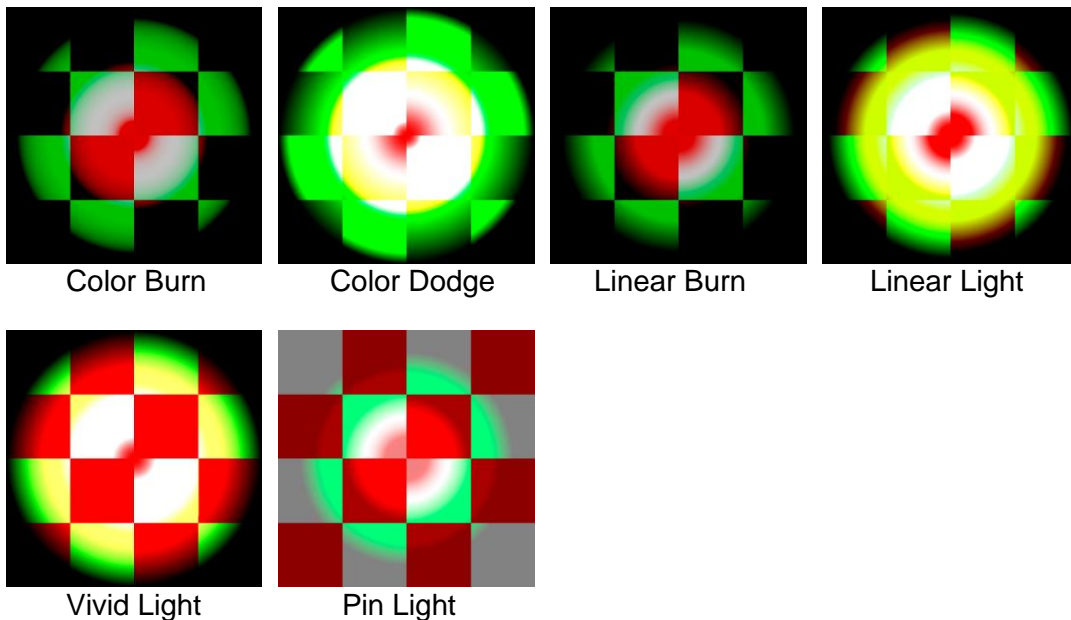
The Strength slider that is visible only when one of these operations is selected can be used to amplify or reduce the difference between the two images.



Increase Difference lightens the input image where it is lighter than the overlay image and darkens it where it is darker than the overlay image. If the overlay image is a blurred version of the input image, this effectively sharpens the input image.

### Color Burn/Color Dodge/Linear Burn/Linear Light/Vivid Light/Pin Light

These are similar to operations of the same name in other image editing software.



### Blending Formulas

For the more mathematically inclined, here are the formulas the Blend transformation uses to compute its output image from its two input images, depending on the selected operation. To simplify the equations, pixels values are assumed to run from 0.0 for black to 1.0 for white, and amount values run from 0.0 for 0% to 1.0 for 100%.

- A Input
- B Overlay
- X Amount
- S Strength
- E Exposure Compensation

Step 1 -- Compute the result (R) – Note: if R goes outside (0.0 ... 1.0), it is clipped.

Blend:  $R = B$

Lighten:  $R = \max(A, B)$

Darken:  $R = \min(A, B)$

Filter:  $R = A * B * E$

Subtractive Filter:  $R = 1 - ((1 - A) * (1 - B)) * E$

Soft Light:  $R = A * (A + 2 * B * (1 - A))$

Reverse Soft Light:  $R = B * (B + 2 * A * (1 - B))$

Hard Light: if  $(B < 0.5)$   $R = 2 * A * B$  else  $R = 1 - 2 * (1 - A) * (1 - B)$

Reverse Hard Light if  $(A < 0.5)$  then  $R = 2 * A * B$  else  $R = 1 - 2 * (1 - A) * (1 - B)$

Negative:  $R = A \text{ xor } B$

Add:  $R = A + B$

Subtract:  $R = (A - B) * S$

Reverse Subtract:  $R = (B - A) * S$

Absolute Difference:  $R = |A - B| * S$

Offset Difference:  $R = (A - B) * S + 0.5$

Color Burn: if  $B = 0$  then  $R = 0$  else  $R = 1 - (1 - A) / B$

Color Dodge: if  $A = 1$  then  $R = 1$  else  $R = B / (1 - A)$

Linear Burn:  $R = A + B - 1$

Linear Light:  $R = B + 2 * A - 1$

Vivid Light: if  $A \leq 0.5$  then  $R = 1 - (1 - B) / (2 * A)$  else  $R = B / (2 * (1 - A))$

Pin Light: if  $B < 2 * A - 1$  then  $R = 2 * A - 1$  else if  $B < 2 * A$  then  $R = B$  else  $R = 2 * A$

Increase Difference:  $R = A + S * (A - B)$

Step 2 -- Apply Amount (X) to R to compute the output value (O)

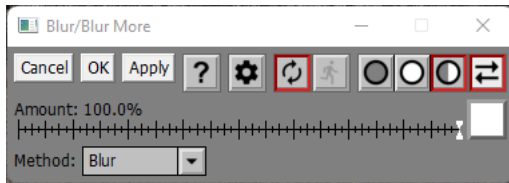
$O = A * (1 - X) + R * X$

## Corresponding Photoshop Names of Blending Modes

| Picture Window      | Photoshop          |
|---------------------|--------------------|
| Blend               | Normal             |
| Lighten             | Lighten            |
| Darken              | Darken             |
| Filter              | Multiply           |
| Subtractive Filter  | Screen             |
| Soft Light          | Soft Light         |
| Reverse Soft Light  |                    |
| Hard Light          | Hard Light         |
| Reverse Hard Light  | Overlay            |
| Negative            |                    |
| Add                 | Add (Linear Dodge) |
| Subtract            | Subtract           |
| Reverse Subtract    |                    |
| Absolute Difference |                    |
| Offset Difference   |                    |
| Color Burn          | Color Burn         |
| Color Dodge         | Color Dodge        |
| Linear Burn         | Linear Burn        |
| Linear Light        | Linear Light       |
| Vivid Light         | Vivid Light        |
| Pin Light           | Pin Light          |
| Increase Difference |                    |



## Blur/Blur More



Blur/Blur More transformation is good for very light blurring.



Original



Blur



Blur More

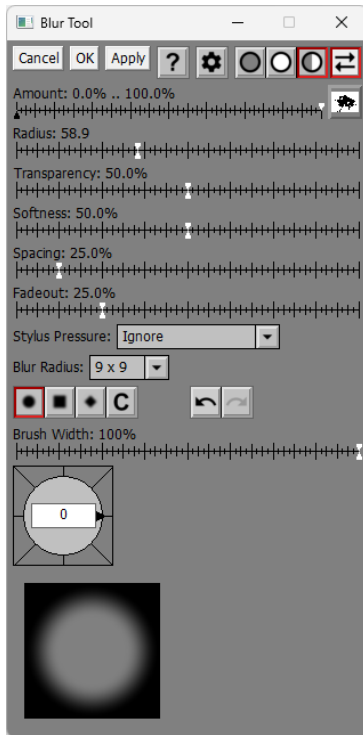
### Amount

The amount control blends a percentage of the input image with the output image to scale back the effect of the Blur transformation. If you create a mask, you can use the amount control to localize the effect of the transformation to parts of the input image.

# Blur Tool

The Blur tool lets you blur an image using a brush. Like the Clone or Paint tools, you paint directly on the output image. Other transformations such as Gaussian Blur and Precise Gaussian Blur, when used with masks, can produce similar results and provide more control, but the Blur Tool is a little easier to use.

## Using the Blur Tool



Unlike most other transformations, the Blur tool operates directly on the output image. It displays a cursor that marks where image data is going to be painted. The radius of the cursor is determined by the brush radius setting.

To blur, click and drag on the output image.

### Amount

The amount control blends a percentage of the input image with the output image to scale back the effect of the Blur transformation. If you create a mask, you can use the amount control to protect parts of the input image from being modified, a little like using masking tape to avoid painting an area.

### Brush Settings

#### Radius

The Radius slider adjusts the brush size. You can also use the mouse scroll wheel to make the brush larger or smaller.

#### Transparency

The Transparency slider lets you vary the transparency of the image data you clone over the output image. The more transparent, the more subtle the effect.

#### Softness

The Softness slider lets you vary the brush from hard-edged to having a gradual falloff. The brush preview area at the bottom of the dialog box lets you see how soft the brush is.

#### Spacing

The Spacing slider lets you vary the interval at which the brush is applied as you move it over the image. If you increase it too much you will not get a smooth effect. Too small and the brush is hard to control.

## Fadeout

The Fadeout lets you make the brush stroke fade out by becoming more transparent the long the paint.

## Blur Radius

The Blur Radius controls how strongly the image will be blurred when you apply the brush. Larger values blur faster.

## Stylus Pressure

If you don't have a tablet connected to your computer, this setting is ignored. If you do have a tablet with a pressure-sensitive stylus, you can use this setting to determine which brush setting, if any, is adjusted depending on how hard you press the stylus into the tablet surface.

### Ignore

This causes stylus pressure to be ignored.

### Controls Opacity

The harder you press, the less transparent the brush.

### Controls Radius

The harder you press, the larger the brush.

### Controls Hardness

The harder you press, the less soft the brush.

### Controls Flow Rate

The harder you press, the smaller the spacing between brush applications.

## Brush Shape

The Brush Shape tool bar lets you make the brush circular, square, diamond shaped or custom. For information on custom brush shapes, see the separate document: [Creating and Using Custom Brush Shapes.pdf](#).

## Brush Width

The Brush Width slider lets you make the brush narrower. Alternatively, you can rotate the mouse wheel with the Ctrl key held down.

## Brush Angle

The Brush Angle compass control lets you rotate the brush shape. Alternatively, you can rotate the mouse wheel with the Shift key held down.

## Settings Menu

In addition to the standard menu items, the settings menu lets you load or save the current brush settings (Radius, Transparency, Softness, Spacing, Fadeout, and Shape).

## Undo/Redo

The Undo and Redo buttons let you erase or redraw blur operations, one stroke at a time. A stroke is defined as everything between pressing the mouse button and releasing it.

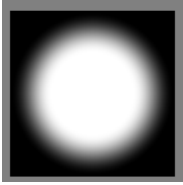
If the Undo or Redo button is grayed, it means there are no operations left to undo or redo. If you undo too many operations by accident, you can click the redo button until you get back to where you wanted to be. However, once you draw a new stroke, you can no longer redo past that point.

You can use the keyboard shortcuts Ctrl-Z for Undo and Ctrl-Y for Redo.

Normally, Undo preserves the current brush settings, but if you want to revert to the settings for the previous stroke, hold down the Shift key while clicking the Undo button or pressing Ctrl-Z.

## Brush Preview

The Brush Preview area at the bottom of the dialog box provides a visual representation of the size, shape, softness and transparency of the brush. It cuts off beyond a certain size, so it is only useful for small to medium size brushes.

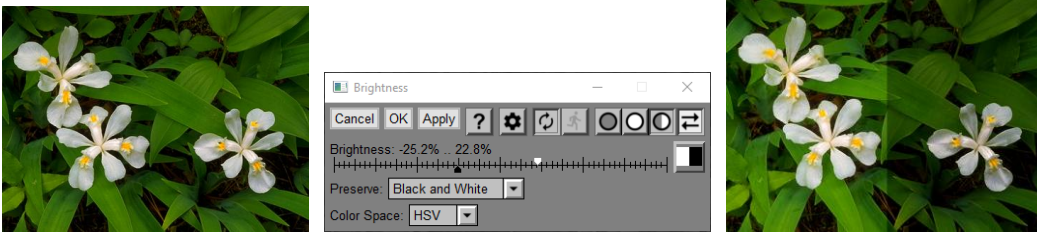


## Reloading Previous Settings

If you use the Ctrl-R keyboard shortcut to load the settings from the last use of the tool, you will restore not only the brush and other tool settings but also all the strokes you applied to the previous image. To load the previous settings without re-applying any strokes, use Ctrl-Shift-R instead.

# Brightness

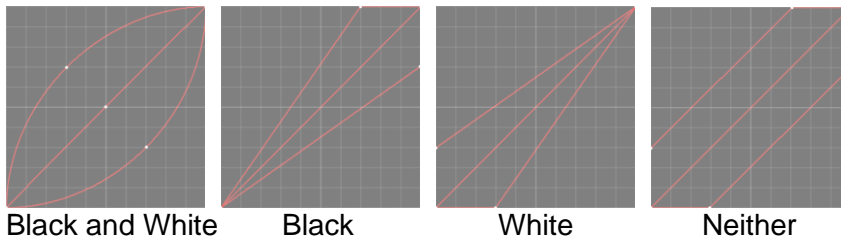
The Brightness transformation lets you increase or decrease the brightness of an image. If you use a mask you can lighten some parts and darken others at the same time.



The Brightness transformation lets you increase or decrease the brightness of an image using a simple slider or selectively, using an Amount mask.

## Preserve

The Preserve control determines what family of curves is used to adjust brightness.



**Black and White** – There is little effect on shadows or highlights. The primary effect is on midtones. This setting works best most of the time.

**Black** – There is little effect on shadows. The primary effect is on midtones and highlights. Increasing brightness can lead to clipping of highlights.

**White** – There is little effect on highlights. The primary effect is on shadows and midtones. Decreasing brightness can lead to clipping of shadows.

**Neither** – Brightness is adjusted equally for all pixels. This can lead to clipping of either shadows or highlights.

To check for highlight or shadow clipping, you can use the buttons on the main tool bar:



These buttons toggle highlight and shadow clipping alarms. Depending on the settings in File/Preferences, pixels above or below a specified limit are displayed as a warning color. By default, clipping is set at 0 and 255 and the colors are red for clipped highlights and yellow for clipped shadows.

## Color Space

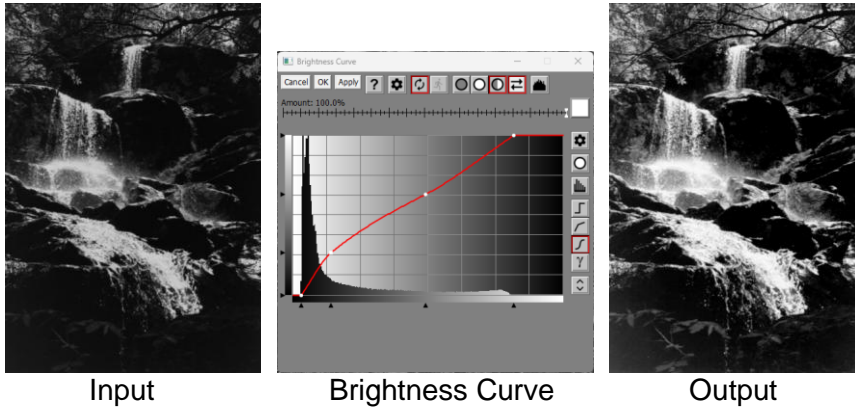
You can choose either the HSV or HSL color space – using HSL, colors get washed out and turn white – using HSV, colors stay brighter but do not become white. The images below illustrate the difference between lightening an image in HSV vs HSL.



# Brightness Curve

The Brightness Curve transformation lets you adjust the brightness of a black and white or color image by applying a curve to it. For details on using curves and histograms, please see the companion document [Curves and Histograms](#).

## Using the Brightness Curve Transformation



### Amount

The amount control blends a percentage of the input image with the output image to scale back the effect of the Blur transformation. If you create a mask, you can use the amount control to localize the effect of the transformation to parts of the input image.

### Curve

The Curve control lets you adjust the curve to be applied to the brightness channel of the input image. If the image is color, you have the choice of applying it to the HSV, HSL L or RGB channels.

Clicking and dragging on the input image displays marker lines at the corresponding locations in the input image histogram. The lines are erased when you release the mouse button. The marker lines helps you understand what part of the curve affects what part of the image.

Shift-clicking on the input image inserts a new control point on the curve at the corresponding location in the input image histogram.

## Color Space, Saturation and Color Balance

These controls are only displayed if the input image is color. If the input image is black and white, they are hidden.

The zero-centered Saturation slider lets you increase or decrease the saturation of the image.

The Color Balance controls lets you adjust the color balance of the image by selecting a color to add to or remove from the image. Selecting white has no effect. Selecting a color adds or removes that color to the image – the more saturated the color you selected, the stronger the effect.

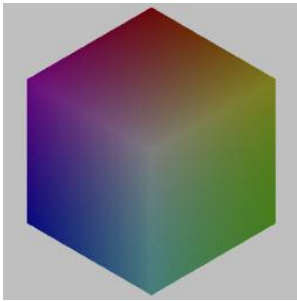
The Color Space control lets you select what color space you want to work in. The Curve control lets you adjust the curve to be applied to the brightness channel of the input image. If the image is color, you have the choice of applying it to the HSV V or the HSL L channels or you can apply the same curve to each of the RGB channels. If you want to apply different curves to each of the RGB channels, use the Color Curves transformation instead.

Both HSV and HSL work similarly when lightening or darkening dark pixels, but their effect on light pixels is somewhat different. Here is a summary of the differences and some examples.

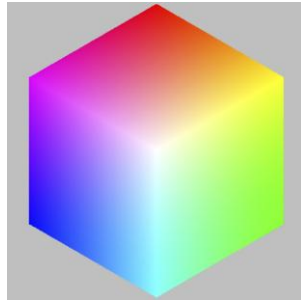


## HSV

Lightening dark pixels in HSV makes colors brighter since 100% HSV V contains all the brightest colors. Conversely, darkening highlights in HSV makes them duller.

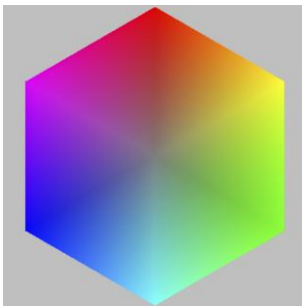


50% HSV V

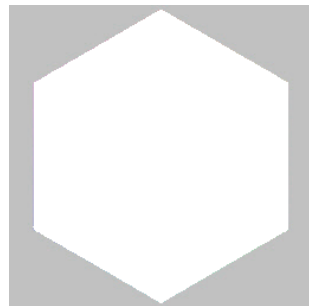


100% HSV V

## HSL



50% HSL L



100% HSL L

Lightening bright pixels in HSL makes them washed out since 100% HSL L is pure white. This can be used to create the effect of very bright light or specular highlight.

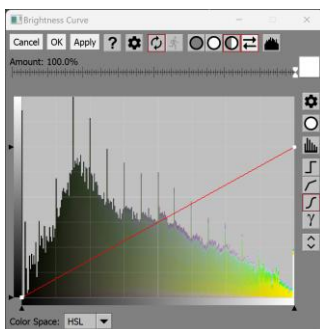
Darkening highlights in HSL makes them more colorful since 50% HSL L contains the brightest colors. This can be a good way to restore color to washed out highlights.

## Examples

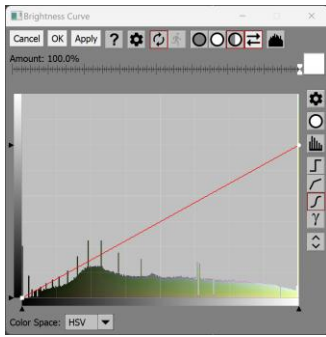
Darkening highlights:



Original Image



Darkened using HSL

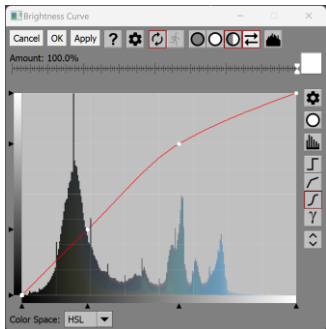


Darkened using HSV

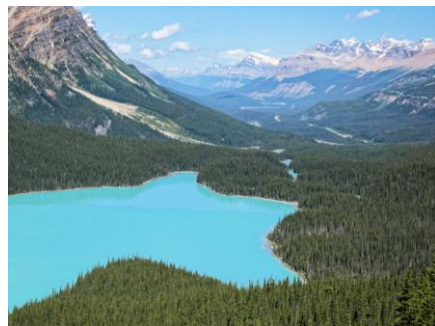
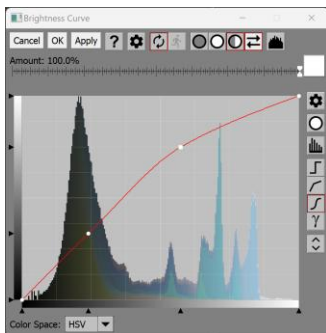
Lightening highlights:



Original Image



Lightened using HSL



Lightened using HSV

## Settings Menu

- Advanced Mode
- Use Bilateral Filter
- ☒ Use Guided Filter
- Reset Advanced Mode Settings

**Advanced Mode** – toggles Advanced Mode (see below)

**Bilateral/Guided Filter** – When using Advanced Mode (see below), you have a choice of Bilateral or Guided filtering as the edge-preserving blur method. The results are very similar, but Bilateral is a lot



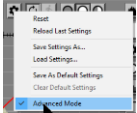
slower than Guided, especially when using a large radius, and also slightly more prone to artifacts. Bilateral is provided mostly for compatibility with older scripts – the more modern Guided option is usually preferable.

**Reset Advanced Mode Settings** – resets Radius, Threshold, Detail and Antialias settings (see below)

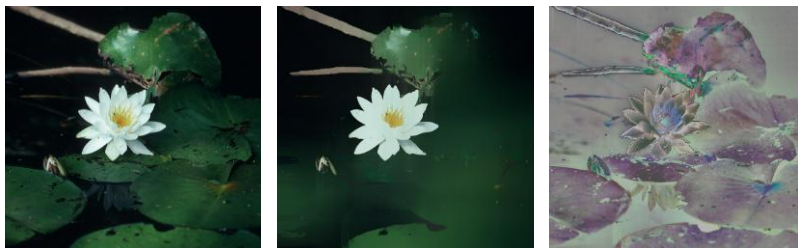
## Advanced Mode

When you change an image by applying a curve to it and increase the contrast in some parts of the brightness scale, generally you will reduce the contrast in other parts. In the example below, the contrast of the main parts of the image that fall under the main peak of the histogram has been increased. Simultaneously, the contrast in the shadows and highlights has been decreased, leading to a loss of visible detail in these areas.

To help in this situation, you can enable Advanced Mode via the Settings menu.



The idea behind Advanced Mode is to split the input image into high-pass and low-pass versions. The low-pass image is essentially a blurred version of the input image and the high-pass image has all the detail.



Input

Low-Pass

High-Pass

The curve is applied to just the low-pass image and then the detail from the high-pass image is added back in. This lets you adjust the brightness of the image while retaining detail in the low contrast areas.

The low-pass image is blurred using a filter just like the one used in the Multipass Sharpen transformation. This is an edge-preserving blurring technique that you can control with the Radius and Threshold sliders. You will need to experiment with the sliders to get a feel for the range of effects you can get. The initial values are usually a good starting point.

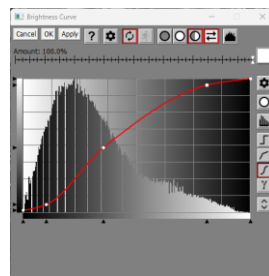
The Detail slider controls how much of the high-pass image gets added in.

## Advanced Mode Example

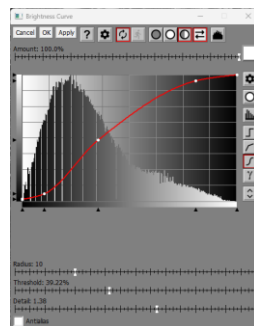
In this example, the same curve has been applied to the original input image using the normal mode and advanced mode. Note how the advanced mode version retains more detail in the water in the foreground.



Original



Brightness Curve

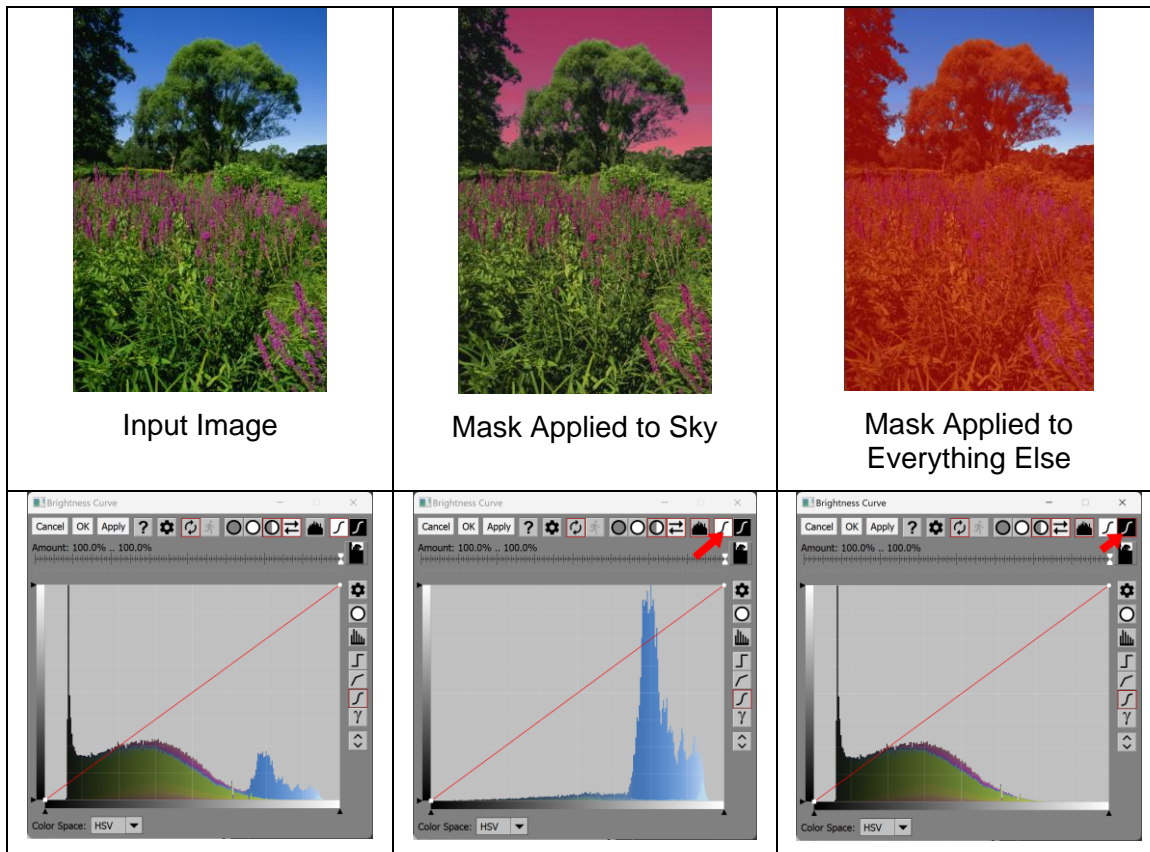


Advanced Brightness Curve

## Histogram Button

The Histogram button located in the upper right corner of the dialog box comes into play when you use a mask with the Brightness Curve transformation. When it is depressed, the histogram displayed in the Curve control is computed using only the pixels where the mask is present. Partially masked pixels make fractional contributions to the histogram. This lets you see the histogram of just the parts of the image to which the transformation will be applied. Based on this restricted histogram you can more easily create curves that modify the brightness or contrast of the masked area.

## Histogram Button Example



## Black/White Curve

This tool bar is only displayed if the Amount control contains a mask image (i.e. its single slider has been split into separate black and white sliders). In this case, you can apply different curves to the masked and to the unmasked parts of the input image. For example, if you create a mask that isolates an object in the input image, you can lighten the object and darken the background at the same time. You can also apply independent saturation and color balance adjustments to the masked and unmasked areas.


The White curve and color settings are applied where the mask is white, and the Black curve and color settings are applied where the mask is black. Where the mask has an intermediate value, the two are blended. The Black curve works exactly like the White curve except it uses an inverted mask, thus effectively selecting everything in the image that was not selected by the mask.

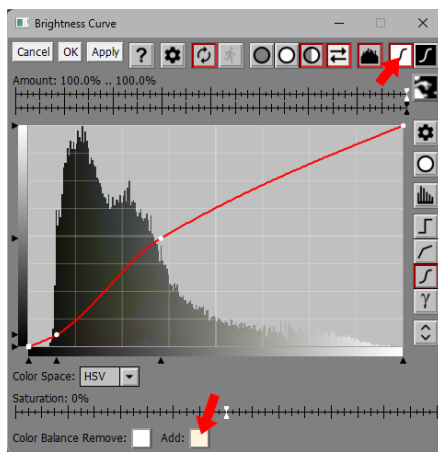
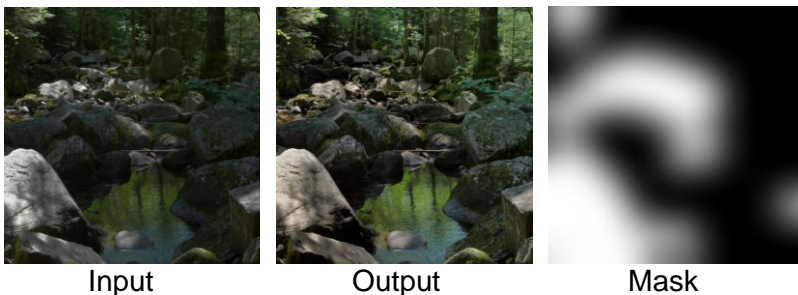
This lets you adjust the brightness, contrast, dynamic range and color of the parts of the input image covered by a mask while simultaneously making a different set of adjustments to the rest of the image.

By default, the Black curve leaves the input image unchanged, in which case the White curve is applied as though there was no Black curve. If you select the Black curve by clicking its button in the tool bar, the Curve control switches to display the Black curve instead of the White curve (and if Advanced Mode is active, its controls are also switched). Modifying these controls alters the Black curve, letting you adjust the appearance of the unmasked parts of the image.

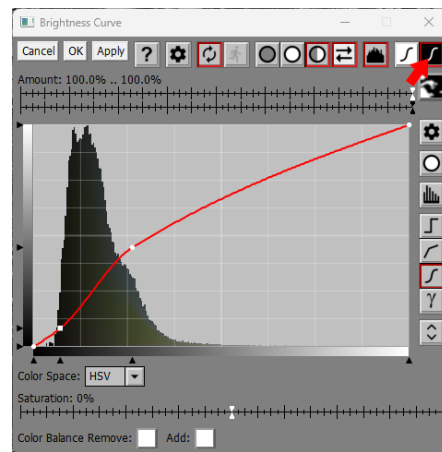
### Black/White Curve Example

In this example, Brightness Curve is used with a soft-edged mask that covers the highlights in the input image. The White curve is used to warm up and adjust the highlights, while the Black curve is used to lighten and increase the contrast in the shadow areas.

Note that since the  button is depressed, the White curve shows the histogram of the highlights (where the mask is white) and the Black curve shows the histogram of the shadows (where the mask is black).



White Curve



Black Curve

You can fine-tune the strength of the effects of the white and black curves by adjusting the white and black sliders in the Amount control.

## Bypass

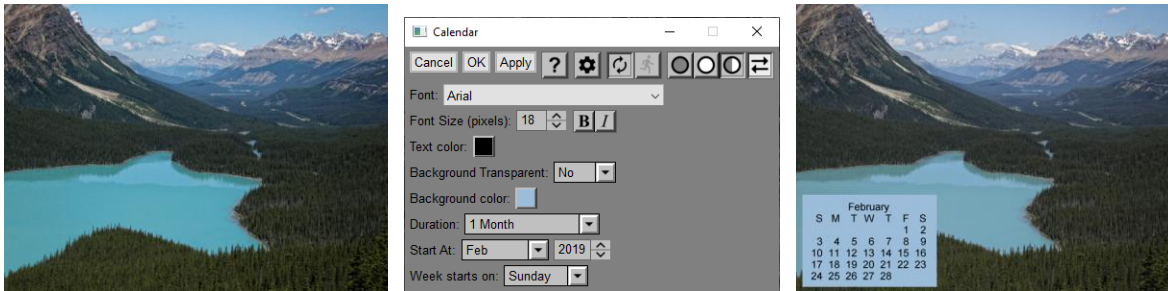
The Bypass transformation just copies its input image to its output image. Its reason for existence is to reserve a place in the image tree. It can be useful if you want to use an image as an auxiliary input, but still be able to add transformations after the image without having to reconnect the input. By using a Bypass transformation as the input, you can insert transformations before it without disturbing the transformations that depend on it.

As a convenience, if the transformation you are inserting a bypass after is currently being used as an auxiliary input to one or more other transformations, you will get a message asking if you want to modify those inputs to reference the Bypass transformation instead. To see which transformations use the bypassed transformation as an auxiliary input you can use the Show Dependencies command.

# Calendar

The Calendar transformation overlays a calendar on the input image. You can control the date range of the calendar, its background, its fonts as well as other settings.

Month and day names are taken from the current locale, so they show up in the language of the country for which Windows is set up.



## Font

This control lets you select what font to use for the calendar text.

## Font Size

These controls let you select the font size and bold or italic.

## Text Color

This sets the text color.

## Background Transparent

This selects a transparent or solid color background.

## Background Color

This selects the color of the solid background, if any.

## Duration

This selects how long you want the calendar to run. It can be anything from a month to a year in various configurations.

## Start At

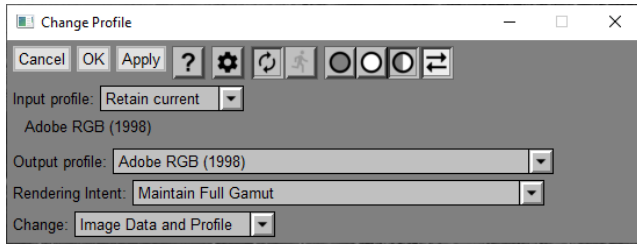
This lets you specify the starting month and year for the calendar.

## Week Starts On

This lets you start the week on Sunday or Monday.

# Change Profile

The Change Profile transformation converts images from one color space to another.



## Input Profile

### Retain Current

If you select Retain Current, the current profile of the input image as displayed just below is taken as color space you are changing.

### Set to Custom

If you select Set to Custom, you can select a custom profile and use to replace the current profile as the color space you are starting with. This effectively re-tags the input image with the custom profile before continuing with the conversion.

## Output Profile

Use this control to select the color space you want to convert to.

## Rendering Intent

This control selects the rendering intent for the output profile. Many profiles do not actually support rendering intents, in which case this setting is ignored. Unless you have a good reason to do otherwise, leave this set to Maintain Full Gamut.

## Change

### Image Data and Profile

This is the normal setting. The image is converted from its input profile to the output profile and the image is assigned the output profile.

### Image Data only

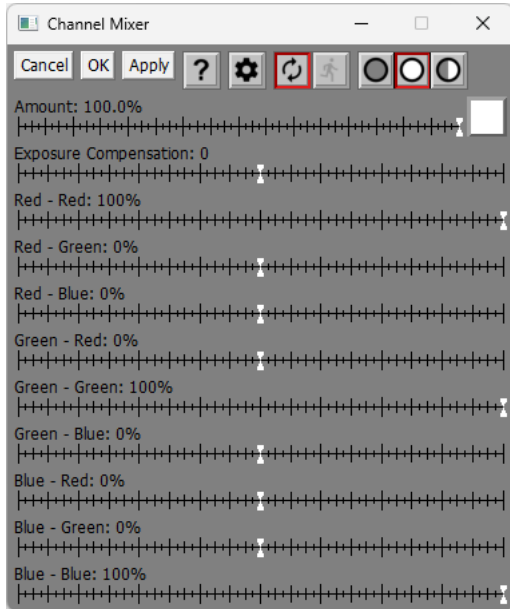
This setting converts the image from the input color space to the output color space but leaves it marked as still having the input profile. This will normally cause a color shift in the image and is only for special purposes.

### Profile Only

This setting does not convert the image to the output color space, but it does mark it as having been converted. Use this setting when an image has been tagged with the wrong profile and you just want to change the profile without altering the image data.

# Channel Mixer

The Channel Mixer transformation lets you blend the red, green and blue channels of an image together.



## Amount

The amount control blends a percentage of the input image with the output image to scale back the effect of the Channel Mixer transformation. If you create a mask, you can use the amount control to localize the effect of the transformation to parts of the input image.

## Exposure Compensation

This slider lets you lighten or darken the output image to compensate if the other sliders lighten or darken the image. The units are f stops so each one represents a factor of 2.

## Red-Red ... Blue-Blue

These nine sliders determine what percentage of each input channel will be passed through to each output channel. Using the abbreviations of RR, RG, RB, GR, GG, GB, BR, BG, BB for the slider values, R, G, B for the input channels and R', G', B' for the output channels, the output image is computed as:

$$R' = R * RR + G * RG + B * RB$$

$$G' = R * GR + G * GG + B * GB$$

$$B' = R * BR + G * BG + B * BB$$

Thus, the default values shown above cause the output image to be a copy of the input image.

Note that the slider values run from -100% to +100% so you can subtract one channel from another.



# Chromatic Aberration

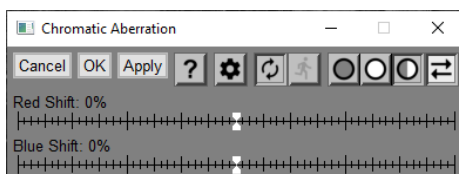
The Chromatic Aberration transformation lets you remove color fringes resulting from poorly color-corrected camera lenses. This is especially common when using long focal length lenses which do not incorporate expensive, ED (extra dispersion) glass elements or extreme wide-angle lenses. Chromatic aberration shows up as color fringes most easily seen where there is a sharp edge between light and dark parts of an image. The fringes are absent in the center of the image and become increasingly pronounced the further you move toward the corners of the image. The color gradients of the fringes are oriented radially out from the center. Unlike purple fringing, chromatic aberration has colors on both sides of the edges, one the complement of the other. Fringes will be red/cyan, green/magenta or yellow/blue. In this example of mild chromatic aberration cropped from the corner of a much larger image, there are green/magenta fringes.



Newer digital cameras correct for chromatic aberration when writing JPEGs, and the better RAW converters have camera and lens databases that let them correct for chromatic aberration during the conversion process. If you are using an unsupported camera and lens combination, however, then these options may not be available, and the Chromatic Aberration transformation can be used instead.

Chromatic aberration arises from the fact that different colors of light are bent at different angles by most glass lenses. This leads to very slight differences in the effective focal lengths of the lens for red, green, and blue light. This in turn causes the red, green, and blue channels of a digital color image to have slightly different magnifications. While all three channels line up in the center of the image, as you move toward the corners of the image, the increasing spread between the different color layers in the image gives rise to color fringes. Chromatic aberration can be corrected by slightly altering the magnifications of the blue and red channels so that their size matches that of the green channel (most lenses are optimized for green light because the eye is most sensitive at this wavelength). Typically, the red channel requires the most magnification and the blue channel quite a bit less and in the opposite direction.

## Using the Chromatic Aberration Transformation



### Red Shift and Blue Shift

These sliders let you control how much the red and blue channels of the color image are magnified (while the green channel remains fixed). A shift of zero leaves the corresponding channel unmodified. The larger the shift setting the more magnification is applied; negative settings shift the fringes in the opposite direction. Since different optical systems can have different characteristics you will have to experiment to get the best settings.

### Optical Center

A crosshair marking the optical center of the input image is displayed as an overlay over the input image. Initially, this marker is placed in the center of the image. For the most accurate possible correction of chromatic aberration, it is important that this marker be positioned at the point in the image in line with the optical axis of the lens. You can adjust the position of the marker, if necessary, by clicking and dragging it in the input image area

## Tips

Start with an uncropped image of the entire frame so you know where the optical center is.

Touch up any dust specks, scratches or other image imperfections before attempting to remove chromatic aberration, otherwise you will introduce color fringes around each one.

To adjust the sliders, first zoom the preview image to 1:1. Then scroll the preview to one of the edges or corners of the image where there are clearly visible color fringes. As you adjust the sliders, the preview image will show you right away if the color fringes are getting better or worse.

Start by increasing the Red Shift slowly until the red/cyan fringes disappear; then adjust the Blue Shift until any remaining blue/yellow fringes disappear. To correct green/magenta fringes, you need to adjust both the red and blue shift values at the same time. Repeat as necessary until you get the best possible correction.

# Clone Tool

The Clone tool provides you with a brush that paints from one image to another. Most commonly it is used as a retouching tool to paint one part of an image over another part of the same image to remove something you don't want such as power lines, facial blemishes dust spots, etc. However, it can also paint from one image to another image to move image data between the two.

## Using the Clone Tool

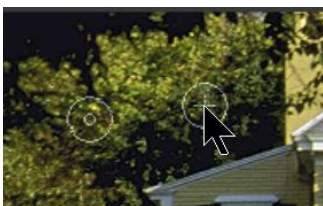
Here is an example of using the Clone tool to remove two parking signs from an image.



## Source and Target Cursors

Unlike most other transformations, the Clone tool operates directly on the output image. It has two cursors, a source cursor that marks where image data is coming from and a target cursor that marks where image data is going to be copied.

The source cursor is drawn in the shape and size of the brush and is distinguished from the target cursor by having a small circle in its center while the target cursor has a cross:



When it starts out, the Clone tool has just a source cursor. To define the point where you want to start cloning, click the mouse button. This sets the source cursor and displays a target cursor which now moves with the mouse while the source cursor stays fixed. To start cloning, click and drag on the output image. As you move the mouse, both cursors move together, and the output image is updated as you paint on it.

## Positioning the Source Cursor

If you are cloning from the output image to itself, you can reset the source cursor location by shift-clicking on the output image.

If you are cloning from one image to another (see Source Image below), you can either click or shift-click on the source image to set or reset the source cursor location.

## Amount

The amount control blends a percentage of the input image with the output image to scale back the effect of the Clone transformation. If you create a mask, you can use the amount control to protect parts of the input image from being modified, a little like using masking tape to avoid painting an area.

## Brush Settings

### Radius

The Radius slider adjusts the brush size. You can also use the mouse scroll wheel to make the brush larger or smaller.

### Transparency

The Transparency slider lets you vary the transparency of the image data you clone over the output image. The more transparent, the more subtle the effect.

### Softness

The Softness slider lets you vary the brush from hard-edged to having a gradual falloff. The brush preview area at the bottom of the dialog box lets you see how soft the brush is.

### Spacing

The Spacing slider lets you vary the interval at which the brush is applied as you move it over the image. If you increase it too much you will not get a smooth effect. Too small and the brush is hard to control.

### Fadeout

The Fadeout lets you make the brush stroke fade out by becoming more transparent the longer the paint.

### Stylus Pressure

If you don't have a tablet connected to your computer, this setting is ignored. If you do have a tablet with a pressure-sensitive stylus, you can use this setting to determine which brush setting, if any, is adjusted depending on how hard you press the stylus into the tablet surface.

#### Ignore

This causes stylus pressure to be ignored.

#### Controls Opacity

The harder you press, the less transparent the brush.

#### Controls Radius

The harder you press, the larger the brush.

#### Controls Hardness

The harder you press, the less soft the brush.

#### Controls Flow Rate

The harder you press, the smaller the spacing between brush applications.

### Brush Shape

The Brush Shape tool bar lets you make the brush circular, square, diamond shaped or custom. For information on custom brush shapes, see the separate document: [Creating and Using Custom Brush Shapes.pdf](#).

### Brush Width

The Brush Width slider lets you make the brush narrower. Alternatively, you can rotate the mouse wheel with the Ctrl key held down.

## Brush Angle

The Brush Angle compass control lets you rotate the brush shape. Alternatively, you can rotate the mouse wheel with the Shift key held down.

## Undo/Redo

The Undo and Redo buttons let you erase or redraw clone operations, one stroke at a time. A stroke is defined as everything between pressing the mouse button and releasing it.

If the Undo or Redo button is grayed, it means there are no operations left to undo or redo. If you undo too many operations by accident, you can click the redo button until you get back to where you wanted to be. However, once you draw a new stroke, you can no longer redo past that point.

You can use the keyboard shortcuts Ctrl-Z for Undo and Ctrl-Y for Redo.

Normally, Undo preserves the current brush settings, but if you want to revert to the settings for the previous stroke, hold down the Shift key while clicking the Undo button or pressing Ctrl-Z.

## Source Image

By default, cloning is from the output image to itself. If you want to clone from a different image, select it using this control.

The Clone output image is always the same type and size as its input image. When you clone a color image over a black and white image, just the luminance channel of the color image is copied. To clone in color over a black and white image, convert it to a color image before cloning.

## Mode

### Copy

This is the normal mode. Data is copied to the output image.

### Lighten Only

In this mode, data is copied to the output image only if it is lighter than what is already there. This is good for getting rid of dark spots while causing less collateral damage to the area around them.

### Darken Only

In this mode, data is copied to the output image only if it is darker than what is already there. This is good for getting rid of light spots while causing less collateral damage to the area around them.

## Brush

### Continuous

This is the normal mode. The brush paints for as long as you hold the mouse button down.

### One Shot

In this mode, the brush paints only once and then stops.

## Cursors

These settings determine what kind of connection the two cursors have, if any.

### Linked

This is the normal mode. Once set, the two cursors move together maintaining the same offset from each other.

### Repeat

In this mode, the source cursor returns to its starting position at the end of each stroke.

## One to One

In this mode, the source cursor and the target cursor are always at the same location. While not useful when cloning from an image to itself, this can be a very powerful technique for cloning from one version of an image to another.

## Fixed

In this mode, the source cursor remains fixed at its starting position during the stroke.

## Tiled

### Yes

When tiling is turned on, if the source cursor runs off the edge of its image, it automatically wraps around to the opposite side and keeps going. This can be useful if the source image is a seamless tile.

### No

This is the normal mode.

## Recycle

### Yes

When recycle is turned on, the source brush picks up any previous cloning you have done. This can cause parts of the image to repeat depending on the direction of the brush and whether the target brush overlaps the source brush.

### No

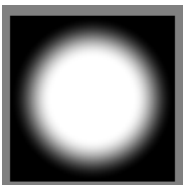
When recycle is turned off, the source brush picks up data from the previous stroke. This avoids image repetition if the source brush starts picks up an overlapping target brush.

## Settings Menu

In addition to the standard menu items, the settings menu lets you load or save the current brush settings (Radius, Transparency, Softness, Spacing, Fadeout, Shape, Mode, Brush, Cursors, Tiled and Overlapped).

## Brush Preview

The Brush Preview area at the bottom of the dialog box provides a visual representation of the size, shape, softness and transparency of the brush. It cuts off beyond a certain size so it is only useful for small to medium size brushes.



## Reloading Previous Settings

If you use the Ctrl-R keyboard shortcut to load the settings from the last use of the tool, you will restore not only the brush and other tool settings but also all the strokes you applied to the previous image. To load the previous settings without re-applying any strokes, use Ctrl-Shift-R instead.

# Color Balance

Color balancing refers to the process of removing or adding an overall color bias from an image. For example, if an image appears too red, it is said to have a red cast. Removing this red cast brings the image back into balance.

Color casts can arise from many different causes: the way the original scene was illuminated, filters you may have used, and how the image was captured and processed. Since it is difficult or impossible to control all the factors that can create a color imbalance, it is often easiest to correct the problem at the end of the process.

## The Color Balance Transformation

The Color Balance transformation is based on removing and adding colors to an image. To remove a color cast, you specify the color you want to remove as the Remove color. To add a color cast, you specify the color you want to add as the Add color. The net result is to replace occurrences of the Remove color in the input image with the corresponding Add color to create the result image.

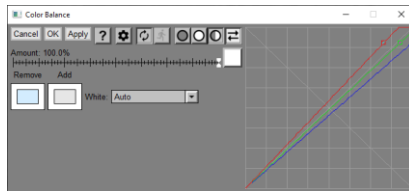
When Color Balance first starts up, it performs an auto white balance by examining the input image, averaging the colors of the brightest pixels, and setting that color as the color to remove. The color to add is set to a neutral gray of the same luminance as the color to remove.

Color Balance also displays a set of red, green and blue curves that it computes from the other settings. This can help you understand what it is doing to the image.

You can increase the size of the dialog box by dragging one of its sides or corners. If you widen the dialog box, you can drag the white diamond in the center of the vertical separator bar between the controls and the color curves to enlarge one while making the other smaller.



Original



Transformation



Auto White Balanced

If you want to remove a different color, you can either click on the color to Remove to bring up a color picker or you can click on something that should be neutral in the input image. In portraits, clicking on the whites of the eyes usually works well. For landscapes, clicking on clouds or tree trunks is usually a good starting point.

To add a color cast, click on the color to Add to bring up a color picker and select a red/yellow/orange color to warm up the image or a blue/cyan color to cool it. The more saturated the color you select, the stronger the effect.



Original

Warmer

Cooler

## Amount

The amount control blends a percentage of the input image with the output image to scale back the effect of the Color Balance transformation. If you create a mask, you can use the amount control to localize the effect of the transformation to parts of the input image.

## Colors to Remove and Add

These color controls let you select the color cast to remove or add to the input image as described above.

## White

This setting lets you select automatic white balancing.

**None** – no automatic white balancing is performed

**Auto** – the white point of the input image is determined automatically, and the color to remove is set to the white point. The color to add is set to a neutral gray of the same luminance as the white point.

**Auto – Full Range** – the white point of the input image is determined automatically, and the color to remove is set to the white point. The color to add is set to pure white.

**Custom** – the color balance is set manually.

## Settings Menu

### White Threshold (Low/Medium/High)

This setting affects how Picture Window determines the white point of the input image. For normal images, a low threshold is fine, but for images with clipped highlights, a higher threshold may work better, although it can result in the clipped highlights being tinted.

### Probe Size

This sets the size of the probe when you click on the input image to set the color to remove. Smaller probes are more precise, but larger probes are less sensitive to noise.



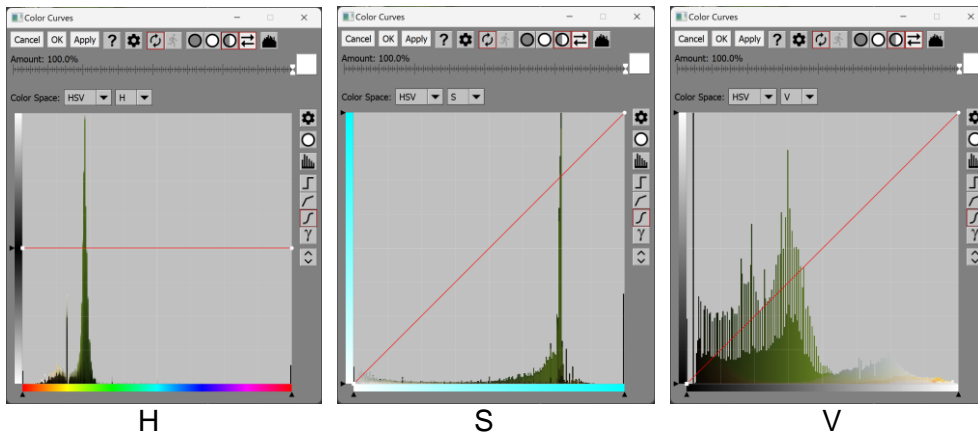
# Color Curves

The Color Curves transformation lets you adjust each of the color channels with. Before tackling color curves, make sure you read up on the Brightness Curve transformation, as many of the same principles of using curves and histograms apply.

## Using the Color Curves transformation

The Color Curves dialog box is very similar to the one for Brightness Curve, but it has two extra controls: one to select the color space and one to select the channel within the color space. For details on using the curve control that makes up most of the dialog box, see the companion document titled Curves and Histograms.

First select what color space you want to work in: HSV, HSL or RGB. Next select which of the three channels in that color space you want to adjust. You can change all three, but only one at a time by switching between channels. At any given time, only the current color space is in effect and any other color space settings you may have made are ignored. When you switch color spaces, the curves for all of its channels are reset.



## Hue Curves

Hue channels are treated differently from Brightness and Saturation channels because Hue is measured on a circular scale that has red at either end. The neutral hue curve that leaves the input image unchanged is a horizontal line through the middle instead of a diagonal.

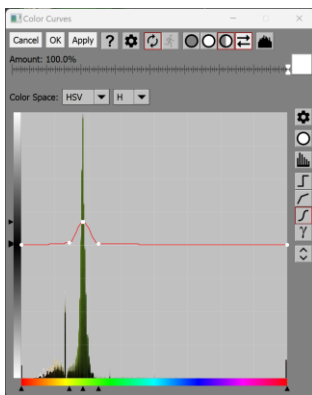
For hue curves, the first and last control points are locked together since they represent the same red hue, so moving one up or down moves the other at the same time. Also, the first and last control points can only be moved up or down and not horizontally. You add or remove control points in the same way as for other curves, by shift-clicking or ctrl-clicking on the curve. As for the other color channels, the hue histogram is displayed in the background so you can see what hues are present in the input image.

To make hue adjustments, drag a part of the curve up or down to shift the hue in a positive (clockwise) or a negative (counter-clockwise) direction.

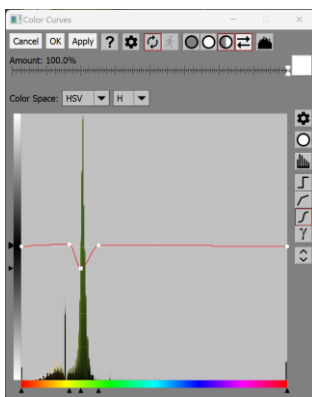
Here is an example of making a positive or negative hue shift for the yellow/green parts of the hue scale:



Input



Positive Hue Change

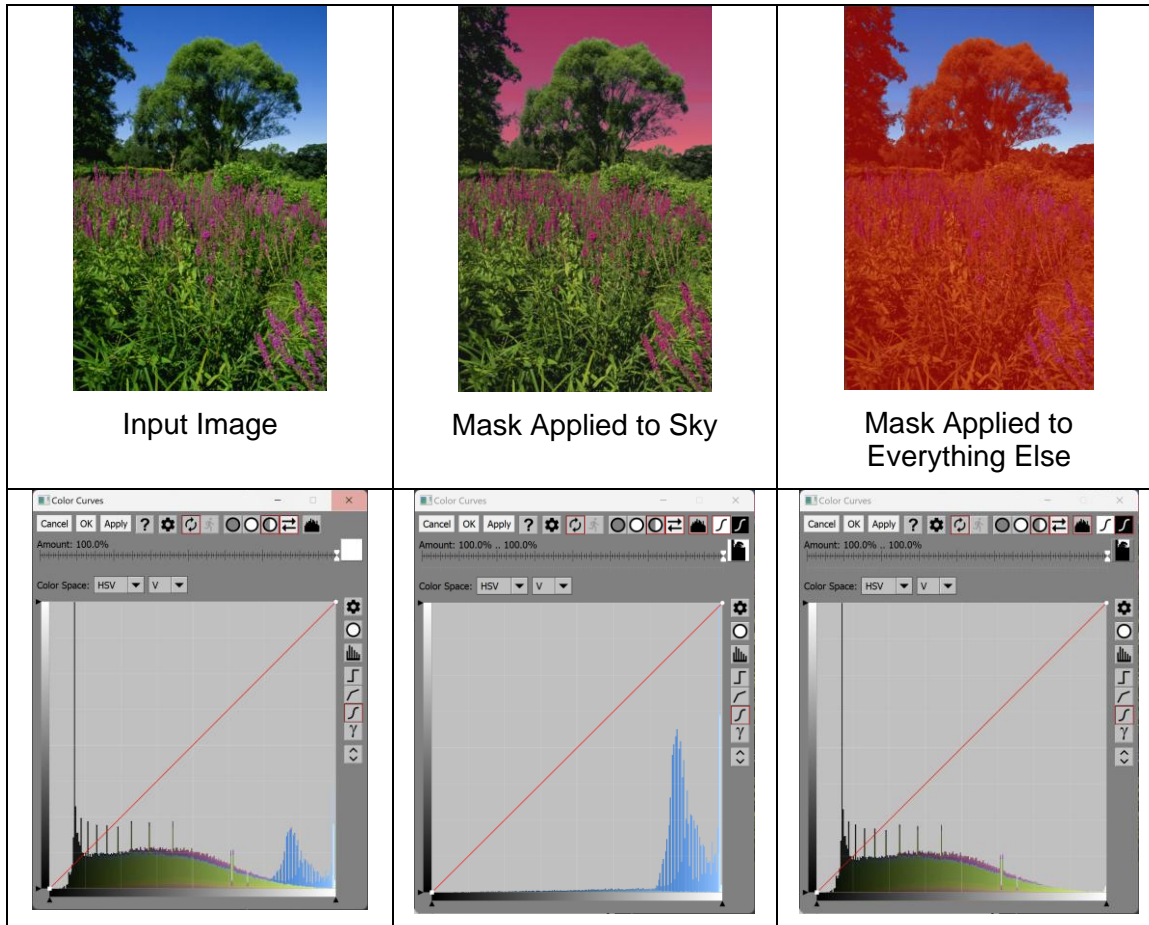


Negative Hue Change

## Histogram Button

The Histogram button located in the upper right corner of the dialog box comes into play when you use a mask with the Color Curves transformation. When it is depressed, the histogram displayed in the Curve control is computed using only the pixels where the mask is present. Partially masked pixels make fractional contributions to the histogram. This lets you see the histogram of just the parts of the image to which the transformation will be applied. Based on this restricted histogram you can more easily create curves that modify the brightness or contrast of the masked area.

### Histogram Button Example



## Black/White Curves

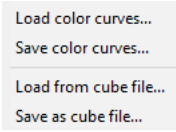
This tool bar is only displayed if the Amount control contains a mask image (i.e. its single slider has been split into separate black and white sliders). In this case, you can apply a different set of curves to the masked and to the unmasked parts of the input image. For example, if you create a mask that isolates an object in the input image, you can lighten and saturate the object and darken and desaturate the background at the same time.

The White curves are applied where the mask is white, and the Black curves are applied where the mask is black. Where the mask has an intermediate value, the two curves are blended. The Black curves work exactly like the White curves except they use an inverted mask, thus effectively selecting everything in the image that was not selected by the mask.

What this lets you do is adjust the brightness, saturation and hue of the parts of the input image covered by a mask while simultaneously making a different set of adjustments to the rest of the image.

By default, the Black curves leave the input image unchanged, in which case the White curves are applied as though there were no Black curves. If you select the Black curves by clicking its button in the tool bar, the Curve control switches to display the Black curves instead of the White curves. Modifying these controls alters the Black curves, letting you adjust the appearance of the unmasked parts of the image.

## Settings Menu



Load color curves...  
Save color curves...  
Load from cube file...  
Save as cube file...

### Load color curves

This command lets you restore a previously saved set of color curves for application to the same or to a different image. You can import Picture Window curves (with the file extension **.cc**), Photoshop Curve files (with the file extension **.acv**) or Photoshop map files (with the file extension **.amp**), depending on the **File Type** you select.

### Save color curves

This command lets you save the current color curves in a file for later use.

### Load from cube file

This command lets you load a 1-dimensional cube file (with the file extension **.cube**) as a set of RGB curves. Cube files come in two types: 1-dimensional and 3-dimensional. A 1-D cube file contains three lookup tables, one each for the red, green and blue channels, so this translates naturally into a set of color curves in the RGB color space. To create 1-D cube files or to work with 3-D cube files, you can also use the Color Lookup transformation.

### Save as cube file

This command lets you save a set of RGB color curves as a 1-dimensional cube file. Cube files saved in this manner always have lookup tables with 256 entries, so if you re-load them there will be a control point at every one of the possible 256 locations.

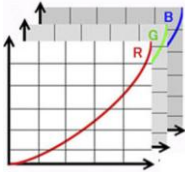
# Color Lookup

This transformation lets you apply a set of three 1-D lookup tables or a single 3-D lookup table to an image. Lookup tables can be loaded from a cube file or created by processing a special test image created by the RGB Cube test pattern transformation.

## Cube Files and Lookup Tables

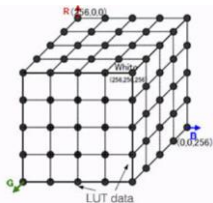
Cube files are an industry standard file format that stores lookup tables. You can think of these files as a sort of preset that encapsulates a series of operations you can perform on the colors in an image. A cube file may contain one of the following two types of lookup tables:

### Three 1-D lookup tables



1-D cube files contain a set of three 1-dimensional lookup tables, one each for the red, green and blue channels. A 1-D lookup table is just a list of values between 0 and 255 that correspond to evenly spaced points on a curve. Applying this type of lookup table to an image is like using the Color Curves transformation in the RGB color space -- each channel is adjusted according to its own independent curve.

### 3-D lookup tables

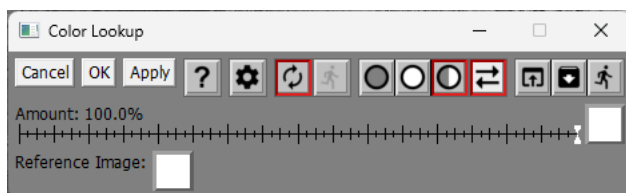


3-D cube files contain a 3-dimensional lookup table that effectively subdivides the RGB cube into  $(n-1)^3$  sub-cubes, all the same size. Each entry in the lookup table corresponds to a base color as specified by its R, G and B channel values. Each entry in the lookup table contains a new set of R, G and B values to which the base color will be changed. Applying this type of lookup table to an image can remap any set of RGB colors to any other set of RGB colors, so this is a very powerful operation. In fact, something similar is used within ICC color profiles to convert images from one color space to another. Within a given sub-cube, RGB values are interpolated using tri-linear interpolation. The larger the value of  $n$ , the finer the RGB cube is subdivided, and the more precise control the lookup table has over the pixel mapping. However, the size of the lookup table grows as the  $n^3$ , so even a value of 32 produces a lookup table with almost 100,000 entries.

You can either obtain pre-configured cube files created by others or you can create your own cube files (see below).

## Using Color Lookup

Since it is impractical to enter lookup table values one at a time by hand, there are two ways to define them: by loading a pre-existing cube file or by processing a reference image. These two options are both accessed via the three-button tool bar in the upper right corner of the dialog box.



### Amount

The amount control blends a percentage of the input image with the output image to scale back the effect of the Color Lookup transformation. If you create a mask, you can use the amount control to protect parts of the input image from being modified, a little like using masking tape to avoid painting an area.

## Reference Image

This setting is ignored until you select the Create lookup table from reference image command from the tool bar (see below). This is part of the process of creating a custom cube file.

## Tool Bar



### Load lookup table from a cube file

Clicking this button lets you load a 1-D or 3-D cube file which is then used to rebuild the current lookup table. The new lookup table is then applied to the current input image to create the output image.

### Save lookup table as a cube file

Clicking this button lets you save the current lookup table as a cube file.

### Create lookup table from reference image

Clicking this button lets you create a custom cube file. (see below).

## How to create your own cube files:

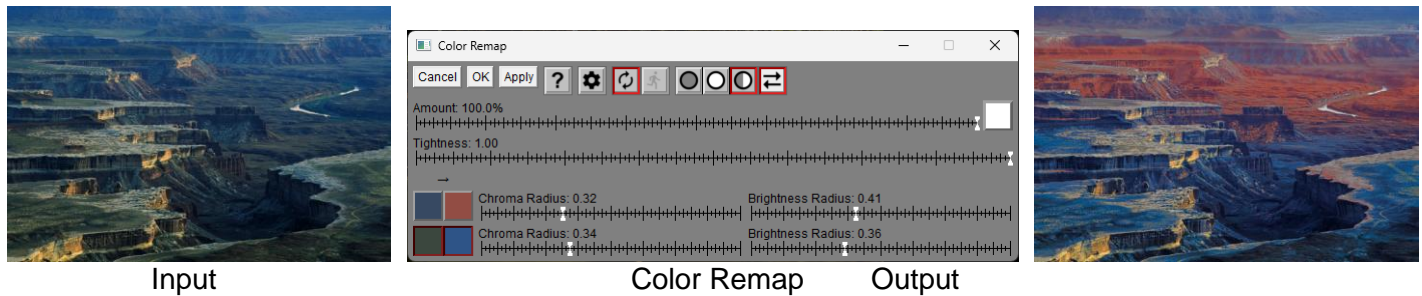
While you can use existing cube files, you can also create your own custom cube files as follows:

1. Create a starting image using the RGB Cube test pattern (Transformation/Test Patterns/RGB Cube). This transformation lets you select whether you want to create a 1-D or 3-D lookup table and the size of the lookup table. It then creates an image that contains all the colors in the lookup table, but with no modifications. After applying transformations to this image, the modified colors in the image become the entries in the lookup tables.
2. Apply one or more transformations to the RGB Cube image that you want the lookup table to embody. This might include levels and color, brightness, brightness curve, color curves, saturation, color balance, selective color correction, color remap, etc. Avoid transformations that operate on more than one pixel at a time, operate locally or via masks, or which alter the size of the image such as Blur, Sharpen, Emboss, Clone, Paint, Smudge, Crop, Add Border or Warp as they will not have the desired effect.
3. Bring up the Color Lookup transformation and select the modified test pattern as the Reference Image.
4. Select Create lookup table from reference image from the tool bar. At this point, a lookup table is created and applied to the current input image, but it is not yet saved as a cube file. Depending on the original RGB Cube image, either a 1-D or a 3-D lookup table is created.
5. Select Save lookup table as a cube file from the tool bar to save the cube file.

Another way to create 1-D cube files is to use the Color Curves transformation. When you save a set of RGB color curves, you have the option of saving them as a cube file. You cannot load or save 3-D cube files using Color Curves.

# Color Remap

The Color Remap transformation lets you change one or more colors in an image.



## Amount

The amount control blends a percentage of the input image with the output image to scale back the effect of the Color Remap transformation. If you create a mask, you can use the amount control to localize the effect of the transformation to parts of the input image.

## Tightness

This slider determines how closely overall colors must match to be changed. The lower the value, the more colors will match.

## Color Pairs

Color pairs define a color to match and a color to replace it with. Each color pair also has its own Chroma Radius and Brightness Radius setting. These settings determine how closely colors in the image must match in color or brightness to be remapped.

The left color is the color to match. The right color is the color to replace it with, so in the following example dark blue is being replaced with dark orange:



There are several ways to create or modify color pairs:

### Click

Clicking on a color square makes it the current color as indicated by a red outline.

### Probe

Shift-Clicking on the input image creates a new color pair, both of whose colors are set to the color of the image where you clicked. To change the replace color, double click on the right color square to bring up a color picker and select the desired color.

Clicking on the input image sets the current color (if any) to the color at the cursor.

### Double-Click

Double-Clicking on a color square brings up a color picker you can use to specify the color directly.

### Right-Click

Right-clicking on a color pair brings up a menu. The options are:

#### Make ending color same as starting color

This sets the ending color to the starting color.

#### Remove color pair

This deletes the color pair.

#### Add a new color pair

This adds a new color pair.



**Edit starting (left) color**

This brings up a color picker for the search color.

**Edit ending (right) color**

This brings up a color picker for the replace color.

**Chroma/Brightness Radius**

You can adjust the Chroma Radius to set how close a match is required on hue and saturation. The Brightness Radius adjusts how close a match is required on the brightness.

**Difference from Selective Color Correction**

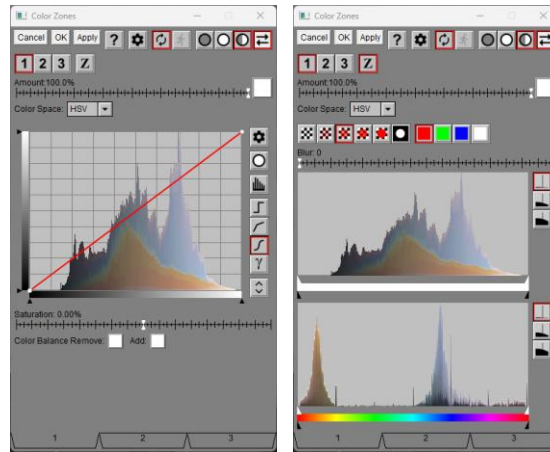
Unlike Selective Color Correction, to be changed, colors must match hue, saturation and brightness. This means that, for example, light orange and dark orange are considered different colors for Color Remap but the same for Selective Color Correction.



# Color Zones

The Color Zones transformation lets you define up to three zones within an image and apply independent adjustments to the brightness and color of each one.

To select one of the three zones, click one its tab at the bottom of the dialog box. There are two screens for each zone – to switch between them, click the **Z** button.



The zone adjustment screen (on the left) lets you specify a brightness curve, a saturation change and a color balance change for the currently selected zone.

The zone selection screen (on the right) lets you specify an Amount mask as well as a brightness range and a hue range based on the brightness and hue histogram of the input image. A mask is created for each zone, based on these settings.

The output image is generated by combining the adjustments for each zone as applied via their respective zone masks.

## Using the Color Zones Transformation

### Zone Enable Tool Bar



This tool bar lets you enable or disable adjustment for each zone. When a zone is disabled, none of its adjustments affect the output image. Turning a zone on and off is a good way to see what effect it is having. Editing the settings for the current zone automatically enables it.

### Screen Toggle



When this button is raised, the zone adjustment screen is displayed. When it is depressed, the zone selection screen is displayed. The Amount and Color Space controls (see below) are displayed on both screens.

### Amount

The Amount control lets adjust how much of the current zone's adjustments are applied to the output image. You can use the slider to scale back the effect or you can define an amount mask to restrict the effect to certain parts of the input image. Note that the amount mask overlay that is display while creating an amount mask is displayed on the input image and not the output image.

### Color Space

This control is not displayed if the input image is black and white. The Color Space setting affects the way brightness and hue histograms are computed as well as how brightness and saturation adjustments are made.

## Zone Adjustment Screen

The settings on this screen let you adjust the brightness, saturation and color balance of pixels in the current zone.

### Brightness Curve

This Curve control lets you adjust the brightness, contrast and dynamic range of the pixels in the current zone.

### Saturation

This slider lets you increase or decrease the saturation of the pixels in the current zone. This control is not displayed if the input image is black and white.

### Color Balance

These controls let you adjust the color balance of the pixels in the current zone by removing and/or adding a color cast. This control is not displayed if the input image is black and white.

## Zone Selection Screen

The settings on this screen are used to create a zone mask. The zone mask is created by combining the amount mask, the brightness range mask and the hue range mask.

### Mask Transparency and Color



The current zone mask is displayed as an overlay on the output image. The mask transparency tool bar determines if and how the mask overlay is displayed. The mask color tool bar selects the color of the mask overlay.



-- Mask is totally transparent – input image is fully visible.



-- Mask is 75% transparent – input image is mostly visible.



-- Mask is 50% transparent – input image is somewhat visible.



-- Mask is totally opaque – input image is obscured where the mask is white.



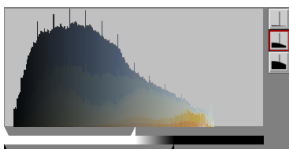
-- Only mask is displayed – input image is hidden. This setting gives you a detailed view of the mask which can reveal subtle variations you might miss when the mask is viewed over the base image.

### Blur

This slider lets you blur the zone mask. Softening the mask makes the transition between masked and unmasked areas less obvious.

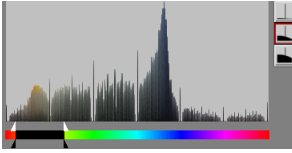
### Brightness Range

The brightness range control is displayed just below a brightness histogram of the input image. The range control lets you select pixels whose brightness falls within (or falls outside) a specified range. The histogram expansion tool bar lets you expand the scale of the histogram to make small values easier to see.



### Hue Range

The hue range control is displayed just below a hue histogram of the input image. The range control lets you select pixels whose hue falls within (or falls outside) a specified range. The histogram expansion tool bar lets you expand the scale of the histogram to make small values easier to see. This control is not displayed if the input image is black and white.

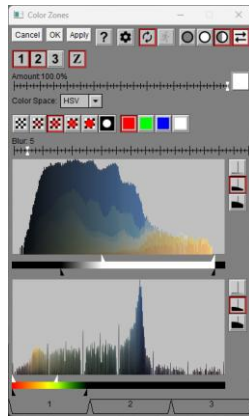
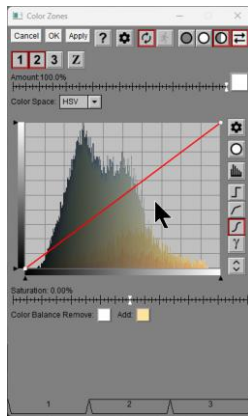


## Example

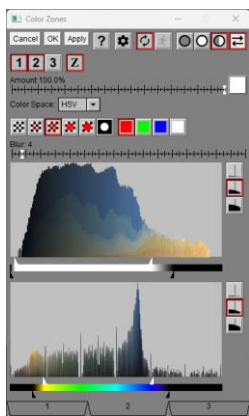
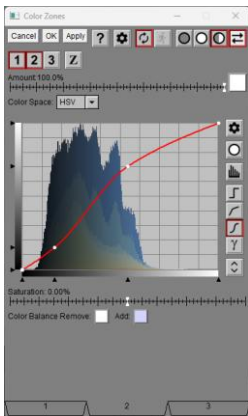
Here is an example illustrating the use of Color Zones to apply independent adjustments to the highlight and shadows of an image. Zone 1 defines the yellow and orange highlights where the sun hits the canyon wall – this zone has a yellow cast added to accentuate its color. Zone 2 defines more or less everything else – a contrast boost is applied to this zone as well as adding a blue cast.



Input Image



Zone 1



Zone 2

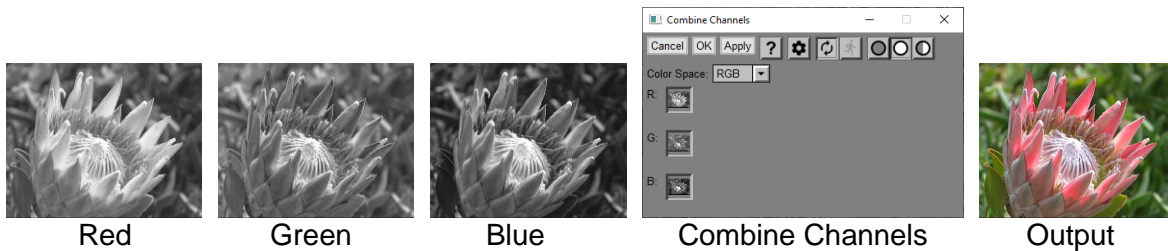


Output Image

# Combine Channels

The Combine Channels transformation takes three gray levels or black and white images as input and produces a color image output. The three grays or images are each assigned to a channel of the output image according to the color space you are using.

## Using the Combine Channels Transformation



### Color Space

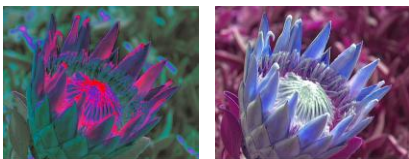
You use the Color Space control to determine which three channels to work with: RGB, HSV or HSL. The channels below are labeled accordingly.

### Channels

These three controls let you select a gray level or a black and white image for each channel. If you select more than one image, they must all be the same size in pixels. Selecting a gray level is like selecting a solid gray image of the same size as the other input images. If you select three gray levels, the output image is a solid color 100 x 100 pixel image.

## Tips

Mixing up the channels can produce some interesting effects:



By using this transformation in conjunction with the Extract Channel transformation, you can split a color image into its three channels, operate on each one individually, and then recombine them.

# Compare

The Compare transformation is designed to help you compare two images and highlight their differences using several different techniques. It also creates an output image that can be useful in some cases.

By default, Compare starts up comparing its input image with to one above it, if any. If you use Compare after performing some transformation, this initial configuration lets you compare the input to that transformation and its output. However, you can always choose a different image to compare with if that's not the one you want.

Normally, this transformation is used on two versions of the same image or at least two images of the same size in pixels. If the images have different sizes, the smaller one is padded with a white border to match the larger one. In this case, the synchronized zooming and scrolling may not work very well.

For convenience, the two images are called A and B. Image A is always the input image and Image B is the image you are comparing it to.

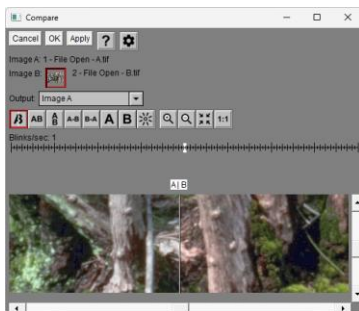
## Using the Compare Transformation



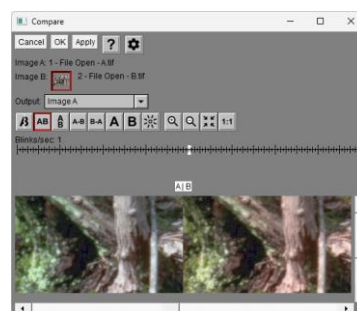
Input (Image A)



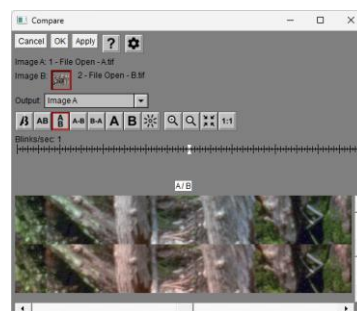
Image B



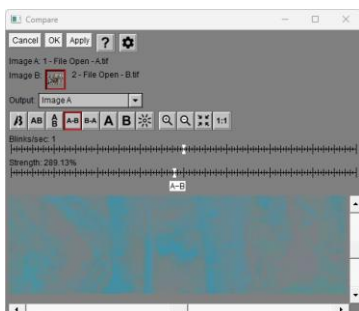
Moving Curtain



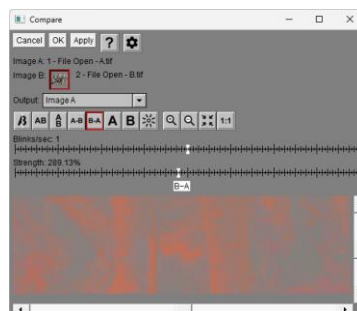
Side-by-Side



Over/Under



A-B



B-A

## Image A

This displays the caption of image A for reference.

## Image B

This image picker control selects which image to compare the input image to. Image A is always the input image. The caption of image B is displayed just to the right of the image picker.

## Output

This determines what is passed through as the output image when you click OK or Cancel.



## Image A

Copies the input image through to the output image. Use this when you want to compare the input image with another image but want the input image to pass through to the next transformation in the branch.

## Image B

Copies Image B (or, if there is no Image B, Image A) through to the output image. Use this when you want to compare the input image with another image but want the other image to pass through to the next transformation in the branch.

## The compare results

The output image is based on the Compare preview image.

## Method Tool Bar

This tool bar lets you choose the comparison method you want to use.

### Moving Curtain

The moving curtain method displays A and B on top of each other with a vertical line separating what parts of A and B show through. You can drag the curtain back and forth to compare different parts of the images. Shift-click on the image area to swap which image is on the left and which is on the right.

### Side by Side or One Above the Other

These methods display the images side by side or one over the other. They zoom and scroll in sync so you can compare parts of the two images in detail. Click on the image area to swap which image is on the left/right or top/bottom.

### A-B or B-A

These methods display the difference or reverse difference between A and B. The Strength slider lets you exaggerate the differences to make them more obvious. Click on the image area to toggle between A-B and B-A.

### A or B

These methods display either image A or B. By switching back and forth between them you can see what parts of the image change. Click on the image area to toggle between A and B.

### Blink

This method displays A or B alternately, blinking between them at a rate you control with the Blinks/sec slider.

## Zoom Tool Bar

This tool bar lets you zoom the image(s) in or out, zoom to fit or zoom to 1:1. If the images don't fit in the display, scroll bars are displayed to let you move around in the images.

You can also scroll the preview image by holding down the Alt key while clicking and dragging the preview image. When you release the mouse button, the preview is redrawn.

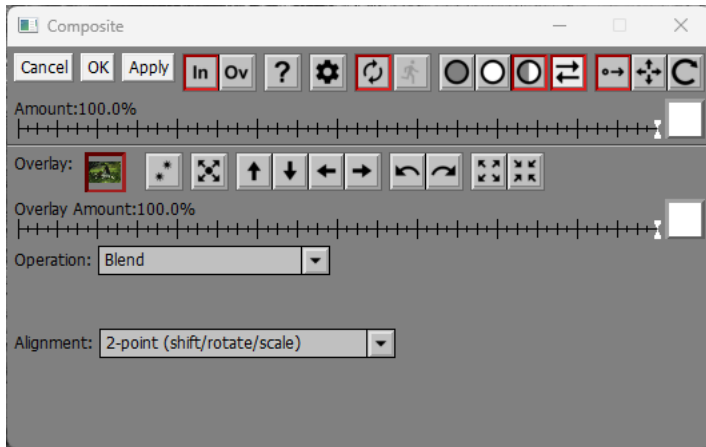
### A/B or B/A

The White button just above the display area indicates if Images A and B are swapped.

# Composite

The Composite transformation combines a solid color or an overlay image with its input image to produce its output image. You can control the method by which images are combined and you can precisely align the control points in the overlay image with control points in the input image.

If you don't need to align the two images and they are the same size in pixels, you can use the simpler Blend transformation instead of Composite.



## Masks

The full power of Composite comes into play when you use masks.

### Input Image Masks

Using a mask on the input image by setting an Amount mask lets you control what parts of the input image are changed and what parts are protected.

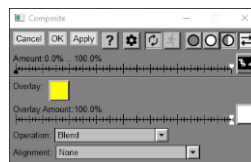
For example, if you make a mask for the input image and select a solid color for the overlay, the parts of the input image where the mask is white get a solid color overlay and where the mask is black the input image are left unchanged.



Input



Input with Mask



Composite



Output

### Overlay Image Masks

Using a mask on the overlay image by setting an Overlay Amount mask lets you control what parts of the overlay image are combined with the input image. The overlay mask is mainly important when the overlay image is being shifted, rotated or distorted to align with the input image. In this case the overlay mask is aligned in the same way as the overlay image before compositing.

For example, to place an image of the moon over an input image, the overlay image is the moon photo and the overlay image mask is white where the moon is and black elsewhere. Then, no matter where you place the moon over the input image, only the moon will be composited and not its background.



