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Camera Hobby Photography e-Book
By Edwin Leong

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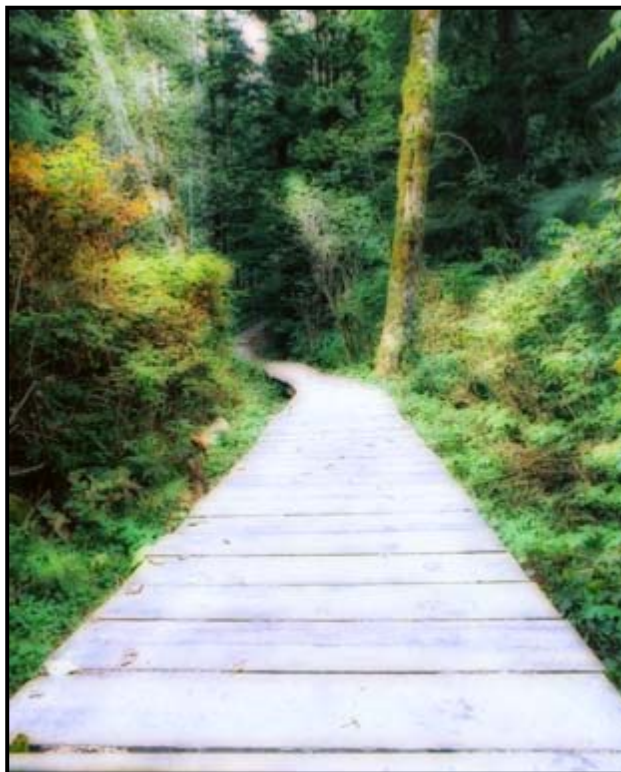
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This is the evolution of the Camera Hobby web site to become less equipment oriented and more relevant for beginning photographers to understand the basic concepts and principles of photography.

This particular page will be the starting point as this electronic book project becomes more fleshed out in detail and I recommend checking this page for new additions from time to time. The first 18 chapters are just a start with more chapters to come.

I hope you enjoy the journey into the world of photography as much as I have.

Edwin Leong

August 27, 2001

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Photography e-Book Chapter 1 - Introduction

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You choose the film to use. You choose the lens for the perspective and angle of view desired. You compose the scene and choose how to expose it on film. You choose the enlargement factor allowed by the exposed film by using a tripod or not. You choose how to edit the image if you are into the chemical or digital darkroom and by extension, how the image is printed. Do you see the common thread here? **YOU!** You make the conscious choices for the photographic process not the equipment. This point will be expanded in the meat of the project in various individual sections.

Why this project

When I immersed myself in the hobby of photography back in the spring of 1997, I relied on books and magazines to instruct me through the process. It was not until I hooked up to the Internet that the process really took off with the discovery of photography websites and newsgroups. Although there is a lot of wasted bandwidth on the Internet, I found enough quality to really get me going and read comments and reviews from other like-minded people.

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I found this same sensation through my other interests such as computers and paintball while in university and then high fidelity audio after graduation. Those first stages are the best because you have little in the way of preconceived attitudes, you take things at face value. However, as you develop more experience and knowledge, the more jaded and hardened you become and biases develop about what is right and what is not. What one has to keep in mind is that what works for you may not work for others. Individual choices and attitudes should not be foisted upon others as found in many newsgroups discussions. Find your comfort zone and fine tune it for your requirements but do not expect others to follow.

Now I am in a position to give back a little bit to those budding photographers who are experiencing the sensation of something new and creative. I think the Internet is a wonderful medium to get your message across to other interested people. Where else can a serious amateur photographer publish his own comments about the craft and actually receive instant feedback on his contributions? Certainly not from the traditional print medium that only caters to those who have already found success as professional photographers.

As mentioned earlier, I think of this project as a book but there is no chance that I could ever have it published even if I did finesses it with good writing and fantastic images from around the world. To the traditional methods of publishing, I do not exist. In the cyber world of publishing, thousands have already read my words and seen my images. The Internet is the great equalizer for those of us who wish to contribute on a specific topic.

I benefited greatly by those who contributed to the Internet first and now I wish to contribute a little something back to the community. Altruistic and Pollyanna for sure but it does only go so far as I am not in the Philip Greenspun or Michael Reichmann money territory. Without the benefit of a benevolent brother-in-law (big thanks Ben) providing me with software and hardware as well as Internet access and web hosting, this project and indeed this website would not be possible.

Just remember one thing, my comments are based upon my experiences in photography and I have my own biases that you will have to understand and take account of. I also highly recommend the purchase of basic photography books as a means of having the information always at your finger tips. My current favorite is National Geographic's Photography Field Guide but there are also quite a few good ones out there. The NGS Photography Field Guide is written by Peter K. Burien and Robert Caputo, ISBN 0-7922-7498-9, and costs \$25 US or \$37 CAN. For digital photographers, Martin Evening's Adobe Photoshop 6 for Photographers is highly rated and sells in the \$60 CAN range, ISBN 0-240-51633-8.

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The site in its current form is made possible by the generous benevolence of my brother-in-law, Ben, who has provided the site with a permanent home gratis and nowadays is the source of my computer equipment and software to keep the site going and feeding my current interest in the digital darkroom. Without him, there would be no PIII 1 GHz with 1 GB of RAM onboard to power Photoshop. I may create the content but he is the backbone of the site.

As with the other reviews and essays, commentary, clarification, and corrections are welcome. Whether you disagree or agree with me, I welcome thoughtful discourse on the topics at hand.

Private correspondence can be sent to edwin@camerahobby.com.

Public correspondence, meaning it will be posted in the relevant sections of the website, can be sent to comments@camerahobby.com.

[Chapter 1 Subsection - Glossary of Terms](#)

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Photography e-Book - Glossary of Terms

This glossary is by no means extensive, so if there is a term not available below, or if you would like to supply a term and definition, please [contact me](#) with your suggestions. You'll excuse me for having a bit of fun with some of the terms below, all in good jest :-)

18% Grey – the former standard for a middle tone grey, as espoused by Kodak, apparently on the encouragement of Ansel Adams because 18% grey conformed to his Zone system for B&W photography. However, an 18% reflectance is a not true middle grey with the true middle reflectance actually between 12% and 13%. Most camera meters are apparently calibrated for 18% grey reflectance though.

Aperture – the diaphragm that controls the amount of light exposed on the film. This diaphragm is usually situated at the back of the lens and opens and closes depending on what setting has been chosen. A wide-open aperture will have its settings at the maximum amount to allow in the most light whereas a stopped-down aperture will have the opening closed to reduce the amount of light entering into the camera's film plane.

ASA (American Standards Association now known as ANSI or America National Standards Institute) – usually used by longtime photographers who broke into photography when the ASA provided the standards for film speed ratings, now handled by the International Standards Organization (ISO).

Color – the hues of light that travel along a certain electromagnetic radiation frequency that our brains interpret as color.

Colorimeter – a hardware device that is attached to a monitor and used to measure brightness, contrast and white point to allow the accompanying software to create a custom profile. One of the key steps for a properly color managed digital darkroom.

Color Management – a coordinated approach by various hardware and software vendors to establish a standard of communication from one device (scanner or camera) to a viewing device (monitor) to an output device (printer) to ensure consistent colors from A to Z in the digital darkroom process. Requires a color management capable software or OS to enjoy though.

Circle of Confusion – What a group of photographers is known as when they get together and hash out Nikon versus Canon. Just playing with you J Circle of Confusion or CoC is the point where an out of focus element in your photo, but still within the acceptable depth of field of the photo, is no longer considered a sharp point.

The standard CoC measurement is 0.03 inches for an 8x10 enlargement, but other companies use a more stringent figure of 0.025. This is how large a particular subject point in your photo can be and still be considered a sharp point in an enlargement, any larger and it is no longer seen as being a sharp point, so obviously, the larger you print, the smaller your CoC must be. There are various programs and calculators available online that will provide you with the appropriate CoC.

