FILTERS

The photographer's "seasonings" can spice up a photo

by the Jack and Sue Drafahl

One of the most misused and misunderstood photo accessory is the filter. Most beginning photographers are first introduced to filters when they buy their first camera. Invariably the camera salesperson will inform them that they *must* have an UV filter to protect their lens. In truth, that's why they designed the lens cap. Filters should be used as filters. They should be used to make corrections or creative change to the light coming through the lens. If a filter is applied properly, it may make the difference between a so-so shot and a prize winner.

Before you go out and buy every filter on the market, remember that filters are tools. Every craftsman needs to know how and when to select the proper tools. We'll explain the different types of filters and their uses and then you can go shopping.

FILTER TYPES

Up to now, you probably assumed that all filters screwed on the front of the lens. Not true. Actually, there are three basic filter systems for your camera. The most common, of course, is the screw-in threads. On the front of each camera lens is a set of fine machine threads designed for filter attachment. The filter size in millimeters is usually stamped on the inside of the lens cap or side of the lens. Some of the more common sizes are 49mm, 52mm, 55mm, 62mm, 67mm, and 72mm.

If you decide to use screw-in filters, and have different diameter lenses, you may want to consider step-up or step-down adapters. These compact conversion rings convert one filter size to another. To avoid image cutoff, you need to step the filter down to a lens instead of up. Let's say that you have lenses with thread sizes of 52mm and 55mm. With a 55 to 52 step-down adapter you would only have to buy 55mm filters for both lenses.

The second method for attaching filters is with a modular filter holder. The advantage to this system is that you can buy a filter holder for each lens, and then use the same filters for all your lenses. The filter holder is a rectangular device with camera threads on one side and a filter slot on the other side. The holder is first screwed on the lens like a standard screw-in filter, and then a filter is placed in the slot.

Several specialty lenses such as extreme telephoto or fisheye lenses require a third type of filter system. These lenses use filters that drop into a filter drawer in the middle or rear of the lens.

Most filters are made of gels, glass, gels laminated in glass, or plastic. Filters can easily be damaged, so protect them in a filter pouch or filter case.Most of the filter manufacturers offer a storage device for all their filters.

BASIC LIGHTING CONTROL FILTERS

This brings us back to that UV filter. It is true that it will protect your lens somewhat, but its real purpose is to reduce the amount of ultraviolet

light striking the film. The new film emulsions today already have UV filtration built right in, so the UV filter isn't as necessary as it used to be. If you shoot color negative films, you will not even need the filter, as fine-tuning of color can be accomplished in the printing process.

The polarizer on the other hand can be an invaluable tool to have in your camera bag. This filter is for enhancing and correcting problems that might occur in the scene. The polarizing filter is made of a series of very fine parallel lines that block certain light rays passing through it. Before autofocus systems all these filters had parallel lines, but that caused problems with the autofocus lenses. A new type of circular polarizing filter has been introduced to allow the polarizer to work with the autofocus cameras.

In order to use the polarizer, attach the filter to your SLR lens and you can see it working. Rotate the front element of the filter until you see the effect you desire. If you see no change in the scene, then you don't need the polarizer. For those of you without SLR, hold the filter up to your eye and rotate the element. You will see if the filter will help your photo or not.

If you want to use a polarizer to enhance the blue sky, rotate the front element of the filter until it blocks a large portion of the light rays coming from the sky. The sky becomes dark and more pronounced while the rest of the scene remains normal. Maximum effect is when the camera is pointed at a 90° angle to the sun.

When using the polarizer to photograph rainbows, the colors become extremely enhanced and record on the film closer to the way you saw them. The polarizer can also be used to control reflections in glass, water, and plastic. To reduce the reflections, turn the front element until the reflection becomes minimized. The density of the parallel line will reduce your exposure, so expect your autoexposure system to make a change of 1–2 stops.