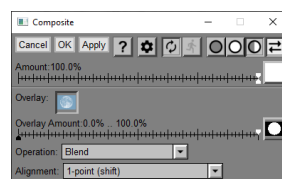
Input



Overlay



Mask



Composite



Output



Using masks with Composite is described in more detail at the end of this document.

## Overlaying with a Solid Color or an Image of the Same Size

The simplest case of using Composite is when the Overlay is set to a solid color or is an image of the same size as the input image. With a mask on the input image, the overlay only affects the parts of the image where the mask is white. Without a mask, the overlay affects the entire input image.

The overall effect depends on the Amount sliders and on the Operation you select.

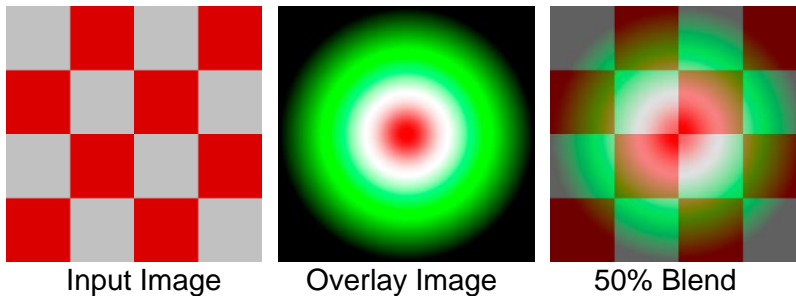
There are many different ways to combine two images. Here are the ones supported by Composite along with examples of how they work with different Amount settings.

### Operation

This control lets you select the way the two images are combined. Depending on the operation you select, an additional slider may be displayed at the bottom of the dialog box.

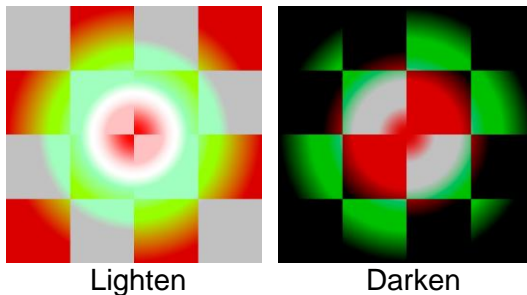
#### Blend

The Blend operation creates the output image as a weighted average of the input and overlay images. The slider in the Amount control determines the relative amounts of the two images – an Amount of 0% yields the input image, an Amount of 100% yields the output image and intermediate values yield a combination of the two images similar to a multiple exposure.



#### Lighten/Darken

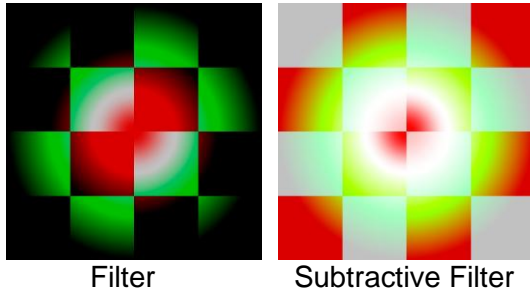
These operations create the output image by selecting the lightest or darkest of the two images at every pixel location.



## Filter/Subtractive Filter

Filter creates the output image by multiplying the two images at every pixel location. The effect is like sandwiching two transparencies. Subtractive filter (also known as Screen) is similar except it inverts the two images before multiplying them and also inverts the result. Filter always darkens the image and subtractive filter always lightens it. The Exposure Compensation slider that is visible only when either of these operations is selected can be used to lighten the filter image or darken the subtractive filter image.

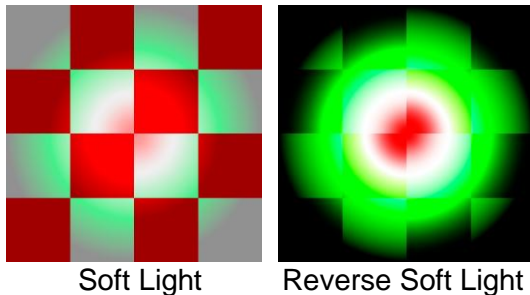
Filter is also known as Multiply and Subtractive Filter is also known as Screen.



## Soft Light/Reverse Soft Light

Soft Light darkens or lightens the colors in the input image, depending on the overlay image color. The effect is like shining a diffused spotlight on the image. If the overlay color (light source) is lighter than 50% gray, the image is lightened as if it were dodged. If the blend color is darker than 50% gray, the image is darkened as if it were burned in. Applying pure black or white produces a distinctly darker or lighter area but does not result in pure black or white.

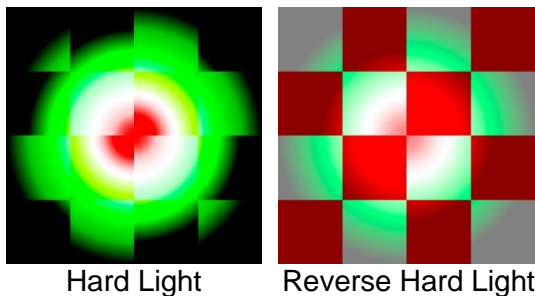
Reverse Soft Light is the same as Soft Light but with the input and overlay images swapped.



## Hard Light/Reverse Hard Light

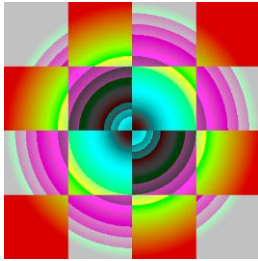
Filters or subtractive filters the colors, depending on the overlay color. The effect is similar to shining a harsh spotlight on the image. If the overlay color (light source) is lighter than 50% gray, the image is lightened, as if it were subtractive filtered. This is useful for adding highlights to an image. If the blend color is darker than 50% gray, the image is darkened, as if it were filtered. This is useful for adding shadows to an image. Applying pure black or white results in pure black or white.

Reverse Hard Light is the same as Hard Light but with the input and overlay images swapped. Reverse Hard Light is also known as Overlay.



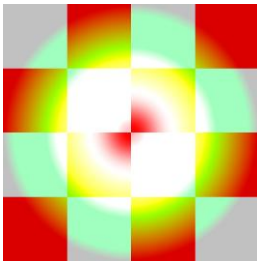
## Negative

Negative combines the input and overlay images using the exclusive-or operation. This is a special effect and not useful for general photo editing.



## Add

Add creates the output image by adding the input and overlay images. Highlights are clipped to white if they exceed the maximum pixel value. This operation is also known as Linear Dodge.

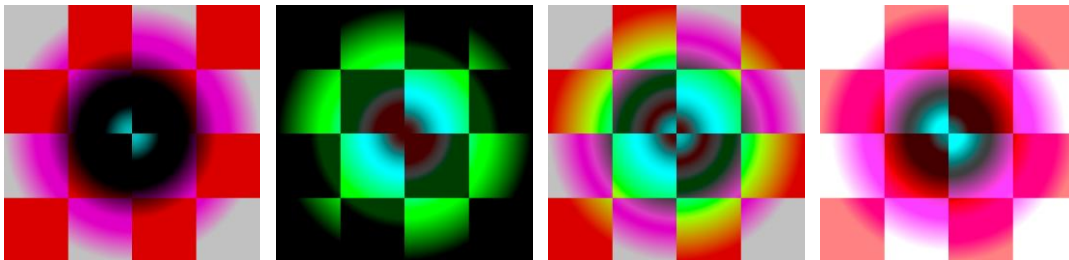


## Subtract/Reverse Subtractive/Absolute Difference/Offset Difference/Increase Difference

Subtract creates the output image by subtracting the overlay image from the input image at every pixel location. Reverse Subtract is similar except that it subtracts the input image from the overlay image. In either case, negative values are clipped as black. Absolute difference subtracts the two images but makes any negative values positive. Offset difference is like Subtract but with a mid-level gray added.

These operations are useful when you want to determine where two similar images are different.

The Strength slider that is visible only when one of these operations is selected can be used to amplify or reduce the difference between the two images.



Subtract

Reverse Subtract

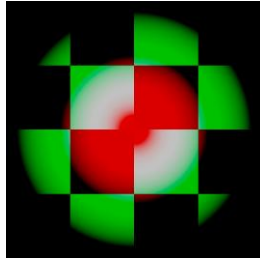
Absolute Difference

Offset Difference

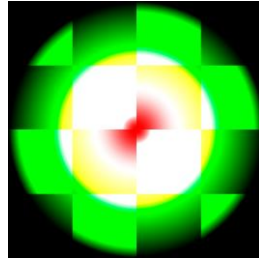
Increase Difference lightens the input image where it is lighter than the overlay image and darkens it where it is darker than the overlay image. If the overlay image is a blurred version of the input image, this effectively sharpens the input image.

## Color Burn/Color Dodge/Linear Burn/Linear Light/Vivid Light/Pin Light

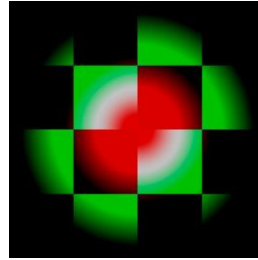
These are similar to operations of the same name in other image editing software.



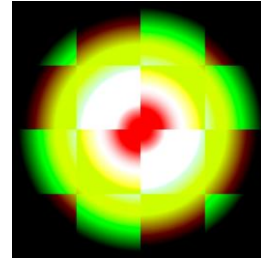
Color Burn



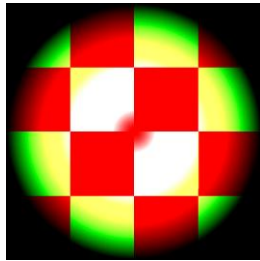
Color Dodge



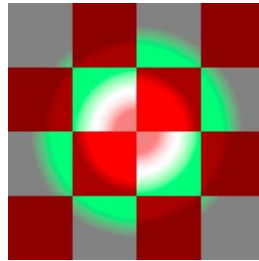
Linear Burn



Linear Light



Vivid Light



Pin Light

## Register

This operation is only useful if **Alignment** is set to something other than **None**. It causes the output image to be just the aligned version of the overlay image without any of the input image.

## Blending Formulas

For the more mathematically inclined, here are the formulas the Composite transformation uses to compute its output image from its two input images, depending on the selected operation. To simplify the equations, pixels values are assumed to run from 0.0 for black to 1.0 for white, and amount values run from 0.0 for 0% to 1.0 for 100%.

- A Input
- B Overlay
- X Amount
- S Strength
- E Exposure Compensation

Step 1 -- Compute the result (R) – Note: if R goes outside (0.0 ... 1.0), it is clipped.

Blend:  $R = B$

Lighten:  $R = \max(A, B)$

Darken:  $R = \min(A, B)$

Filter:  $R = A * B * E$

Subtractive Filter:  $R = 1 - ((1 - A) * (1 - B)) * E$

Soft Light:  $R = A * (A + 2 * B * (1 - A))$

Reverse Soft Light:  $R = B * (B + 2 * A * (1 - B))$

Hard Light: if  $(B < 0.5)$   $R = 2 * A * B$  else  $R = 1 - 2 * (1 - A) * (1 - B)$

Reverse Hard Light if  $(A < 0.5)$  then  $R = 2 * A * B$  else  $R = 1 - 2 * (1 - A) * (1 - B)$

Negative:  $R = A \text{ xor } B$

Add:  $R = A + B$

Subtract:  $R = (A - B) * S$

Reverse Subtract:  $R = (B - A) * S$

Absolute Difference:  $R = |A - B| * S$

Offset Difference:  $R = (A - B) * S + 0.5$

Color Burn: if  $B = 0$  then  $R = 0$  else  $R = 1 - (1 - A) / B$

Color Dodge: if  $A = 1$  then  $R = 1$  else  $R = B / (1 - A)$

Linear Burn:  $R = A + B - 1$

Linear Light:  $R = B + 2 * A - 1$

Vivid Light: if  $A \leq 0.5$  then  $R = 1 - (1 - B) / (2 * A)$  else  $R = B / (2 * (1 - A))$

Pin Light: if  $B < 2 * A - 1$  then  $R = 2 * A - 1$  else if  $B < 2 * A$  then  $R = B$  else  $R = 2 * A$

Increase Difference:  $R = A + S * (A - B)$

Step 2 -- Apply Amount (X) to R to compute the output value (O)

$O = A * (1 - X) + R * X$

## Corresponding Photoshop Names of Blending Modes

| Picture Window      | Photoshop          |
|---------------------|--------------------|
| Blend               | Normal             |
| Lighten             | Lighten            |
| Darken              | Darken             |
| Filter              | Multiply           |
| Subtractive Filter  | Screen             |
| Soft Light          | Soft Light         |
| Reverse Soft Light  |                    |
| Hard Light          | Hard Light         |
| Reverse Hard Light  | Overlay            |
| Negative            |                    |
| Add                 | Add (Linear Dodge) |
| Subtract            | Subtract           |
| Reverse Subtract    |                    |
| Absolute Difference |                    |
| Offset Difference   |                    |
| Color Burn          | Color Burn         |
| Color Dodge         | Color Dodge        |
| Linear Burn         | Linear Burn        |
| Linear Light        | Linear Light       |
| Vivid Light         | Vivid Light        |
| Pin Light           | Pin Light          |
| Increase Difference |                    |


## Aligning Images

In the previous examples we had two pre-aligned images of the same size. However, you may need to reposition, resize, rotate, skew, or alter the perspective of the overlay image to make it conform to the input image. The key to doing this is to use alignment points.

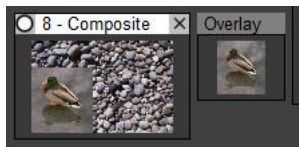
Picture Window supports 1-point, 2-point, 3-point, 4-point or multi-point alignment. These options let you specify one, two, three, four or multiple pairs of alignment points to make the overlay image line up with the input image. Each pair of points includes one point in the input image and one point in the overlay image. The overlay image is adjusted as necessary to bring each pair of alignment points into alignment in the result image before compositing. The more alignment points you specify, the more ways Picture Window needs to be able to distort the overlay image to make all the points line up.

As soon as you modify the Alignment control to specify one or more alignment points, numbered control points are displayed as an overlay over both the input and the overlay images. Initially, these alignment points are placed in the corners of the images, but you can drag them to any location you desire. Each alignment point is numbered so you can tell which points in the input image correspond to which points in the overlay image. Setting the display to split screen is useful so you can position alignment points and see the result at the same time.

If the display is set to split screen or to show the input image, you can switch back and forth between displaying the base image with its control point overlay or the overlay image and its control points. There are two ways to switch input images:

 -- this tool bar at the top of the dialog box lets you display either the input (**In**) or the overlay (**Ov**) image. If the overlay image is set to a solid color instead of an image, the second button is grayed out. If the display is set to show only the output image, the entire tool bar is hidden.

The other way to switch between inputs is to use the image browser. To select alignment points on the base image, click the Composite thumbnail in the image browser. To select alignment points on the overlay image, click the smaller Overlay thumbnail just to the right of the Composite thumbnail in the image browser to select the auxiliary input image.



In addition to displaying the locations of the control points, the input image overlay also displays a quadrilateral showing where the edges of the overlay image fall on the input image after alignment has been performed.

### Adjusting Alignment Points

You can move any of the alignment points in either the input or the overlay image by dragging them to new locations.

#### Click and Drag



This tool bar at the top of the dialog box lets you select what happens when you click and drag an alignment point in either the base or overlay image. You can also change this setting by right-clicking on the input or overlay image and selecting an option from the popup menu.



**Move a single alignment point** -- this setting lets you reposition just the alignment point you clicked on.



**Move all alignment points** -- this setting lets you reposition all the alignment points at once.



**Rotate all alignment points** -- this setting lets you rotate all the alignment points about a center point marked with a cross in the overlay. The center point is computed as the average location of all the control points.



## Auto Alignment



The Auto Align button is displayed only if Alignment is set to 1-point (shift), 2-point (shift/rotate) or 2-point (shift/rotate/scale).

When the button is raised, Auto Alignment is off and it has no effect.

When the button is depressed, Auto Alignment is active. In this case, Picture Window searches both the base and overlay images for distinctive features and locates the best-matching features from each image. It then positions the alignment points in both images so as to bring the overlay image into alignment with the base image. Auto Alignment can be useful when trying to composite two hand-held shots of the same scene.

If you manually reposition any of the alignment points after doing an Auto Alignment, Auto Alignment is turned off, and the button is raised.

Auto Alignment can fail if matching features cannot be located or if the images have heavily repeating patterns. If part of the scene moves between images, alignment may fail or, even if it succeeds, you will see ghosting where the two images do not match.

If Alignment is set to Multi-point, only the first 3 alignment points are adjusted.

### Refine Alignment Point Locations



The Refine button is displayed unless Alignment is set to None.

When the button is clicked, Picture Window tweaks the overlay image alignment points in an attempt to find the locations that best match the base image.

If Auto Alignment fails to find a good match, you can set the alignment points manually and then use the Refine button to fine tune them for the best match.

If Alignment is set to Multi-point, only the first 3 alignment points are adjusted.

### Number or Letter Keys

Each alignment point is labeled with a number from 1 to 9 or a letter from a to z or A to Z. Pressing a number or letter key centers the display on the corresponding control point in either the input or the overlay image, depending on which is currently being displayed. Pressing the same number key more than once zooms the image each time. This provides a convenient way to make fine adjustments to the control point locations, even when the images are zoomed in such that you cannot see it all at once.

### Nudging Alignment Points

You can use the following three tool bars when you want to make fine adjustments to the alignment points:



When Alignment is set to something other than None, four arrow buttons are displayed. Clicking one of these buttons shifts all of the alignment points in the input image by one pixel in the direction of the arrow. If you hold down the Shift key while clicking on an arrow, it shifts the alignment points in 1/2 pixel increments instead. The arrow keys are useful to fine tune the location of the overlay image.



When there are exactly two alignment points, two additional buttons are displayed to let you fine tune the rotation angle by rotating alignment point 2 about alignment point 1 by an angle of 1/4° either clockwise or counter-clockwise. If you hold the Shift key down, the rotation angle is reduced to 1/16°.



When Alignment is set to 2-point (Shift/Rotate/Scale), two additional buttons are displayed to let you expand or shrink the overlay image by 0.5% or, if you hold the Shift key down, by 0.1%. It does this by moving alignment point 2 further from or closer to alignment point 1.

### Locating and Zooming In On Alignment Points

Typing the number or letter of an alignment point re-centers the display on the corresponding alignment point to the extent possible. This provides a quick way to check the locations of the alignment points in the base or the overlay image if the display is zoomed in and you cannot see all of them at once.

If you type the same number again, the image zooms in one more level and re-centers. To zoom out, use the normal zoom out button in the main image area.

### Copying Alignment Points

You can copy all the alignment points from the base to the overlay image or from the overlay image to the base image by right-clicking on the base or overlay image and selecting the command from the drop-down menu.

If you have two images of about the same size which are approximately aligned, you can use this feature to quickly set initial alignment points. First set alignment points in one image on prominent features you want to align. Then copy these alignment points to the other. This will produce a rough alignment that you can subsequently refine by adjusting the alignment points in one or both images.

### No Alignment

If you use the default Alignment setting of None, Picture Window aligns the input and overlay images by lining up their lower left corners. This setting is primarily useful if the two images are already properly aligned and have the same size in pixels.

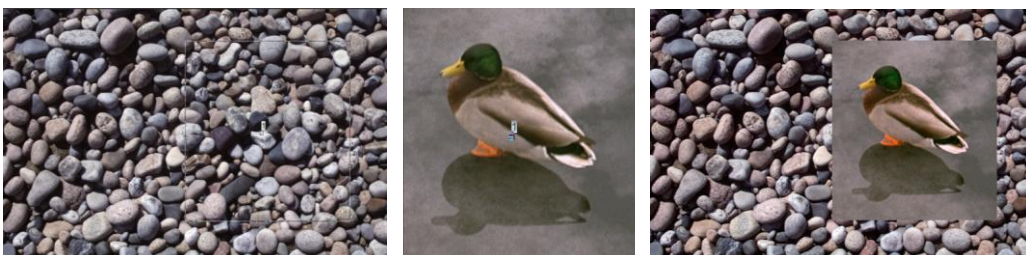
If the overlay image is smaller than the input image, some of the input image will remain visible around the edges.



However, if the overlay image is larger than the input image, the excess is cut off since the output image always has the same size as the input image. If you need the overlay image to extend beyond the edges of the input image, first use the Add Border transformation to enlarge the input image so there is room for the overlay image overhang. This applies to all the other alignment methods as well.

### 1-Point Alignment

When you specify 1-point alignment, Picture Window slides the overlay image over the input image without rotating or scaling it, until the two alignment points, one in the input image and one in the overlay image, are coincident.



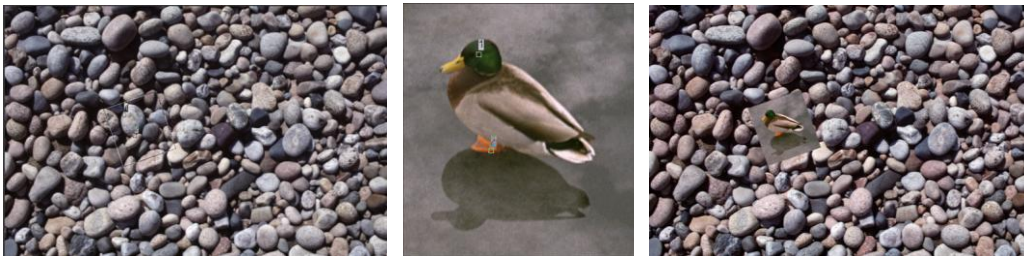
## 2-Point Alignment

When you specify 2-point alignment, Picture Window first slides the overlay image to align the first pair of points and then scales and rotates the overlay image as necessary to align the second pair of points as well. This is the alignment method you would use when creating a collage of two images, although in this case you would be using a mask.

There is also a variant of 2-point alignment that lets you shift and rotate the overlay image only without affecting its size. In this case, alignment point 1 lines up and the angle (but not the length) of the line segment between the two alignment points is also preserved.



2-Point (shift/rotate)



2-Point (shift/scale/rotate)

## 3-Point Alignment

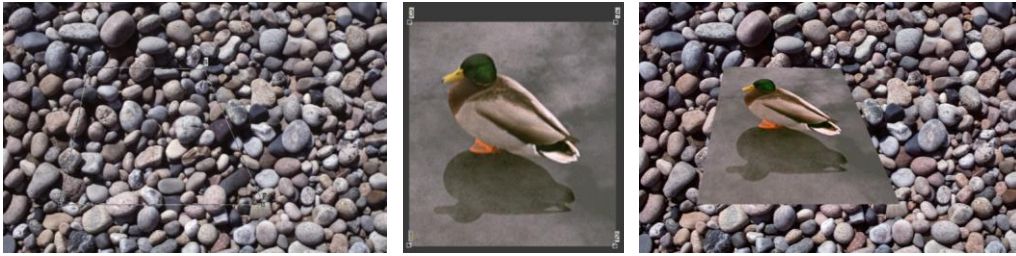
When you specify 3-point alignment, Picture Window skews the overlay image into a parallelogram to get the third pair of points into alignment. This type of warping is called an affine mapping.





## 4-Point Alignment

When you specify 4-point alignment, Picture Window applies a perspective warp to the overlay image to make all four pairs of points match up.



For example, using 4-point alignment you can make the overlay image fit in a picture frame in the input image, even if it is viewed from an angle.



## Multi-Point Alignment

When you specify multi-point alignment, Picture Window uses the first 3 pairs of alignment points to define a baseline 3-point warp of the overlay image. Additional pairs of alignment points that you add change the mapping so that all the control points in the overlay image coincide with the corresponding points in the input image. This method can be useful when you want to distort one image to match another when the mismatch is irregular. For example, multi-point alignment can be used to align an aerial photo with a map of the same area by ensuring that various landmarks on the photo coincide with their representations on the map.

There are infinitely many ways to perform this kind of interpolation, depending on the treatment on the parts of the image between the alignment points. The problem is similar to reconstructing a topographic map from a set of measured elevations at known locations in that there are many possible landscapes that match all the known elevations.

To add a new pair of control points, Shift-click on the input image. A corresponding point in the overlay image is also be created, based on the affine transformation defined by the first three control points. To remove a pair of alignment points, Ctrl-click on the control point in the input image.

## Method

Several methods of multi-point alignment are supported. Experiment with different ones to see which works best for your situation.

**Shepard** – distortion of the mapping is mostly local.

**Multi-quadratic** – distortion of the mapping is fairly smooth and fairly local.

**Inverse Multi-quadratic** – distortion of the mapping is fairly smooth and fairly local.

**Thin Plate** – simulates warping similar to bending a thin sheet of metal. While the mapping is usually very smooth, an alignment point may affect distant parts of the image.

**Gaussian** – distortion of the mapping is mostly local. This method is a good choice when you want to move a small part of an image and leave the rest where it is.

**Sinc** – distortion is like ripples that fade out with distance from the alignment point. This is intended primarily as a special effect.

## R

Multi-quadratic, inverse multi-quadratic, gaussian and sinc methods support an additional setting, R, that can be used to adjust how local the mapping will be. The R slider is displayed only when one of these methods is selected. Smaller values make the effects of each alignment point more local – larger values cause each alignment point to affect a wider area.

## Compositing with Masks

### Copying objects from one image to another is hard

Compositing a person or object from one image and placing it in another image without having the result look fake is surprisingly difficult. There are a lot of subliminal visual cues that contribute to making a scene look real. Some of these are related to color, so it is not surprising that compositing black and white images is a lot easier.

### Lighting Direction

If the light is coming from a different direction in one image than the other, the shadows will be on the wrong side.

### Cast Shadows

Objects cast shadows onto other parts of the scene. This can be very difficult to reproduce when copying an object from one image to another.

### Lighting Color

If the color balance is off between the two images due to different time of day or light source, they will not blend in with each other.

### Reflected Light

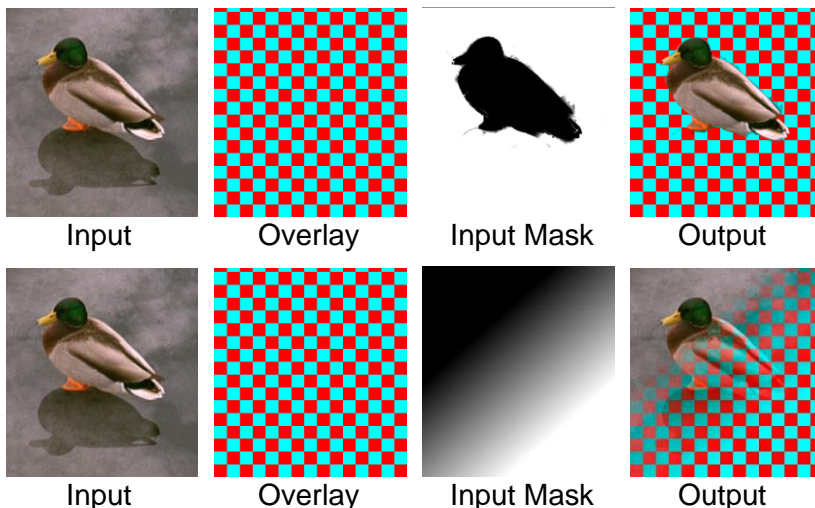
Colored light reflects off nearby objects. If the reflected light is the wrong color, the object will look out of place.

### Edges

If the edges of the mask used to cut an element out of an image are inaccurate or improperly feathered, it will look like a cut-out glued onto the other image.

### Using the Input Image Mask

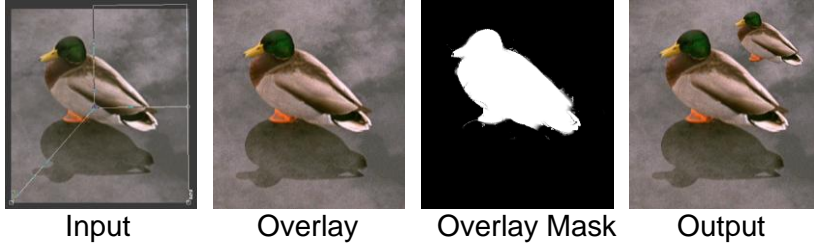
The Input Image mask determines what parts of the input image will be protected from the overlay color or image and what parts will be affected. The overlay covers the input image where the mask is white and leaves it untouched where the mask is black.



## Using the Overlay Image Mask

The Overlay Image mask determines what parts of the overlay image will be applied to the input image and what parts will not. The overlay covers the input image where the mask is white and leaves it untouched where the mask is black.

The big difference between the input and overlay masks is that the overlay mask gets distorted along with the overlay image if you specify alignment points. Here is an example of extracting an object from an image and placing the copy back into the same image.



## Using Both Masks

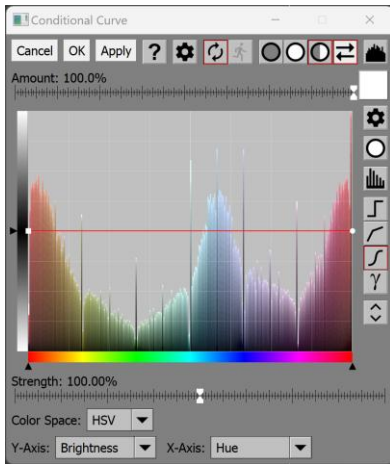
By using both an input image mask and an overlay image mask, you can place an object in the overlay image behind an object in the input image. The overlay image and mask are composited over the input image, but only where the input image mask is white. This is the setup you would use to place an image of the moon behind a mountain or a tree.



# Conditional Color Curves

The Conditional Color Curves transformation lets you adjust one color channel based on another. In other words, you can increase or decrease one channel (the one assigned to the y-axis) for pixels that fall into a particular range of another channel (the one assigned to the x-axis).

## Using the Conditional Color Curves transformation



First select what color space you want to work in: HSV or HSL.

Next, assign channels to the x-axis and y-axis. The x-axis channel is the one on which you want to base adjustments. The y-axis channel is the one you want to increase or decrease. The two channels can be the same.

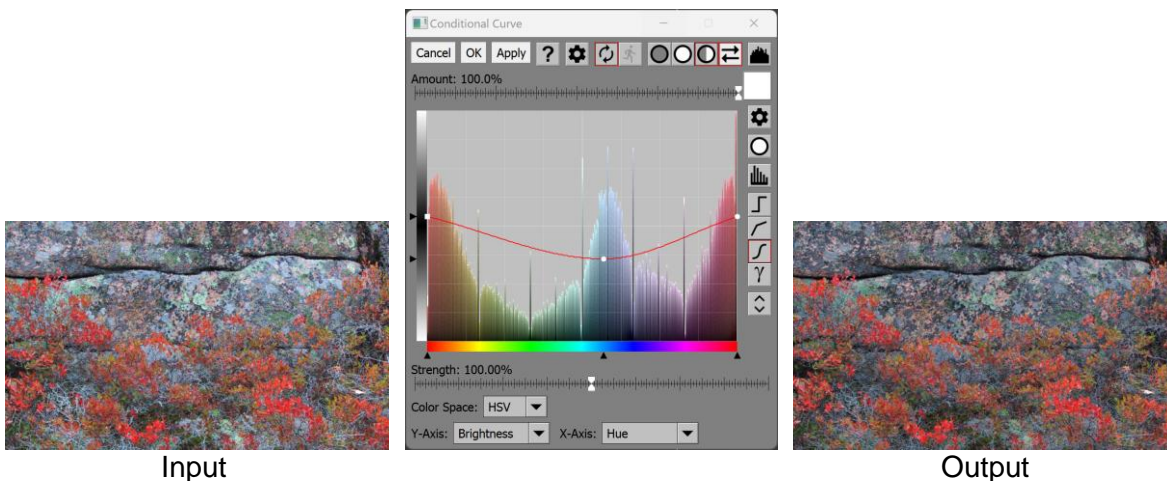
## Making Adjustments

Unlike normal curves, the curves in Conditional Color Curves make incremental adjustments, similar to hue curves in the Color Curves transformation described above.

To make an adjustment, drag a part of the curve up or down to increase or decrease the channel assigned the y-axis.

If the x-axis is assigned to hue, the rules described above for hue curves apply. For brightness or saturation, you can move the first and last control points freely.

Here is an example of making the warmer colors in the input image stand out by darkening the cooler colors. This is done by setting the x-axis to Hue and the y-axis to Brightness and lowering the curve for cyan/blue/purple:



## Strength

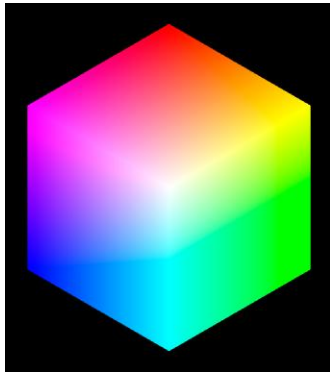
The Strength slider amplifies or reduces the amount of correction applied by the curve. This lets you make the overall effect of the transformation stronger or weaker.



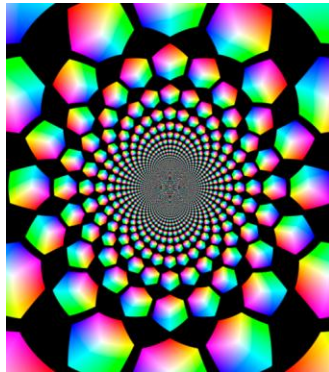
# Conformal Mapping

Conformal mapping is a mathematical technique based on functions of a complex variable. Complex numbers are made up of two parts: a real part and an imaginary part. If you consider the real part to be an x coordinate and the imaginary part to be a y coordinate, applying a complex function takes these coordinates and returns a new set of x and y coordinates. Thus every point in the x-y plane is mapped to a different point in the x-y plane.

Applying this to 2-dimensional images, conformal mapping becomes a way to distort images depending on the complex function used. This can produce some striking effects, especially if the image is tiled to fill the entire plane.

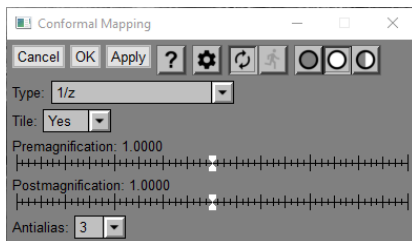


Input



Output

## Using the Conformal Mapping Transformation

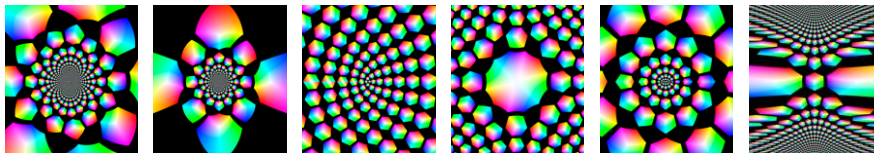


### Origin

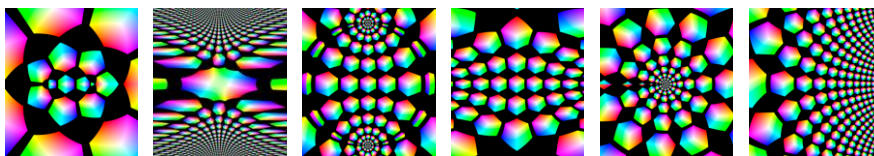
The Conformal Mapping transformation displays a control point as an overlay on its input image. Initially the control point is located at the center of the input image, but you can drag it to other locations, even outside the input image. This point defines the origin for the complex function, so moving it around will shift the pattern in the output image.

### Type

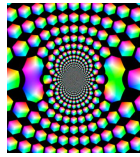
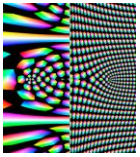
This control lets you select which complex function to use. Each one produces a different effect.



$(z+1)/(z-1)$   $1/z$   $z^2$   $\sqrt{z}$   $\sin(z)$   $\sin^{-1}(z)$



$\cos(z)$   $\cos^{-1}(z)$   $\tan(z)$   $\tan^{-1}(z)$   $\exp(z)$   $\ln(z)$



Joukowski(z)    Inverse Joukowski(z)

### Tile

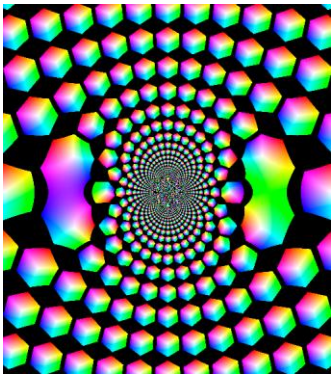
This control turns tiling on or off. If tiling is off, any part of the plane that falls outside the input image is rendered as black in the output image.

### Premagnification and Postmagnification

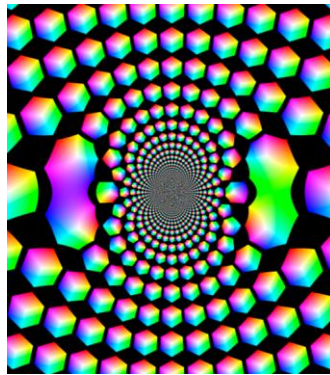
You can use these sliders to adjust the magnification. Premagnification scales the input image before applying the conformal mapping. Postmagnification scales image after conformal mapping.

### Antialias

This controls the oversampling factor. If it is greater than 1, each output pixel is determined by computing the result at multiple nearby locations and averaging the results. This creates a smoother result image, especially where the input image is being reduced greatly in size, such as in the center of the image below. However, it does take longer to compute the output image if you antialias.



Antialias = 1

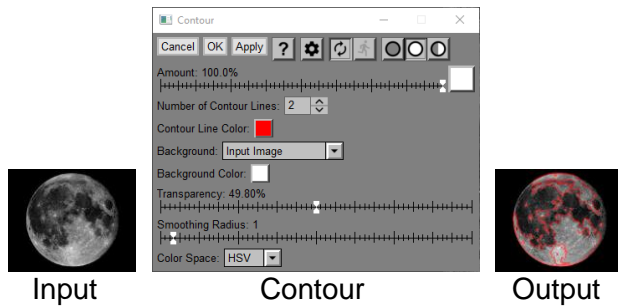


Antialias = 3

# Contour

The Contour transformation copies its input image to its output image and then draw contour lines on the output image at equally-spaced brightness levels.

## Using the Contour Transformation



### Amount

The amount control blends a percentage of the input image with the output image to scale back the effect of the Contour transformation. If you create a mask, you can use the amount control to localize the effect of the transformation to parts of the input image.

### Number of Contour Lines

This setting lets you specify how many equally-spaced brightness levels you want to contour.

### Contour Line Color

This controls the color of the contour lines.

### Background / Background Color

These controls let you use a copy of the input image or a solid color background.

### Transparency

This slider controls the transparency of the contour lines.

### Smoothing Radius

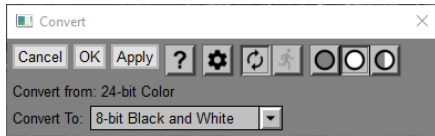
This slider lets you smooth the contour lines as they can get quite tangled in noisy parts of the input image.

### Color Space

If the input image is color, this lets you select whether HSV V or HSL L is used as a brightness measure.

# Convert

The Convert transformation changes image from one type to another.



## Image Types

Image types are one of the following:

- 1-bit Binary
- 8-bit Black and White
- 16-bit Black and White
- 24-bit Color
- 48-bit Color

## How Conversion is Performed

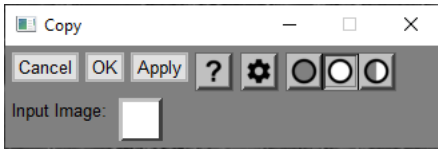
When converting from color to black and white, the luminance channel is used.

When converting from black and white to color or from color to black and white, the image is converted to the appropriate working color space.

When converting from 8 bits per channel to 16 bits per channel, the low order 8 bits are filled with random data to fill the gaps in the tone scale.

# Copy

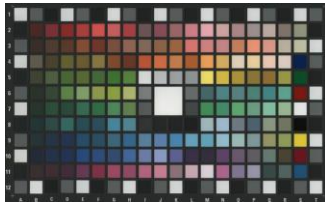
The Copy transformation takes one auxiliary image and produces an output image that is a copy of its input image. Its purpose is to let you build a branch below the Copy. Then, by simply changing what image makes up its auxiliary input, the branch can quickly be made to operate on a different image.



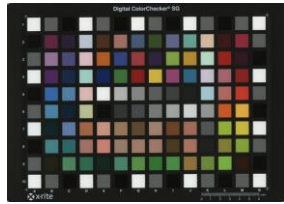
The Input Image control is where you select an input image to copy.

# Create Profile

The Create Profile transformation is a tool for creating custom scanner or camera profiles. Before you can use it, you need to obtain a standard test target such as one of the ones listed below.



ColorChecker DC



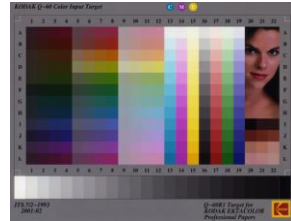
ColorChecker SG



HCT



ColorChecker



IT8



SpyderCheckr 24 and 48

To begin, you first scan or photograph a special test target consisting of a number of color patches. Next you bring up the Create Profile transformation which compares the image of the test target to known reference values for the colors of the target patches. Using this information, it then creates a profile that converts images taken under the same conditions as the target image and corrects them to standard viewing conditions.

The Create Profile transformation only creates input profiles. It does not create monitor or printer profiles.

## When to use custom profiles

There are several situations where a custom input profile is useful.

### Scanner Profiles

If you have a transparency or flatbed scanner, creating a profile for it can improve the accuracy of its color rendition. Since a scanner has a fixed light source, you only need to profile it once.

### Camera Profiles

If you are doing photography that requires accurate color such as reproducing artwork, catalog photography or photographing objects for scientific study or analysis, a custom profile can be invaluable. In studio portrait photography, a custom profile can help reproduce skin tones.

If you are using standard lighting such as a copy stand with fixed lights or a standard studio setup, you may only need to profile once. If the lighting conditions are changing, you will need to create a profile for each situation.

## Using the Create Profile Transformation

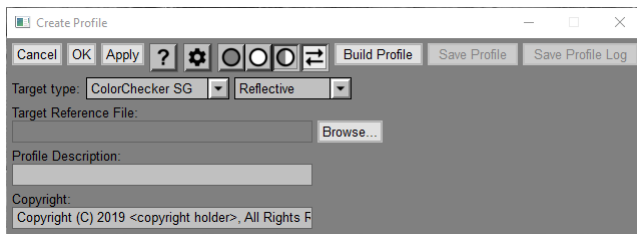
### Target Image

Before using this transformation, scan or photograph your test target to use as the input image. The target must be illuminated uniformly with a consistent light source. Shadows, reflected light from nearby objects, or mixed or uneven lighting will cause the profiling process to fail or will generate a useless profile. To

avoid reflections, try to keep the illumination at roughly a 45 degree angle. Don't try to fill the entire frame with the target as this will increase vignetting and the full camera resolution is unnecessary.

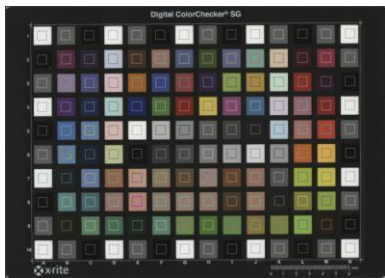
The profile you generate will only apply to images scanned or photographed under the same conditions as the target and processed using the same workflow.

Before doing anything else, set the Target Type to match the type of target you are using.



## Input Image Overlay

The Create Profile transformation displays an overlay on the input image. To position the overlay, drag its four corners until the little squares line up with the color patches in the target image as shown below.



## Target Type

This is where you specify what type of test target you are using and whether it is a reflective or transparency target. While you can use a ColorChecker or SpyderCheckr 24 as a target, it does not have enough color patches to make a good profile. Using a ColorChecker SG or IT8 target will work much better. The more expensive HCT target is for use with high end scanners and has too many patches for normal use. The SpyderCheckr is not recommended as there seem to be problems with the target not accurately matching its reference file, at least in the one copy I tested.

## Target Reference File

A reference file containing the measured colors of each patch is required before the target can be processed. Some targets such as ColorCheckers and SpyderCheckrs have standard reference files which are distributed with Picture Window, while others are made in batches and have different reference files for each batch. In this case, a reference file may come with your target or you may need to download it from the manufacturer's web site. See the help file for details.

## Profile Description


Enter the name of the profile here. Profiles are listed by this description and not by filename. It is important to provide enough information in the description that you can identify the profile. Including the time and date in the description is also a good idea.

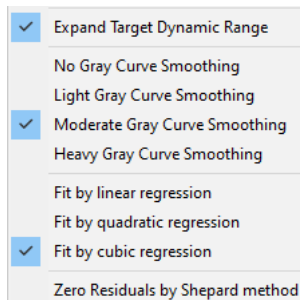
## Copyright

You can include a copyright in your profile if you want.



## Settings Menu

Clicking the  button displays the Settings Menu. In addition to the standard menu items there are several settings specific to the Create Profile transformation:



### Expand Target Dynamic Range

If this item is checked, the target image is adjusted, prior to creating the profile, so that its darkest patch is pure black and its lightest patch is pure white. This ensures that the profile will not significantly affect the brightness of images to which it is applied and avoids potential kinks in the gray curve.

### Gray Curve Smoothing (No/Light/Moderate/Heavy)

Smoothing the gray curve is recommended to compensate for small inaccuracies in the reference file that can otherwise cause kinks in the gray curve. Moderate smoothing is generally recommended.

### Fit by (Linear/Quadratic/Cubic) Regression

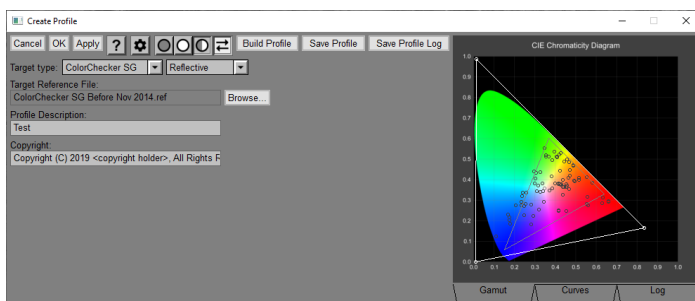
The type of regression used determines the class of curves that is used to model the color space. Cubic regression is the most accurate method, but targets such as the 24-patch ColorChecker do not have enough color patches to use this method, so a Quadratic fit is used instead.

### Zero Residuals by Shepard Method

If this item is checked, the final profile is further refined after performing cubic regression to eliminate any residual errors for the color patches. Unless you know your reference file is highly accurate, this is not recommended.

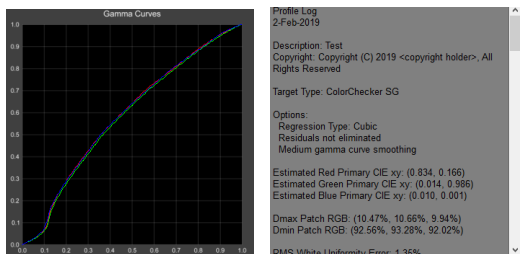
## Build Profile

Once everything is set up, click the Build Profile button to create the profile. If the process is successful, the dialog box is updated.



The right-hand side of the dialog box shows a standard CIE Chromaticity Diagram with the locations of each color patch marked with small circles.

If you click the Curves tab, the display is replaced with a display of the red, green and blue curves that the profile applies to linearize the brightness levels in the image. If you click the Log tab, summary information about the profile is displayed.



## Save Profile

Clicking this button lets you save the new profile as a standard ICC profile in the Windows profile folder. Once the profile has been saved, you can use it right away.

## Save Profile Log

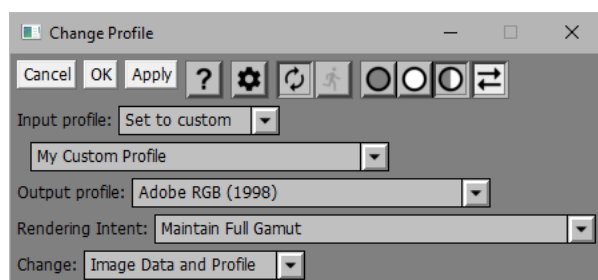
Clicking this button lets you save the profile log as a text file.

## Output Image

The output image is the input target image corrected using the profile. This is done by first assigning the new profile to the input image and then converting it to the working color space.

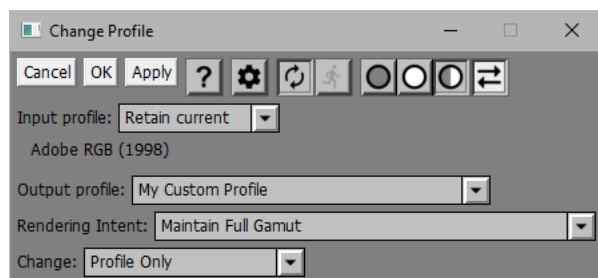
## Using the Profile to Correct Images

Once you have your custom profile, to apply it to an image other than the target image you use the Change Profile transformation as follows.



- Set Input Profile to Set to Custom and then select your custom profile from the list.
- Set Output Profile to your working color space or whatever standard color space you want to convert to.
- Set Rendering Intent to Maintain Full Gamut
- Set Change to Image Data and Profile.
- Click OK
- At this point, the output image will be in a standard color space and will have the corrections of the custom profile applied to it.

Another option is to simply assign your new custom profile to the image so you can decide later what color space to convert it to. Use this option only if you really know what you are doing since combining image data from images in different color spaces can produce unpredictable results. A reasonable use for this option might be to save the image in its custom color space so it can be converted to the current working color space the next time you open it.



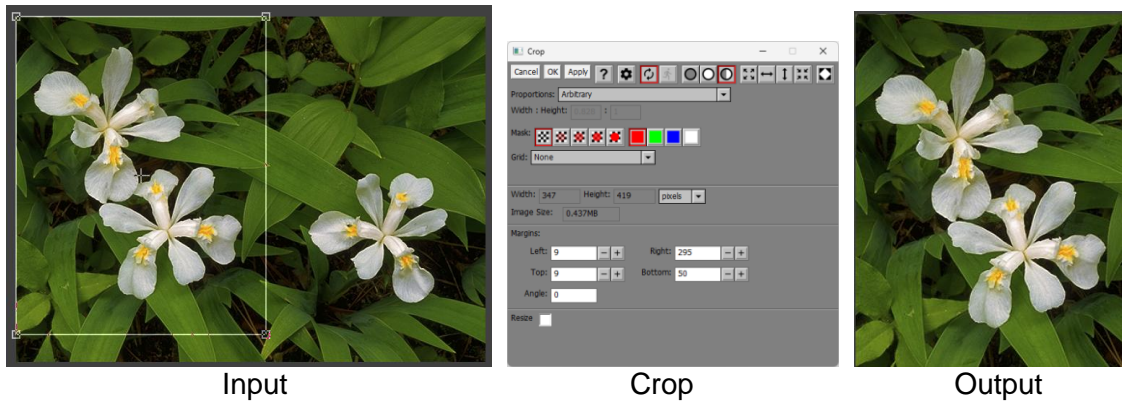
- Set Input Profile to Retain current.

- Set Output Profile to your custom profile.
- Set Change to Profile.
- Click OK
- At this point, the output image will be in the custom profile's color space.

# Crop

The Crop transformation displays a rectangular overlay on its input image. You can resize this rectangle by dragging its corners, sides or interior, and you can also rotate it. The output image is created by extracting the image data within the cropping rectangle. You also have the option of resizing the image after cropping.

## Using the Crop Transformation



### Selecting the Cropping Rectangle

The cropping rectangle is displayed as an overlay on the input image. Initially it is set to cover the entire input image. If Proportions is not set to Arbitrary (see below), the proportions of the cropping rectangle are locked to the proportions you select.

You adjust the cropping rectangle by dragging one of its four corners, four sides, or the interior of the crop box. The width, height, size, and margins of the resulting image are updated in the Crop dialog box as you adjust the cropping rectangle. You can also rotate the cropping rectangle by dragging one of the corners while holding down the Shift key.


#### Dragging a Corner

When you drag one of the corners of the cropping rectangle, the center of the cropping rectangle remains fixed while the cropping rectangle grows larger or smaller.

#### Rotating the Crop Box

If you hold the Shift key down while dragging one of the corners of the cropping rectangle, the crop box rotates about its center. You can also set the rotation angle in degrees directly by entering it into the Angle control.

If the rotation angle is zero, the input image is cropped without resampling. If the rotation angle is not zero, the input image is resampled to produce the output image which can cause a slight softening of the image.

If the rotation angle is zero, you cannot move the crop box outside the input image. If the rotation angle is not zero, you can move the crop box outside the input image. Any part of the crop box that lies outside the input image will show up as black in the output image. To force a rotated cropping rectangle back inside the input image, use the  button (see Crop Box Tool Bar below).

#### Dragging a Side

When you drag one of the sides of the cropping rectangle, the opposite side remains fixed. If the proportions of the cropping rectangle are Arbitrary, the side you are dragging, and the opposite size stay the same length. If the proportions of the cropping rectangle are fixed, the side you are dragging and the opposite side change in length to preserve the proportions while staying centered.

#### Dragging the Interior

When you drag the interior of the cropping rectangle, the entire rectangle moves while keeping the same size.

## Dragging the Output Image

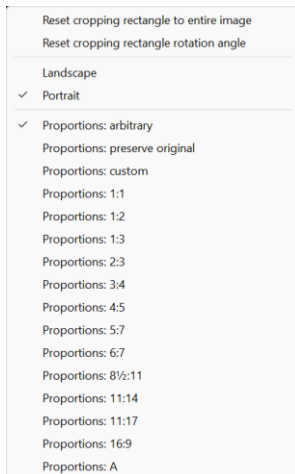
As an alternative to positioning the cropping rectangle overlay by dragging its interior, you can change the part of the input image revealed within the cropping rectangle by clicking and dragging the output image. This has the effect of moving the cropping rectangle in the opposite direction and is like moving a picture behind a picture frame to change what part of the image shows through. If the cropping rectangle covers the entire input image, you cannot drag it as there is nowhere for it to move. The output image is redrawn when you stop dragging it for  $\frac{1}{4}$  second.

## Number Keys

Each of the four corners of the crop box is labeled with a number from 1 to 4. Pressing a number key centers the display on the corresponding control point. Pressing the same number key more than once zooms the input image each time. This provides a convenient way to make fine adjustments to the control point locations, even when the image is zoomed in such that you cannot see it all at once.

## Right-Click Menu

When you right-click on the input image, Picture Window displays the following menu:



### Reset cropping rectangle to entire image

Selecting this item resets the cropping rectangle to cover the entire input image and resets the angle to zero while leaving the other settings alone.

### Reset cropping rectangle rotation angle

Selecting this item sets the cropping rectangle angle to zero while leaving the other settings alone.

### Orientation






These menu items offer shortcuts for changing the Orientation setting.

### Proportions

These menu items offer shortcuts for changing the Proportions setting.

## Crop Box Tool Bar



-  expands the crop box to include the entire input image
-  centers the crop box horizontally
-  centers the crop box vertically
-  shrinks the crop box to match the currently zoomed and scrolled view of the input image
-  shrinks the rotated crop box so it fits entirely within the input image

This first shrinks the crop box (without altering its proportions) so its total width and height are both less than or equal to the width and height of the input image. Then, if part of the crop box is

still outside the input image, it shifts the crop box just enough to position it inside the input image.

## Proportions

The Proportions control determines the ratio of width to height of the cropping rectangle. Your choices are Arbitrary, Preserve Original, Custom, or a number of pre-defined standard proportions.

### Arbitrary

Selecting Arbitrary lets you adjust the cropping rectangle without restriction to any proportions you want.

### Preserve Original

Selecting Preserve Original means the proportions of the cropping rectangle are locked to the proportions of the input image.

### Custom

Selecting Custom lets you enter a width and height and the proportions of the cropping rectangle are locked to those proportions.

## Width : Height

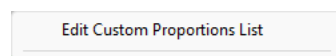
The Width and Height controls display the current proportions of the cropping rectangle. The values are read-only unless Proportions is set to Custom, in which case you can enter your own proportions.

## Custom Proportions List

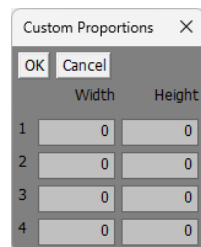
If you find yourself frequently using custom proportions not available in the pre-define standard proportions list, you can enter them in a list of up to four custom proportions and you will be able to select them from a menu instead of having to type them in every time.

When Proportions is set to Custom, an extra button is displayed just to the right of the Height control. Clicking this button displays a drop-down menu. Selecting the first item in the menu lets you create or edit the list. Custom proportions you create subsequently show up in the menu. Selecting one of these from the menu copies its width and height values to the Width : Height control and adjusts the cropping rectangle accordingly.

Initially, the list is empty so the drop down menu only includes one item:

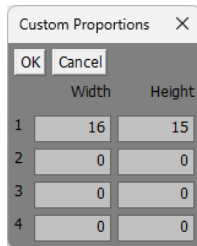


Selecting this item displays the following dialog box:

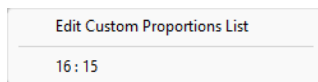


|   | Width | Height |
|---|-------|--------|
| 1 | 0     | 0      |
| 2 | 0     | 0      |
| 3 | 0     | 0      |
| 4 | 0     | 0      |

There are four slots – a slot is considered empty if either its Width or Height is 0. Suppose you frequently crop images to proportions of 16:15 – just enter 16 for the width and 15 for the height in one of the slots.



Subsequently the drop down menu will include this option:



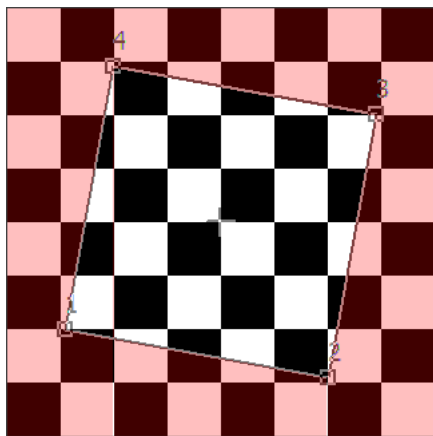
Selecting 16:15 from the list enters these values into the Width : Height controls and adjusts the crop box accordingly. Similarly, you can add other custom proportions to the list and they will appear in the menu as well.

To make a list of custom proportions available to future Crop transformations, create the list you want and then use the Crop transformation's Settings Menu to save the settings as the defaults. This causes the custom proportions list to be initialized with your selected proportions each time a new Crop transformation is created.

## Mask

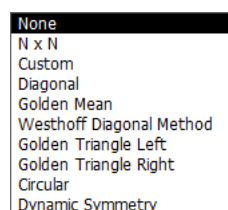


Optionally, Picture Window can display a solid color overlay over the parts of the input image that lie outside the crop box as illustrated below.



You can change the transparency and color of this overlay, similar to the way masks are displayed. The overlay makes it more obvious which pixels are inside or outside the crop box, but it can obscure details in the image, especially if you select a low mask transparency. To remove the overlay, set its transparency to 100% by depressing the first button. While this looks like a mask, it is just cosmetic and does not affect the results of the transformation.

## Grid



The Grid control lets you place a grid within the cropping rectangle as a composition guide. Standard grids are built-in and you can also define a custom composition guide if you need some special kind of grid.



## None

Selecting None removes the grid. Just the cropping rectangle is displayed.



## N x N

Selecting N x N displays a rectangular grid with a fixed number of divisions both horizontally and vertically. An additional control is displayed to let you set the number of divisions. For the rule of thirds, use a 3 x 3 grid.



## Custom

Selecting Custom lets you select a custom composition guide. See Composition Guides in the help file for details on creating your own.



## Diagonal

Selecting Diagonal displays a grid consisting of just the two diagonals.



## Golden Mean

The Golden Mean grid is another popular composition guide based on the golden mean proportion.



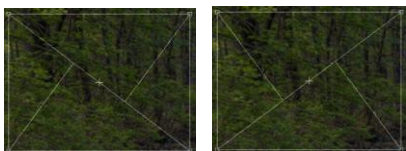
## Westhoff Diagonal Method

The Westhoff Diagonal Method draws diagonal from each of the four corners.



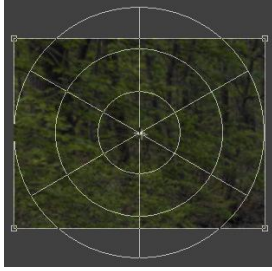
## Golden Triangle Left/Right

Another method based on diagonals



## Circular

Creates a polar coordinate grid with N divisions



## Dynamic Symmetry Method

The Dynamic Symmetry Method is similar to superimposing the left and right golden triangle grids.



## Width/Height/Image Size

These controls provide a readout of the size of the cropping rectangle, based on the units you select. The cropped image size in Mb is also displayed.

## Margins/Angle

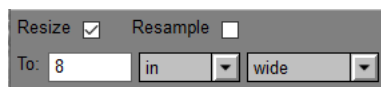
These controls display the current left, right, top and bottom margins in pixels. You can also set these values by entering number manually or using the +/- buttons. This is often a good way to make very small adjustments to get an exact size.

Similarly, the current rotation angle (in degrees) is displayed and you can enter values into this control as well.

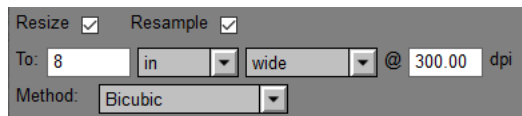
If the rotation angle is not zero (i.e. the crop box is rotated), the margin settings become read-only and are based on the bounding box of the rotated crop box.

## Resizing

If Resize is unchecked, no resizing occurs and the part of the input image within the cropping rectangle is copied directly to the output image. If Resize is checked, then additional controls appear to let you resize the cropped image.



If Resample is unchecked, resizing is done just by changing the dpi setting without affecting the image data. If Resample is checked, additional controls are displayed.



This lets you set the dpi of the output image as well as its size in physical units or pixels. You can also select the resampling method.

## Settings Menu

Reset cropping rectangle in batch mode

### Reset cropping rectangle in batch mode

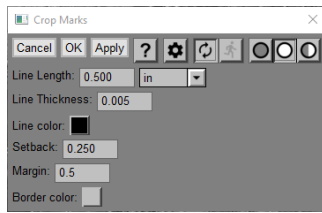
If this item is checked, then when the Crop transformation is executed in batch mode, the cropping rectangle is reset each time to the entire input image. Otherwise, the previous cropping rectangle is used. This feature is primarily useful if you have set a break point on the Crop transformation to let you manually adjust how each image is cropped.

# Crop Marks

Crop marks are guides that make it easier to trim a printed image to an exact size.



Input



Crop Marks



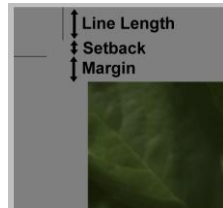
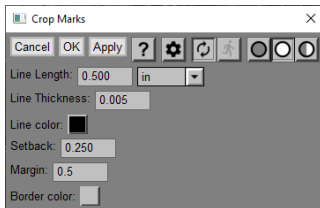
Output with 1 inch Gray Border

While you could just place a thin border around the image as a cutting guide, trimming the print would be tricky because part of the border might be left behind, or you might over-crop to prevent this from happening. Crop marks lie entirely outside the area to be trimmed so they avoid this problem.

Crop marks can only be used if the printer paper is large enough to leave room for them.

To trim the print, you line up a ruler with crop marks on each side of the image and cut across the print area but not all the way across the page. Then you repeat with the perpendicular set of crop marks until the print can be removed from the paper.

## Using the Crop Marks Transformation



### Line Length/Thickness/Color

These controls let you set how long to make each of the lines that make up the crop marks, how thick to make them and what color.

### Setback

Setback is the distance between the ends of the crop marks and the part of the print you want to trim.

### Margin

This selects the width of the margin (in the current units) to leave around the image.

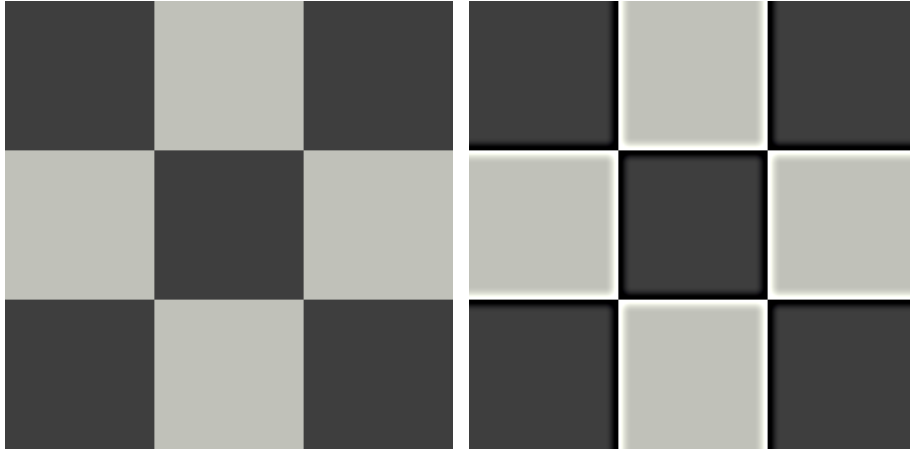
### Border Color

This control lets you change the color of the border. To leave the paper showing, use white.

# Dehalo

The Dehalo transformation is designed to reduce light and/or dark halos in oversharpened images. The best way to prevent halos is to use a sharpening transformation such as Multipass Sharpen that suppresses them. However, from time to time you may need to work on an oversharpened file from some external source such as a cell phone or the internet.

Halos arise when sharpening an image that has distinct edges between light and dark areas – light halos occur on the light side of the edge and dark halos on the dark side. The width of the halos depends on the sharpening radius.

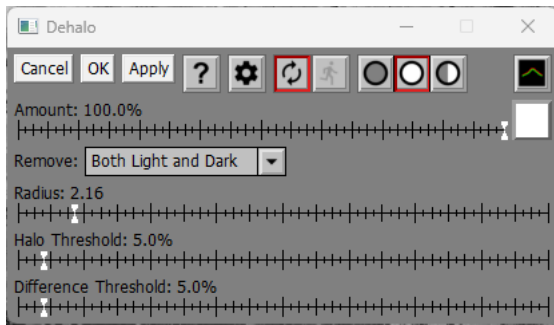


A common, annoying artifact is a light halo that occurs in oversharpened landscapes at the boundary between the bright sky and a darker mountain, horizon or tree line.



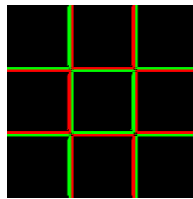
The Dehalo transformation works by first detecting and then replacing halos by copying image data from adjacent pixels. In some cases, it may fail to detect halos very near the edges of the input image.

## Using the Dehalo Transformation



### Display Halo Map

If this button is depressed, the output image is replaced with a halo map that shows where the transformation has detected light or dark halos. Light halos locations are red and dark halos are green. This halo map is a very useful aid when adjusting the Radius and Threshold settings (see below) as it lets you see what parts of the input image will be modified.



### Amount

The Amount control lets you blend a percentage of the input image with the output image to reduce the effect. Or, if you use a mask, you can limit the effect of the Dehalo transformation to just part of the input image.

### Remove

The Remove setting lets you choose to remove only light halos, only dark halos, or both.

### Radius

The Radius slider lets you match the approximate width in pixels of the halos you want to remove.

### Halo and Difference Thresholds

For a halo to be detected, the brightness of the light and dark halos must differ by more than the Halo Threshold, and the brightness of the light and dark areas just beyond the halos must differ by more than the Difference Threshold.

### Tips

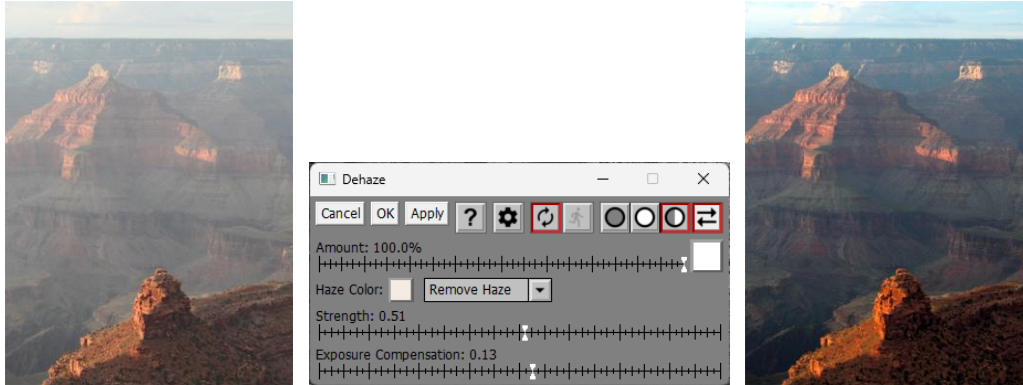
Try to use the largest threshold settings that still detect the halos you want to remove. This will reduce the amount of collateral damage done to other parts of the input image.

Using a mask to restrict the effects of the transformation to a subset of the input image makes it run faster.

# Dehaze

The Dehaze transformation is designed to remove atmospheric haze from images. Without a depth map, this is impossible to do correctly since there is no way for the program to tell the difference between haze and a foreground object of the same color as the haze. However, by making certain assumptions, most hazy images can be improved. Dehaze only works on color images.

## Using the Dehaze Transformation



### Amount

The Amount control lets you blend a percentage of the input image with the output image to reduce the effect. Or, if you use a mask, you can limit the effect of the Dehaze transformation to just part of the input image.

### Haze Color

Initially, the haze color is set automatically by the Dehaze transformation, but you can change it if necessary. The default haze color is computed as an average of the lightest colors in the image.

### Remove Haze / Add Haze

This setting lets you choose whether to add or remove haze from the input image.

### Strength

This slider adjusts the strength of the dehaze effect.

### Exposure Compensation

Removing haze from an image darkens it while adding haze lightens it. You can compensate for this effect by adjusting the exposure compensation slider which darkens or lightens the output image by up to two stops.



# Denoise

The Denoise transformation is designed to remove various kinds of digital image noise.

## Using the Denoise Transformation



For faster response time, Denoise has its own preview area. You can increase the size of the preview by dragging one of the corners of the dialog box. If you widen the dialog box, you can drag the vertical separator bar between the controls and the preview area to enlarge one while making the other smaller.



### -- Preview Button

To preview the effect on the entire output image, click the button just above the preview area.

To re-center the preview, click on the input image in the main image area. You can also scroll the preview area by clicking and dragging on it.

You can increase the size of the preview by dragging one of the corners of the dialog box. If you widen the dialog box, you can drag the white diamond in the center of the vertical separator bar between the controls and the preview area to enlarge one while making the other smaller.



### -- Difference Button

When the Difference button is depressed, the preview area displays the difference between the input image and the preview image.



### -- Magnify Preview Button

When the Magnify Preview button is depressed, the central portion of the preview area is magnified by a factor of two, making it easier to see fine details. Clicking the button a second time restores the normal 1:1 display.

### Amount

The Amount control lets you blend a percentage of the input image with the output image to reduce the effect. Or, if you use a mask, you can limit the effect of the Denoise transformation to just part of the input image.

### Radius

The Radius slider determines the size of the area around each pixel that will be used in the noise reduction process. The larger the scale of the noise, the more benefit you will get from increasing the radius. Large radius values compute much slower however.

### Strength

The Strength slider determines how aggressive the noise reduction will be, but this can come at the expense of loss of image detail.

## Tips

Sometimes different types of noise reduction work better for different parts of the image. In this case it may be advantageous to do noise reduction in sequential stages using masks for each part.

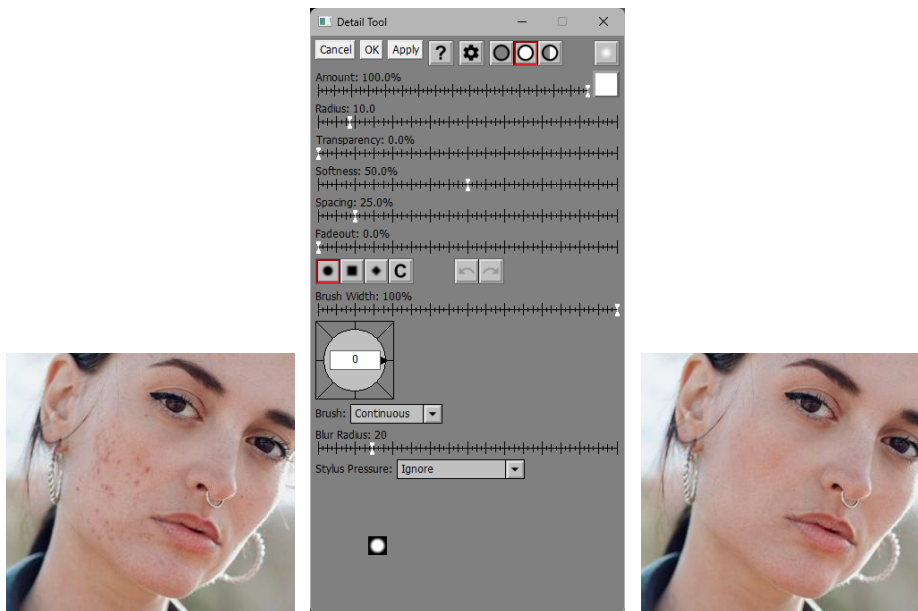
It may take some experimentation to get the best combination of radius and strength for each type of noise. For example, chroma noise in areas of solid color tends to be large scale and require a large radius and lower strength, while salt and pepper noise is often better treated with a small radius and higher strength.

## Detail Tool

The Detail tool provides you with a brush that copies detail and texture from one part of an image to another. Most commonly it is used as a retouching tool to remove something you don't want such as facial blemishes, dust spots, etc.

The Detail tool is very similar to the Clone tool, but it copies only high-pass detail from one spot in the image to another. High-pass detail is extracted by subtracting a blurred version of the input image from itself. You can control the level of detail copied by varying the blur radius.

### Using the Detail Tool



### Source and Target Cursors

Unlike most other transformations, the Detail tool operates directly on the output image. It has two cursors, a source cursor that marks where image data is coming from and a target cursor that marks where image data is going to be copied.

The source cursor is drawn in the shape and size of the brush and is distinguished from the target cursor by having a small circle in its center while the target cursor has a cross:



When it starts out, the Detail tool has just a source cursor. To define the point where you want to start cloning, click the mouse button. This sets the source cursor and displays a target cursor which now moves with the mouse while the source cursor stays fixed. To start cloning, click and drag on the output image. As you move the mouse, both cursors move together, and the output image is updated as you paint on it.

To reset the source cursor to a new location, shift-click on it.

### Display Blurred Input Image

When this button is depressed, a blurred version of the input image is displayed instead of the output image. When it is raised, the output image is displayed normally. Displaying the blurred input image makes it easier to select an appropriate value for the Blur Radius (see below).

When you click OK or Apply, this button is automatically raised so that the transformation produces its output image.

## Amount

The amount control blends a percentage of the input image with the output image to scale back the effect of the Detail transformation. If you create a mask, you can use the amount control to protect parts of the input image from being modified, a little like using masking tape to avoid painting an area.

## Brush Settings

### Radius

The Radius slider adjusts the brush size. You can also use the mouse scroll wheel to make the brush larger or smaller.

### Transparency

The Transparency slider lets you vary the transparency of the image data you copy over the output image. The more transparent, the more subtle the effect.

### Softness

The Softness slider lets you vary the brush from hard-edged to having a gradual falloff. The brush preview area at the bottom of the dialog box lets you see how soft the brush is.

### Spacing

The Spacing slider lets you vary the interval at which the brush is applied as you move it over the image. If you increase it too much you will not get a smooth effect. Too small and the brush is hard to control.

### Fadeout

The Fadeout lets you make the brush stroke fade out by becoming more transparent the longer the paint.

### Stylus Pressure

If you don't have a tablet connected to your computer, this setting is ignored. If you do have a tablet with a pressure-sensitive stylus, you can use this setting to determine which brush setting, if any, is adjusted depending on how hard you press the stylus into the tablet surface.

#### Ignore

This causes stylus pressure to be ignored.

#### Controls Opacity

The harder you press, the less transparent the brush.

#### Controls Radius

The harder you press, the larger the brush.

#### Controls Hardness

The harder you press, the less soft the brush.

#### Controls Flow Rate

The harder you press, the smaller the spacing between brush applications.

### Brush Shape

The Brush Shape tool bar lets you make the brush circular, square, diamond shaped or custom. For information on custom brush shapes, see the separate document: [Creating and Using Custom Brush Shapes.pdf](#).

### Brush Width

The Brush Width slider lets you make the brush narrower. Alternatively, you can rotate the mouse wheel with the Ctrl key held down.

## Brush Angle

The Brush Angle compass control lets you rotate the brush shape. Alternatively, you can rotate the mouse wheel with the Shift key held down.

## Undo/Redo

The Undo and Redo buttons let you erase or redraw operations, one stroke at a time. A stroke is defined as everything between pressing the mouse button and releasing it.

If the Undo or Redo button is grayed, it means there are no operations left to undo or redo. If you undo too many operations by accident, you can click the redo button until you get back to where you wanted to be. However, once you draw a new stroke, you can no longer redo past that point.

You can use the keyboard shortcuts Ctrl-Z for Undo and Ctrl-Y for Redo.

Normally, Undo preserves the current brush settings, but if you want to revert to the settings for the previous stroke, hold down the Shift key while clicking the Undo button or pressing Ctrl-Z.

## Brush

### Continuous

This is the normal mode. The brush paints for as long as you hold the mouse button down.


### One Shot

In this mode, the brush paints only once and then stops.

## Blur Radius

The Blur Radius slider controls the level of detail copied. The larger the radius, the coarser the detail is copied. Each stroke has its own blur radius. Changing this setting only affects future strokes and does not affect any strokes that have already been applied.

The idea is to use as small a Blur Radius as possible while still blurring out the detail you want to replace.

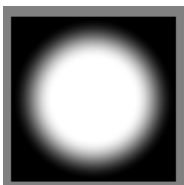
To make this easier, you can depress the  button in the upper right corner of the dialog box which displays a version of the input image blurred with the current Blur Radius instead of the output image.

## Settings Menu

In addition to the standard menu items, the settings menu lets you load or save the current brush settings (Radius, Transparency, Softness, Spacing, Fadeout, Shape and Brush).

## Brush Preview

The Brush Preview area at the bottom of the dialog box provides a visual representation of the size, shape, softness and transparency of the brush. It cuts off beyond a certain size so it is only useful for small to medium size brushes.

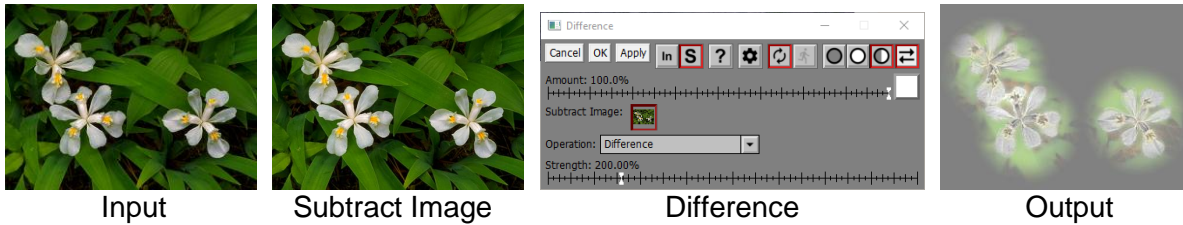


## Reloading Previous Settings

If you use the Ctrl-R keyboard shortcut to load the settings from the last use of the tool, you will restore not only the brush and other tool settings but also all the strokes you applied to the previous image. To load the previous settings without re-applying any strokes, use Ctrl-Shift-R instead.

# Difference

The Difference transformation subtracts one image from another and places the result in its output image. It is most commonly used to compare two images to see where there are changes.



## Amount

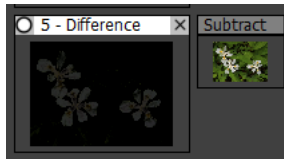
The amount control blends a percentage of the input image with the output image to scale back the effect of the Difference transformation. If you create a mask, you can use the amount control to localize the effect of the transformation to parts of the input image.

## Subtract Image

This control lets you select the image to subtract from the input image.

**In S** -- this tool bar at the top of the dialog box lets you display either the input (**In**) or the subtract (**S**) image. If the subtract image is set to a solid color instead of an image, the second button is grayed out. If the display is set to show only the output image, the entire tool bar is hidden.

Another way to switch between inputs is to use the image browser. To see the input image, click the Difference thumbnail in the image browser. To see the subtract image, click the smaller Subtract thumbnail just to the right of the Difference thumbnail in the image browser.



## Operation

### Difference

This computes the input image minus the subtract image. Where the result is negative, the output is black.

### Reverse Difference

This computes the subtract image minus the input image. Where the result is negative, the output is black.

### Offset Difference

This computes the input image minus the subtract image, offset so zero is a mid-level gray.

### Offset Reverse Difference

This computes the subtract image minus the input image, offset so zero is a mid-level gray.

### Absolute Difference

This computes the absolute value of the input image minus the subtract image.

## Strength

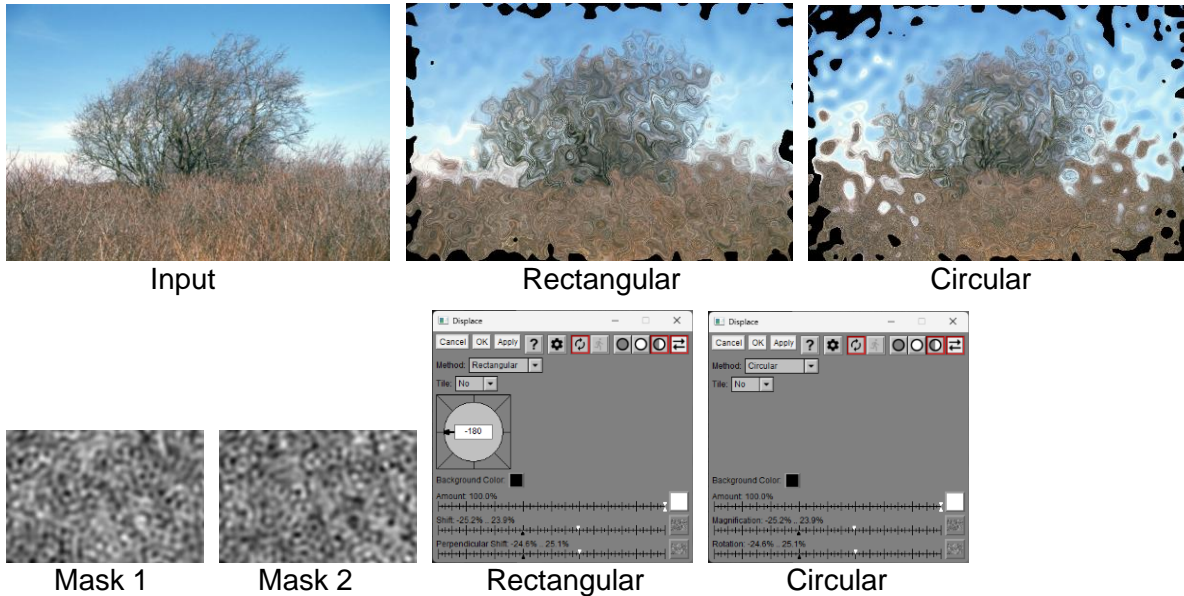
The Strength slider amplifies the differences between the two images to make them more visible.