Think of a needle. You look at the needle with your eye and it looks sharp, but what if you had a second needle just outside of your eye's plane of focus, would it still look sharp? That second needle's point that is ever so slightly out of focus is now a circle instead of a point to your eye, but as long as the circle remains a set measurement size, your eye will still consider it a sharp point. If you take the second needle farther away from your eye then you pass that set measurement so

that the circle is larger. Your eye will no longer see it as a sharp point and this where the circle of confusion starts for that second needle.

Daylight Exposure - See Sunny 16 below.

Depth of Field (DOF) – the zone of what appears to be in sharp focus from a two-dimensional piece of film or photo print. DOF is controlled by the aperture of the lens and a large aperture such as f2.8 has less DOF than a small aperture such as f16.

Those grand landscapes you admire in books and prints are taken with small apertures to maximize the DOF so that everything from the foreground to the distant background appears to be in sharp focus. Portrait photos on the other hand are usually taken with shallow DOF to blur out the background and allow all the attention to fall on the subject.

The wider your lens is, the greater the DOF and vice versa, the longer your lens, the less DOF you have to work with.

Digital Darkroom – What a person whose brain cells have been largely fried by dank development chemicals moves onto after buying a scanner or digital camera, only to have the few good remaining brain cells fried by the electromagnetic radiation from the computer and monitor.

Actually, a computer system setup in a dedicated space that should try and conform to an actual ISO standard of having low ambient light and neutral colors. Or, wherever you have the space to setup your computer to edit some digital files and output them from an inkjet printer for tossing into the family album or scrapbook. A good digital darkroom attempts to provide at least the same kind of editing and flexibility as the old chemical based darkroom.

Flash Sync – How quickly a dirty old man can flash you and then move on before your brain has comprehended what just happened, or the fastest shutter speed that a camera or lens will be fully open to allow the entire film plane to be exposed to a flash burst. Selecting a faster shutter speed will result in the flash popping while the shutter curtain is still traveling along the film plane, cutting off the subject view.

Most focal plane shutters sync at a maximum speed of 1/250 or slower whereas leaf-shutters typically sync at 1/500; however, there are always exceptions to the rule and as technology advances, so do the shutter speeds. There are leaf shutters that can sync to 1/1000 of a second and there are focal plane shutters that can sync at 1/300. Then there are digital CCD chips with their own electronic shutters that can sync to 1/500. And finally there are various workarounds to the flash sync speed limitations that utilize flash pulses to allow the film plane to be exposed to flash – note though that this is not true flash syncing due to use of multiple flash pulses instead of one continuous burst.

Why is flash sync important, a faster flash sync such as 1/250 or 1/500 allows you to mix flash lighting with ambient lighting outdoors to create a more natural photo, or can allow you to freeze motion more effectively than without flash.

Focus Plane – the point that the subject is sharply defined. Although we live in a three-dimensional world, film is a two-dimensional medium with no depth. Within the “apparent” depth of our in focus subject, there will be one optimum focus plane with everything in front of or behind the subject that still appears sharp, as being just a benefit of the Depth of Field available from your choice of aperture setting.

Guide Number (GN) – the number used to reference the power of a flash unit and also used to determine what the correct exposure setting should be set to on the camera. GN is not of much use in this day or modern TTL conveniences, but is if you’re into using a manual-only flash.

Take your GN and divide by the distance in feet your subject is away from the camera. The resulting number is your aperture. Or divide the GN by the aperture you wish to use and the resulting number is how far away the subject must be from the camera in order to be properly exposed by the flash output. E.g. GN 100 divided by 10 feet equals an aperture setting of 10, or

f8.5 since 10 is in between f8 and f11. Or GN 100 divided by f8 equals 12.5 feet the subject should be away from the camera.

Hyperfocal Distance – the focusing distance for your lens that will maximize the depth of field for the aperture setting chosen. Hyperfocal distance changes for the focal length of the lens being used and what aperture is set. Calculators and charts are available to provide an easy reference since most of the auto focus lenses offered currently do not offer hyperfocal focusing guides.

Incident light – is the light that falls onto your subject (contrasted to reflected light). An incident meter measures this type of light and is a more critical form of measuring light in certain situations. Incident metering is the preferred method for measuring complex scenes or highly dark or reflective subjects that could fool a camera's built-in reflected meter.

ISO (International Standards Organization) – based in Europe that provides standards for a wide variety of matters, but for photographers, the key one for us is for film speed ratings.

Photography – from the Greek, photo meaning light and graphos meaning to write – write with light. The act of taking a subject seen through a lens and then exposing a copy of that subject onto a piece of film or digital device and then later recovering that image through a chemical or electronic process, both of which can end up on a piece of paper meant for display.

Photographer (amateur) – a nut bar that spends more time and money on a hobby than is otherwise warranted or desired by the significant other. Or a person passionate about creating images that provide some personal meaning to the process.

Photographer (professional) – a person earning the bulk of his or her income through photographic work and usually someone who can deal with adversity when thrown at them without warning, but not always the case.

Reflected light – is light that reflects off of the subject. The meter found inside your camera measures this type of light to determine an exposure for the film being used. There is some debate as to whether or not these built-in meters are calibrated for 18% grey or 13% grey (or 12%) or if they correspond to some other ANSI standards, as Nikon cameras reputedly are.

Rule of Thirds – a compositional guide that suggests placing important subject scenes onto imaginary points in the viewfinder divided up into thirds. See Chapter

Sepia Tone – a warm toning process used in B&W photos to mimic the aged look of very old B&W prints. Sepia toning is usually a brownish tint, but can also come out in blue or green tints depending on the lab or darkroom enthusiast doing the processing. It is much easier to do Sepia toning digitally today.

Shutter – usually made of metal or cloth, but now being created with hybrids and composites such as carbon fiber, that acts as the gate or door that provides the timing of how long light is exposed to film. Controlling the timing also controls the motion for either a freeze-action shot or motion blur subject that conveys movement.

There are two main types of shutters used in cameras and lenses, the focal plane shutter which travels vertically or horizontally and the leaf shutter, which opens and closes in circular fashion. Differences between the two are in maximum, fast shutter speeds and flash sync.

Spectrophotometer – a high precision measuring device that is used to calibrate monitors as well as printed targets to create custom profiles used in a color managed digital darkroom.

Spyder – a misspelled word for an arachnid, an eight legged creature that is not an insect, or a sporty little Italian convertible made by Fiat. Okay, it's actually what Pantone ColorVision calls their colorimeter, used to measure various monitor hardware settings. Spyder is now casually used to reference any brand's colorimeter much like Kleenex is used to reference any brand's soft tissue.

Stop - what you should do when you drive your car and come to a red octagon at an intersection, or incremental settings for your aperture ring and shutter speed dial. Using a manual camera as a reference, the change from one shutter speed to the next one up or down is called "a stop", e.g. using 1/60 as our default, a change downwards to 1/30 is a one-stop difference and a change upwards to 1/125 is also a one stop difference. For an aperture ring using f5.6 as an example, a change down to f4 is a one-stop difference and a change upwards to f8 is a one stop difference. Film speeds work the same way and a stop denotes either a halving or doubling of the value for the shutter speed or ISO film rating. For an aperture, the stop indicates a physical opening of the lens' diaphragm for either a halving or doubling of the opening to control the amount of light exposing the film.

Sunny 16, or Daylight Exposure - the rule of thumb that dictates that the correct exposure on a sunny day with minimal clouds will be an aperture of f16 and the reciprocal of your film speed for the shutter speed, e.g. with ISO 100 film loaded in the camera, your correct exposure setting is f16 and 1/100 of a second. Since some cameras do not allow for intermediate shutter steps, the closest full stop shutter speed is appropriate, in this example, it would be 1/125.

Tripod - John Holmes' nickname, or a stable and portable three-legged support for your camera and/or lens to provide for maximum sharpness and use of slow shutter speeds. Indispensable for quality photography and something every photographer should have very soon after becoming involved in the hobby.