ALL PHOTOS BY JENNI BIDNER

▲▲ *Top row:* A polarizer can reduce the reflection on non-metallic materials, including masonry. It also causes a more dramatic difference between the clouds and sky. Notice the contrast difference on the sunny and shaded sides of the building in the two versions.
▲ *Bottom row:* A polarizer can also reduced or eliminated reflections from glass windows—as seen in the building reflected in the window behind these Christmas heralding sculptures.

CONVERSION FILTERS

Conversion filters convert one light source to another so you can match the color temperature of the film in your camera. Most images are shot on daylight film either outdoors or with flash. If you find yourself indoors without a flash, the tungsten to daylight correction is with an 80 series color correction filter. These filter have a heavy bluish cast that fool the camera into thinking it is using tungsten film, so you get a non-yellow picture. The reverse of this situation, the conversion of daylight to tungsten light, requires the use of the orange-colored 85 series filters.

Professional photographers are usually not happy with these coarse color corrections, and will make minor adjustments with a series of color compensating or CC filters. They come in red, green, blue, cyan, magenta, and yellow. Each group has values of 10, 20, 30, 40, and 50 color change. As the number goes up so does the correction. Each 10 points in color correction is about ⅓ stop in exposure change.

One of the most difficult light sources to work with is fluorescent light. There are over 40 different bulb types and each has its own color balance. Most of the filter manufacturers make a general purpose filter for this situation, but state that it may not fully correct the problem. We have found that you can come pretty close to correcting most fluorescent lights with a 30 magenta color compensation filter.

The real trick is using flash with fluorescent lighting. This requires the double filter trick. First you place a CC30 green color compensating filter over the flash, and then a CC30 magenta filter over the camera. This setup will first convert the flash to fluorescent with the CC30 green, and then whole scene is converted to daylight with the CC30

STYLE	ADVANTAGES	DISADVANTAGES
Screw-In Filters	• Securely screws into camera; maintains precise alignment with front element of lens • Very convenient • Usually easy to find at your local camera store	• Screwing-on and -off the filters is time consuming • Need one for each lens that has a different lens diameter (or step-rings to retrofit them) • Cannot change the position (up or down) of graduated or special-effects filters • Improper handling can cause misthreading.
Gel Filters	• Very precise filtration • Exceptional optical clarity • Obscure filters available	• Extremely fragile • Can only be cleaned with compressed air • Usually only available at pro camera stores
Modular System	• Economical way to share filters between lenses & cameras • Can move the filters up, down or sideways	• Can be large and cumbersome to port • For purposes of speed, you might want to mount one holder on each lens (although you can still share filters).