# Displace

The Displace transformation offsets its input image either by shifting it horizontally and vertically or by rotating it and magnifying or reducing it.

This is not a very interesting transformation unless you use masks to vary the amount of offset for different parts of the input image. In the examples below, masks were created using the Texture transformation and cropped to match the size of the input image.

## Using the Displace Transformation



### Method

This setting lets you select Rectangular (at right angles) or Circular (magnification/rotation) as the offset method.

### Tile

When tiling is turned off, if a displacement runs outside the input image, the background color is used. When tiling is turned on, image data is taken instead from the other side of the image.

### Angle

This control is only displayed when Method is set to Rectangular. The angle indicates the direction corresponding to a positive Shift. A Perpendicular Shift is offset by 90 degrees.

### Background Color

This setting lets you control the color of an imaginary border around the input image. Where the displacement runs outside the input image (see the black spots around the edges of the output images), the background color is pulled into the output image.

### Amount

Reducing the Amount cuts back the amount of shift specified by the other two sliders. If you create a mask for the Amount, the effect can be scaled back for different parts of the input image.

### Shift/Perpendicular Shift

These two Amount controls let you specify the amount of offset to apply to the input image in the horizontal and vertical directions. Using a mask as illustrated above lets you create interesting distortions.

### Magnification/Rotation

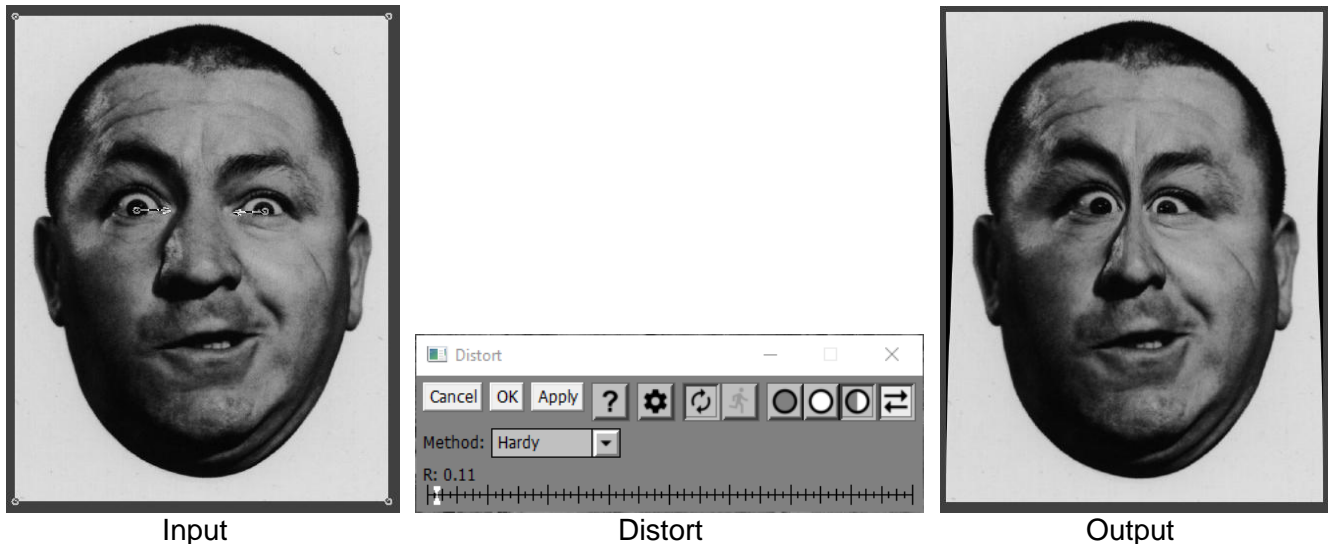
These two Amount controls let you specify the amount of offset to apply to the input image in the radial and tangential directions. Using a mask as illustrated above lets you create interesting distortions.



# Distort

The Distort transformation lets you stretch an image as though it were on a rubber sheet. You control the distortion by specifying one or more control points in the input image and where you want each of them to be in the output image.

## Using the Distort Transformation



### Control Points

Control points are displayed over the input image as small circles.

The Distort transformation starts out with four control points – one in each corner of the input image. These control points lock down the four corners of the image, but you can remove or edit any of these control points if you wish.

To create a new control point, shift-click on the input image. You can define up to a total of 1000 control points.

To remove a control point, ctrl-click on or near the control point. You cannot remove the last control point as there always needs to be at least one. If there is only one control point, the output image is simply a shifted version of the input image.

To specify a target location in the output image for a control point, click and drag on it. This extends an arrow from the control point to its desired location in the distorted image.

To adjust a control point's locations, click and drag on the small circle or the arrowhead.

The current control point, if any, is displayed as a solid circle.

### Method

Given a set of control points, there are many different ways to distort the image while still moving each control point to its designated target location. The Distort transformation supports several methods each of which produces different results: Shepard, Multiquadratic (Hardy), Inverse Multiquadratic, Thin Plate, Gaussian and Sinc. All the methods except Shepard distort the image using radial basis functions. Each method uses a different basis function and thus produces a different result. The Sinc method produces wilder results than the others and is provided more as a special effect.

It is difficult to predict the results from the different methods, so it is worth experimenting. Sometimes the differences are subtle while other times they can be very obvious.

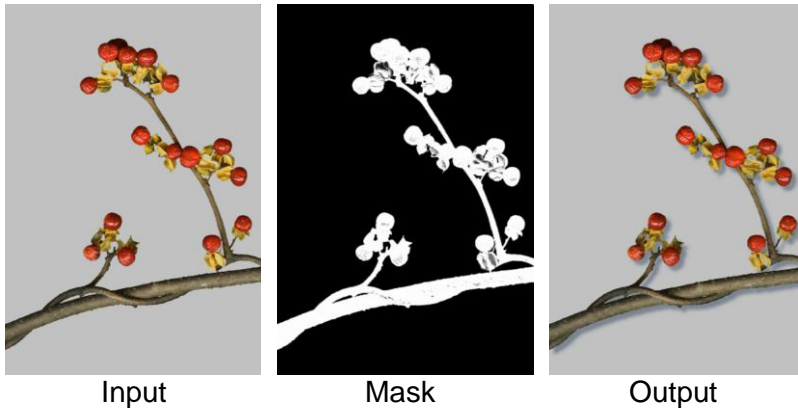
If you select the Multiquadratic, Inverse Multiquadratic, Gaussian or Sinc methods, an R slider is displayed, providing you with an additional parameter that alters the distortion, generally making the effects more or less local.

If you select the Shepard method, you can assign a weight between 0.1 and 10.0 to each individual control point. The larger the weight of a control point relative to the ones nearby, the larger the area it drags with it. The weight of the current control point, if any, is displayed via the Weight slider:

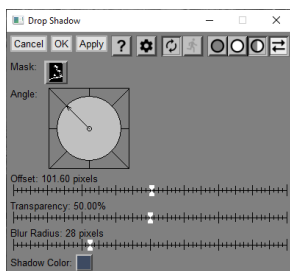


# Drop Shadow

The Drop Shadow transformation works with an input image and a mask that identifies an object in the input image. It then places a drop shadow behind the object in the output image.



## Using the Drop Shadow Transformation



### Mask

Use this control to select the mask for the input image.

### Angle

This control sets the angle of the light source. The shadow is cast in the opposite direction.

### Offset

This slider sets how far the shadow is offset from the masked object.

### Transparency

This slider controls how transparent the shadow is.

### Blur Radius

This slider controls how soft the shadow is.

### Shadow Color

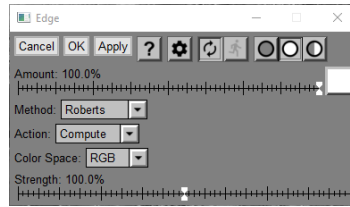
This control sets the color of the shadow.

# Edge

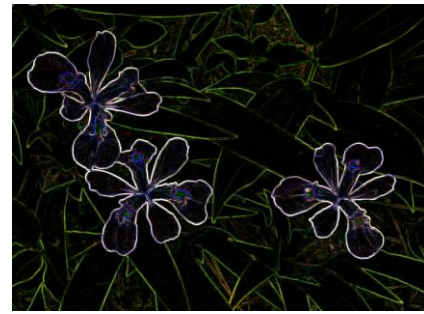
The Edge transformation locates and enhances the edges in an image. It supports several different edge detectors.



Input



Edge

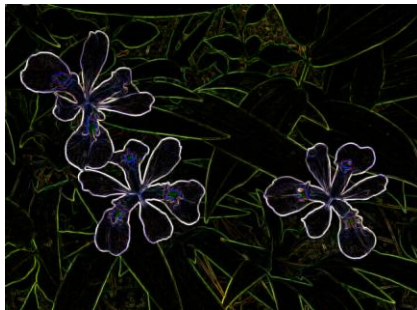


Output

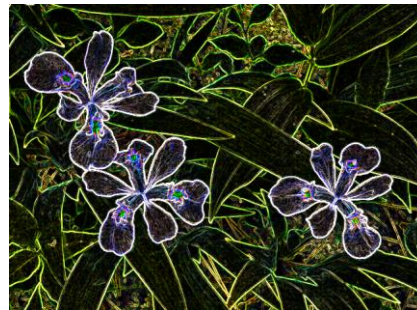
## Amount

The amount control blends a percentage of the input image with the output image to scale back the effect of the Edge transformation. If you create a mask, you can use the amount control to localize the effect of the transformation to parts of the input image.

## Method



Roberts



Sobel



Laplacian

## Action

### Compute

Selecting Compute causes the input image to be replaced by the output of the edge detector as illustrated above.

### Lighten / Darken

Selecting Lighten or Darken causes the input image to be copied to the output image and then lightened or darkened where there are edges.

## Color Space



RGB



HSV



HSL

## Strength

The Strength slider amplifies the output of the edge detectors, making edges more or less prominent.

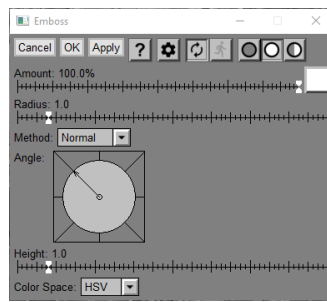


# Emboss

The Emboss transformation produces a special effect that makes parts of the input image appear to be embossed into the image plane and viewed with light coming from an angle.



Input



Emboss



Output

## Amount

The amount control blends a percentage of the input image with the output image to scale back the effect of the Emboss transformation. If you create a mask, you can use the amount control to localize the effect of the transformation to parts of the input image.

## Radius

Adjusting the radius setting makes the embossing effect stronger but coarser. You can compensate for the weaker effect of small radius values by increasing the Height setting (see below).



0.5



3.0

## Method



Normal



Shadow

## Angle

This Compass control lets you set the angle of the light source. By convention the light is normally oriented so it comes from the upper left corner.

## Height

This slider amplifies the embossing effect.

## Color Space

This control lets you emboss in HSV, HSL or RGB. The effects are similar.

# Equalize

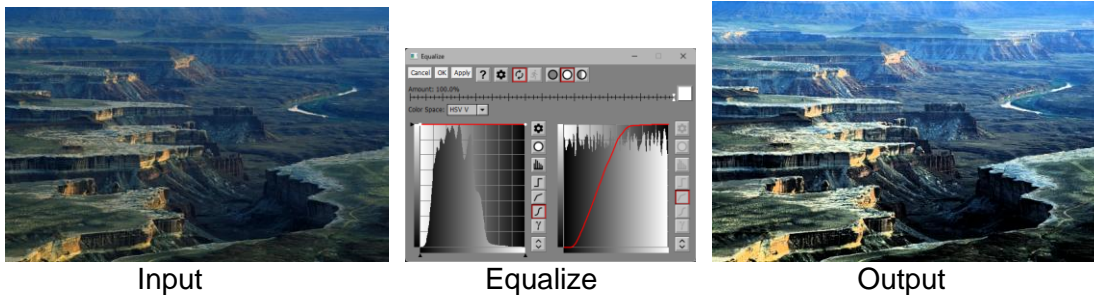
Normally, histograms are modified as a side effect of changing curves. It is possible, however to specify a histogram and compute what curve you have to apply to an image to get its histogram to match. While an exact match is impossible, an approximate can be achieved.

The term histogram equalization refers to adjusting an image so that its histogram is constant. In other words, so that all gray levels occur in equal numbers of pixels. Histogram equalization is a well-known technique of local contrast enhancement and has been used to bring out detail in medical X-ray images. While it does tend to bring out detail, histogram equalization often does not produce a pleasing photographic image for normal subjects.

It is possible to derive a curve that, when applied to an image, changes its approximate histogram to any shape at all, not just a constant level. This is what the Equalize transformation does.

## Using the Equalize Transformation

Here is an example of straight histogram equalization.



The curve on the left is the desired histogram shape—in this case a constant. The curve on the right is the curve that must be applied to the input image to get it to have the desired histogram.

### Amount

The amount control blends a percentage of the input image with the output image to scale back the effect of the Equalize transformation. If you create a mask, you can use the amount control to localize the effect of the transformation to parts of the input image.

### Color Space

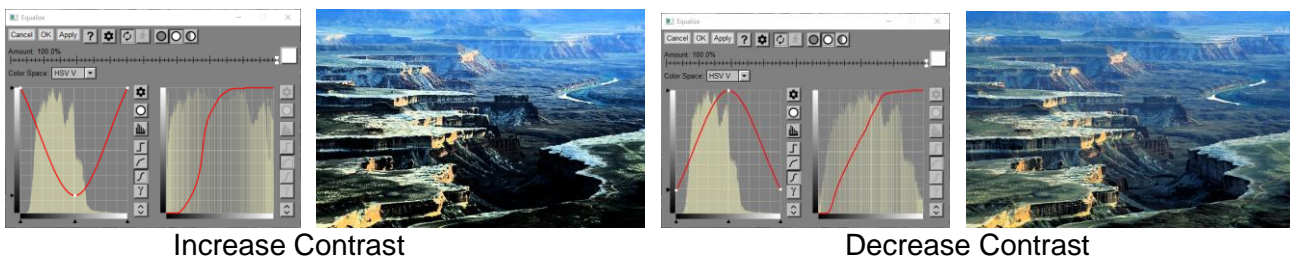
This lets you select the color space you want to work on.

### Curves

The curve on the left is the one you adjust to shape the histogram. The curve on the right is for informational purposes only. The histogram in the background of the left hand curve is the histogram of the input image. The histogram on the right hand side is for the output image.

## Tips

Setting the desired histogram lower in the center and higher at the ends increases contrast by increasing the number of shadow and highlight pixels and reducing the number of midtone pixels. Setting it lower at the ends and higher in the center reduces contrast.



# Expand Dynamic Range

As good as modern camera sensors are, there is a limit to how much dynamic range they can capture. When photographing scenes that have a large range such as landscapes with a bright sky and dark foreground, you may need to choose whether to expose for the sky and get a very dark foreground or expose for the foreground and get a washed-out sky.

This transformation lets you create an image with an extended dynamic range by combining a normal exposure with either an overexposed or underexposed version of the same image, or both. By using an underexposed version, you can recover clipped highlight detail in the normal exposure, while an overexposed version lets you recover clipped shadow detail. This only works if all the images are perfectly aligned (e.g. shot using a tripod), the subject does not move, and the images are processed identically. For best results, try to use this transformation early in your processing workflow.

As a rule, an extended dynamic range image has less contrast than any single exposure, similar the way color negative film has wider latitude but less contrast than slide film. This transformation lets you apply a final shaping curve to the output image which you can use to adjust its tonal balance if you wish.

The normal, underexposed and overexposed images must all be the same type, have the same size and have the same profile. If both the underexposed and overexposed images are omitted, the result is simply a copy of the input image. You may specify either an underexposed image, an overexposed image or both.

A similar effect can also be created using the Stack Images transformation, but Expand Dynamic Range is easier to use and does not require calibration images.

This transformation supports two methods for merging bracketed exposures: **HDR** and **Exposure Fusion**. They usually produce similar results, but depending on the input images, one method may produce more pleasing results than the other:

## HDR

This method works by first compressing the dynamic range of the normal exposure to make room for extending the final dynamic range. It then attempts to map all the images to this expanded range, using the under- and over-exposed images to fill in the gaps at the bottom and top of the range. When you use this method, you can select how much to compress the normal image by setting its white and black points. The more you compress the normal image, the lower the resulting image contrast, but the wider its dynamic range. To accommodate the wider dynamic range, the output image is always created with 16 bits per channel, even if the input images have 8 only bits per channel.

## Exposure Fusion

This method blends the normal, and over- and under-exposed images, attempting to combine the best parts of each one. It uses a combination of three adjustable criteria to determine which pixels to emphasize and which to de-emphasize:

**Brightness** -- this creates an overall preference for midtones and suppresses very dark or very light pixels which are likely to represent lost shadow or highlight detail. High levels of the brightness setting tend to produce images with more of less even brightness throughout.

**Contrast** -- the creates a preference for pixels in highly textured parts of the image and suppresses pixels in smooth areas which are often associated with loss of shadow or highlight detail.

**Saturation** -- the creates a preference for highly saturated pixels. This has no effect on black and white images.

Masks for each input image are created based on a combination of these three. To reduce artifacts at edges, you can blur these masks by a selectable **Blur Radius**.



## Using the Expand Dynamic Range Transformation



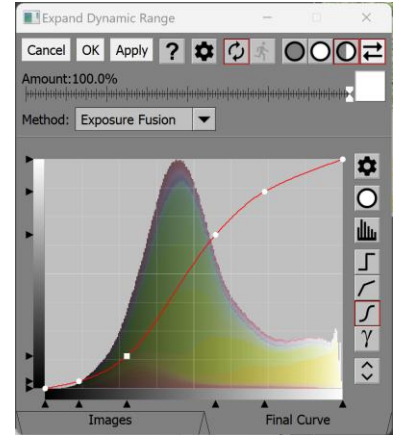
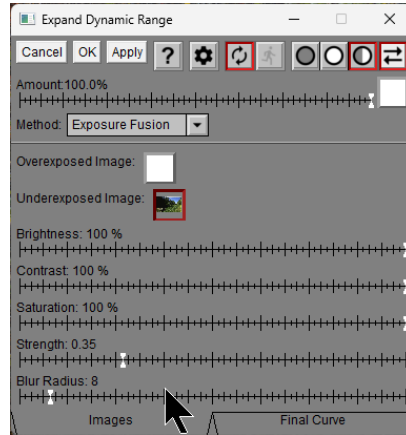
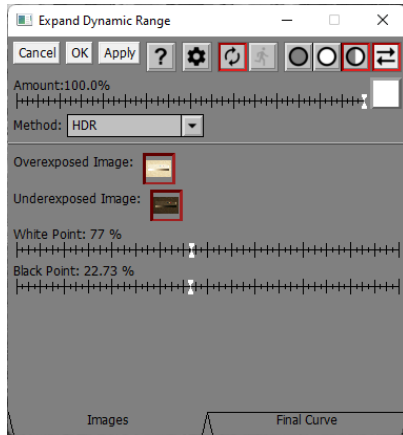
Normal



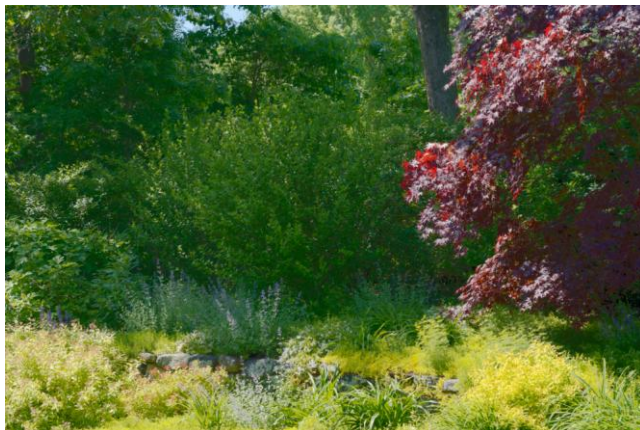
Underexposed 2 stops



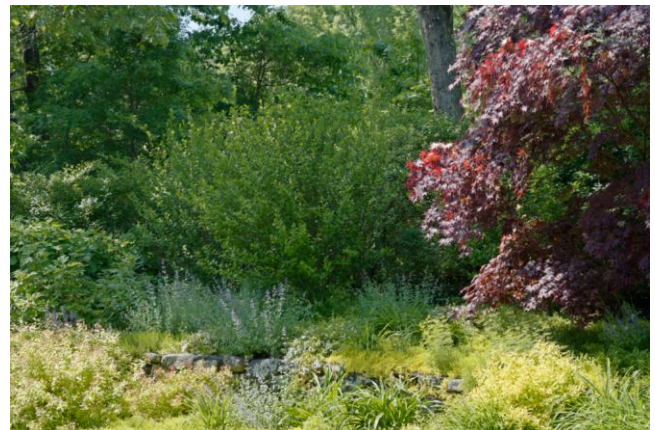
Overexposed 2 stops



Input image



HDR



Exposure Fusion

Note the recovery of highlight and shadow detail.

## **Amount**

The amount control blends a percentage of the input image with the output image to scale back the effect of the Expand Dynamic Range transformation. If you create a mask, you can use the amount control to localize the effect of the transformation to parts of the input image.

### **Overexposed Image**

This lets you select the overexposed image. If you leave it blank, no shadow recovery is performed.

### **Underexposed Image**

This lets you select the underexposed image. If you leave it blank, no highlight recovery is performed.

### **White Point (HDR method only)**

This slider controls how much of the underexposed image is used -- anywhere from the upper 50% to 100% of the tonal range. Lower values will add more dynamic range at the lighter end of the range but will also reduce the contrast of the output image.

### **Black Point (HDR method only)**

This slider controls how much of the overexposed image is used -- anywhere from the lower 0% to 50% of the tonal range. Higher values will add more dynamic range at the darker end of the range but will also reduce the contrast of the output image.

### **Brightness (Exposure Fusion method only)**

This slider controls the relative importance of the brightness criterion which emphasizes midtone pixels and de-emphasizes very light and very dark pixels.

### **Contrast (Exposure Fusion method only)**

This slider controls the relative importance of the contrast criterion which emphasizes pixels in highly textured areas.

### **Saturation (Exposure Fusion method only)**

This slider controls the relative importance of the saturation criterion which emphasizes highly saturated pixels (this slider has no effect on black and white images).

### **Strength (Exposure Fusion method only)**

Increasing the Strength setting increases or decreases the contribution of the underexposed and overexposed images relative to the input image.

### **Blur Radius (Exposure Fusion method only)**

This slider lets you blur the masks created for each image. Adding a small amount of blur can help reduce boundary artifacts.

## **Final Curve**

This curve control lets you adjust the brightness and contrast of the output image. The Final Curve is applied after merging the input, underexposed and overexposed images to produce the output image.

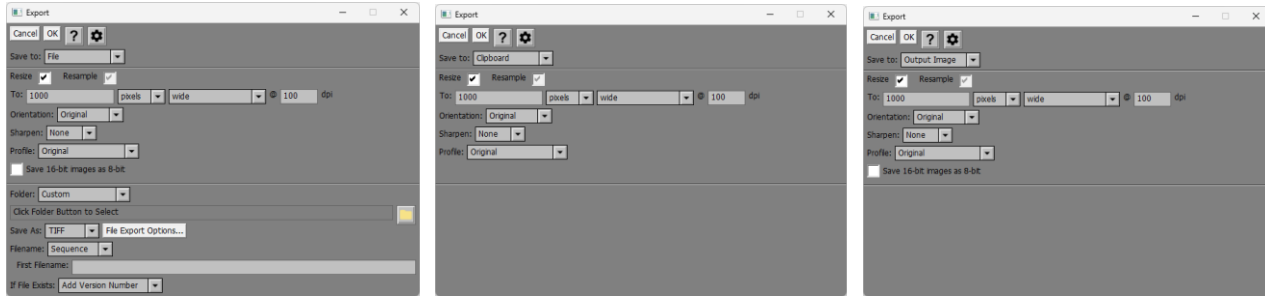
## **Tabs**

There are two tabs at the bottom of the dialog box. Clicking the Images tab displays the Underexposed Image and other settings. Clicking the Final Curve tab displays the final shaping curve.

# Export

The Export transformation is designed for use with batch workflows. It copies its input image through to its output image but, as a side effect, it also saves its input as an image file. Before saving, it can optionally resize the image and convert it to a standard color space. Export can also be configured to send its output to the clipboard or to pass it through as its output image.

For more information on batch processing, please see the separate document [Batch Processing.pdf](#).



## Save to

This controls lets you determine what to do with the exported image.

**File** – The exported image is saved as an image file.

When selected, additional controls are displayed at the bottom of the dialog box to let you control the location, name and type of file to save. The output image is an exact copy of the input image.

**Clipboard** – The exported image is copied to the clipboard instead of being written to a file.

When selected, the file controls are hidden, and 16-bit images are automatically converted to 8-bit since the clipboard cannot hold 16-bit images. This option is not especially useful in batch operations unless you place a breakpoint on the transformation and paste the clipboard to another application while Picture Window is paused. The output image is an exact copy of the input image.

**Output Image** – The exported image becomes the output image of the transformation instead of being written to a file.

When selected, the file controls are hidden, and the output image displays a preview of how the exported image looks. Use this option to prepare images for export without actually exporting them.

## Resize / Resample



These settings let you resize the image before saving it.

If Resize is not checked, no resizing is performed, and the rest of the controls are hidden.

The To setting determines the size of the exported image, either in pixels or in physical units. If you select pixels, the Resample box is always checked. If you select physical units, you can opt to resample the image or not. If you don't resample, the resolution in dpi is adjusted to set the physical size of the image, but the pixels remain unchanged.

You can resize to a specific width or height, so the longest or shortest side is a specific length, or so that the image fits within a rectangular bounding box of given width and height. A further option lets you size to a bounding box but then fill any unused space with a solid Fill Color. Finally you can set the desired image size in megapixels.

## Orientation

You can set this to Original, Landscape or Portrait. Selecting Original causes the original orientation to be preserved. Selecting Landscape or Portrait causes the exported image to be rotated 90 degrees if it is not already in the selected orientation.

## Sharpen

You can set this to None, Light or Heavy, depending on how much you want to sharpen the image before saving it.

## Profile

Select what color space, if any, you want to convert to before saving. When saving for the web, select sRGB or Gamma 2.2.

The following controls are only displayed when saving to a file:

## Folder

There are three Folder options:

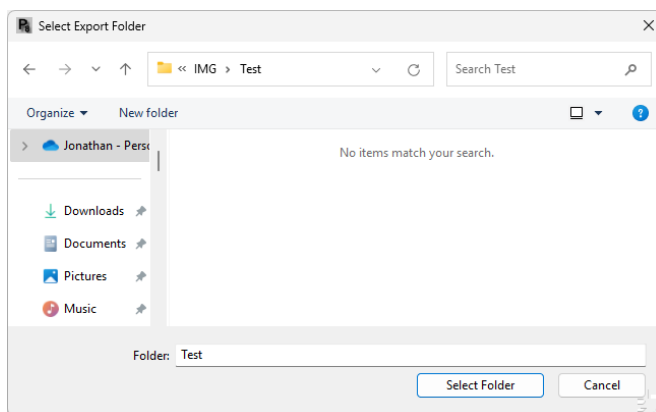
**Original** – if you select this option, the export folder is set to the folder containing the original file, if any. The original file is the one selected by a File Open at the top of the branch containing the Export transformation. If there is no original file (if the top of the branch is not a File Open), the default folder is used instead.

**Custom** – if you select this option, the export folder is set to a folder you select on the following line. Click the yellow folder button to select the folder in which you want to save image files.



**Original Subfolder** – if you select this option, the export folder is set to a subfolder of the original folder (see above). The folder you select must be a subfolder of the original folder.

**Ask** – this option is primarily intended for use in batch operations. If selected, when encountering the first file in the batch file list, Picture Window asks you to select the export folder using its standard Select Folder dialog box:



Navigate to the folder you want to select and click Select Folder. If the folder does not exist, use the New Folder button at the top of the dialog box to create it and then double click on it and select it. The starting folder for the dialog box is set from the current Custom folder (see above). If no Custom folder is specified or if the Custom folder does not exist, the Original folder is used. If there is no Original folder, the default folder is used.

Subsequent files in the batch file list are exported to the same folder you selected for the first file without asking each time.

If you use Export not withing a batch process, Picture Window asks for an export folder every time.



## Save As

Use this control to select the image file type.

## Filename

If you select Original, the file will be saved with the same name that is associated with the input image (if any). If you select Ask, the program will ask you for what name to save under for each file. If you select Sequence, a numbered sequence of filenames is created starting with the First Filename by appending “1”, “2”, etc. If you select Template, you can enter a custom filename, optionally including macros.

The filename you enter should not include an extension as this is automatically appended based on the selected file type.

## If File Exists

This setting determines what happens if a file of the same name already exists.

**Overwrite** – replace the old version with the new file

**Ask** – ask what to do

**Add Version Number** – add a version number to make the new name unique

**Skip** – don’t save the new file

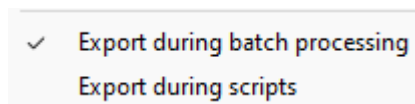
## Save Options

These settings let you decide what metadata to include with the file and whether or not to convert to 8-bit before saving.

## Write File

Clicking this button exports the current input image. This is useful for testing Export before running a batch process. Normally, to export you can just use the File/Export command from the main menu.

## Settings Menu



### Export during batch processing

This is the default setting -- If Save to is set to File or Clipboard, images are exported only when you are executing a batch process. If Save to is set to Output Image, the exported image is copied to the output image whether a batch process is running or not.

### Export during scripts

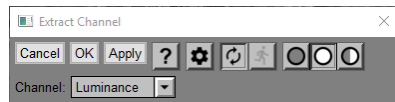
This setting is provided to allow Export to write its output file or save its result to the clipboard when you load a script or workspace script. This option would normally be used when a script file is provided as a command line argument and you want to run the script unattended.

Selecting one option deselects the other.

# Extract Channel

Color spaces are three-dimensional, meaning that it takes three numbers to uniquely define a color. Depending on the color space, these three numbers might be red, green and blue or hue saturation and brightness, or some other scheme. An image made up of just the values of one of the three dimensions is called a channel. Thus the red channel of an image is a black and white image made up of just the red components of a color image.

## Using the Extract Channel Transformation



### Channel

The control determines which channel you want to extract from the input image.



Original



Luminance



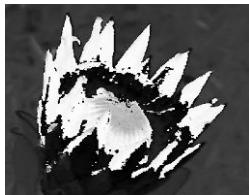
Red



Green



Blue



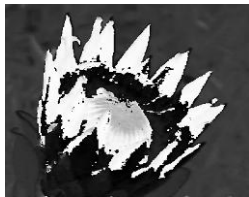
HSV H



HSV S



HSV V



HSL H



HSL S



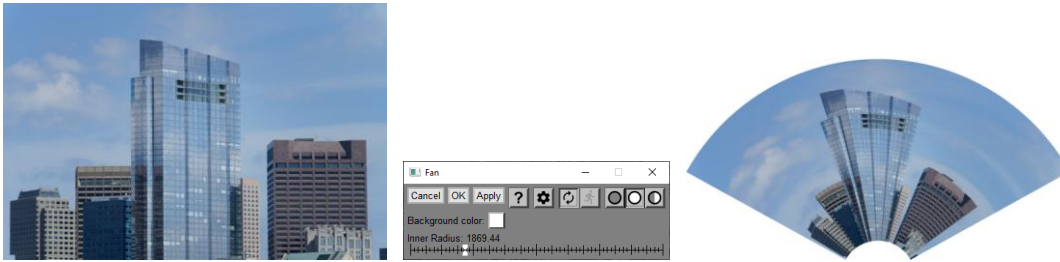
HSL V

# Fan

The Fan transformation warps its input image into the shape of a fan bounded by circular arcs on the top and bottom and straight lines on the sides. You control the degree of rotation by setting the radius of the bottom circle. The size of the output image is set by preserving the length of the horizontal midline on the image. Parts of the image below the midline are compressed, parts above the midline are expanded.

The transformation supports two different warping methods: Fan and Full Circle. The Fan method warps the image into a fan shape that you can control. The Full Circle method warps the image into a full circle and the resulting image is square.

## Using the Fan Transformation



### Background Color

This sets the color of the background behind the fan image.

### Method

This lets you select Fan or Full Circle.

### Inner Radius (Fan method only)

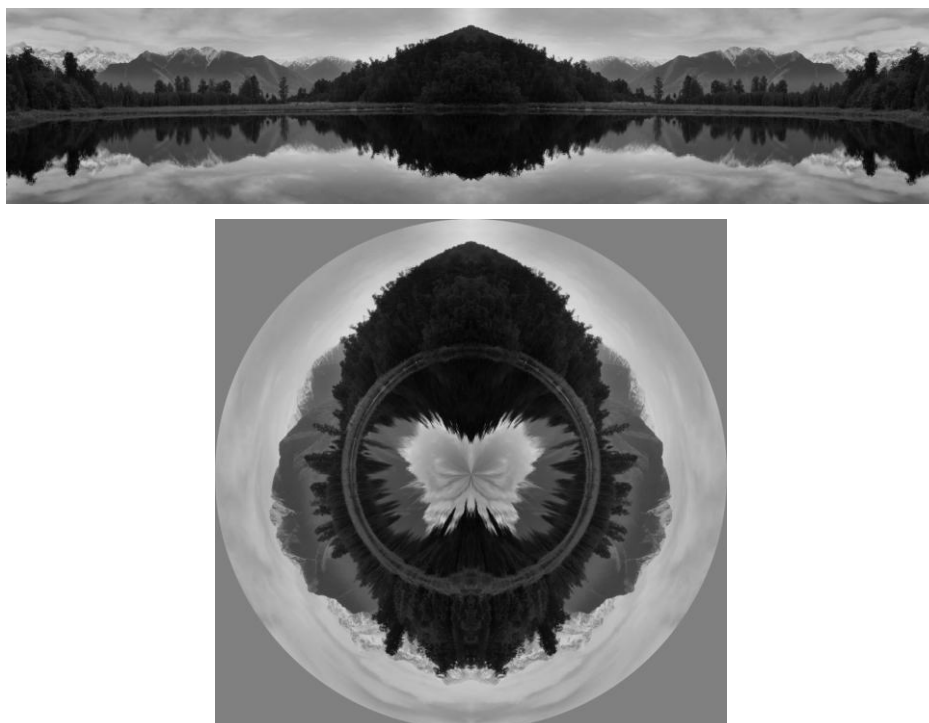
The Inner Radius slider sets to radius of the circle at the bottom of the fan. The lower limit is set by the proportions of the input image.

### Output Image Size (Full Circle method only)

This control determines the size of the output image in pixels. The output image is always square.

### Angle (Full Circle method only)

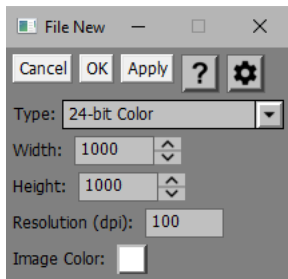
This control determines the position of the seam where the two ends of the image meet.





# File New

This top-level transformation is created as a side effect of the File/New command from the main menu. It creates a new image filled with a solid color.



## Type

This control lets you select the type of image you want to create. The options are:

- Binary
- 8-Bit Black and White
- 24-Bit Color
- 16-Bit Black and White
- 48-Bit Color

## Width and Height

Enter the desired width and height of the new image in pixels.

## Resolution

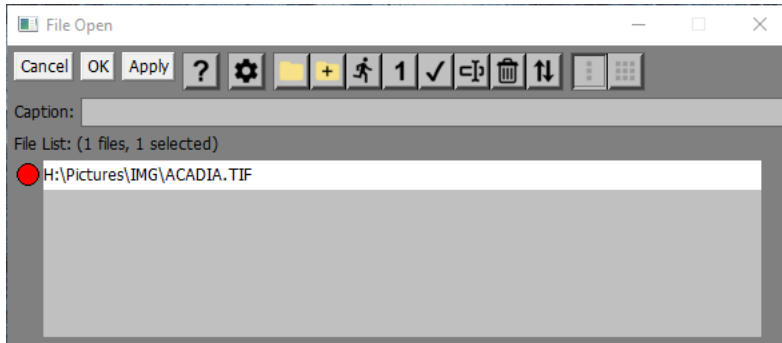
Enter the desired resolution in dpi (pixels per inch).


## Image Color

Use this control to set the color of the new image. The selected color is converted to black and white if the new image is black and white.

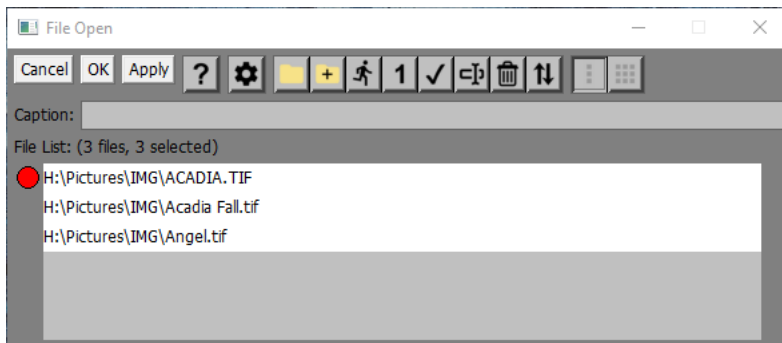
# File Open

This top-level transformation is created as a side effect of the File/Open command from the main menu. It creates a new image by reading it from an image file. If you want to change which file is opened, double-click on the File Open transformation to display its transformation dialog box:




If you just want to open a different file, click the  button on the tool bar and select the new file. Then click OK to close the dialog box and propagate the changes to all the downstream images.


If you created the File Open transformation via a File/Open Multiple command, the File List will contain a list of all the files you selected. If there are more files than will fit, a scroll bar is displayed to the right of the File List.



## Editing the File List

The red dot marks the current file in the file list. This is the file whose contents are currently loaded into the transformation and which is available to downstream images to process. The other files are not loaded, but their pathnames are available to load later. To make a different file in the list current, click to the left of its pathname in the list, or you can use the mouse scroll wheel to move the red dot up or down a file at a time. This causes the previous file to be closed and the new file to be opened in its place.

To replace the current file list with one or more different files, click the  button on the tool bar and select the new file(s).


To add files to the current list, click the  button on the tool bar and select the file(s) you want to add.


Files in the list can either be selected (white background) or deselected (gray background).

To select a single file, click on its pathname.

To toggle whether a file is selected or not, Ctrl-click on its pathname.

To select a range of files, click on the first one and Shift-click on the last one.

To remove the currently selected files from the file list, click the  button on the tool bar.

To rename a file in the file list, click on its pathname to select it and then click the  button on the tool bar. This brings up a dialog box you can use to enter the new filename.

The remaining buttons on the tool bar are used for batch operations which are described in a separate document.

## Single/Multiple Batch



This tool bar is grayed out unless the image tree contains more than one File Open having more than one file selected. For more details, see the separate Batch Processing documentation.

### Caption

When you save a script (or workspace script) file without image names, all the File Open transformations are saved with empty file lists. When you open the saved script, the File Open transformations detect that the file list is empty and ask for a pathname to open. If there are multiple File Opens in the script, it can be confusing which file the script is asking for. This is where the Caption comes in. If the caption is empty, the normal caption of Open Image File is displayed at the top of the Windows File Open dialog box. If you supply a caption, it is displayed instead to let the user know which file the script is asking for.

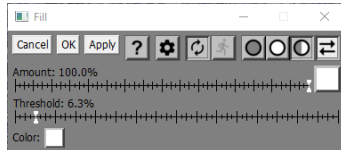
# Fill Tool

The Fill Tool lets you select one or more fill points in its input image. Each of these fill points is then enlarged to form a region consisting of all adjacent pixels with a similar color. Finally, a solid color is painted over each region in the output image. Each fill point has its own fill threshold and fill color. The fill threshold controls how similar colors have to be to the color at the fill point to be included in the fill region. The fill color is the color that is painted on the output image for the fill region.

In the following example, the Fill Tool is used to replace the irregular solid black background behind the subject:



Input with Overlay



Fill Tool



Output

## Input Image Overlay

The Fill Tool displays an overlay on the input image to let you specify where the fill points are located.

To define a fill point, shift-click on the input image. You can mark up to 256 different fill points per image. The new fill point's threshold and color are set from the Threshold slider and Color control.

To reposition a fill point, click and drag it.

To remove a fill point, ctrl-click on it.

To select a fill point, click on it. The current fill point is displayed in the input image overlay with a cross. The threshold and color of the selected fill point are used to set the Threshold slider and Color control.

To deselect a fill point, click on the input image away from all the existing fill points. This lets you adjust the Threshold slider and Color control without affecting any of the existing regions.

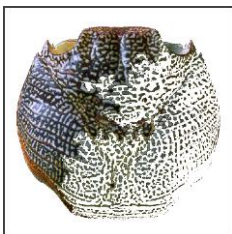
## Amount

The amount control blends a percentage of the input image with the output image to scale back the effect of the Fill Tool. If you create a mask, you can use the amount control to localize the effect of the transformation to parts of the input image.

## Threshold

This slider adjusts fill threshold. If there is a current fill point, its threshold is adjusted.

Smaller threshold values yield smaller regions that more closely match the color of the input image at the fill point. Larger threshold values produce larger regions that include less similar pixels. In the example above, selecting too large a threshold causes part of the subject to be filled along with the background:



## Color

This control lets you set the fill color. If there is a current fill point, its color is adjusted. If the input image is black and white, the color is converted to a neutral gray according to the luminance of the selected color. To do a colored fill on a black and white image, you need to convert it to a color image before using the Fill Tool.

## Settings Menu

Remove All Control Points

**Remove All Control Points** – removes any existing control points while leaving the other settings and mask unchanged.

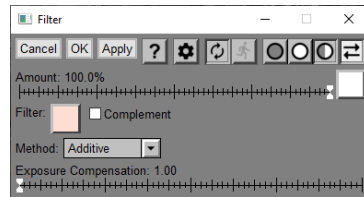
## Filter

The Filter transformation applies one image or solid color to another like a filter. The end result is like sandwiching two transparencies and viewing them on a light box. Mathematically, the two images are multiplied together. There is a tendency for filters to darken the image they are applied to and the Filter transformation has an Exposure Compensation slider you can use to lighten the result.

Here are two examples—the first one filters with a solid color filter and the second with a colored gradient image.



Input



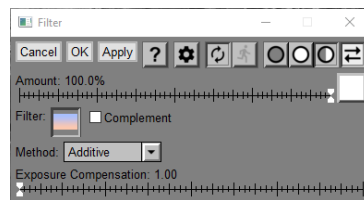
Filter



Output



Input



Filter



Output

## Amount

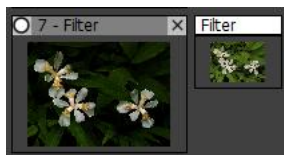
The amount control blends a percentage of the input image with the output image to scale back the effect of the Emboss transformation. If you create a mask, you can use the amount control to localize the effect of the transformation to parts of the input image.

## Filter

This control lets you select a solid color or a filter image. If you use an image, it must be the same size as the input image in pixels.

**In F** -- this tool bar at the top of the dialog box lets you display either the input (**In**) or the filter (**F**) image. If the filter image is set to a solid color instead of an image, the second button is grayed out. If the display is set to show only the output image, the entire tool bar is hidden.

Another way to switch between inputs is to use the image browser. To see the input image, click the Filter thumbnail in the image browser. To see the subtract image, click the smaller thumbnail just to the right of the Difference thumbnail in the image browser.



## Complement

If this box is checked, the filter color or the filter image is changed to its complementary color. The complement of a color is found half-way around the color wheel. Filtering with a color adds that color to the output image. Filtering with the complement of a color removes that color from the output image.

## **Method**

There are two kinds of filtering—Additive and Subtractive. Subtractive filtering is done by inverting both images, performing a normal filter operation and then inverting the result. While Additive filtering makes the image darker, Subtractive filtering makes it lighter. Additive filtering with white leaves the input image unchanged. Filtering with black makes the output black. Subtractive filtering is the opposite—filtering with white yields white and filtering with black leaves the image unchanged.

## **Exposure Compensation**

You can use this slider to correct for any darkening caused by Additive filtering or lightening caused by Subtractive filtering.



# Frame

The Frame transformation creates an output image that shows how its input image will look when matted and framed and displayed in a given environment. Key features include:



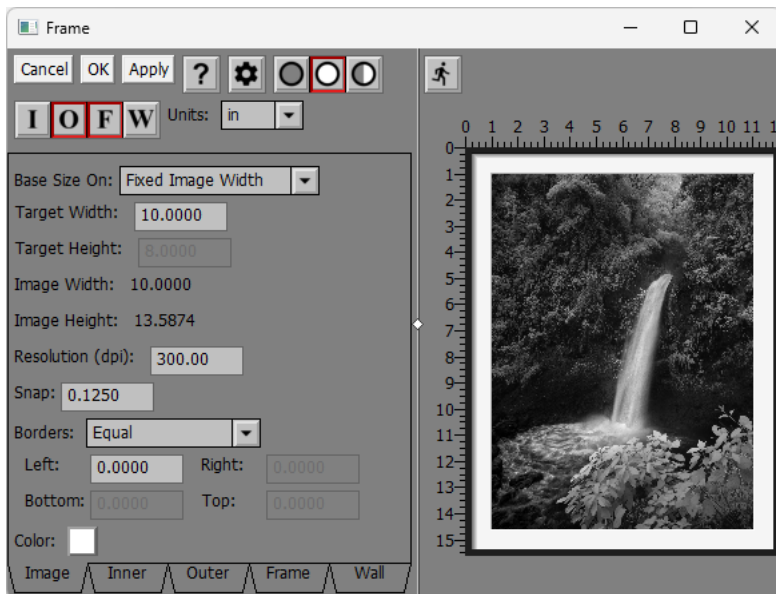
**Border** -- you can optionally surround the image with a border of any solid color and specify the border widths.

**Inner and Outer Mats** -- you can specify no mat, single matting or double matting. Each mat can have specified widths, thickness, bevel, and bevel color. Mats may be any solid color, a textured color, or a repeating pattern. If you need more than two mats, you can create the first two and then add more by running the Frame transformation again on the output image.

**Frame** -- you can specify a variety of frames with specified widths, colors, shapes, or custom images.

**Wall** -- you can display a background color behind the frame to simulate hanging the framed photograph on a colored wall. You can also simulate different lighting color temperatures and intensities.

## Using the Frame Transformation



### Preview area

For faster response time, Frame has its own preview area.

You can increase the size of the preview by dragging one of the corners of the dialog box. If you widen the dialog box, you can drag the white diamond in the center of the vertical separator bar between the controls and the preview area to enlarge one while making the other smaller.



To preview the effect on the entire output image, click the button just above the preview area.

Clicking on a part of the preview image (image/inner mat/outer mat/frame/wall) selects the corresponding tab at the bottom of the dialog box and displays the settings for the selected part of the image.

## Cropping Rectangle

A cropping rectangle is displayed over the input image to allow part of the input image to be cropped out. The cropping rectangle may be adjusted by dragging its corners, edges or interior. Depending on the *Base Size On* setting (see below), the proportions of the cropping rectangle may be constrained to match those of the innermost mat opening.

## Tool Bar

This control contains 4 buttons that can be raised or depressed independently. Each button activates or deactivates one component of the output image:

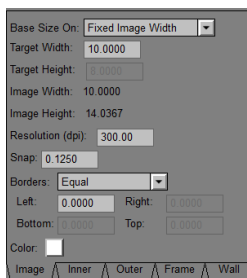
- I** Inner mat
- O** Outer mat
- F** Frame
- W** Wall displayed behind the framed image

If a toolbar button is depressed, the corresponding element is incorporated into the output image. If the toolbar button is raised, the corresponding element is suppressed although all of its settings are retained should you re-enable it.

## Units

This control selects the units in which image, mat and frame sizes are entered and displayed.

## Image Tab



This tab selects a set of controls that adjust image size and borders.

## Base Size On

The Base Size On control is very important and should be set before adjusting mat and frame widths. It determines how the dimensions of the various elements in the output image are computed, giving you the flexibility to deal with a variety of situations.

### Image Size

This setting uses the dimensions of the input image (computed from its size in pixels and dpi setting) to fix the size of the image. The output image is then built out from the input image by adding mats, frame and wall of specified widths. Use this setting when you need the input image to be reproduced at a specific size.

### Fixed Image Width/Height

This setting scales the image width (or height) to a fixed value and computes the image height (or width) based on the proportions of the input image cropping rectangle to preserve the image aspect ratio. Use this setting when you need the image to be a specific width or height (e.g. 8") and you want to preserve the proportions of the image.

### Mat Opening Size

This setting fixes the dimensions of the innermost mat opening. The image dimensions are computed by subtracting the image border widths from the mat opening size. Use this setting when you need to place an image inside a frame with a given mat opening, for example when using a prefabricated frame and mat with an 8"x10" opening. This setting will cause the input image to be cropped as necessary to fit the mat opening.

## Frame Opening Size

This fixes the dimensions of the frame opening. The image dimensions are computed by subtracting the mat and image border widths from the frame opening size. Use this setting when you want to place an image inside a frame with given inside dimensions, for example when the final framed image needs to fit into a prefabricated frame (frames are generally sold based on the size of the opening). This setting will cause the input image to be cropped as necessary to fit the mat opening.

## Frame Outside Size

This fixes the dimensions of the outside of the frame. The image dimensions are computed by subtracting the frame, mat and image border widths from the frame outside dimensions. Use this setting when you want to place an image inside a frame with given outside dimensions, for example when the final framed image needs to fit into a particular space on the wall. This setting will cause the input image to be cropped as necessary to fit the mat opening.

## Width/Height/Resolution

These controls let you specify the desired image size as selected by the *Base Size On* setting (see above). The width, height or both may be grayed out if they are computed automatically from other data and cannot be modified. The *Resolution* setting determines the resolution of the output image. The number of pixels in the output image is in turn determined by the physical dimensions of the output image divided by its resolution. All elements of the image are resampled as necessary to create an output image of the desired resolution.

## Snap

The Snap setting determines the increments in which width and height settings are modified when dragging frame, mat, border or image widths/heights in the preview image (see below).

## Borders/Left/Right/Top/Bottom/Color

The *Borders* setting determines whether the image borders will all be equal, will be equal except for the bottom border or will be unequal.

The *Left/Right/Top/Bottom* controls let you enter the desired border widths using the current units. To frame an image without borders, set all four border widths to zero.

The *Color* control lets you set the color of the image borders.

## Inner/Outer Tabs

These tabs select the properties of the inner or outer mat.

## Opening

This control determines the shape of the mat opening. The options are *Rectangular* or *Oval* (elliptical).

## Bevel

This control determines the angle at which the mat is cut. The options are 45, 60 or 90 degrees. The bevel angle determines how much of the mat interior is visible around the mat opening.

## Thickness

This control sets thickness of the mat in the current units. A typical 6-ply mat is about 0.05" (1.6 mm.) thick. To eliminate the bevel and its drop shadow entirely, set *Thickness* to 0.0.

## Borders/Left/Right/Top/Bottom

The *Borders* setting determines whether mat widths will all be equal, will be equal except for the bottom border or will be unequal.

The *Left/Right/Top/Bottom* controls let you enter the desired mat widths using the current units.

## Color/Image

The Color/Image setting determines the color or pattern of the mat. There are several options depending on what you select:

If a *solid color* is selected (which you specify using the standard color picker), then you have the option of applying a texture that is applied to mat. If a texture is specified, you also have the option of adjusting its scale factor so as to vary the granularity of the texture

If a *color image* is selected, then that image is tiled to cover the entire mat and you have the option of adjusting the scale factor of the image.

If a *black and white image* is selected, then that image is tinted with a color you specify and then tiled to cover the entire mat and you have the option of adjusting the scale factor of the image so as to vary the granularity of the image.

## Bevel Color

The Bevel Color setting determines the color or pattern of the mat bevel. This can match the mat color or be a different color (e.g. some mats are black inside).

## Frame Tab

This tab selects the properties of the frame.

### Width

This control lets you set the frame width in the current units. The frame width must be the same for all four sides.

### Inside/Outside Thickness

These controls set the inside (or outside) thickness of the frame in the current units. The frame thickness is used to display drop shadows on the mat (wall).

### Profile

The *Profile* setting lets you select from a built-in set of frame shapes.

### Color/Image

The *Color/Image* setting determines the color or pattern of the frame. There are several options depending on what you select:

If a *solid color* is selected, then you get a solid color frame of the specified color and profile.

If a *color image* is selected, then that image is tiled to cover the entire frame and you have the option of adjusting the scale factor of the image one of two ways.

If a *black and white image* is selected, then that image is tinted and tiled to cover the entire frame and you have the option of adjusting the scale factor of the image one of two ways.

If a color or black and white image is specified, it is taken to be a repeating section of the left edge of the frame. This image is then tiled vertically as necessary to create the entire left edge of the frame. The tiled image is then rotated and reflected as necessary to generate images for the other three edges of the frame. Although it is not required, when an image is used, the profile should normally be set to *Flat* to avoid undesired shading effects.

### Scale to Fit/Tile

If you select *Scale to Fit*, the frame image is scaled so that its width exactly fills the width of the frame.

If you select *Tile*, the frame image is tiled as necessary (with an adjustable scale) to fill the entire frame.

## Wall Tab

This tab selects the properties of the wall displayed behind the frame and the lighting conditions.

### Width

This control determines how the dimensions width of wall area displayed behind the frame.

### Color

This control determines the wall color.

### Lighting Type

This control lets you adjust the color temperature of simulated lighting.

### Lighting Intensity

This control lets you adjust the brightness of simulated lighting.


## Preview

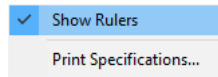
The right side of the Frame dialog box is occupied by a preview of the result image. Clicking on an element of the preview image selects the corresponding tab (image/inner/outer/frame/wall).

In addition, the width of the current element can be adjusted by dragging it, subject to the *Snap* setting (see above).

The size of the preview area may be adjusted by resizing the Frame dialog window.

## Settings Menu

Clicking the  button displays the Settings Menu. In addition to the standard menu items there are a few commands specific to the Frame transformation:



### Show Rulers

This toggles the display of rulers around the outside of the frame.

### Print Specifications...

This option lets you print the current frame specifications.

## Examples

A simple frame with a flat profile and single mat - no image borders



A simple frame with a round beveled profile and double mat - 1/8" white image borders. Outer mat has zero thickness and applies a tiled image of Japanese paper.



Similar to above with a frame created from a custom image and no outer mat.



No frame, single mat using a tiled stone image.





# Gamma Adjust

The Gamma Adjust transformation lets you increase or decrease the brightness of an image by applying a gamma curve. The higher the gamma, the darker the image. Changing the gamma affects shadows more than highlights.



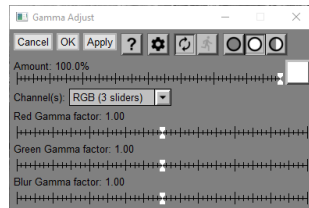
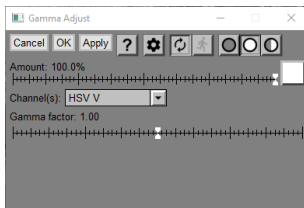
Input



Higher Gamma



Lower Gamma



## Amount

The amount control blends a percentage of the input image with the output image to scale back the effect of the Gamma Adjust transformation. If you create a mask, you can use the amount control to localize the effect of the transformation to parts of the input image.

## Channel(s)

You can adjust the gamma of the HSV V channel, the HSL L channel or RGB (either the same of all channels or with separate sliders for red, green and blue).

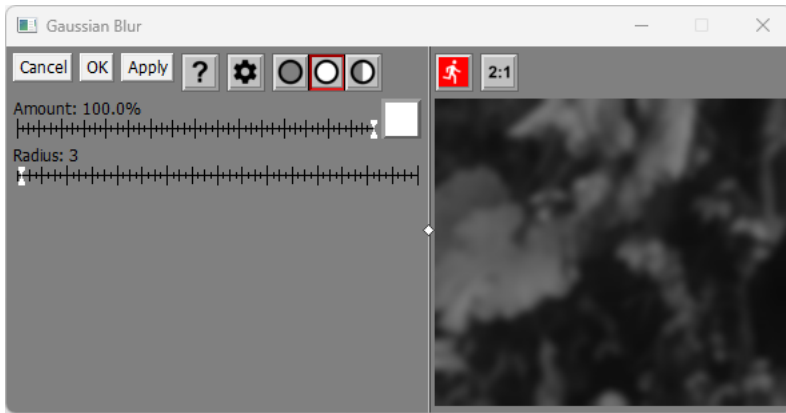
## Gamma Factor

These sliders let you increase or decrease the gamma of the input image.

Higher values darken the image while lower values lighten it.

The inverse of a gamma factor of  $x$  is  $1/x$ . For example, to reverse the effects of a 2.22 gamma adjustment, use a  $(1.0/2.22 = 0.45)$  gamma adjustment.

# Gaussian Blur



Gaussian Blur lets you specify a large blur radius if you want, so it is good for heavily blurring an image.

For faster response time, Gaussian Blur has its own preview area.

You can increase the size of the preview by dragging one of the corners of the dialog box. If you widen the dialog box, you can drag the white diamond in the center of the vertical separator bar between the controls and the preview area to enlarge one while making the other smaller.



To preview the effect on the entire output image, click the button just above the preview area. To re-center the preview, click on the input image in the main image area. You can also scroll the preview area by clicking and dragging on it.



## -- Magnify Preview Button

When the Magnify Preview button is depressed, the central portion of the preview area is magnified by a factor of two, making it easier to see fine details. Clicking the button a second time restores the normal 1:1 display.

## Amount

The Amount control lets you blend part of the original image with the blurred image. Rather than reducing the degree of blurring, reducing the amount produces an effect like a fog filter:



Original



Radius = 20, Amount = 50%

## Radius

The Radius slider controls the amount of blurring.



Radius = 5



Radius = 10





Radius = 20

## Blurring Chrominance Only

Some of the blurring transformations support an option to blur just the chrominance of the image. You can think of a color image as being made up of two components: luma (the black and white part) and chroma (the color part – basically a combination of hue and saturation).

It is common for digital camera images to have more chroma noise than luma noise, so blurring just the chrominance is a way to reduce color noise without losing luminance detail. In most cases, the difference is fairly subtle.

To select chrominance-only blurring, click the  button at the top of the dialog box and select the option from the popup menu.

 Blur chrominance only

## Tips

Picture Window comes with two sets of saved settings you can use as starting points for experimentation:

### Fog - Radius 20 - Amount 50%

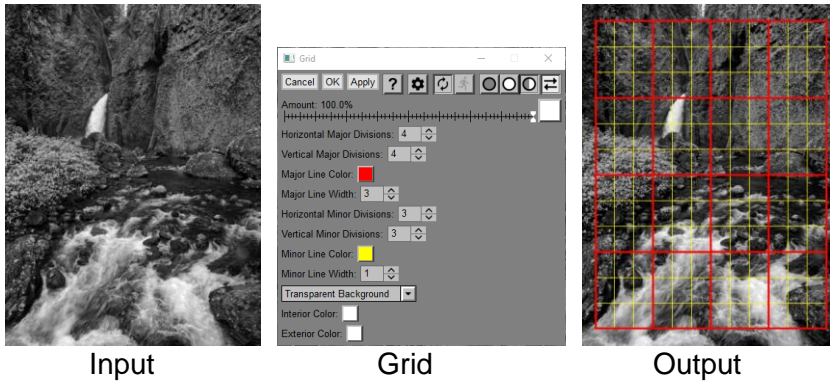
This creates a fog effect which is just a gaussian blur of 20 pixel radius applied at 50%.

### Orton Effect - Radius 20

This creates an Orton effect by applying a gaussian blur of 20 pixel radius mostly to the highlights.

# Grid

The Grid transformation lets you superimpose a rectangular grid over an image.



## Amount

The amount control blends a percentage of the input image with the output image to scale back the effect of the Grid transformation. If you create a mask, you can use the amount control to localize the effect of the transformation to parts of the input image.

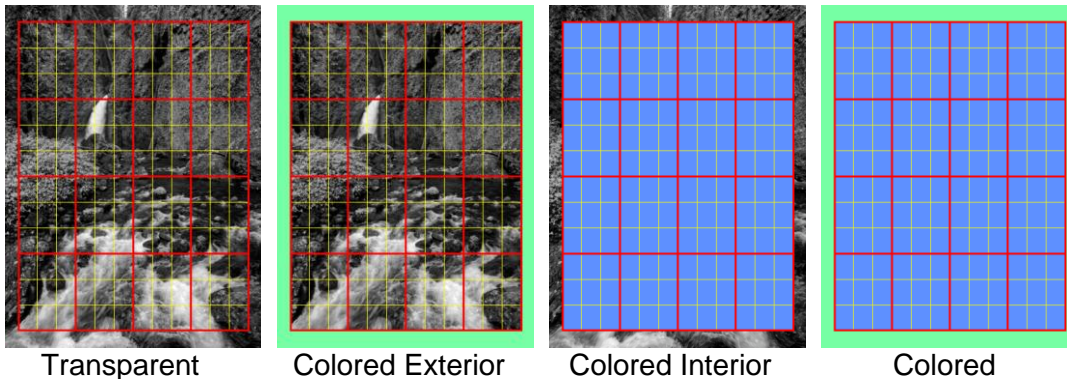
## Major Divisions / Line Color / Line Width

These controls let you set the number of major horizontal and vertical grid divisions, the grid line color and the grid line width.

## Minor Divisions / Line Color / Line Width

These controls let you set the number of minor horizontal and vertical grid divisions, the grid line color and the grid line width.

## Background



## Interior / Exterior Colors

These controls let you set the interior and exterior colors.

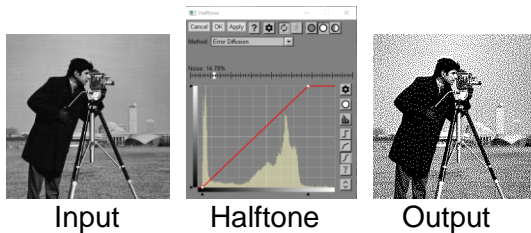
## Omit Edges

If this box is checked, the outermost grid lines are suppressed.

# Halftone

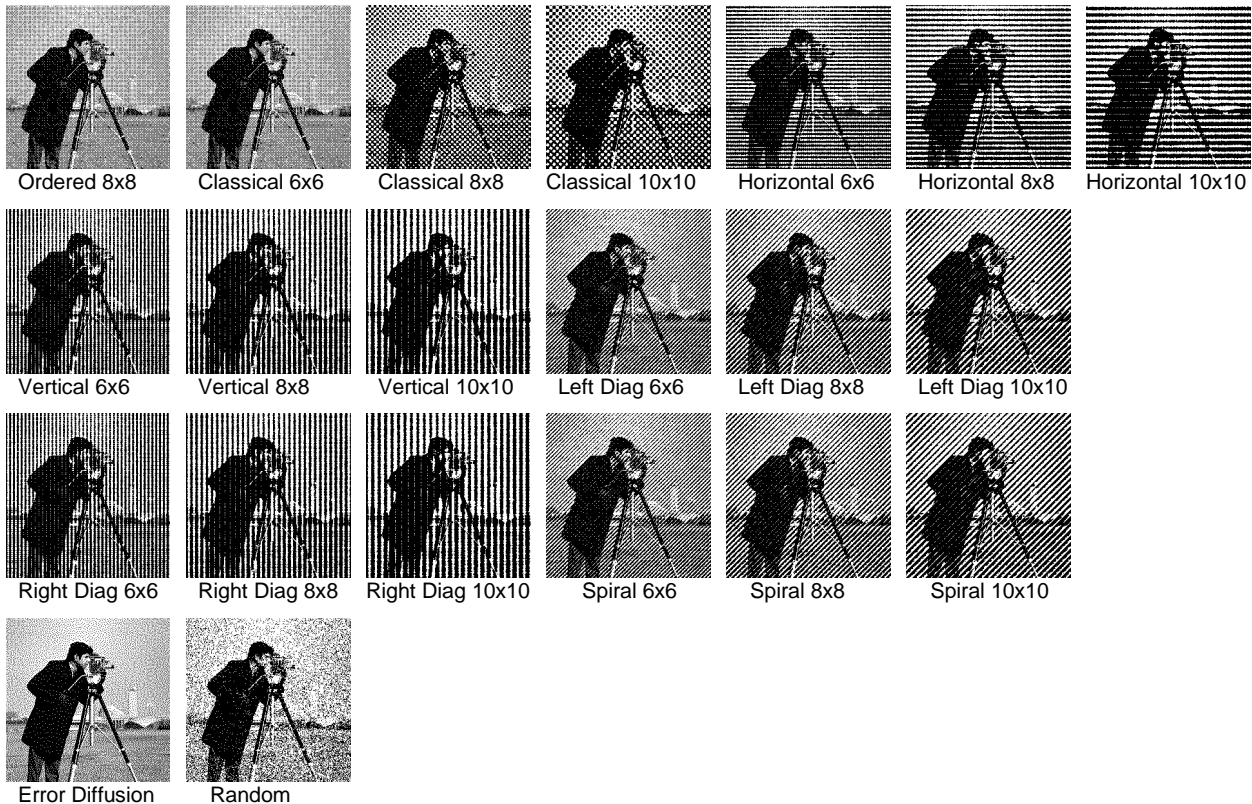
The Halftone transformation renders an image as isolated dots arranged according to a dithering pattern. The dots are arranged so that, when viewed from a distance, the image looks like a continuous tone image instead of just a collection of dots. This process is the way ink jet and laser printers print images. There is an inherent loss of resolution when halftoning so it is a good idea to resize the input image to have more pixels unless you don't mind losing some detail.

When viewing halftone image at a zoom factor other than 1:1, you will get moiré patterns. If you do need to view them zoomed out, try to keep the zoom factor an integer such as 1:2, 1:3, ... .



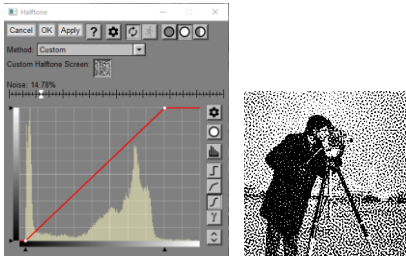
## Method

There are many different dithering patterns. Larger cells do a better job of reproducing a smooth tone curve but have worse spatial resolution.





If you select Custom, you can provide your own dither image such as a mezzotint image created using the [Texture transformation](#) or one of the pre-built mezzotint texture images available for download on our web site. Images used as custom dither patterns should have a fine texture and more or less equal number of pixels of every possible brightness level.



## Noise

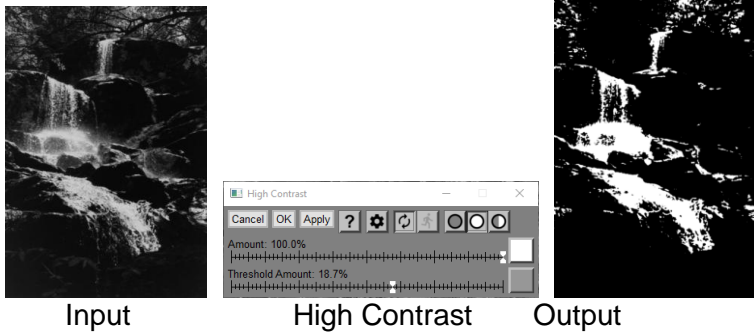
This slider lets you add random noise to the input image. Sometimes this is helpful in breaking up repeating patterns in Error Diffusion or other types of dithering.

## Curve

The curve control lets you adjust the input image by applying a curve to it before halftoning. Increasing the contrast and dynamic range sometimes produces better results.

## High Contrast

The High Contrast transformation renders an image as pure black and pure white. A threshold value determines which pixels are white and which are black. The boundary between black and white in the output image is antialiased to avoid jagged edges.



## Amount

The amount control blends a percentage of the input image with the output image to scale back the effect of the High Contrast transformation. If you create a mask, you can use the amount control to localize the effect of the transformation to parts of the input image.

## Threshold Amount

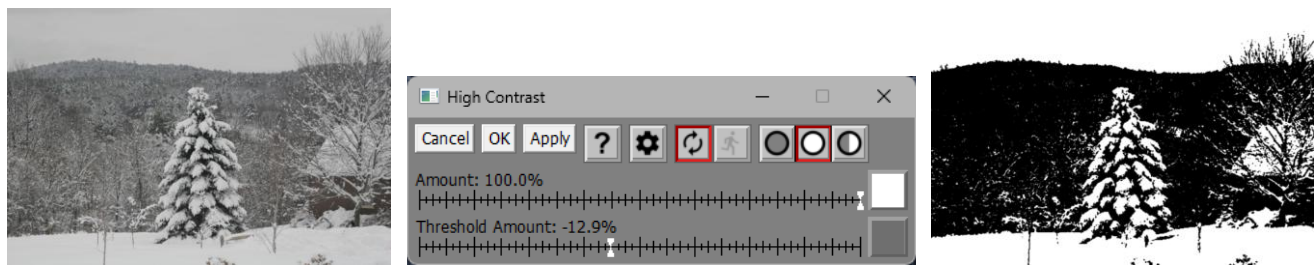
If you don't create a mask for the Threshold Amount, you can use the single slider to move the threshold value up or down, altering the balance between white and black in the output image.

If you do create a threshold mask, you can vary the threshold from one part of the image to another.



# High Contrast

The High Contrast transformation converts an image to high contrast black and white. It does this based on a threshold value which you can set with an Amount control to either a fixed gray level or using a mask to set different thresholds for different parts of the image. Pixels darker than the threshold level become black and pixels lighter than the threshold level become white. The edges between black and white areas are antialiased to avoid jagged edges.



## Amount

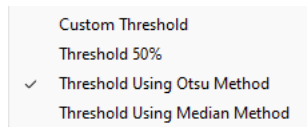
The Amount control blends a percentage of the input image with the output image to scale back the effect of the High Contrast transformation. If you create a mask, you can use the amount control to localize the effect of the transformation to parts of the input image.

## Threshold Amount

The zero-centered Threshold Amount can be used without a mask to set a threshold gray level anywhere from pure black to pure white. If you create a mask for the Threshold Amount, the gray level of the mask at any point determines the threshold used at that location.

## Settings Menu

There is also a settings menu available by clicking the  button at the top of the dialog box.



This menu lets you select various advanced options:

### Custom Threshold

This is the default setting – it lets you adjust the threshold using the Threshold Amount slider and mask. Using any of the other settings resets the Threshold Amount mask, if any, and selects a specific value for the threshold slider.

### Threshold 50%

This sets the threshold to a mid-level 50% gray.

### Threshold Using Otsu Method

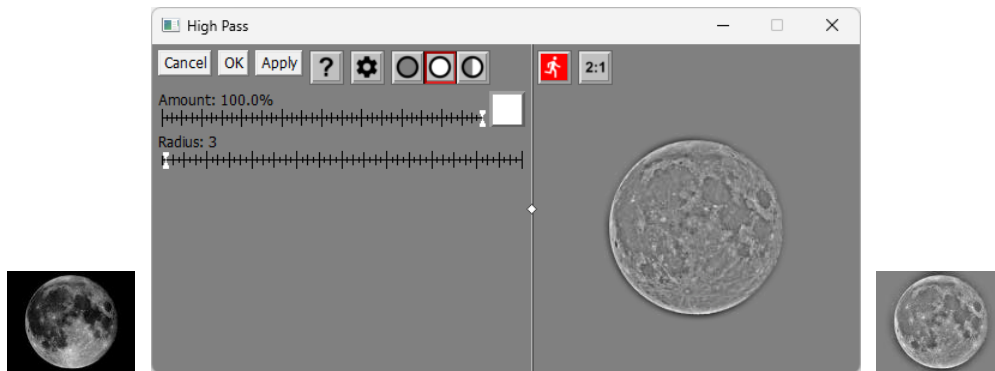
This sets the threshold using the Otsu method which attempts to maximize the variance between the black and white pixels.

### Threshold Using Median Method

This sets the threshold using the Median method which attempts to produce equal numbers of black and white pixels.

# High Pass

The High Pass transformation extracts the detail from an image by subtracting it from a blurred version of itself. The result is offset so that a mid-level gray is zero. By itself, this is not a generally useful transformation, but it is included because some published workflows make use of it.



For faster response time, High Pass has its own preview area.

You can increase the size of the preview by dragging one of the corners of the dialog box. If you widen the dialog box, you can drag the white diamond in the center of the vertical separator bar between the controls and the preview area to enlarge one while making the other smaller.



To preview the effect on the entire output image, click the button just above the preview area. To re-center the preview, click on the input image in the main image area. You can also scroll the preview area by clicking and dragging on it.

## 2:1 -- Magnify Preview Button

When the Magnify Preview button is depressed, the central portion of the preview area is magnified by a factor of two, making it easier to see fine details. Clicking the button a second time restores the normal 1:1 display.

## Amount

The amount control blends a percentage of the input image with the output image to scale back the effect of the High Pass transformation. If you create a mask, you can use the amount control to localize the effect of the transformation to parts of the input image.

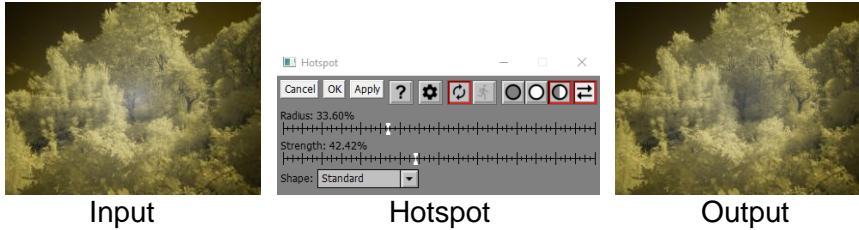
## Radius

The Radius slider lets you control how much the image is blurred. Small radius values retain finer detail.

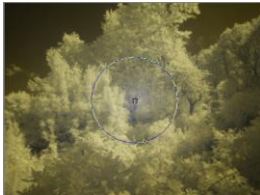
# Hotspot

The Hotspot transformation compensates for the central hotspot in many IR (infrared) photographs by darkening the center of the image. Hot spots are usually a bigger problem with wide angle lenses. Some lenses produce much more prominent hot spots than others, and the effect often varies with f stop as well.

Although designed specifically for IR photography, this transformation can also be used to remove circular lens flare spots such as those that result from shooting into the sun.



## Input Image Overlay



A circular overlay is displayed over the input image showing the radius of the area that will be darkened. While initially located at the center of the image, you can move the hotspot location by dragging the control point in the middle of the circle.

## Radius

The Radius slider lets you adjust the size of the circular area to be darkened. The darkening is concentrated in the middle of the circle and fades to zero at the edge.

## Strength

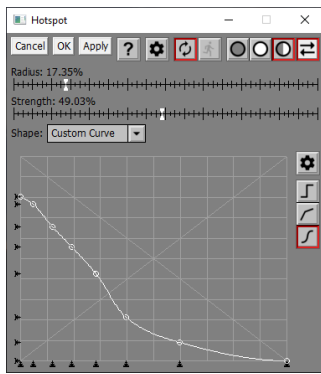
The Strength slider lets you adjust how much the central area is darkened. The greater the strength, the darker the center gets.

## Shape

This setting applies to the shape of the light falloff curve as a function of distance from the center of the hot spot. For most cases, the Standard shape models the light falloff curve reasonably well, but in some more extreme or atypical cases, a custom falloff curve is necessary to remove the hot spot completely. If you select Custom Curve, a curve control is displayed that you can use to match the hot spot light falloff curve.

## Curve

This curve control is only displayed if Shape is set to Custom Curve. The initial curve has four control points, two in the upper left corner and two in the lower right. Pairs of control points are used to make the curve horizontal at each end. By adding additional control points and adjusting their locations, you can model pretty much any radially symmetric hot spot.



## Tips

The size and intensity of the central hotspot depends on the lens, the f stop and the focal length if it is a zoom lens. For this reason, you may have to adjust images taken with different lenses or settings individually.

You can use this transformation to remove other kinds of lens flare such as bright spots caused by shooting into the sun, just as long as they are circular. To do this, position the control point over the center of the spot and adjust the Radius slider to match the spot size. Then create a custom curve that models the brightness profile of the flare and adjust the Strength slider as necessary to remove the flare.

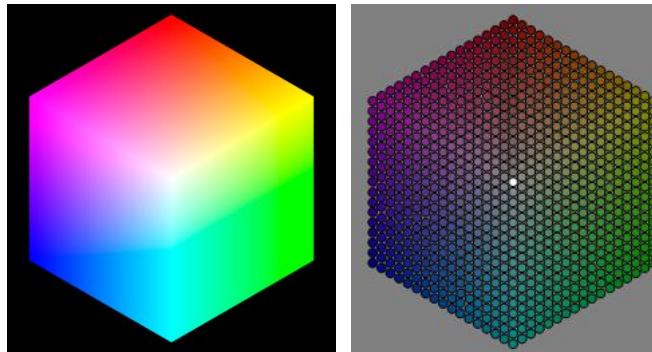
# Hue Saturation

The Hue Saturation transformation lets you select parts of an image based on their hue and saturation histogram and then adjust the saturation, brightness, or hue of the selection. The transformation lets you select up to two different sets of colors and adjust each one independently.

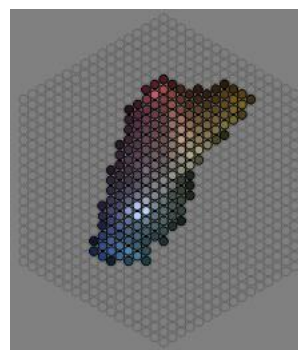
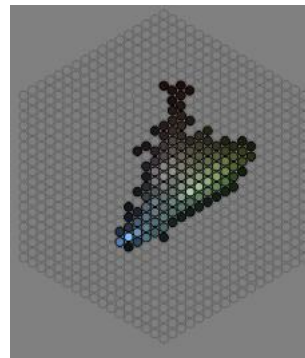
In addition to restricting the effects of the transformation to a set of colors, you can also limit its effect to specific parts of the brightness range.

## The Hue-Saturation Histogram

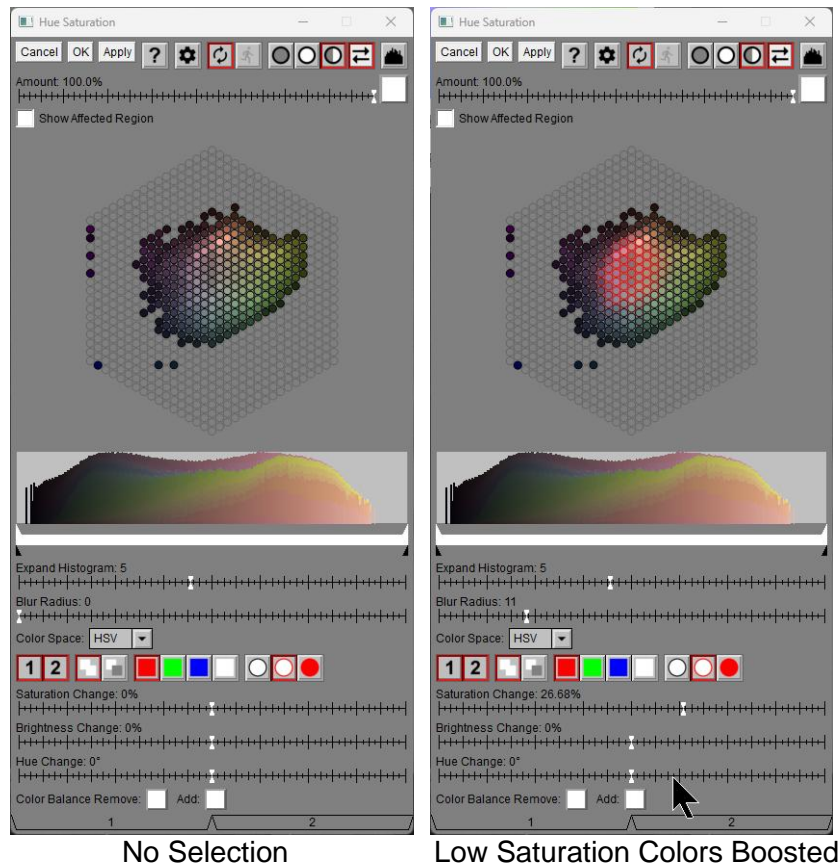
The Hue-Saturation histogram examines the input image and computes the hue and saturation of each pixel. It breaks down the same color hexagon used in the color picker into 817 distinct color patches corresponding to an evenly distributed set of different combinations of hue and saturation. The value of the histogram for each color patch is proportional to the number of pixels in the input image whose color matches the patch.