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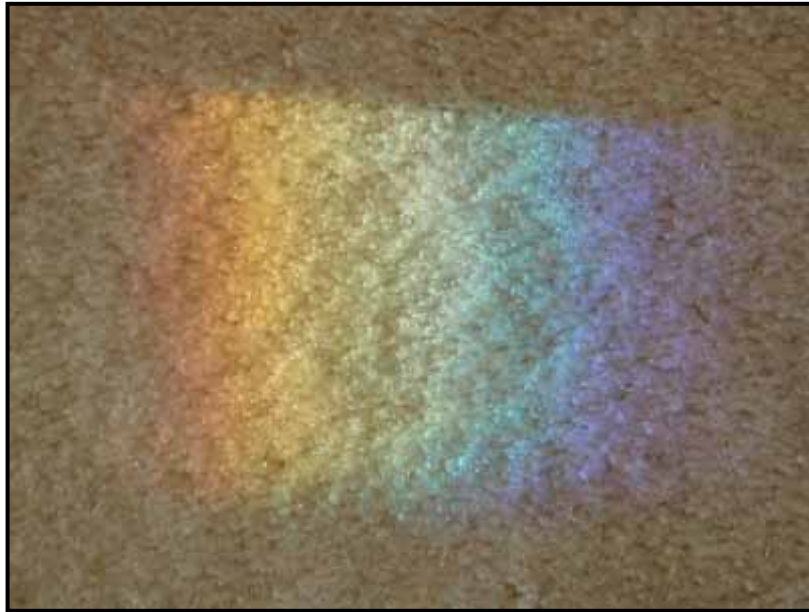
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Photography e-Book Chapter 2 - Light

Let there be light, commanded God and so there was and it was good and became the basis of all life in the universe; so goes the biblical explanation. On a more earthly scale, light as we know it on the planet earth comes primarily from the sun and can be measured and quantified.

Quantum Mechanics is the branch of physics that looks into the world of the infinitely small as opposed to Relativity, which is physics on a grand, cosmological scale – physicists are trying to reconcile the two branches into a unified law, something even Einstein was not able to do but perhaps came the closest with his general theory of relativity in 1915. Incidentally, for those who want to know, Einstein's epochal $E=MC^2$ is from his special theory of relativity of 1905 (the general theory of relativity came in 1915). He did not receive the Nobel Prize for either theory but instead received it for his research into quantum mechanics, the branch of physics he later rejected. Einstein rejected quantum mechanics because it is based upon the Heisenberg Uncertainty Principle and as he put it, "God does not play dice." Meaning, he did not believe in the randomness that quantum mechanics implied in the laws of physics.

Max Planck discovered that light travels in a series of waves that he called packets of quanta. Light is a form of electromagnetic radiation and the wavelengths of light determine its color. Long wavelengths are red and these are situated on one end of the electromagnetic spectrum and longer wavelengths, which humans cannot see, are in the infrared section and going even longer than this are radio waves. Light on the other end of the visible spectrum is violet and beyond this in the non-visible section, are ultra-violet, x-rays, and gamma rays. A rainbow is a prism that reveals the color spectrum from the longest red wavelengths to the shortest violet wavelengths.



Pure white light is an amalgam of all the visible colors in the spectrum as it reflects all the colors whereas pure black absorbs all the colors and reflects nothing back. The black SLR camera you hold in your hands is actually absorbing all the colors of the spectrum and only reflects a tiny bit back to allow you to distinguish between flat black and the deepest darkest black. A blue shirt absorbs all the colors except for the blue waves and the tiny bit of other waves that determine what type of blue it is. The rejected color wavelengths are what you then see and recognize as its color.

I have now exhausted my miniscule amount of knowledge about the physics of light and I do hope that the real physicists will forgive my horribly basic introductory comments here. Let us discuss light in terms of photography.

The Golden Hours

Photography is derived from the Greek words "photos" meaning light, and "graphos" meaning

writing. Put the two together and we have writing with light. Understanding the basics about light is key to obtaining the best in your photographic pursuits. Light is not constant and changes during the day. We need to discover light and its properties during different times of the day and work around those times when light is weakest or least attractive for photography.

Most budding photographers have heard that the best hours for photography occurs twice a day in sunny conditions, one hour after sunrise and one hour before sunset. Why these particular hours and not during the rest of the day when the light is the most intense and brightest?

Contrast is harshest during the hours between sunrise and sunset. Contrast for light, is defined as the difference between the lightest parts of the scene and the darkest parts of the scene. Take your girlfriend or boyfriend outside during the late morning or early afternoon for some environmental portraits and you are going to end up with some harsh looking images. The sun will cast short and dark shadows. Your subject can only face the sun or turn around and have the sun at the back, as the angle of the sun is not enough to provide good side lighting, or at least not the type of side lighting you would want.

The subject facing the sun is front lit and will be squinting trying to block out the intense light, not the best of portraits. Turn your subject around and now he or she no longer faces the sun but is now in a shadow situation (silhouette) that will blow out the contrast range of your film and give your camera's internal matrix or evaluative meter fits trying render a correct exposure. The likely result of your shots will be either a squinting subject lit by a harsh and flat light of the sun or your subject blacked out because your camera could not handle the extreme contrast of the scene. There are of course workarounds to this situation but more on that later.

Flat light occurs during daylight hours, as the sun is either directly overhead or very nearly so. The light has no dimensionality that provides a flattering look to your subject. Does this mean you should never take photos during daytime? Of course not but you need to be aware of the limitations of what this light offers you.

Sunrise offers very clean air as airborne pollutants are only starting to get created from the daily activities of urban areas. Winds are generally not a factor, making for ideal conditions for macro or flower shots. Shadows are long and provide subjects with texture. The contrast between shadows and light areas is within a range that can be handled a bit better than noontime light by most modern cameras and many negative films but chrome films will still require some neutral density filtration to balance out the scene.



Sunset is even more dramatic than sunrise because of the increased amounts of pollutants that provide vivid sunset colors when near urban areas. Clouds are generally more plentiful during this time and they add to the colors with their reflective qualities. Shadows are again long and textured and there is just a quality to sunset light that is golden. When you see the light reflected off a window what you get is not a burnt out, intense white hotspot but a golden ray.

Now keep in mind that it is not exactly at sunrise or sunset that the best times for photography occurs but just after or just before when the contrast range is a Goldilocks just right to balance out highlights and shadows better than at any other time during the day.

For examples of these ideal conditions for dramatic photography, look at the images in just about any issue of National Geographic Magazine. When you look through the documentary or

photojournalism shots, you will notice that more often than not, the photographer has chosen the golden hours around sunrise or sunset to light the scene or subject. Also look at Galen Rowell's work, as you will find that he is a master of what he calls the magic light.

Generally speaking the golden or magic hours are longer in the summers and shorter in the winters so adjust your photography accordingly to make best use of the light. My friend Wilson often lamented doing photography in the summer mornings because it meant having to get up at 4am in order to head out to a location, set up and wait for the light to arrive. Winters means being able to sleep in a couple more hours but your magic hour is more like a magic half hour in the mornings. Winter photography has certain charms though as the sun is lower on the horizon so shadows are generally longer through much of a winter's day.

So far, I have discussed light in sunny conditions but as we all know, we cannot always enjoy sunshine, especially for those of us living in temperate rainforest regions. My city of Vancouver seems to rain from about October through to June with the sun popping out only a few times during the prolonged rainy season. While not raining every single day of the rainy season (just seems like it) the non-raining days are usually overcast.

Overcast conditions may mean that some photographers put away their cameras for lack of sun but for many it is often the best time to go out and shoot. Portrait photographers love the clouds as clouds equalize the high contrast of the sun and provide a gentle diffused light onto their subjects so that everything is evenly lit. Outdoor photographers love the way overcast conditions increase the saturation of flora.

When weather conditions become more temperamental, this is actually another creative opportunity to explore the world that others would just as soon shut out. Of course, before going out in monsoon weather, be sure your equipment can handle it or take the proper precautions to protect it.

You know a little about light now but until you get out and explore the properties of light yourself, you will not truly understand it. It will be a wonderful experience when you recognize the golden light during the prime shooting conditions. But with that bit of knowledge about light, how do we expose correctly with our cameras to create the images on film

In this series of shots, the house is bathed in differing qualities of light as per the time of day. Understanding which light is the best for your subject will help you to bring out the most in your images.



Early Morning Light



Mid Morning Light



Mid Afternoon Light



Late Afternoon Light



Overcast Light

The series of shots below are more examples of how light changes throughout the day and notice how the shadows change and deepen or lighten as the light changes.



