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# Correct image distortion and noise

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## About lens distortion

*Barrel distortion* is a lens defect that causes straight lines to bow out toward the edges of the image. *Pincushion distortion* is the opposite effect, where straight lines bend inward.



Examples of barrel distortion (left) and pincushion distortion (right)

*Vignetting* is a defect that darkens the corners of an image due to light falloff around the perimeter of the lens.

*Chromatic aberration* appears as a color fringe along the edges of objects, caused by the lens focusing on different colors of light in different planes.

Some lenses exhibit different defects at certain focal lengths, f-stops, and focus distances. With the Lens Correction filter, you can specify the combination of settings used to make the image.

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## Correct lens distortion and adjust perspective

The Lens Correction filter fixes common lens flaws such as barrel and pincushion distortion, vignetting, and chromatic

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aberration. The filter works only with 8- and 16-bit-per-channel images in RGB or Grayscale mode.

You can also use the filter to rotate an image or fix image perspective caused by vertical or horizontal camera tilt. The filter's image grid makes these adjustments easier and more accurate than using the Transform command.

## Automatically correct image perspective and lens flaws

Using lens profiles, the default Auto Correction option quickly and accurately fixes distortion. For proper automatic correction, Photoshop requires Exif metadata that identifies the camera and lens that created the image, and a matching lens profile on your system.

- 1 Choose Filter > Lens Correction.
- 2 Set the following options:

**Correction** Select the problems you want to fix. If corrections undesirably extend or contract the image beyond original dimensions, select Auto Scale Image. The Edge menu specifies how to handle blank areas that result from pincushion, rotation, or perspective corrections. You can fill blank areas with transparency or a color, or you can extend the edge pixels of the image.

**Search Criteria** Filters the Lens Profiles list. By default, profiles based on image sensor size appear first. To list RAW profiles first, click the pop-up menu ▾☰, and select Prefer RAW Profiles.

**Lens Profiles** Select a matching profile. By default, Photoshop displays only profiles that match the camera and lens used to create the image. (The camera model does not have to match perfectly.) Photoshop also automatically selects a matching sub-profile for

the selected lens based on focal length, f-stop and focus distance. To change the automatic selection, right-click the current lens profile, and select a different sub-profile. If you find no matching lens profile, click Search Online to acquire additional profiles created by the Photoshop community. To store online profiles for future use, click the pop-up menu ▾☰, and choose Save Online Profile Locally.


**Note:**

For tips for working with lens profiles and a list of supported lenses, see the support article [Lens profile support](#). To create custom profiles, use the [Adobe Lens Profile Creator](#).

## Manually correct image perspective and lens flaws

You can apply manual correction alone or use it to refine automatic lens correction.

- 1 Choose Filter > Lens Correction.
- 2 In the upper-right corner of the dialog box, click the Custom tab.
- 3 (Optional) Choose a preset list of settings from the Settings menu. Lens Default uses settings that you previously saved for the camera, lens, focal length, f-stop, and focus distance used to create the image. Previous Conversion uses the settings used in your last lens correction. Any group of custom settings you saved are listed at the bottom of the menu. (See [Save settings and set camera and lens defaults](#).)
- 4 Set any of the following options to correct your image.

**Remove Distortion** or pincushion distortion. Move the slider to straighten horizontal and vertical lines that bend either away from or toward the center of the image. You can also use the Remove Distortion tool  to make this correction. Drag toward the center of the image to correct for barrel distortion and toward the edge of the image to correct for pincushion distortion. To compensate for any blank image edges that result, adjust the Edge option on the Auto Correction tab.

**Fix Fringe settings** Compensate for fringing by adjusting the size of one color channel relative to another.

**Note:**

Zoom in on the image preview to get a closer view of the fringing as you make the correction.

**Vignette Amount** Sets the amount of lightening or darkening along the edges of an image. Corrects images that have darkened corners caused by lens faults or improper lens shading.

**Note:**


You can also apply vignetting for a creative effect.

**Vignette Midpoint** Specifies the width of area affected by the Amount slider. Specify a lower number to affect more of the image. Specify a higher number to restrict the effect to the edges of the image.