TYPE	DESCRIPTION
Blue	***For color films:*** A blue filter adds an overall blue cast to the photo or "cancels out" an overall yellow color cast. A deep-blue filter and slight underexposure can be used in daytime to create a moonlit effect. ***For B&W films:*** Lightens blue subjects (and slightly lightens cyan and magenta subjects) and darkens yellow subjects (and slightly darkens green and red subjects).
Color Compensating	CC filters are designed to compensate for minute overall color casts on color-slide (transparency) films. (Overall color casts on color-print film can be corrected in the printing stage.)
Conversion Filters	Color films are usually balanced to either 5500 K (daylight) or 3200 K (tungsten) light—causing scenes shot under these precise color temperatures to appear normal. These filters allow you to shoot daylight films under tungsten illumination (80 Series) or tungsten films in daylight (85 Series).
Color Correction	Similar to conversion filters, but they correct for smaller (+/– 100 K increments) color temperature changes.
Cyan	***For B&W films:*** Lightens cyan subjects (and slightly lightens green and blue subjects) and darkens red subjects (and slightly darkens magenta and yellow subjects).
Diffraction Grating	This filter distorts white light source, creating spectral colors. A standard diffraction grating turns white light sources into slashes of rainbow colors; holographic diffraction filters produce specialized patterns.
Diffusion	Produces a sharp primary image, overlaid by an unsharp secondary image for a soft effect. A good diffusion filter will maintain contrast.
Fluorescent	Helps correct for unpleasant color casts caused by fluorescent lights. Available for tungsten or daylight films. In a pinch, try a CC30M (magenta) filter with daylight-balanced films.
Fog	Creates illusion of fog by producing a soft effect and lowering contrast. Comes in different strengths, as well as graduated versions.
Graduated Filters	The "top" starts with a full filter effect and gradually reduces to no effect at the halfway point of the filter. Available in neutral density, colors or fog. Helps reduce extreme exposure difference between a bright sky and a dark landscape.
Green	***For color films:*** A green filter adds an overall green cast to the photo or "cancels out" an overall magenta color cast. A weak green filter can be used to enhance a green foliage scene. ***For B&W films:*** Lightens green subjects (and slightly lightens cyan and yellow subjects) and darkens magenta subjects (and slightly darkens blue and red subjects).
Haze	***See ultraviolet filters.***
Low-Contrast	Reduces contrast without (in theory) effecting image quality.
Magenta	***For color films:*** A CC30M filter helps corrects green casts from fluorescent lighting and the green tint from airplane and train windows. ***For B&W films:*** Lightens magenta subjects (and slightly lightens blue and red subjects) and darkens green subjects (and slightly darkens yellow and cyan subjects).
Multiple-Image	Produces multiple images of the subject on one piece of film with one exposure. Commonly creates a central image surrounded by secondary images or a primary image followed by a line of secondary images that imply "speed."
Neutral Density	Neutral-density (ND) filters reduce the amount of light that reaches the film without affecting the color or tonal rendition. Used to produce slower shutter speeds or wider apertures than would otherwise be possible for the film in use. Often used to shoot waterfalls with extremely slow shutter speeds, to cause the water to record as an ethereal blur.
Polarizer	Polarizing filters allow light that is vibrating in one particular plane to pass through it, and blocks or partially blocks other light rays. Used to reduce reflections on glass, water and other nonmetallic objects; to darken the sky on film in relation to the clouds; or to intensify rainbows in a scene. *Note:* If you own a modern SLR, you will probably need a circular polarizer (rather than a linear polarizer) to avoid problems with the AF and metering systems.
Red	***For B&W films:*** Lightens red subjects (and slightly lightens magenta and yellow subjects) and darkens cyan subjects (and slightly darkens blue and green subjects).
Skylight	***See ultraviolet filters.***
Star	Star filters turn point-light sources (such as bare bulbs) into spectacular starbursts with 2–16 points, depending on the filter.
Sunset	Adds dramatic, vibrant color to a dull sunset scene. Most effective when shooting silhouettes.
Tri-Color	***For color films:*** A special effect based on three exposures on one piece of color film—each through one of these specialized red, green and blue filters with a tripod-mounted camera. Moving objects are depicted as magenta, cyan, yellow, green, red or blue ghosts; stationary objects appear normal. ***For B&W films:*** These specialized red, green and blue filters can be used to create color images with three separate black-and-white pictures.
Ultraviolet (UV)	Reduces the bluish cast of atmospheric haze by absorbing ultraviolet light. It works well at higher elevations because UV is especially prevalent. Will not reduce the effects of fog and smog.
Warming (81 Series)	Corrects the blue cast caused by light that is "cooler" (higher-number K or color temperature) than the film is designed for. Use in the open shade, on overcast and rainy days or to add warmth to fleshtones. Comes in strengths from A–EF.
Yellow	***For color films:*** Can be used as a substitute for a warming filter (see above). ***For B&W films:*** Lightens yellow subjects (and slightly lightens green and red subjects) and darkens blue subjects (and slightly darkens magenta and cyan subjects).