The hue-saturation histogram is displayed with its color patches arranged in the color hexagon, each with its corresponding hue and saturation. The brightness of each patch, however, is based on the number of pixels in the input image that most closely match each patch. If no pixels in the input image match, the patch is not displayed. In the case above, there is a bright spot in the center of the hue-saturation histogram corresponding to the black border surrounding the color hexagon since black has zero saturation. Here are some other examples of input images and their hue-saturation histograms:

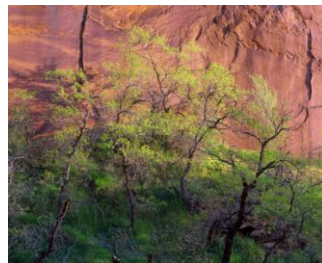


Here is what the Hue-Saturation transformation dialog box looks like:

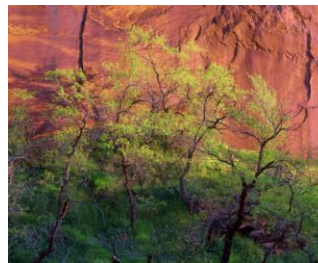


No Selection

Low Saturation Colors Boosted



Input



Output

## Amount

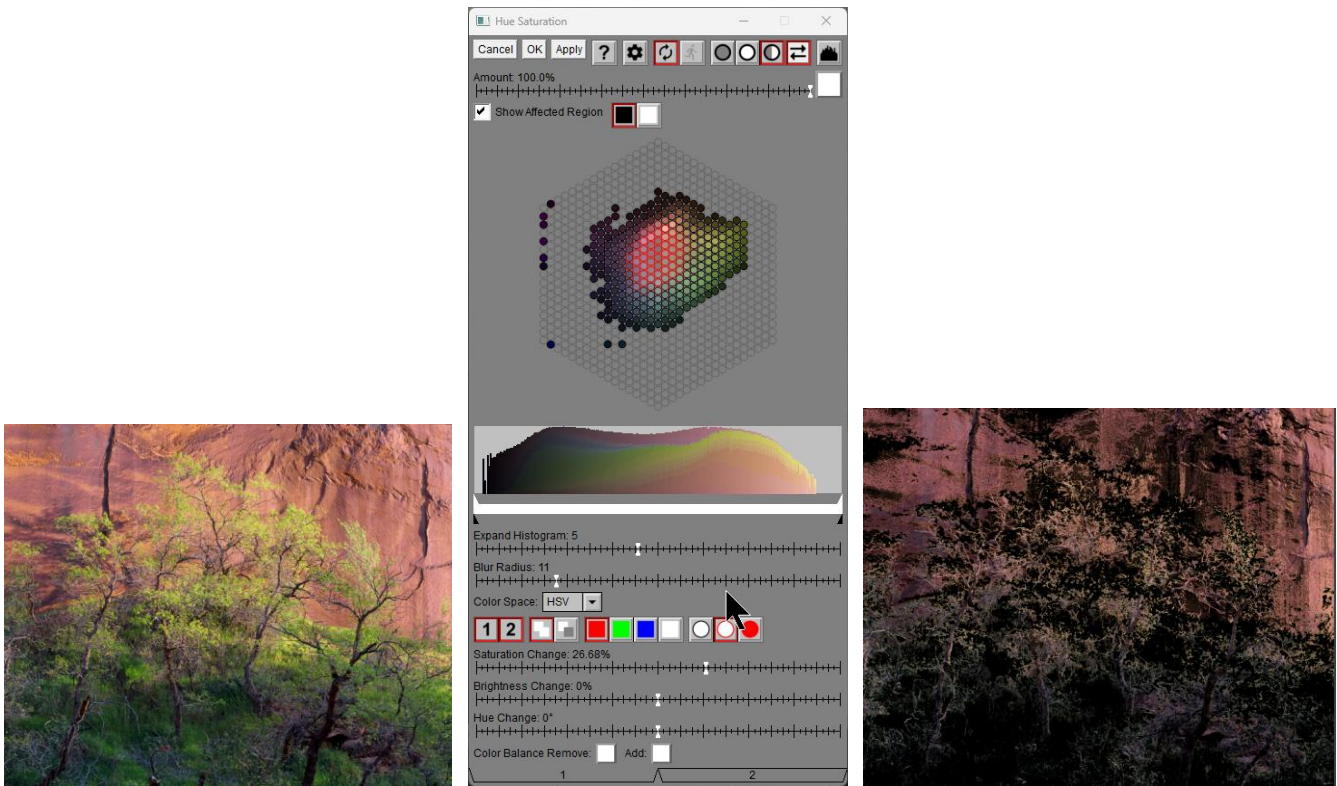
The amount control blends a percentage of the input image with the output image to scale back the effect of the Hue Saturation transformation. If you create a mask, you can use the amount control to localize the effect of the transformation to parts of the input image. For example, you could use a mask to limit the hue saturation transformation to just part of the tonal range.

## Show Affected Region

When you check this box, two extra buttons are displayed next to the checkbox – one black and one white.

In addition, the output image is changed to show just those parts of the output image that are currently selected by their hue, saturation and brightness – the remainder of the output image is black or white depending on which button is depressed. Using a black background makes it easier to see selected colors that are light while a white background makes dark colors stand out. This helps you visualize what parts of the input image are selected and thus will be modified as you adjust the Saturation, Brightness or Hue Change sliders (see below). This setting only affects previews – when you click OK or Apply, the box is automatically unchecked. Here is an example showing what happens when you use Show Affected Region:





Input Image

Transformation

Preview Image

## Base Histogram on Masked Area Only



If this button is raised, both the hue saturation and the brightness histograms are based on the entire input image. If depressed, the histograms are based on just the currently masked area as defined by the amount mask. If there is no mask, the histogram is based on the entire image.

If you are using a mask to limit the action of the transformation to just part of the image, this control lets you see the histograms of just the parts you are adjusting.

## Hue-Saturation Histogram

The hue-saturation histogram is displayed below the Amount control. You can enlarge it by resizing the dialog box by dragging any of its corners or edges. The histogram is used to select the colors you want to adjust.

There are two ways to select parts of the histogram:

- 1) Click and drag on the histogram to outline the colors you want to select. When you release the mouse button, all the colors inside the area you encircled are selected.
- 2) Click and drag on the input image. As you do this, the parts of the histogram corresponding to the colors in the input image are selected.

To clear or invert the current selection, right-click on the histogram and select the desired action from the popup menu.

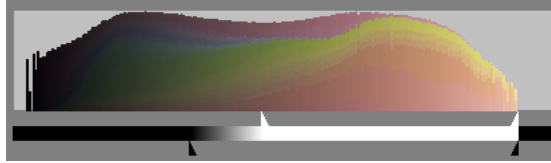
Selected color patches are outlined in the current selection color (by default, red). The brightness of the outline is proportional to the degree to which the patch is selected. When you select patches by either of the methods above, they become fully selected, but you can feather the edges of the selection by adjusting the Blur slider (see below). This will cause patches around the edge of the selection to be partially selected and consequently the corresponding adjustments to be only partially applied.

## Brightness Histogram and Range Slider

A brightness histogram of the input image is displayed just below the hue-saturation histogram. This histogram is based on the HSV V or HSL L channel, depending on your choice of color space (see below).



Just below the brightness histogram is a range control that lets you select which parts of the tonal range you want to affect with the transformation.



The range slider has four independently adjustable markers – two white and two black. The white markers delineate the range of brightness values that are fully selected. The black markers are used to feather the transition from selected to de-selected. You can move one white slider past the other to select all but the brightness range between them, however you cannot move the black markers past their associated white marker.



The band between the black and white markers indicates the selected areas of the brightness scale. White means fully selected, black means fully de-selected, and gray means partially selected. To select the entire brightness range, just leave the markers at their default locations at either end of the tone scale:

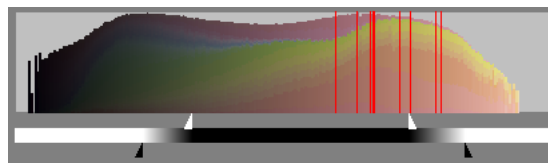


There are two ways to set the brightness range:

- 1) Adjust the markers manually to the desired range.
- 2) Click and drag on the input image to select the corresponding brightness range:

To contract the range to a single brightness level, Ctrl-Shift-Click on the input image. To expand the range to include all the brightness levels in a part of the input image, Shift-Click and drag over the area you want to sample. When you are done, you can still adjust the markers manually to fine tune the result.

As a visual aid to setting the brightness range markers, you can also Ctrl-Click and drag on the input image. This displays red markers in the brightness histogram corresponding to each pixel sampled from the input image. This lets you visualize what part of the brightness range you need to select to affect the part of the input image you dragged over:



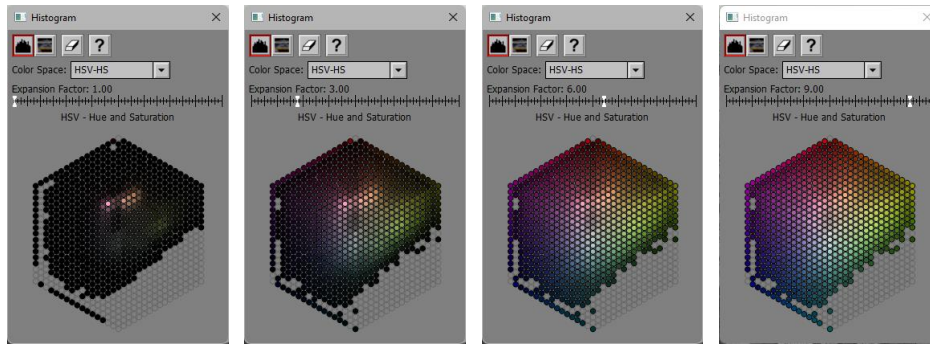
To clear the accumulated markers, click anywhere on the brightness histogram.

Here are some typical range slider settings to limit the effects to the highlights, midtones or shadows of an image.



## Expand Histogram

When the slider is set to 1.0 (all the way to the left), the brightness of each patch is linearly proportional to the number of pixels in the input image matching its color. If some colors occur very frequently in an image, this can make all the other colors appear very dark in the histogram which makes them hard to see. As you move the Expand Histogram slider to the right, darker colors in the histogram are progressively lightened, although the contrast of the histogram is reduced. Here are some examples of the same histogram displayed with different amounts of expansion:



Lower values make it easier to see which colors occur the most frequently, while higher values bring out the darker colors in the histogram.

The Expand Histogram slider only affects the hue-saturation histogram and not the brightness histogram.

## Blur Radius

When you select color patches in the hue saturation histogram they are either fully selected or fully deselected. This can cause artifacts in the output image if some colors are close to the boundary between selected and deselected patches. To reduce this problem, you can blur the selection using the Blur Radius slider. This feathers the edges of the selection so it takes effect gradually instead of abruptly. If you use too large a radius, the selection can bleed into colors you did not intend to select at all, so generally try to use the smallest amount of blur that works.

## Color Space

The Hue Saturation transformation can operate using either the HSV or the HSL color space. These two color spaces produce slightly different histograms and adjusting the saturation and brightness also has slightly effects. When you switch from one to the other, the current selection is cleared since it is specific to a particular color space.

## Enable Settings Tool Bar



The Hue Saturation transformation lets you make two independent selections and adjustments. You can toggle each one on or off using the buttons in this tool bar. If a collection of settings is disabled, its effect on the output image is suppressed and its tab (see below) is grayed out. If no settings are enabled, the output image is just a copy of the input image. If both are enabled, the results of the two settings are blended to create the output image. Turning a collection on and off can help you see what effect it has on the output image.

Making changes to brightness, saturation, hue or color balance automatically enables the current collection.

## Add/Remove Tool Bar



Normally when you outline color patches in the histogram or click on the input image, the corresponding color patches are selected. If the Remove button is depressed, however, the color patches are deselected instead. This lets you remove unwanted colors from the current selection.

## Selection Color Tool Bar

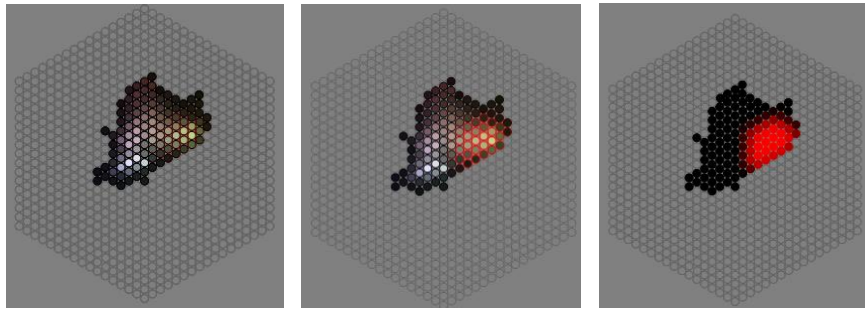


This tool bar lets you select the color used to outline selected patches.

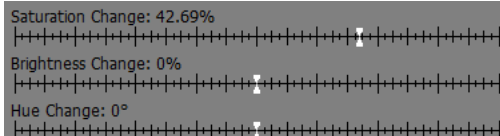
## Selection Transparency Tool Bar



This tool bar lets you choose to display just the hue-saturation histogram, the histogram with selected patches outlined, or just the selection with no histogram. Sometimes switching among these settings can make it easier to see exactly what colors are selected and how smoothly the edges of the selection are feathered.



## Saturation/Brightness/Hue Change Sliders



These three sliders let you make adjustments to the colors selected in the hue-saturation histogram. Moving the Saturation or Brightness slider to the right or left increases or decreases the saturation or brightness. Moving the Hue slider to the left or right shifts the hue counter-clockwise or clockwise. The Hue Change is shown in degrees of rotation.

## Color Balance

Color Balance Remove: ☐ Add: ☐

The Color Balance controls let you remove or add a color cast to the colors selected in the hue-saturation histogram. If the colors are white, no adjustments are made.

## Tabs



Clicking one of the tabs at the bottom of the dialog box lets you switch between one collection of settings and the other. This swaps the current selection and the Blur Radius, Saturation, Brightness, Hue sliders and Color Balance colors.

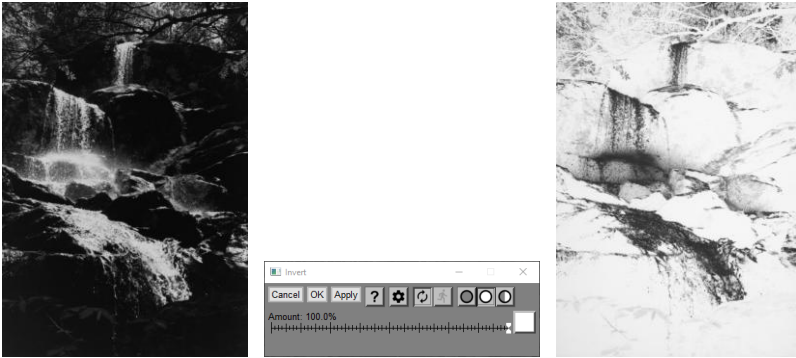
## Settings Menu

- 1x1 Color Probe
- 3x3 Color Probe
- ✓ 5x5 Color Probe
- 7x7 Color Probe
- 9x9 Color Probe

These menu items let you select the size of the area of the input image that is sampled when you click on it. Smaller values let you select finer details while larger values are less prone to noise.

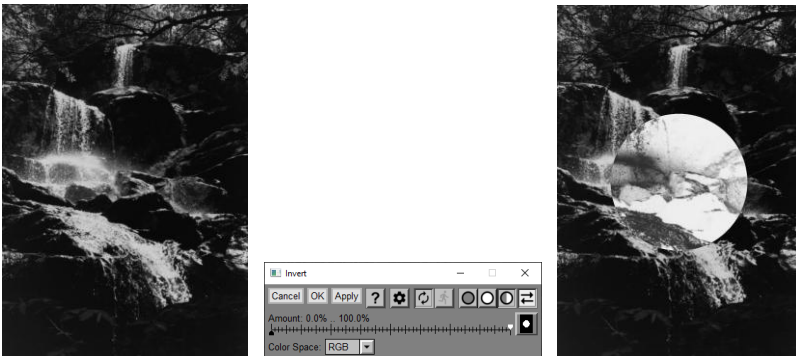
## Invert

The Invert transformation produces a negative of its input image by mapping black to white and white to black for each channel of the image.



## Amount

The Amount control lets you reduce the effect by blending part of the input image with the output or, if you use an Amount Mask, you can limit the effect to parts of the input image.



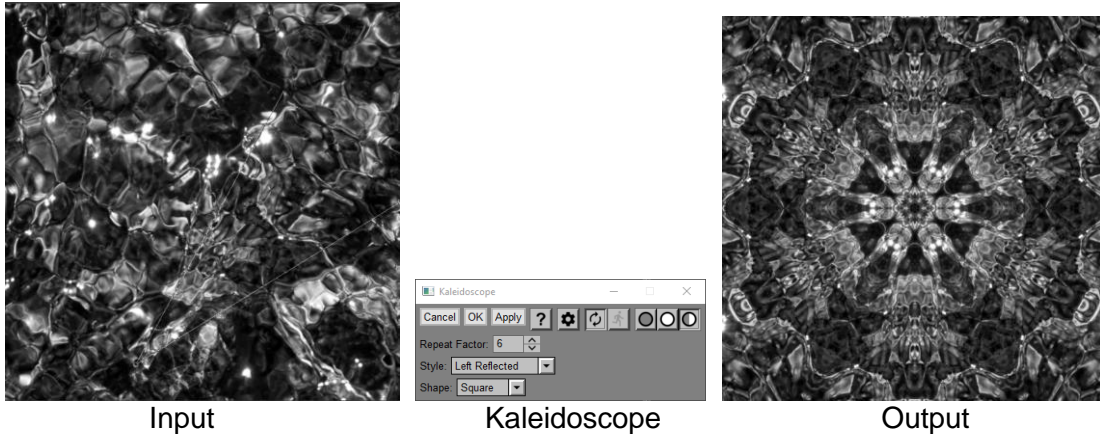
## Color Space

For color images, if you select HSV or HSL, just the brightness channel is inverted. If you select RGB, all three channels are inverted.

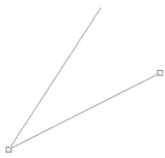
# Kaleidoscope

Something like a kaleidoscope, Picture Window's Kaleidoscope transformation repeats part of its input image with rotational symmetry. You can select what part of the image is repeated and what kind of symmetry to use.

## Using the Kaleidoscope Transformation



### Control Points

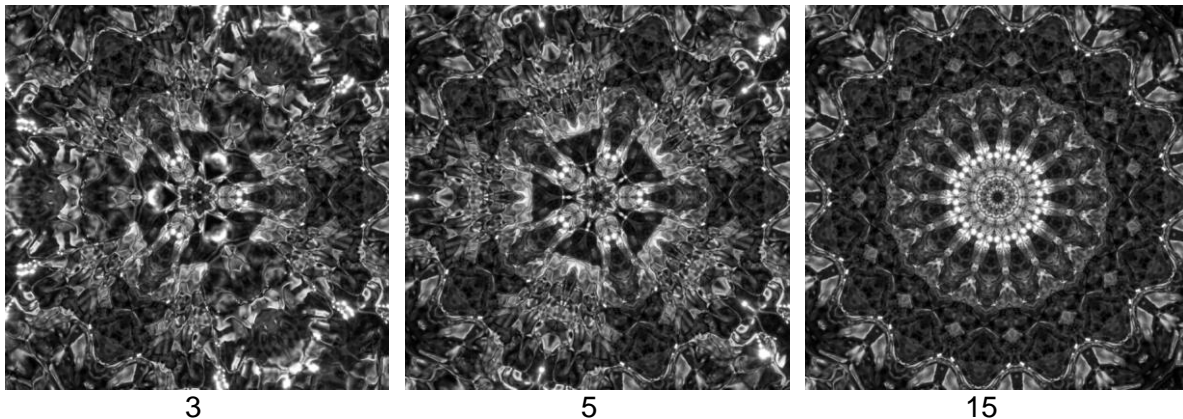


An overlay is displayed over the input image which has two control points. The control point where the two lines intersect marks the center of the output image. The position of the second control point determines the size and location of the pie slice of the input image that is replicated in the output image. You can drag either control point to reposition it. If you hold down the Shift key, you can drag both control points at the same time.

The output image is always square. The width and height of the output image is equal to twice the distance between the two control points.

### Repeat Factor

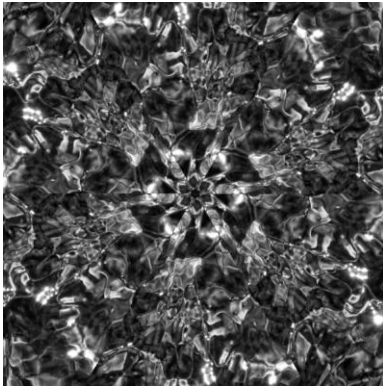
The repeat factor is the number of times the slice of the input image is repeated to make a full circle. The higher the repeat factor, the thinner the slice.



### Style

The Style setting alters the type of symmetry. Left means that the line that goes through only one control point is oriented counter clockwise from the line that goes through both. Right means it is clockwise. Reflected means the slice is reflected so the edges line up in the output image. Consequently, the slice is half the width of the non-reflected versions. In the non-reflected versions, there can be a discontinuity in the output image where the slices meet.





Left



Left Reflected

### Shape

Shape can be Square or Circular. If you select Circular, the result will be black outside the circle inscribed in the square image as illustrated below.



# Layout

Picture Window's Layout Transformation lets you create a composite output image of a specific size and resolution by placing multiple images and/or blocks of text over a background. The images or blocks of text are called panels. Each panel can be positioned and adjusted independently of the others. You can also alter the layering order to make one panel appear in front of another where they overlap.

You can use the Layout Transformation to create album pages with captions, ad layouts, photo business cards or greeting cards, slide show frames, image catalogs, or any time you need to place multiple images and text on a page.

There are several advantages of the Layout Transformation:

## Convenience

The Layout Transformation automates the many tedious steps involved in creating a page layout such as resizing the images to the required dimensions, rotating them as necessary, creating antialiased text at the proper resolution for the output image, and placing all the text and component images on the background in the correct locations.

## Flexibility

While the Layout Transformation is in progress, a preview of the finished output image is continuously displayed and updated. You can select and freely reposition or resize any of the component images or text blocks and see the results immediately. This lets you experiment until you get it just right. In addition, there are many layout options to let you control image proportions and transparency, borders, text fonts, colors, sizes, and styles, and so on. The background on which all the components are superimposed may be a solid color, an image, or a tiled image.

## Precision

The Layout Transformation's snap-to-grid feature lets you easily align images and text by hand, precisely and without guesswork. There is also a feature for automatically creating arbitrary grids of evenly spaced panels anywhere within the layout.

## Repeatability

Layouts can be saved and then reloaded at a later time. Once you save a layout, you can quickly restore it and make whatever modifications you wish, even though the final image has already been created. This feature also lets you create multiple, individualized output pages each of which conforms to a standard page layout template. For example, you could create a standard layout for a slide show which included a textured background, the title of the slide show, and a place for the slide caption and image. Creating a series of slides is then as simple as dropping the desired image and caption into the layout. Saved layout files are very compact so you can create as many of them as you need. Layouts can include references to specific images and/or text, or it can simply provide a place holder for inserting custom images or text.

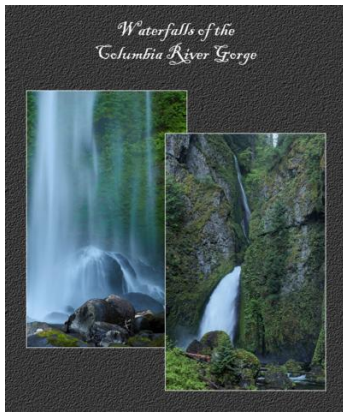
## Examples

Here's a photo business card created using the Layout Transformation.



Saving the associated layout makes it easy to create other cards with the same look but with different text or to change the underlying photo.

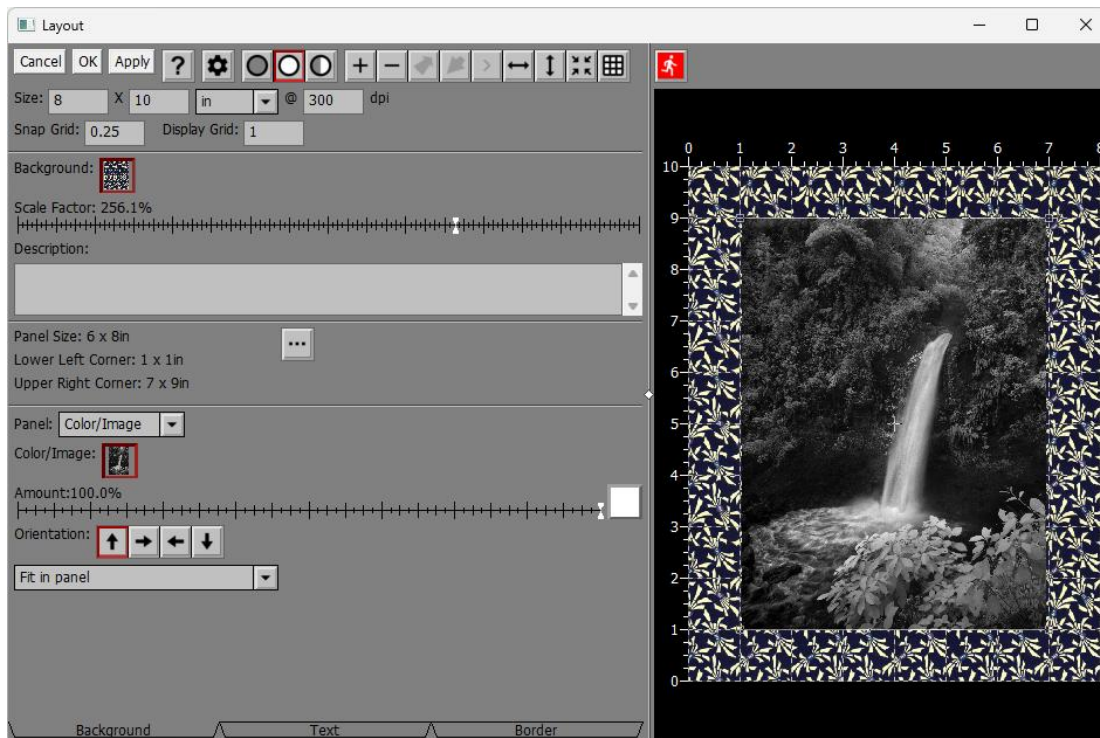




Album pages like this are easy to create. This one illustrates the use of a tiled background texture and three panels—one for each image and one for the title.

## Using the Layout Transformation

There are several steps to using the Layout Transformation. Here is what the Layout dialog box looks like when you first start Layout:



The area on the left of the dialog box is used to enter or modify layout settings. The area on the right displays a preview of the current output image.

You can increase the size of the preview by dragging one of the corners of the dialog box. If you widen the dialog box, you can drag the white diamond in the center of the vertical separator bar between the controls and the preview area to enlarge one while making the other smaller.



To preview the effect on the entire output image, click the button just above the preview area.

To create a layout, you specify the background and then add panels to the layout, one at a time.

## Specifying the Output Page Size

The first thing you need to do is to specify the size of the background area. This determines the size of the output image. While not strictly necessary, it is easier to do this before you add any panels to the layout. Enter the width, height, and resolution into the control in the upper left corner of the Layout dialog box. This

is where you need to think ahead to the intended use of the output image. To prepare an image to be printed, for example, you need to decide what size the image will be and what resolution you need. For printing, select a size that will fit on the paper you intend to print on, taking required margins into account and set the resolution to around 300 dpi. To create images for a slide show or for the web, select the width and height in pixels (by changing the units drop-down menu) to the desired image size. The resolution setting is not important in this case.

## Specifying the Background

By clicking on the Background control, you can select a solid background color or image.

If you select a solid color, then Picture Window displays a color picker—when you select a color it is immediately reflected in the preview area.

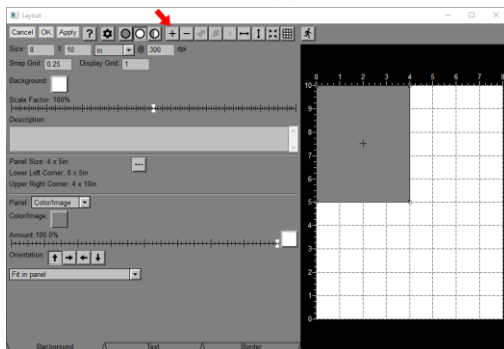
If you select an image instead of a solid color, it is automatically tiled (repeated) as necessary to fill the output image. You can control the size of the tiles with the Scale Factor slider. As with solid color backgrounds, the results of selecting and scaling a background image are immediately reflected in the preview image.

You can create seamless background tiles using Picture Window's Texture transformation. There are also many commercially available collections of background images. Or, if you prefer, you can create your own background images by scanning various materials on a flatbed scanner or by first photographing them.

## Adding Panels to a Layout

The real power of the Layout Transformation becomes evident when you start creating and combining panels. A panel can be as simple as solid color rectangle, or it can include a block of text or an image with a rectangular or an irregular outline.

To add a blank panel to the current layout, click the **+** button on the tool bar in the Layout dialog box. This places a blank panel with a gray background in the upper left corner of the current layout and displays controls to set the panel properties:



## Repositioning and Resizing Panels

To resize a panel, simply click and drag one of its corners or edges. To move a panel, click and drag its interior.

The locations of the corners of the panel move in steps determined by the Snap Grid setting in the Layout dialog box. This helps you align panels or space them evenly. If you prefer, you can set the Snap Grid to zero to allow panels to be positioned freely. The current panel size and location of the lower left and upper right corners of the panel are also displayed for reference.

## Editing Panel Properties

When you first add a new panel or when you select a panel by clicking on it, controls to set the panel's properties are displayed in the dialog box. There are three sets of controls selected by the tabs at the bottom of the dialog box: Background, Text and Border.

- The Background controls let you select the panel background as transparent or as a solid color or as an image.
- The Text controls let you place text within the panel.

- The Border controls let you outline the panel with a border.

## Setting the Panel Background

Panels may have one of three types of background: transparent, solid color, or image. First use the Panel control to select whether you want a Transparent or Color/Image background. If you selected Color/Image, then select the solid color or image.

If you select a solid color, you can use the Amount slider to set the transparency of the color background.

If you selected an image, you can use the Amount slider to set the overall transparency of the image or to create a mask for use with the image. Then you can use the Orientation toolbar to rotate the image (and its mask) in 90-degree increments within the panel if necessary.



Finally, you can select how the image will be cropped. When the Layout dialog box is active, a cropping rectangle is displayed as an overlay on the input image which you can use to select what part of the image will be visible in the panel.

The Proportions control determines how the image fits within the panel.

### Fill panel

Selecting this option guarantees that the entire panel is filled with the image. Use the cropping rectangle on the input image to select what part of the image appears in the panel.

Use this option if it is more important to fill the entire panel than to preserve the image proportions.

### Fit in panel

Selecting this option guarantees that the entire image will just fit in the panel, possibly leaving part of the panel empty.

Use this option if it is more important to preserve the image proportions than to fill the entire panel.

### Panel matches image dimensions

Selecting this option locks the panel dimensions to the dimensions of the input image. If you select this option, you cannot resize the panel by dragging its corners or edges.

Use this option if you have already sized the input image and just want to use Layout to position the image on the background.

### Panel matches image size in pixels

Selecting this option locks the panel size to the size of the input image in pixels. The physical dimensions of the panel are determined according to the dpi setting of the layout. If you select this option, you cannot resize the panel by dragging its corners or edges.

Use this option if you want the input image reproduced in the output image 1:1, without scaling up or down.

### Fit panel – scale to dimensions

The size of the cropping rectangle is locked to the panel size in physical units. The size of the cropping rectangle is fixed, but you can move it around the image. Use this setting when you want to place part of an image, scaled to its size in physical units, in a panel of a given size. If the image is smaller than the panel, the panel size is reduced to match the image size - you can make it smaller than this, but not larger.

### Fit panel – scale 1:1

The size of the cropping rectangle is locked to the panel size in pixels. The size of the cropping rectangle is fixed, but you can move it around the image. Use this setting when you want to place part of an image, scaled at 1:1, in a panel of a given size. If the image is smaller than the panel, the panel size is reduced to match the image size - you can make it smaller than this, but not larger.

## Setting the Panel Text

To place text in a panel, click on the Text tab and enter the text into the Text control. Place carriage returns where you want lines to break. To insert a large block of text from a document or other program, copy the text to the clipboard and then click on the Text control and press Ctrl-V to paste the information into the control. To insert special characters like the copyright symbol, click the Unicode button and select the special character you want to enter. You can also enter Macros which expand to text that relates to the input image.


Once you have entered the text, you can alter its size, font, style, line spacing, alignment, and color using the controls immediately below the Text control.

The Alignment control provides nine possible settings for placing the text within the panel. If you need more control over the placement of the text, you can place it in a separate panel with a transparent background and then position the new panel anywhere you want.

## Setting the Panel Border

By default, panels have no border, but you can add a rectangular border around the edge of a panel by clicking the Border tab and setting the Border Color control to the desired border color and setting the Border Width (in the current units) to a value greater than zero. To turn the border off again, set its width to 0.0. Note that the border is drawn around the outside of the panel, increasing its width and height by twice the border width. You can also use borders with a transparent panel background to place rectangles in your layout.


## Selecting Panels

The easiest way to select a panel is to click on it. If the panel you want to select is obscured by other panels, click on the  icon on the toolbar in the Layout dialog box to select panels one at a time until you get to the one you want.



To resize the current panel, click and drag one of its corners or sides. To move the panel, click and drag its interior.

To edit the properties of the currently selected panel, click on it to select it.

## Removing Panels

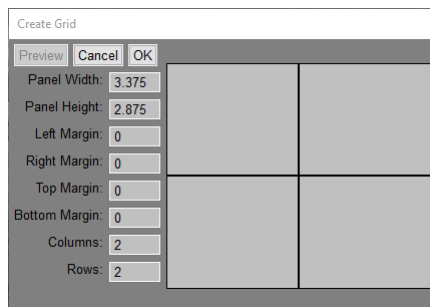
To remove a panel from a layout, first select it and then click the  button on the tool bar at the top of the Layout dialog box.

## Centering Panels

To center a panel horizontally or vertically in a layout, first select it and then click the  or  button on the tool bar at the top of the Layout dialog box.

## Creating a Grid of Panels

To create a rectangular grid of panels within the current panel, click the  button on the tool bar at the top of the Layout dialog box. This brings up the Create Grid dialog box:





The 'Create Grid' dialog box is shown. It has a title bar 'Create Grid' and three buttons: 'Preview', 'Cancel', and 'OK'. Below the buttons are input fields for 'Panel Width' (3.375), 'Panel Height' (2.875), 'Left Margin' (0), 'Right Margin' (0), 'Top Margin' (0), and 'Bottom Margin' (0). At the bottom are 'Columns' (2) and 'Rows' (2). To the right of these fields is a preview area showing a 2x2 grid of panels.

Once you fill in the sub-panel size, margins and number of columns and rows and click OK, all the panels are added to the current layout.

## Controlling the Layering Order

The output image is created by first painting the background and then applying each of the panels one at a time in a stack of layers. Each new layer obscures (partially or totally, depending on its transparency) any panels previously applied.

To alter the sequence of a panel in the layering order, first select it and then click on the  or  button in the Layout toolbar to move it one level lower or higher in the stack.

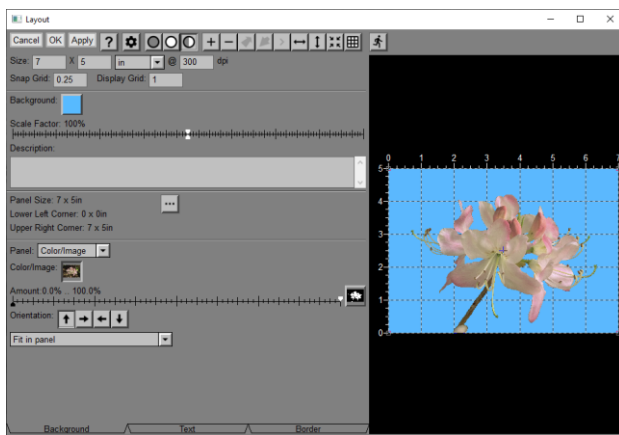
## Creating Panels with Irregular Outlines

Panels are normally rectangular, but you can use masks to create panels of any shape. To create a solid color or image in a panel with a non-rectangular shape, start by creating a mask that isolates the subject from its background. Select the input image in the Color/Image control and select the mask into the Amount control.



Input Image

Mask



Layout

You can use this method to place images with irregular shapes into a layout or to create frames with irregular openings which can be placed over other panels.

Here is an example of placing an image in a frame:



This example was created by using a stock frame image. Next, a mask was created to identify the opening in the frame. The image of the frame was then placed in a panel and the mask selected into the Amount control. A second panel was created to hold the landscape image. It was necessary to alter the layering order to place this panel behind the frame. Finally, the position and size of the panel containing the landscape image was adjusted to make it fit nicely within the frame.



# Lens Distortion

Some lenses exhibit barrel or pincushion distortion. Usually, this is best corrected during the raw file conversion process, if possible. If you want to correct extreme distortion from a fisheye lens or if you don't have the raw file or if there is no available lens profile for the camera/lens combination you were using, the Lens Distortion transformation provides an alternative method for correcting distortion. It can also be used to introduce distortion deliberately as a special effect.

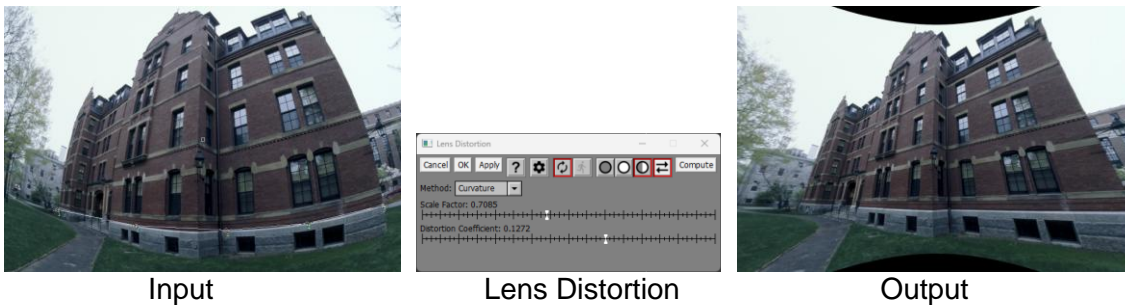
This transformation can only remove radial image distortion, i.e. distortion that is symmetrical about the center of the image. It can model the distortion using either of two different mathematical formulas: by assuming the field is curved into part of a sphere or by applying a fifth-order polynomial.

The circular field method is simpler since there is only one variable – if you increase the distortion coefficient it removes barrel distortion, and decreasing it removes pincushion distortion.

The polynomial method is more complicated but can more accurately model some types of radial lens distortion.

## Using the Lens Distortion Transformation

To make this transformation work properly, do not crop your images before attempting to remove lens distortion as this may change the location of the optical center.



### Method

This setting lets you choose the Circular or Polynomial distortion correction method.

### Input Image Overlay / Compute Button

A line with five numbered control points is displayed over the input image and an extra control point at the center. The idea is to place the five control points along a part of the input image that you know is supposed to be a straight line. In the example above, it is part of the building, but it could be a horizon or any other linear feature in the input image. As a convenience, you can scroll the input image to bring one of the five control points into view by typing its number. For the most accurate results, make the line as long as you can. Leave the center point in the middle of the image unless you know for some reason that the center of distortion is elsewhere. After the control points are placed, click the Compute button. This causes Picture Window to search for the method and coefficients that do the best job of mapping the control points to a straight line. If you save these settings, they should work for any other image taken with the same camera and lens.

### Scale Factor

Correcting lens distortion can shrink or expand the image. You can compensate for this by adjusting the Scale Factor slider.

### Coefficients

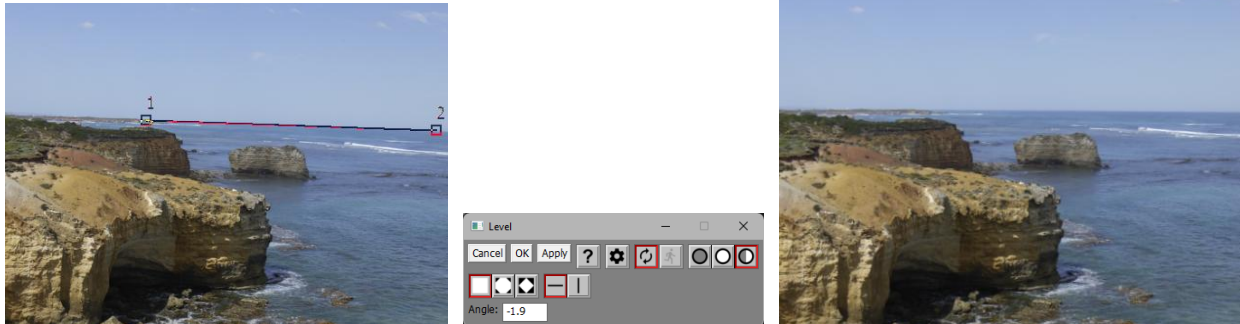
These sliders show you what coefficients were computed when you clicked the Compute button. Or, to introduce distortion into an image you can adjust them manually. If you are going to adjust the amount of distortion, it is a lot more intuitive to use the Circular method.

# Level

The Level transformation lets you level photographs taken with the camera tilted.

You use it by identifying a line in the image. The transformation then rotates the image to make the line either exactly horizontal or vertical. You can position the endpoints of the line by dragging them. Dragging the line from the middle moves both endpoints at once.

## Using the Level Transformation



## Cropping Tool Bar



When you rotate an image, there is the problem of what to do with the corners. The Level transformation gives you three options.

- Trim the edges – makes the output image smaller than the input image.
- Make the output image the same size as the input image – shows some black border, depending on the rotation angle.
- Retain the entire input image – shows more black border and makes the output image larger than the input image, depending on the rotation angle.



Trim



Same Size



Don't Trim



## Horizontal/Vertical Tool Bar



This lets you make the line identified in the input image horizontal or vertical.

## Angle

The Angle control displays the automatically computed rotation angle in degrees, or you can enter an angle if you prefer.

## Number Keys

The control points at either end of the overlay line are numbered 1 and 2. Pressing a number key centers the display on the corresponding control point. Pressing the same number key more than once zooms the input image each time. This provides a convenient way to make fine adjustments to the control point locations, even when the image is zoomed in such that you cannot see it all at once.

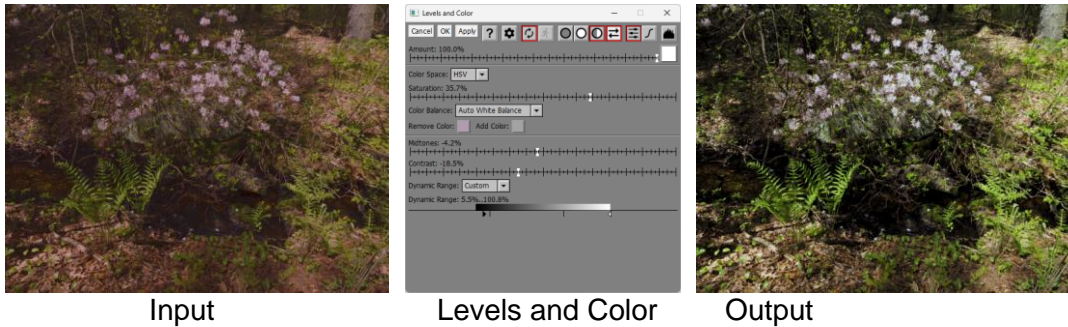
## Settings Menu

Reset level line in batch mode – if this item is checked, each time a new image is processed as part of a batch operation, the level line is reset to its default initial location. This feature is primarily useful if you have set a break point on the Level transformation to let you manually adjust each image.

## Levels and Color

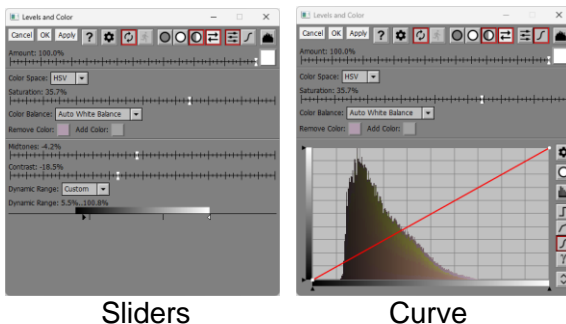
The Levels and Color transformation is a simplified version of the Adjust transformation. It lets you alter the brightness, contrast, dynamic range, color balance and saturation of an image using simple controls. Like Adjust, this transformation is especially useful when used with masks to make local adjustments.

When Levels and Color starts up, Picture Window analyzes the input image to determine its lightest and darkest points to determine the dynamic range and the average color of its brightest pixels to determine the auto white balance color. Most of the time it does a good job of extracting this information from the input image, but in rare cases it may misidentify the dynamic range or white point. See the Settings Menu below for information on adjusting the dynamic range and auto white balance thresholds as this may correct the problem.



### Sliders/Curve

This tool bar gives you the option of adjusting brightness using sliders (Midtones, Contrast and Dynamic Range), or by applying a brightness curve (see images below). When Curve is selected, clicking and dragging the cursor over the input image displays markers in the curve corresponding to the colors in the input image. When Sliders is selected, clicking on the input image sets the colors to add and remove so as to make the selected color neutral.



### Base Histogram on Masked Area

If you select the Curve method of adjusting brightness, then this button controls how the histogram displayed behind the curve is computed. If an Amount mask is present and the button is depressed, the histogram is based just on the masked area. Otherwise, the histogram is based on the entire input image.

### Amount

The amount control blends a percentage of the input image with the output image to scale back the effect of the Levels and Color transformation. If you create a mask, you can use the amount control to localize the effect of the transformation to parts of the input image.

### Color Space

You can adjust brightness in either the HSV or HSL color space. Using HSV preserves bright colors but does not make the brightest areas white. Using HSL washes out bright colors but does make the brightest colors white. Changing the color space changes the locations of the tic marks in the Dynamic Range slider – selecting HSL moves the tic marks closer together. The Color Space control is not displayed if the input image is black and white.

## Saturation

You can use the Saturation slider to increase or decrease the saturation of the input image. The Saturation slider is not displayed if the input image is black and white.

## Color Balance

There are two Color Balance options:

**Custom** – This setting indicates the current Remove and Add colors should remain the same when the transformation is applied to a different image. This can happen if an upstream image is changed or during a batch process.

**Auto White Balance** – This setting indicates the input image is analyzed to determine the average color of its brightest parts. The Remove Color is set to this average highlight color and the Add Color is set to a neutral gray of the same luminance. The net result of this is to remove any highlight color cast from the input image. If this option is selected, subsequent input images will also be auto white balanced.

## Remove and Add Colors

These controls let you color balance the input image. To remove a color cast, click on a part of the input image that should be neutral, and the Remove Color will be set accordingly while the Add Color is set to a neutral gray of the same luminance. Changing the color balance may alter the locations of the tic marks on the dynamic range slider.

If the input image is black and white, the Color Balance setting is used to tint the image. For more control over tinting black and white images, see the Tint transformation.

## Midtones

This slider lets you adjust brightness by lightening or darkening primarily midtones.

## Contrast

This slider lets you increase or decrease midtone contrast.

## Dynamic Range

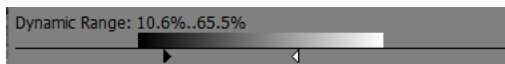
There are three Dynamic Range options:

**Custom** – This setting indicates the current dynamic range marker positions should be left unmoved when the transformation is applied to a different image. This can happen if an upstream image is changed or during a batch process.

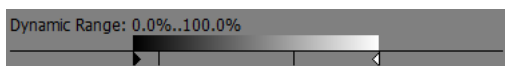
**Reset** – This setting indicates the dynamic range markers should always be positioned to align with the tic marks in the dynamic range slider, even if the input image is changed.

**Full** – This setting indicates the dynamic range markers should always be positioned at 0% and 100%, even if the input image is changed.

The dynamic range slider displays its black and white markers at the gray levels corresponding to the darkest and lightest parts of the input image (after any color balance has been applied). Tic marks are shown below the gray scale at these initial points.



To change the dynamic range, drag the black and white markers to new locations. To use the full dynamic range, drag the black marker to 0% and the white marker to 100%. Setting Dynamic Range to Full will also do this. Also as a shortcut, you can Shift-Click on the Dynamic Range slider to expand to full dynamic range or Ctrl-Click on it to reset the markers back into alignment with the tic marks.



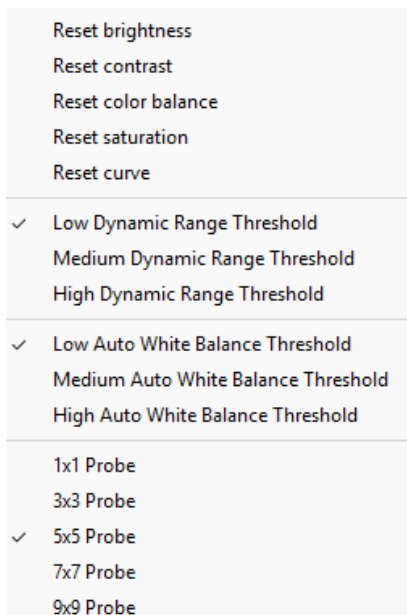
For additional contrast at the cost of losing shadow or highlight detail, you can move the markers beyond the end of the gray scale.



## Curve

Curves let you adjust the tonality of the output image. They give you more control than the simpler Midtone/Contrast/Dynamic Range sliders but are a little harder to learn to use fully. For more information, see the document: [Curves and Histograms.pdf](#).

## Settings Menu



**Reset Brightness/Contrast/Color Balance/Saturation/Curve** – Selecting one of these menu items resets just a subset of the Levels and Color settings to their neutral values. To reset Dynamic Range, use the Dynamic Range control.

**Dynamic Range Threshold (Low/Medium/High)** – When Picture Window analyzes the input image to determine its darkest and lightest points, it uses a threshold setting to reject small numbers of dark or light pixels that may be noise or small specular reflections and not representative of the image. The default value is **Low**. Occasionally, if the light and dark parts of the image are very small, they may be overlooked, for example a photograph of the night sky with a few bright stars. By raising the dynamic range threshold, you may be able to get better results.

**Auto White Balance Threshold (Low/Medium/High)** – When Picture Window analyzes the input image to determine the color of its brightest pixels, it uses a threshold setting to reject small numbers of light pixels that may be noise or small specular reflections and not representative of the image. Occasionally, if the light parts of the image are very small, they may be overlooked. By raising the auto white balance threshold, you may be able to get better results.

**Probe Size** – This lets you select the size of the probe used to set the color balance. Smaller probes sizes are more precise, but larger sizes are less sensitive to noise.

## **Reloading Previous Settings**

If you use the Ctrl-R keyboard shortcut to load the settings from the last use of the tool, you will restore not only the brush and other tool settings but also all the strokes you applied to the previous image. To load the previous settings without re-applying any strokes, use Ctrl-Shift-R instead.

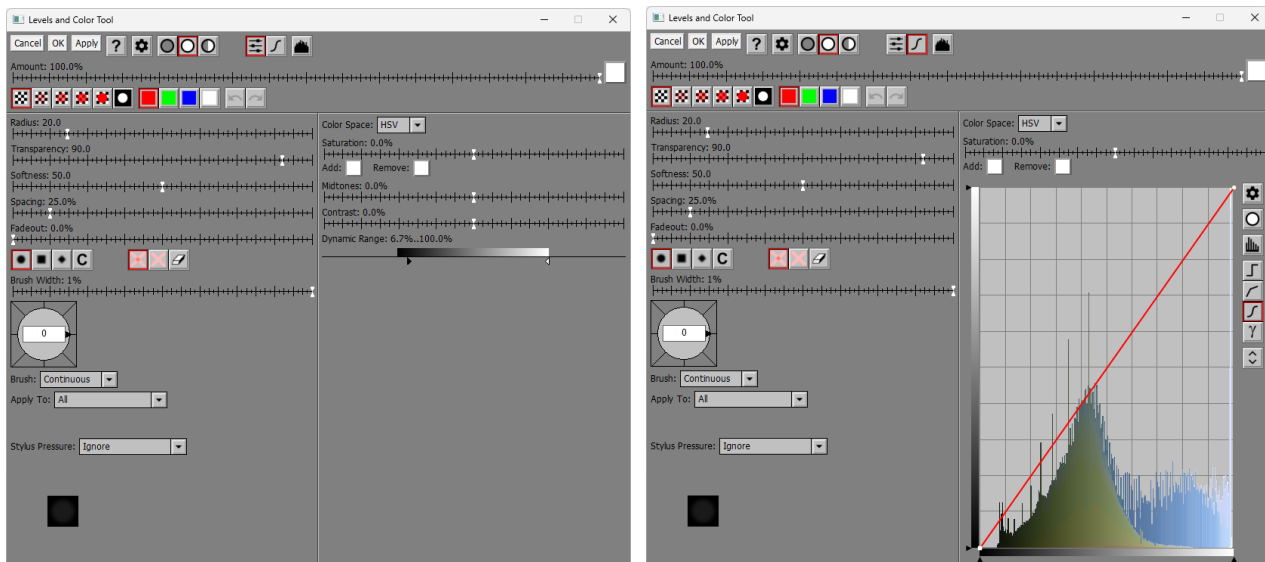
## Levels and Color Tool

The Levels and Color Tool lets you make similar brightness and color corrections as the Levels and Color Transformation (described immediately above), but it is designed to let you brush the corrections directly on the output image. While you could achieve the same effect using the Levels and Color Transformation by creating a mask that you build using the Mask Brush tool, the Levels and Color Tool is easier to set up and use.

The Levels and Color Tool maintains a mask layer which is a black and white image the same size as the input and output images. When you apply the brush, you are painting on the mask layer which is then used to apply corrections to the input image to produce the output image. The advantage of painting on a mask layer instead of directly on the output image is that it lets you try different corrections after you paint them as well as edit the mask to change where the corrections are applied.

While you are using the Levels and Color Tool, you have the option of either displaying the mask as a colored overlay on the input image to see where the corrections are applied, or displaying the output image to see the result of applying the corrections.

The Levels and Color Tool dialog box is roughly divided into two halves – one for brush settings and one for Levels and Color settings:



### Sliders/Curve

This tool bar gives you the option of adjusting brightness using sliders (Midtones, Contrast and Dynamic Range), or by applying a brightness curve (see images above). When Curve is selected, clicking and dragging the cursor over the input image displays markers in the curve corresponding to the colors in the input image. When Sliders is selected, clicking on the input image sets the colors to add and remove so as to make the selected color neutral.

### Base Histogram on Masked Area

If you select the Curve method of adjusting brightness, then this button controls how the histogram displayed behind the curve is computed. If an Amount mask is present and the button is depressed, the histogram is based just on the masked area. Otherwise, the histogram is based on the entire input image.

### Amount

The amount control blends a percentage of the input image with the output image to scale back the effect of the Levels and Color Tool. If you create a mask, you can use the amount control to localize the effect of the transformation to parts of the input image.

## Mask Transparency

Clicking the leftmost button of this tool bar displays the output image so you can see the results of the transformation. The remaining buttons display the current mask layer as a colored overlay on the input image instead of displaying the output image. You can adjust the mask transparency for 75% (mostly transparent) to 0% (opaque). More transparent masks make it easier to see how the mask relates to the underlying image. More opaque masks make it easier to see the details of the mask. Clicking the rightmost button displays just the mask as a black and white image.

When you click OK or Cancel to close the transformation dialog box, the mask is always reset to 100% transparent to remove any mask overlay.

## Mask Color

This tool bar lets you set the color of the mask overlay, assuming the mask is being displayed.

## Undo/Redo

The Undo and Redo buttons let you erase or redraw levels and color operations, one stroke at a time. A stroke is defined as everything between pressing the mouse button and releasing it.

If the Undo or Redo button is grayed, it means there are no operations left to undo or redo. If you undo too many operations by accident, you can click the redo button until you get back to where you wanted to be. However, once you draw a new stroke, you can no longer redo past that point.

You can use the keyboard shortcuts Ctrl-Z for Undo and Ctrl-Y for Redo.

Normally, Undo preserves the current brush settings, but if you want to revert to the settings for the previous stroke, hold down the Shift key while clicking the Undo button or pressing Ctrl-Z.

## Brush Settings

### Radius

The Radius slider adjusts the brush size. You can also use the mouse scroll wheel to make the brush larger or smaller.

### Transparency

The Transparency slider lets you vary the transparency of the image data you clone over the output image. The more transparent, the more subtle the effect.

### Softness

The Softness slider lets you vary the brush from hard-edged to having a gradual falloff. The brush preview area at the bottom of the dialog box lets you see how soft the brush is.

### Spacing

The Spacing slider lets you vary the interval at which the brush is applied as you move it over the image. If you increase it too much you will not get a smooth effect. Too small and the brush is hard to control.

### Fadeout

The Fadeout slider lets you make the brush stroke fade out by becoming more transparent the longer the paint.

### Stylus Pressure

If you don't have a tablet connected to your computer, this setting is ignored. If you do have a tablet with a pressure-sensitive stylus, you can use this setting to determine which brush setting, if any, is adjusted depending on how hard you press the stylus into the tablet surface.

#### Ignore

This causes stylus pressure to be ignored.



### Controls Opacity

The harder you press, the less transparent the brush.

### Controls Radius

The harder you press, the larger the brush.

### Controls Hardness

The harder you press, the less soft the brush.

### Controls Flow Rate

The harder you press, the smaller the spacing between brush applications.

### Brush Shape

The Brush Shape tool bar lets you make the brush circular, square, diamond shaped or custom. For information on custom brush shapes, see the separate document: [Creating and Using Custom Brush Shapes.pdf](#).

### Brush Width

The Brush Width slider lets you make the brush narrower. Alternatively, you can rotate the mouse wheel with the Ctrl key held down.

### Brush Angle

The Brush Angle compass control lets you rotate the brush shape. Alternatively, you can rotate the mouse wheel with the Shift key held down.

### Mode

#### Accumulate

In this mode, the mask gets more and more opaque the more you go over the same area. Using a very transparent mask, this lets you build it up gradually.

#### Don't Accumulate

In this mode, painting over an area does not make the mask more opaque. This is useful if you want to paint a mask of a uniform transparency over an area.

#### Erase

In this mode, the brush is subtracted from the current mask. Use this mode to erase or reduce part of the mask when necessary.

### Brush

#### Continuous

This is the normal mode. The brush paints for as long as you hold the mouse button down.

#### One Shot

In this mode, the brush paints only once and then stops.

### Apply To

When you are painting on the mask, this control lets you limit the part of the mask corresponding to pixels that are similar to the pixels under the cursor. There are three options which are similar to those in the [Mask Paint Tool](#).

#### All

Causes all the mask pixels under the current brush to be affected. Also, the Threshold slider is hidden.

#### Similar Pixels – Fixed

The input image color is sampled once when you click to start a new stroke. For the remainder of the stroke, only mask pixels where the input image color is similar to the sampled color within the Threshold are painted.

### Similar Pixels – Track

This option samples the input image color continuously as you click and drag. Only mask pixels corresponding to where the input image color is similar to the color at the cursor location within the Threshold are painted.

These last two options are useful when painting near the edge of a region to prevent the brush spilling over into an adjacent region of a different color. You can use the Threshold slider (see below) to adjust the sensitivity of the similarity test.

### Threshold

This slider is only displayed when Apply To is set to Similar Pixels - Fixed or Similar Pixels - Track. The threshold determines how similar colors have to be for the brush to be applied to the mask.

## Levels and Color Settings

These settings are the same as for the Levels and Color Transformation. When you alter any of these settings, the mask transparency is automatically reset to 100% so you can see the results of the changes.

Depending on the Sliders/Curve tool bar at the top of the dialog box, you adjust the brightness of the image either using a standard brightness curve or using three sliders as described below:

### Midtones

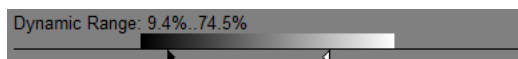
This slider lets you adjust brightness by lightening or darkening primarily midtones.

### Contrast

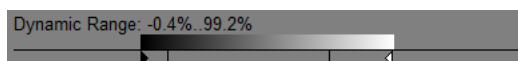
This slider lets you increase or decrease midtone contrast.

### Dynamic Range

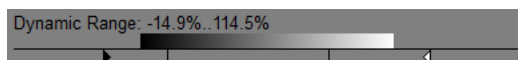
This control initially displays its black and white markers at the gray levels corresponding to the darkest and lightest parts of the input image. Tic marks are shown below the gray scale at these initial points.



To change the dynamic range, drag the black and white markers to new locations. To use the full dynamic range, drag the black marker to 0% and the white marker to 100%.



For additional contrast at the cost of losing shadow or highlight detail, you can move the markers beyond the end of the gray scale.



### Curve

Curves let you adjust the tonality of the output image. They give you more control than the simpler Midtone/Contrast/Dynamic Range sliders but are a little harder to learn to use fully. For more information, see the document: *Curves and Histograms.pdf*.

### Add/Remove Color

These controls let you color balance the input image by either adding or removing a color cast.

If the input image is black and white, the color balance color is used to tint the image.

## Color Space

You can adjust brightness and saturation in either the HSV or HSL color space. Using HSV preserves bright colors but does not make the brightest areas white. Using HSL washes out bright colors but does make the brightest colors white. This control is not displayed if the input image is black and white.

## Saturation

You can use the Saturation slider to increase or decrease the saturation of the input image. This control is not displayed if the input image is black and white.

## Custom Brush Shapes

While the built-in brush shapes (round, square and diamond) are adequate most of the time, if necessary you can create a custom brush shape.

### Defining a custom brush shape

A custom brush shape is defined as a 2000 x 2000 pixel, 8-bit black and white image. This image is scaled up or down to match the brush radius and used to determine where to apply the brush. Where the image is black, the brush has no effect, where it is white it has full effect and where it is gray it has partial effect, consistent with the Brush Preview (see above).

One way to build a custom shape is to start by using the File/New command to create a black, 8-bit 2000 x 2000 pixel image. Next, paint white over the black background where you want the brush to take effect. For more control, you can use the Masks transformation to create a brush image as Mask 1, and then set Output to Mask 1. This lets you use any of the mask tools to construct the brush shape image.

If you have custom brush shapes you expect to re-use, you can save them in a folder as image files and simply reload them when needed.

### Using a custom brush shape

To use a custom brush shape, first select Custom as the brush shape from the Shape tool bar. This causes an image picker control to appear just to the right of the tool bar. Next, click on this control and select the custom brush shape image you want to use. A list of currently open 8-bit black and white 2000 x 2000 images will be displayed for you to pick from.



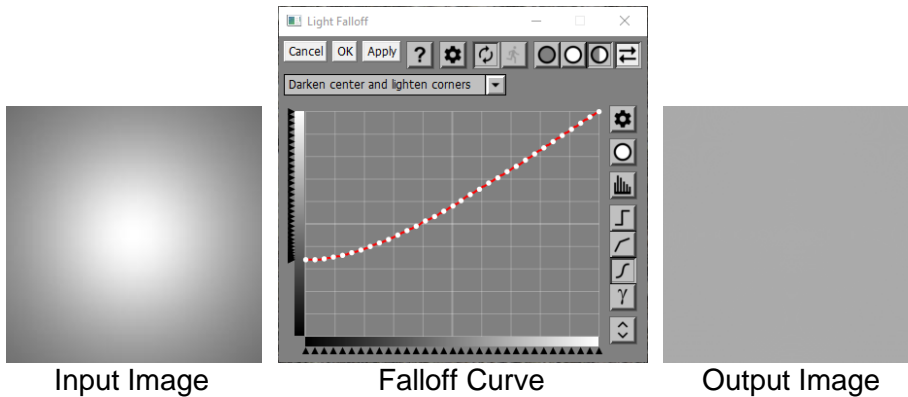
Once you select a custom brush shape you can paint using the custom brush the same way you use one of the built-in brush shapes. To switch to a different custom brush shape, just click on the image picker control and select the shape you want.

Note that if the current brush has a custom brush shape, the custom brush shape image is not saved or reloaded when you save the brush settings (see Settings Menu below), but the shape will be saved as Custom.

# Light Falloff

The Light Falloff transformation lets you make changes to the brightness of its input image that vary with distance from the center of the image. Such radial light falloff is a common property of most wide angle lenses and, to a lesser extent, longer lenses as well. The transformation can also be used to vignette images by applying a correction that darkens the corners. If you take a photo of an evenly illuminated white field, Light Falloff can compute the necessary curve to correct light falloff in the image. This transformation gives you the choice of several methods for evening out the image brightness: you can darken the center to match the corners, lighten the corners to match the center or do a combination of the two that preserves the average brightness.

## Using the Light Falloff Transformation



### Curve

A curve control is used to define the light falloff curve. The x-axis represents distance from the center of the image with 0.0 at the far left and the diagonal distance to one of the corners of the image at the far right. The y-axis represents a factor that the image brightness is multiplied by.

### Settings Menu

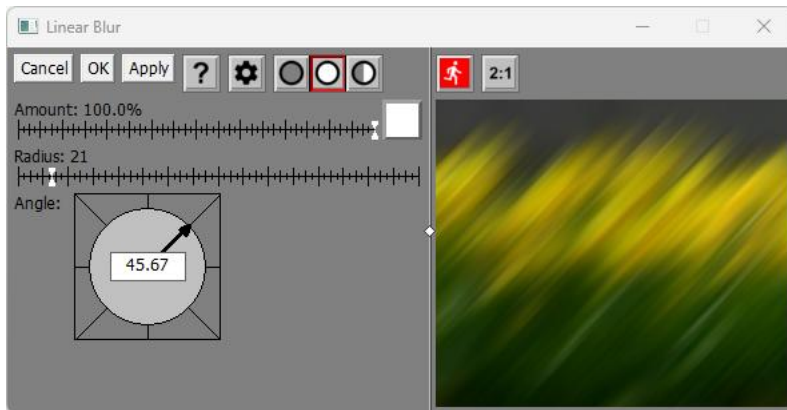
#### Compute Falloff Curve

This command assumes that the input image is a photograph of an evenly-illuminated white field. You can use a light box, a piece of white paper outside in the sun or the File/White Screen command. By analyzing the image, a curve is generated automatically that will correct for any radial light falloff. You can then save this curve by saving the Light Falloff settings and apply it to other images taken with the same lens.

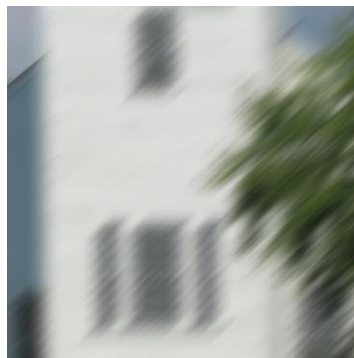
In the example above, the Cosine Falloff test pattern transformation was used to create the input image, and you can see how the compute falloff curve restores it to a uniform gray.

# Linear Blur

Linear Blur simulates panning the camera with the shutter open since it blurs in one direction only. You select the direction and the radius.



Original



Linear Blur

For faster response time, Linear Blur has its own preview area.

You can increase the size of the preview by dragging one of the corners of the dialog box. If you widen the dialog box, you can drag the white diamond in the center of the vertical separator bar between the controls and the preview area to enlarge one while making the other smaller.



To preview the effect on the entire output image, click the button just above the preview area. To re-center the preview, click on the input image in the main image area. You can also scroll the preview area by clicking and dragging on it.

## 2:1 -- Magnify Preview Button

When the Magnify Preview button is depressed, the central portion of the preview area is magnified by a factor of two, making it easier to see fine details. Clicking the button a second time restores the normal 1:1 display.

## Amount

The amount control blends a percentage of the input image with the output image to scale back the effect of the High Pass transformation. If you create a mask, you can use the amount control to localize the effect of the transformation to parts of the input image.

## Radius

The Radius slider lets you adjust the amount of blurring.

## Angle

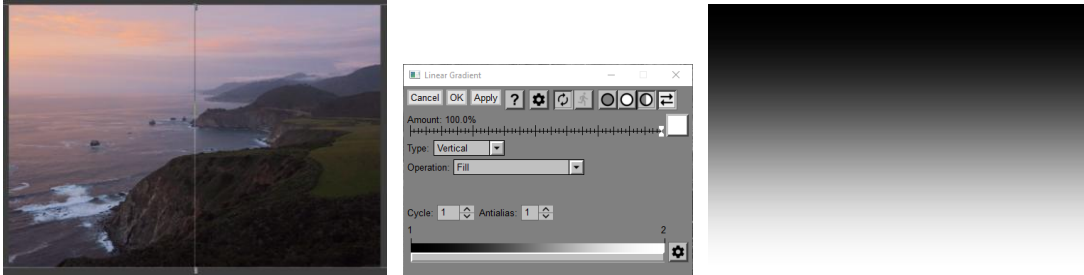
This compass control lets you set the blur angle.

# Linear Gradient

The Linear Gradient transformation creates gradients that vary along a line segment from one color to another and are uniform in the direction perpendicular to the line segment. The transition from the starting to the ending color can be configured to pass through a number of intermediate colors based on a color line control.

The gradient can either become the output image or it can be applied to the input image in different ways.

## Using the Linear Gradient Transformation



### Input Image Overlay

An overlay is displayed on the input image consisting of a line segment with control points at either end. You can drag the control points to position where you want the gradient transition to occur. Perpendiculars are also displayed for each control point on the color line.

If you hold down the shift key while dragging the first or last control point, the gradient is constrained to be horizontal or vertical regardless of the Type setting (see below).

### Amount

The amount control blends a percentage of the input image with the output image to scale back the effect of the Gradient transformation. If you create a mask, you can use the amount control to localize the effect of the transformation to parts of the input image.

### Type

Linear gradients can be oriented vertically, horizontally or freely in any direction.

### Operation

This setting lets you control how the gradient is applied to the input image to create the output image. For examples of how the different operations work, see the end of this help topic.

#### Fill

If you select Fill, the gradient becomes the output image and the input image is ignored.

#### Filter / Subtractive Filter

If you select Filter, the gradient is applied as a filter to the input image to create the output image. This is like sandwiching two transparencies and viewing them on a light box. For the Filter operations only, an Exposure Compensation slider is also displayed to let you compensate for any darkening of the input image as a result of applying the filter.

Subtractive Filter is the same as Filter, but the two images are inverted before filtering and the result is then inverted.

### Adjust Brightness (HSV / HSL)

These operations lighten or darken the input image depending on whether the gradient is lighter or darker than a mid-level gray.

### Soft Light

Similar to the soft light blend mode in other image editors.

### **Reverse Soft Light**

Same as Soft Light, but with the input and gradient images swapped.

### **Hard Light**

Similar to the hard light blend mode in other image editors.

### **Reverse Hard Light**

Same as Hard Light, but with the input and gradient images swapped. This mode is also known as Overlay in other image editors.

### **Add**

The gradient image is added to the input image. This can generate out-of-range pixel values which are then clipped.

### **Subtract**

The gradient image is subtracted from the input image. This can generate out-of-range pixel values which are then clipped

### **Reverse Subtract**

The input image is subtracted from the gradient image. This can generate out-of-range pixel values which are then clipped

### **Absolute Difference**

Similar to Subtract except negative differences (i.e. where the gradient image is brighter than the input image) are converted to positive instead of being clipped to black.

### **Offset Difference**

The result is a mid-level gray plus the input image minus the gradient image.

### **Color Burn**

Similar to the color burn blend mode in other image editors.

### **Color Dodge**

Similar to the color dodge blend mode in other image editors.

### **Linear Burn**

Similar to the linear burn blend mode in other image editors.

### **Linear Light**

Similar to the linear light blend mode in other image editors.

### **Vivid Light**

Similar to the vivid light blend mode in other image editors.

### **Pin Light**

Similar to the pin light blend mode in other image editors.

### **Cycle**

The Cycle setting causes the gradient to pass through multiple complete cycles between the starting and ending points.

### **Antialias**

If antialiasing is greater than 1, sharp transitions of the gradient are smoothed out, avoiding jagged edges. The higher the Antialias setting, the more accurate the result.

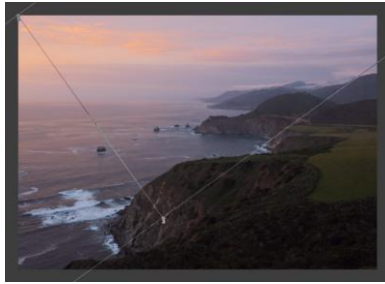


## **Color Line**

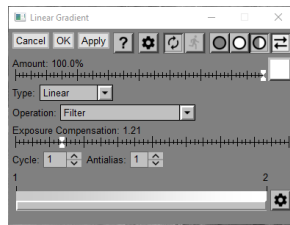
The color line control is where you specify how the gradient varies from its starting to its ending color. For details on using color lines, see the [Tint transformation](#) or the [Color Lines](#) help topic.

## Example

In the following example, the upper left corner of the input image is darkened, making the overall brightness of the image more uniform. Then, by turning up the exposure compensation, shadow detail can be improved without clipping the highlights.



Input with Overlay



Linear Gradient



No Exposure Compensation

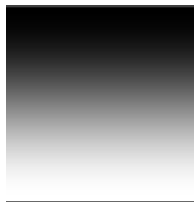


Exposure Compensation

## Examples of Different Operations



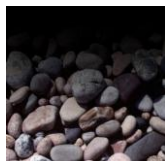
Input



Gradient



Fill



Filter



Subtractive Filter



HSV



HSL



Soft Light



Reverse Soft Light



Hard Light



Reverse Hard Light



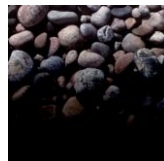
Lighten



Darken



Add



Subtract



Reverse Subtract



Absolute Difference



Offset Difference



Color Burn



Color Dodge



Linear Burn



Linear Light



Vivid Light



Pin Light

# Lines, Arrows, Text Tool

The Lines, Arrows, Text tool lets you draw straight, broken or curved lines on an image, optionally with arrowheads at one or both ends. The line width, color and transparency are adjustable. You can optionally place a text box aligned with the starting point of a line or arrow, or you can place one or more text boxes on an image with no lines or arrows.



## Input Image Overlay

The Lines, Arrows, Text tool displays an overlay on the input image to let you add, remove or reposition the control points that define the lines, arrows and text.

### Creating lines

To get started, Shift-click on the input image to start a new line. This places a single control point at the beginning of the new line. Alternatively, you can right click where you want the new line to start and select Add new line/arrow/text from the popup menu.

To extend the line, click away from the first control point. Each time you click, a new line segment is added to the current line. If the closest control point is an endpoint the current line, the new control point is inserted at the end; otherwise, it is inserted between the two control points whose line segment is closest. In some cases, this means you need to insert the new control point to get it in the right sequence and then drag it to its final location. Alternatively, you can add new control points to the current line by right clicking where you want the control point to be located and selecting Add control point from the popup menu.

To reposition a control point, click on it and drag it to its new location.

To start a new line, Shift-click on the input image. Alternatively, you can right click where you want the new line to start and select Add new line/arrow/text from the popup menu.

Clicking on the input image on an existing control point selects the line the control point is part of. This determines which line new control points will be added to. The control points for the current line are displayed as larger, filled circles so you can tell which line is selected.

To remove a control point, Ctrl-click on it. Removing the last control point removes the entire line. Alternatively, you can right click on a control point and select Remove control point or Remove entire line/arrow/text from the popup menu.

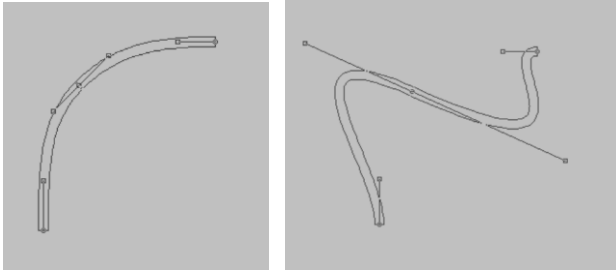
To move the current line by moving all of its control points at once, Ctrl-Shift click and drag it to the new location.

### Editing control points

Depending on the **Line Type** (see below), either a broken line or a spline curve is passed through the control points and a rough outline is displayed as an overlay over the input image.

If you select a curved line, each control point has two additional handles which control the incoming and outgoing slope and velocity of the curve at that point. The slope controls the angle at which the curve arrives at or departs from the control point. The length sets the velocity which controls how fast it arrives or departs—the higher the velocity, the further the curve goes before turning toward the other end of the

segment. If you select too high a velocity and the control points are too enough to each other, the curve may kink or intersect itself.



## Amount

The amount control blends a percentage of the input image with the output image to scale back the effect of the Lines, Arrows, Text transformation. If you create a mask, you can use the amount control to localize the effect of the transformation to parts of the input image.

## Line Width

This slider sets the width of the currently selected line.

## Arrowhead Size

This slider sets the size of the arrowheads, if any, for the currently selected line.

## Transparency

This slider sets the transparency of the current line.

## Line Type



This tool bar lets you switch between broken line and spline curve for the currently selected line.

## Arrowheads



This tool bar lets you select no arrowheads, an arrowhead at one end or the other, or arrowheads at both ends.

## Arrowhead Shape



This tool bar lets you select from three arrowhead shapes ranging from blunt to sharp.

## Snap to 45 Degree Increments



If this button is depressed while you are dragging a control point to a new location, its line segment is made to run horizontally, vertically or diagonally, whichever is closest to the direction of motion. This makes it easy to create horizontal, vertical or diagonal line segments.

## Text Box



When this button is depressed, a text control pops up to let you place a text box aligned with the starting point of the line (or arrow). If the Text Box button is not depressed (or if no text is entered), no text box is placed over the image. If you close the text control, the Text Box button is raised and the text box is removed.

## Color

This control sets the line color.

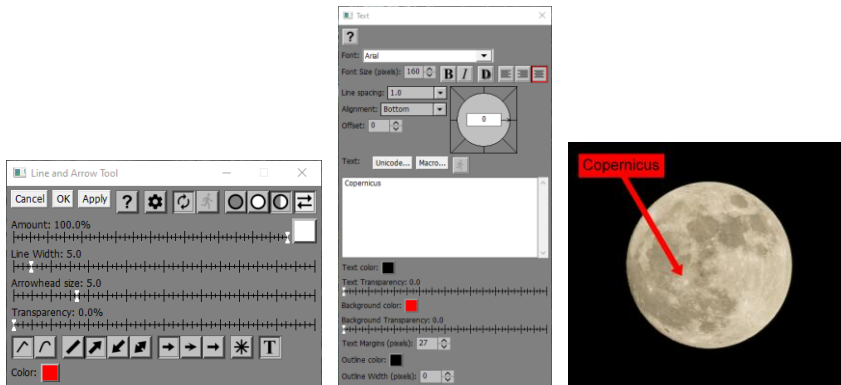
## Using Text Boxes



Text boxes can be placed at the starting point of a line or arrow. To place text in the margins of an image, first use the Add Border transformation to create a border around the image.

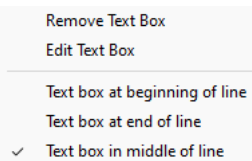
To add a text box, click the Text Box button which in turn pops up a text control. The Text settings are similar to those in the Text transformation. For details, see the description of the Text Control in Controls.pdf or the help file.

If you want just a text box and no line or arrow, create only the starting point of the line.



Enter the desired text into the Text field and then set the Font, Font Size, and other settings as necessary. To get the effect shown above, Background Transparency was set to 0% to display a solid red rectangle behind the text that matches the arrow color. Alignment was set to Bottom to connect the arrow to the bottom center of the text box, and Text Margins was increased slightly to cover the gap between the start of the line and the text box. You can close the Text control window when you are done editing the text box.

If a text control is already displayed, clicking on the Text Box displays a menu with five options:



To remove or edit an existing text box, select Remove Text Box or Edit Text Box.

The remaining three menu items let you place the text box at the beginning, end or middle of the line.

# Magnify

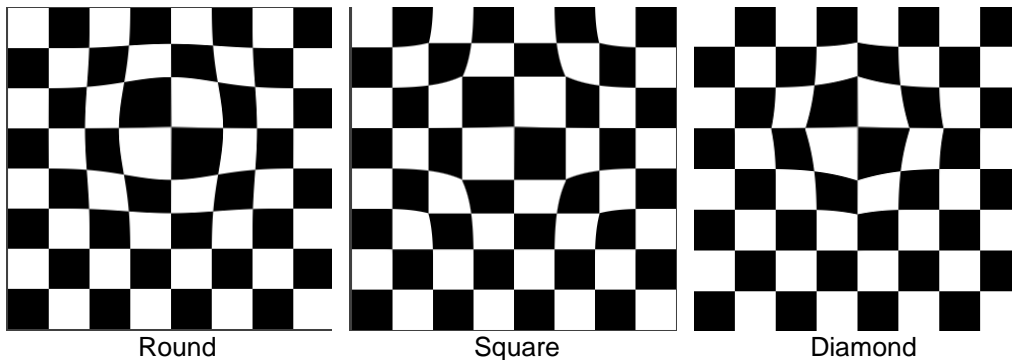
The Magnify transformation lets you enlarge or reduce a region of its input image.



This transformation displays an overlay on the input image indicating the center and radius of the region to be enlarged or reduced. You can reposition it by dragging the control point at the center of the region. You can change the radius by dragging the control point at the extreme right edge of the region or by adjusting the Radius slider (see below).

## Shape

You can choose between three shapes: Round, Square or Diamond.



## Edge

You can choose between two edge blending methods: Smooth or Abrupt.

The Smooth method enlarges or reduces the selected circular region and blends the result smoothly into the rest of the input image. If you enlarge the region, the surrounding region is reduced correspondingly and vice versa.

The Abrupt method does not blend the enlarged or reduced region with the rest of the input image, so there is an abrupt transition at the edges.



## Radius

The Radius slider lets you adjust the radius of the region in pixels. You can also adjust the radius by dragging the control point located at the extreme right edge of the overlay region.



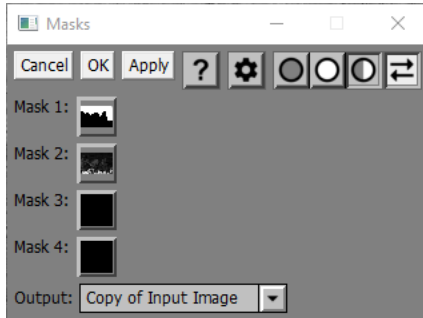
## **Scale Factor**

The Scale Factor slider controls the enlargement or reduction factor of the circular region. Values run from -1.0 to +1.0 – negative values reduce the region and positive values enlarge it. Excessive enlargement or reduction can make the output image blurry.

