Lens and Camera Profiles

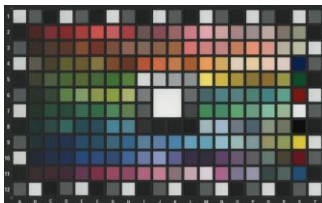Last Updated: 14-Dec-2024

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Camera and Lens Profiles

Camera and lens profiles are used to apply corrections to raw images. Camera profiles adjust image colors and the tone curve. Lens profiles correct for barrel or pincushion distortion, light falloff in the corners of the frame and chromatic aberration. Increasingly, camera designers are taking advantage of the fact that images can be corrected in software to create innovative new lenses that are smaller, lighter, sharper and less expensive.
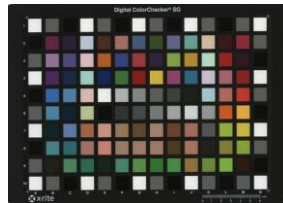
Creating Camera Profiles

Camera profiles are standard ICC color profiles that convert the colors in raw files to a standard color space. Camera profiles are created by photographing a test target that has a number of color patches whose color properties have been accurately measured and recorded in a reference file.

Picture Window supports several different types of commercially available test targets. Targets with more color patches produce more accurate profiles but are more sensitive to uneven illumination. The most commonly available target capable of creating profiles is the widely available 24-patch ColorChecker. The ColorChecker DC is now discontinued. The SpyderCheckr 24 and 48 patch targets are less expensive than the standard ColorChecker but appear to have quality control issues as patches in the copy I purchased did not accurately match its published reference file Lab values. The ColorChecker SG is currently the best available camera target, but it is fairly expensive. Other targets such as IT8s printed on film or on glossy paper are intended for calibrating scanners and do not work as well for camera calibration.

ColorChecker DC   ColorChecker SG   ColorChecker

SpyderCheckr 24 and 48

By comparing the color of each patch as captured by the camera with the corresponding color in the reference file, correction tables can be generated which are then stored as a standard ICC profile.

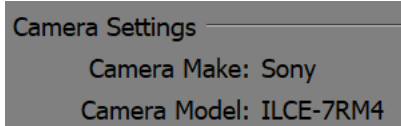When photographing the target, try to observe the following precautions:

1) Make sure your camera sensor and the target are clean since dust or debris may cause slightly inaccurate results or cause problems processing the image files later.

2) The test target should be illuminated as evenly as possible, without glare or reflections, preferably by full mid-day sunlight incident at roughly a 45º angle. Make sure the camera white balance is set to Daylight.

3) You may wish to create additional camera profiles for different types of illumination such as overcast, tungsten or flash. Make sure the camera white balance setting corresponds to the type of illumination.

4) Do not use on-camera flash as this will cause reflections from the target – try to keep the illumination at a 45º angle to avoid reflections.

5) Don't try to fill the entire frame with the target as this will cause brightness variations due to light falloff and the full camera resolution is overkill for measuring the color patches.

6) Take a bracketed series of exposures of the test target so you can select the one that makes the white patches as bright as possible without clipping.

7) Before creating a camera profile, use the Raw Develop transformation to apply the lens profile to the target image. This will correct for light falloff in the target image and make the profile you create more accurate.

For more details on creating profiles from a target image, see the Create Profile transformation.

If you want Picture Window to automatically select the camera profile when processing raw files taken with a particular camera, save the profile with the following pathname:

My Documents\Picture Window Pro\Camera Profiles\xxx

where xxx is the camera make and model as displayed in the Image Info dialog box for images taken using the camera. For example, for a Sony A7RIV the Image Info dialog box displays the following in the Camera tab:

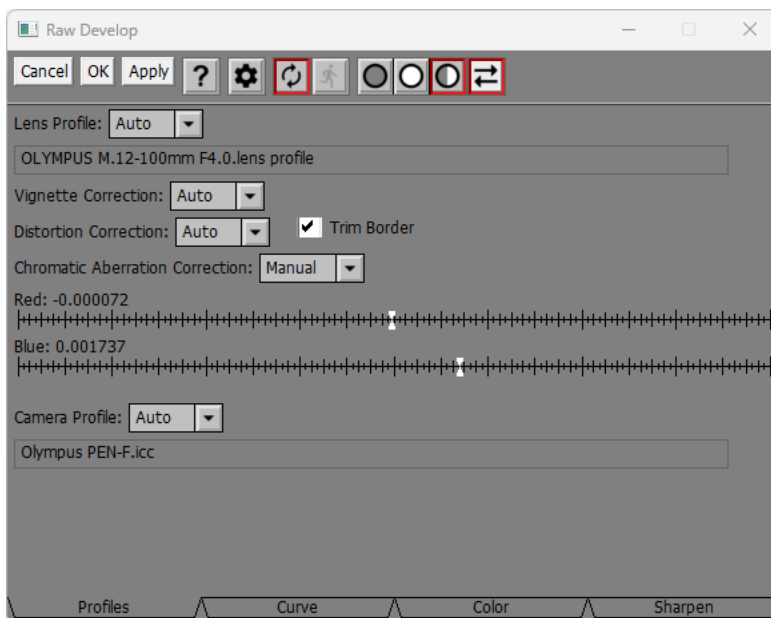The corresponding camera profile filename to use is: Sony ILCE-7RM4.icc