B+W FILTERS

● B+W filters by Schneider offer screw-in glass filters in two formats: economic standard filters with an anti-reflection coating and top-of-the-line multi-coated filters made with high-quality Schott glass. In addition, a new "drop–in" single and double filter unit designed for medium format wedding and portrait photographers is available. The new Pro–Speed filters can be changed quickly while shooting.

CALUMET FILTERS

● Calumet offers professionally oriented gelatin Calumet Pro, resin, and polyester filters. Color correction, conversion, neutral density and black and white film filters are available in all three materials. Kits are available.

COKIN FILTERS

● The Cokin line includes three distinct filter types: Optilight screw-in filters, Series A square filters (over 25 choices) and Series P rectangular filters (over 50 choices). The Series A (for "amateur") and Series P (for "professional") filters are designed to fit into the modular A and P system filter holders, with the P series being larger to accommodate the larger professional camera lenses. Optilight filters are available in economic theme kits, such as the Mountain Snow, Sky & Ocean, Fashion, Black-and-White and Close-Up Kits.

CONTAX FILTERS

● The Contax line of screw-in filters are available in 49–86mm sizes, designed for Carl Zeiss T* lenses used on Contax cameras. Options include filters for both B&W and color photography.

HARRISON & HARRISON

● Harrison & Harrison offers hundreds of filters for artistic, as well as scientific purposes. Screw-in and slip-on filters, filters for bayonet-style holders and filters for light sources or windows are among their offerings.

HASSELBLAD FILTERS

● Victor Hasselblad Inc. offers its own line of popular high-quality filters for the Hasselblad medium-format camera systems, which shoot 2¼x2¼-inch images on 120 and 220 size (2¼-inch wide) film.

HOYA FILTERS

● With Hoya, choices include over 85 different types of screw-in filters, each available in different sizes—many of which rotate for exact control. Selections are geared for color, black-and-white and special-effects photography. New introductions are the Super Circular Polarizer and Hoya HMC Super multicoating. The super multicoating uses 12 layers including an over–coat. The Circular Polarizer is 5mm thick, eliminating corner shading. Hoya also offers a limited selection of slip-on and bayonet-style filters for old TLR cameras.

KODAK/WRATTEN

● Kodak Wratten makes precision gelatin filters for professional photography and scientific applications. They feature a thin 0.1mm thickness with excellent optical qualities. Most are available in 3-, 4- and 6-inch squares, plus 14x18-inch size. These filters are easily cut to fit any needed smaller size or shape, or can be used with a gel filter holder. Kodak Wratten gels are available in a wide variety of precise colors, as well as neutral-density filters (from 0.10 to 1.00 in 0.10 increments, plus 2.00, 3.00 and 4.00 densities) and color-compensating filters (in the six primary colors—magenta, yellow, cyan, green, blue and red—in densities from .025 to .50). The neutral-density (and color-compensating) filters can be combined for added density.

LEE FILTERS

● Lee Filters offers a wide range of filters for motion picture, theatrical and still photography. New from Lee is a filter holder system that will allow any lens to use a 100mm filter using adapter rings.

SINGH-RAY

● Singh-Ray Corporation offers precise color-balancing filters, including four graduated neutral-density filters (2- and 3-stop gradations in an abrupt hard step or soft gradation). These carry a high price tag, but offer truly neutral color (whereas many cheaper ND filters tend to be greenish). They also make custom filters.

TIFFEN

● Tiffen has screw-in, Bayonet 60, 3x3 squares, 4x4 squares, 4x5 rectangles and rear-mount glass filters. Their Hollywood/FX filters include Pro-Mist (removes harsh edge off sharpness without appearing out-of-focus), as well as Black Pro-Mist (for a subtle change of contrast) and Warm Pro-Mist (for Pro-Mist effects plus added warmth), each in five densities. The Enhancing Filter (didymium glass) produces more saturated reds, browns and oranges on film—an excellent choice for autumn photography.

magenta filter.