# Masks

One of the limits of Amount controls is that you can only have one mask per image. If you need to make more than one mask for an image, you can use the Masks transformation.

By default, the Masks transformation copies its input image through to its output image and lets you create up to four masks for the input image. These masks are then available to select into Amount control of other transformations. You also have the option of making one of the masks the output image or a combination of masks 1 and 2.



## Mask 1 .. Mask 4

These Amount controls let you create up to four masks for the input image.

## Output

This control determines what the output image of the Mask transformation will be:

**Copy of Input Image** -- the output image is a copy of the input image.

Use this when you want to perform further operations on the input image using the masks you have created, without having to add a side branch.

**Mask 1** -- the output image is a copy of Mask 1

**Mask 2** -- the output image is a copy of Mask 2

**Mask 3** -- the output image is a copy of Mask 3

**Mask 4** -- the output image is a copy of Mask 4

Use one of these to convert a mask to an image.

**Mask 1 + Mask 2** -- the output image is a combination of masks 1 and 2.

**Mask 1 - Mask 2** -- the output image is a copy of mask 1 minus the masked areas in mask 2

**Mask 1 & Mask 2** -- the output image is the overlap between masks 1 and 2

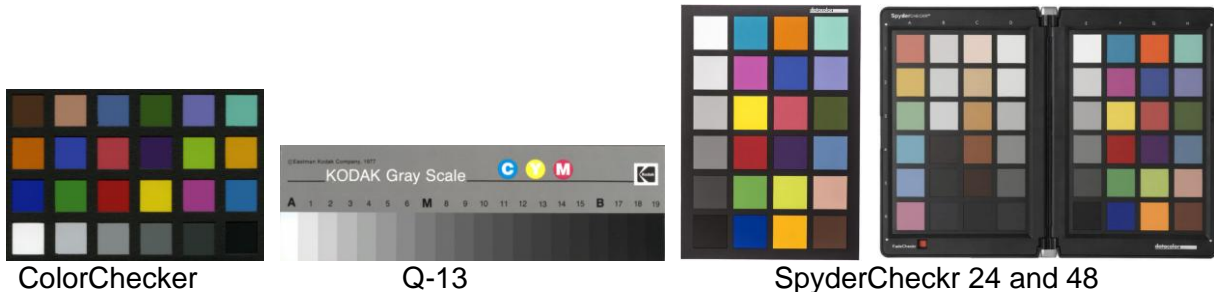
Use one of these to combine two masks.

## Match Reference

The Match Reference transformation provides a quick and easy way to color correct images to standard lighting conditions. For a more comprehensive method of accomplishing the same goal, see the Create Profile transformation.

Using Match Reference requires two things.

- First you need a Q-13 target or preferably a ColorChecker or SpyderCheckr.



ColorCheckers and SpyderCheckrs are widely available in different sizes. Q-13 grayscales are also available, but if you don't want to purchase one you can create a simulated Q-13 using the Q-13 test pattern transformation and print it out yourself using black ink only.

- Second, you need to think ahead and remember to photograph the reference target under the same conditions that you take photographs you want to correct.

The basic procedure works like this:

- 1) Photograph the reference target, adjusting the exposure to more or less center its histogram. Make sure the target is uniformly illuminated, more or less perpendicular to the camera axis.
- 2) Photograph your subject under the same lighting conditions as the target and with the same exposure.
- 3) Process both images exactly the same way.
- 4) Use Match Reference to process the subject image using the image of the target as a reference. This corrects the subject photo to remove any color cast.

### When to use Match Reference

If you are doing photography that requires accurate color such as reproducing artwork, catalog or eBay photography or photographing objects for scientific study or analysis, Match Reference can help correct the brightness and colors in your images to standard viewing conditions. In studio portrait photography, it can also help reproduce skin tones more accurately. For critical color work, consider using the Create Profile transformation instead to create a custom color profile. Match Reference is a light-weight version of Create Profile designed to work with simple reference targets such as the X-Rite ColorChecker.

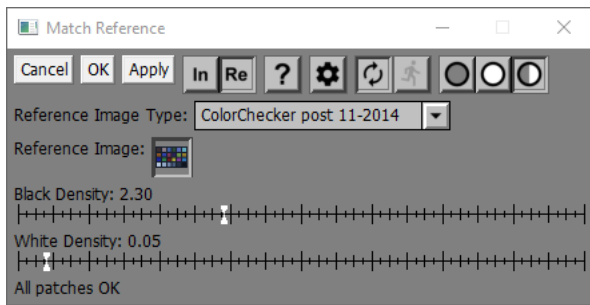
### How Match Reference Works

Match Reference uses the gray patches of the ColorChecker, SpyderCheckr or Q-13 to create curves for the red, green and blue channels of the input image that assign the correct brightness levels to each gray level and remove any color bias as well. This causes neutral grays in the scene to be rendered as neutral grays in the output image.

If you are using a ColorChecker or SpyderCheckr, it optionally uses the additional color patches to make color corrections after neutral balancing has been done.

### Using the Match Reference Transformation

Before starting the Match Reference transformation, select the image you want to correct as the input image.



## Reference Image Type

Start by selecting the type of reference target you are using.

## Reference Image

Next select the reference image (the image of the reference target), loading it from a file if it is not already open.

Commonly, the reference image is a separate image of the reference target, however you can also include the target in the same image as the one you wish to correct. For example, you might take a portrait with the subject holding a Color Checker. In such cases, the input image is also the Reference Image.

Once you select a reference image, Picture Window displays an overlay over the reference image window showing where it expects to find each color patch when you display the reference image. You can reposition the sample points as necessary in the reference image by dragging the corners, sides, or interior of the rectangle displayed around all the patches. Initially this rectangle just covers the entire reference image. You can drag each corner independently of the others to correct for any skew in the reference image.

When the display is set to show the input image or split screen, you can select whether the input image or the reference image is displayed. There are two ways to do this:

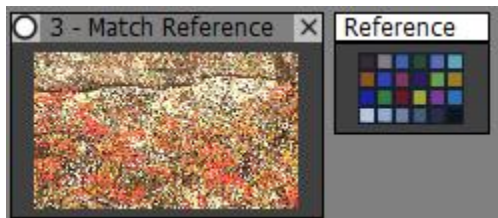
The first way is to use the tool bar at the top of the Match Reference dialog box:



-- this tool bar lets you switch between displaying the input image and the reference image -- click **In** to display the input image or **Re** to display the reference image. If no reference image has been selected yet, the **Re** button is grayed out. If only the output image is being displayed, the entire tool bar is hidden.

The other way to switch between the input and the reference image involves using the image browser.

To display the input image, click the Match Reference thumbnail. To display the reference image, click on the half size Reference thumbnail just to the right of the Match Reference thumbnail:



## Reference Image Overlay

Position the overlay over the reference image display so it lines up with the reference target patches.



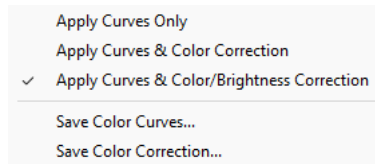
## Black/White Density

These sliders adjust the dynamic range of the output image. The lower you set the black density, the darker the shadows will be. The higher you set the white density, the lighter the highlights will be. This lets you adjust for the fact that different cameras have different dynamic ranges.

## Status

The status line at the bottom of the dialog box displays All Patches OK if everything worked or an error message if there is a problem.

## Settings Menu



If you are using a Q-13 grayscale reference target, since it has no color patches, your only option is Apply Curves Only.

If you are using a ColorChecker or SpyderCheckr, you can apply curves, or both curves and color correction.

Brightness correction refers to using the Black and White Density sliders to adjust the dynamic range.

Save Color Curves lets you save the current curves that perform neutral balancing as a set of RGB color curves in a .cc file. This file can be loaded into the Color Curves transformation and the same curves applied to other images.

Save Color Correction lets you save the current selective color correction settings (if any) as a settings file for the Selective Color Correction transformation (.selective color). This option is not available if the target is set to Q-13. To reproduce the full effect of Match Reference, you first apply the color curves and then apply the selective color corrections.

# Median Blur

Unlike the other blurring transformations, Median Blur does not replace pixels with an average of their neighbors, but with their median. The median of a set of number is a value chosen so that half of them are above the median and half are below. There are really two versions of this transformation – one that works precisely for a 3 x 3 or 5 x 5 neighborhood around each pixel and one that works approximately for a variable size radius.

## 3x3 and 5x5 Median Blur

These options implement a classical median filter which is one of the best ways to eliminate speckle noise from an image. The 3x3 version removes less noise but preserves more detail than the 5x5 version.



Image with Speckles



3x3 Median Blur

## Variable Median Blur

This option lets you apply a large radius median blur to an image which produces a painterly effect. The variable median blur algorithm used is limited to 8-bit black and white or 24-bit color images. If the input image has 16-bits per channel, it is converted internally to 8-bit and the result is 8-bit.



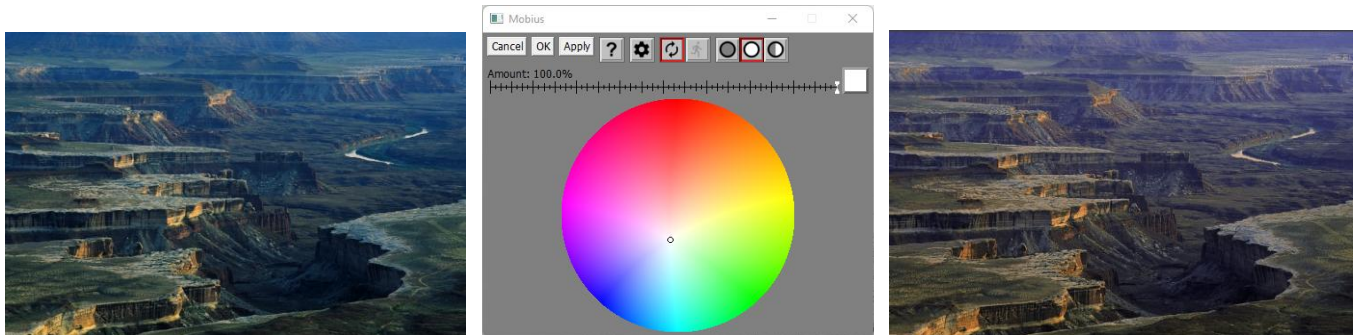
Radius = 5

# Mobius

The Mobius transformation lets you adjust an image by exaggerating some colors while reducing others. It is built around a circular color wheel that displays the full range of hue and saturation. A single control point is displayed over the color wheel, corresponding to its white point. When the control point is in the center of the color wheel, the transformation has no effect. As you drag the control point away from the center, the colors you move it away from become more prominent and the colors you move it toward are reduced. The result is vaguely similar to the Color Balance transformation, but the effect is more nuanced.

The transformation is named after the mathematical function used to distort the color wheel as you move its white point.

## Using the Mobius Transformation



### Amount

The Amount control lets you blend a percentage of the input image with the output image to produce a sort of hybrid effect. Or, if you use a mask, you can limit the effect of the Mobius transformation to just part of the input image.

### Color Wheel

The color wheel just below the Amount control has a single control point displayed over it, indicating the location of the white point. By dragging this control point you alter the effect on the colors in the input image. When the control point is in the center of the color wheel, the transformation has no effect. Dragging the control point away from a color emphasizes that color in the image as illustrated above. Colors on the other side of the color wheel are reduced. The further from the center you move the control point, the stronger the effect.

### Black/White Buttons

This tool bar is only displayed if the Amount control contains a mask image (i.e. its single slider has been split into separate black and white sliders). In this case, you can apply different color changes to the masked and to the unmasked parts of the input image. For example, if you create a mask that isolates an object in the input image, you can make the object warmer and the background cooler at the same time.

There are in fact two independent color wheels, each with its own control point – a white one for masked areas and a black one for unmasked areas of the input image. When no mask is present, the second color wheel is ignored.

The white color wheel is applied where the mask is white, and the black color wheel is applied where the mask is black. Where the mask has an intermediate value, the two versions are blended. The black color wheel works exactly like the white color wheel except it uses an inverted mask, thus effectively selecting everything in the image that was not selected by the mask.

What this lets you do is adjust the colors in the parts of the input image covered by a mask while simultaneously making a different adjustment to the rest of the image.

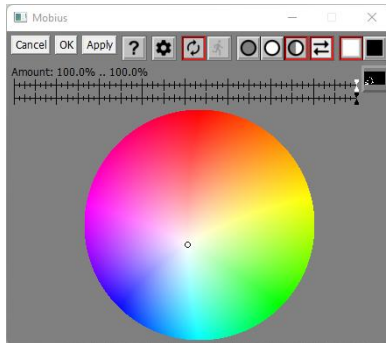
By default, the black color wheel leaves the input image unchanged, in which case the White color wheel is applied as though there was no black color wheel. If you select the black color wheel by clicking its button in the tool bar, the display switches over to the black color wheel. Moving its control point lets you adjust the appearance of the unmasked parts of the image.



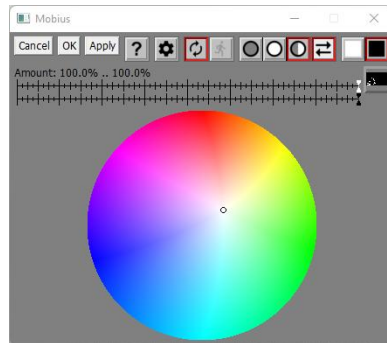
You can reduce the overall effects of the white and black color wheels by adjusting the white or black Amount sliders. By default, both sliders are set to the maximum – moving the sliders lets you independently dial back the effects of the white color wheel, the black color wheel or both.

## Example

In this example, an Amount mask was first created that was light in the region of the brighter parts of the canyon walls and dark for the rest. The cliffs were made more orange and the rest more blue.



White color wheel



Black color wheel



Mask



Before



After

## Settings Menu

Reset control point

**Reset control point** – Selecting this menu item resets the current control point to the center of the color wheel.

# Monochrome

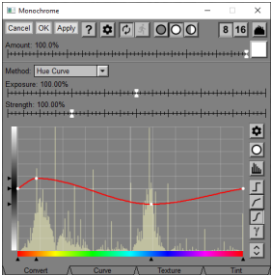
The Monochrome transformation converts color images to black and white. You can also tint the resulting black and white image and add texture to it. Here are some examples of what it can do:



Original



Luminance Channel



Hue Curve – lighten yellows and reds, darken blues and cyans

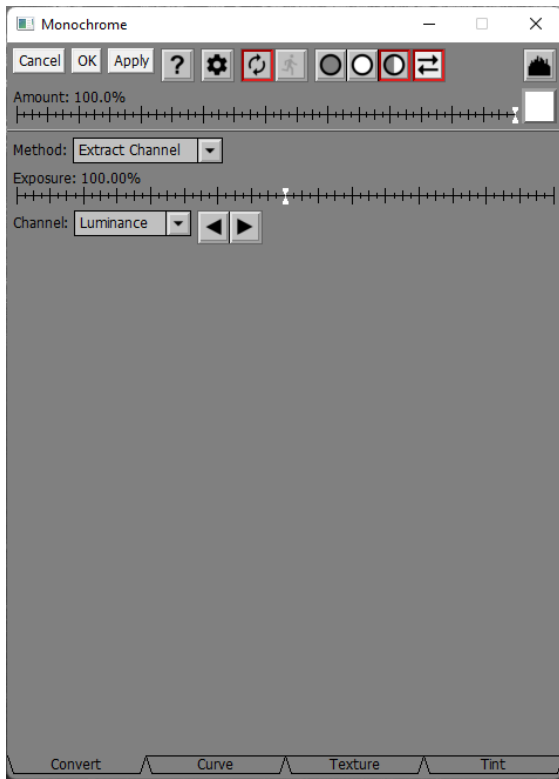


Mezzotint Texture



Sepia Tint

## Using the Monochrome Transformation



The Monochrome transformation dialog box has four tabs along the bottom edge. These tabs let you select the method of converting color to black and white, apply a brightness curve to the black and white image, apply texture to the image, and tint the image.

There is also an Amount control that lets you scale back the Monochrome effect or restrict the transformation to just part of the input image.

### Convert Tab

The Convert tab lets you select a method for converting from color to black and white and, depending on the method you select, provides additional controls to let you manage the conversion process.

You can select whether the resulting black and white image is 8-bit or 16-bit using the tool bar at the top of the dialog box:

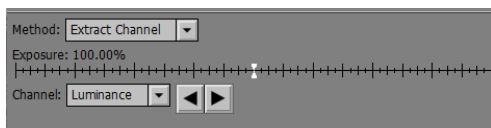


If the input image is 48-bit color, the output is always 16-bit black and white. If you are just extracting a channel such as red, green or blue from a 24-bit color image, then there is no advantage to producing a 16-bit image, but if you are combining information from two or more channels, you can get a smoother tonal scale by selecting 16-bit.

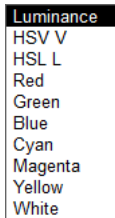
### Method

The Monochrome transformation supports five different conversion methods:

#### Extract Channel



The Extract Channel method creates a black and white image by extracting one of the channels of the color image. Depending on the input image, each of these channels will give a different look.



Luminance is a weighted average of red, green and blue according to the sensitivity of the human eye, so this is the most natural option, but the results may not have as much contrast as you want. The HSV V and HSL L channels are the brightness channels in the HSV and HSL color spaces. Choosing a color channel (red, green, blue, cyan, magenta, yellow) will render colors in the input image of that color lighter and complementary colors darker. Choosing the white channel gives you an average of the red, green and blue channels – this option preserves the most information from the input image. You can use the left and right arrow keys to scroll through the list of channels quickly to see which one works best for the image you are converting.

## Filter

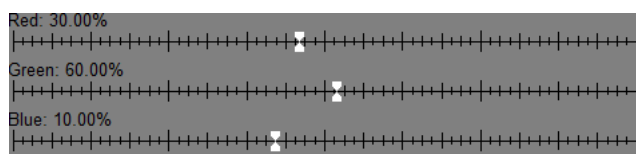
The Filter method simulates photographing a scene on black and white film using a color filter.



Colors similar to the filter color are rendered lighter and complementary colors darker. You can specify the filter as a solid color or as a color image of the same size as the input image, so you can vary the filter color for different parts of the input image.

## Channel Mixer

The Channel Mixer method creates a black and white image by computing a weighted average of the red, green and blue channels in the input image. You can select the relative weights using three sliders.



By using negative weights, you can produce results that are more dramatic than you can get with the Filter or Extract Channel method. If the sum of the 3 weights is negative, the image will look strange. Here is an example comparing the results of extracting a channel to the channel mixer:



input

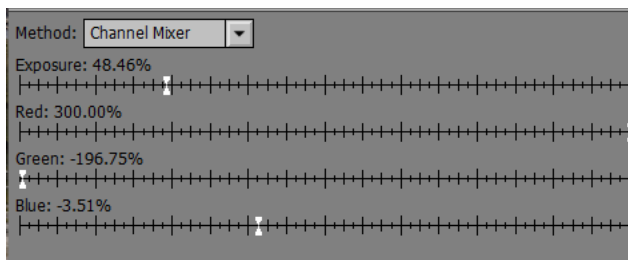


red channel



channel mixer

To get this effect using the channel mixer, the following settings were used:



The Exposure was reduced to avoid clipping.

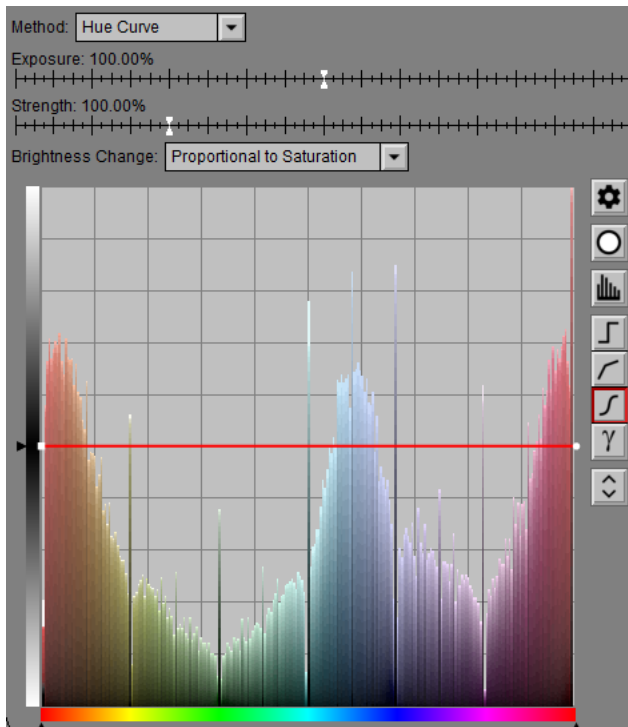
Using a combination of positive and negative weights means you are computing the difference between two channels and this can increase noise in the resulting output image

## Hue Curve

The Hue Curve method lets you lighten or darken colors in the input image selectively, depending on their hue. The initial hue curve is a horizontal line across the middle – this produces a result that retains the original brightness for every hue. Dragging the curve above the horizontal mid-line lightens colors and dragging it lower darkens them.

The amount of lightening and darkening can be adjusted using the Strength slider. This makes it easier to make very subtle adjustments or very dramatic ones.

If Brightness Change is set to Proportional to Saturation, the brightness change is proportional to the saturation of the color being changed. Otherwise, the brightness change is applied independent of the saturation.



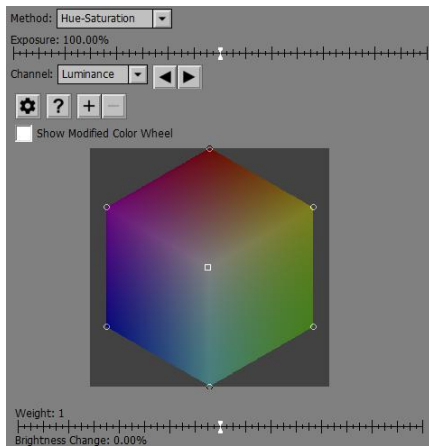
Since hue is really an angle, the left edge of the curve is the same as the right edge and the control points at either end of the curve move up and down together and cannot be moved sideways. To create additional control points, shift-click on the curve. The hue histogram of the input image is displayed in the background so you can see what part of the hue curve to adjust to get the biggest effect. In this example, the yellows and greens are lightened.

## Hue Saturation

The Hue Saturation method starts by extracting a selected channel of the input image to create a black and white image. It then lets you lighten or darken colors in the black and white image depending on their combined hue and saturation.

This method lets you select the channel to extract and uses a Hue Saturation control to set one or more control points on a color wheel.





Hue Saturation Control

## Using the Hue Saturation Control

To convert images to monochrome, Picture Window starts by extracting the selected Channel as a black and white image. It then uses the control points defined in the Hue Saturation control to lighten or darken pixels in the extracted image according to the hue and saturation of the input image.

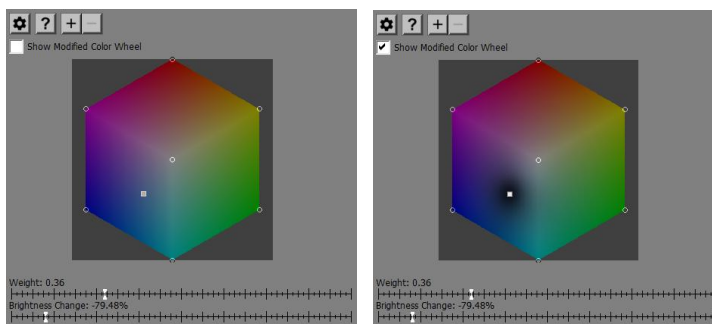
Each control point has a location on the color wheel, a weight (between 0.1 and 10.0) and a brightness change (between -100% and +100%).

Picture Window computes the hue and saturation of each input image pixel which then sets its location on the color wheel. The amount of brightness change is then computed as a weighted average of the nearby control points. Closer control points are weighted more heavily than distant ones. Control point weights are also adjusted according to their Weight slider. The resultant brightness change is then applied to the extracted channel to produce the output image.

There are seven initial control points – one at each vertex of the hexagon and one in the center. These initial control points all have a weight of 1.0 and a brightness change of 0%. Since they do not change the brightness of the output image, these control points have no effect on the output image. To create a change, you normally add one of more extra control points and adjust their brightness change. The initial control points prevent colors other than the ones you are adjusting from changing too much. If you want, you can remove or adjust any or all the initial control points. This may be necessary if one of the control points you add is close to one of the initial control points.

## Show Modified Color Wheel

When the Show Modified Color Wheel box is checked, the brightness adjustment is applied to the color wheel itself and the results of this are displayed in its place. This gives you a visual representation of which colors are being affected and by how much. To return to the normal color wheel display, uncheck the box.



## Color Wheel

The color wheel and the control points displayed over it are central to this control. Control points are displayed as small circles. All colors in the input image whose hue and saturation match the control

point color are affected according to the Brightness or Brightness Change setting. Colors between control points are interpolated to make a smooth transition.

The control point you most recently added or clicked on is called the current control point. The current control point, if any, is displayed as a square instead of a circle. To make a control point the current control point, simply click on it.

**To add a new control point**, shift-click on the color wheel at the desired hue and saturation location. Or, you can add a control point by using the probe by clicking once on a color in the input image window you want to change. You can create up to 256 control points.

**To remove a control point**, control-click on it.

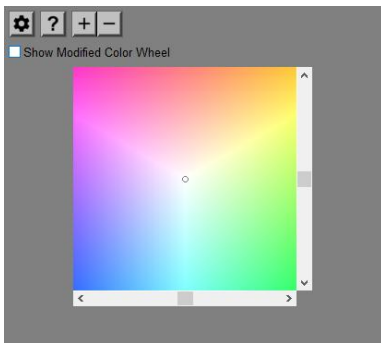
**To change the location of a control point**, click and drag its circle on the color wheel.

**To select a control point**, simply click on it. The selected control point is displayed on the color wheel as a square instead of a circle.

### Zoom Tool Bar



The zoom buttons let you zoom in or out on the color wheel. When you zoom in, the color wheel is enlarged centered on the current control point, if any, and scroll bars are displayed next to the color wheel to let you move around. Zooming in makes it easier to make fine adjustments to the control points; zooming out lets you see more of the color wheel at once. You can zoom in a maximum of four levels.



### Weight Slider

The Weight slider lets you assign a greater or smaller weight to the current control point. If there is no current control point, this slider is not displayed.

The larger the weight (as compared to the weights of nearby control points), the more colors around the control point are affected. Reduce the weight to limit the effects to colors that closely match the control point or increase the weight to affect more colors.

### Brightness Change Slider

The Brightness Change slider lets you assign brightness adjustments to the current control point. If there is no current control point, this slider is not displayed.

The values displayed in the slider run from -100% to +100%. Changes you make to the slider alter the brightness change setting for the current control point.

In the example below, the Luminance channel was first selected and then a new control point was created by clicking on the sky in the input image. The Brightness Change slider for the new control point was then shifted left to darken the sky in the output image and the Weight slider was also shifted left to narrow the effect to colors that more closely matched the selected sky color.

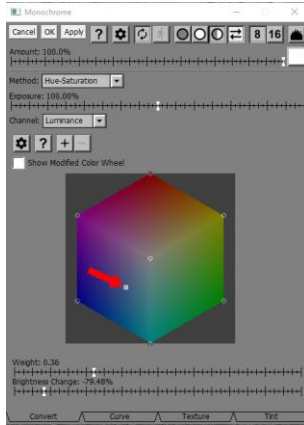




Input



Luminance Channel



Monochrome



Output

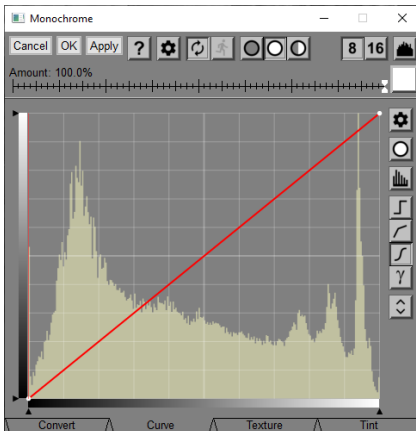
## Exposure

The Exposure slider lightens or darkens the entire black and white image. If the conversion starts to clip highlights or darken the image, you can compensate by adjusting the Exposure.

You can check for clipping by enabling the shadow or highlight clipping alarms via the main tool bar:

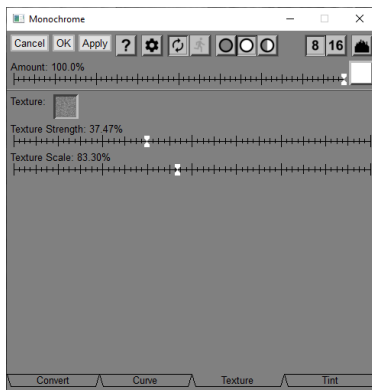


## Curve Tab



The Curve tab lets you apply a brightness curve to the black and white image produced by the Convert tab. This lets you adjust the brightness, contrast and dynamic range of the converted image.

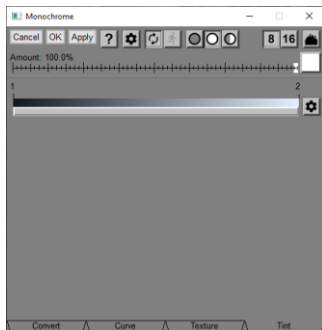
## Texture Tab



The Texture Tab lets you apply a texture to the black and white image. A texture is defined by a seamless black and white tile image, several of which are distributed with Picture Window or are available for download at our web site.

You can adjust the granularity of the texture and how much of it you want to apply with the Texture Scale and Texture Strength sliders.

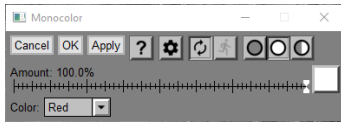
## Tint Tab



The Tint Tab lets you apply a tint to the final image. The color of the result is defined by a Color Line control. When you create a color line, you are selecting what color each gray level in the image becomes. Several pre-configured color lines are supplied with Picture Window, including several versions of sepia and cyanotype. Other color lines can produce subtle duotone or tritones, metallic looks, or wild special effects.

# Monocolor

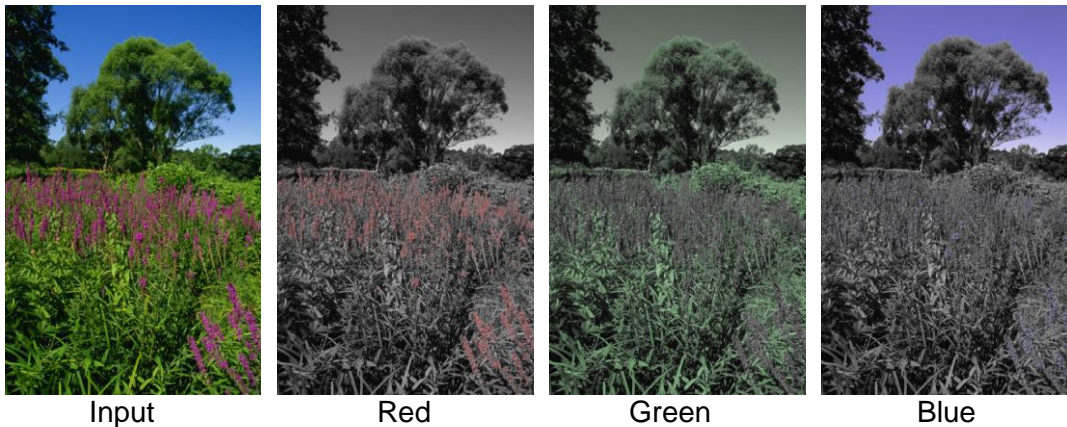
The Monocolor transformation is a special effect that lets you render an image using black and white plus one other color.



## Amount

The amount control blends a percentage of the input image with the output image to scale back the effect of the Monocolor transformation. If you create a mask, you can use the amount control to localize the effect of the transformation to parts of the input image.

## Color



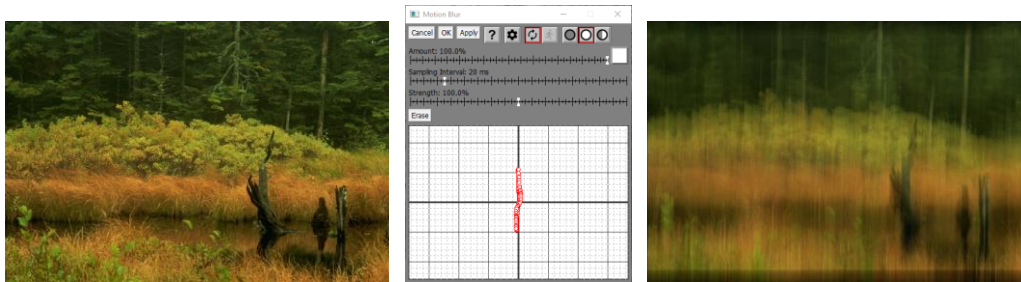
## Method

This setting lets you select which of two methods (Soft or Hard) are used to compute the output image. Generally, Hard produces a stronger effect than Soft.



# Motion Blur

Motion blur is an effect caused when either the camera or the subject moves during the exposure. A similar effect can be obtained by stacking a series of images each one slightly offset from the previous one and blending them together. Thus, the output image is computed at each pixel by averaging pixel values computed at a sequence of offsets from the input pixel.



When the offsets are clustered more densely at some location, the image at that offset is weighted more heavily than the ones from other areas and it is more distinct in the result.

Where the offsets are farther apart, there is more blurring, and the motion trail is more wispy. When the offsets are even further apart, the result image starts to break down into a series of multiple exposures as though you used a flashing strobe to photograph a moving object.

## How Motion Blur Works

The Motion Blur transformation lets you draw one or more blur paths in an area in the Motion Blur dialog box that looks a little like graph paper. The center of the graph paper represents an offset of (0,0) with respect to the input image. From the time you first click in the blur path area until you release the mouse button, Picture Window samples the cursor location at regular intervals. By default, this is once every 20 milliseconds or 50 times per second, but you can adjust the slider to vary the sampling interval to speed it up or slow it down according to your personal preference. Each time the cursor location is sampled, the offset corresponding to that location is recorded and a small red circle is displayed to mark the location in the blur path. Thus, as you drag the cursor across the blur path area, red circles are left behind every time a sample is taken. The slower you drag, the closer the samples are to each other and the more distinct the image corresponding to that offset will appear in the output image. This transformation is unique in that it depends on how fast you drag the mouse and therefore it takes a little practice to learn to control the speed to get the effect you want. Once you master it however, you can achieve many subtle effects.

You can build a complex blur path by combining multiple strokes or you can press the Erase to clear the blur path and start over at any time. When it comes time to update the preview or compute the final image, the images at every single stored offset in the blur path are averaged together. For this reason, the more offsets you specify, the longer it takes to compute the result.

In addition to creating blur paths by clicking and dragging, you can also add an individual point to a blur path by Shift-Clicking on the grid or remove an individual point by Ctrl-Clicking on it.

The Strength control acts as a scale factor on all the offsets so the smaller the strength, the less the motion blur. If you use an Amount mask, you can vary the amount of motion blur in different parts of the image.

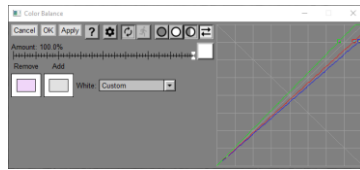
There can be something of a problem at the edges of the result image where, unlike when moving a camera with its shutter open, there is no offset image data available to shift into the frame. If you don't like this effect, you can simply crop out the edges.

## Multi Color Balance

Sometimes just adjusting the white balance is not enough, and you need to apply different corrections to the lighter and darker parts of the image. In this case, you can use Multi Color Balance.



Original



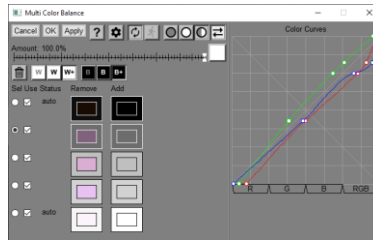
Color Balance



Balanced



Original



Multi Color Balance



Balanced

## Automatic White and Black Color Balancing

When the Multi Color Balance transformation starts up, it examines the input image to determine the average color of its brightest and darkest parts. If you select automatic white or black balancing, the white or black Remove colors are set to the values Picture Window found in this initial analysis. Auto white and black balancing is selected via two tool bars:



For white or black balancing, the first button selects manual balance, the second selects auto balance and the third select auto balance with dynamic range extension.

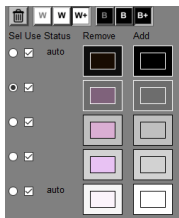
Manual balancing means you select the highlight color to remove. Auto balancing means Picture Window selects the highlight or shadow color to remove and sets the color to add to a neutral gray of the same luminance. Auto balancing with dynamic range extension selects the highlight or shadow color to remove and sets the color to add to pure white or pure black.

## Adding or Removing Color Rows

Initially there are two color rows – one for black balance and one for white balance. To add additional color rows, shift-click on the input image. This will use the color of the image where you clicked to set the new color to remove and will set the color to add to a neutral gray of the same luminance.

To remove a color row, select it by clicking its radio button, and then click the trash can button.

## The Transformation Controls



The radio buttons in the **Sel** column indicate which set of colors to add and remove are currently selected. To select a row, click its radio button.

The checkboxes in the **Use** column let you temporarily ignore a row of colors to add and remove. This helps you visualize the effect of each row.



The **Status** column indicates **auto** if the set of colors to add and remove have been set automatically (as auto black or white balance). If you accidentally set a color pair to an illegal value, the status will be **err** and the row will be ignored.

## Clicking on the Input Image

When you click on the input image, the color at the point you click is used as follows:

|                  |   |
|------------------|---|
| Click            | For the currently selected row, sets the color to remove and sets the color to add to a neutral gray of the same luminance. |
| Shift-Click      | Adds a new row and sets the color to remove and sets the color to add to a neutral gray of the same luminance.              |
| Ctrl-Click       | For the currently selected row, set both the color to remove and the color to add.  |
| Ctrl-Shift-Click | Adds a new row and sets both the color to remove and the color to add.  |

Use Click or Shift-Click when you want to remove a color cast. Use Ctrl-Click or Ctrl-Shift-Click when you want to add a color cast.

If a color picker is active, clicking on the input image will be intercepted by the color picker to set its current color.

## Settings Menu

### White Threshold (Low/Medium/High)

This setting affects how Picture Window determines the white point of the input image. For normal images, a low threshold is fine, but for images with clipped highlights, a higher threshold may work better, although it can result in the clipped highlights being tinted.

### Black Threshold (Low/Medium/High)

This setting affects how Picture Window determines the black point of the input image. For normal images, a low threshold is fine, but for images with clipped shadows, a higher threshold may work better, although it can result in the clipped shadows being tinted.

### Probe Size

This sets the size of the probe when you click on the input image to set a color to remove. Smaller probes are more precise, but larger probes are less sensitive to noise.

## Matching colors between two images

You can use Multi Color Balance to match colors between two images. Whenever you remove one color and add another, any occurrences of the Remove color are changed to the Add color. Thus, to get white (or any other color) from one image to match another image, you simply remove the color from the input image and add the color you want to match from the other image.

To select colors from an image other than the input image, you can use the Palette tool. This lets you add colors from any image to the palette that shows up in the color picker.

## Color Balancing for Different Light Sources

Different films are balanced for different light sources. Similarly, many digital cameras have white balance settings for light sources such as Tungsten and Daylight. The purpose of these settings is to ensure that white objects appear white in the final image. If the color of the light used to illuminate the object is different from the color for which the film or camera was set, white objects will come out colored.

You can create your own custom color balance settings to correct for this kind of problem as follows:

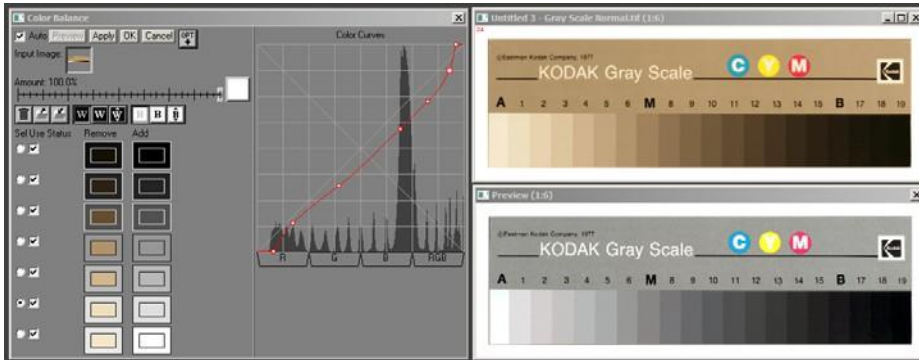
Photograph a pure white sheet of paper or a gray card under the illumination conditions and using the film or camera settings for which you wish to correct.

In the Multi Color Balance transformation, click on the image of the white paper to identify the highlight color to remove. This setting will cause the image of the white paper to come out perfectly neutral in the output image.

You can then use this setting to correct other photographs taken in the same light with the same film or camera settings.

## Color balancing using a reference target

For a more definitive version of the procedure outlined above, you can photograph a reference target that has a graduated series of gray patches instead of just a white sheet of paper. By shift-clicking on several of the gray patches in the reference image you can create a curve that precisely remove casts from the entire tonal range. If you save these settings, you can use them to correct subsequent images take under the same lighting conditions.



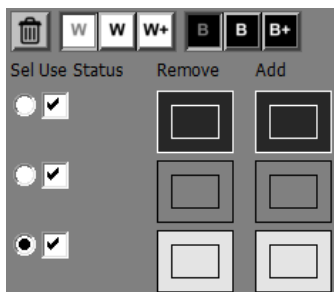
In the above example, a standard Kodak Q-13 gray scale was photographed under tungsten lighting on a copy stand with the camera set for daylight white balance. The resulting image is, as you might expect, very orange. A set of correction curves was created from this test target by setting the black and white Remove colors to the colors of the darkest and lightest patches, and then shift-clicking on a series of patches in the image (#3, #6, #9 and #12) to create additional rows for intermediate gray levels. These settings can then be used to accurately correct other photographs taken under the same conditions.

If you don't have a Q-13, Macbeth ColorChecker, IT8 or other standard target that includes a graduated series of neutral grays, you can print one on your own printer. Just make sure you print it using only black ink so it will come out truly neutral and that you print it on your whitest paper using your blackest ink. You can create a simulated Q-13 or a step wedge image using one of Picture Window's Test Pattern transformations.

## Adding Color to an Image

While Multi Color Balance was designed to remove color casts from images, you can also use it as a creative tool to add or adjust colors in an image, based on their brightness.

For example, suppose you want to add colors to the highlights, midtones and shadows of an image. You might start out with settings like this:



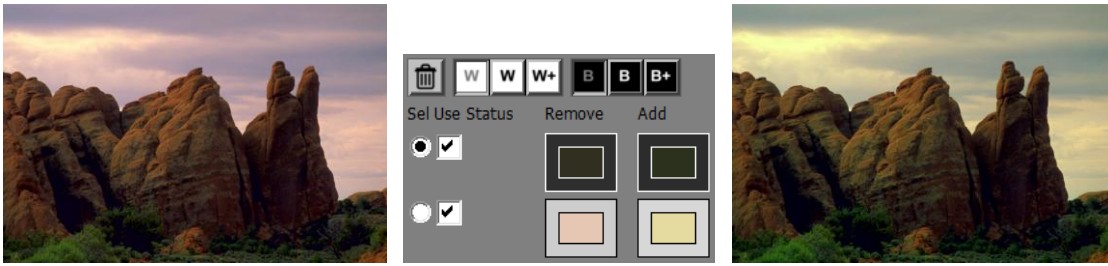
This setup has three rows each of which has the same color to Add and Remove. The first row is set to a dark gray, the second to a mid-level gray and the third to a light gray.

Adjusting the dark gray color to Add assigns a color cast to the shadows; adjusting the mid-level gray color to Add assigns a color cast to the midtones, and adjusting the light gray color to Add assigns a color cast to the highlights. This is just an example -- you can have as many or as few rows as you like.

Another way to use the transformation to add color to an image is to start by removing the default shadow and highlight rows. Then Ctrl-Shift-Click on a part of the input image you want to change to add a new row with that color set to both Add and Remove. Next, click on the color to Add to bring up a color picker. You can change the hue and saturation by moving the control point in the color wheel and change the brightness by moving the brightness slider. This will affect colors of similar brightness in the image Repeat this process for other parts of the image from different parts of the tonal range to add different color casts.



For example, here is an image with simultaneous adjustments to the cloud color and the darker foliage:



The top row was created by **Ctrl-Shift-Clicking** on the green foliage and the bottom row by **Ctrl-Shift-Clicking** on the clouds. The two **Add** colors were then adjusted using their color pickers.

## Color Curves

The right side of the Multi Color Balance dialog box displays a curve for each of the color channels, or you can view all three curves at once. You select the one you want to view using the tabs below the curves (R/G/B/RGB). If you select a single channel, its histogram is displayed for reference purposes in the curve background.

Points are marked on each curve according to the current values of the color patches. The x-coordinates of the red curve points are determined by the red channel values of the Remove colors; their y-coordinates are determined by the red channel values of the Add colors, and similarly for the other two channels. The point corresponding to the current row is identified by having larger markers.

You can directly manipulate the curves by dragging any of the points.

Useful Tip: In most cases smooth curves produce the best results. Usually, if any of the curves has a kink in it (such as a sudden change in slope), the end result will look strange. The more Remove colors you are using, the easier it is to accidentally introduce kinks in the curves so it is a good idea to check them from time to time.

To avoid fold-over, the sequence of x-coordinates for each of the three curves must always be in ascending order—if the selected colors do not have each channel in ascending order, the out-of-order points are flagged with an **err** status and are temporarily disabled. This condition is unlikely to occur unless two adjacent Remove colors are very close to each other or one or more of the Remove colors are highly saturated. To correct the problem, delete one or more of the inconsistent rows.

The way the color balance transformation works is to simply apply the curves derived from the Remove and Add colors to each channel of the input image to produce the output image. Because of the way the curves are constructed, any occurrence of a Remove color in the input image will be changed to the corresponding Add color. Colors intermediate in brightness between two adjacent Remove colors are computed as a smoothly blended average of the two Add colors. Thus, if the Add colors are all neutral and the Remove colors correspond to parts of the input image that should be neutral but appear with a color cast, the curves will remove that color cast.

# Multipass Sharpen

## How Multipass Sharpening Works

Multipass sharpening works by first computing a blurred image from the input image using an edge-preserving filter. This prevents pixels on one side of a sharp edge from being averaged with those on the other side of the edge and thus preserves details such as edges and isolated light or dark pixels. The size of the neighborhood and the threshold for inclusion in the average are adjustable by sliders. The resulting blurred image is then combined with the original image to produce the sharpened image. For an in-depth discussion of how to get the most out of the Multipass Sharpen transformation, see the separate document: [Multipass Sharpen.pdf](#)

Each pixel in the result image is computed by multiplying the difference between pixels in the input image and pixels in the blurred image by a sharpen factor. This has the effect of lightening pixels that are lighter than the surrounding background and darkening pixels that are darker than the background. The degree to which pixels are changed from the blurred image (i.e. the scale factor) determines the amount of enhancement. The net result is to bring out fine details in the image, but because edge-preserving filters prevent image data from bleeding across edges, halos are greatly reduced.



Original

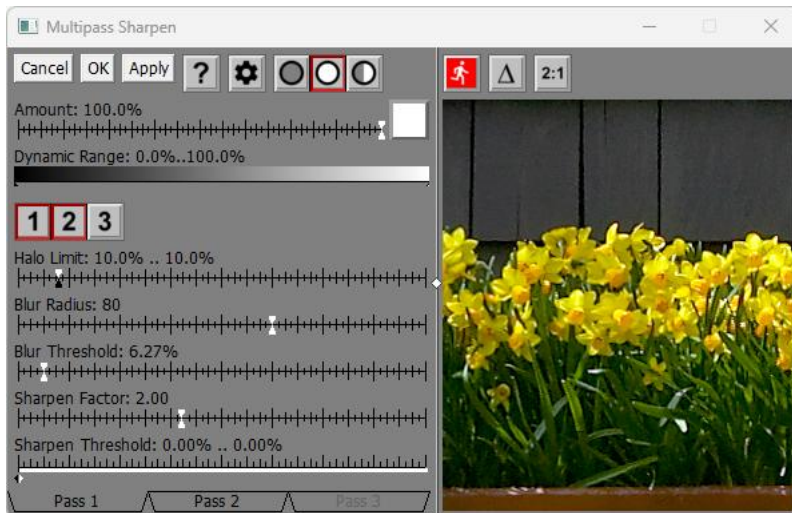


Blurred



Sharpened

## Using Multipass Sharpen



For faster response time, Multipass Sharpen has its own preview area.

You can increase the size of the preview by dragging one of the corners of the dialog box. If you widen the dialog box, you can drag the white diamond in the center of the vertical separator bar between the controls and the preview area to enlarge one while making the other smaller.



### -- Preview Button

To preview the effect on the entire output image, click the button just above the preview area. To re-center the preview, click on the input image in the main image area. You can also scroll the preview area by clicking and dragging on it.

## -- Difference Button

When the Difference button is depressed, the preview area displays the difference between the input image and the preview image.

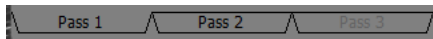
## -- Magnify Preview Button

When the Magnify Preview button is depressed, the central portion of the preview area is magnified by a factor of two, making it easier to see fine details. Clicking the button a second time restores the normal 1:1 display.

## Multi-pass Sharpening

Unlike any of the other sharpening transformations, Multipass Sharpen can perform up to three independent sharpening passes on an image, each with its own settings. This lets you sharpen images to bring out both fine and coarse detail in a single operation.

Picture Window displays tabs at the bottom of the dialog box for each of the passes.



Clicking on a tab displays the controls for the selected pass and hides the controls for the other passes. Tabs for disabled passes are grayed out but can still be selected.

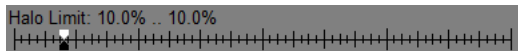


This tool bar lets you enable or disable individual passes. For example, for single pass sharpening, enable the first pass and disable the other two.

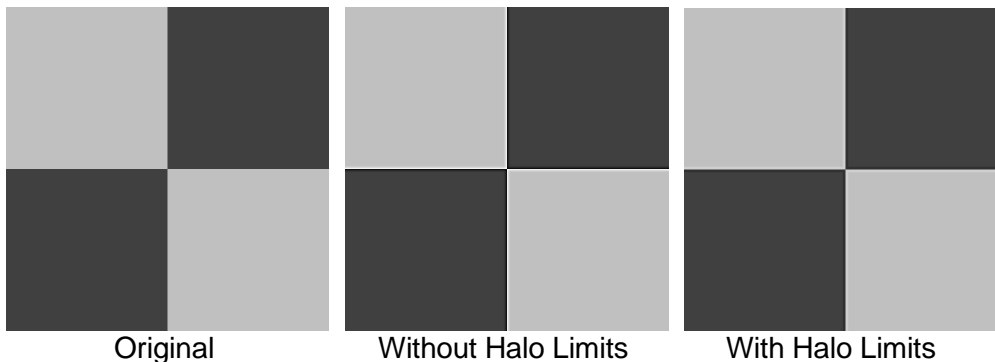
The tool bar also lets you quickly turn passes on or off to see their effect on the preview area. When a pass button is down, the pass is active. When it is raised, the pass is inactive, and it makes no contribution to the final result. Clicking one of the buttons also selects the corresponding tab.

## Halo Limits

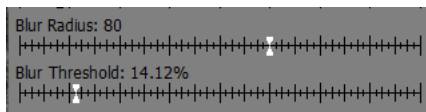
Excessive lightening of pixels during sharpening causes light halos around dark objects and excessive darkening causes dark halos around light objects.



Halo limits restrict how much any pixel can be lightened or darkened in the sharpening process. Typically values between 5% and 15% work fairly well. Light halos usually stand out more than dark halos so you can get away with a slightly larger value for the dark halo limit.



## Blur Radius and Blur Threshold



The Blur Radius slider sets the radius of the neighborhood around each pixel that is averaged. The larger the radius, the smoother the blurred image. Using a smaller blur radius such as 2-8 pixels is good for

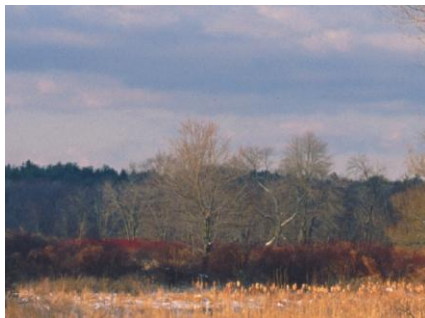


sharpening fine image detail. Sharpening with a larger radius such as 80 pixels brings out detail at a larger scale.

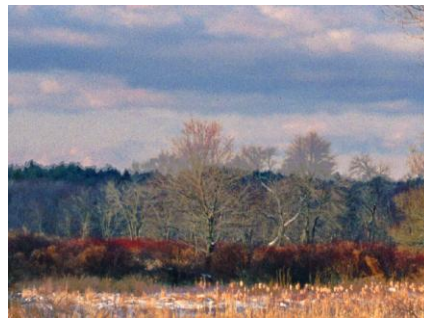
Sharpening with a large radius performs local contrast enhancement – a process that makes features stand out from the background immediately surrounding them. This can help bring out details in areas of low contrast such as dense shadows or bright highlights.

For each pixel in the input image, all the pixels within the blur radius are examined. If their color is within the blur threshold of the central pixel, they contribute to the average – otherwise they are ignored. This prevents, for example, colors on the other side of an edge from bleeding across the edge. The larger the blur threshold, the more surrounding pixels of different colors contribute to the blur.

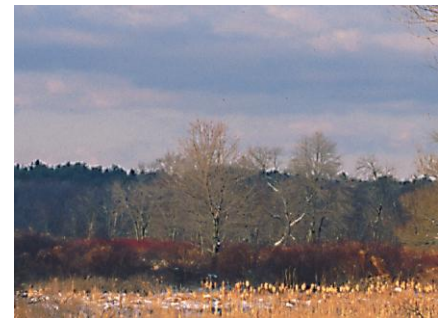
In the example below, you can see how sharpening with a large radius brings out detail in the clouds and other large features, while sharpening with a small radius makes fine detail in the trees and grass more distinct but has much less effect on the sky. Combining the two sharpening passes sharpens detail at both scales.



original image



sharpened with large radius



sharpened with small radius

When you blur with a small radius, a blur threshold around 30% to 40% usually works best. When you use a larger blur radius, you will generally need to use a smaller blur threshold (around 5% to 10%) and a sharpen threshold at or near 0%. Increasing the blur threshold beyond this point makes the sharpening effect stronger but can produce artifacts, so it is important to adjust this slider according to the image. Some experimentation with the sliders which watching the effects in the preview area will help you get a feel for how the settings work together. Here is an example of varying the Blur Threshold with a Blur Radius of 80 pixels.



0%



5%



10%

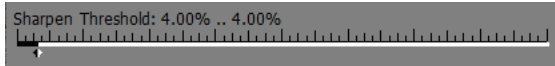


15%

20%

25%

## Sharpen Threshold

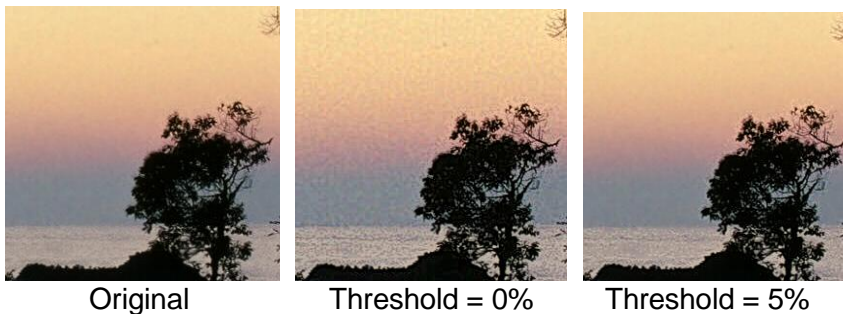


The sharpen threshold setting lets you limit sharpening to those pixels whose difference from their neighbors exceeds a specified threshold value. This prevents sharpening smooth areas while still sharpening more prominent details. The idea behind setting the threshold is to select the smallest possible value that brings out edge detail without creating unwanted texture in smooth areas such as clouds or clear skies.

A threshold of zero causes the entire image to be sharpened (except for regions partially or totally excluded by a mask). Higher values suppress sharpening of increasingly coarse detail while still sharpening strong edges. By adjusting the black and white sliders you can soften the transition between sharpening and no sharpening.

The effect of the threshold is to exclude sharpening from those areas of the input image that are relatively smooth. This can be helpful, for example, in sharpening a scene without amplifying noise in featureless areas such as clouds or clear skies. A threshold setting of 0% .. 0% enables full sharpening; relatively small values (say less than about 5%) are good for selective sharpening.

In the image detail below, you can see how Unsharp Mask with a threshold of 0% sharpens the tree silhouette, but also brings out noise in the sky and water. Increasing the threshold to 5% leaves the sky smooth but still makes the tree stand out against its background.



## Sharpen Factor



The sharpen factor determines how much lighter or darker to make each pixel when sharpening.

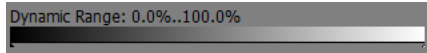
The larger the sharpen factor, the stronger the sharpening effect. The following example shows the effect of varying the sharpen factor from 1.0 to 3.0:



There is a connection between halo limits and the sharpen factor. If you lower the halo limits, you can use a higher sharpen factor. Similarly, if you reduce the sharpen factor, you can use higher halo limits.

## Dynamic Range

Sharpening frequently brightens highlights and darkens shadows. Therefore, even if you start with an input image that has no clipped pixels, the sharpened output image may have clipped pixels. If clipping occurs and you want to prevent it, you can use the Dynamic Range slider to lighten the shadows or darken the highlights of the input image prior to sharpening.



Moving the black marker to the right lightens shadows while moving the white marker to the left darkens highlights. Generally only small adjustments are necessary.


You can tell if the output image contains clipped pixels using either the Display Clipped Pixels tool bar or clicking the Histogram button in the main tool bar.



-- Display Clipped Pixels Tool Bar



-- Histogram button

For either of these tools to reflect changes you make to the sharpening settings, you first need to click  to recompute the entire output image.

## Sharpening Luminance Only

All of Picture Window's sharpening transformations except Sharpen/Sharpen More provide an option to sharpen just the luminance of the image. You can think of a color image as being made up of two components: luma (the black and white part) and chroma (the color part – basically a combination of hue and saturation).


It is common for digital camera images to have more chroma noise than luma noise, so if you sharpen just the luminance, you avoid amplifying color noise and can get a slightly cleaner image. In most cases, the difference is fairly subtle.

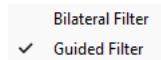
To select luminance-only sharpening, click the  button at the top of the dialog box and select the option from the popup menu.



## Bilateral/Guided Filter

You have a choice of Bilateral or Guided filtering as the edge-preserving blur method. The results are very similar, but Bilateral is a lot slower than Guided, especially when using a large radius, and also slightly more prone to artifacts. Bilateral is provided mostly for compatibility with older scripts – the more modern Guided option is usually preferable.

To select the filter method, click the  button at the top of the dialog box and select the option from the popup menu.

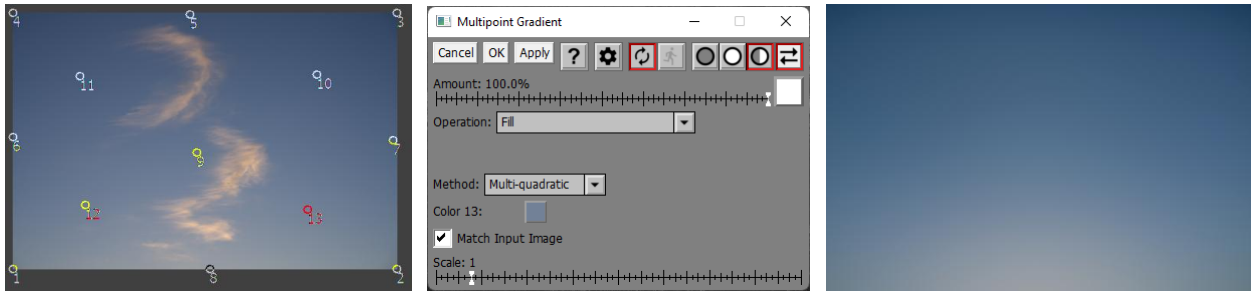


# Multipoint Gradient

The Multipoint Gradient transformation creates smooth gradients that interpolate colors between multiple control points. This can be used to model smooth gradients in an image or to create new gradients.

The gradient can either become the output image or it can be applied to the input image in different ways.

## Using the Multipoint Gradient Transformation



### Input Image Overlay

An overlay is displayed on the input image consisting of a several numbered control points. Initially these points are located in the corners of the input image, but you can drag them to other locations and you can add new control points by shift-clicking on the input image. To remove a control point, ctrl-click on it.

### Operation

This setting lets you control how the gradient is applied to the input image to create the output image. For examples of how the different operations work, see the end of this help topic.

#### Fill

If you select Fill, the gradient becomes the output image, and the input image is ignored.

#### Filter / Subtractive Filter

If you select Filter, the gradient is applied as a filter to the input image to create the output image. This is like sandwiching two transparencies and viewing them on a light box. For the Filter operations only, an Exposure Compensation slider is also displayed to let you compensate for any darkening of the input image as a result of applying the filter.

Subtractive Filter is the same as Filter, but the two images are inverted before filtering and the result is then inverted.

#### Adjust Brightness (HSV / HSL)

These operations lighten or darken the input image depending on whether the gradient is lighter or darker than a mid-level gray.

#### Soft Light

Similar to the soft light blend mode in other image editors.

#### Reverse Soft Light

Same as Soft Light, but with the input and gradient images swapped.

#### Hard Light

Similar to the hard light blend mode in other image editors.

#### Reverse Hard Light

Same as Hard Light, but with the input and gradient images swapped. This mode is also known as Overlay in other image editors.

#### Add

The gradient image is added to the input image. This can generate out-of-range pixel values which are then clipped.



## **Subtract**

The gradient image is subtracted from the input image. This can generate out-of-range pixel values which are then clipped.

## **Reverse Subtract**

The input image is subtracted from the gradient image. This can generate out-of-range pixel values which are then clipped.

## **Absolute Difference**

Similar to Subtract except negative differences (i.e. where the gradient image is brighter than the input image) are converted to positive instead of being clipped to black.

## **Offset Difference**

The result is a mid-level gray plus the input image minus the gradient image.

## **Color Burn**

Similar to the color burn blend mode in other image editors.

## **Color Dodge**

Similar to the color dodge blend mode in other image editors.

## **Linear Burn**

Similar to the linear burn blend mode in other image editors.

## **Linear Light**

Similar to the linear light blend mode in other image editors.

## **Vivid Light**

Similar to the vivid light blend mode in other image editors.

## **Pin Light**

Similar to the pin light blend mode in other image editors.

## **Method**

The Method setting lets you select the interpolation method. The options are Shepard, Multi-quadratic, Thin Plate, Gaussian, Inverse Multi-quadratic and Sinc.

While each of these methods takes on the color of each control point at its location, they vary in how they fill in the space between control points. The best way to understand how this works is to experiment. For more information on these interpolation methods, see Multi-Point Alignment in the Composite transformation.

## **Color <number>**

This control displays the color assigned to the current control point. The number of the control point is displayed after the word Color. To select a different control point, click on it in the input image.

## **Match Input Image**

If this box is checked, the color associated with each control point is taken from the color of the input image at the control point location. This applies on startup, whenever a control point is moved or whenever a new control point is created.

If this box is unchecked, you must select the color for each control point manually and it remains the same until you change it. When you create a new control point, it inherits its color from the previous control point.

Examples of Different Operations



Input



Gradient



Fill



Filter



Subtractive  
Filter



HSV



HSL



Soft Light



Reverse  
Soft Light



Hard Light



Reverse  
Hard Light



Lighten



Darken



Add



Subtract



Reverse  
Subtract



Absolute  
Difference



Offset  
Difference



Color Burn



Color Dodge



Linear Burn



Linear Light



Vivid Light

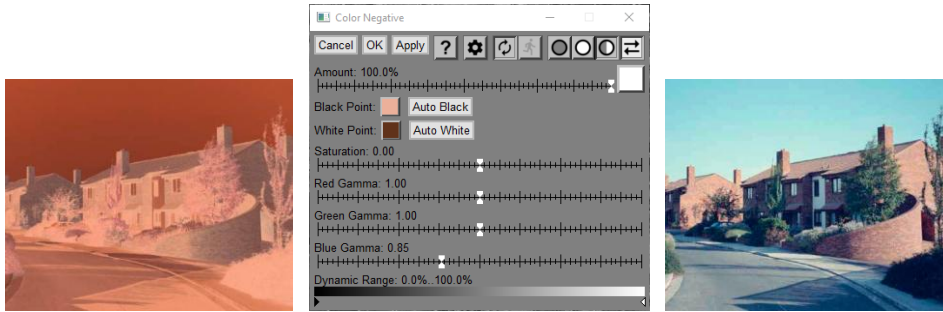


Pin Light

# Negative

The purpose of the Negative transformation is to convert scanned images of color negatives to positives. This is not a straightforward process due to the orange masking layer in color negatives and the somewhat extreme curves that need to be applied. If you choose to use this transformation you will be better off if the input image is 48-bit color so the conversion curves will not introduce too much posterization. Or, if your scanning software has settings to allow scanning negatives, you may get better results using those instead of trying to convert negatives scanned as positives.

## Using the Negative Transformation



### Amount

The Amount control lets you blend a percentage of the input image with the output image to produce a sort of hybrid effect. Or, if you use a mask, you can limit the effect of the Negative transformation to just part of the input image.

### Black Point

The black point is the color in the negative image that should become black in the output image. Normally, this is the lightest part of the negative image. You can set this color manually or you can click Auto Black to have Picture Window determine it automatically.

### White Point

The white point is the color in the negative image that should become white in the output image. Normally, this is the darkest part of the negative image. You can set this color manually or you can click Auto White to have Picture Window determine it automatically.

### Saturation

This slider adjusts the saturation of the converted image.

### Red/Green/Blue Gamma

These sliders let you adjust red, green and blue independently. This can be helpful as in the example shown above where the blue sky came out too cyan without adjusting the blue slider.

### Dynamic Range

You can set the dynamic range of the output image by adjusting the black and white markers below the dynamic range scale.

## Notecard

This transformation prepares an image for printing as notecards, postcards, business cards or other document requiring one or more copies of the same image printed on a single sheet of paper. For purposes of this transformation, a notecard is considered to be a card folded in half with an image on the front and an optional caption on the back. A postcard or business card is simply a card with an image on one side.

In some cases, computer printable paper and envelopes are available in sets that are perforated and scored to separate and fold as necessary. This saves a lot of time trimming and folding the individual cards.

The exact positioning of images and layouts is controlled by a card layout file, and a number of these are included with Picture Window to facilitate creating standard size cards.

Corresponding to each available card layout there is a card layout file stored in your *My Documents\Picture Window Pro\Notecard\Card Layouts* folder. These are text files you can use as-is or you can create new ones. For more information on creating card layouts, see the end of this section.

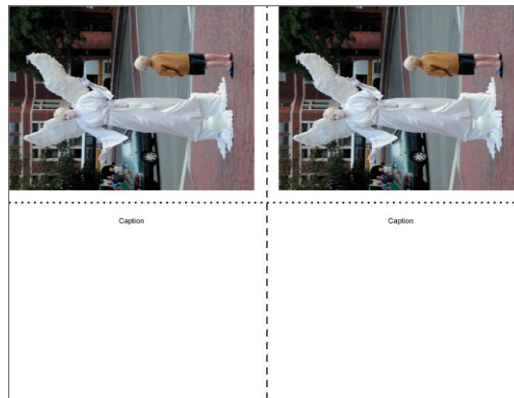
While you can get the similar effects using the Layout transformation, Notecard is easier to use, provides optional cut and fold lines and, if there are multiple images per page, it automatically crops all the images the same.

The output image is formatted for printing, but you must set your page margins to match the setting for the notecard when it is printed. The required print margins are displayed at the bottom of the dialog box. While the output image may look off-center, when it is printed with the correct margins the image will be perfectly centered in the card. When printing, the image must also be scaled to match the image dimensions so it comes out the correct size.

For example, here is an input image and an output image formatted as two notecards printed on 11 x 8.5 paper with 0.25" margins.



input image



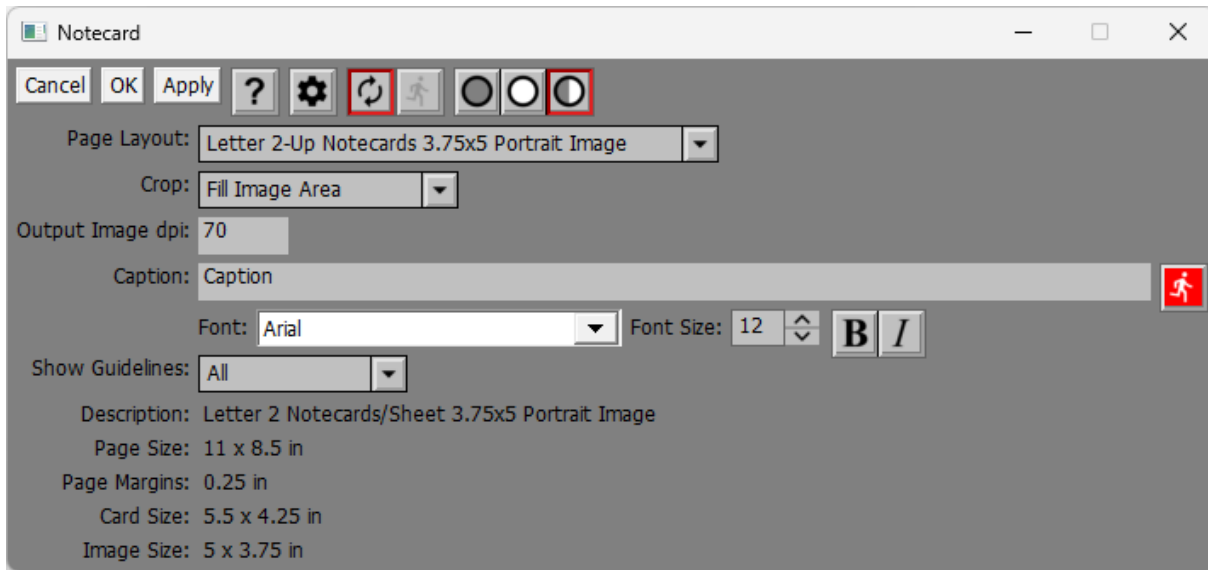
output image



front of printed card

Dashed lines indicate where to cut the page to separate the two notecards. Dotted lines indicate where to fold each notecard. These guide lines are optional as they are not needed if you are using perforated and scored paper stock or have some other way to trim and fold the cards accurately.

## Using the Notecard Transformation



### Cropping Rectangle

A crop box is displayed as an overlay on the input image. You can resize it by dragging any of its corners or move it by dragging its interior. If Crop is set to Scale to Image Area (see below), you can also resize the crop box by dragging any of its sides. Only the part of the input image inside the crop box will appear on the card.

### Page Layout

Use this control to select the desired card layout. There is one item in the menu for every card layout file in the folder: *My Documents\Picture Window Pro\Notecard\Card Layouts*. Various characteristics of the currently selected file are displayed at the bottom of the dialog box. Note that card layouts generally come in Landscape and Portrait versions to accommodate images that are horizontal or vertical.

### Crop

There are two ways you can crop the input image to fit in the available space on the notecard.

#### Fill Image Area

The proportions of the cropping rectangle are constrained to match the proportions of the image area in the notecard. This guarantees the image area will be completely filled, but you may not be able to include the entire input image if its proportions do not match the layout.

#### Scale to Image Area

The proportions of the cropping rectangle are unconstrained. This means the image area may not be completely filled, but you will be able to include the entire input image even if its proportions do not match the layout. If the image does not fit, it is centered in the available space so the left/right margins may not match the top/bottom margins.

### Output Image dpi

This setting controls the resolution of the output image. Normally you would set this to printer resolution.

### Caption

The Caption controls are only displayed if the current card layout supports captions. If you don't want a caption, simply leave this blank. Otherwise, enter the caption text and then click the red button when you are done to update the output image.

**Font, Font Size, Bold/Italic** - use these controls to select the caption font and control its size and style.

## Show Guidelines

This control lets you include guide lines in the output image, or not. You can select (dashed) cut lines, (dotted) fold lines, both or neither.

## Card Layout Info

The bottom part of the dialog box displays various items of information about the current card layout.

Description - this displays the description information stored in the card layout file

Page Size - this is the intended page size

Page Margins - this is the margin setting required when printing the output image

Card Size - this is the total size of each card, including the margins around the image

Image Size - this is the maximum image size that will fit on the card

## Card Layout File Format

Card layout files are text files located in your *My Documents\Picture Window Pro\Notecard\Card Layouts* folder. A set of card layout files is installed along with Picture Window. Normally you do not need to create or edit card layout files, but if you do, here is a sample file so you can see how they work.

```
CardLayout 1.0
description "Letter 2 Notecards/Sheet 3.75x5 Landscape Image"
units in
page_size 11 8.5
page_margins 0.25
image_size 5 3.75
card_size 5.5 4.25
caption_size 5 0.25
orientation 2
n_images 2
image 0 0 4.25
image 1 5.5 4.25
n_captions 2
caption 0 0 3.5
caption 1 5.5 3.5
n_lines 2
line 0 dashed 5.25 0 5.25 8
line 1 dotted 0 4 10.5 4
end
```

The first line of the file must be `CardLayout 1.0` which defines the type of file and its version number

`description "..."` is simply text that describes the layout file - make sure you include the quotes

`units (in or mm)` defines the units used in the rest of the file

`page_size width height` defines the intended paper size in the current units

`page_margins width` defines the margin width (must be the same of left/right/top/bottom) to be selected when printing the output file

`image_size width height` defines the size of the image area

`card_size width height` defines the finished notecard size

`caption_size width height` defines the caption area size

`orientation n` defines the orientation of the image (0 for normal, 1 for rotated 90° CW, 2 for rotated 180° CW, 3 for rotated 270° CW)

`n_images n` defines the number of images per page

`image i x y` defines the location of the *i*th image in the current units (0,0) corresponds to the lower left corner

`n_captions n` defines the number of captions per page (0 if none)

`caption i x y` defines the location of the *i*th caption in the current units (0,0) corresponds to the lower left corner

`n_lines n` defines the number of guide lines

`line i (dashed or dotted) x0 y0 x1 y1` defines the *i*th guide line

`end` signals the end of the text file

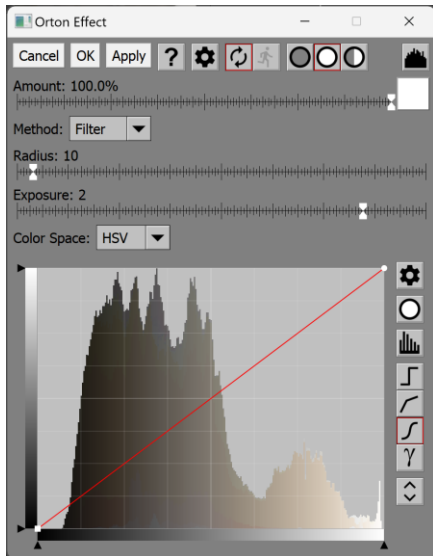


# Orton Effect

The Orton effect is a technique developed by Michael Orton during the film era that he used to produce dream-like images. To create the effect, two over-exposed transparencies of the same subject were taken, one of which was out of focus, and then the two transparencies were sandwiched. The images were overexposed to compensate for the fact that sandwiching an image with itself darkens it.

When recreating this effect digitally, it is unnecessary to take two photographs, nor is it necessary to overexpose, since a blurred version can be created and combined with a lightened version of the original using software.

## Using the Orton Effect Transformation



### Amount

The Amount control lets you blend a percentage of the input image with the output image to produce a sort of hybrid effect. Or, if you use a mask, you can limit the effect of the Orton Effect transformation to just part of the input image.

### Method

This control lets you select one of two methods for simulating the Orton effect.

### Filter



The Filter method reproduces the original Orton method by simulating sandwiching the input image with a blurred version of itself. Uncompensated, this greatly darkens the image, especially the shadow areas. To correct for this, when you select Filter, additional controls are displayed to let you adjust the brightness of the image, either before or after filtering.

## Blend



The Blend method

The Blend method computes a weighted average of the input image with a blurred version of itself. You can adjust the relative weights of the original and blurred images by adjusting the Amount slider. At 50% they contribute equally – at 100% you get only the blurred image, and at 0% you get only the original image.

## Blur Radius

This slider lets you adjust how much you want to blur the input image before combining it with the original.

If Method is set to Filter, the following additional controls are displayed to let you adjust the brightness of the final image. The Color Space and Curve controls let you adjust the brightness of the input image before it is filtered against itself. The Exposure slider lets you adjust the brightness of the image after the filter operation. You can use either method or a combination of the two. The Curve gives you more control over the final result, but the Exposure slider is quicker and simpler to use.

## Color Space

This control (displayed only for color images) lets you select what channel of the image the curve adjusts: either the HSV V or the HSL L channel.

## Curve

This curve control lets you create a curve that is applied to the brightness of the input image before blurring and filtering it with itself. Normally, you would use the curve to lighten the input image to compensate for the darkening effect of the filter operation.

## Exposure

The exposure slider lets you compensate for the tendency of the filter method to produce dark images by adjusting the gamma of the image after the filter operation. A gamma setting of 2.0 more or less preserves the tonality of the original image. Lower values create a darker output image but with added contrast and saturation.

## Tips

When using Blend, start with the Amount slider at 50% and experiment from there.

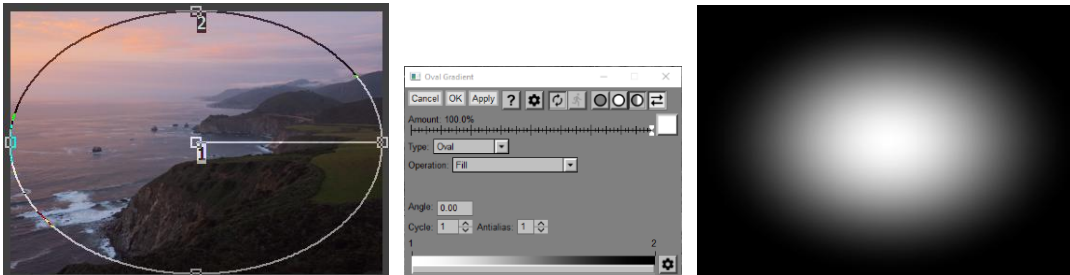
One way to refine this effect is to use a mask to apply it mostly to the image highlights.

# Oval Gradient

The Oval Gradient transformation creates gradients that extend from a center point to an ellipse, passing from one color to another. The transition from the starting to the ending color can be configured to pass through a number of intermediate colors based on a color line control.

The gradient can either become the output image or it can be applied to the input image in different ways.

## Using the Oval Gradient Transformation



### Input Image Overlay

An overlay is displayed on the input image consisting of a line segment with control points at either end. You can drag the control points to position where you want the gradient transition to occur. Ellipses (or rectangles) are also displayed for each control point on the color line.

### Amount

The amount control blends a percentage of the input image with the output image to scale back the effect of the Gradient transformation. If you create a mask, you can use the amount control to localize the effect of the transformation to parts of the input image.

### Type

Oval gradients may extend from the center point as ellipses or as rectangles.

### Operation

This setting lets you control how the gradient is applied to the input image to create the output image. For examples of how the different operations work, see the end of this help topic.

#### Fill

If you select Fill, the gradient becomes the output image and the input image is ignored.

#### Filter / Subtractive Filter

If you select Filter, the gradient is applied as a filter to the input image to create the output image. This is like sandwiching two transparencies and viewing them on a light box. For the Filter operations only, an Exposure Compensation slider is also displayed to let you compensate for any darkening of the input image as a result of applying the filter.

Subtractive Filter is the same as Filter, but the two images are inverted before filtering and the result is then inverted.

#### Adjust Brightness (HSV / HSL)

These operations lighten or darken the input image depending on whether the gradient is lighter or darker than a mid-level gray.

#### Soft Light

Similar to the soft light blend mode in other image editors.

#### Reverse Soft Light

Same as Soft Light, but with the input and gradient images swapped.

## **Hard Light**

Similar to the hard light blend mode in other image editors.

## **Reverse Hard Light**

Same as Hard Light, but with the input and gradient images swapped. This mode is also known as Overlay in other image editors.

## **Add**

The gradient image is added to the input image. This can generate out-of-range pixel values which are then clipped.

## **Subtract**

The gradient image is subtracted from the input image. This can generate out-of-range pixel values which are then clipped

## **Reverse Subtract**

The input image is subtracted from the gradient image. This can generate out-of-range pixel values which are then clipped

## **Absolute Difference**

Similar to Subtract except negative differences (i.e. where the gradient image is brighter than the input image) are converted to positive instead of being clipped to black.

## **Offset Difference**

The result is a mid-level gray plus the input image minus the gradient image.

## **Color Burn**

Similar to the color burn blend mode in other image editors.

## **Color Dodge**

Similar to the color dodge blend mode in other image editors.

## **Linear Burn**

Similar to the linear burn blend mode in other image editors.

## **Linear Light**

Similar to the linear light blend mode in other image editors.

## **Vivid Light**

Similar to the vivid light blend mode in other image editors.

## **Pin Light**

Similar to the pin light blend mode in other image editors.

## **Cycle**

The Cycle setting causes the gradient to pass through multiple complete cycles between the starting and ending points.

## **Antialias**

If antialiasing is greater than 1, sharp transitions of the gradient are smoothed out, avoiding jagged edges. The higher the Antialias setting, the more accurate the result.

## **Color Line**

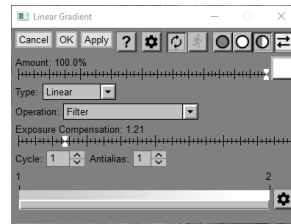
The color line control is where you specify how the gradient varies from its starting to its ending color. For details on using color lines, see the Tint transformation or the Color Lines help topic.