Sunrise



Early Afternoon



Mid Afternoon



Late Afternoon



Late Afternoon Near Sunset



Overcast Light



Morning Light

Notice the golden overtones of the light on the greenbean plants but also the harsh shadows cast by the plants on the fence



Overcast Light

Notice the lack of shadows as compared to the morning light shot, allowing balance throughout the scene

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Photography e-Book Chapter 3 - Metering

Sunny 16

Sunny 16 is a standard derived from the shade of gray that some exposure meters are referenced to (more at the bottom of this page). Sunny 16 is also known as daylight exposure and is quite simple to understand and remember. If ever your camera's meter goes kaput either mechanically or for when the battery dies and if you are fortunate to have a manual camera that can go on without batteries, use Sunny 16 as your guide.

Sunny 16 states that in bright sunny conditions, with a few clouds overhead but not blocking the sun, your front lit subject, meaning the sun is behind you the photographer, your exposure should be f/16 and the reciprocal of your film speed.

If you are using ISO 100 film then your exposure is aperture at f/16 and shutter speed at 1/100 but since there are still many cameras out there that do not allow for 1/3 stop increments for shutter and aperture settings, you would use the closest equivalent, which would be 1/125. Using the set standard shutter speeds as available on a manual camera such as a Nikon FM2, if you were using ISO 200 film, your exposure value would be f16 and 1/250. ISO 400 would be f16 and 1/500 and so on up or down the film ISO scale.

Sunny 16 provides a ready and known standard and there is an easy way to test the exposure of your meter. On a clear sunny day, mount a telephoto lens to your camera and set the lens to f16. If you have film in the camera you can use that ISO as your reference or set the film speed to a default ISO 100. Look north and point your camera, in either center-weighted or spot meter mode NOT Matrix or Evaluative Mode, mid way between directly overhead and the distant horizon. Your shutter speed should be the reciprocal of your film speed. You can also test your handheld spot meter this way too. I have done so with my Sekonic 508 and Nikon F100 camera and found them both spot on with the Sunny 16 rule.

Why mid way between overhead and the horizon? Directly overhead and the exposure will be one-stop slower than Sunny 16 and over the horizon will be one-stop faster than Sunny 16. The sky is not a continuous tone, it is slightly darker directly above you and lighter as you look anywhere at the horizon, in any direction.

Now that we understand what camera exposure meters can be referenced to, do we have to use f16 and the reciprocal of the film speed all the time? Of course not, if we used f16 all the time our shots would all look the same and if we did not break the rule of Sunny 16 for creative purposes we would not have all the dramatic images created to date. You can use the equivalent to Sunny 16 using other aperture or shutter speed combinations.

- f16 and 1/125 is the same as,
- f11 and 1/250 is the same as,
- f8 and 1/500 is the same as,
- f5.6 and 1/1000 is the same as,
- f4 and 1/2000 is the same as,
- f2.8 and 1/4000 is the same as,
- f2 and 1/8000

and conversely speaking,

- f16 and 1/125 is the same as,
- f22 and 1/60 is the same as,

- f32 and 1/30 is the same as,
- f45 and 1/15

The above examples are referenced to ISO 100 but you just merely have to replace the ISO for whatever film speed you wish to use and adjust the shutter speed accordingly.

There are times when using Sunny 16 does not represent our creative intentions and we may wish to saturate the colors more so with some underexposure or wash out some colors with a bit of overexposure. This is when exposure compensation is useful for allowing easy manipulation of the exposure. If your camera does not have an exposure compensation feature then you can adjust the film speed dial and receive the same effect. Dial in a higher ISO speed for some negative (underexposure) compensation or a slower ISO speed for positive (overexposure) compensation. This feature works best with slide film and unless you contact sheet your negatives, there is little point to doing any sort of compensation with generous latitude negative films.

Hopefully, you will have understood the basics of exposure by this point but what we have not discussed are the choices of aperture, shutter speed, and film speed. Understanding exposure is just the start but we need to interpret the scene and how to best communicate our intentions to people who will view our images.

Aperture, Shutter, and Film Speed

Aperture, shutter, and film speeds are set in increments called "stops". A one-stop change represents either a doubling or halving of the settings. For example using a shutter speed of 1/125 as a reference, opening up the speed one stop would halve it to 1/60 whereas closing down one-stop would double the speed to 1/250. A two-stop change would mean opening up to 1/30 or closing down to 1/500.

Film speeds work the same way and using ISO 100 as a reference, ISO 50 represents a one-stop change for slower shutter speeds and an ISO 200 film would mean a one-stop faster change. ISO 800 would represent a three-stop change from ISO 100 and would allow a three-stop increase in shutter speeds or wider apertures.

The three variables of aperture, shutter, and film speed work symbiotically to provide an exposure value, change one variable and the others will change but we usually change only the aperture or shutter speed to work with the film we have in the camera. You would choose your film for the task to be undertaken and then adjust the aperture and shutter according to your creative requirements.

Aperture

The aperture is a diaphragm in the lens that opens and closes according to our desired effect for depth of field. This opening controls how much light comes through from the lens and onto the film. Use a wide-open aperture (opening up) and a lot of light will come through and hit the film but use a small opening (closing down) and the light will be reduced to a trickle. What is very important to understand is that as you adjust the aperture, an equivalent adjustment of the shutter speed is required to compensate.

Aperture settings are not easily identifiable as being either double or half of a setting due to the use of fractional numbers. F-stops are actually fraction amounts with the *f* representing the focal length of the lens and the */* meaning divided by the aperture setting. With f/16 and a 50mm lens, this means that

- $f=50\text{mm}$
- $/$ by 16
- $=3.125$ in mm
- 3.125mm is the physical opening for the 50mm set at f16

You can do this with any lens and obtain the actual physical opening for the focal length at an aperture setting.

As you open up an aperture, the shutter speed must be set at a faster speed otherwise overexposure will result for a given film ISO speed. As you close down the aperture, the shutter speed must be set slower otherwise underexposure will result for a given ISO film speed.

Aperture Priority mode is favored by many photographers due to the direct control of depth of field with the chosen lens. Depth of field is the perceived depth of sharpness in a scene. A wide-open aperture such as $f2.8$ has less depth of field than a stopped-down aperture of $f16$. There is only one true plane of focus in a scene, as chosen by you but the use of a small aperture will provide a large range of perceived sharpness to provide depth.



Aperture set to $f/22$ on a Nikon 35-70mm $f2.8$ lens



Aperture set to $f/8$ on same lens



Aperture set to $f/2.8$ on same lens

Notice the heptagon in the example shot of the lens at $f8$. In certain lighting conditions, those with pronounced broken highlights in the background (think a backlit scene with bushes or trees with the light coming through the leaves) will reveal the shape of the aperture if the lens has been set to any aperture other than wide open. Many people find such artifacts to be disconcerting and seek out lenses with more rounded aperture blades to provide more pleasing out of focus elements in the scene.

Ever since the Photo Techniques Magazine on "bokeh", Japanese for and sometimes associated with bouquet, as in wine tasting to describe the characteristics of the wine. Bokeh can be an esoteric way to describe the characteristics of the lens. German lenses, especially those from Leica, are considered the standard for which all others are compared to.

Nikon and Canon have jumped on the bokeh bandwagon and now design lenses to reflect the desire of the photographic world for more pleasing out of focus elements. This has largely been done by designing apertures with more blades for a rounder diaphragms. I am not sure if bokeh is merely a result of round diaphragms or is something that has to be purposely designed into a lens.

Shutter speed

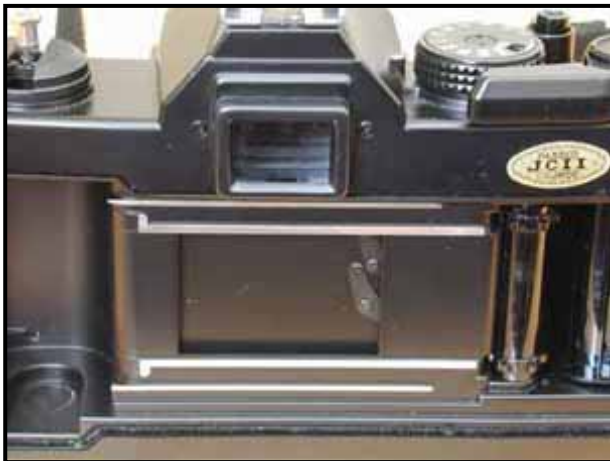
Shutter speeds control the duration that the light coming through the lens will hit the film for. Again, the aperture controls the amount of light hitting the film but the shutter times the light hitting the film. As aperture is predominantly about depth of field, shutter speed is predominantly about motion and affecting how we perceive motion in the image.