If you take a picture in full sunlight or on a gray day, the sky's color balance is usually pretty close to that of your daylight film. The color will shift blue as soon as you move into the shade or to any area where the sun does not directly light the scene. This means that the primary source of lighting is now coming from the blue sky. As the shade becomes deeper, the color shifts more to the blue part of the spectrum. The solution is warming color correction filters in the 81 series. These come in strengths from A to EF with the color correction increasing as the letters go up the alphabet.

FILTERS FOR BLACK-AND-WHITE FILM

You're probably wondering why black-and-white photographers need color filters. Don't get these color filters confused with those used in color photography. They are used differently and have different light transmission properties. The red, orange, and yellows filters are used to increase overall contrast in the scene. A red filter for example will give an almost black sky in a black-and-white image. The orange filter has lesser effect and the yellow even less.

Portraits taken with the green filter will make the person look more natural by darkening the skin tones. The green filter will also make green foliage look lighter than it really is. So you will find this filter in a black-and-white outdoor photographer's camera bag for sure.

The blue filter is not as common as the others but would be used in situations where you want the blue areas to be lighter than the rest of the scene. This would also be used if your want a yellow subject to be darker and stand out.

▲ ***Above:*** **If the sky is too bright in comparison to the rest of a scene, you'll end up with either a burned-out sky or a very dark foreground—unless you use a graduated filter. This filter can darken the sky one (2X) or two (4X) stops, creating a more natural-looking picture.**

SLIDES VS. PRINT FILMS

Note: throughout this article, you will notice that filters that correct or create slight color casts are used only for color-transparency (slide) films, since most minor color problems can be corrected in color-print films during the printing process. Why go through the hassle, expense and risk of image degradation to make minor color adjustments to color-print films, when major adjustments can be made during the printing?

The exceptions are polarizers, neutral-density, diffusion, fog, contrast, special-effect and graduated filters. Each of these affects aspects of the image beyond (or in addition to) overall color, such as the shutter-speed/aperture relationship, the overall contrast, etc.

SPECIAL-EFFECTS FILTERS

Up till now the filters we have talked about correct color or add contrast to a scene. Most of these could be considered non-creative corrections. The filters we will talk about now make alterations to scenes, so that they are no longer the way we see, but the way we might like to see it.

The split-image filter is really not a filter, but half of a close-up lens. This close-up lens is the same as those attached to the front of the camera lens, allowing it to focus closer than the limits of the lens. The practical application for this filter is that you can compress the depth of field in a scene from inches to infinity. Here's an example of how it works. The close-up part of the split filter is turned to the bottom of the lens. The camera is focused on a building in the distance, then the camera is physically moved into a flower until it comes into focus in the bottom half of the scene.

Multi-image filters have a multi-faceted prism, each at a slight angle to the scene. As the scene strikes each facet, they are projected into the viewing area all out of phase with each other. The resulting image may have 3, 5 7, or 9 versions of the same image in the viewing area. Some radial multi-image filters have one large image in the center and several smaller images around the larger one.

The starburst filter has several focus points in the filter that force any light source to give a starburst effect. There are several variations to this filter that add a color diffraction filter resulting in a colored starburst. This filter is great for city lights, studio lighting, or to emphasize candle light atmosphere.

The diffraction filter is sometimes called the rainbow filter as the resulting effect is very much like a rainbow. The filter is like a very simple starlight filter with diffraction material added. Some filters produce one rainbow, while more complex ones have several.

The soft-focus filter is primarily used for portrait, flower, and product photography. This filter may produce softness throughout the image area, or only at the outer edges. You might use this filter when taking a portrait of someone and you want all the area around the face out-of-focus.

The fog and diffusion filters are very similar to the soft-focus filter. The diffusion filter is soft throughout the image and can comes in varied degrees depending on the diffusion you desire. The fog filter is the same except that it has a secondary sharper image that overlaps the soft image, giving a ghost effect.