## Example

In the following example, the outer edges of the input image are darkened, making the overall brightness of the image more uniform. Then, by turning up the exposure compensation, the center of the image can be brightened, creating a vignette.



Input with Overlay



Oval Gradient



No Exposure Compensation



Exposure Compensation

## Examples of Different Operations



Input



Gradient



Fill



Filter



Subtractive  
Filter



HSV



HSL



Soft Light



Reverse  
Soft Light



Hard Light



Reverse  
Hard Light



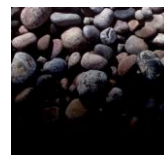
Lighten



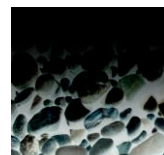
Darken



Add



Subtract



Reverse  
Subtract



Absolute  
Difference



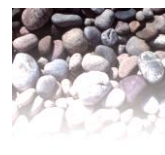
Offset  
Difference



Color Burn



Color Dodge



Linear Burn



Linear Light



Vivid Light

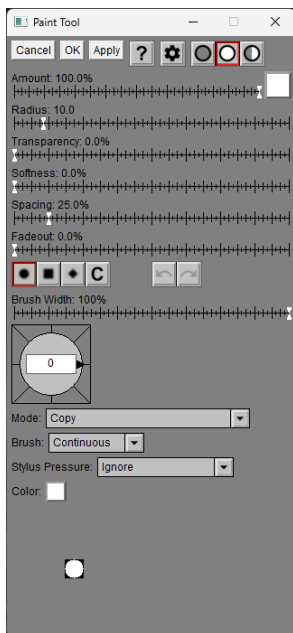


Pin Light

## Paint Tool

The Paint tool lets you paint a solid color on an image using a brush. Like the Clone tool, you paint directly on the output image.

### Using the Paint Tool



Unlike most other transformations, the Paint tool operates directly on the output image.

When you move the cursor over the output image, it displays a cursor that outlines where image data is going to be painted. The radius of the cursor is determined by the brush radius setting.

To apply paint, click and drag on the output image.

### Amount

The amount control blends a percentage of the input image with the output image to scale back the effect of the Paint transformation. If you create a mask, you can use the amount control to protect parts of the input image from being modified, a little like using masking tape to avoid painting an area.

### Brush Settings

#### Radius

The Radius slider adjusts the brush size. You can also use the mouse scroll wheel to make the brush larger or smaller.

#### Transparency

The Transparency slider lets you vary the transparency of the image data you clone over the output image. The more transparent, the more subtle the effect.

#### Softness

The Softness slider lets you vary the brush from hard-edged to having a gradual falloff. The brush preview area at the bottom of the dialog box lets you see how soft the brush is.



## Spacing

The Spacing slider lets you vary the interval at which the brush is applied as you move it over the image. If you increase it too much you will not get a smooth effect. Too small and the brush is hard to control.

## Fadeout

The Fadeout slider lets you make the brush stroke fade out by becoming more transparent the longer the paint.

## Stylus Pressure

If you do not have a tablet connected to your computer, this setting is ignored. If you do have a tablet with a pressure-sensitive stylus, you can use this setting to determine which brush setting, if any, is adjusted depending on how hard you press the stylus into the tablet surface.

### Ignore

This causes stylus pressure to be ignored.

### Controls Opacity

The harder you press, the less transparent the brush.

### Controls Radius

The harder you press, the larger the brush.

### Controls Hardness

The harder you press, the less soft the brush.

### Controls Flow Rate

The harder you press, the smaller the spacing between brush applications.

## Brush Shape

The Brush Shape tool bar lets you make the brush circular, square, diamond shaped or custom. For information on custom brush shapes, see the separate document: [Creating and Using Custom Brush Shapes.pdf](#).

## Brush Width

The Brush Width slider lets you make the brush narrower. Alternatively, you can rotate the mouse wheel with the Ctrl key held down.

## Brush Angle

The Brush Angle compass control lets you rotate the brush shape. Alternatively, you can rotate the mouse wheel with the Shift key held down.

## Mode

### Copy

This is the normal mode -- the paint color is blended with the output image according to the brush settings.

### Lighten Only

In this mode, data is copied to the output image only if it is lighter than what is already there. This is good for getting rid of dark spots while causing less collateral damage to the area around them.

### Darken Only

In this mode, data is copied to the output image only if it is darker than what is already there. This is good for getting rid of light spots while causing less collateral damage to the area around them.

## HSV Hue Only/HSV Hue and Saturation Only/HSL Hue Only/HSL Hue and Saturation Only

These settings let you restrict painting to the hue or hue and saturation channels of the image. This lets you change the color of a region without altering its brightness. This is especially useful for colorizing black and white images.

## Soft Light/Hard Light/Color Burn/Color Dodge

These settings let you blend the paint color with the image color using the corresponding blending modes.

## Brush

### Continuous

This is the normal mode. The brush paints for as long as you hold the mouse button down.

### One Shot

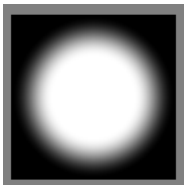
In this mode, the brush paints only once and then stops.

## Color

This sets the color of the brush. When painting on black and white images, only the red channel is used.

## Brush Preview

The Brush Preview area at the bottom of the dialog box provides a visual representation of the size, shape, softness and transparency of the brush. It cuts off beyond a certain size so it is only useful for small to medium size brushes.



## Settings Menu

In addition to the standard menu items, the settings menu lets you load or save the current brush settings (Radius, Transparency, Softness, Spacing, Fadeout, Shape, Mode, Brush, and Color). You can also set the probe size for setting the paint color by clicking on the input image.

## Undo/Redo

The Undo and Redo buttons let you erase or redraw paint operations, one stroke at a time. A stroke is defined as everything between pressing the mouse button and releasing it.

If the Undo or Redo button is grayed, it means there are no operations left to undo or redo. If you undo too many operations by accident, you can click the redo button until you get back to where you wanted to be. However, once you draw a new stroke, you can no longer redo past that point.

You can use the keyboard shortcuts Ctrl-Z for Undo and Ctrl-Y for Redo.

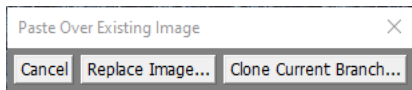
Normally, Undo preserves the current brush settings, but if you want to revert to the settings for the previous stroke, hold down the Shift key while clicking the Undo button or pressing Ctrl-Z.

## Reloading Previous Settings

If you use the Ctrl-R keyboard shortcut to load the settings from the last use of the tool, you will restore not only the brush and other tool settings but also all the strokes you applied to the previous image. To load the previous settings without re-applying any strokes, use Ctrl-Shift-R instead.

# Paste

The Paste top-level transformation is created as a side effect of the Edit/Paste command from the main menu. It creates a new image by pasting the image currently on the clipboard. There is no Paste dialog box since it has no settings, but if you want to paste a new image into the transformations, double click on the Paste transformation to get a dialog box that lets you replace the current image from the one on the clipboard.



**Cancel** closes the dialog box without doing anything.

**Replace Image** pastes a new image from the clipboard, replacing the current image.

**Clone Current Branch** pastes the image from the clipboard to a new top-level image and then appends copies of all the transformations below the original paste.

# Posterize

The Posterize transformation renders an image using a limited palette of colors. It works by comparing each pixel in the input image to all the palette colors to see which one matches best. The pixel in the output image is then set to the best matching color.

Optionally, you can remap the output to another set of colors. The remap colors are substituted for the best matching colors from the main palette.



Original

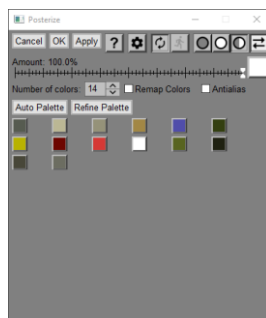


Posterized

## Using the Posterize Transformation



Input



Posterize



Output

### Amount

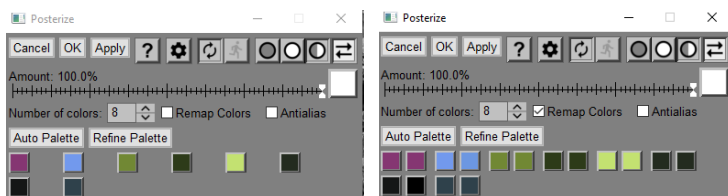
The Amount control lets you blend a percentage of the input image with the output image to produce a sort of hybrid effect. Or, if you use a mask, you can limit the effect of the Posterize transformation to just part of the input image.

### Number of Colors

This let you set the number of colors in the palette. You must have a minimum of 2 colors and can have up to a maximum of 64.

### Remap Colors

If this box the checked, a second palette is activated. The best matching color from the main palette is changed in the output image to the corresponding color in the remap palette.



### Antialias

If this box is checked, the edges in the output image where different colors meet are smoothed.



Not Antialiased



Antialiased

### **Auto Palette**

Clicking this button uses an algorithm to try to pick a palette based on the input image. However, unless the palette has a lot of colors it tends not to do a very good job, since it tends to ignore colors that occur only in small areas of the input image.

### **Refine Palette**

Clicking this button processes the current palette to try to get a better match with the input image. It does not preserve the order of the colors, so don't use this with Remap Colors turned on.

### **Colors**

The bottom part of the dialog box is a set of color controls you can use to set the palette colors. If Remap Colors is turned on, the remap colors are displayed next to the palette colors. Clicking on one of the palette colors brings up a color picker you can use to set or change the color.

### **Editing the Palette**

You can add new colors to the palette in either of two ways:

- 1) Increase the number of colors and click on the palette color to bring up a color picker. Use the color picker to select a color.
- 2) Click on the input image to add the color at the point where you clicked to the end of the palette.

To change an existing color, click on the color you want to change and use the color picker to adjust the color.

To remove a color, right click on the color you want to remove and select Remove Color from the popup menu.

To reset the mapping of a single color, right click on it and select Reset Mapping from the popup menu.

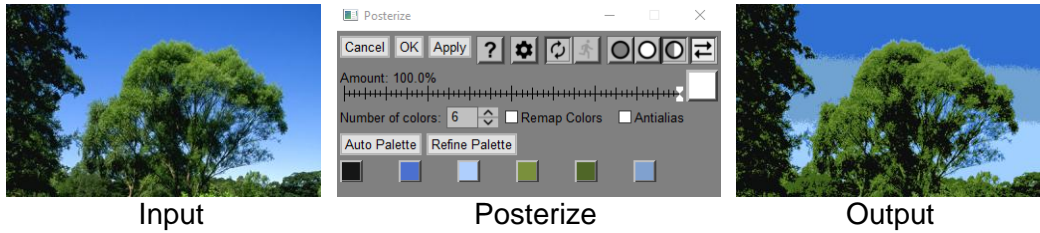
## **Tips**

### **Selecting Palette Colors**

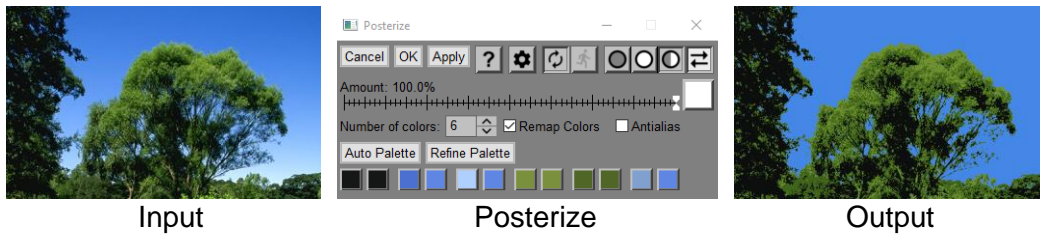
Selecting a good palette frequently takes a lot of experimentation. Try selecting palette colors manually by choosing colors directly from the input image and adding one color at a time to the palette. To do this, click on one of the palette colors in the dialog box to bring up a color picker and then click on the input image to set the color.


## Avoiding Banding

Sometimes you get bands in smooth gradients such as the sky in this example:



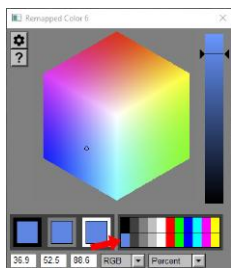
The trick to avoid this is to remap the three different blues to the same color.



To make all three colors the same, use the Palette tool (click the  button on the main tool bar). Click one of the buttons along the bottom to select a slot in the palette and then click on the color above it to bring up a color picker you can use to set the palette color.



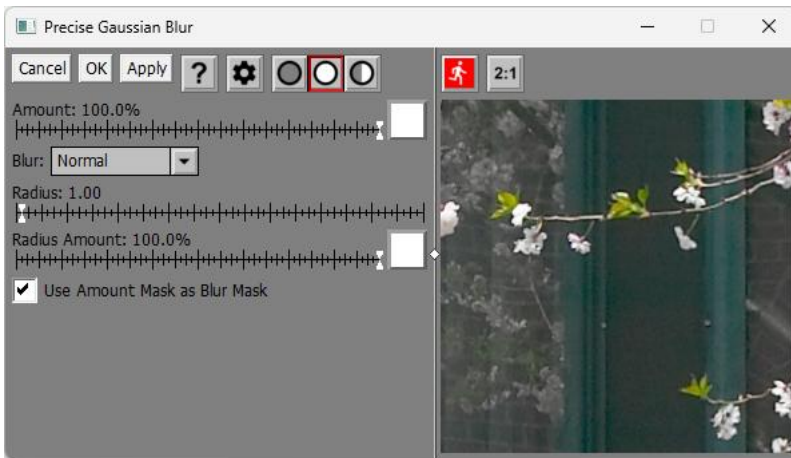
This color will then show up in the color picker where you can select it by clicking on it:





# Precise Gaussian Blur

The Precise Gaussian Blur transformation is an advanced version of the Gaussian Blur transformation that gives you more control over the blurring process when you want to blur just part of an image or when you want to vary the degree of blurring for different parts of the image. The trade-off is that Precise Gaussian Blur is much slower.



For faster response time, Precise Gaussian Blur has its own preview area.

You can increase the size of the preview by dragging one of the corners of the dialog box. If you widen the dialog box, you can drag the white diamond in the center of the vertical separator bar between the controls and the preview area to enlarge one while making the other smaller.



To preview the effect on the entire output image, click the button just above the preview area. To re-center the preview, click on the input image in the main image area. You can also scroll the preview area by clicking and dragging on it.

## 2:1 -- Magnify Preview Button

When the Magnify Preview button is depressed, the central portion of the preview area is magnified by a factor of two, making it easier to see fine details. Clicking the button a second time restores the normal 1:1 display.

## Amount

This setting controls how much of the selected blur is applied to the image. When set to zero, no blurring is performed—as the amount increases, blurring is also increased. This is done by computing a weighted average between the original image and the fully blurred image. As with Gaussian Blur, amounts less than 100% produce an effect like a fog filter. To vary the amount of blurring, use the Radius Amount setting instead.

## Blur

This setting lets you blur all the channels or just the chrominance. Blurring just the chrominance is a way to reduce color noise without losing too much edge detail.

## Radius

As for Gaussian Blur, the larger the radius, the more the image is blurred. Radius values for Precise Gaussian do not correspond exactly to radius values for Gaussian Blur.

## Radius Amount

This Amount control lets you vary the blurring radius for different parts of the image. At 100%, the effective blurring radius is the value specified by the Radius slider. As the Radius Amount is reduced, the blurring radius is reduced accordingly.

## **Use Amount Mask as Blur Mask**

When this box is checked, if the Amount control is selected with a mask, then that same mask is used as the Blur Mask, and the Blur Mask control (see below) is not displayed. This is the setting to use if you want to blur just one part of the input image -- the Blur Mask keeps image data from bleeding into the blurred areas and the Amount Mask makes sure the edges of the blurred region are properly anti-aliased.

## **Blur Mask**

This is where you select what parts of the image to blur and what parts to leave alone. Note that the part you want to blur must be white and the part you want to leave alone must be black as illustrated in the example below. This mask is used a little differently from the mask in the Amount control. The Amount mask acts as if the entire image was blurred and then selectively blends the blurred image with the input image. The difference shows up when you set the amount to somewhere between 0% and 100% in which case the output image looks like a double exposure of a blurred and a sharp image -- an effect something like a fog filter.

The parts of the image where the mask is black are excluded from the weighted average of neighbors. This prevents colors from the parts of the image not being blurred from bleeding into the parts that are being blurred.

The mask just controls the amount of blurring so values between 0% and 100% are partially blurred and there is no fog filter effect. If no mask image is selected, the entire input image is blurred uniformly at 100% -- regardless of the gray level selected for the mask color, however the Amount control can still be used to selectively blend the input image with the blurred image.

## Example – Blurring the background behind an object

If you are blurring an entire image with no mask or threshold, the visual difference between blurring with Precise Gaussian and regular Gaussian is insignificant and there is no real advantage in using the slower Precise Gaussian. However, there are effects Precise Gaussian can produce that you can't get with Gaussian Blur.

One real advantage of Precise Gaussian comes into play when blurring the background behind a foreground object. To make this work, you need a mask that isolates the object from its background. The mask must be white in the background areas (the part to be blurred) and black in the foreground areas (which will remain sharp). If you blur the background using Gaussian Blur, colors from the foreground object bleed into the background and can create a halo around the foreground object where its color differs from the background. Using Precise Gaussian eliminates the halo giving a far more realistic look.

Precise Gaussian also allows for fractional radius values which gives you finer control over the degree of blurring, although for the same radius it blurs somewhat less than Gaussian. And, by using the Radius Amount, you can vary the amount of blurring for different parts of the image.



Original



Mask



Gaussian Blur



Precise Gaussian Blur

## Example 2 – Varying the amount of blur

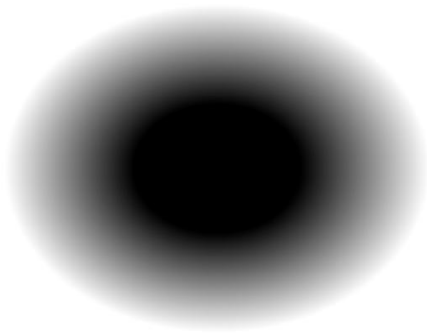
By using the Radius Amount, you can vary the amount of blurring for different parts of the image. In the example below, by blurring using an oval gradient Radius Amount mask, the center part of the image remains sharp while the edges gradually become softer and softer.



Original



Blurred

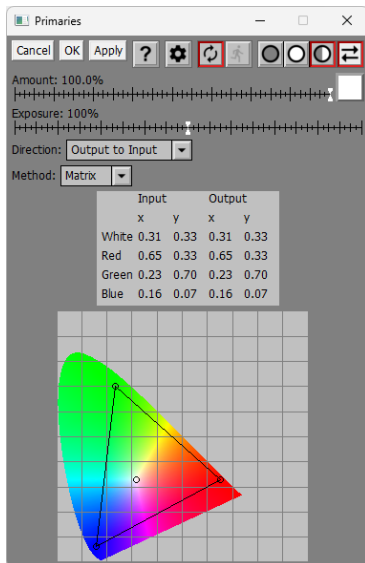


Radius Amount Mask

# Primaries

The Primaries transformation lets you modify the white point and red, green and blue primary colors on which an RGB color image is based. The initial white point and primaries are extracted from the ICC profile of the input image. The transformation works by converting from RGB to the device independent CIE XYZ color space using one white point and RGB primaries and then converting back to RGB using a different white point and primaries.

This transformation can be used to emphasize some colors while de-emphasizing others. A sample settings file, *Warming.primaries*, is distributed with Picture Window that emphasizes red, orange, yellow and green and de-emphasizes blue. This frequently works well to brighten fall foliage.



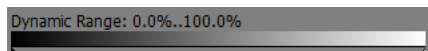
## Using the Primaries Transformation

### Amount

The amount control blends a percentage of the input image with the output image to scale back the effect of the Primaries transformation. If you create a mask, you can use the amount control to localize the effect of the transformation to parts of the input image.

### Dynamic Range

This transformation may produce clipped pixels even if you start with an input image that has no clipped pixels. If clipping occurs and you want to prevent it, you can use the Dynamic Range slider to lighten the shadows or darken the highlights of the input image prior to processing.



Moving the black marker to the right lightens shadows while moving the white marker to the left darkens highlights.

You can tell if the output image contains clipped pixels using either the Display Clipped Pixels tool bar or clicking the Histogram button in the main tool bar.



-- Display Clipped Pixels Tool Bar



-- Histogram button

### Direction

The conversion of white point and primaries can be done from the input image primaries to the new primaries (Input to Output) or from the new primaries to the input image primaries (Output to Input). These two methods produce opposite results – if one adds a color, the other removes it. The Output to Input method is a little more intuitive since, for example, if you drag the white point towards yellow, the image becomes more yellow. If Direction is set to Input to Output, it makes the image more blue instead.

## Method

This setting lets you choose between two different methods of applying primaries to an image. The Matrix method works by computing a 3 x 3 transformation matrix that is applied to the RGB channels of the input image. The Profile method works by creating a copy of the input image profile and substituting the new primaries for the original values. This profile is then used to convert the input image to the new color space using the color management engine. When using the Profile method, changes to the white point are ignored.

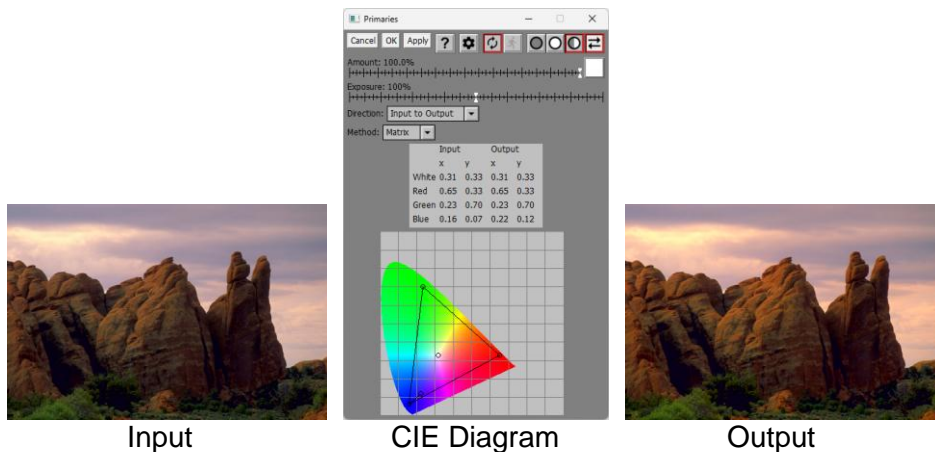
## Chromaticity Coordinates

A table of the input and output white point and primary chromaticity coordinates is displayed just below the amount control. These numbers are the x and y coordinates in the CIE diagram displayed at the bottom of the dialog box (the coordinates run from (0.0, 0.0) and the lower left corner of the diagram to (1.0, 1.0) at the upper right corner). This table is displayed for reference and cannot be edited directly. Chromaticity coordinates must be in the range from 0.0 to 1.0.

## CIE Diagram

A standard CIE diagram is displayed at the bottom of the dialog box. The light gray surrounding the colored area corresponds to physically unrealizable colors. The colors around the curved boundary at the top of the colored area are the colors of the visible spectrum.

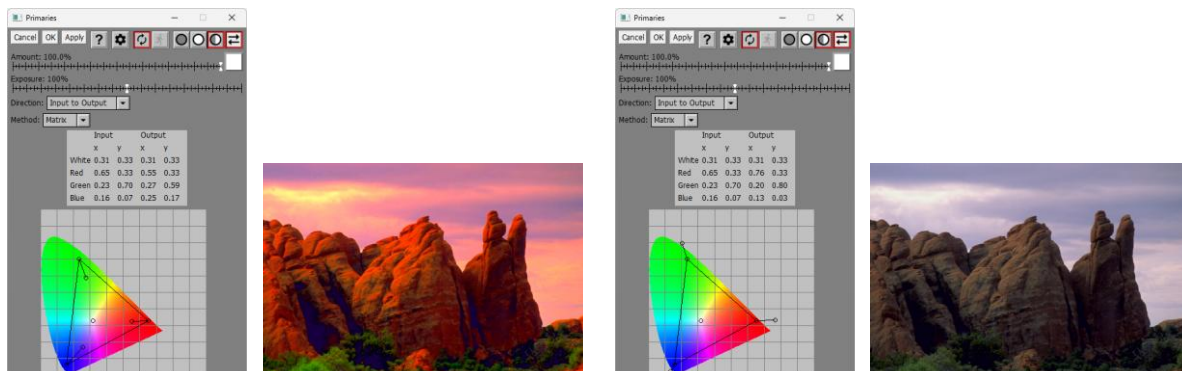
The input image primaries are displayed as a triangle on the CIE diagram, and the white point is displayed as a point roughly in the center of the triangle. To change a primary, click and drag the corresponding vertex. To change the white point, click and drag it. As you drag, a line is drawn connecting the input and output values as shown below:



## Tips

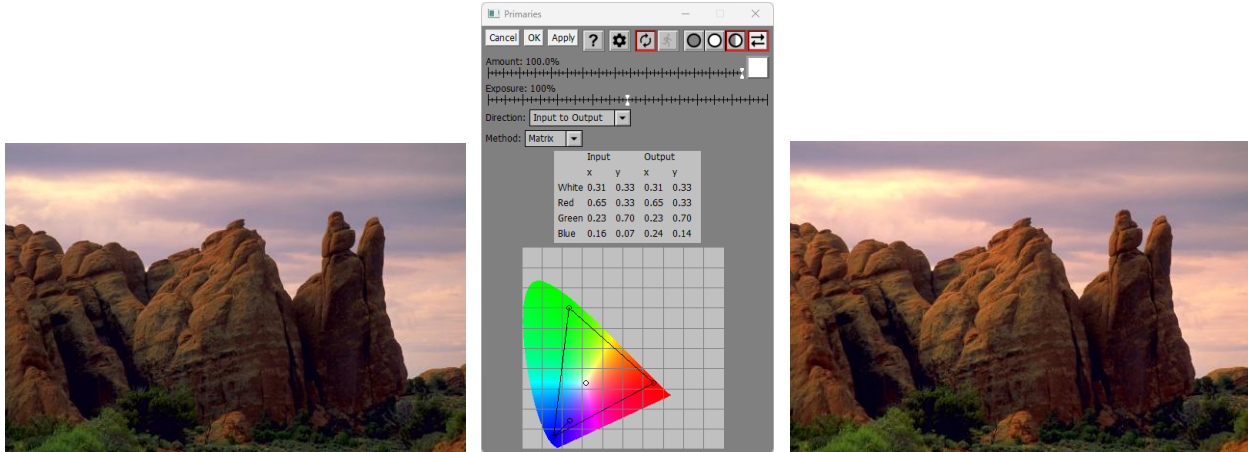
Small changes to the white point make big changes. You can enlarge the CIE diagram to make it easier to edit by resizing the dialog box, although it is always displayed as a square to preserve its proportions.

If Direction is Output to Input, moving primaries towards the center decreases saturation and brightness and moving them away from the center increases saturation and brightness. If Direction is set to Input to Output, the opposite is true. You can get effects with one direction that are impossible with the other.





A good way to add warm light to a landscape image is to set Direction to Input to Output and then drag the blue primary toward the white point. This has the effect of brightening and saturating yellows and thus warming the image:

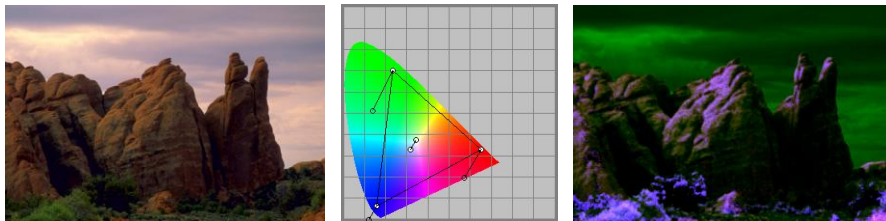


Clipping of one or more color channels can easily occur with this transformation, especially if you make big changes. To check for this, you can turn on the clipped pixel display (configured in File/Preferences and enabled or disabled from the main tool bar:

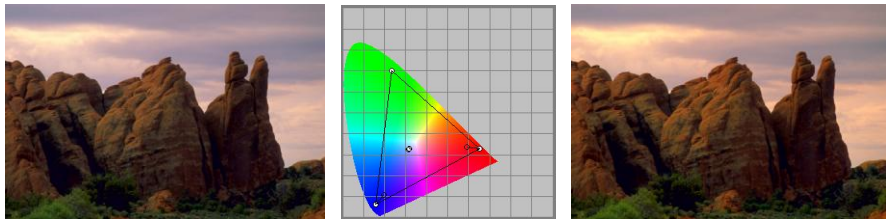


If this happens, you can reduce clipping by reducing the Exposure setting.

Unpredictable but possibly interesting effects are possible:

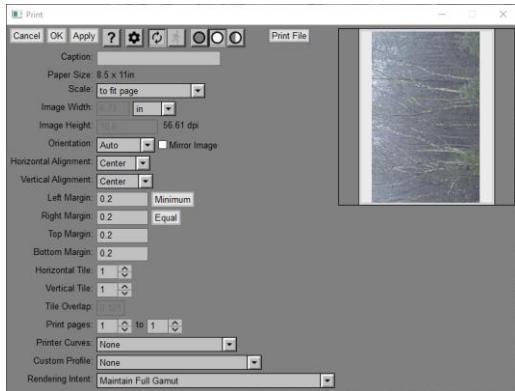


Smaller changes can produce subtle color enhancements:



# Print

The Print transformation is made to allow printing image in a batch workflow. For normal printing, use the File/Print command from the main menu. The Print transformation copies its input image through to its output image, but if a batch workflow is in progress, as a side effect it prints its input image.



The settings for the Print transformation are exactly the same as for the File/Print command, but the buttons on the top row of the dialog box are slightly different.

The Print File button lets you print the input image. This is useful as a test before initiating the batch workflow.

For more information on batch processing, please see the separate document [Batch Processing.pdf](#).

## **Process or Skip**

The Process or Skip transformation is a special purpose tool for manually controlling batch processes.

For information on how to use this transformation, please see the separate document [Batch Processing.pdf](#).

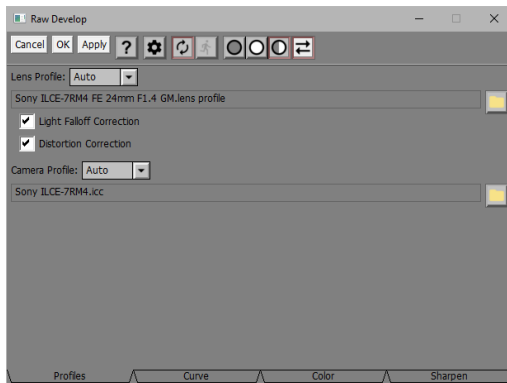
# Raw Develop

The Raw Develop transformation is intended to be used immediately after opening a raw camera file. The transformation lets you apply a lens and/or camera profile to the image to correct for light falloff, barrel or pincushion distortion, chromatic aberration, and color. In addition, similar to the Adjust transformation, you can apply curves to the image, adjust its color balance and saturation, and sharpen or blur it.

## Using the Raw Develop Transformation

The Raw Develop transformation has four panels, corresponding to the four tabs at the bottom of the dialog box: Profiles, Curve, Color and Sharpen. Each panel has its own set of controls.

### Profiles Panel



The Profiles panel lets you apply a lens and/or camera profile to the input image. Initially, the camera and lens profiles are set based on the metadata in the raw input image, assuming a match can be found.

### Lens Profile

- None** No lens profile is selected
- Custom** You select a specific lens profile
- Auto** A lens profile is selected automatically based on the camera make and model and the lens model.

If a lens profile is selected, the selected lens profile is applied to the image. To select a custom lens profile, click the folder button to the right of the profile name.

### Light Falloff Correction

This checkbox lets you turn light falloff (vignetting) correction on or off. Sometimes the light falloff is a desirable effect that you might want to retain.

### Distortion Correction

This checkbox lets you turn distortion and chromatic aberration correction on or off. Depending on the amount of lens distortion, the edges of the image are cropped to remove any pixels that fall outside the image.

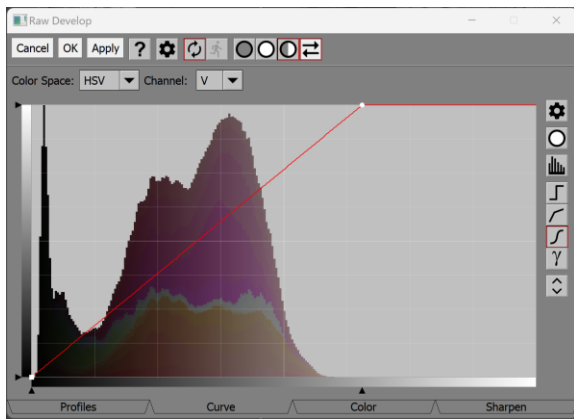
### Camera Profile

- None** No camera profile is selected
- Custom** You select a specific camera profile
- Auto** A camera profile is selected automatically based on the camera make and model.

If a camera profile is selected, the selected camera profile is applied to the image. To select a camera profile, click the folder button to the right of the profile name.

If both a lens and a camera profile are selected, the lens profile is applied before the camera profile.

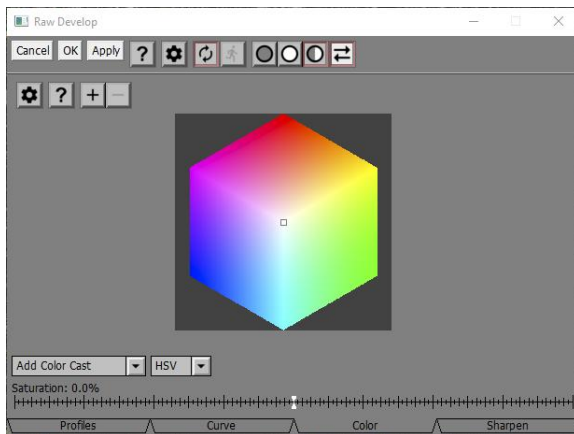
## Curve Panel



The Curve panel displays controls more or less identical to the Color Curves transformation.

Unlike some other programs, when Picture Window opens raw files, it does not adjust their brightness -- as a result, images may appear dark or have a limited dynamic range (as in the example above), depending on the camera make and model that generated the raw file. By not adjusting the brightness, Picture Window leaves you lots of headroom to avoid clipped highlights or shadows, however, you will normally need to use a Curve to adjust the white and black points of the image to produce a more normal result.

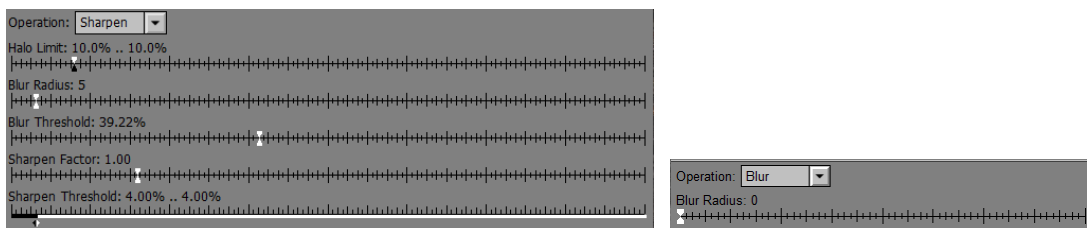
## Color Panel



The Color panel displays a zoomable color hexagon to let you select a color to add to or remove from the input image. The effect is the same as in the Color Balance transformation. There is also a Saturation slider you can use to increase or decrease the saturation of the image.

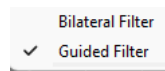
## Sharpen Panel

The Sharpen panel lets you sharpen or blur the image, depending on the operation you select.



The Sharpen settings are the same as those of the Multipass Sharpen transformation. The Blur settings do a Gaussian blur of the specified radius.

## Settings Menu

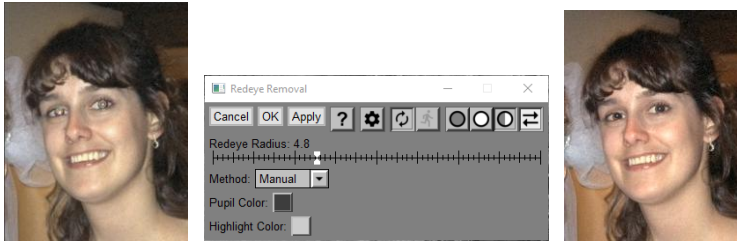


You have a choice of using Bilateral or Guided filtering when sharpening. The results are very similar, but Bilateral is a lot slower than Guided, especially when using a large radius, and also slightly more prone to artifacts. Bilateral is provided mostly for compatibility with older scripts – the more modern Guided option is usually preferable.



# Redeye Removal

The Redeye Removal tool lets you remove the red reflection that shows up in the eyes of some portraits take with on-camera flash.



## Input Image Overlay

The Redeye Removal tool displays an overlay on the input image that lets you specify where the red part of the eyes is located and how large a circle it covers.

To place a new control point, shift-click on the input image. You can adjust the position of the circle by dragging its center. You can adjust its radius using the Radius slider (see below) or using the mouse scroll wheel.

To remove a control point, ctrl-click on it.

To select a control point, click on it.

## Redeye Radius

This slider shows lets you adjust the radius of the current control point.

## Method

If you select Auto, the red with be detected automatically and removed.

If you select Manual, the red is overwritten with a pupil circle with a highlight in the center and you can set the pupil and highlight colors.

## Remove Purple Fringe

The Remove Purple Fringe transformation helps you remove purple fringing from digital images. Purple fringing is a blue to magenta edge surrounding clipped highlights of an image. While I have never seen a satisfactory explanation of the cause of this phenomenon, it is not chromatic aberration which has very different characteristics. More likely it is caused by leakage from overexposed green photo sites into neighboring red and blue photo sites. In any case, most digital cameras can have this problem to some degree depending on the subject and lens. Commonly it surrounds overexposed highlights in an image as in the example below or it appears at the edge between trees or buildings and a very bright or overexposed sky.



Severe Purple Fringing

The idea behind the Remove Purple Fringe transformation is simple—first locate purple fringe pixels and then replace them with a nearby color. To be considered part of a purple fringe, a pixel must satisfy two criteria:

- It must be purple as defined by its hue being in a specific range.
- It must be within a given distance of a pixel brighter than a given threshold value.

In other words, Remove Purple Fringe replaces every purple pixel near a bright pixel.

### How to Tell Purple Fringing from Chromatic Aberration

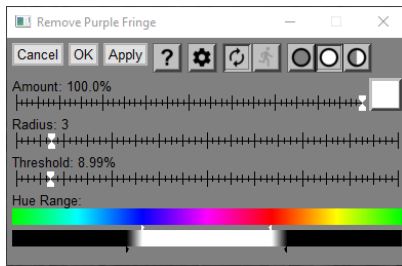
Unlike chromatic aberration, purple fringe is only purple and can be anywhere in the frame. Color fringes from chromatic aberration are most pronounced at the edges and especially the corners of the image. They also come in pairs of complementary colors (magenta/green or blue/yellow), and are usually visible at any sharp edge, not just edges adjacent to overexposed highlights.

Here is a magnified example of mild chromatic aberration from the edge of a much larger image. Notice the green fringes on one side and magenta on the other.



Chromatic aberration is usually well corrected during raw conversion if you have an accurate lens profile for your camera body.

## Using the Remove Purple Fringe Transformation



### Amount

The Amount control works the same as for other transformations. It can scale back the overall effect of the transformation or isolate the effect to specific parts of the image via a mask.

### Radius

The Radius slider sets the maximum distance a pixel can be from a bright pixel and still be considered a purple fringe pixel. This should be set to roughly the fringe width in pixels or perhaps a bit larger since the effect falls off gradually as you reach the full radius value. Try to use the smallest value that removes all the fringe to minimize the impact on other parts of the image.

### Threshold

The Threshold slider defines how bright a pixel must be to qualify pixels within the radius setting as purple fringe pixels. Set the threshold as high as possible while still maintaining the desired effect as this will minimize collateral damage to other parts of the image.

### Hue Range

The Hue Range slider defines the range of hues you want to consider as purple. If the selected range is too narrow, the transformation will not remove all the fringe. If the range is too wide, it may start affecting other parts of the image.

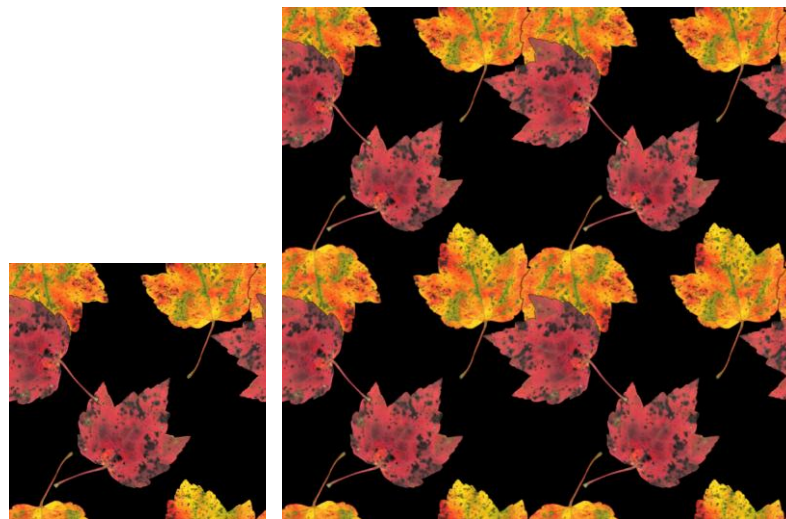
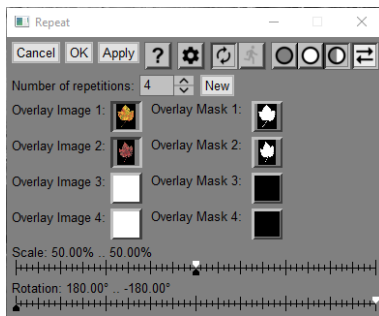
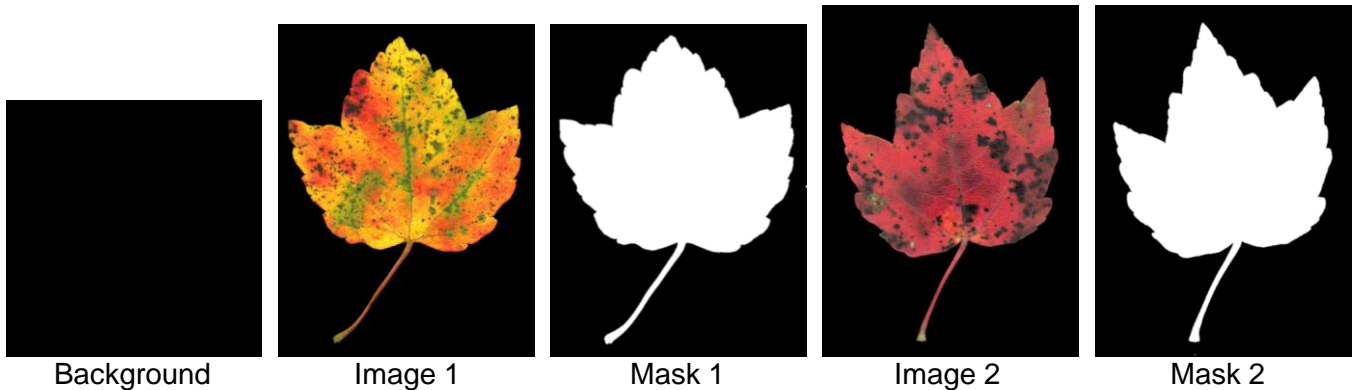


At the top of the hue range is a color strip that shows you the full range of possible hues with magenta in the center. There is also a gray bar and four sliders - two white ones above the bar and two black ones below it. Moving the white sliders moves the corresponding black slider at the same time. The range of hues between the white sliders is fully selected as indicated by the gray bar between them being white. Moving the black sliders extends the hue range, causing its effect to fall off gradually for pixels whose color is adjacent to the fully selected range. These partially selected hues between the black and white sliders are affected but to a lesser extent than pixels with fully selected hues. Pixels with hues outside the range defined by the black sliders will not be affected by the transformation at all. This range feathering reduces artifacts from the transformation suddenly cutting off.

# Repeat

The Repeat transformation is a special effect that simulates dropping up to four different objects onto a background image in random locations, sizes and orientations, a little like falling leaves. The output image is a seamless tile since the objects wrap around both horizontally and vertically if they fall on an edge.

The background image is the input image. To work properly, for each object you need an image and a mask that isolates the object in that image. All images must be the same type.



## Number of repetitions

This setting controls the number of objects that will be dropped on the background image.

## New

Clicking the New button generates a new random pattern based on the current settings.

## Overlay Images / Masks

This is where you select the images and masks for each object. If no image is selected, the object is ignored.

## Scale

This double slider specifies the range of scale factors to be applied to the objects. A value between the minimum and maximum will be chosen at random for each object dropped.

## Rotation

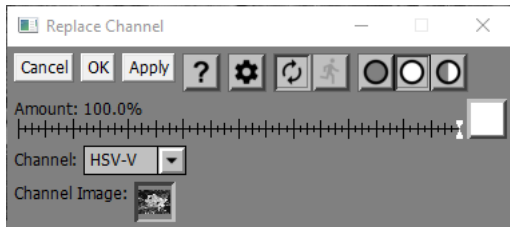
This double slider specifies the range of rotation angles to be applied to the objects. A value between the minimum and maximum will be chosen at random for each object dropped.

# Replace Channel

The Replace Channel transformation lets you replace a single channel of a color image with a substitute black and white channel image of the same size. This transformation is primarily useful for applying one or more transformations to a single color channel of an image while leaving the other channels unchanged.

This transformation works in the RGB, HSV or HSL color space.

## Using the Replace Channel Transformation



### Amount

The Amount control works the same as for other transformations. It can scale back the overall effect of the transformation or isolate the effect to specific parts of the image via a mask.

### Channel

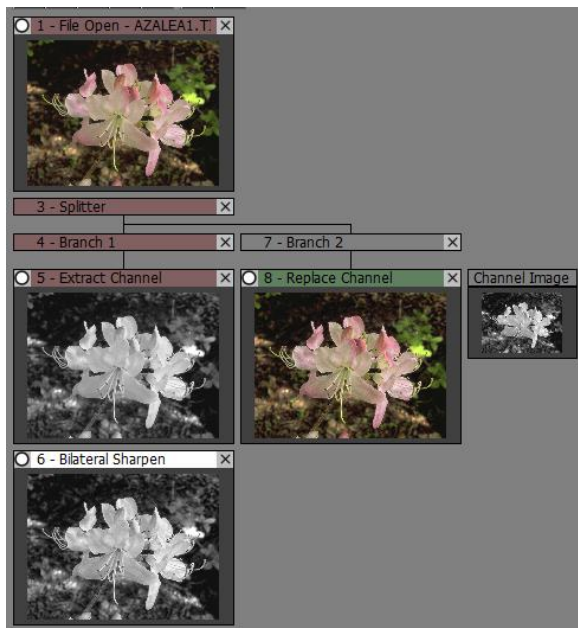
This control lets you select the color channel you want to replace. It can be one of nine options: Red, Green, Blue, HSV-H, HSV-S, HSV-V, HSL-H, HSL-S, HSL-L.

### Channel Image

This image picker control lets you select the substitute black and white image for the selected color channel. Only black and white (either 8-bit or 16-bit) images whose size in pixels matches the input image can be selected as a channel image.

## Example – Sharpening the HSV-V Channel of a Color Image

Suppose you wish to sharpen just the HSV-V channel of an image. While this feature is already built into some of the sharpen transformations, here is a way to do it using Replace Channel instead. This same technique can be used to apply any set of transformations to any channel of a color image.



- 1) Open the file you want to work on.
- 2) Insert a splitter after it (right click on the image and select Insert Splitter After from the context menu).
- 3) In one branch, extract the channel you want to operate on using the Color/Extract Channel transformation (HSV-V in this case).
- 4) Apply the desired transformation to the extracted channel (in this case Multipass Sharpen).
- 5) In the other branch, place the Replace Channel transformation and select the same channel you selected in step 3. Select as the Channel Image the Multipass Sharpen image.

The result of Replace Channel will now be the original image with its HSV-V channel sharpened.

# Resize

Image size is determined by three parameters: width and height in pixels and resolution in dpi (dots per inch). Technically this should be called ppi (pixels per inch), but the term dpi is more commonly used for historical reasons.

The physical width and height of an image is calculated as (width in pixels)/dpi and the physical height is (height in pixels)/dpi. For example, working in inches, an image 1000 pixels wide and 1500 pixels high with a dpi of 100 has a physical size of 10 x 15 inches.

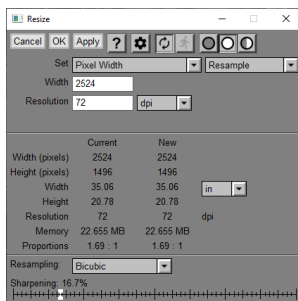
Physical dimensions are mostly irrelevant unless you are printing the image or exporting it to a word processor or page layout program, in which case the size can be used as a default size for the image on the page.

Changing the dimensions of an image in pixels requires a process called resampling since the pixels in the output image must be computed from the input image by some kind of interpolation.

Usually resampling preserves the image proportions, but you can also resample by different factors horizontally and vertically which stretches the image.

The Resize transformation lets you change either the physical dimensions of an image, its size in pixels or both.

## Using the Resize Transformation



### Resample/Don't Resample

This control lets you specify whether you want to Resample (change the image dimensions in pixels) or Don't Resample (change the resolution only)

#### Set

This control lets you specify what size settings you want to change. The options are different depending on the Sample/Don't Resample setting -- unavailable options are grayed out in the list. The controls below Set are where you enter the size settings and units.

#### Resample

**Pixel Width** -- Set image width in pixels and resolution - image height is calculated to preserve proportions.

**Pixel Height** -- Set image height in pixels and resolution - image width is calculated to preserve proportions.

**Pixel Width & Height** -- Set width and height of image in pixels and resolution - use this to change the image proportions.

**Physical Width** -- Set width of image in physical units and resolution - image height is calculated to preserve proportions. The image width in pixels is computed by multiplying the physical width by the resolution.

**Physical Height** -- Set height of image in physical units and resolution - image width is calculated to preserve proportions. The image height in pixels is computed by multiplying the physical height by the resolution.

**Physical Width & Height** -- Set image width and height in physical units and resolution - use this if you want to change the image proportions.

**Memory** -- Set image size in megabytes (MB) while preserving proportions. The actual value may differ slightly since image width and height are integers.

**Pixel Short Side** -- Set image shorter side in pixels and resolution - image longer side is calculated to preserve proportions.



**Pixel Long Side** -- Set image longer side in pixels and resolution - image shorter side is calculated to preserve proportions.

**Physical Short Side** -- Set image shorter side in physical units and resolution - image longer side is calculated to preserve proportions. The image dimension in pixels is computed by multiplying the physical dimension by the resolution.

**Physical Long Side** -- Set image longer side in physical units and resolution - image shorter side is calculated to preserve proportions. The image dimension in pixels is computed by multiplying the physical dimension by the resolution.

**Pixel Bounding Rectangle** -- Set image width and height as large as possible, without altering the proportions of the image, to fit in a rectangle of given width and height in pixels.

**Physical Bounding Rectangle** -- Set image width and height as large as possible, without altering the proportions of the image, to fit in a rectangle of given width and height in physical dimensions.

**Pixel Percent** -- Enlarges or reduces the image size in pixels by a given percentage, without altering the proportions of the image. A value of 100% leaves the image the same size.

**Megapixels** -- Enlarges or reduces the image size to a given number of megapixels, without altering the proportions of the image.

## Don't Resample

**Physical Width** -- Set width of image in physical units. The resolution is computed by dividing the width in pixels by the physical width.

**Physical Height** -- Set height of image in physical units. The resolution is computed by dividing the height in pixels by the physical height.

**Resolution** -- Set image resolution.

**Physical Short Side** -- Set image shorter side in physical units. The resolution is computed by dividing the dimension in pixels by the physical dimension.

**Physical Long Side** -- Set image longer side in physical units. The resolution is computed by dividing the dimension in pixels by the physical dimension.

**Physical Bounding Rectangle** -- Set image width and height by altering just its resolution, as large as possible, to fit in a rectangle of given width and height in physical dimensions.

**Physical Percent** -- Enlarges or reduces the image physical dimensions by a given percentage by changing its resolution setting only. A value of 100% leaves the image the same size.

## Width/Height/Resolution

This area displays the width and height in pixels, the physical width and height, the resolution and the image size and proportions for the input image (Current) and for the output image (New). This lets you see how the transformation is changing each of these parameters.

## Resampling

If resampling is selected, this control lets you select what resampling method you want to use.

**Nearest Neighbor** -- This setting selects the simplest method of resampling, call nearest neighbor. The color of each pixel in the output image is the color of the nearest pixel in the input image. This interpolation method is extremely fast, but when making an image larger, the individual pixels become visible as little blocks of solid color and when making an image smaller the effect can be coarse and jagged.

An interesting effect can be obtained by resizing an image smaller using Bicubic interpolation and then larger again using Nearest Neighbor. This converts the image to a sort of mosaic made up of large blocky pixels.

**Bilinear** -- Bilinear interpolation uses only the four neighboring pixels. It produces slightly softer results than the default Bicubic method.

**Bicubic** -- This is the default setting and produces high quality results. When resizing the input image, new pixels are computed by interpolating between the existing pixels using a technique called bicubic resampling. When this method is selected an additional sharpening slider is available. The default

setting of 16.7% is recommended; moving the slider alters the bicubic convolution kernel to add or remove a little sharpening during the resampling process.

**Lanczos** -- These settings use a method called Lanczos-windowed sinc resampling to resize the input image. The larger the window, the larger the neighborhood of pixels used to interpolate between pixels. Using more pixels means you can obtain more accurate resampling at the expense of increased computation times. These higher quality resampling methods are especially useful when you need to scale an image by 200% or more and want to squeeze out the most resolution possible. The Lanczos 4x4 method produces nearly identical results to Bicubic resampling; the Lanczos 6X6 and Lanczos 8X8 methods produces slightly better results.

### **Sharpening**

Depending on the resampling method, there may be a sharpening option.

## Examples of Resampling Methods

The differences between bilinear, bicubic and Lanczos sampling are fairly subtle.

### Nearest Neighbor

The nearest neighbor resampling method is very simple; it computes new pixels as the value of the nearest pixel in the original image. This produces a blocky result when upsampling and a coarse, grainy effect when downsampling.



### Bilinear

Bilinear resampling computes new pixels using linear interpolation. When upsampling, this method operates on the 2 by 2 cell of pixels surrounding each new pixel location. The resulting images are much smoother than those produced by the nearest neighbor method but are not as sharp or as smooth as image computed using bicubic resampling (see below).



## Bicubic

Bicubic resampling computes new pixels using a cubic splines. When upsampling, this method operates on the 4 by 4 cell of pixels surrounding each new pixel location. This is the recommended resampling method for most images as it represents a good trade-off between accuracy and speed.

This method has an extra parameter you can use to sharpen the image during the resampling process. No sharpening gives the smoothest results; excessive sharpening can produce halos and more jagged diagonals. The default sharpening value of 16.7% is usually a good compromise.

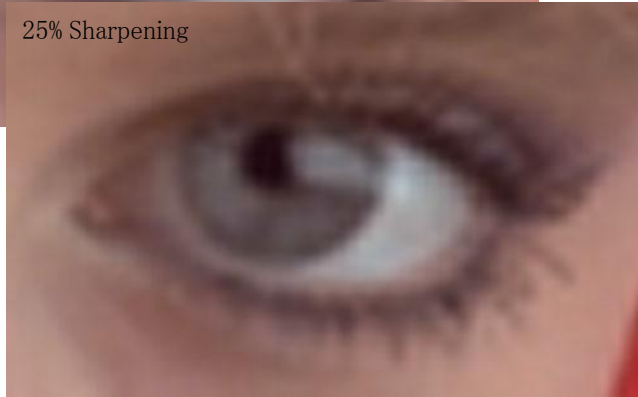
0% Sharpening



16.7% Sharpening



25% Sharpening



### Lanczos 4X4, 6X6 and 8X8

Lanczos resampling computes new pixels using a Lanczos-windowed sinc kernel. When upsampling, these methods operate on the 4 by 4, 6 by 6, or 8 by 8 cell of pixels surrounding each new pixel location. The 4 X4 method is nearly identical to the bicubic method with no sharpening; the 6X6 and 8X8 methods produce slightly more accurate results than bicubic but take a little longer to compute.

4X4

6X6

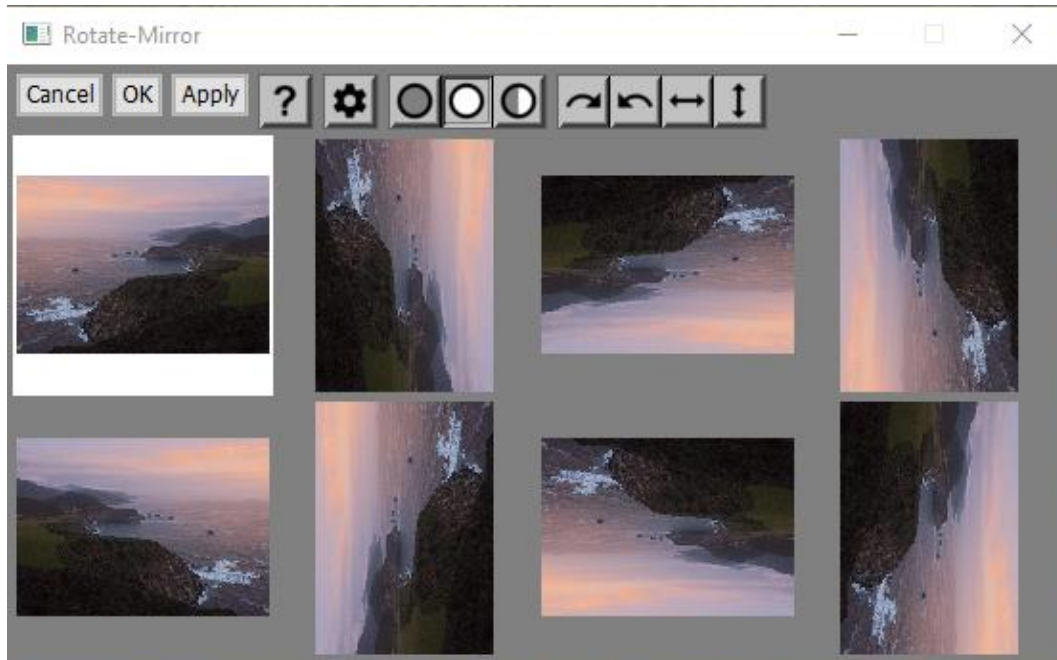
8X8



# Rotate-Mirror

The Rotate-Mirror transformation lets you rotate an image in increment of 90° and/or mirror the image. There are eight possible combinations of rotation and reflection. To rotate an image by an angle that is not a multiple of 90°, you can use either the Crop or the Level transformations.

## Using the Rotate-Mirror Transformation



Miniatures of the eight possible variations are displayed at the top of the dialog box. The top row shows rotation by 90° clockwise from left to right. The bottom row is mirrored and rotated 90° counter-clockwise from left to right.

### Action Tool Bar

The currently selected orientation is highlighted with a white background. You can either just click on the one you want, or you can use the action tool bar to switch to a rotated and/or reflected version of the current one.

### Settings Menu

- ✓ **Select Orientation Manually**
  - Un-Rotate
  - Re-Rotate
- ✓ **Reset orientation in batch mode**

#### Select Orientation Manually

This is the default setting – clicking on any of the thumbnails selects the corresponding image orientation.

#### Un-Rotate

If Un-Rotate is checked, if the camera was rotated when the image was captured (typically, either left or right for portrait mode), the orientation is set to correspond to the camera being in its normal landscape orientation. Naturally, this is only possible if the camera records its orientation in the image file's metadata.

The purpose of this option is to facilitate processing a series of images in a batch workflow where some were take in landscape and some in portrait mode. For example, if there are dust specks on your camera sensor that show up in the same location for every



image, you could use the same Speck Removal transformation to remove the dust specks from all of the images.

### **Re-Rotate**

If Re-Rotate is checked, any rotation resulting from the Un-Rotate option above is reversed, restoring the image to its orientation before Un-Rotate was applied. Typically you would use this option after removing the dust specks.

Clicking on any of the thumbnails or any of the buttons of the Action tool bar reverts this setting to Select Orientation Manually.

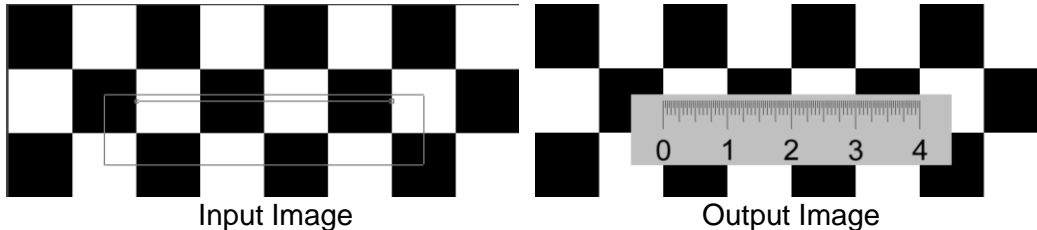
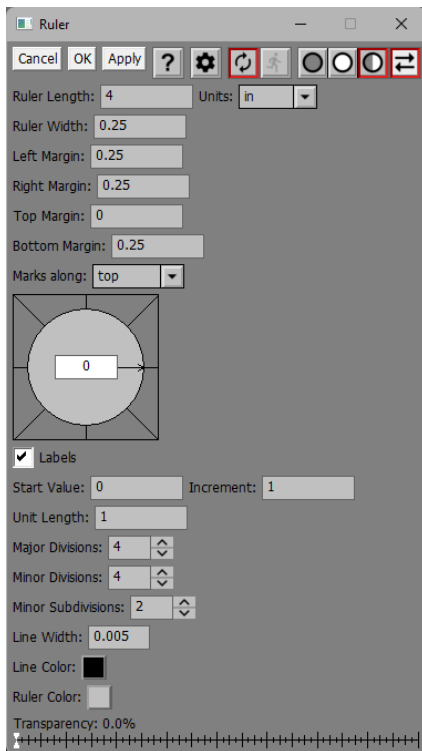
### **Reset orientation in batch mode**

If this item is checked, Orientation is reset for each new image when processing a batch job. Otherwise, Orientation remains set to its value the last time the transformation was executed.

# Ruler

The Ruler transformation superimposes a ruler on the input image to produce the output image. The ruler is a rectangular area containing a scale, optionally with labeled tic marks.

## Using the Ruler Transformation



A rectangular overlay is displayed on the input image indicating the space the ruler will occupy. A line is also displayed within the rectangle indicating the location of the ruler's scale. A control point consisting of a small circle is displayed at the origin of the ruler's scale, with another square control point at the other end. You can reposition the ruler by dragging the scale origin. You can change the ruler angle by dragging the scale line. You can change the ruler length by dragging the scale endpoint.

## Ruler Length and Units

This setting controls the length of the scale part of the ruler and the units that the length and other physical measurements are in. The length does not include the left or right margins.

Units may be pixels, inches, centimeters, or millimeters. If you select a unit other than pixels, the input image's dpi setting is used to determine the image dimensions. When you change units, all the readouts are adjusted so the output image remains unchanged.

## Ruler Width

This setting controls the width of the scale part of the ruler in the current units. The width does not include the top or bottom margins.

## Margins

The margin settings let you add extra space around the scale part of the ruler. If you plan to add labels to the ruler's scale, you may need to add margins to make space for the labels.

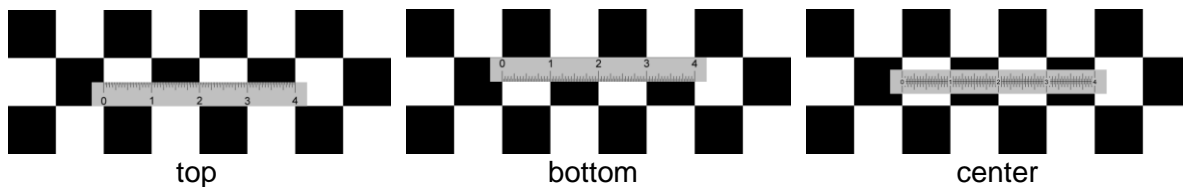
## Marks along

This setting lets you place the scale tic marks along the top of the ruler, the bottom of the ruler or in the center of the ruler.

If you select bottom, labels are placed above the scale, and you will need to add a top margin to make room for the labels. The size of the labels is based on the size of the top margin.

If you select top, labels are placed below the scale, and you will need to add a bottom margin to make room for the labels. The size of the labels is based on the size of the bottom margin.

If you select center, labels are placed on top of the scale. The size of the labels is based on the size of the ruler width.



## Angle

You can set the angle of the ruler using the compass control. Zero degrees corresponds to horizontal and as the angle increases, the ruler rotates counter-clockwise about the scale origin.

## Labels

If this box is checked, labels will be displayed for every major tic mark, assuming there is room for them. The first or last label is not displayed if it is too close to the end of the ruler. If you need to label the ends of the ruler, increase the left and right margins to make extra room.

## Starting Value and Increment

When labeling the ruler, the Starting Value is used for the origin of the scale and the Increment is added for each major tic mark. For example, for an inch ruler, the starting value might be 0 and the increment 1. For a millimeter ruler, the increment might be 10, assuming major tic marks every centimeter. If you are creating a scale for a map, the increment can be adjusted to correspond to the reproduction ratio of the map.

## Unit Length

This setting determines the interval between major tic marks in the current units.

## Major and Minor Divisions

These settings determine how each major unit is subdivided into minor units and further subdivided into minor subdivisions. The tic marks get smaller and smaller as you go from major to minor. To omit a subdivision level, set it to 1.

## Line Width

This setting determines the width of the tic mark lines in the current units.

## Line Color and Ruler Color

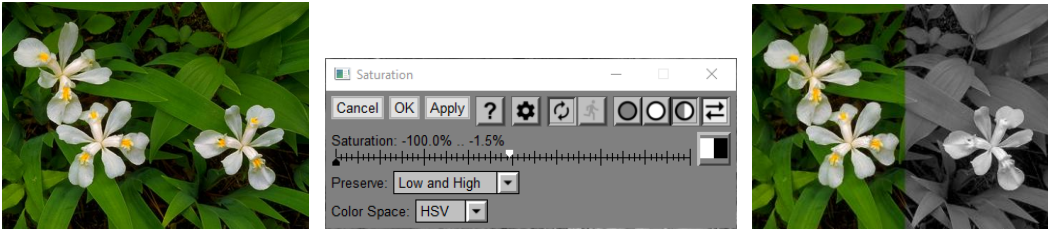
The Line Color lets you assign a color to the scale and the labels, if any. The Ruler color controls the background color of the ruler.

## Transparency

This setting lets you make the ruler semi-transparent.

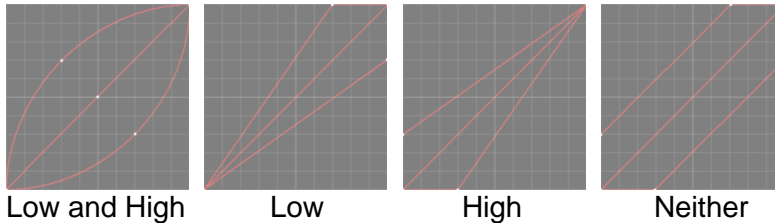
# Saturation

The Saturation transformation lets you increase or decrease the saturation of an image using a simple slider or selectively, using an Amount mask.



## Preserve

The Preserve control determines what family of curves is used to adjust saturation.



**Low and High** – There is no effect on totally unsaturated or fully saturated colors. The primary effect is on mid-saturated colors. This setting works best most of the time.

**Low** – There is no effect on totally unsaturated colors. The primary effect is on partly or fully saturated colors. Increasing saturation using this method can lead to clipping of fully saturated colors.

**High** – There is no effect on fully saturated colors. The primary effect is on unsaturated or partly saturated colors. Decreasing saturation using this method can lead to clipping of unsaturated colors.

**Neither** – Saturation is increased or decreased equally for all colors. This can lead to clipping of either unsaturated or highly saturated colors.

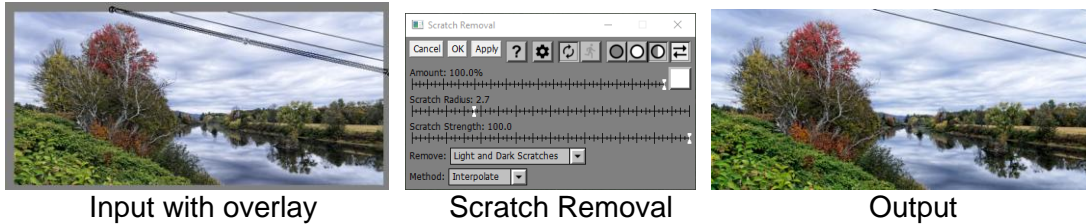
Note: If you select **High** or **Neither** and increase the saturation, this will make neutral (fully unsaturated) colors become red.

## Color Space

You can choose either the HSV or HSL color space – using HSL, saturation changes are more pronounced in the midtones; using HSV, saturation changes are more pronounced in the highlights.

# Scratch Removal

The Scratch Removal transformation paints over straight lines or curves in the input image by interpolating from either side of the line towards the center. This is useful for removing power lines, hairs, scratches, or other linear image artifacts, assuming they are not too large.

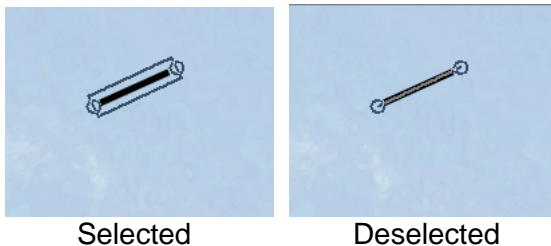


## Input Image Overlay

The Scratch Removal transformation displays an overlay on the input image to let you specify one or more scratches you want to remove.

To define a scratch, shift-click on the input image at one end of the line and drag to the other end. Or, if you prefer, you can shift-click at one end to create a zero-length scratch and then shift-click at the other end to extend it. You can mark as many scratches as you want. To define a new scratch, the current scratch, if any, must first be deselected by clicking on the input image away from any of its control points.

To select a scratch, click on any of its control points or click anywhere within the scratch outline. To deselect a scratch, click away from any of its control points outside its outline. The currently selected scratch is outlined with a box indicating the width of the scratch. Deselected scratches are displayed with just a single thin line running through the control points.



To create a curved scratch, place additional control points along the curve – the scratch line always passes through each of the control points.



To add a new control point to a scratch, first make sure the scratch is selected by clicking on one of its control points, if necessary. Then shift-click on the input image between two control points where you want to insert the new control point.

When you add a new control point to an existing scratch, it is inserted between two nearby control points. If you click too far away from the curve, it may not choose your intended insertion point, so a better way is to shift-click between two existing points and then drag the new point where you want it. If you shift-click beyond either end of the scratch, it is extended.

To reposition a control point, click and drag it.

To remove a control point, ctrl-click on it. When you get down to one control point, the entire scratch is removed.

To remove an entire scratch, ctrl-shift-click on it.

To increase or decrease the scratch width, use the Scratch Radius slider (see below) or you can use the mouse scroll wheel.

## Amount

The amount control blends a percentage of the input image with the output image to scale back the effect of the Scratch Removal transformation. If you create a mask, you can use the amount control to localize the effect of the transformation to parts of the input image.

## Scratch Radius

This slider adjusts the width of the current scratch.

## Scratch Strength

This slider lets you reduce the effect of the scratch removal for the current scratch.

## Scratch Softness

This slider lets you control how the edges of the scratch are blended with the input image. At 0%, the edges are hard – at 100%, the edges are heavily blended.

## Remove

This lets you limit scratch removal or just those lighter than the background or just those darker than the background. In some cases, this can reduce collateral damage to the background.

## Method

There are two scratch removal methods.

### Interpolate

This method fills in the scratch by interpolating image data perpendicular to the line, from one edge to the other. It works best if the background behind the scratch is smooth and with little texture.

### Clone

This method fills in the scratch by painting patches of the input image from either side over the scratch. It works best if the background behind the scratch is heavily textured.

Here are examples showing the results of applying the two different methods to two different images:

Input



Interpolate



Clone





# Selective Correction

What makes Selective Correction so powerful is that it lets you change one or more colors in an image without changing any other colors in the image and without the painstaking work of masking the parts of the image you want to change. This type of selective color correction goes far beyond conventional color balancing or filtration techniques that simply apply a uniform correction to the entire image or give you a few sliders to adjust.

In addition to changing the hue and saturation of selected colors, you can also use it to lighten or darken selected colors in an image. For example, you can change the color of a sky and darken it at the same time.

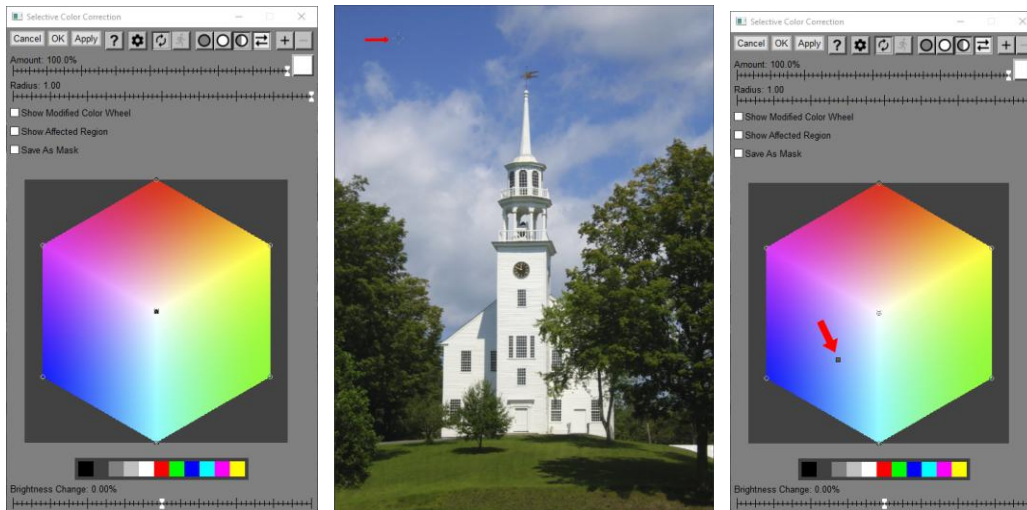
Finally, you can make multiple color adjustments at the same time. For example, you can correct the skin tones, sky color and clothing colors in a photograph with immediate on-screen preview of each modification as you make it.

## Quick Start

Before getting into the details, here are the basics.

### Create a new control point.

Click on a part of the input image whose color you want to change. This creates a new control point in the color hexagon at the location corresponding to the hue and saturation of the input image at the location you selected.



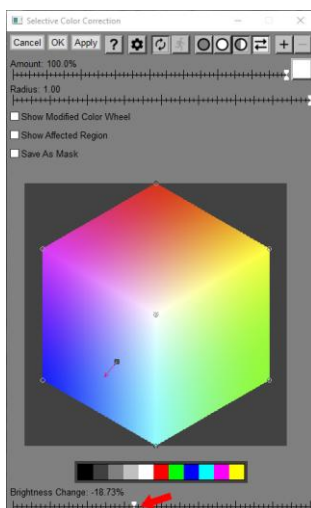
### Specify a Color Correction.

Click and drag the new control point in the color hexagon to change its color. This extends a line and an arrowhead from the control point in the direction you move it. Moving a control point toward or away from the center of the color hexagon reduces or increases the saturation; moving the control point clockwise or counter-clockwise changes the hue.



### Specify a brightness correction.

To make brightness as well as color adjustments, use the Brightness Change slider located just below the color hexagon. Move the slider to the right to lighten or to the left to darken colors whose hue and saturation match those of the control point.



The Brightness Change slider is only displayed when a control point is selected—to select a control point, just click on it in the color hexagon. Each control point has its own independent brightness change setting.

### Make additional corrections.

If a correction changes colors other than the ones you are trying to change, you can narrow the range of affected colors. Just create one or more additional control points by clicking on parts of the image that you want to leave unchanged. When you create a new control point and specify no color adjustment (by not dragging it to a new location or moving its brightness slider) you are telling Picture Window not to change pixels in the input image that match the hue and saturation of the control point.

You can refine an existing correction by dragging either end of any of the control point. In most cases, you will want to drag the arrowhead and not the circle.

You can also create and adjust additional control points as necessary if you want to make any additional color corrections to the same image.

To remove a control point, ctrl-click on the control point at either end of the arrow.

## How Selective Color Correction Works

### Hue and Saturation Matching

Selective Color Correction is based on hue and saturation matching. When you create a control point that tells Picture Window to change color A to color B, it searches the input image for colors that match color A exactly, regardless of how light or dark they may be, and changes their hue and saturation to that of color B while preserving their brightness. For a pixel whose hue and saturation does not exactly match any of the control points, it uses 2-dimensional interpolation to derive corrections based on how close the hue and saturation of the pixel are to those of each of the currently defined control points.

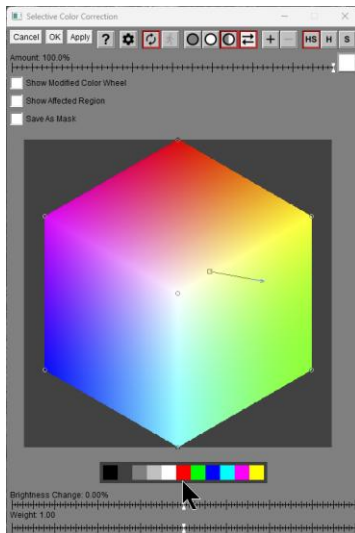
The reason this method works so well is that a colored object such as an orange has a more or less uniform surface color but, due to uneven lighting and an irregular shape, it does not have uniform brightness. The parts of the orange that face away from you or that are poorly lit may look dark, while the parts that face you or are well lit may look light. By matching colors based on hue and saturation and ignoring variations in brightness, Selective Color Correction lets you change the entire orange in a single operation.

### Brightness Changes

Normally, when a pixel whose hue and saturation match color A is changed to color B, only its hue and saturation are changed, and its original brightness is retained. If you request a brightness change however, you can make it either lighter or darker as well as changing its color.

Naturally, there are limits to how brightness changes are applied since, if a pixel is already as light as it can get, it cannot be made brighter, or if it is already black it cannot be made darker.

## Using the Selective Color Correction Transformation



### The Color Hexagon

This is area in the middle of the dialog box where control points are displayed. To color correct an image, you create and adjust control points on the input color hexagon. You can add control points up to a maximum of 256.

You can zoom and scroll the color hexagon to make fine adjustments.

### Creating A New Control Point

There are two ways to create a new control point:

#### Clicking on the input image

This creates a new control point at the point in the color hexagon whose hue and saturation match those of the input image at the tip of the eyedropper. This method is

usually the most natural since you are indicating the color you want to change by pointing to an example of it.

When you click on the input image, Picture Window samples the color of the input image in a small square centered on the location you clicked at and averages the colors of all the pixels in the square. It then computes the hue and saturation of this average color and creates a control point at the spot in the input color hexagon corresponding to those computed values.

You can control the size of the sampling area by changing the Probe Size setting via the Settings Menu. Averaging a small area instead of sampling a single pixel can be useful when the region you are clicking on has a lot of texture.

### **Shift-Clicking on the Color Hexagon**

This creates a new control point where you click. This method is useful when you want to manipulate the color hexagon directly. An alternate way to create new control points is to right-click on the color hexagon and select Create a New Control Point from the menu.

### **Removing a Control Point**

To remove a control point, Ctrl-click on it. An alternate way to remove a control point is to right-click on the control point in the color hexagon and select Delete Control Point from the menu.

### **Resetting a Control Point**

To reset a control point's color or brightness change without removing it, right-click on the control point in the color hexagon and select Reset Control Point Color Change or Reset Control Point Brightness Change from the menu.

### **Editing a Control Point**

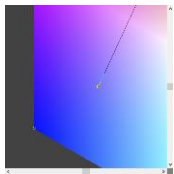
To select a new control point, click on it. This makes it the current control point which is distinguished from the other control points by being displayed as a square instead of a circle.

To edit the current control point, click and drag on it. This extends the control point from a single point to an arrow indicating what color change to apply. You can then drag either end of the arrow independently.

### **Zooming and Scrolling the Color Hexagon**



The two-button tool bar at the top of the dialog box lets you zoom the color hexagon in or out. If it is zoomed in, scroll bars are displayed to let you view different parts.



When making small color corrections, you may find zooming in on the color hexagons makes it easier to fine tune the effect. The zoom in button is grayed out when you reach the maximum zoom factor; the zoom out button is grayed out when the entire hexagon is displayed.

### **Adjusting Just Hue or Saturation**



Normally, you can move control points freely within the color hexagon. To limit adjustments to hue-only or saturation-only, click the corresponding button.

## Amount

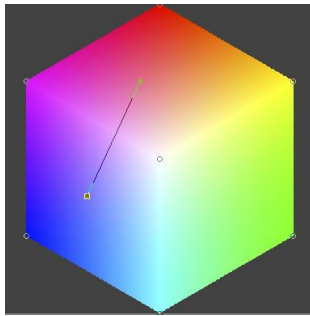
The Amount control lets you dial back the overall effect of the transformation. If you create an Amount mask, you can apply the color corrections to selected parts of the image.

## Radius

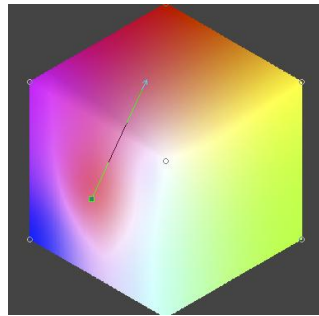
The Radius slider changes the 2-dimensional color interpolation to make a tighter or looser fit to the control points.

## Show Modified Color Wheel

Checking the Show Modified Color Wheel box applies the color corrections to the color hexagon itself and displays the modified version instead of the original version.