A fast shutter speed such as 1/500 is effective at freezing high-speed motion such as sports when the athletes are moving very quickly. A slow shutter speed such as 1/30 blurs the motion as the speed is too slow to freeze action and the athlete's movement continues through the shutter cycle. The use of slow shutter speeds to create a blurring motion provides the eye with the illusion of movement and can be more effective than simply freezing the action outright.

Shutter speed affects all movement and water flow is often shot at slow shutter speeds to provide a silky glow to the water. Use of the slow shutter speeds can affect other landscape elements such as swiftly moving clouds. Used creatively, shutter speed can open up a whole realm of possibilities.



A slow shutter speed and some Photoshop enhancement provided the silky glow to this water fall scene



The shutter screen shields the film from light entering in from the lens until the moment the shutter release button is pressed

Shutter speed dial in traditional one stop increments on a manual camera - the orange setting indicates the maximum flash sync speed for this camera

Film

The choice of film to affect the exposure is sometimes forgotten but professionals have been using film to help with their assignments, especially sports photographers using high-speed films in low ambient light conditions.

Your choice of film will directly affect the exposure whether you are shooting landscapes or shooting action. The grain and quality of the images provided by the film is also an important consideration.

Landscape photographer want the most detail and the best enlargement capabilities possible, meaning using low speed films to minimize grain and recording as much as detail as possible. The overwhelming choice is for high quality chrome films such as Fuji Velvia, Provia F 100, and Kodak E100.



Action photographers will sometimes use chrome films too but the nature of chrome films is not generally conducive to obtaining the desired results. The higher speeds favored by sports photographers are generally not of the best quality in chrome films and thus these photographers usually use color negative films for their tighter grain structure and better ISO speeds. Using ISO 800 and ISO 1600 speed films is a regular occurrence and many times the sports photographer is pushing the film even further to ISO 3200.

Pushing film means to shoot the film at a higher ISO than rated and requesting the lab to compensate the development time to match the faster ISO. The danger is that not all films have been developed to be pushed (or pulled, the opposite of pushing) and the results can be less than stellar.

Depending on the film you use you may also encounter reciprocity failure if your exposure times are very long or very short in duration. Slide films generally have their best results between 1/10 of a second and 1/10,000 of a second and going beyond these speeds in either direction requires compensation. Each film is different so you need to find out what the recommended reciprocity compensation is from the film company of your choice.

More comments in the [film chapter](#).

Types of Meters



Matrix or evaluative metering is probably what most amateur photographers use in their modern-day high-tech SLRs. The multi-segment meter was first implemented in the early 1980s and has evolved into a complex and viable metering option for many people. In its very basic form, the Matrix meter seems to be merely a beefed up center-weighted meter but in its current mature stage of development, the Matrix meter can ignore various



segments and add weight to others to come up with a technically correct exposure. Complex algorithms are utilized for the Matrix meter to analyze a scene and provide an exposure value. The algorithms are based on actual exposures taken from many thousands of shooting situations. The Matrix is a number of segments in the viewfinder area that the camera's computer can use to come up with an exposure. Most Matrix meters are in the 10 to 16 segments range but the Nikon F5 has 1005 RGB sensors in its state of the art Matrix meter. Although quite complex and quite capable, Matrix meters are not fool proof. When confronted with extreme exposure situations, the Matrix meter is not able to cope and provide a good exposure. Compensation from the photographer is required and in the case with Nikon cameras, Nikon recommends using Center or Spot metering for exposure compensation in order to obtain consistency. Compensation, while in Matrix metering, can provide some undesired results.

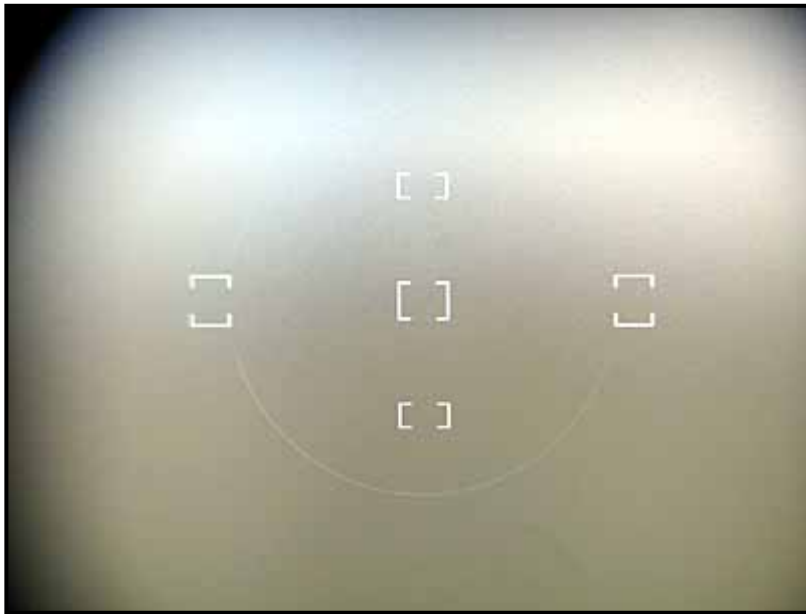
Center metering is the old standby that many older photographers know so well. Up until the acceptance of the Matrix type of meter, center weighted meters were the standard. This meter places the majority of importance to the center portion of the viewfinder with the remaining portions left to the rest of the viewfinder. This classic meter is also the one that photographers have to be aware of for weaknesses in metering complex or extreme scenes. Too much brightness without compensation would result in underexposure and too little brightness would result in overexposure as the meter reads everything as a middle tone. Snow or sand scenes are common ones for center meters to underexpose on while a black cat in a dark room is the cliché example of overexposure.

Spot metering is a very fine tuned exposure reading for a small portion of the overall scene. In complex metering situations where even an incident meter is not reliable or unavailable, spot metering is the best option. The best spot meters are found in handheld units and offer very precise 1-degree readings. You can see yours truly using the Sekonic 508 in spot meter mode in the image here.



Most modern day autofocus SLRs come with a spot meter but some offer spot meters that are still too broad for a precise reading. In these situations, mounting a telephoto lens onto the body will narrow the angle of view and provide a more precise spot reading. After obtaining your exposure reading and having dialed it in, you can mount the lens you actually wish to use to take the exposure.

Some SLRs offer multiple spot meters in the viewfinder as seen here and are small enough to be meaningful with most lenses. Canon's EOS 3 offers an averaging feature wherein multiple spot readings can be taken and then averaged, very handy.



The viewfinder of the Nikon F100 and its five autofocus points, which are also spot meters as well as part of the 10 segment Matrix meter. The circle that you see is the indicator for the Center Weighted meter.



Incident metering is the favored method by many pros and serious amateurs when using slide films. Color and B&W negative films have such generous exposure latitude and thanks to the vagaries of the printing process, the built in meters of SLRs can be used with not much regard for exact readings. Slide films are not so generous and some careful thought is required when in difficult metering situations. Because Matrix, Center, and Spot metering is based upon reflected light, incident metering can offer a better way of reading a scene.

Reflected light readings is self-explanatory, meaning the amount of light reflected off of the subject is the basis of the SLRs built-in meters. Incident metering measures the amount of light falling on the subject and it matters not what the brightness or darkness of the subject is. Bright subjects such as sand and snow reflect more light than dark subjects such as a stand of pine trees. Because built -in meters attempt to expose based upon a 13% gray reading, a light subject will end up as a gray tone on slide film as will a black subject. Center weighted meters are notorious for this but Matrix or Evaluative meters are also highly

susceptible.

Hold your incident meter in front of the subject at a 45 degree angle facing up with the half dome light collector up. Make sure the meter is in the same light as your subject otherwise your reading will be incorrect.