Graduated filters have become very popular with Hollywood in the last few years. The filter is usually clear on one half, and graduates to a specific color as you move to the other filter edge. For example, you can place the clear side

over the bottom of the lens, and it turns a light blue sky into a dark brown sky. There are dozens of variations to this filter such as: clear to any color, one color to the next, and black to a color.

Enhancing filters are made of didymium glass and will saturate the warm colors in a photo. Landscape and nature photographers like the increased color saturation that this filter provides.

FILTER FACTORS

Before autoexposure anyone who used filters could tell you off the top of their head how much more exposure was needed for a specific filter. The autoexposure systems today give you correct exposures most of the time. Slide films may not always give correct results because some of the metering cells in the autoexposure cameras do not read well through filters. The best way to know for sure is to run some slide film tests with each filter. Bracket your exposures, and look at the results. If the exposure is off a little, make a note and put the correction with the filter so you will remember next time you use the filter. If you are shooting color negative film, the exposure latitude will cover the filter factor.

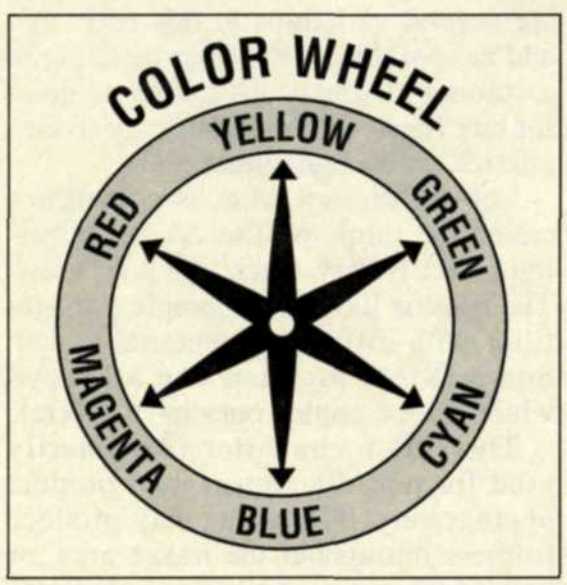
Manual exposure through a filter requires knowledge of the filter factor. Once you have determined your basic exposure, use the filter factor to adjust the exposure. A factor of 2X means that you double the exposure or add one stop of light. 4X is 2 stops, and 8X is three stops. If you add two filters together, you multiply the factors together and make the necessary compensation. Unfortunately not all filter manufacturers' methods for determining filter factors are the same, so 2X may vary from filter to filter. The only true way to know is to run tests.

It's generally easier to open the lens a certain number of stops (or fractions thereof) than to give "2.5X" more exposure, so here are the values of some common filter factors in terms of f-stops:

Filter Factor	Open lens
1.5X	⅔ stop
2X	1 stop
2.5X	1⅓ stops
3X	1⅔ stops
4X	2 stops
6X	2⅔ stops
8X	3 stops
12X	3⅔ stops
16X	4 stops

We hope that you now have a better understanding of how filters work and which ones you need to buy. Hurry on down to your local camera store and put those filter tools to work in your creative photographic efforts. ❑

▲ *Above:* A simple statue (above) can be turned into an abstract with a radial multi-image filter (top). Or a spot diffusion filter (clear in center) can eliminate a distracting background (above left).
▼ *Below:* A radial zoom filter creates a zoom-blur effect without a zoom lens, giving an old MG Midget hood insignia new life.



Colors on opposite sides of the wheel are considered complementary to each other—i.e., the opposite of green is magenta. *In color photography*, to correct an overall color cast, use the complementary color (opposite position on the wheel). For example, a weak green filter (such as a CC05G) will cure a slight magenta cast. The stronger the cast, the higher-number CC filter you need to use, such as CC25R. *In black-and-white photography*, to lighten a tone in the final print, shoot with the same color filter over the lens for maximum result, or the neighboring color for lesser lightening. Or, to darken that tone in the final print, shoot with the color shown on the opposite side of the wheel (its complementary color).