**Vertical Perspective** Corrects image perspective

caused by tilting the camera up or down. Makes vertical lines in an image parallel.

**Horizontal Perspective** Corrects image perspective, making horizontal lines parallel.

**Angle** Rotates the image to correct for camera tilt or to make adjustments after correcting perspective. You can also use the Straighten tool  to make this correction. Drag along a line in the image that you want to make vertical or horizontal.

**Note:**


To avoid unintended scaling when adjusting perspective or angle settings, deselect Auto Scale Image on the Auto Correction tab.

**Scale** Adjusts the image scale up or down. The image pixel dimensions aren't changed. The main use is to remove blank areas of the image caused by pincushion, rotation, or perspective corrections. Scaling up effectively results in cropping the image and interpolating up to the original pixel dimensions.

## Adjust the Lens Correction preview and grid

Adjust the preview magnification and grid lines to better judge the necessary amount of correction.


- To change the image preview magnification, use the Zoom tool or the zoom controls in the lower left side of the preview image.
- To move the image in the preview window, select the Hand tool and drag in the image preview.
- To use the grid, select Show Grid at the bottom of the

dialog box. Use the Size control to adjust the grid spacing and the Color control to change the color of the grid. You can move the grid to line it up with your image using the Move Grid tool .

## Save settings and set camera and lens defaults

You can save the settings in the Lens Correction dialog box to reuse with other images made with the same camera, lens, and focal length. Photoshop saves both Auto Correction settings and Custom settings for distortion, chromatic aberration, and vignetting. Perspective correction settings are not saved because they typically vary from one image to another.

You can save and reuse settings in two ways:

- Manually save and load settings. Set options in the dialog box, and then choose **Save Settings** from the Settings menu . To use the saved settings, choose them from the Settings menu. (If you save settings outside the default folder, they don't appear in the menu; use the **Load Settings** command to access them.)
- Set a lens default. If your image has EXIF metadata for the camera, lens, focal length, and f-stop, you can save the current settings as a lens default. To save the settings, click the Set Lens Default button. When you correct an image that matches the camera, lens, focal length, and f-stop, the Lens Default option becomes available in the Settings menu. This option is not available if your image doesn't have EXIF metadata.

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## Reduce image noise and JPEG artifacts

Image noise appears as random extraneous pixels that aren't part of the image detail. Noise can be caused by photographing with a high ISO setting on a digital camera, underexposure, or shooting in a dark area with a long shutter

speed. Low-end consumer cameras usually exhibit more image noise than high-end cameras. Scanned images may have image noise caused by the scanning sensor. Often, the film's grain pattern appears in the scanned image.

Image noise can appear in two forms: luminance (grayscale) noise, which makes an image look grainy or patchy, and color noise, which is usually visible as colored artifacts in the image.

Luminance noise may be more pronounced in one channel of the image, usually the blue channel. You can adjust the noise for each channel separately in Advanced mode. Before opening the filter, examine each channel in your image separately to see if noise is prevalent in one channel. You preserve more image detail by correcting one channel rather than making an overall correction to all channels.

- 1 Choose Filter > Noise > Reduce Noise.
- 2 Zoom in on the preview image to get a better view of image noise.
- 3 Set options:

**Strength** Controls the amount of luminance noise reduction applied to all image channels.

**Preserve Details** Preserves edges and image details such as hair or texture objects. A value of 100 preserves the most image detail, but reduces luminance noise the least. Balance the Strength and Preserve Details controls to fine-tune noise reduction.

**Reduce Color Noise** Removes random color pixels. A higher value reduces more color noise.

**Sharpen Details** Sharpens the image. Removing noise reduces image sharpness. Use the sharpening control in the dialog box or use one of the other



Photoshop sharpening filters later to restore sharpness.

**Remove JPEG Artifacts** Removes blocky image artifacts and halos caused by saving a image using a low JPEG quality setting.

- 4 If luminance noise is more prevalent in one or two color channels, click the Advanced button and then choose the color channel from the Channel menu. Use the Strength and Preserve Details controls to reduce noise in that channel.

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