In complex metering situations where no incident meter is available, you can use a spot meter to

read off a subject with an average tone such as tree bark or green grass. Or take a reading off your palm and then open up the exposure as required. You will note that I suggest the palm of the hand and not the usual back of the hand. The back of your hand will become tanned when in sunny conditions and depending on how dark your skin becomes, the usual recommendation of opening up one-stop will no longer apply. Referencing the palm of your hand, which will not become tanned, will provide a more reliable source for metering. You are probably looking at a two-stop opening up with a palm reading.

In the series of shots below, different metering options were used. The images are uncropped and the exposure meters were allowed to dictate the exposure. Mr. teddy's face was kept in the center to allow the spot meter to expose for it. Although the spot meter option exposed Mr. Teddy correctly, the burnt out highlights do not make for a good overall exposure. In this instance the use of flash to balance out the background with the subject provides the best overall exposure.



Matrix Evaluative Meter



Center-weight Meter



Spot Meter, reading taken from the middle of Mr. Teddy's face



Center-weight meter reading, with flash on

Gray Cards

A note about gray cards. Photographers have been told and taught about 18% gray cards for decades, as a known reference to measure light with reflected light meters, i.e., the meters built into most cameras. Using a gray card held up at 45 degree angle in front of the subject allows the camera to meter correctly and achieve a similar exposure value as if you were using an incident light meter. However, there is growing acknowledgement among the photographic community that gray cards at 18% reflectance is wrong.

It is now known that the real middle gray value is a reflectance of around 12% to 13% NOT 18% and this represents an off exposure of around 1/2 stop. What this means for those who like using gray cards is that you need to open up the aperture or shutter speed by 1/2 stop to compensate for the greater amount of reflectance of the 18% card.

Such well known photography writers and commentators as Thom Hogan (Nikon Field Guide) and Bob Shell (of Shutterbug) are attempting to educate amateur photographers of this industry-propagated error. Second hand rumour suggest that Kodak had been badgered by Ansel Adams himself to use 18% as the middle gray value. Tough to say no to the pre-eminent landscape photographer of the 20th century.



According to those who think they know better, even Kodak has come to realize the error of their ways and instruct purchasers of their gray cards to compensate the camera's meter reading by 1/2 stop. This revisionism must have come about very recently because my own Kodak gray card, bought in 1997, has NO instructions advising of a 1/2 stop compensation required and yes I did read the instructions back then. So for those who wag their fingers at us ignorant consumers, keep the attitude in check because the 18% revising seems like a bandwagon movement but one that should be jumped on by all photographers. Regardless of what is the correct reflectance, 18% gray cards are still useful because they are still a known reference and really what is the big deal about opening up 1/2 stop of exposure? Nothing to be overly worked up about.

There is confusion about just which standard camera companies use to calibrate their meters. Is it 18%, 13% or even something in-between? Camera companies are secretive about this information and it is left to the photographer to determine the accuracy of the camera's meter and how it will affect the picture taking process. Since I am confident my cameras and handheld meters can be checked against the Sunny 16 rule, I won't worry too much about it since this is another known reference that can be worked with.

There are some photographers who like to debate all the technicalities about 18%, 13%, or 12% gray and just which one is truly middle gray. I suppose they like to know so as to ensure that they can achieve a technically accurate exposure all the time, however, just consider that technically accurate exposures do not always work to achieve what our creative intentions are. Often times too much is made of the technicalities of photography and not enough about the creativity of the medium.

Update: Reader Bill Chiarchiaro sent some information to help shed some light about the Kodak gray card and its 18% reflectance:

I became curious about the "18% issue," and I actually purchased a copy of ANSI's 30-odd-year-old standard for light meters (ANSI PH3.49-1971). Unfortunately, it's a terrible piece of work, ambiguous or self-inconsistent in some places and with outright errors in others. Using the standard's equations and its typical values for the reflected light and incident light "exposure constants," you indeed calculate an average scene reflectance of 12% as has been claimed by various people on the Web. However, taking the extreme values for the exposure constants, you can calculate reflectances from 10% to about 18%. Also, this standard's predecessor from 10 years earlier (PH2.12-1961) showed a slightly different typical value for the reflected light exposure constant, leading to an imputed reflectance of 11%.

The 1971 standard says that the value of the reflected light or incident light exposure constant, or both, shall be marked on the nameplate of the meter or given in the instruction manual. It's not clear whether this is supposed to apply to all meters or only to ones which use constants different from the typical values. The standard allows meter manufacturers the leeway to choose values with result "in optimum exposure for the most critical film, usually color film." The standard also indicates that the constants are chosen based on psychometric evaluations of "preferred exposure."

I think the bottom line to this whole story is that while 18% reflectance might be perceived as "halfway" between black and white, the average reflectance of a typical scene is close to 12%. In other words, "middle gray" is more reflective than the average of a typical scene. An averaging exposure meter needs to be calibrated to the average reflectance of a typical scene, but 18% gray might still be useful as a visualization tool. Perhaps that's why Kodak has stuck with the 18% card.

By the way, Kodak did have a representative (G. Edwin Kindig) on the 1971 standard's committee.

Another reader offered this bit of information about the 18% grey card debate and whether or not 18% grey is the true middle grey reference, or whether it should be 12 or 13% grey:

I have just seen your website and in particular was interested in your questions about the 18% grey cards. Many years ago I looked into this and came to the following conclusion, although I have never seen this in writing.

Most cameras and meters are calibrated for anything between about 10% and 14% average reflectance. I seem to remember reading that Nikon at one time used 10%, optimised for transparencies. 12% seems common with hand held meters and modern cameras.

If you place a grey card in a scene, it is almost certain that it will not be lit from the camera axis, unless you happen to be using ringflash. It will be lit at an angle, probably around 45 degrees if you want best lighting conditions. The cosine law takes effect, and the card will have an adjusted reflectance (i.e. the reflectance as seen by the camera) of (0.707×0.18) , i.e. 12.76%!

Your 18% grey card, therefore, in normal photographic lighting conditions, will simulate an average reflectance of 13% to the nearest round figure. I'm sure this is what old Ansel was thinking of, but I'm amazed not to have seen this in writing so far!

Bill McKelvie

A response to the above:

I think it's more of the Law of Sines (SOH-CAH-TOA) rather than the Law of Cosines. 18 is the actual reflectance of card (hypotenuse), x is the (perpendicular line) representing the reflectance seen by the camera, and 45 is the angle on which the card is held. now the reflectance seen by the camera is opposite to the angle so $\cos(45\text{degrees}) = x/18$. which gives you also 12.72 degrees.

*Then again, the last time I thought about these things was more than 10 years ago
back in college...*

Dexter Legaspi

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Photography e-Book Chapter 4 - The Equipment

This is the section that most people are interested in, the toys for big boys AND girls. Those sleek, picture-taking machines that denote sophistication and cutting edge technology. The stuff that photographic wet dreams are made of.

In the beginning, the equipment is probably the driving force behind the photography but as one becomes more experienced and learns more about the craft of photography rather than the gear of photography, the better the person will become creatively. However, the desire for the latest and greatest never seems to end and the mindset of just needing that one more lens or filter is a black hole of money being flushed away. Trust me on this as I have so many examples of buying good gear and then selling at a loss or not using it anymore because the next great thing comes within my view.



It takes a lot of discipline not to go overboard and throw more good money after bad. Subjectivity and personal neurosis come to play as you see the rich boys and gals play with the good stuff while you slum it with what you think is questionable gear. What has been lost is perspective.

Sure, your Manfrotto 190 tripod is not a slick and super light carbon fiber Gitzo tripod but then you did not have to spend half a month's salary to buy the Manfrotto. Meanwhile your non-photographic buddy is using a plastic hunk of junk bought from a drugstore (or maybe even given to him for free during a store promotion) that barely has the stability and strength to hold itself up. You on the other hand may have pangs of desire for multi-kilo buck tripod and head combinations but unless you are schlepping a massive large format rig or some grossly huge and expensive super telephoto, are you really missing out? Are your slides so lacking in sharpness that you need the strength and load bearing of the Arca Swiss B1G on top of the Gitzo 1548? If not then put your money where it really counts, film to shoot with and vacations to go to those places to shoot with and forget about the pros with the expense accounts and/or tax write offs, buying the latest and greatest. Besides while you are easily hoofing it up the trails like a mountain goat with your light but sturdy rig, big time yuppie is huffing and puffing trying to carry his 60 lbs of equipment up the same trail. Of course, the big time pro with the expense account just hires slave-wage locals to carry his burdens.