Color Hexagon



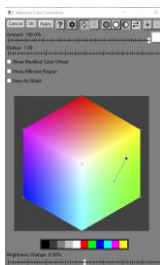
Modified Color Hexagon

## Show Affected Region

The Show Affected Region checkbox is displayed when a control point is selected. Checking it alters the output image to indicate what parts of the image are affected by the current control point and how much. Parts of the image unaffected by the current control point are blacked out; parts of the image that are fully affected are displayed normally; parts of the image that are partially affected are darkened proportionately. Unchecking the box or deselecting the control point restores the output image display.



Original



Output



Show Affected Region

There are several reasons you may find this feature useful:

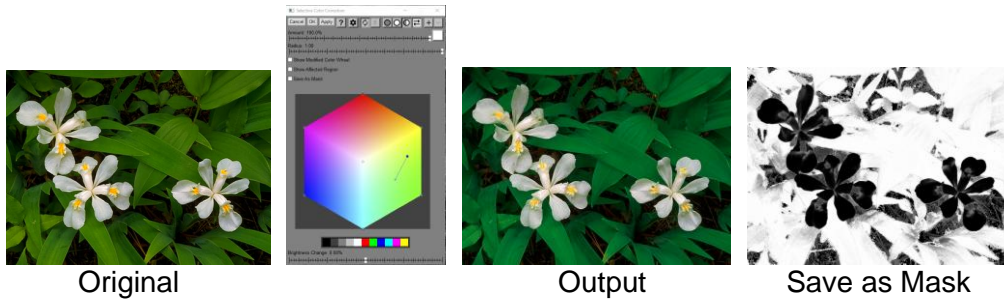
- It lets you see if a control point is altering parts of the image you do not wish to change. If this happens, you may need to use a selection to restrict Selective Color Correction to working on only the part of the image you want to change, or you may need to create additional control points to refine the color selection process.
- If you have several nearby control points, it lets you see which ones are affecting which pixels.
- It helps you understand how selective color correction works and what each control point is doing to the image.

## Save as Mask

The Save as Mask checkbox is displayed when a control point is selected. Checking it changes the output image to a black and white image. Parts of the image unaffected by the current control point are black; parts of the image that are fully affected are white; parts of the



image that are partially affected are gray. Unchecking the box or deselecting the control point restores the output image display.



### Palette

The row of color patches just below the color hexagon represents the current palette as defined by the Palette Tool. This is useful if you want to match colors in one image against those in another image. Clicking on a palette color inserts a new control point at the corresponding hue and saturation. Shift-Clicking on a palette color sets the output color for the current control point, if any.

### Brightness Change

The Brightness Change slider is only displayed if a control point is currently selected. It lets you lighten or darken colors that match the control point. Each control point has its own brightness change setting.

### Weight

The Weight slider is only displayed if a control point is currently selected. It lets you adjust the relative importance of the current control point. The greater the weight, the greater the range of surrounding colors it affects. Each control point has its own weight setting.

## Working with Control Points

Each control point consists of a pair of endpoints connected by an arrow. When you create a new control point, both endpoints are in the same location, and the control point is displayed as a small circle. Setting both endpoints the same tells Picture Window not to change colors for pixels whose hue and saturation are at or near the hue and saturation of the control point.

### Making a Color Correction

Before you can change a control point, it must first be selected as the current control point by clicking near it.

To separate the two endpoints of the current control point, click and drag on it. An arrow will be displayed connecting the original location of the control point and the spot to which you dragged it. This tells Picture Window to change colors whose hue and saturation match the hue and saturation corresponding to the base of the arrow to the color at the arrowhead. If you wish, you can make further adjustments to the control point by dragging either endpoint.

To increase the saturation of colors for a control point, drag the arrowhead away from the center of the color hexagon; to decrease the saturation, drag it toward the center. To change the hue of colors for a control point, drag the arrowhead either clockwise or counter-clockwise about the center of the color hexagon.

### The Seven Initial Control Points

When Selective Color Correction starts up, it automatically places control points at each of the six vertices of the color hexagon corresponding to the fully saturated primary and secondary colors and a seventh control point in the center for pure white. You can modify or remove any of these seven default control points, but most of the time you are better off leaving them alone as they lock down the extreme colors and preserve neutral grays. There are two exceptions to this general rule:

- Sometimes, moving the white point can be a good way to add a color cast to the neutrals in an image, should you wish to do this deliberately.
- If you create a new control point close to one of the seven initial control points, you may have to remove the nearby initial control point to keep it from interfering with the correction you are making.

## **Making Brightness Adjustments**

In addition to using control points to make color adjustments, you can also use them to make brightness adjustments. Each control point has an associated brightness change. A brightness change of 0% means no change; a positive brightness change tells Picture Window to lighten the colors; a negative brightness change tells Picture Window to darken the colors. The Brightness Change slider is displayed any time a control point is selected. When you create a new control point, it automatically becomes the current control point so you can go ahead and adjust its brightness change right away. You can make a control point current at any time by simply clicking on it. The current control point is displayed as a small filled-in square instead of a small open circle, so you can tell which one is selected.

## **Two Ways to Use Control Points**

You can use control points two different ways—to change one color to another or to keep a color from changing. You may find the second type of control point useful if some colors near a control point you have created are being changed and you want them to remain the same. To do this, just create a new control point for the color you want to stay fixed and leave it with both endpoints on top of each other.

## **Problems with Large Corrections**


Selective Color Correction is designed primarily as a tool for fine tuning the colors in an image. This corresponds to moving control points by relatively small amounts and making limited brightness adjustments. While there is nothing to stop you from using it to make radical color or brightness changes, you may find it more difficult to do so without changing colors you did not wish to change. If this starts to happen, create control points for the colors you want to lock down.

Another problem you may encounter when you make large color adjustments is color fringing—a thin, colored halo around objects whose color you are changing. This happens because the pixels at the edge of the object are partly the color of the object and partly the color of the background, so they may fail to match the hue and saturation of the object closely enough to be adjusted. To some extent, this is a limitation of the transformation, however you may be able to greatly reduce or totally eliminate color fringes if you carefully locate the color of the edge pixels and create a control point that changes the edge color consistently with the change you are making to the object.

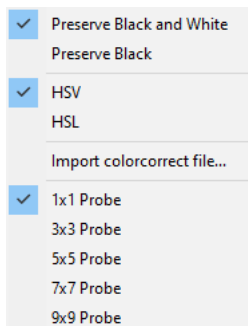
## **Selecting overlapping control points**

When endpoints of several control points are near each other or near another control point, it can be difficult to lock on to the one you want to drag. To make this easier, Picture Window always gives priority to the current control point. To make a control point current, you can select it either by clicking on one of its endpoints.

## **Settings Menu**

When you click on the  button at the top of the Selective Color Correction dialog box, the settings menu is displayed. This menu lets you select certain less frequently used commands and settings.





## **Preserve Black and White / Preserve Black**

This setting affects the way brightness changes are applied to the input image.

If Preserve Black is selected, the RGB channels are multiplied by the brightness change and clipped if they exceed the maximum brightness. This keeps black the same and applies moderate changes to midtones and the most change to highlights.

If Preserve Black and White is selected, blacks and white stay the same and the effects are mostly in the midtones.

## **HSV / HSL**

This setting lets you select which color space to work in when making brightness adjustments. Lightening colors in HSV scales all the RGB channels equally until one of them maxes out. Lightening colors in HSL makes them tend toward white.

## **Import colorcorrect file**

This command lets you import settings from colorcorrect files generated by previous versions of Picture Window.

## **Probe Size**

When you use the eyedropper tool to create a new control point, the image data in the input image is sampled at the location you clicked to determine its color. You can control the size of the region in the input image that is sampled by varying the probe size. Selecting the minimum value of 1x1 means that a single pixel in the input image is sampled. Selecting larger values such as 3x3 or 5x5 means that the average color of a 3x3 or 5x5 square patch of the input image is used instead. This can be more accurate, especially if the image has a lot of fine texture

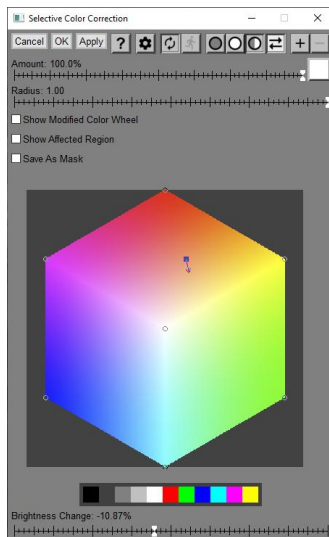
## Example 1: A simple skin tone correction



The skin tones in the image at the left are too red, too saturated, and too bright. The corrected version at the right shows how you can use Selective Color Correction to adjust the skin tones without changing the blues and purples of the scarf simply by creating a single control point.

The procedure for making this correction is as follows:

- Click on the woman's forehead to create a control point for the skin tones.
- Drag the control point a little toward the center of the color hexagon and a little toward yellow.



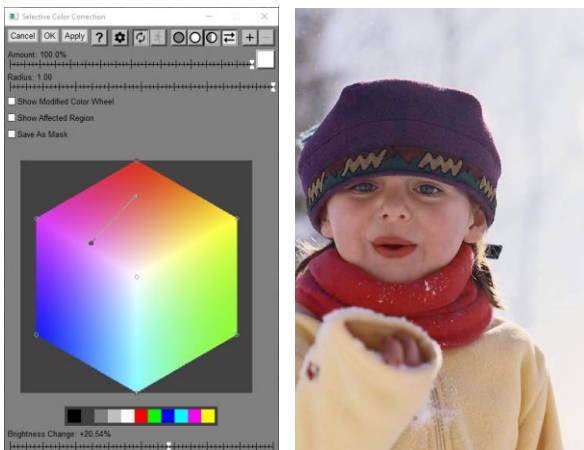
Feel free to experiment with different corrections, but skin tones usually only require small changes. Making such fine adjustments is usually easier if you zoom in on the color hexagon to magnify the area around the control point you are working on.

Leaving the skin tone control point selected, move the Brightness Change slider to the left to darken the woman's face. A value of roughly -10% was used to produce the corrected image above.

## Example 2: Using multiple control points

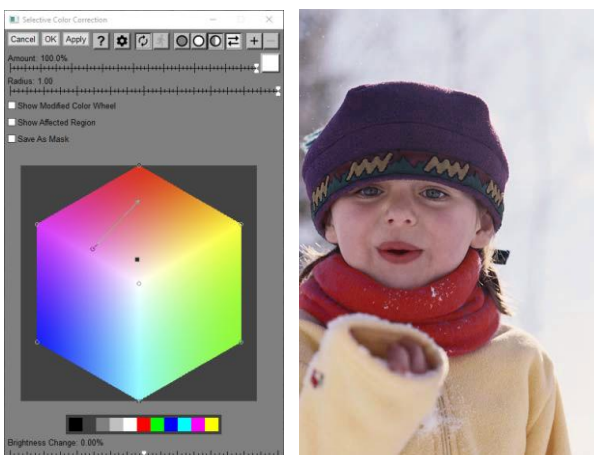


This example shows how you can make a major color change without changing the other colors in the image. First, create a control point by clicking on the scarf and then drag it from purple over to red.



To get the bright red shown above, you will also need to set the Brightness Change slider to roughly +20%. While this changes the scarf from purple to red, the change is so large it causes a small but visible reddening in the skin tones.

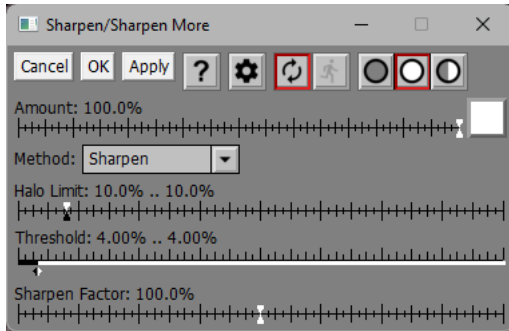
To preserve the skin tones from the original image, click on the face to create a new control point for the skin tones (and don't drag it). When you create this second control point, you are telling Picture Window not to change the skin tones.



You may also have noticed there a slight lightening of the purple cap which you could eliminate by creating a third control point.

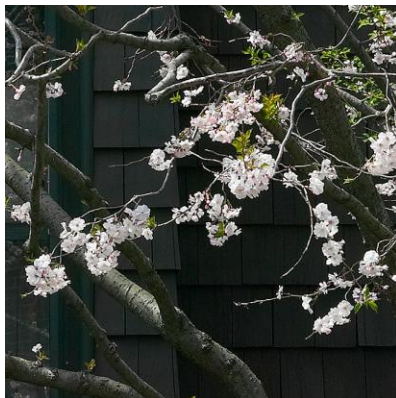
# Sharpen/Sharpen More

For slightly blurred images, the Sharpen transformation often works well.

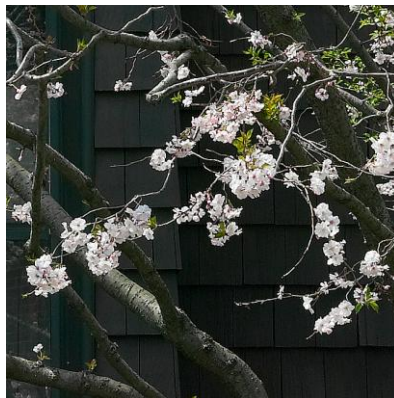


## Method

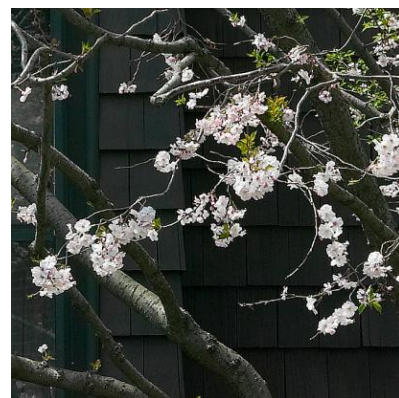
You can select Sharpen or Sharpen More. The effects of this setting are illustrated below:



Original



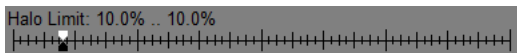
Sharpen



Sharpen More

## Halo Limits

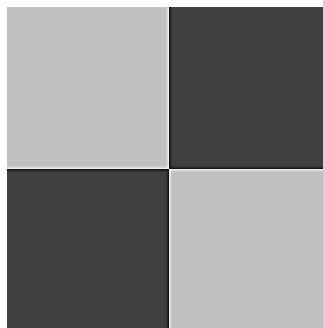
Excessive lightening of pixels during sharpening causes light halos around dark objects and excessive darkening causes dark halos around light objects.



Halo limits restrict how much any pixel can be lightened or darkened in the sharpening process. Typically values between 5% and 15% work fairly well. Light halos usually stand out more than dark halos so you can get away with a slightly larger value for the dark halo limit.



Original



Without Halo Limits

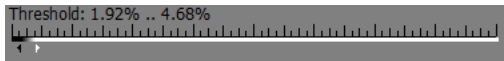


With Halo Limits

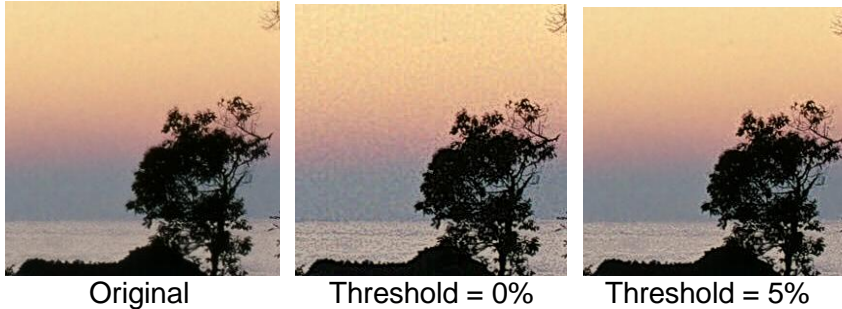
## Threshold

The threshold setting lets you limit sharpening to those pixels whose difference from their neighbors exceeds a specified threshold value. This prevents sharpening smooth areas while still sharpening more prominent details. The idea behind setting the threshold is to select the

smallest possible value that brings out edge detail without creating unwanted texture in smooth areas such as clouds or clear skies.



In the image detail below, you can see how Sharpen More with a threshold of 0% sharpens the tree silhouette, but also brings out noise in the sky and water. Increasing the threshold to 5% leaves the sky smooth but still makes the tree stand out against its background.



## Sharpen Factor

The sharpen factor determines how much lighter or darker to make each pixel when sharpening.



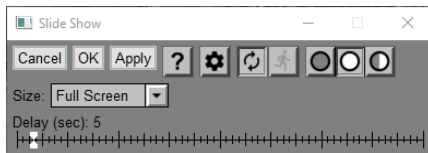
The larger the sharpen factor, the stronger the sharpening effect. The following example shows the effect of varying the sharpen factor from 100% to 200%:



There is a connection between halo limits and the sharpen factor. If you lower the halo limits, you can use a higher sharpen factor. Similarly, if you reduce the sharpen factor, you can use higher halo limits.

# Slide Show

The Slide Show transformation lets you assemble slide shows in a batch workflow. It copies its input image through to its output image, but if a batch workflow is in progress, as a side effect it resizes its input image and appends it to the current slide show. When the batch process terminates, the slide show is displayed.



## Size

This control lets you set the size of the images that make up the slide show.

## Delay

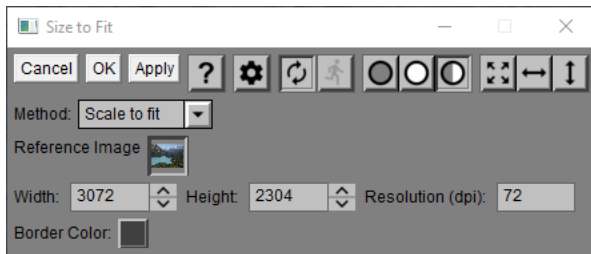
This slider lets you adjust the length of time slides are displayed before advancing to the next image.

For more information on batch processing, please see the separate document [Batch Processing.pdf](#).



## Size to Fit

The Size to Fit transformation lets you resize all or part of its input image to fit within an output image of specified dimensions.



## Cropping Rectangle

Size to Fit displays an overlay on the input image to let you specify what part of the input image you want to resize. You can adjust the cropping rectangle by dragging its corners, sides or interior.



This tool bar provides shortcuts to let you adjust the cropping rectangle as follows:

expands the crop box to include the entire input image

←→ centers the crop box horizontally

↑↓ centers the crop box vertically

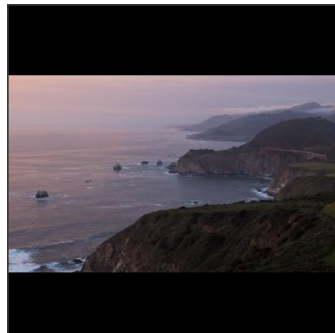
## Method

Size to Fit provides four different methods of resizing the part of the input image within the cropping rectangle:

### Scale to fit

The cropped input image is resized, preserving its proportions, as large as possible within the output image. If the output image is not filled completely, the resized image is padded with a solid border color, either on the left and right or on the top and bottom to fill the output image.

Use this option when to size an image, without losing any of it, to fit specific dimensions.





### Scale to fit – No border

This is the same as Scale to fit, except that it omits the border. The cropped region of the input image is scaled as large as possible without its width exceeding the Width setting or its height exceeding the Height setting. The output image size is reduced as necessary to eliminate the border.

### Scale to fill

The cropping rectangle is constrained to have the same proportions as the output image. The cropped input image is resized to fill the output image completely.

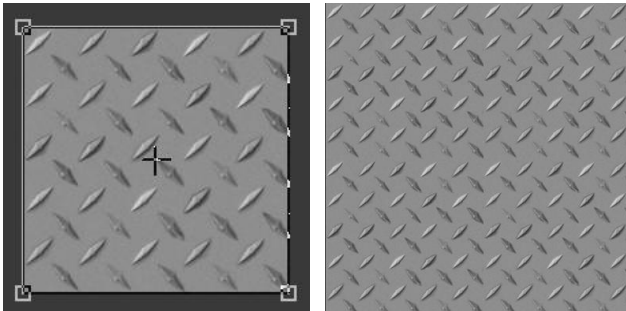
Use this option to size an image to fit specific dimensions and you are willing to crop part of the input image if its proportions don't match. For example, this option can resize an image to fit a picture frame with an opening of a specific size.



### Tile

The cropped input image is then repeated, starting at the lower left corner, as many times as necessary to cover the entire output image.

Use this option to extend a seamless tile image to fit specific dimensions.



### Stretch

The cropped input image is resized to fit the output image without trying to preserve its proportions. This generally stretches or compresses the input image either horizontally or vertically, depending on the proportions of the cropping rectangle and the proportions of the output image.

Use this option to make an image fit to specific dimensions when you don't want to lose any of it, and you don't care if it gets distorted.



## **Autorotate**

If this box is checked, Width and Height (see below) are swapped if Width is greater than Height and the input image height is greater than its width or if Height is greater than Width and the input image width is greater than its height. This can be useful when processing a series of images in a batch process some of which have landscape orientation while others are portrait.

## **Reference Image**

This control lets you select a reference image whose dimensions are used as the width, height and resolution of the output image. If no reference image is selected, the default dimensions are derived from the input image, but you can enter specific values if you wish. If a reference image is selected, then the output image dimensions are set to match the dimensions of the reference image.

Specifying an image is handy if you need to resize an image to match the reference image. For example, if you need to resize a mask to match the dimensions of an image.

## **Width, Height and Resolution**

These controls display the width and height of the output image in pixels and its resolution in dpi. If no reference image is selected, you can change the values of these controls manually. If a reference image is selected, the width, height and resolution are set from the reference image and these controls are disabled.

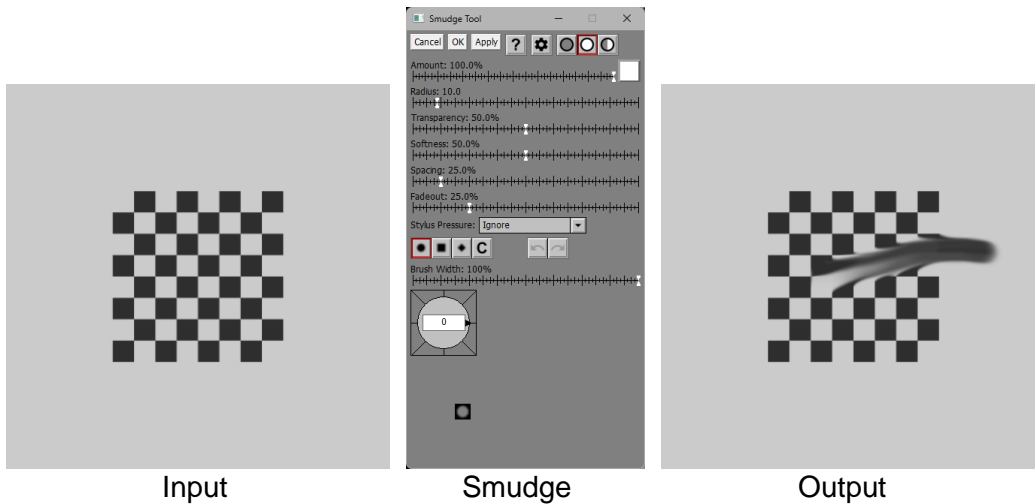
## **Border Color**

This control lets you select the solid border color used if Method is set to Scale to fit. For all other methods it is ignored.

# Smudge

The Smudge tool lets you smudge an image using a brush. Like the Clone tool, you paint directly on the output image.

## Using the Smudge Tool



Unlike most other transformations, the Smudge tool operates directly on the output image. It displays a cursor that marks where image data is going to be painted. The radius of the cursor is determined by the brush radius setting.

To smudge, click and drag on the output image.

## Amount

The amount control blends a percentage of the input image with the output image to scale back the effect of the Smudge transformation. If you create a mask, you can use the amount control to protect parts of the input image from being modified, a little like using masking tape to avoid painting an area.

## Brush Settings

### Radius

The Radius slider adjusts the brush size. You can also use the mouse scroll wheel to make the brush larger or smaller.

### Transparency

The Transparency slider lets you vary the transparency of the image data you clone over the output image. The more transparent, the more subtle the effect.

### Softness

The Softness slider lets you vary the brush from hard-edged to having a gradual falloff. The brush preview area at the bottom of the dialog box lets you see how soft the brush is.

### Spacing

The Spacing slider lets you vary the interval at which the brush is applied as you move it over the image. If you increase it too much you will not get a smooth effect. Too small and the brush is hard to control.

### Fadeout

The Fadeout lets you make the brush stroke fade out by becoming more transparent the longer the paint.

## Stylus Pressure

If you don't have a tablet connected to your computer, this setting is ignored. If you do have a tablet with a pressure-sensitive stylus, you can use this setting to determine which brush setting, if any, is adjusted depending on how hard you press the stylus into the tablet surface.

### Ignore

This causes stylus pressure to be ignored.

### Controls Opacity

The harder you press, the less transparent the brush.

### Controls Radius

The harder you press, the larger the brush.

### Controls Hardness

The harder you press, the less soft the brush.

### Controls Flow Rate

The harder you press, the smaller the spacing between brush applications.

## Brush Shape

The Brush Shape tool bar lets you make the brush circular, square, diamond shaped or custom. For information on custom brush shapes, see the separate document: [Creating and Using Custom Brush Shapes.pdf](#).

## Brush Width

The Brush Width slider lets you make the brush narrower. Alternatively, you can rotate the mouse wheel with the Ctrl key held down.

## Brush Angle

The Brush Angle compass control lets you rotate the brush shape. Alternatively, you can rotate the mouse wheel with the Shift key held down.

## Settings Menu

In addition to the standard menu items, the settings menu lets you load or save the current brush settings (Radius, Transparency, Softness, Spacing, Fadeout, and Shape).

## Undo/Redo

The Undo and Redo buttons let you erase or redraw smudge operations, one stroke at a time. A stroke is defined as everything between pressing the mouse button and releasing it.

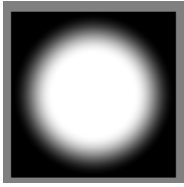
If the Undo or Redo button is grayed, it means there are no operations left to undo or redo. If you undo too many operations by accident, you can click the redo button until you get back to where you wanted to be. However, once you draw a new stroke, you can no longer redo past that point.

You can use the keyboard shortcuts Ctrl-Z for Undo and Ctrl-Y for Redo.

Normally, Undo preserves the current brush settings, but if you want to revert to the settings for the previous stroke, hold down the Shift key while clicking the Undo button or pressing Ctrl-Z.

## Brush Preview

The Brush Preview area at the bottom of the dialog box provides a visual representation of the size, shape, softness and transparency of the brush. It cuts off beyond a certain size, so it is only useful for small to medium size brushes.

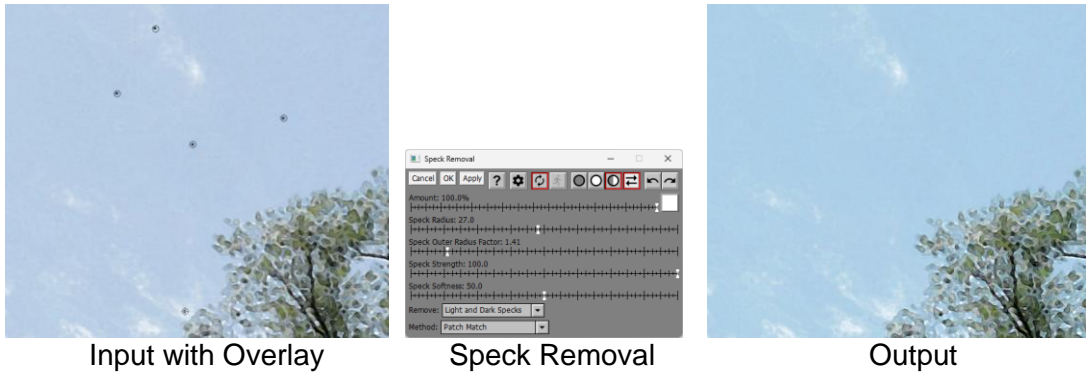


## Reloading Previous Settings

If you use the Ctrl-R keyboard shortcut to load the settings from the last use of the tool, you will restore not only the brush and other tool settings but also all the strokes you applied to the previous image. To load the previous settings without re-applying any strokes, use Ctrl-Shift-R instead.

# Speck Removal

The Speck Removal transformation paints over spots in the input image by replacing a circular region in the input image with pixels from the surrounding area. This is useful for removing dust specks, skin blemishes, or other localized image defects or unwanted objects.



## Input Image Overlay

The Speck Removal transformation displays an overlay on the input image to let you specify where the specks are that you want to remove.

To define a control point, shift-click on the input image. You can mark as many points as you want.

To reposition a control point, click and drag it.

To remove a control point, ctrl-click on it.

To select a control point, click on it.

To adjust the size, use the Speck Radius slider (see below) or you can use the mouse scroll wheel. The size should be as small as possible to reduce side effects.

## Amount

The amount control blends a percentage of the input image with the output image to scale back the effect of the Speck Removal transformation. If you create a mask, you can use the amount control to localize the effect of the transformation to parts of the input image.

## Speck Radius

This slider adjusts the size of the area that will be replaced.

## Speck Outer Radius Factor

This slider is only displayed when Method is set to Patch Match. When Patch Match is selected, each control point is displayed at two concentric circles. The inner circle represents the Speck Radius and defines the size of the area that will be replaced. The outer circle defines the size of the area that will be searched for a candidate replacement. The Speck Outer Radius Factor slider lets you increase the radius of the outer circle and thus search a wider area for the best match.

## Speck Strength

This slider lets you reduce the effect of the speck removal for the current control point.

## Remove

This lets you limit the speck removal or just those lighter than the background or just those darker than the background. In some cases, this can reduce collateral damage to the background.

## Method

The speck removal tool provides two different methods. Depending on the image, one may work better than the other.

## Patch Match

This method effectively clones over the speck. It first searches around the edge of the speck for the adjacent part of the image that best matches the area around the speck. Having found the best match, it then copies the image data over the speck to remove it. The edges of the patch are blended smoothly to make it less obvious where it has been applied. This method usually works better when the background behind the speck is textured or the speck is relatively large. You can adjust the size of the area around the speck that will be searched using the Speck Outer Radius Factor slider.

## Directional Interpolation

This method interpolates image data across the speck in the direction that has the best match from one side of the patch to the other. This method usually works better when the background behind the speck is smooth and the speck is small.

## Four Way Interpolation

This method interpolates image data across the speck both horizontally and vertically. This method usually works better when the background behind the speck is smooth and the speck is small.

## Shrink

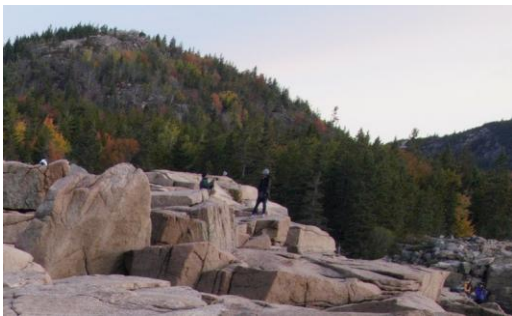
This method warps the image around the speck, like cutting a hole in a piece of fabric and stitching the edges together. This method usually works better when the background behind the speck is smooth and the speck is small.

## Rotate

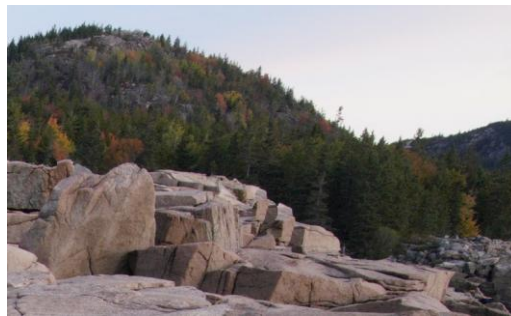
These buttons let you rotate the locations of all the speck points by 90 degrees, either counterclockwise or clockwise. This can be useful if you want to remove the same set of specks from a series of images, some of which are rotated.

## Example

Although it does have limits, in many cases the speck removal tool can convincingly remove even moderately large objects from images. The following example illustrates using it to remove people from a landscape photo:



Input Image



Output Image

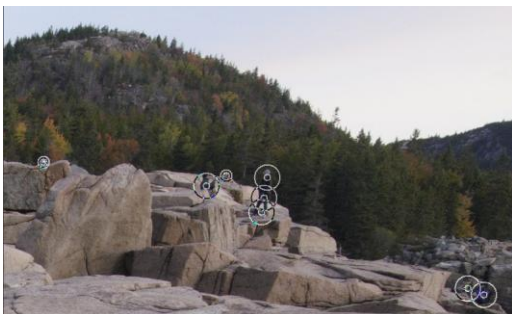
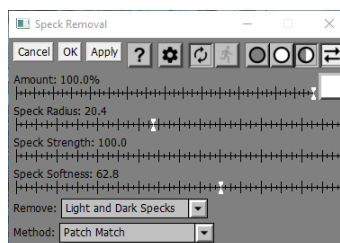


Image with Speck Removal Overlay



Speck Removal

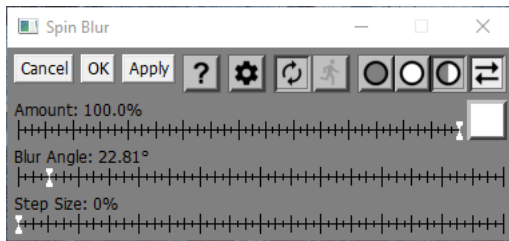
## Tips

Sometimes making slight changes to the position or size a speck circle can greatly improve the quality of the result. Using a side-by-side display, you can make fine adjustments to the input image overlay while monitoring the results on the output image.



# Spin Blur

Spin Blur simulates rotating the camera with the shutter open. The corners of the image lack surrounding pixels to blur with, so they are not blurred as much as the center of the image.



Original



Step Size = 0%



Step Size = 40%

## Input Image Overlay

Spin Blur displays a small cross overlaid on the input image to indicate the center of rotation. By default, this is located at the center of the input image, but you can drag this control point to another location in the input image if you wish.

## Amount

The Amount control lets you blend some of the input image into the output image to reduce the effect of the transformation or, if you use a mask, to localize its effect to selected parts of the input image.

## Blur Angle

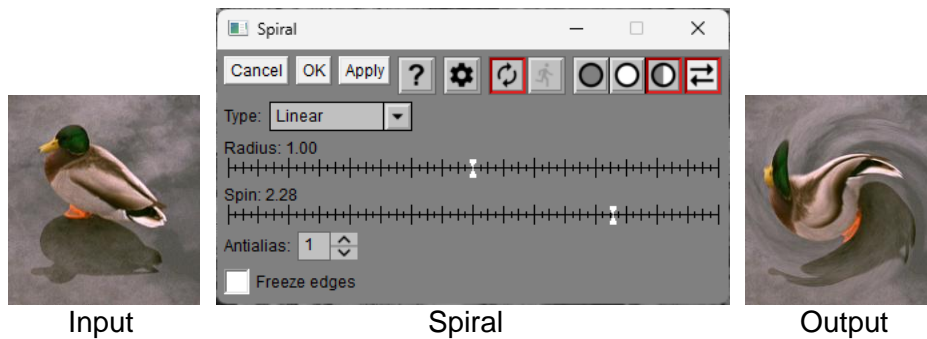
This slider controls the amount of rotation in degrees.

## Step Size

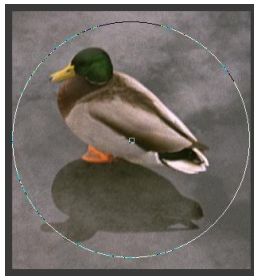
This slider controls the size of the steps, as illustrated above. You can do a smooth blur by setting the Step Size to 0% or zoom in steps by increasing the Step Size.

# Spiral

The Spiral transformation twists part of an image into a spiral. There are several different types of spirals and for each type there are settings you can adjust.

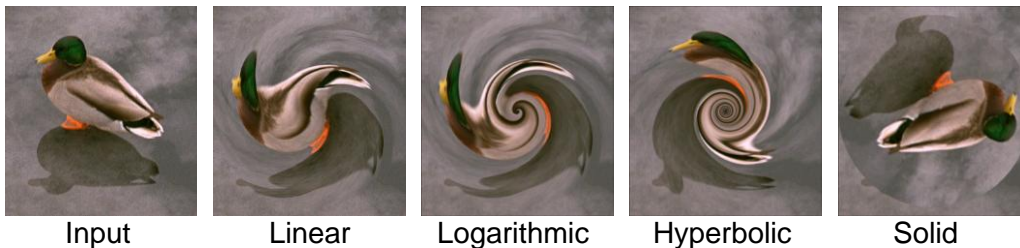


## Input Image Overlay



An overlay is displayed over the input image showing the center and radius of the spiral. While the center of the spiral is initially located at the center of the input image, you can drag it to another spot.

## Type



## Radius

The Radius slider lets you adjust how far out the spiral extends.

## Spin

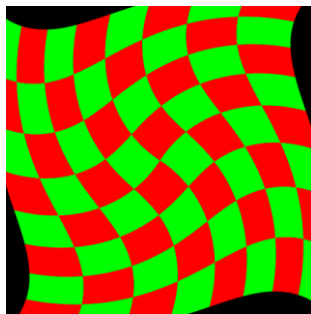
The Spin slider lets you adjust how tightly the spiral is wound.

## Antialias

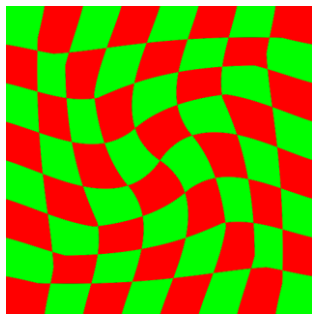
Increasing the Antialias setting does a more accurate job of computing the spiral near its center if it is tightly wound.

## Freeze Edges

Checking the Freeze Edges box prevents the edges of the image from being warped. While the result is no longer strictly a spiral, this does avoid areas from outside the input image showing up as black in the output image.



Not Frozen



Frozen

# Stack Images

The Stack Images transformation in Picture Window Pro is a powerful tool for combining multiple images. As its name implies, it lets you arrange the images in a stack of layers and control the transparency and weighting of each image to create a single composite result. While this transformation is a general purpose tool, its primary intended application is to combine multiple exposures of the same scene into a single image.

Stack Images assumes all the images to be combined are already registered. Normally this is automatic if you capture images using a digital camera mounted on a good tripod. If you are shooting handheld or scanning film however, you will need to register all the images before stacking them.

The usual goal of stacking bracketed exposures is to extend the dynamic range of the digital camera sensor or film you are using. For example, if the scene you are photographing contains very dark and very bright elements, you will often have to choose between good shadow detail and no highlight detail or good highlight detail and no shadow detail. By taking overexposed and underexposed photographs of the same scene you can overcome this limitation by combining the good highlight detail from the underexposed image with the good shadow detail from the overexposed image. The resulting image will have lower contrast than an image shot at the correct exposure, but will include more detail at both the high and low ends of the tone reproduction scale. For low contrast subjects there is little to be gained by bracketing, but for very high contrast scenes that exceed the dynamic range of the camera sensor, stacking bracketed exposures may save the day.

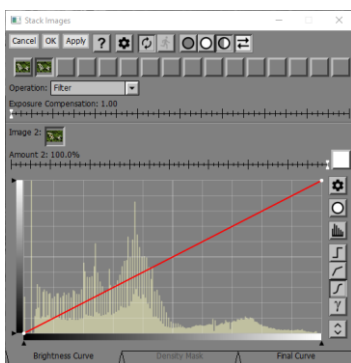
The trick to combining bracketed images properly is to first lighten the underexposed image and darken the overexposed image to bring their overlapping tonal ranges to a set of levels consistent with a normal exposure, and then to combine the two adjusted images assigning a higher weight to the lighter parts of the underexposed image and the darker parts of the overexposed image. Determining the right adjustment curves and density masks by trial and error is next to impossible, but fortunately, the Stack Images transformation includes a built-in tool for creating the necessary curves automatically from a set of test exposures. Once you have a good set of curves you can continue to re-use them without having to make new test exposures every time.

Another use for Stack Images is noise reduction by combining multiple exposures of the same subject. This same technique can also be used to simulate longer exposure times for moving subjects such as waterfalls, as an alternative to using neutral density filters.

A further use is to remove moving people, cars or other subjects from a scene by stacking multiple images with the Median operation. This eliminates any subject that is only in a minority of the images.

## Using Stack Images

Here is what the Stack Images transformation dialog box looks like:

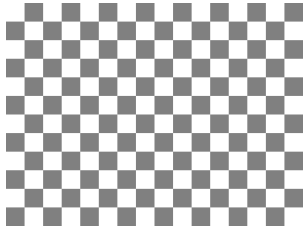


Stack Images lets you combine up to 16 input images to produce the output image.

## Input Selection

At the top of the dialog box is a row of 16 buttons—one for each possible input image. Each button displays a miniature of the input image currently selected, if any. Clicking one of the buttons displays the controls for the corresponding input image and hides the controls for all the other input images.

If no input images are selected, there is no way to compute an output image, so a checkerboard image is produced instead.



Once you select at least one input image, the checkerboard is replaced with a normal output image.

## Operation

Images can be combined using several different operations:

### Blend

Blend computes a weighted average of the input images. When Blend is selected, the Brightness Curve and Density Mask are also used (see below). Otherwise they are ignored.

### Pick Darkest

For each pixel in the output image, the corresponding pixels in all the input images are examined and the darkest one is copied to the output image.

### Pick Lightest

For each pixel in the output image, the corresponding pixels in all the input images are examined and the lightest one is copied to the output image.

### Median

For each pixel in the output image, the corresponding pixels in all the input images are examined and median value is copied to the output image.

### Filter

For each pixel in the output image, the corresponding pixels in all the input images are multiplied together. This is like sandwiching a set of transparencies.

### Subtractive Filter

For each pixel in the output image, the corresponding pixels in all the input images are inverted, multiplied together and inverted again. This is like a negative of sandwiched negatives.

## Exposure Compensation

This slider is only displayed if Operation is set to Filter or Subtractive Filter. It lets you compensate for the tendency of Filter to darken images or Subtractive Filter to lighten images.

## Image

This control lets you select which image is assigned to the current input. All images must be the same type and size. If no image is selected, the corresponding input is ignored and does not contribute to the output image.

## **Amount**

Each image also has an amount control you can use to scale back the overall weight of the image in the result. Setting the amount to zero is a quick way to see what an image is contributing since it effectively turns it off.

## **Brightness Curve**

The Brightness curve is only used if the Operation is set to Blend. The curve is applied to its input image before combining it with other images.

## **Density Mask**

The Density Mask curve is only used if the Operation is set to Blend. The curve adjusts the weight assigned to its input image, based on its brightness.

## **Final Curve**

The Final Curve is applied to the output image once all the inputs have been combined, and it is used to adjust the overall brightness and contrast of the result.

## **Settings Menu**

The Stack Images settings menu has a few items unique to the transformation:

### **Output 16 bits-per-channel**

When this menu item is checked, it causes the result image to be 16 bits/channel even if the input images are 8 bits/channel. If the input images are 16 bit/channel, it has no effect.

### **Build Curves**

Selecting this menu item automatically builds curves for combining bracketed exposures (see **Creating Custom Curves** below).

### **Load a Set of Images**

Selecting this menu item first clears out the current settings (with a warning) and then lets you select a one or more image files which are opened. If a file is already open, the open copy is used instead of reading in a new copy. Next, the newly opened files are selected as the inputs to Stack Images. This saves a lot of time compared to opening and selecting multiple files one at a time.

## **Workflow Considerations**

### **Not all subjects are equal.**

If you want to be able to combine multiple exposures, your subject needs to be stationary for the length of time it takes to capture all the images. Landscapes are often good candidates but be careful if it is windy. Sometimes a little motion is OK as long as it is primarily in the darker or lighter parts of the scene since most of the contribution for that part of the tone range will come from a single image.

All the images must be the same type and must have the same dimensions in pixels. There is no provision in Stack Images for registering images—all the input images are assumed to already be registered. You will save yourself a lot of trouble if you use a good tripod when taking pictures you expect to stack.

### **How much bracketing is enough?**

When you photograph a scene, you need to consider how much to bracket. A good starting point is 2 stops overexposure, normal exposure, and 2 stops underexposure. For higher contrast scenes you could go to 3 or 4 stops over and under. Unfortunately, most cameras will not auto-bracket by more than 2 stops so in those cases you may need to bracket manually. If in doubt, shoot a range of exposures such as -4, -2, 0, +2,+4. Different amounts of bracketing call for different adjustment curves.

Bracketing by two stops either adds four stops of exposure latitude—bracketing by three stops adds 6 stops. However, remember that sooner or later when you view or print your images you will need to reduce them back to the 6-8 stops or so that printers or monitors can reproduce, so there is a practical limit to how much exposure latitude is really useful.

### **Consistency is essential**

In addition to deciding how much to bracket, you also need to make sure you process your images consistently before combining them. For example, use all JPEGs straight from the camera, or all RAW files processed with the same settings, but not a combination of the two. Different RAW processing also requires different sets of adjustment curves, so it pays to standardize your workflow.

### **Creating custom curves**

Once you have selected a bracketing amount and preprocessing workflow, the next step is to create a set of custom adjustment curves and density masks that bring all the bracketed exposures to a consistent set of brightness levels. Doing this requires some test photographs of a target.

If you have a Kodak Q-13 gray scale or a standard IT8 target of the type used for calibrating scanners you can use that as a test target. A Kodak Q-13 is available for about \$20 from any good photo supply store.

If you don't have a target, you can use Picture Window's Test Pattern/Q-13 transformation to create a simulated Q-13 target or you can load the file *Gray Wedge 15.tif* that is supplied with Picture Window. If you print your own target, try to get the blacks and darks as possible and to print on very white paper—the wider the contrast range of the target the better. It does not matter if there is a slight color cast to the gray patches as long as all of them can be easily distinguished.

Alternatively, you can display the test pattern and photograph it on your monitor. If you go this route, make sure you do it in a darkened room to minimize screen reflections and defocus the image slightly to avoid moire patterns from the screen raster.

Determine a normal exposure by making sure the range of gray patches in the target is centered in the image histogram.

Take three test exposures of your target at the same level of bracketing you intend to use for normal subjects and using the same preprocessing workflow. Proper preparation of these reference images is critical (see illustration below):

Crop the three images to the same size so that only the gray scale is showing as illustrated below. Make sure the lightest patch is on the left and the darkest on the right. Clean up any specks in your test images by cloning, speck removal, or using the Median Blur transformation with a radius of 5.

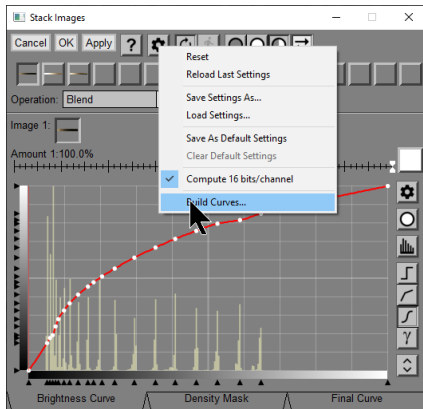


It does not matter if the images have a slight color cast, and high resolution is unnecessary—around 1000 pixels in image width is plenty.

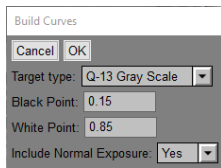
To generate custom curves from your test images, select the underexposed test image as Image 1, the overexposed test image as Image 2, and the normal test image as Image 3.



Then click on the Settings button at the top of the dialog box and select Build Curves... from the options menu.



This brings up the Build Curves dialog box:

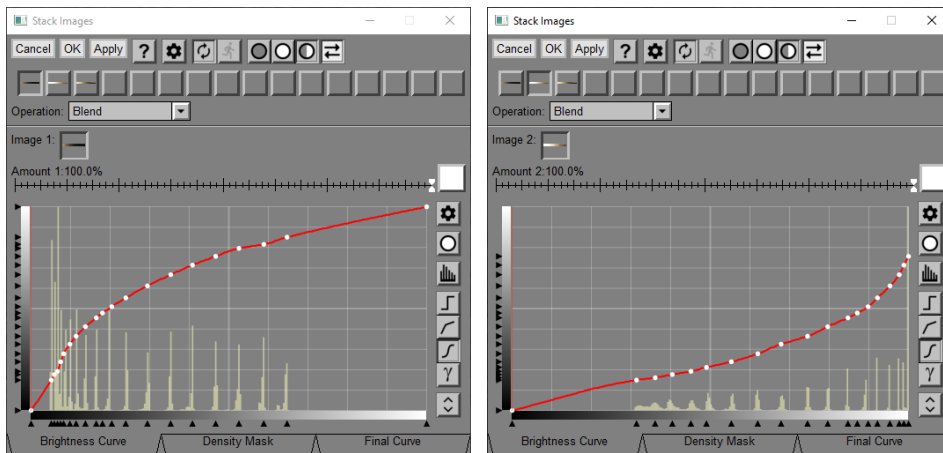


Double check that the three images are set up with white on the left and black on the right and with the underexposed image first, the overexposed image second, and the normal image (if any) third.

In the dialog box, first specify the type of target (15-Step Gray Wedge, Q-13 or IT8).

Next you have some decisions to make about overall contrast. The black and white point settings let you determine what level the black and white patches in the normally exposed test target will be assigned in the final image. Setting the black point at 0.0 and the white point at 1.0 will expand the normal image so that its black patch becomes pure black and its white patch becomes pure white, but doing this does not leave any room to add new tonal information below black or above white which is why we are going to all this trouble in the first place. Setting the black and white points closer together results in a lower contrast final image, but this leaves room to render shadows darker than the black target patch and highlights lighter than the white target patch. The default values of 0.15 and 0.85 are a good starting point, but for very high contrast scenes where you are bracketing by more than two stops you might want to use 0.25 and 0.75 or even 0.30 and 0.70.

Finally, you need to specify whether you will be stacking just the underexposed and overexposed images or whether you want to stack the normal image along with the other two. For 2-stop bracketing, the normal image is usually unnecessary, but for wider bracketing it may help fill the gap between the two exposures. Once you make your selections and click OK, you are returned to the Stack Images dialog box with the newly created curves all set up. The example below was created for Plus 2 / Minus 2 stop bracketing with no normal exposure.



At this point you might want to check how the stacked gray scale output image looks. If everything is OK, it should show a smooth gradation from a dark gray corresponding to your selected black point to a light gray corresponding to your selected white point.



To save these curves for future use, Save As... from the Settings Menu.

### Applying your custom curves

Having created a set of custom curves, you are now ready to process bracketed images of something other than test targets.

Load the underexposed image into Image 1, the overexposed image into Image 2, and, if needed, the normally exposed image into Image 3. Then select Load... from the Settings Menu and select your saved settings file. Finally click OK and check the results.



Underexposed



Overexposed



Stacked

Remember the order of the images must be the same as when you created the curves—Image 1 is the underexposed version, Image 2 is the overexposed version, and if you included the normal exposure, it must be Image 3. Also, the images you work with must be processed using the same workflow you used to create the reference images.

## **Final Shaping Curve**

The end result of the Stack Images transformation is an image that includes a wider dynamic range than any of the input images. Consequently, it will have lower contrast since this wider range of information is compressed into the same number of bits. Unless the original subject was extremely high contrast, the end result can look somewhat dull and lifeless. To offset this effect, you can apply an S-shaped final shaping curve to the result image to increase its midtone contrast at the expense of some shadow and highlight contrast. This restores the punch of the original images while recovering some of what would otherwise be lost shadow and highlight detail. This is done using the Final Shaping Curve tab at the bottom of the dialog box. You can also use the final shaping curve to bring out more shadow or highlight detail depending on the effect you are looking for.

## **Bit Depth**

Even if your input images are 8-bit black and white or 24-bit color, the Stack Images transformation treats them internally as 16-bit black and white or 48-bit color. This extra bit depth allows for manipulating a wider tonal range without loss of information. Consequently, the final result image normally comes out with 16 bits per channel, but if you wish you can force the result back to 8 bits per channel by unchecking Output 16 bits per channel in the Settings menu. If the input images all have 16 bits per channel, the result will always have 16 bits per channel regardless of the option setting.

## Other Uses for Stack Images

### Long Exposures and Noise Reduction

Blending multiple short exposures is like taking one long exposure, so if you want to increase motion blur for subjects like moving water, this technique can be used as an alternative to neutral density filters.

Stacking multiple images of the same subject is often a good way to reduce noise and bring out very faint detail. Astrophotographers frequently combine multiple exposures of the same part of the sky to produce the equivalent of a single, very long exposure, thus revealing objects too faint to be seen otherwise. Or you can stack a series of noisy high ISO images to produce a less noisy composite. Similarly, when using a scanner, stacking multiple scans will often produce a better result than any single scan—assuming the scans are all perfectly aligned.

### Making People Disappear

By selecting Median as the Operation, you can combine multiple images of the same scene taken using a tripod to remove people or other moving objects that are present in only a minority of the images. Here is an example using sample images from The Luminous Landscape web site.



Three of 15 images of the same scene with people and boats moving through it



Combined using Median

## Motion Blur

Often it is considered a problem when subjects move while you are trying to photograph them, but sometimes you may want to capture a sense of motion in your images. The following example was created from a series of photographs of an elm tree during a windstorm:



Three of the 8 input images



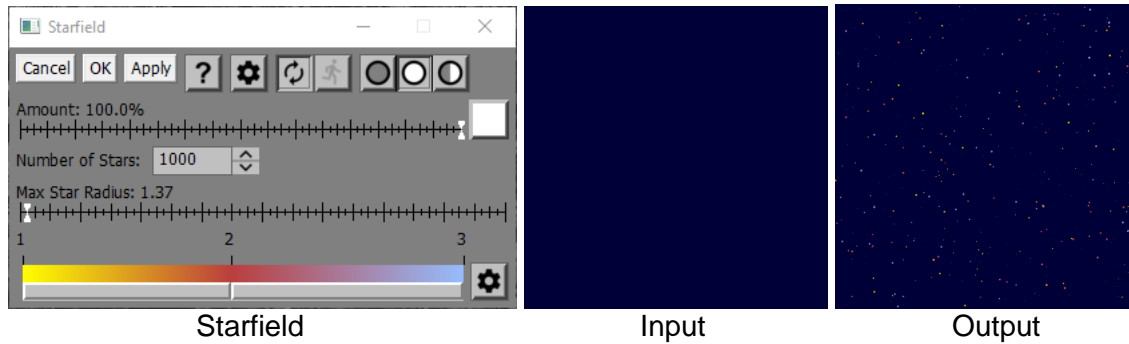
Stacked Images

## Mixed Illumination

First take several photographs of the same exact subject but illuminated differently – either from a different direction or with a different color or brightness. You can then use Stack Images to adjust the relative amounts of each image which in turn lets you explore different combinations of the light sources.

# Starfield

The Starfield transformation applies a random, simulated starfield to its input image.



## Amount

The Amount control lets you blend some of the input image into the output image to reduce the effect of the transformation or, if you use a mask, to localize its effect to selected parts of the input image.

## Number of Stars

This determines the total number of stars to be applied to the input image.

## Max Star Radius

This slider let you set the maximum star radius. Each star has a random radius between 0.0 and the maximum.

## Star Colors

This Color Line control lets you set to color of the stars to be superimposed on the background. Star colors are chosen at random from the range of possible colors.

## Stereo

Stereo photography involves combining two images of the same subject from two different locations offset horizontally. This simulates stereo binocular vision by capturing slightly different images for the left and right eyes to process. When the two images are viewed so the left eye sees the left image and the right eye sees the right image, the scene develops a three-dimensional appearance where some parts of the image seem closer and some farther away.

There are several ways to take stereo photographs. You can use a stereo camera with two lenses, a lens attachment that splits the image in two, two cameras mounted on a sliding bar, one camera moved sideways between exposures.

The strength of the stereo effect depends mostly on the separation between the two cameras when the left and right images are captured. Too close together and there is no 3-D effect, too far apart and your eyes may have difficulty merging the two images. Another sign that the separation is too great is an effect called cardboarding where objects at different distances look like stage sets painted on flat surfaces. There are some rules of thumb relating separation to object size, or you can just use the distance between your eyes to get a more natural effect. Generally, the ideal spacing between cameras is about  $1/30$  of the distance to the subject. For aerial photography, images are taken very far apart to exaggerate subtle changes in topography. For very small objects, image separation needs to be reduced drastically.

You also need to align the two images horizontally to get the best effect. Shifting one image with respect to the other makes the entire image look closer or farther away than the image frame. By convention, stereo images are normally adjusted so the entire image appears to lie behind the frame.

Finally, there are different ways to view stereo images.

### Anaglyphs

The simplest is to create an anaglyph and view the image with red/cyan glasses.



An anaglyph combines both the left and right images into a single image with one image tinted red and the other cyan. When viewed with colored glasses, the left and right eyes see mostly the left and right images.

### Side by Side

There are a variety of stereo viewers that use prisms and lenses to take two images printed side by side or one above the other and present one of them to your left eye and one to the right.





Some very good ones that can handle large images are available used on eBay and produce spectacular results. At the other end of the spectrum are inexpensive folding side by side viewers with plastic lenses. There are also viewers designed to work with images displayed on a monitor.

## Polarized Images

There are some monitor-based stereo viewing systems that use polarized glasses. The left and right images are displayed alternately on a special screen during alternate refresh cycles. Simultaneously, a signal is sent to the glasses to reverse their polarization in sync with the refresh. This presents a different image to each eye, but it requires special hardware and is not supported by Picture Window.

## Using the Stereo Transformation

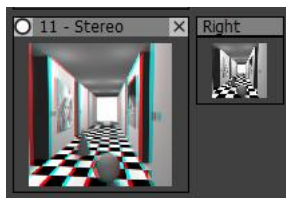


## Right Image

Normally, the input image is assumed to be the left image. Use this control to select the right image. If you have accidentally got the images reversed, check the Swap Images box to swap the left and right images.

**L R** -- this tool bar at the top of the dialog box lets you display either the left (L) or the right (R) image. If the right image is set to a solid color instead of an image, the second button is grayed out. If the display is set to show only the output image, the entire tool bar is hidden.

Another way to switch between inputs is to use the image browser. To see the left image, click the Stereo thumbnail in the image browser. To see the right image, click the smaller Right thumbnail just to the right of the Stereo thumbnail in the image browser.



## Horizontal Offset

This adjusts how much to slide the right image left or right with respect to the left image before combining the two. When the output image is viewed, this offset causes the entire image to appear to shift forward or backward with respect to the frame of the output image.

## Vertical Offset

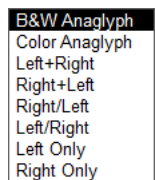
This adjusts how much to slide the right image up or down with respect to the left image before combining the two. Use this offset to compensate for one camera being accidentally aimed higher than the other.

## Rotation

This slider adjusts how much to rotate the left and right images with respect to each other before combining them. This lets you compensate for an accidental rotation of the camera by up to 20 degrees between taking the two images. One image is rotated clockwise and the other counter-clockwise to keep both images the same size. After rotation, each image is cropped by the minimum amount necessary to exclude image data beyond the edge of the image.

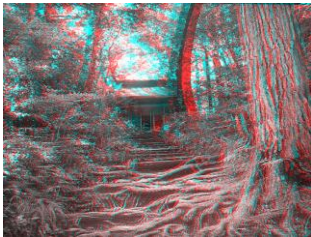
## Method

This control lets you choose a method for combining the left and right images to create the output image.



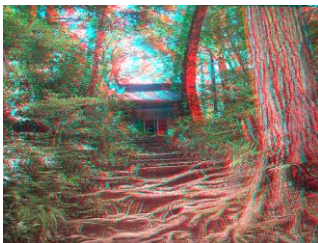
## B&W Anaglyph

This method reduces both images to black and white if necessary and then combines them into a red/cyan anaglyph.



## Color Anaglyph

This method combines two color images into a red/cyan anaglyph, preserving as much of the color information as possible.



## Left + Right / Right + Left

This method combines the left and right images for side-by-side viewing. You can set both the spacing between the two images and the background color.



### **Left/Right / Right/Left**

This method combines the left and right images for over/under viewing as required by some viewers. You can set both the spacing between the two images and the background color.



### **Left/Right Only**

This method lets you output just the left or just the right image. This is useful if you want to print them separately.

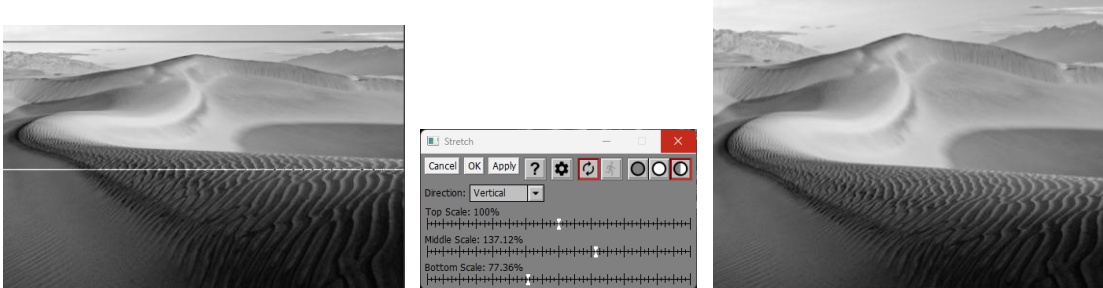
# Stretch

The Stretch transformation lets you expand or compress horizontal or vertical strips of an image. Consequently, the resulting output image will be either larger or smaller than the input image. This style of image distortion can be useful for example in landscape photography to adjust the relationship between the foreground and background.

## Using the Stretch Transformation

The strips of the input image to be expanded or compressed are specified by two marker lines displayed as an overlay on the input image. You can reposition the marker lines by dragging them, but you cannot drag one line past the other.

Clicking on the output image temporarily displays the corresponding locations of the marker lines on the output image. The marker lines are erased when you release the mouse button.



### Direction

This indicates the direction the image strip will be stretched.

#### Horizontal

If you select Horizontal, the marker lines are vertical, and the image is stretched horizontally. The Scale sliders are also renamed Left, Middle and Right.

#### Vertical

If you select Vertical, the marker lines are horizontal, and the image is stretched vertically. The Scale sliders are also renamed Top, Middle and Bottom.

### Aspect Ratio

This readout displays the aspect ratio (i.e. the width to height ratio) of the output image. It is automatically updated after any change you make to the Scale Sliders (see below). This can be helpful if you are trying to stretch the image to specific proportions.

### Scale Sliders

The two marker lines effectively divide the input image into three zones – the area between the lines and the areas on either side. You can use the three Scale sliders to adjust the scale factor for each zone independently.

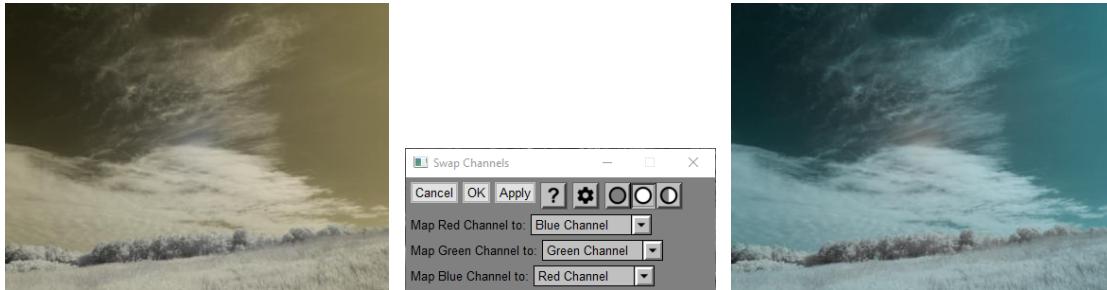
Values greater than 100% expand the corresponding strip, making the output image either wider or taller. Values less than 100% compress the strip, making the output image either narrower or shorter.

# Swap Channels

While not particularly useful for working on normal photographic images, the Swap Channels transformation can be used as a special effect or, for some kinds of color IR photography, as a quick and dirty way to make skies blue.

## Using the Swap Channels Transformation

This transformation lets you switch around the red, green and blue channels of its input image.



Here is an example of an image and what it looks like with various channels swapped.



Original



Variations

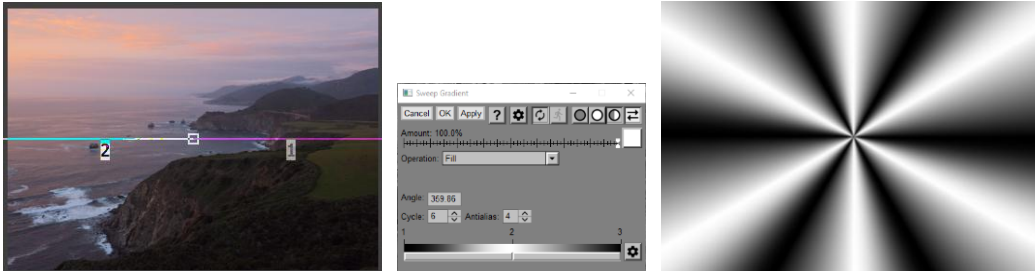


# Sweep Gradient

The Sweep Gradient transformation creates gradients that radiate out from a center point, passing from one color to another. The transition from the starting to the ending color can be configured to pass through a number of intermediate colors based on a color line control.

The gradient can either become the output image or it can be applied to the input image in different ways.

## Using the Sweep Gradient Transformation



### Input Image Overlay

An overlay is displayed on the input image consisting of a line segment with control points at either end. One end defines the center of the gradient and the other lets you rotate the starting angle. You can drag the control points to position where you want the gradient transition to occur. Radial lines are also displayed for each control point on the color line.

### Amount

The amount control blends a percentage of the input image with the output image to scale back the effect of the Gradient transformation. If you create a mask, you can use the amount control to localize the effect of the transformation to parts of the input image.

### Operation

This setting lets you control how the gradient is applied to the input image to create the output image. For examples of how the different operations work, see the end of this help topic.

#### Fill

If you select Fill, the gradient becomes the output image and the input image is ignored.

#### Filter / Subtractive Filter

If you select Filter, the gradient is applied as a filter to the input image to create the output image. This is like sandwiching two transparencies and viewing them on a light box. For the Filter operations only, an Exposure Compensation slider is also displayed to let you compensate for any darkening of the input image as a result of applying the filter.

Subtractive Filter is the same as Filter, but the two images are inverted before filtering and the result is then inverted.

#### Adjust Brightness (HSV / HSL)

These operations lighten or darken the input image depending on whether the gradient is lighter or darker than a mid-level gray.

#### Soft Light

Similar to the soft light blend mode in other image editors.

#### Reverse Soft Light

Same as Soft Light, but with the input and gradient images swapped.

## **Hard Light**

Similar to the hard light blend mode in other image editors.

## **Reverse Hard Light**

Same as Hard Light, but with the input and gradient images swapped. This mode is also known as Overlay in other image editors.

## **Add**

The gradient image is added to the input image. This can generate out-of-range pixel values which are then clipped.

## **Subtract**

The gradient image is subtracted from the input image. This can generate out-of-range pixel values which are then clipped

## **Reverse Subtract**

The input image is subtracted from the gradient image. This can generate out-of-range pixel values which are then clipped

## **Absolute Difference**

Similar to Subtract except negative differences (i.e. where the gradient image is brighter than the input image) are converted to positive instead of being clipped to black.

## **Offset Difference**

The result is a mid-level gray plus the input image minus the gradient image.

## **Color Burn**

Similar to the color burn blend mode in other image editors.

## **Color Dodge**

Similar to the color dodge blend mode in other image editors.

## **Linear Burn**

Similar to the linear burn blend mode in other image editors.

## **Linear Light**

Similar to the linear light blend mode in other image editors.

## **Vivid Light**

Similar to the vivid light blend mode in other image editors.

## **Pin Light**

Similar to the pin light blend mode in other image editors.

## **Cycle**

The Cycle setting causes the gradient to pass through multiple complete cycles between the starting and ending points.

## **Antialias**

If antialiasing is greater than 1, sharp transitions of the gradient are smoothed out, avoiding jagged edges. The higher the Antialias setting, the more accurate the result.

## **Color Line**

The color line control is where you specify how the gradient varies from its starting to its ending color. For details on using color lines, see the Tint transformation or the Color Lines help topic.



Examples of Different Operations



Input



Gradient



Fill



Filter



Subtractive  
Filter



HSV



HSL



Soft Light



Reverse  
Soft Light



Hard Light



Reverse  
Hard Light



Lighten



Darken



Add



Subtract



Reverse  
Subtract



Absolute  
Difference



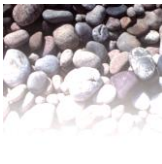
Offset  
Difference



Color Burn



Color Dodge



Linear Burn



Linear Light



Vivid Light



Pin Light

## Test Patterns

The Test Patterns submenu lets you create a variety of special purpose test images. Please see the help file for more details.

# Text

Picture Window lets you apply text to images and control its position, size, color, font, properties and background.

To place a single block of text on an image, the Text transformation is usually your best option.

To place multiple text blocks over different parts of an image, the Layout transformation is usually more efficient.

Both methods are described below—also included is a section on using text to create various special effects.

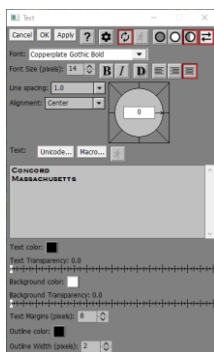
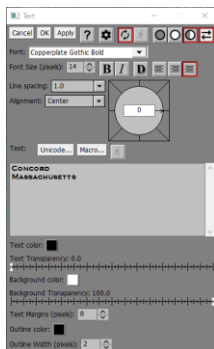
## Using the Text Transformation

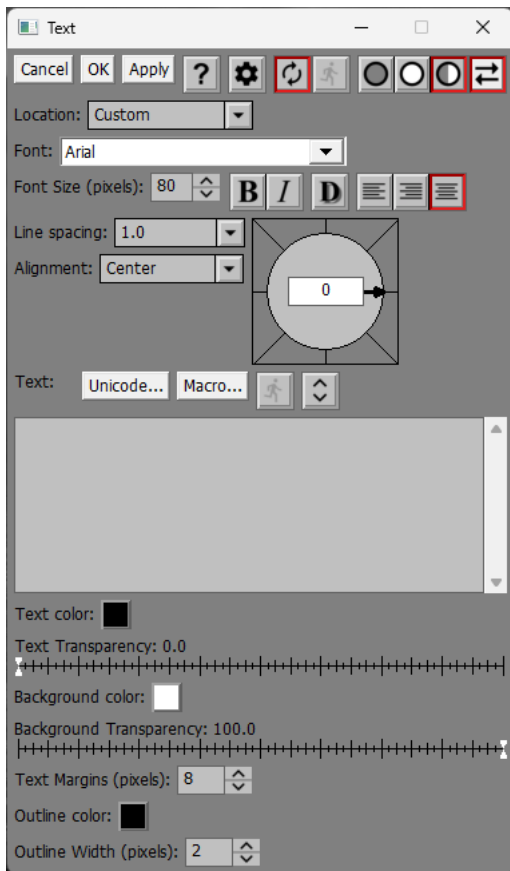
The Text transformation places a single block of text over its input image. You position the text over the image by dragging an overlay displayed on the input image as a rectangle indicating the extent of the text and a cross indicating the alignment point.

To make it easier to add captions to images that have a border, you can also set the text location to the bottom or top center of the border.

Optionally, you can place a background rectangle behind the text. If you set Text Margins to -1, you can reposition it by dragging its corners. Otherwise, the background rectangle is automatically placed around the text box. If you don't want a background rectangle, set the Background Transparency to 100%.

If you want to place multiple text annotations on an image, you may find the Lines, Arrows, Text tool more useful since it lets you create multiple text blocks and optionally connect each text box to a location on the image with a line or arrow.





## Location

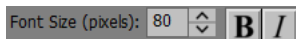
If you select Custom, you can drag the text box to position it anywhere in the image.

As an aid in captioning images to which a border has been added, you can select Bottom Center or Top Center. When you select one of these options, a Border Width control is also displayed. This automatically positions the text in the center of the bottom or top border of the image. Use the same value for Border Width as you used with Add Border.

## Font

Use this control to select the font you want to use.

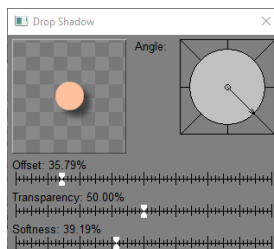
## Font Size and Properties



Use these controls to select the font size and whether you want bold and/or italic.

## Drop Shadows

You can also apply a drop shadow to the text if you click the **D** button. This displays the Drop Shadow dialog box:



This lets you select the direction of the light source, the offset between the text and its drop shadow, the transparency of the drop shadow, and the degree to which it is blurred. The preview in the upper left corner of the dialog box gives you an idea of what the settings will do.

## Multi-line Text Justification

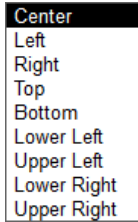


This 3-button tool bar lets you choose how the lines of multi-line text are aligned – by their left edges, by their right edges or horizontally centered. If there is only one line of text, this setting is ignored.

## Line Spacing

This controls the line spacing if the text has more than one line. Different fonts have different default line spacings built in, so when you switch fonts you may need to adjust the line spacing to keep the look consistent.

## Alignment and Offset





Text is positioned with respect to the alignment point you place on the input image. The Alignment control lets you specify what part of the text box lines up with the alignment point.


The Offset sets how much distance (in pixels) to allow between the text bounding box and the alignment point. If Alignment is set to Center, the Offset control is hidden as it does not apply in this case.

## Angle

This Compass control lets you adjust the angle of the text and its background rectangle. To snap the angle to a multiple of 15 degrees, hold down the Shift key while dragging the angle marker. You can also enter a specific angle in degrees if you prefer. An angle of 0 degrees produces horizontal text. Increasing the angle rotates the text counter-clockwise.

## Text

This is where you enter the text. Unlike other edit controls that auto-enter after a time delay, modified or new text is not processed until you click  (or until you click OK or Apply). When you modify the text, the button is enabled and turns red . This lets you to take as much time as you need to enter the text string. Place carriage returns in the text where you want lines to break since there is no automatic word wrap. To paste a block of text from the clipboard, click on the Text control to select where you want to insert it, and press Ctrl-V.

Depending on the selected font, the text may be hard to read -- to display it in the dialog box using a larger font, click the  button. This displays the text twice as large but does not alter the Font Size setting. Click the button a second time to revert to small text.

## Text Color

This sets the color of the text.

## Text Transparency

This sets the transparency of the text.

## Background Color

This sets the color of the background rectangle, if any.

## Background Transparency

Sometimes text is hard to see against an image if its color is too similar to the part of the image over which it is placed. In this case, you can set a solid color rectangle behind the text to make it stand out.

This sets the transparency of the background rectangle. If you don't want a background rectangle, leave it at 100%.

## Text Margins

If you set Text Margins to -1, you can position the background rectangle to any arbitrary size or location, however the background rectangle does not rotate with the text if you change the Angle setting. If you set Text Margins to 0 or greater, the background rectangle is automatically positioned to surround the text box with specified margins in pixels. In this case the background rectangle does rotate with the text.

## Outline Color

This sets the color of the outline drawn just inside the edges of the background rectangle.

## Outline Width

This setting lets you control the width of the outline draw inside the edge of the background rectangle. For no outline, set Outline Width to zero. If you enter an Outline Width greater than or equal to the Text Margins setting, it will be treated as though you entered Text Margins – 1.

## Using the Lines, Arrows & Text Transformation to add text

If you want to place text in multiple locations on an image, you can use a Text transformation once for each block of text, but it is usually easier to use the Lines, Arrow & Text Tool instead. This lets you create and position multiple blocks of text and optionally draw lines or arrows connecting the text boxes to parts of the image.

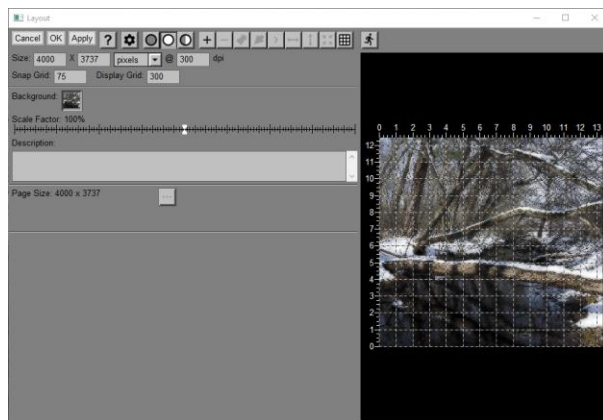
## Using the Layout Transformation to add text

Another way to add multiple blocks of text to an image is to use the Layout Transformation.

Assuming you don't want to resize the input image, start by setting the layout image size to the same size in pixels as the input image. The size of the input image is displayed in its caption in the main image area.

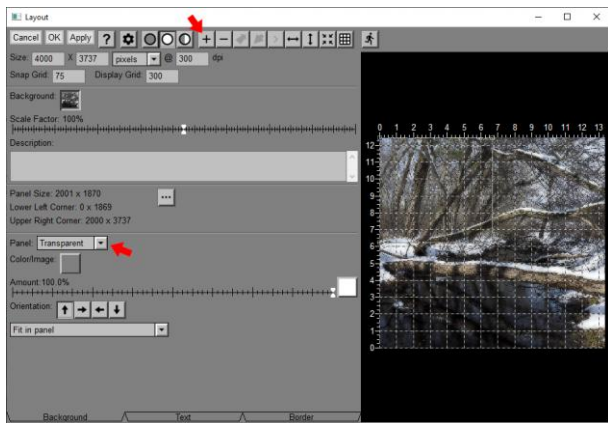


Next you set the input image as the layout background image, so it will be behind all the text. If you just want text against a solid color background, set the Background to a solid color instead of an image.

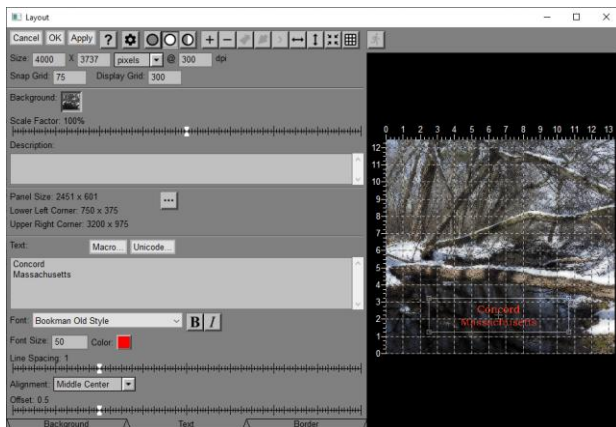


Next, click the **+** button to add a blank panel and set its background to Transparent. If you want a background rectangle, select Color/Image instead and set the Color/Image control to a solid color.





Finally, click the Text tab and enter the text you want to apply to the image along with its font, size, properties, color, etc., and drag the panel to where you want the text to appear.



You can repeat this process as often as you want, adding a new panel for each block of text. You can then reposition or edit the text of any of the panels at any time since each one sits on a separate layer.

## Macros

A macro is a sort of place marker you can insert in your text which is replaced when the text is applied to the image with information about the input image. To insert a macro, click the Macro button and select the item you want to include. The text display on the output image will have the macro replaced by the information it represents. Don't try to type macros into the text manually as they use special characters not available via the keyboard.

| Macro                     | Property                             |
|---------------------------|--------------------------------------|
| <<created year>>          | file creation year                   |
| <<created month number>>  | file creation month number           |
| <<created month abbr>>    | file creation month abbreviation     |
| <<created month full>>    | file creation month full             |
| <<created day>>           | file creation day                    |
| <<created date>>          | file creation date                   |
| <<created time>>          | file creation time                   |
| <<modified year>>         | file modification year               |
| <<modified month_number>> | file modification month number       |
| <<modified month_abbr>>   | file modification month abbreviation |
| <<modified month_full>>   | file modification month full         |
| <<modified day>>          | file modification day                |
| <<modified date>>         | file modification date               |
| <<modified time>>         | file modification time               |
| <<pathname>>              | pathname                             |

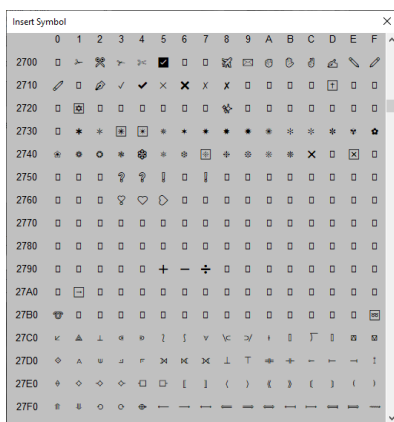


|                         |                                    |
|-------------------------|------------------------------------|
| <<filename>>            | filename                           |
| <<camera make>>         | camera model                       |
| <<camera model>>        | camera model                       |
| <<f stop>>              | f stop                             |
| <<shutter speed>>       | shutter speed                      |
| <<focal length>>        | focal length                       |
| <<iso>>                 | ISO                                |
| <<description>>         | description                        |
| <<taken date and time>> | date and time photo was taken      |
| <<taken year>>          | year photo was taken               |
| <<taken month number>>  | month number photo was taken       |
| <<taken month abbr>>    | month abbreviation photo was taken |
| <<taken month full>>    | month full photo was taken         |
| <<taken day>>           | day photo was taken                |
| <<taken date>>          | date photo was taken               |
| <<taken time>>          | time photo was taken               |
| <<author>>              | author                             |
| <<copyright>>           | copyright                          |

## Unicode

Picture Window uses Unicode to represent text. Unicode is a 16-bit standard developed to deal with all the characters used by different languages and symbols needed to represent documents in different languages as well as mathematical and other specialized symbols.

To insert a Unicode character into your text, click the Unicode button. This displays the Insert Symbol dialog box:



Unicode characters are identified a unique hexadecimal code running from 0000 to FFFF. If you know the code for the special character you want, scroll down to the row and click on the character. If you don't know the code, you can usually Google it—for example searching for “Unicode Pencil” gets you:

U+270E is the **Unicode** hex value of the character Lower Right **Pencil**

Or, you can just leaf through the whole entire a page at a time. Just be aware that most fonts do not implement the entire Unicode character set so the character you select may come out as a box instead.