Lens Profiles

A large database of lens data exists as part of an open source project called LensFun. A copy of this database is included with Picture Window which can use it to correct raw images for barrel/pincushion distortion, vignetting, and chromatic aberration. While the database is not exhaustive and may not include the very latest lenses, it is periodically updated. While LensFun does a good job of characterizing lens distortion and vignetting, it does not correct chromatic aberration very well, and for many lenses chromatic aberration information is missing altogether. For this reason, Picture Window lets you correct chromatic aberration manually.

Unfortunately, unlike lens profiles, there is no database of camera profiles so you need to create your own if you wish to use this feature.

Using Camera and Lens Profiles

To apply a camera and/or lens profile to a raw image, use the Raw Develop transformation. This transformation is designed to be used immediately following the File Open transformation that opens the raw file before any other operations are performed on the image. The Profiles tab of the Raw Develop transformation lets you select the camera and lens profile you want to use – these settings are automatically filled in based on the image's metadata, if available.
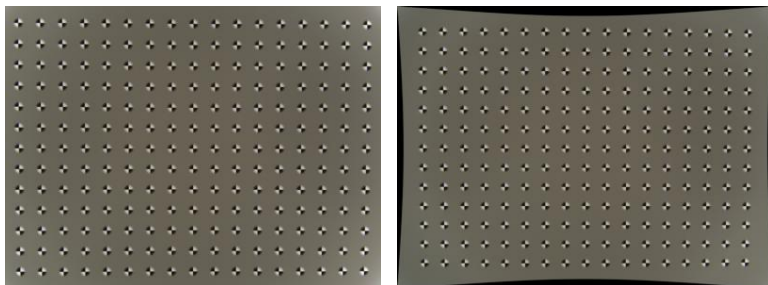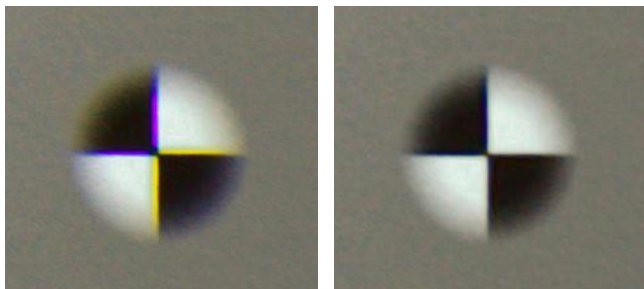

Lens Profile Settings

If Lens Profile is set to Auto, Picture Window searches the database based on the lens EXIF metadata in the raw file. If a match is found, the name of the lens profile is displayed, otherwise "None" is displayed, and no lens correction is performed.

If a lens profile is located, the correction settings that best match the focal length and f-stop of the raw image are selected and applied.

Normally, the edges of the raw image are automatically cropped to remove any black border caused by pixels lying outside the image, however you can prevent this by unchecking the Trim Border checkbox.

If Chromatic Aberration Correction is set to Auto, information from the LensFun database is used, however these automatic corrections frequently work poorly if at all. When Chromatic Aberration Correction is set to Manual, you can use the Red and Blue sliders to correct it yourself. Chromatic aberration is strongest in the corners of the image and shows up as red/cyan or blue/yellow color fringes on high contrast edges. To make the correction manually, zoom way into one of the corners of the image and adjust the sliders until the color fringes are minimized. Here is an example of a magnified portion of a test target image before and after correcting for chromatic aberration:

Camera Profile Settings

If Camera Profile is set to Auto, Picture Window searches for a camera profile based on the camera EXIF metadata in the raw file. If a match is found, the name of the camera profile is displayed; otherwise "None" is displayed and no camera profile is applied.

If a camera profile is found, the profile is first assigned to the raw image. Next, the image is converted to the current working color space. If you specify both a lens and camera profile, the lens profile is always applied first.

After applying camera and lens profiles, you can move on to the remaining tabs to adjust the brightness curve, color balance and saturation, and sharpness of the image.