What about the damn equipment though? One simple rule to follow, buy the best you can afford. If that means that you can only afford a Nikon F65 type of camera with a 50mm f1.8 lens then do so but if you can stretch out the funds for a F80 or even a F100 (and the requisite quality lenses) then that is even better. If you have so much money that you can look at the F5 and all those sexy AF-S lenses without batting an eye when told of the price, send me a check and I will name my next dog after you. Seriously though, if you have the scratch for the F5 without the need to burn through a roll of film in mere seconds and if your style of photography is not about chasing down elusive birds and critters or sporting events, then you might want to consider something far more satisfying than a tiny chunk of 1x1.5 inch film. Medium format - more on that later on.

Brand Wars

What about brands? There is a great deal of brand loyalty among photographers and you will encounter the inevitable battles about which brand is superior. You will even find comments about [brand wars](#) elsewhere in this web site. Read about them if you wish but do not take it seriously. In this day of computer-assisted design, there is precious little difference among the major brands in terms of body ergonomics, features, and optical quality. What you want to do is seek out a camera body that feels good in your hands and then go with that brand's system to the best of your financial capabilities.

Forget about the overblown prestige factor of Leica, Contax/Ziess, or Hasselblad. If these companies' products feel good to you and if you have the scratch, then buy it. If you can only muster enough cash to buy a Nikon F65 or Bronica SQ-B, do not think for one minute that you are somehow beneath the prestige brands because your images will still be as good so long as your technique and creativity are good. That is what matters in photography. ***The equipment is just a means to an end and most certainly not the end itself.***



Admittedly, fine equipment helps to quicken or ease the process of photography and I personally prefer cameras that are in the higher range of a company's lineup but that has more to do with being forced to buy all the bells and whistles just to get the right combination of features I want. I fully admit that I do not utilize all of the capabilities of my [Nikon F100](#) such as Auto Bracketing or even the well-regarded Five Point Auto focus Pad however, I use enough of the other features that the F100 is a fine upgrade to my former [Nikon F90x](#) and [Nikon F70](#) bodies.

My medium format [Bronica SQ-Ai](#) is just about perfect in features desired from an SLR camera. I can use it as a manual exposure camera or add the prism finder and obtain a very capable Aperture Priority metered camera. The SQ-Ai with the prism is large and heavy but as far as features are concerned there is nothing else I need beyond what this combination offers. I do not even use the SQ-Ai in this configuration for most of my shooting as I work with a handheld meter most of the time with a waist-level finder.

When you buy a particular camera body, you have bought into the company's system and over time you will know that camera as merely an extension of your hands. The operations of the camera will become second nature and if satisfied, you will become a fan of the company you bought into. This will happen no matter which brand you buy into. It will be natural to speak well of the company and defend it against its detractors. You bought this camera and it was a fine decision for your use. Nothing that anyone else says should matter or detract from your decision but do not let your sentimentality get in the way of objectivity.



Recognize that all the other major brands have excellent products available too and that supporting one brand over another is merely your familiarity with only one or two brands of equipment. Recognize that the camera and the lenses are tools in your hands and that you ultimately control the image making process and no



matter which brand of camera you have in your hands you are the one that creates the image and not that old saw about the lens creating the image. The lens did not see the scene first and did not compose the scene, it was you and you are the one who chose the lens for the perspective and coverage desired. So, forget the Nikon versus Canon,

et al debates (even if I did write a silly essay about it) and use the equipment instead of talking about the equipment.

No matter what format you choose you will require some basic pieces of equipment, so let us start from the top and work our way down. You should also keep in mind what you want out of the tools you choose. Just as you would not use a large format camera for street shooting, you would not use an APS camera for landscapes - at least you should not although many ignorant consumers do. Buy the right tool for the shoots you expect to be doing. At the risk of contradicting myself, just because the Leica M6 feels "right" in your hands does not mean that it is going to be the right tool for when you see the nearly extinct warbler you have been chasing all your life, fly right in front of you. And just because the Nikon F5 feels "right" in your hands does not mean it is the right tool to be using at full speed 8 frames per second motor drive in the face of a minister at a wedding service.

It can be the case that you should have two or three systems for different types of shoots if you are going to be serious about photography. Most of use are not so flush with cash that we can just up and buy everything from 35mm to medium format to large format to digital to satisfy the myriad opportunities we will encounter. The purchase of a 35mm SLR system is going to be the accepted compromise choice for most people as one that can do most types of shoots reasonably well. For that reason, the comments on equipment is preponderantly towards the 35mm format.

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Photography e-Book Chapter 5 - The Camera

If you have already read some photography web sites and/or photography newsgroups, mailing list, and discussion boards, no doubt you will have come across the little gem that states that the lenses come first and that you should always devote as much as possible to the best glass you can afford. Good advice and very true if you are already into photography but a bit of bunk if you are starting out because how are you going to use that jewel like first lens that costs so much your wife is jealous, as she looks at that low grade diamond ring you bought her. You are going to need a body to use with that lens and all the future ones you will purchase, so go out and get yourself the camera body that you feel good about using. It is a personal choice so never mind about the brand or how entry level of how high flying the body, just get one that you like and **can afford**. Oh yes, you may wish to keep in mind certain features that will make life easier but not necessarily make you a better photographer.

Robust build. This is a personal criterion for me as I most admire cameras that have been built to withstand harsh environments or conditions wrought on to them by the users. Absolute bomb-proofness is not a requirement but monsoon proofing is nice to have in my wet, neck-of-the-woods of the coastal, Pacific Northwest. Cameras known to have significant quantities of rubber O-rings to survive a deluge or two as well as a solid metal or metal-hybrid chassis are tops in my book. Some examples of such cameras would be the Nikon F100 and F5; Canon EOS 3 and EOS 1v; Minolta Maxxum 9; the Contax N1; and the new Pentax MZ-S.

Robustly built cameras are not light, especially when mated to their companion vertical booster grips. The F5 has its vertical grip built-in as an integral part of its build and is not for the weak of arm. Even the predominantly plastic EOS 3 is still a very solidly built and hefty camera to hold (despite what some Nikon wags claim and despite my own allergic reactions to plastic).

Vertical grips or motor drives. Weight of a camera body may be an issue for some but for others who shoot a lot of portrait oriented images then a vertical grip makes life much easier as most such grips have a shutter release button as well as additional controls and dials to mimic shooting in the traditional landscape mode. Additionally, if you handhold a larger lens such as a 80-200mm f2.8 variant you will come to appreciate the extra stability that a vertical grips lends to such situations.

Other features that I would want from a camera are:

- Depth of Field preview, a button that should be logically placed (usually around the base of the lens mount) for easy access and quick checks to determine your range of sharpness. Note that I state range of sharpness and not range of focus because there is only one true plain of focus as determined by you but with small apertures, your range of sharpness will increase. As you move further away from the subject, the greater this range will be and as you move closer to a subject, the more constricted this range will be. Note that sharpness here is related to the actual details captured on film just its perception from depth of field.
- Mirror lock up (MLU) or at least a mirror pre-release feature tied into the self-timer. Many photographers use mirror lock up religiously to maintain as much resolution as possible and avoid the vibrations of a mirror flapping up and down during the exposure making process. It is generally accepted that MLU most affects an exposure when using certain slow shutter speeds from slower than 1/60 to faster than 1 second. Some brief tests I have done with my mirror-lockup equipped Bronica SQ-Ai, confirms that MLU is a worthwhile feature to have for maintaining sharpness in the danger zone of shutter speeds. Unfortunately, my Nikon F100 body does not have MLU nor even a mirror pre-release tied into the self timer. Nikon get with the program already and offer a feature that most serious photographers can make good use of on your non-F bodies, after all many worthwhile images are in the danger zone of shutter speeds.

