

Effect of B&W Color Filters on Landscape Images In the Visible Spectrum

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Someone with normal vision can see colors from violet (about 360nm, nanometers) to deep red (about 680nm). We cannot see ultraviolet radiation (UV, 10nm to 360nm) or above 680nm (infrared, IR). The range for IR extends from 780nm to 1000nm (1mm).

Panchromatic B&W film can record some of the UV range so we need to use a UV filter to cut out some of the UV light. Since it does not normally record above about 650nm we do not need an IR filter. Different films may record a little differently from each other within the visible spectrum.

A sensor can start to record from UV wavelengths of about 300nm through IR at about 1000nm (1mm). This range is inherent in common silicon based sensors.

To record the normal spectrum of visible light we need to remove some of the UV and IR radiation. Digital sensors commonly have two filters on top of the CFA. If they are removed we need to use a cut filter on the lens to restore normal imaging for the visible range. Cut filters block light over a narrow boundary rather than abruptly at their intended cutoff.

Note: If the CFA is still present you don't need additional B&W filters to create B&W image from the raw data. You can do the adjustments during your raw conversion on the computer. However, there is some loss of sharpness from combining the red, green and blue channels.

In this article you will see what happens in the visible range with different B&W color filters on Sony A7 II with a full-spectrum digital conversion (no UV, IR or CFA over the sensor). A UV/IR cut filter is used in each example to restrict the spectrum to the visible light range of about 400-700nm.

The effects of filters in a monochrome image can be very subtle depending on the scene, time of day and the weather. They are more effective in broad daylight than when it is overcast.

Regardless of the color of light we perceive in the scene, without the CFA the monochrome sensor just sees luminosity. It records the intensity of the light reaching each sensor element indiscriminately. To modify the balance of colors we need to add our own filters.

The camera's B&W conversion doesn't know that the Bayer array or the other filters have been removed. It proceeds to convert what it thinks is an RGB image in the conventional manner. It will end with a pink-magenta tint. You can override that by setting the camera to produce a B&W JPEG. But that JPEG is useless due to the compromised resolution. Don't save the JPEG. Just keep the raw file. Then convert the raw file to DNG using [Monochrome2DNG](#) and you can use your usual raw conversion program to create a JPEG or TIFF.

Since this is a mirrorless camera and you are already looking at the results on your LCD screen or in the viewer, you don't have to guess how the images are going to end up looking.



This is the scene from a camera with a Bayer array.

The remaining images are from the A7 II (m). All were exposed at aperture priority with at EC+1 so the shutter speeds give us an idea of the exposure adjustment needed to achieve a normal exposure.



This image used only the cut filter. 1/1000

The remaining images will show the effect of the color filters.



A yellow filter blocks some blue light. 1/640 (0.7 stops)



An orange filter blocks more blue and starts to block some green. 1/400 (1.3 stop)



A red filter blocks more green and most of the blue. 1/160 (2.7 stops)



A green filter blocks a lot of red and blue. 1/320 (1.7 stops)