## Text Effects

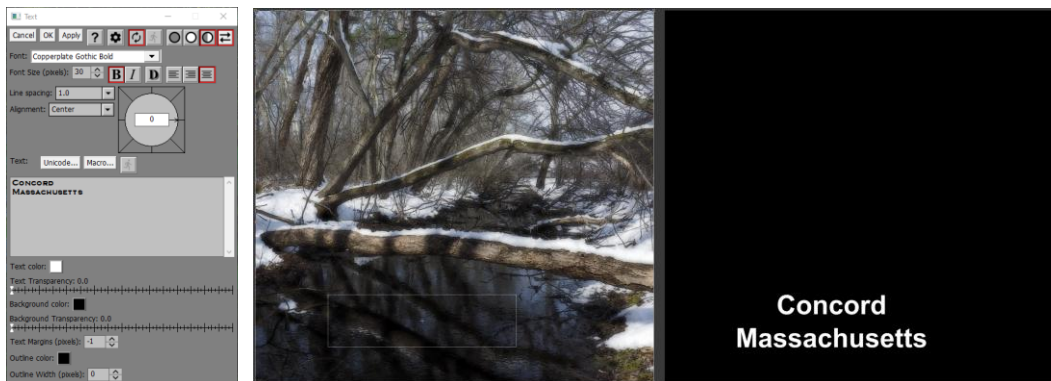
Picture Window can combine text and images in many interesting ways. This section describes techniques for creating a variety of special effects using text, including how to distort text, how to emboss text into an image, and how to fill text with a pattern. Many of these techniques can be used with other high contrast images as well as with text.

## The First Step: Creating a Text Image

You can apply text directly to an image using the Text transformation, but this method gives you relatively little control over how the text looks. The first step to creating more interesting text effects is to create a black and white image containing just the text. This image can then be manipulated directly or used as a mask.

If you want to apply text to an image, start by creating a text image of the same size as the base image which is white where the text will appear and black everywhere else. If you just want to create an image (say for a sign) that has a solid or textured background (rather than a photograph), then start by creating a background image of the desired dimensions and resolution using File/New.

Once you have a background image, start up the Text transformation. Set the text color to white and make the background transparent and black. Enter the text and position it by dragging the alignment point displayed over the input image. You can also adjust the font size, style, alignment, and font at this time. When you have the text looking just the way you want it, change the background transparency to 0% and then set the Text Margins to -1 and make sure the background rectangle is covering the entire input image. Then click OK to create the text image. This should leave you with an image whose size is the same as the background image that is white where the text goes and black everywhere else. The advantage of this method is that you can place the text exactly where you want it with respect to the input image.



## Using Text as a Mask

One of the ways to use a text image is as a mask. Here is a simple example of what you can do.

Using the text mask with the Brightness transformation lets you lighten or darken the parts of the image where the text is located:



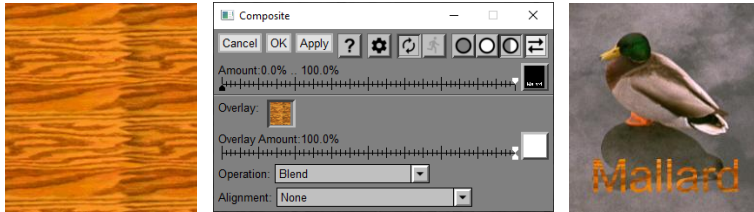
The Brightness transformation was used to create this example. The text image was selected as the Amount mask and the white slider was moved to +77%, thus making the background

image 77% brighter where the text is located. The remainder of the image was darkened by 15%.

In a similar fashion, you could use the mask with the Color Balance, Color Curves or Saturation transformations to change the color of the background image where the text is located, or with Gaussian Blur to blur the text area, and so on for any other transformation that accepts masks.

### Filling Text with an Image

You can use the Composite transformation to place text over a background image and fill the text with a solid color or texture contained in a third image. The basic idea is to overlay the base image with the texture image and use the text as a mask to make the texture image opaque where the text is located and transparent everywhere else:



To create this example, a clipart image of a piece of wood was first tiled and then cropped to match the dimensions as the background photograph. Then, applying the Composite transformation to the background image, the text image was selected as the Amount mask and the wood image as the Overlay image.

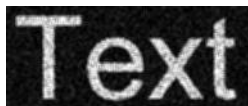
### Creating text with ragged edges

Here is one technique to create text with rough edges.

1) Use the Add Noise transformation to add graininess to the text image. The more noise you add, the more ragged the text will become.



2) Use the Gaussian Blur transformation to smooth out the grain introduced by the Add Noise transformation. The more you blur, the smoother the edges will be.



3) Use the High Contrast transformation to make the edges crisp again. The net result is text with an eroded or distressed look.



### Rotating or Warping Text

You can use the Warp transformation to rotate text or create perspective effects. The Warp transformation may make the text a little blurry where it is magnified and a little jagged where it is reduced.



## Distorting Text

You can also use the Spiral, Kaleidoscope, or Displace transformations to alter text in other imaginative ways.



Spiral



Kaleidoscope



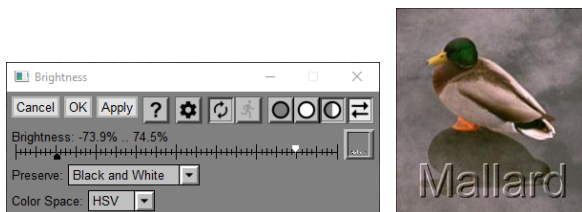
Displace

## Embossing Text

Embossed text has a certain elegant, engraved look that can be very appealing. The first step is to create a text image as described above. Then use the Emboss transformation to emboss the text. Adjust the Radius and Height settings to create the desired bevel on the edge of the text and set the Angle to control the direction of the apparent light source.



Finally use the embossed text image as a mask with the Brightness transformation and adjust the black and white sliders to emboss the text into the image.



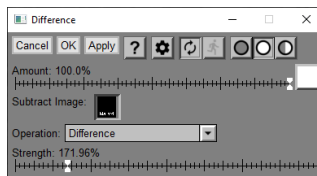
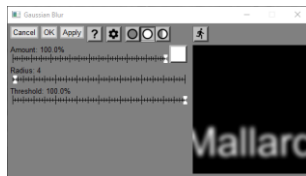
If, prior to embossing, you apply text to the image using the technique described above under Filling Text with an Image, you can achieve additional effects like the following shown before and after embossing:



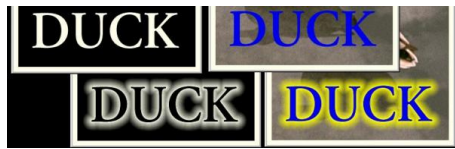
## Making Text Glow

The trick to creating glowing text is to create a second text image that is feathered outward from the original text image. This creates a new mask image that defines a halo around the text and which can be used to add a glowing outline around each letter.

To create a halo around the characters in a text image, start by blurring the text image using the Gaussian Blur transformation, and then subtract the text image from the blurred image using the Difference transformation:

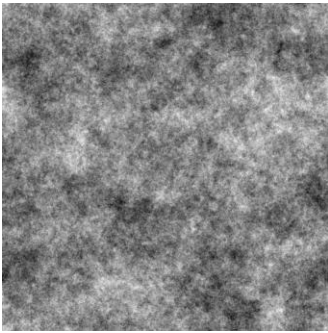


Once you have the halo mask, you can use any of the techniques described above to apply it to the background image.



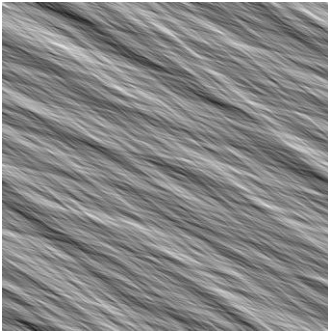
# Texture

The Texture transformation lets you create images with a wide range of random textures. Each texture image can be used as a seamless tile since they line up right edge to left edge and top edge to bottom edge. Since the textures are based on random numbers, you will not get exactly the same ones twice.

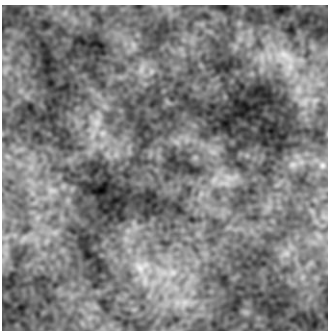


Textures are created by performing an inverse 2-dimensions Fourier transform of an array of random numbers. Depending on the settings, you can restrict the random numbers to certain directions or frequencies.

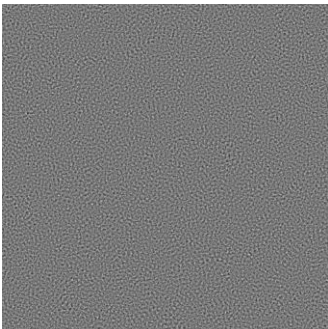
Limiting the direction angle gives the texture a directional bias.



Limiting high frequencies makes the texture smoother.

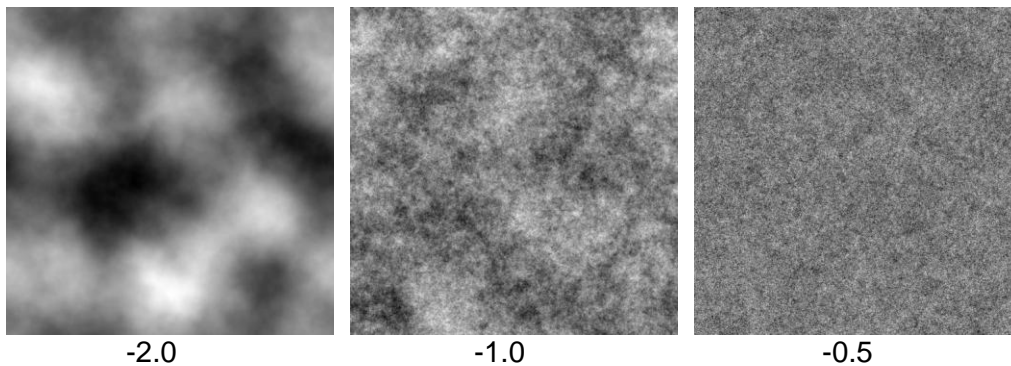


Limiting low frequencies makes the texture more uniform.

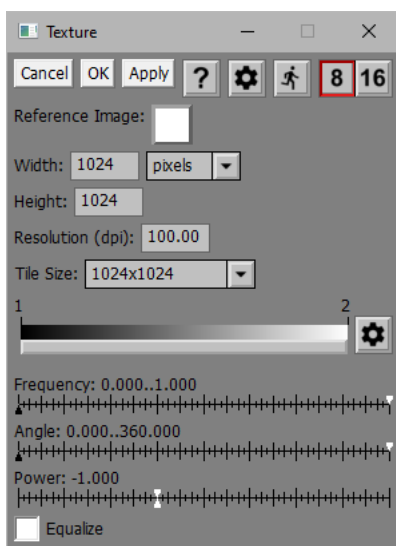




One additional slider applies a power law to the frequency distribution. The higher the power, the more the texture approaches white noise. The lower the power, the lumpier it gets. Setting the power to -1.0 generates a 1/f power law that is a hallmark of fractal images, so the amount of detail is roughly the same when viewed at any scale.



## Using the Texture Transformation



### Refresh

Clicking this button creates a new texture with the current settings, but with a fresh set of random numbers, so each time you click it you will get a new variation.

### Bit Depth

This tool bar lets you select 8-bit or 16-bit output.

### Reference Image

If you select a reference image, its width, height and resolution are used to set the Width, Height and Resolution settings (see below).

### Width/Height/Resolution

These settings determine the size of the output image. If you want to create a seamless tile, the size of the output image in pixels must be a multiple of the tile size (see below). If the tile size is smaller than the image size, the random tile is repeated as necessary to fill the output image.

### Tile Size

This sets the size of the random tile used to fill the output image.



## Color Line

This color line control lets you tint the output image. If the leave the color line at is default, the output image is black and white. See the Tint transformation for information on using color lines.

## Frequency

This double slider lets you select the range of frequencies that will go into building the random tile. Only frequencies between the black and white sliders are included, all others are set to zero. If you move the black slider to the right of the white slider, all frequencies not between the two sliders are included instead.

## Angle

This double slider lets you select the range of direction angles that will go into building the random tile. Only direction angles between the black and white sliders are included, all others are set to zero. If you move the black slider to the right of the white slider, all direction angles not between the two sliders are included instead.

## Power

This slider sets the exponent for the power law applied to the frequency distribution. Higher values produce a texture with lots of high frequencies that looks like white noise. Lower values produce a smooth, lumpy texture with lots of low frequencies. The default value of -1.0 produces fractal textures that look similar when viewed at any scale.

## Equalize

If the equalize box is checked, the texture image is adjusted to equalize its histogram. This applies a brightness curve so as to make all brightness levels more or less equally likely. If you plan to use a texture as a custom halftoning screen (see the [Halftone transformation](#)), make sure this option is selected.

## Mezzotint Settings Files

A collection of mezzotint texture settings files is installed along with Picture Window. These files define a graduated series of mezzotint textures you can use with other transformations to add a pleasing random texture. *Mezzotint 10.texture* is the coarsest and *Mezzotint 50.texture* is the finest. To use the mezzotint texture as a mask, crop it to the size of the image it will be used with.

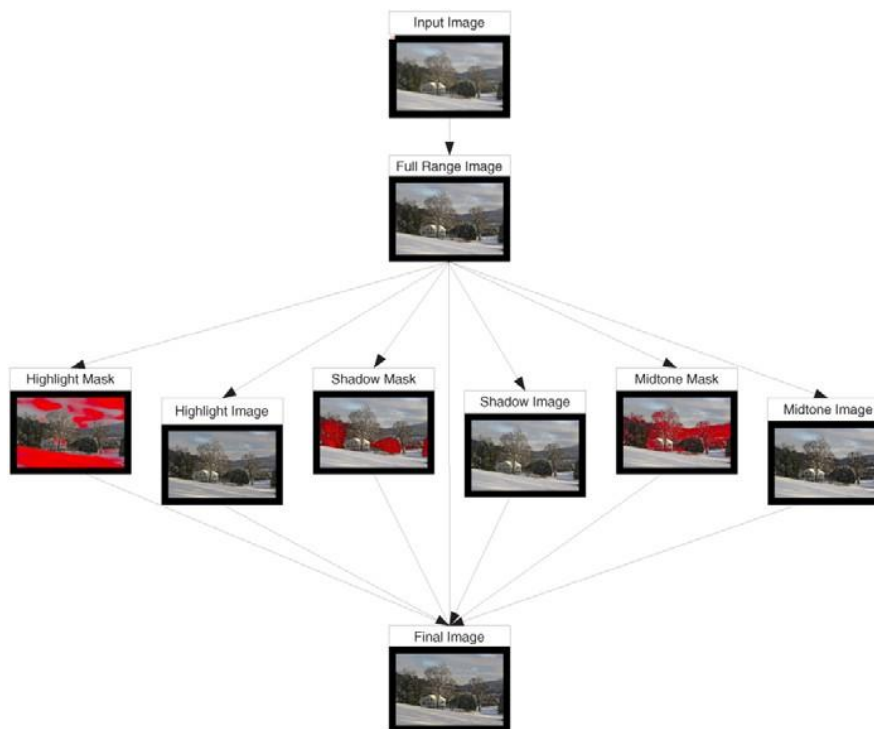
In addition, a set of pre-built mezzotint texture images can be downloaded from the Digital Light & Color web site.

# Three Zone Adjustment

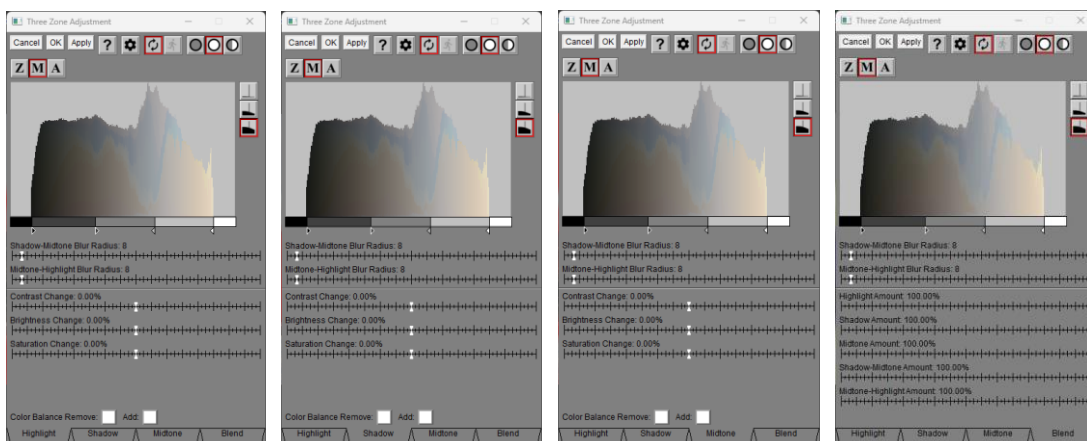
The Three-Zone Adjustment transformation is a powerful image enhancement tool designed for images that separate into three fairly well-defined brightness zones. For example, many landscape photographs naturally break down into shadows, midtones and highlights. For each zone, these transformations let you adjust contrast, brightness, saturation and color balance independently. The final effect can often bring dull images to life by dramatically improving their clarity in a manner difficult or impossible to achieve by adjusting the image as a single zone. Images with very low or very high contrast or with severely clipped highlights or shadows may not be good candidates for Three-Zone Adjustment.

## Overview

The Three-Zone Adjustment transformation uses masks to isolate three tonal zones in an input image: shadows, midtones, and highlights. Masks for each zone are created automatically based on zone markers you adjust to set the brightness thresholds between zones and by additional mask settings for each zone. Once zone masks are established, each zone's contrast, brightness, saturation and color balance can then be adjusted independently. Finally, the three adjusted images and the original input image are blended together to create a composite result with selected contributions from each one as illustrated below:



## Using Three-Zone Adjustment



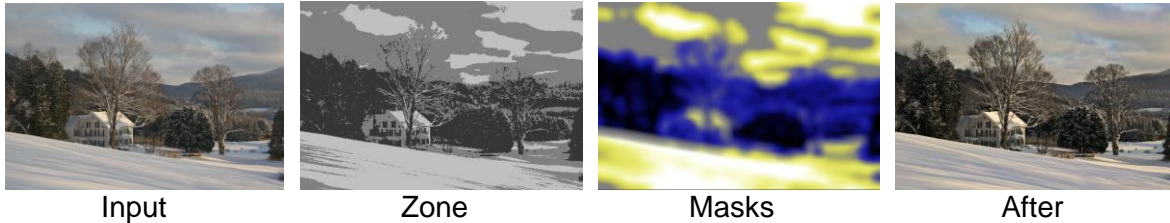
## Tabs

The four tabs at the bottom of the dialog box let you select one of four different sets of controls—one for each zone and one for blending the results of the three zones to create the final image.

## Display Mode



This tool bar lets you select one of three preview displays:



## Zone

In this display mode, the shadow zone is displayed in dark gray, the midtones in mid-gray and the highlights in light gray. Clipped shadows are displayed black and clipped highlights are white. This mode is useful when adjusting the zone markers as it lets you see what part of the input image is in each zone.

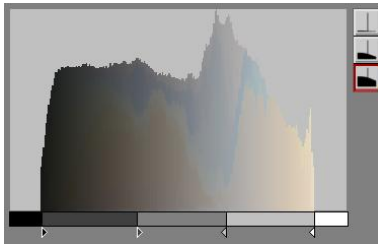
## Masks

This display mode displays the masks used by the current tab and is useful when adjusting the various Blur Radius settings. The highlight mask is displayed as white, the shadow mask as black, the midtone mask as gray, and the two transition masks as blue and yellow.

## After

This display mode shows the results after adjustment, for each tab. To see a preview of the final image, select the Blend tab.

## Input image histogram



The histogram display shows a histogram of the brightness of the input image. The 3-button tool bar at the right lets you apply histogram expansion of different levels to make small histogram values easier to see.

The zone markers under the histogram are used to set the brightness levels for each zone. The bar underneath is color coded to match the Zone display mode.

## Sliders

The Blur Radius sliders let you adjust the feathering of the masks for each tab.

For each zone, there are also Contrast Change, Brightness Change, and Saturation Change sliders as well as Color Balance controls. The Blend tab has sliders for adjusting the contribution from each zone as well as the transitions between zones.

## Adjusting the Zone Markers

There are four zone markers displayed below the input image histogram—from left to right they are black, dark gray, light gray and white. To facilitate setting the zone markers, click the Z button on the display mode tool bar to display a version of the input image with each zone identified by a different gray level.

To get the best results from the Three-Zone Adjustment transformation, it is important to set the outer (black and white) markers so they just bracket the non-zero part of the histogram. This causes the input image to be expanded to use the full range from black to white. Pixels darker than the brightness corresponding to the black marker are shown in the preview as pure black; pixels lighter than the white marker threshold show as pure white. If your image already spans the full range from black to white, leave the black and white markers at their initial extreme left and right positions.

Next adjust the light gray and dark gray markers to divide the remaining tonal range into highlight, shadow and midtone zones. Generally, the settings that work best are those that separate the visual elements of the image as cleanly as possible—usually at a local minimum in the histogram. Don't worry if the zones are not perfect since the transformation is somewhat forgiving and you can always go back and reposition the zone markers later if necessary.

## Adjusting Highlights

You can view the current highlight mask as a red overlay over the full range input image by clicking the M button on the display mode tool bar. This mask should more or less cover the highlight areas of the image although its edges should be blurred somewhat. The degree of blurring of the boundary between the highlight mask and the midtone mask is controlled by the Midtone-Highlight Blur slider. The default settings usually work fairly well, but you can adjust them later if necessary, to reduce halos or other artifacts that can show up around zone edges in the result image, especially if you make large adjustments to the image. More on this later.

By clicking on the A button in the display mode tool bar you can see the results of making image adjustments. Having done this, try playing with the Contrast, Brightness and Saturation sliders and Color Balance controls to get an effect you like. Increasing contrast will generally add snap to the highlights while changing the brightness makes the highlights lighter or darker. The Saturation slider and Color Balance controls are only displayed for color images and similarly can increase or decrease highlight saturation or add or remove color casts to the highlights. To get a better idea of what the sliders are doing, you can switch back and forth between the input image and the output image using the bypass buttons at the top of the dialog box or by selecting split screen display.



Increasing the highlight contrast will open up the highlights and help make more highlight detail visible. The only way to do this is to darken the darker highlights while leaving the brighter highlights alone. The overall effect is to darken the highlight zone. You can compensate for this somewhat by increasing the highlight brightness setting.

## Adjusting the Shadows

To work on the shadow zone, click the Shadow tab at the bottom of the dialog box to expose a new set of adjustment sliders and Color Balance controls which are pretty much the same as the corresponding highlight sliders. Blurring of the boundary between the shadow mask and the midtone mask is controlled by the Shadow-Midtone Blur slider.

Increasing shadow contrast will open up the shadows and help make more shadow detail visible. The only way to do this is to lighten the lighter shadows while leaving the darker shadows alone. The overall effect is to lighten the shadow zone. You can compensate for this somewhat by lowering the shadow brightness setting.

## Adjusting the Midtones

To work on the midtone zone, click the Midtone tab at the bottom of the dialog box to expose the midtone adjustment sliders.

## Blending the images

To view the results of blending the adjusted highlight, shadow and midtone images, click the Blend tab at the bottom of the dialog box.

To see a map showing what parts of the image are controlled by which zones, click the M (mask) button on the display mode tool bar. This displays the masks color coded as follows:

|                                   |        |
|-----------------------------------|--------|
| Controlled by Highlight Settings  | White  |
| Controlled by Shadow Settings     | Black  |
| Controlled by Midtone Settings    | Gray   |
| Shadow-Midtone Transition Zone    | Blue   |
| Midtone-Highlight Transition Zone | Yellow |

When the Blend tab is selected, five sliders are displayed for adjusting the relative contributions of the adjusted highlight, shadow and midtone images plus two additional sliders for the midtone-highlight and shadow-midtone transition zones.

When the highlight, shadow or midtone sliders are set to 0%, they let the original input image show through in their respective zones. When set to 100%, they completely replace the input image in their zone with the adjusted image. Intermediate settings have a partial effect. Thus, you can scale back the effect of any of the three zones as much as you wish at this stage if you find the effect too strong or to reduce halos.

The Midtone-Highlight and Shadow-Midtone sliders affect the boundary areas between highlights and midtones and between shadows and midtones. The higher the sliders are set, the less of the original input image shows through in the corresponding transition zone. Decreasing these sliders is one of the best way to reduce halos in the output image.

## Tips

### Avoiding Halos

For some images, it can be tricky to make the desired adjustments without creating artifacts such as halos or solarization in the transitions at the zone boundaries. You have several tools at your disposal to try to minimize such artifacts.

- Try adjusting the mask Blur sliders for the zone boundaries in question. Generally, the larger the blur setting the softer the edges of the mask. Either increasing or decreasing the blur radius may help with halos by widening or narrowing the transition zone.
- Try adjusting the Contrast and/or Brightness sliders to reduce the brightness discontinuity between the two zones.
- Try adjusting the Highlight, Shadow and Midtone Amount sliders in the Blend tab. Scaling them back can help reduce halos.
- Try adjusting the Midtone-Highlight and Shadow-Midtone sliders in the Blend tab.
- Try adjusting the zone threshold marker between the two zones to make the boundary less obvious.

To see the mask for the current zone, click the M button in the display mode tool bar. This will display the mask as a red overlay over the input image so you can see what parts of the image will be altered by the adjustment sliders. To see all the masks at once, click the Blend tab.

## **Working with black and white images**

Working with black and white images is exactly the same as working with color images with the exception that no Saturation sliders or Color Balance controls are displayed in the Highlight, Shadow and Midtone tabs.

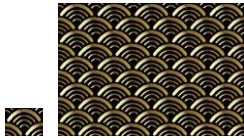
## **Adjusting only one or two zones**

Just because you can adjust all three zones doesn't mean you have to. If you leave all the adjustment sliders for a given zone at 0%, no adjustments are made to that zone. Thus, you can easily confine your changes to a single zone or to two zones. For example, if all you want to do is open up the shadows or highlights in an image, just adjust the shadow or highlight zone.

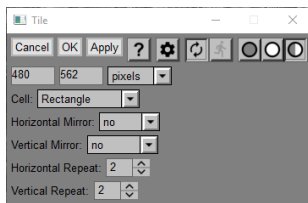
# Tile

The Tile transformation takes its input image and repeats it some number of times, horizontally or vertically. Optionally, it can reflect the image before repeating it.

If the input image is a seamless tile (i.e. the left/right and top/bottom edges match up), tiling it produces a larger image, something little like wallpaper or gift wrap.



## Using the Tile Transformation



### Input Image Overlay

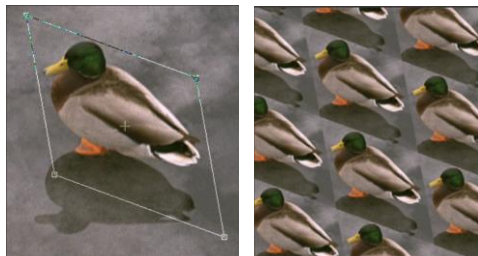
A cropping rectangle or parallelogram is displayed over the input image. You can resize the it by dragging any of its corners, sides or interior. Only the part of the input image within the selected area is repeated.

### Image Size

This displays the size of the output image in the units you select.

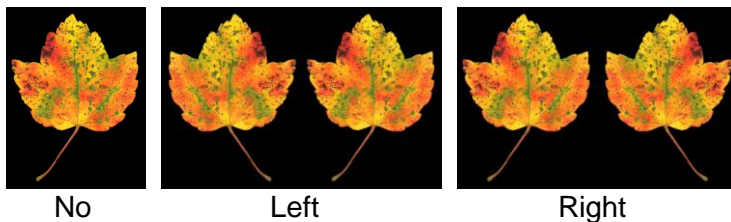
### Cell

You can select Rectangle or Parallelogram. If you select Parallelogram, the repeating cell is oblique:



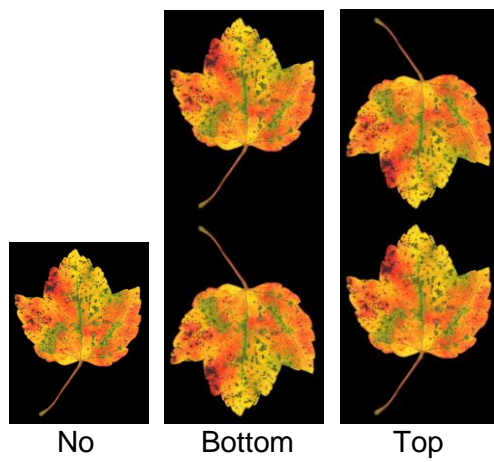
### Horizontal Mirror

This setting lets you control whether the input image is mirrored and if so on which side.



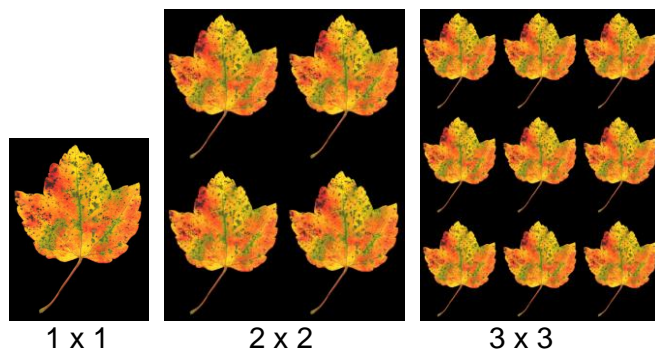


## Vertical Mirror



## Horizontal/Vertical Repeat

These controls let you specify how many times to repeat the input image horizontally or vertically.

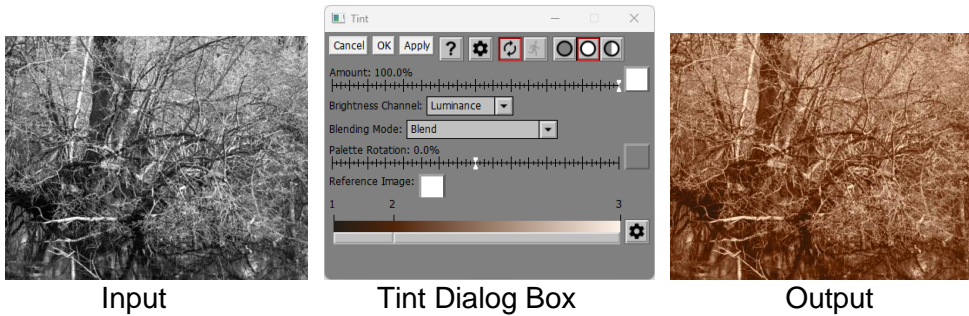


# Tint

The Tint transformation converts images from black and white to color by assigning different colors to each gray level. The resulting color image is then blended back with the input image.

## Using the Tint Transformation

The Tint transformation converts black and white images to color using a Color Line control to define the color for each possible gray level. If the input image is color, it is implicitly converted to black and white by extracting its luminance, HSV V or HSL L channel and then tinted.



### Amount

The Amount control lets you blend some of the input image into the output image to reduce the effect of the transformation or, if you use a mask, to localize its effect to selected parts of the input image.

### Brightness Channel

This control applies only to color images. It lets you select which brightness channel to use as a basis for tinting. The Brightness Channel is ignored if the Blending Mode is set to Color Balance.

### Blending Mode

This control lets you select how the tinted image is blended with the input image. For more information on blending modes, see the [Blend transformation](#).

### Palette Rotation

The Palette Rotation amount control is used to create special effects. If you imagine connecting one end of the color line to the other to make a circle, palette rotation means rotating the circle to shift the colors around. Without a mask, this changes the color line, usually so it has a sharp discontinuity where the two ends are connected, unless the first and last control point have the same color. The following example illustrate a color line and how it applies to an input image with different amounts of palette rotation.



0%



25%



50%



75%

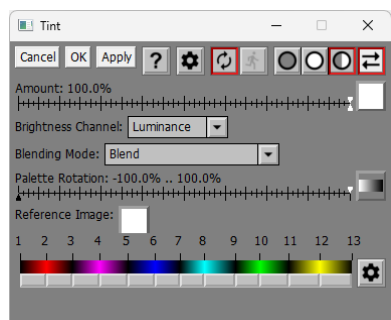
Using a Palette Rotation amount mask, you can continuously vary the color rotation to get some more interesting effects.



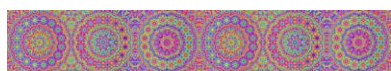
Input



Mask



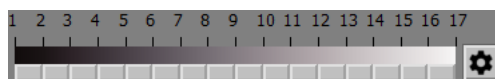
Tint Dialog Box



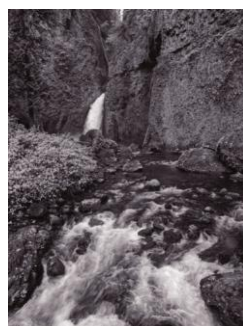
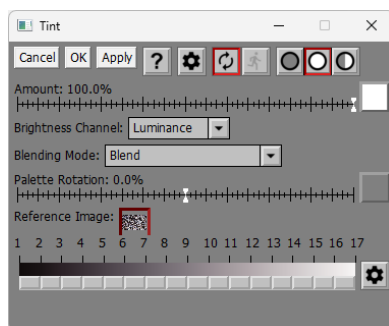
Output

## Reference Image

If you select a color reference image, it is used to redefine the Color Line (see below). The new color line is created with 17 equally spaced control points whose colors correspond to the average colors of the pixels in the reference image with the corresponding brightness level (as computed using the current Brightness Channel setting). The colors at the left end of the color line are based on the darker colors in the reference image while the colors at the right end are based on the lighter colors. For example, the following illustrates a reference image and its corresponding color line:



Tinting an image using this color line transfers some of the feel of the reference image to the input image. For example:



Input Image

Tint Transformation

Output Image

## Color Line

The Color Line control lets you define the way colors are assigned to gray levels. Adjusting the color line manually causes the Reference Image (if any) to be reset.



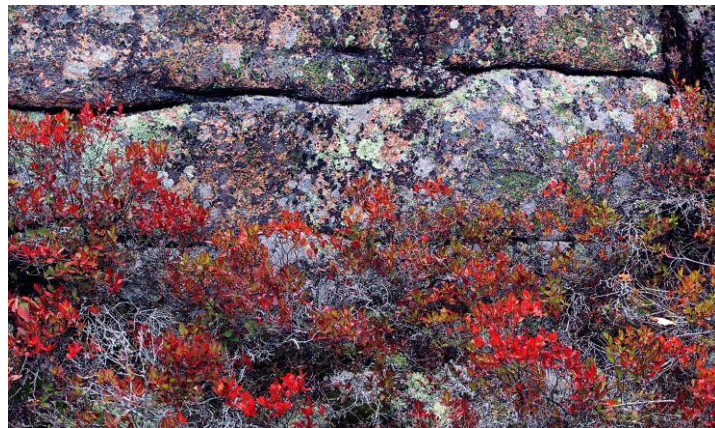
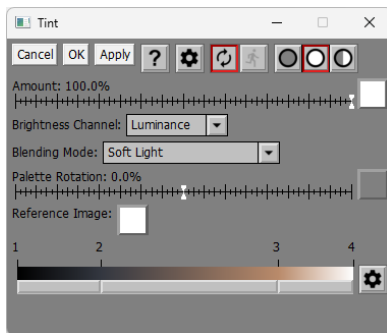
## Using Tint on Color Images

Using Tint to render images as sepia tones or cyanotypes is an obvious use, but Tint is also a powerful tool for altering the look of color images. This works by first converting the color image to black and white, then tinting the image according to the color line and finally blending the tinted image with the original according to the blending mode. The end result is to apply different colors to different parts of the input image, depending on their brightness – so you could, for example, tint the darker parts of an image blue and the lighter parts yellow. You can also change the contrast of the image at the same time depending on how you select colors on the color line.

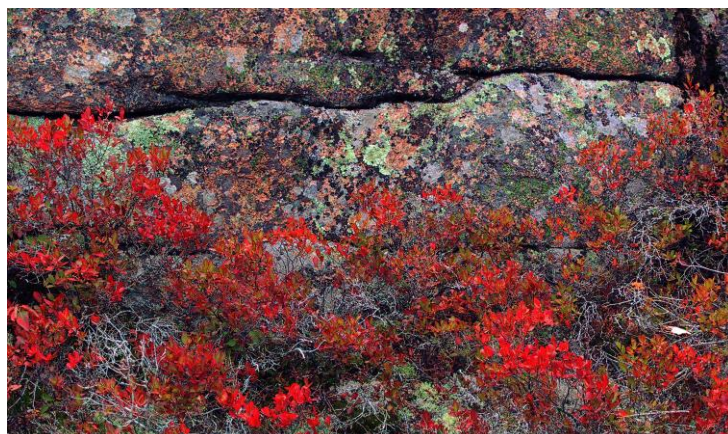
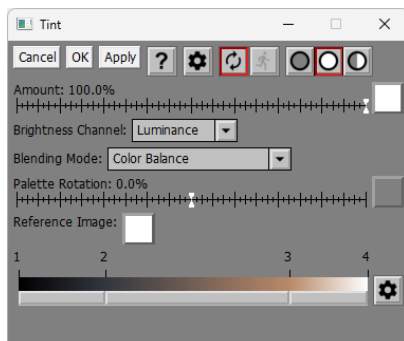
To illustrate some of the subtle effects you can achieve, here are two examples the same color image tinted using the same color line but different blending modes:



Original Image



Tinted using Soft Light



Tinted using Color Balance

## Transparent PNG

The purpose of the Transparent PNG transformation is to let you save PNG files along with a transparency mask (also known as an alpha channel). This is useful in preparing semitransparent images for use in web sites when you need an image with a non-rectangular shape or that fades into the page background.

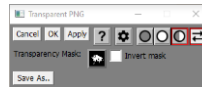
The input image is the image you want to save. The output image illustrates what the transparent input image would look like on a checkerboard background. The checkerboard background is not saved in the PNG file.



Input



Mask



Transparent PNG



Output

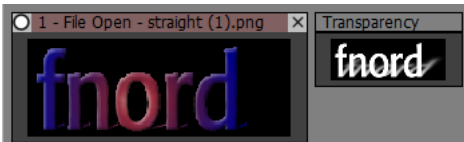
## Transparency Mask

This is where you select the transparency mask. The saved image will be visible where the mask is white and transparent where the mask is black. If you accidentally get it backwards, click the Invert Mask checkbox to invert the mask.

### Save As...

Click this button to save the PNG file.

When you open a transparent PNG file, its alpha channel becomes a mask for the File Open which shows up next to the transformation in the image browser.

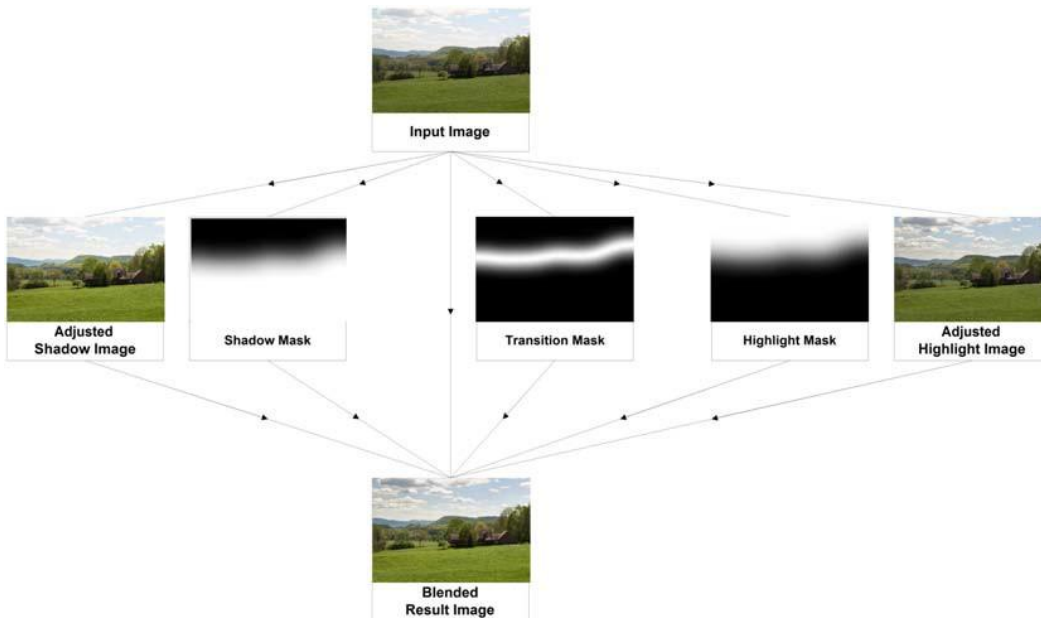


## Two Zone Adjustment

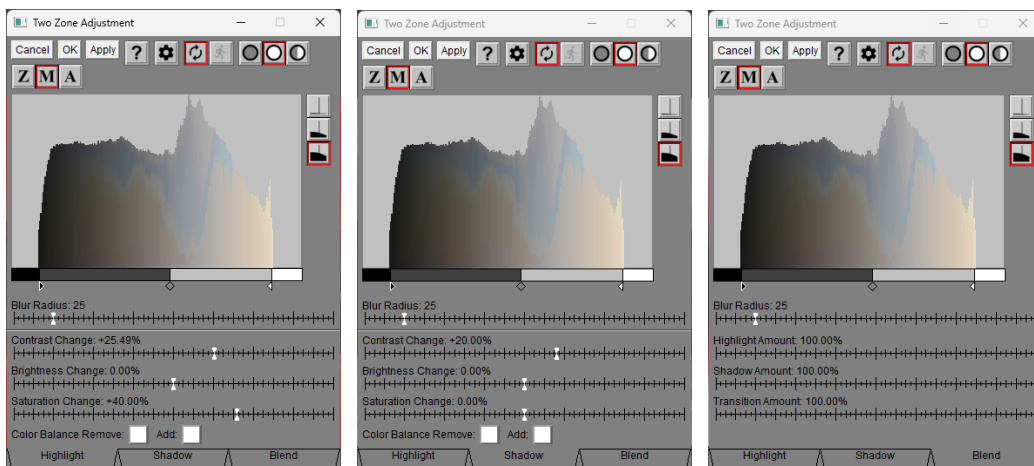
The Two-Zone Adjustment transformation is a powerful image enhancement tool designed for images that separate into two fairly well-defined brightness zones. For example, many landscape photographs naturally break down into shadows and highlights. For each zone, these transformations let you adjust contrast, brightness, saturation and color balance independently. The final effect can often bring dull images to life by dramatically improving their clarity in a manner difficult or impossible to achieve by adjusting the image as a single zone. Images with very low or very high contrast or with severely clipped highlights or shadows may not be good candidates for Two-Zone Adjustment.

### Overview

Two-Zone Adjustment transformation uses masks to isolate highlight and shadow zones in an input image by splitting it at a selected tonal value—usually set to a notch in the input image histogram. Masks for each zone are created automatically based on zone markers you adjust to set the brightness threshold between the light and dark zones and by additional mask settings. A third transition mask is also created which can be used to help eliminate halos in the transition zone at the boundary between the light and dark zones. Once all the masks are established, each zone's contrast, brightness, saturation and color balance can then be adjusted independently. In a final step, the adjusted images and the input image are blended together to create a result image that includes selected parts of each one.



### Using Two-Zone Adjustment





## Tabs

The three tabs at the bottom of the dialog box let you select one of three different sets of controls—one for each zone and one for blending the results of the three zones to create the final image.

## Display Mode



This tool bar lets you select one of three preview displays:



Input

Zone

Mask

After

## Zone

In this display mode, the shadow zone is displayed in dark gray and the highlights in light gray. Clipped shadows are displayed black and clipped highlights are white. This mode is useful when adjusting the zone markers as it lets you see what part of the input image is in each zone.

## Mask

This display mode lets you see the masks used by the current tab and is useful when adjusting the various Blur Radius settings. The highlight mask is white, the shadow mask is black, and the transition mask is red.

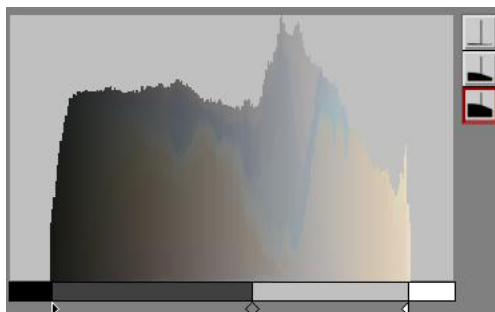
## After

This display mode shows the results after adjustment, for each tab. To see a preview of the final image, select the Blend tab. You can use the tool bar



at the top of the dialog box to display the input image.

## Input image histogram



The histogram display shows a histogram of the brightness of the input image. The 3-button tool bar at the right lets you apply histogram expansion of different levels to make small histogram values easier to see.

The zone markers under the histogram are used to set the brightness levels for each zone. The bar underneath is color coded to match the Zone display mode.

## Sliders and Color Balance Controls

The Blur Radius slider lets you adjust the feathering of the mask for each tab.



For each zone, there are also Contrast Change, Brightness Change, and Saturation Change sliders as well as Color Balance controls. The Blend tab has sliders for adjusting the contribution from each zone as well as the transition between zones.

## Adjusting the Zone Markers

There are three zone markers displayed below the input image histogram—from left to right they are black, dark gray, light gray and white. To facilitate setting the zone markers, click the Z button on the display mode tool bar to display a version of the input image with each zone identified by a different gray level.

To get the best results from the Two-Zone Adjustment transformation, it is important to set the outer (black and white) markers so they just bracket the non-zero part of the histogram. This causes the input image to be expanded to use the full range from black to white. Pixels darker than the brightness corresponding to the black marker are shown in the preview as pure black; pixels lighter than the white marker threshold show as pure white. If your image already spans the full range from black to white, leave the black and white markers at their initial extreme left and right positions.

Next adjust the light gray and dark gray markers to divide the remaining tonal range into highlight and shadow zones. Generally, the settings that work best are those that separate the visual elements of the image as cleanly as possible—usually at a local minimum in the histogram. Don't worry if the zones are not perfect since the transformation is somewhat forgiving and you can always go back and reposition the zone markers later if necessary.

## Adjusting Highlights

You can view the current highlight mask as a red overlay over the full range input image by clicking the M button on the display mode tool bar. This mask should more or less cover the highlight areas of the image although its edges should be blurred somewhat. The degree of blurring of the boundary between the highlight mask and the midtone mask is controlled by the Highlight Blur slider. The default settings usually work fairly well, but you can adjust them later if necessary, to reduce halos or other artifacts that can show up around zone edges in the result image, especially if you make large adjustments to the image. More on this later.

By clicking on the A button in the display mode tool bar you can see the results of making image adjustments. Having done this, try playing with the Contrast, Brightness and Saturation sliders to get an effect you like. Increasing contrast will generally add snap to the highlights while changing the brightness makes the highlights lighter or darker. The Saturation slider is only displayed for color images and similarly can increase or decrease highlight saturation. Similarly, the Color Balance controls are only displayed for color images and can be used to remove or add a color cast to the highlights. To get a better idea of what the sliders are doing, you can switch back and forth between the input image and the output image using the bypass buttons at the top of the dialog box or by selecting split screen display.



Increasing the highlight contrast will open up the highlights and help make more highlight detail visible. The only way to do this is to darken the darker highlights while leaving the brighter highlights alone. The overall effect is to darken the highlight zone. You can compensate for this somewhat by increasing the highlight brightness setting.

## Adjusting the Shadows

To work on the shadow zone, click the Shadow tab at the bottom of the dialog box to expose a new set of adjustment sliders and color balance controls which are pretty much the same as the corresponding highlight sliders.

Increasing shadow contrast will open up the shadows and help make more shadow detail visible. The only way to do this is to lighten the lighter shadows while leaving the darker shadows alone. The overall effect is to lighten the shadow zone. You can compensate for this somewhat by lowering the shadow brightness setting.

## Blending the images

To view the results of blending the adjusted highlight, shadow and midtone images, click the Blend tab at the bottom of the dialog box.

To see a map showing what parts of the image are controlled by which zones, click the M (mask) button on the display mode tool bar. This displays the masks color coded as follows:

|                                  |             |
|----------------------------------|-------------|
| Controlled by Highlight Settings | White       |
| Controlled by Shadow Settings    | Black       |
| Unchanged from Input             | Transparent |
| Transition Zone                  | Red         |

When the Blend tab is selected, three sliders are displayed for adjusting the relative contributions of the adjusted highlight and shadow images plus one additional slider for the transition zone.

When the highlight or shadow sliders are set to 0%, they let the original input image show through in their respective zones. When set to 100%, they completely replace the input image in their zone with the adjusted image. Intermediate settings have a partial effect. Thus, you can scale back the effect of any of the three zones as much as you wish at this stage if you find the effect too strong or to reduce halos.

The Transition slider affects the boundary area between highlights and shadows. The higher the slider is set, the less of the original input image shows through in the corresponding transition zone. Decreasing this slider is one of the best way to reduce halos in the output image.

## Tips

### Avoiding Halos

For some images, it can be tricky to make the desired adjustments without creating artifacts such as halos or solarization in the transitions at the zone boundaries. You have several tools at your disposal to try to minimize such artifacts.

- Try adjusting the mask Blur slider for the transition zone. Generally, the larger the blur setting the softer the edges of the mask. Either increasing or decreasing the blur radius may help with halos by widening or narrowing the transition zone.
- Try adjusting the Contrast and/or Brightness sliders to reduce the brightness discontinuity between the two zones.
- Try adjusting the Highlight and Shadow Amount sliders in the Blend tab. Scaling them back can help reduce halos.
- Try adjusting the Transition slider in the Blend tab.
- Try adjusting the zone threshold marker between the two zones to make the boundary less obvious.

To see the mask for the current zone, click the M button in the display mode tool bar. This will display the mask as a red overlay over the input image so you can see what parts of the image will be altered by the adjustment sliders.

### Working with black and white images

Working with black and white images is exactly the same as working with color images with the exception that no Saturation sliders and Color Balance controls are displayed in the Highlight and Shadow tabs.

### Adjusting only one zone

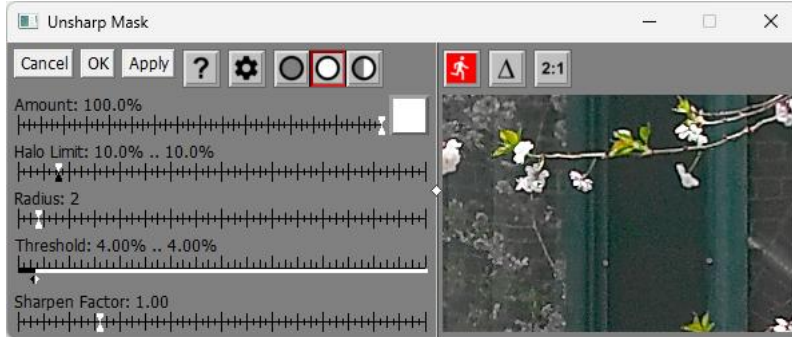
Just because you can adjust both zones doesn't mean you have to. If you leave all the adjustment sliders for a given zone at 0% and the color balance colors set to white, no adjustments are made to that zone. Thus, you can easily confine your changes to a single zone. For example, if all you want to do is open up the shadows or highlights in an image, just adjust the shadow or highlight zone.

# Unsharp Mask

## Overview

Unsharp Mask works by first blurring the image using Gaussian Blur and then exaggerating the differences between the original image and the blurred image. You can adjust the blurring radius for different effects.

## Using the Unsharp Mask Transformation



### Preview Area

For faster response time, Unsharp Mask has its own preview area.

You can increase the size of the preview by dragging one of the corners of the dialog box. If you widen the dialog box, you can drag the white diamond in the center of the vertical separator bar between the controls and the preview area to enlarge one while making the other smaller.



#### -- Preview Button

To preview the effect on the entire output image, click the button just above the preview area. To re-center the preview, click on the input image in the main image area. You can also scroll the preview area by clicking and dragging on it.



#### -- Difference Button

When the Difference button is depressed, the preview area displays the difference between the input image and the preview image.



#### -- Magnify Preview Button

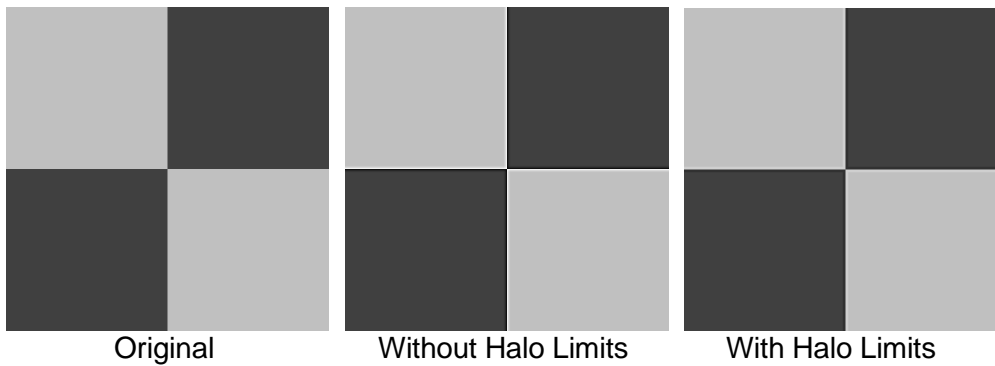
When the Magnify Preview button is depressed, the central portion of the preview area is magnified by a factor of two, making it easier to see fine details. Clicking the button a second time restores the normal 1:1 display.

### Halo Limits

Excessive lightening of pixels during sharpening causes light halos around dark objects and excessive darkening causes dark halos around light objects.



Halo limits restrict how much any pixel can be lightened or darkened in the sharpening process. Typically values between 5% and 15% work fairly well. Light halos usually stand out more than dark halos so you can get away with a slightly larger value for the dark halo limit.

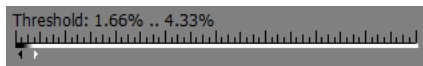


## Radius

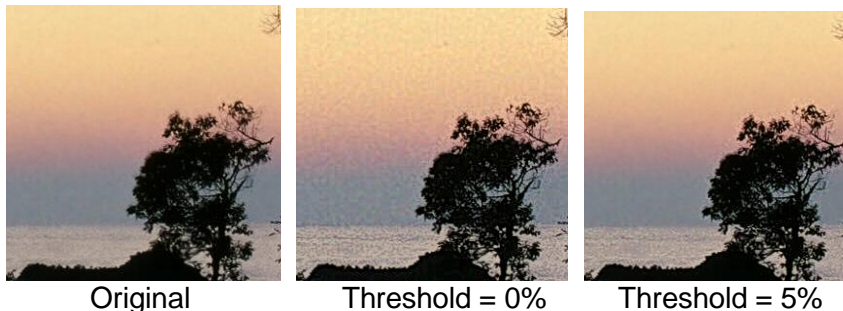
The Radius slider lets you control the amount of blurring. Generally, you should set the radius according to how much the original image is blurred. The blurrier the image, the higher the radius you need to select. Choosing too large a radius creates a sort of ghosting effect around the edges of objects; if the radius is too small, the sharpening effect is minimized.

## Threshold

The threshold setting lets you limit sharpening to those pixels whose difference from their neighbors exceeds a specified threshold value. This prevents sharpening smooth areas while still sharpening more prominent details. The idea behind setting the threshold is to select the smallest possible value that brings out edge detail without creating unwanted texture in smooth areas such as clouds or clear skies.

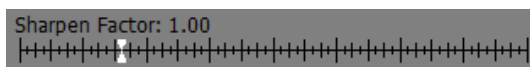


In the image detail below, you can see how Unsharp Mask with a threshold of 0% sharpens the tree silhouette, but also brings out noise in the sky and water. Increasing the threshold to 5% leaves the sky smooth but still makes the tree stand out against its background.



## Sharpen Factor

The sharpen factor determines how much lighter or darker to make each pixel when sharpening.



The larger the sharpen factor, the stronger the sharpening effect. The following example shows the effect of varying the sharpen factor from 1.0 to 3.0:




There is a connection between halo limits and the sharpen factor. If you lower the halo limits, you can use a higher sharpen factor. Similarly, if you reduce the sharpen factor, you can use higher halo limits.

### Sharpening Luminance Only

All of Picture Window's sharpening transformations except Sharpen/Sharpen More provide an option to sharpen just the luminance of the image. You can think of a color image as being made up of two components: luma (the black and white part) and chroma (the color part – basically a combination of hue and saturation).

It is common for digital camera images to have more chroma noise than luma noise, so if you sharpen just the luminance, you avoid amplifying color noise and can get a slightly cleaner image. In most cases, the difference is fairly subtle.

To select luminance-only sharpening, click the  button at the top of the dialog box and select the option from the popup menu.

☒ Sharpen Luminance only

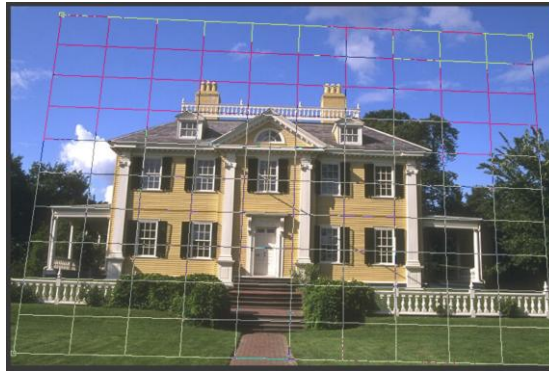
# Warp

The Warp transformation applies a perspective warp to its input image. It can also rotate and stretch images. Perspective warping is commonly used to correct converging verticals in architectural photography or for that matter in any other image that is taken with the camera pointing upwards or downwards.

You control the warp by positioning the four corners of a grid over the input image as illustrated below. Whatever falls within the grid is stretched to fill the output image. Thus, if you line up the horizontals and verticals of the grid with the horizontals and verticals of the subject, the perspective of the subject will be corrected in the output image.



Original



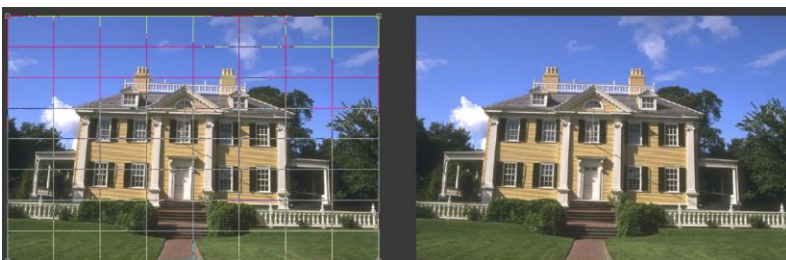
Original with Grid



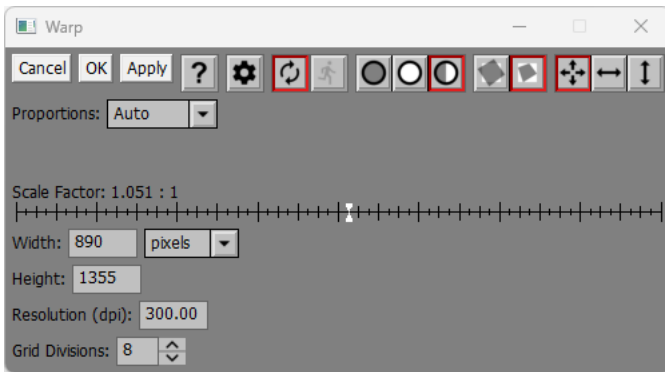
Corrected Image

## Using the Warp Transformation

Starting the Warp Transformation displays the Warp dialog box and puts the main display into split screen mode with the input image on the left and the output image on the right. Initially, a grid covers the entire input image and the output image is a copy of the input image.







## Grid Divisions

You can change how fine or coarse the grid is by adjusting the Grid Divisions control. Depending on the image, this may make it easier to adjust the grid.

## Positioning the Grid

To position the grid, drag the control points at the corners. To move all four corners at once, drag the interior of the grid. The idea is to line up the horizontals and verticals of the grid with the horizontals and verticals of the subject you want to straighten out. Anything lying outside the grid will be cropped out. If the grid extends beyond the edge of the input image, the corresponding part of the output image will be black.

Holding down the shift key while dragging one of the corners of the grid, constrains the motion to be horizontal or vertical, whichever is the primary direction.



## Force Control Points In-Bounds

Depending on which button is depressed, this tool bar lets you either position the corners of the grid freely or prevent them from moving beyond the edges of the input image.



## Constrain Control Points

Depending on which button is depressed, this tool bar lets you move control points freely or just horizontally or just vertically.

## Number Keys

Each of the four corners of the warp region is labeled with a number from 1 to 4. Pressing a number key centers the display on the corresponding control point. Pressing the same number key more than once zooms the input image each time. This provides a convenient way to make fine adjustments to the control point locations, even when the image is zoomed in such that you cannot see it all at once.

## Proportions

After warping an image, it is often necessary to adjust the output image proportions to make the result look natural.

You can select either Auto or Custom proportions. If you select Custom, a proportions slider is displayed to let you set the output image proportions manually. If you select Auto, the output image proportions are automatically computed so as to preserve the proportions of the center of the input image.

## Scale Factor

The Scale Factor lets you increase or decrease the resolution of the output image. By default, the Scale Factor is set to preserve the area of the part of the input image covered by the grid.



## Settings Menu

|  |                                    |
|--|------------------------------------|
| <input type="radio"/>  | Rigid                              |
| <input type="radio"/>  | Rotate Only                        |
| <input type="radio"/>  | Scale Only                         |
| <input checked="" type="radio"/>                               | Free                               |
| <hr/>  |                                    |
| <input type="checkbox"/>                                       | Lock Scale, Vary Output Image Size |
| <input checked="" type="checkbox"/>                            | Lock Output Image Size, Vary Scale |
| <hr/>  |                                    |
| <input type="radio"/>  | Bilinear                           |
| <input checked="" type="radio"/>                               | Perspective                        |
| <hr/>  |                                    |
| <input type="button" value="Reset warp region in batch mode"/> |                                    |

The Settings Menu lets you control the way the grid is adjusted and select the warping method.

**Rigid** – adjusting the grid only scales and rotates it

**Rotate Only** – adjusting the grid only rotates it

**Scale Only** – adjusting the grid only expands or contracts it

**Free** – lets you adjust the four grid corners independently

**Lock Scale, Vary Output Image Size**

**Lock Output Image Size, Vary Scale**

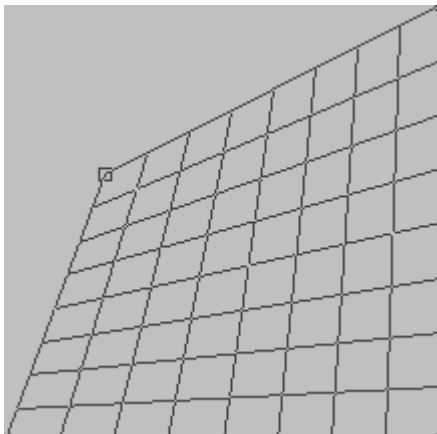
These settings determine what happens when you change the warp region quadrilateral or select a new input image.

If you lock the scale factor, it stays the same and the output image size is adjusted according to the area of the warp region and the proportions. By default, the output image size is set to the input image size, the proportions are set to the proportions of the input image, and the scale factor is set to 1:1. With the scale factor locked at 1:1, as you adjust the warp region quadrilateral, the output image size is adjusted to have the same area as the warp region.

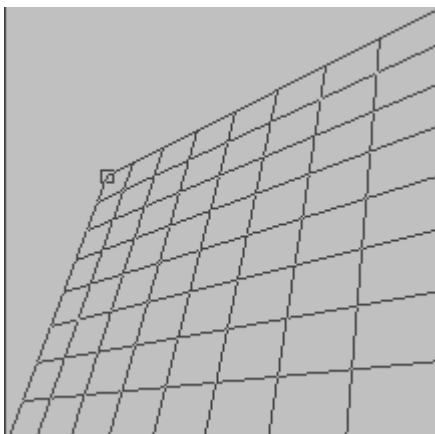
If you lock the output image size, it stays the same and the scale factor and proportions is adjusted according to the area of the warp region. By default, the output image size is set to the input image size, the proportions are set to the proportions of the input image, and the scale factor is set to 1:1. With the output image size locked, as you adjust the warp region quadrilateral, the scale factor and proportions sliders change to reflect the relative sizes of the warp region and the output image.

**Bilinear**

**Perspective**



Bilinear



Perspective

**Perspective** warping is a little slower than **Bilinear** warping but more accurate, especially when making large perspective corrections. A true perspective warp keeps straight lines in the input image as straight lines in the output image, regardless of their orientation, and

the grid lines get closer together where the quadrilateral is smaller. A bilinear warp only preserves straight lines that are parallel to the grid lines, and the grid lines are evenly spaced.

**Reset warp region in batch mode** – If this item is checked, then the warp region quadrilateral is reset to cover the entire image for each new image when **Warp** is executed as part of a [Batch Process](#). Otherwise, the warp region from the previous image is used as a starting point.

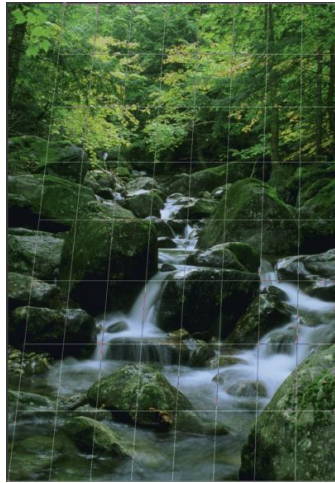
## Tips

Another use for the Warp transformation is to do a kind of asymmetrical cropping. This method usually only works for landscapes since it distorts the image.

In this image, there is distracting tree trunk and branch in the upper left corner. Using the Warp transformation, it can be removed while barely affecting the rest of the image.



Original

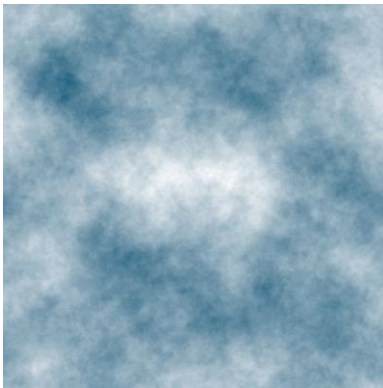


Setting the Grid

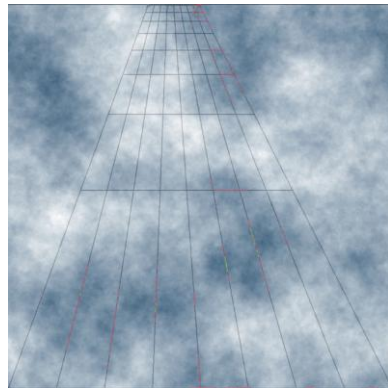


Warped Image

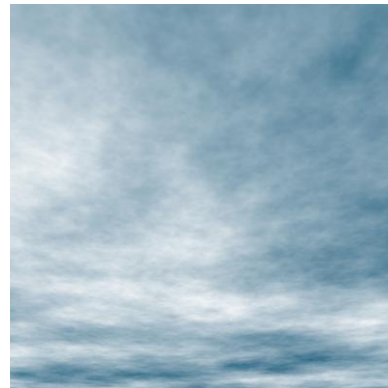
Warp can also be used to add perspective as well as removing it. For example, you can create a simulated sky by starting with an image generated by the Texture transformation:



Original



Grid



Output

# Watercolor

The Watercolor transformation renders images in a way that resembles a watercolor painting as illustrated below.



## What Watercolor Does

The idea behind creating a painting from a photograph is to first simplify the image by removing detail and then to make the remaining elements of the image stand out. Sometimes an image that doesn't work well as a photograph comes alive as a painting. Paradoxically, sometimes a loose painting succeeds at capturing the feel of a place more than a sharp photograph, and problems such as clipped highlights or shadows that can detract from a photograph can make a painting luminous. Generally, simulated watercolors look best displayed or printed large and viewed from close up -- the further away you get the more they revert to looking like the photograph from which they were derived.

The Watercolor transformation works by performing a specific series of operations on the input image. At each stage you can fine tune the result by adjusting the corresponding settings.

### Step 1 - Resize

Before any other operations are performed, the input image is resized. This is done by specifying the maximum dimension (width for landscape or height for portrait) in pixels of the result image. Generally, the image size is reduced in order to reduce the amount of detail in the image, but if the input image is already small, resizing it larger may also produce good results. Setting the maximum dimension to zero sets the result image to the same size as the input image. The larger you make the output image, the more detail it will capture but the less impressionistic it will be. The following examples illustrate the effect on a section of the input image of doubling the output image size.



Max Dimension = 2000



Max Dimension = 4000

### Step 2 - Reduce detail by repeated median filtering

The next step is to blur the image by performing multiple passes of median filtering. The larger the median radius and the more median passes, the more the image is simplified.





Horizontal Radius = 2, Vertical Radius = 2    Horizontal Radius = 4, Vertical Radius = 4

Horizontal and vertical filtering can be controlled independently to vary the effect.



Horizontal Radius = 0, Vertical Radius = 4    Horizontal Radius = 4, Vertical Radius = 0

Finally, there is a threshold setting that lets you reduce the tendency of median filtering to blur detail and round corners. The following example shows different threshold values applied to a radius 5 median blur.



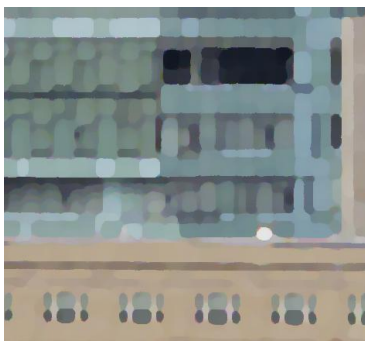
0%



25%



50%



75%



100%

### Step 3 - Sharpening

The next step is to sharpen the result of median filtering using unsharp masking. Since median filtering tends to preserve areas of solid color, sharpening accentuates the boundaries between the solid color regions and makes them stand out a little like brush strokes. The larger the sharpening radius, the more sharpening is performed. Increasing the sharpening threshold prevents indistinct edges from being sharpened.



Sharpen Radius = 1



Sharpen Radius = 5

#### Step 4 - Edge Darkening

The final step is to darken the edges of the sharpened image. This simulates the way watercolor tends to pool and deposit pigment at the edges of a brush stroke and further emphasizes the boundaries between solid areas by giving them a dark outline. The more edge darkening is performed, the stronger the effect and the darker the overall image.



Edge Darkening = 0%



Edge Darkening = 100%

## Tips

You can get an interesting variation on the Watercolor effect by doing a Gaussian Blur on the input image before applying the Watercolor transformation. In the Gaussian Blur, set the radius to roughly 20 pixels and set the Amount to around 50%. Running this blurred image through the Watercolor transformation creates a sort of dreamy effect.



Original



50% Gaussian Blur



Watercolor of Original



Watercolor of 50% Gaussian Blur



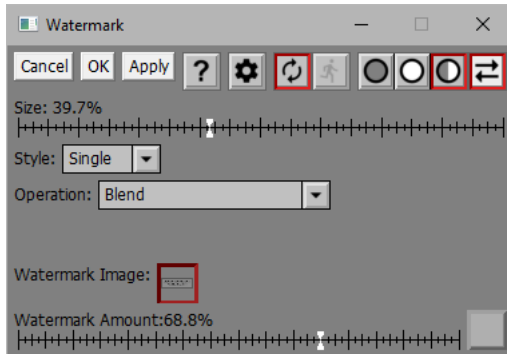
# Watermark

## Overview

The Watermark transformation lets you apply a watermark or logo to an image as is commonly done by photographers to identify their images or to prevent them from being used without attribution or licensing. It lets you apply a single watermark or tile the entire image with watermarks. You can also vary the transparency of the watermark and its size and location.

You can control the watermark location by positioning the center of a rectangle displayed over the input image as illustrated below.

## Using the Watermark Transformation

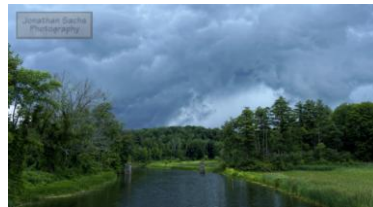


### Input Image Overlay

If no Watermark Image has been defined yet, a single control point is displayed over the input image, initially located at the center of the image. Once you define a Watermark Image, a rectangle is displayed showing the size and location of the watermark on the output image. To change the location, drag the control point at the center of the rectangle. To change the size, adjust the Size slider.



Input



Output



Tiled

### Size

The Size slider lets you control the width of the watermark as a percentage of the width of the input image. The watermark image is resized as necessary to the desired width.

### Style

This controls lets you specify if you want to apply a single copy of the watermark image or if you want to tile the entire output image with watermarks. The single method is normally used to apply a signature or logo placed in an unobtrusive part of the image. Tiling the entire output image makes it much harder to steal, but it is more annoying visually. When tiling the output image, you normally select a very high transparency to let the image mostly show through.


### Operation

This controls the way the watermark is blended with the input image. For details of the different blending modes, see the [Blend transformation](#).

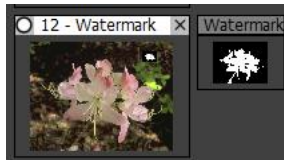


## Watermark Image

This control is used to select the image you want to apply as a watermark. The output image is always the same size and type as the input image, so the watermark image is internally converted to the same type as the input image before being applied. This means that a color watermark is converted to black and white when used with a black and white image.

 -- this tool bar at the top of the dialog box lets you display either the input (**In**) or the watermark overlay (**Ov**) image. If the watermark image is set to a solid color instead of an image, the second button is grayed out. If the display is set to show only the output image, the entire tool bar is hidden.

The other way to switch between inputs is to use the image browser. To select alignment points on the base image, click the Watermark thumbnail in the image browser. To select alignment points on the overlay image, click the smaller thumbnail just to the right of the Composite thumbnail in the image browser to select the auxiliary input image.



## Watermark Amount

This amount control lets you set the transparency of the watermark image or create an optional mask for the watermark image.

If no mask image is selected, the watermark will be rectangular and encompass the entire watermark image. A watermark mask lets you vary the transparency of the watermark to create different shapes or to make parts of the watermark partially transparent. In the following example, a mask was created that was white where the text was located and black everywhere else. This made the text opaque and the background transparent.

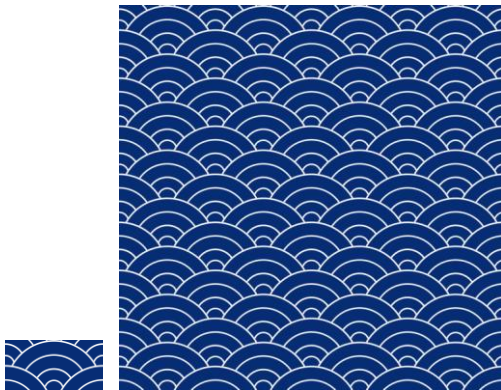




# Wave

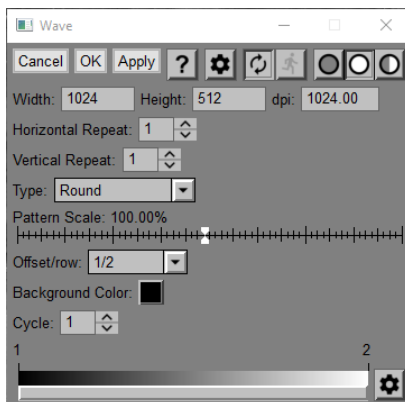
The Wave transformation creates images that can be seamlessly tiled. These images are constructed by painting a pattern in overlapping rows with every other row offset by half the pattern width. The repeating pattern can in turn be either a radial gradient in one of several shapes or it can be defined by a custom image and mask.

The motivation for this transformation was to create a simulation of Japanese seigaiha or wave patterns originally used as a fill pattern to indicate ocean on Japanese maps and later adopted as a common pattern for papers or embroidery. Illustrated below is a single seamless tile in the classical Japanese pattern as produced by the Wave transformation and the same tile repeated multiple times.



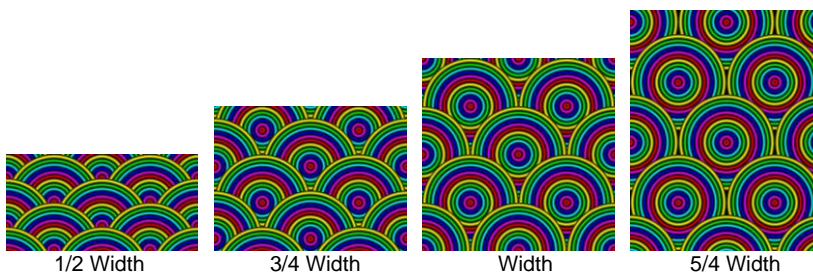
Seamless tiles can be used as web page backgrounds, as backgrounds in the Layout or Frame transformations or, by extending them with the Tile transformation, to print custom gift wrap or origami paper.

## Using the Wave Transformation



### Width/Height/dpi

These settings determine the dimensions of the tiles that make up the output image in pixels and the resolution in dots/inch. The width setting just controls the width of the tile. The height setting determines both the height of the tile and the amount of overlap between successive rows of patterns—the larger the setting, the more space between rows. The following images illustrate the effect of varying the Height setting.



Changing the dpi setting does not affect the output image other than to determine its physical size in inches. This can be useful when using the Frame transformation which uses this physical size to determine how large to make the pattern.

## Repeat Factors

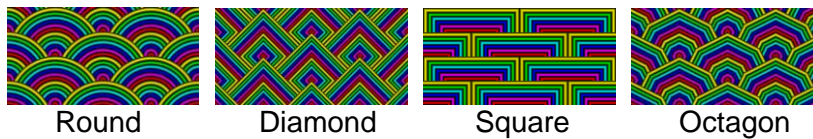
The horizontal and vertical repeat factors let you set how many times you want the tile image repeated horizontally and vertically. The width of the output image is the tile width times the horizontal repeat factor. The height of the output image is the tile height times the vertical repeat factor.

## Type

The Wave transformations supports several different pattern types:

### Round/Diamond/Square/Octagon

These pattern types all use the same gradient to define the pattern, but they differ in the shape of the pattern produced. The easiest way to understand this is to see a few examples:

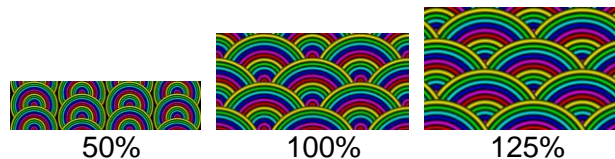


### Custom

The custom type is described later.

## Pattern Scale

Adjusting the pattern scale slider makes the individual patterns smaller or larger. The same scale factor is applied to the height of the result image—if this was not done the result image would not repeat seamlessly when vertically tiled.



## Offset/row

This setting determines by what fraction of the full pattern width each successive row is shifted to the right or left.



## Background Color

The background color setting determines the color of the background that the result image is filled with before painting rows of patterns over it. In most the examples shown so far, the background is totally obscured so its color doesn't matter, but as you increase the height setting or reduce the pattern scale, space can open up between rows and the background color fills this space.

## Cycle

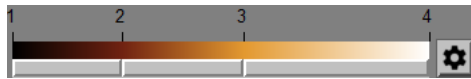
The cycle and color line controls at the bottom of the dialog box determine the nature of the gradient used to fill the pattern. While these are the same controls used in other transformations such as the Gradient transformations, some examples may be useful to illustrate the available range of effects.

The cycle setting simply causes the gradient defined by the color line to be repeated multiple times.



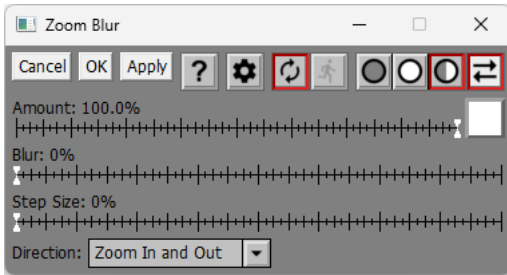
### Color Line

The color line defines the colors in the gradient with the left edge corresponding to the center of the pattern and the right edge corresponding to its outer edge. For example, here is the color line that produced the patterns above:

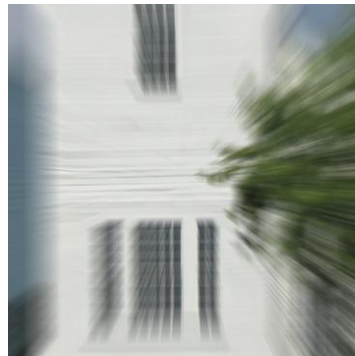


# Zoom Blur

Zoom Blur simulates zooming the lens with the shutter open.



Original



Step Size = 0%



Step Size = 40%

## Input Image Overlay

Zoom Blur displays a small cross overlaid on the input image to indicate the center of the blur. By default, this is located at the center of the input image, but you can drag this control point to another location in the input image if you wish.

## Amount

The Amount control lets you blend some of the input image into the output image to reduce the effect of the transformation or, if you use a mask, to localize its effect to selected parts of the input image.

## Blur

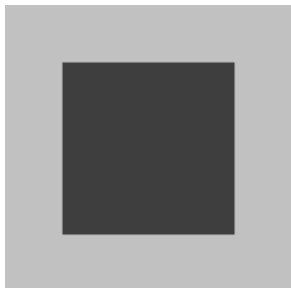
This slider controls the strength of the blur.

## Step Size

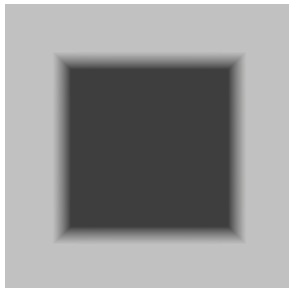
This slider controls the size of the steps, as illustrated above. You can do a smooth blur by setting the Step Size to 0% or zoom in steps by increasing the Step Size.

## Direction

You can use this setting to specify how you want the blur to work, namely by simulating zooming the lens both in and out, just out, or just in.



Original



In and Out



In



Out