- Exposure Compensation done in an easy fashion, as is the case on the Nikon F100 or various Canon EOS bodies in which compensation can be done via a control dial without the need to put the camera into Exposure Compensation mode via a dedicated button. A few cameras coming out these days have their own dedicated Exposure Compensation dial (Minolta Maxxum 9 and Contax N1). The compensation should be user selectable to go as fine as 1/3 stop over a plus/minus 3 stops range. Exposure bracketing is not much of a feature for me despite the fact that I do bracket my shots on occasion when using slide films. I find it easier and simpler to bracket manually whether I use a fully featured Nikon F100 body or the manual Bronica SQ-Ai. The ability to bracket an outrageous number of frames such as 15 or more is superfluous.
- TTL flash capability is available in most of today's cameras or else accessories are available to provide the feature, as is the case with many medium format bodies. What would really be wonderful is the ability to have flash exposure compensation built into the camera but most times the feature is built into the flash unit. The exception to this are the mid-level cameras with built in flash heads such as the F80. The downside to these bodies is that their flash sync is a slowish 1/125 shutter speed instead of the more useful 1/250 or 1/500 as found in certain medium format offerings. The ability to synchronize the flash to the rear curtain of the shutter is also useful to have as well as the slow sync mode so that ambient light can be better balanced with the flash exposure. Red eye reduction may seem like a wonder feature but I cannot remember the last time I used it, probably back in the days when I was still feeling out the capabilities of my then new SB26 and F90x combination. I have otherwise not had a problem with red eyes with any of my flash shots when using the flash directly connected to the camera.
- PC Sync socket is useful to have but not vital since \$15 accessories can be bought to adapt a PC Sync connector to the camera's hotshot. PC Sync sockets are generally only available on the top tier cameras above the mid-level varieties such as the Nikon F80 and Canon Élan 7.
- Electronic remote cord connections. You will find these types of connections on top tier cameras too and though a bit pricey, I prefer them to the mechanical cord release that uses a plunger to trip the shutter. Electronic cords do not induce as much vibration and are more reliable. The connections will also support computer link ups as well as variety of remote and radio controllers on the more advanced 35mm bodies. Most of these features I would have little use for but are nice to have if you decide you need them. The one feature I do like is the possibility to do cordless shutter releases so that you do not even need to be near the camera to trip the shutter. Mike Nicholls of National Geographic magazine has used infrared controllers on N90s bodies to capture images of wildlife at night and others like to use such devices to capture skittish birds on film without having to be anynear near the wildlife.
- DX override allows you to alter the way the camera exposes the film, providing full control of the film's characteristics. Exposure compensation is exactly the same thing and you could use one or the other depending on how you wish to operate but just remember to return the setting to the default otherwise all your other rolls of film will also be DX overridden or compensated. DX override is also how you push or pull film.
- Spot metering capabilities and if the camera can associate the spot meter to an auto focus point, so much the better (Nikon F100 among others). The finer the spot meter the more precise your meter reading will be. Your evaluative or matrix meter can handle the majority of metering for your day-to-day photography but certain conditions require manual readings for the best result. Just remember one rule of thumb, meter for the most important part of the scene as determined by you.
- Backlight for reading the top LCD is necessary if you work in low ambient light a lot. Mid level bodies generally do not have such a feature, requiring you to move up to at least a second level body like the F100 or EOS 3.



There are probably a few other features that I would like to have but forgotten but these are the main ones I would prefer to have to others. You should be able to read between the lines and

figure out that any recommendations I would make with regard to a camera body is for a near-state of the art model such as the Nikon F100, Canon EOS 3 or Minolta Maxxum 9. These cameras are not cheap and for the best bang for the buck, mid-level offerings such as the Nikon F80 and Canon Élan 7 are very good, however, they do not have the build quality and durability of the better cameras. Unless you absolutely need to burn through a roll of film faster than a Ferrari can go from 0 to 60, there is not a need for a top-level body such as the Nikon F5 or Canon EOS 1v. These are no doubt the finest high-tech 35mm offerings available (no disrespect to Leica and Contax users) but at the prices these bodies demand, not worth the money and an investment in another film format would be my suggestion. Remember, my opinion only, your needs will dictate your personal choices.

Here we have the 35mm camera that I use at the moment. Some of its key features include:

1. Magnesium-alloy build for long-lasting durability
2. Thick rubber cover for good gripping and extra protection against knocks and bangs
3. Depth of Field preview feature to check your zone of sharpness
4. Remote cord terminal that can also be used as a computer link-up for data downloading
5. PC Sync socket for easy connection to studio flash
6. Electronic contacts in the lens mount that allow the use of high tech lenses such as the Silent Wave and Vibration Reduction models
7. Screw mount drive that allows the use of other Nikon autofocus lenses. This makes Nikon unique in its ability to allow state of the art lens motor capable lenses as well as older screw mount lenses to be used on the same body.





1. Many of today's current autofocus cameras offer multiple focus points in the viewfinder display - you will need an effective and ergonomic control to select the desired focus point
2. A Canon innovation now widely copied, is the AF-On feature that removes the AF start from the shutter release and to this button, easily controlled by the right thumb
3. Many cameras also offer Custom Functions to fine tune your personal shooting requirements
4. Dynamic or Predictive Autofocus allows you to maintain focus on a moving subject, even those that move erratically - but do not expect miracles from this feature
5. An accessory vertical grip with additional controls to make vertical shooting easier is a must for those using big and heavy lenses on a regular basis
6. Any vertical grip should have easy access to the battery chamber for fast changing when required
7. If the camera does not come with a generous rubber eyecup, an accessory one should be available to make for a much more comfortable head to camera contact



1. No serious camera today should be without a LCD illuminator - Nikon's also turns on the illuminator on their top flash units
2. Exposure compensation is a must
3. Even better is for easy Exposure Compensation via a secondary command dial as is possible with the Nikon F100 body, without the need to press the Exposure Compensation button and then turning a dial
4. The more thoughtful companies include an indicator for where the film plane is
5. More and more cameras offer a frame counter even when the camera is powered down - very convenient to figure out how many frames are left with a quick glance while the camera is off.



1. Bracketing is an essential feature for many - for myself, less so
2. DX override is another method of doing exposure compensation - most cameras offer ISO 6 to 6400
3. Modern day flash electronics is a key part of today's state of the art cameras
4. Locking mechanism to prevent unwanted changes to your personal settings is nice to have but some find it to be fiddly and slows them down for changing settings
5. A silent shooting mode is helpful when you need to be more discreet and silent



Many people eschew the high-tech computerized autofocus SLRs of today and prefer manual cameras that do not require batteries to operate. If your eyes are in good shape and if your style of photography does not require autofocus and motor drives, a manual system can be a very methodical and involving manner of photography.

The best manual cameras can continue working for decades after first purchase and are often handed down from father to son/daughter.

The example here is a budget priced manual camera but for those who wish finer build and

mechanics, there is little to compare to the classic Nikon FM2 but for me, if I were to buy a manual camera today, it would be the Nikon FM3a.



Some people eschew SLR cameras altogether and prefer rangefinder cameras. Although this elderly Konica S2 is no Leica M6, it does work in similar fashion and is capable of excellent results thanks to a very good quality, fixed 45mm f/1.8 lens.

Rangefinders are very quiet as there is no mirror slapping up and down for each exposure. With no mirror to provide a pentaprism view, a side-oriented viewfinder is situated for composing. No mirror also means never having a split second blackout of the scene and wondering if your subjects blinked or moved during the exposure.

The rangefinder method of focusing is of moving two superimposed images together in the viewfinder - you are in focus or not for your subject. So long as your viewfinder is bright, as Leica rangefinders impressively are, you will be able to focus in low light too, unlike SLR cameras with their dim viewfinders.

Rangefinder lenses are also built with less compromises than SLR lenses due to the lack of need to accommodate a mirrorbox in a rangefinder camera. This allows rangefinder wide-angle lenses truly

superb as the designer has much fewer constrictions and they often knock the stuffing out of comparable SLR wide-angle lenses.



Don't forget to carry spare batteries for your cameras, especially autofocus and/or motor driven cameras. Always have at least one full set available for all your gear from cameras to flashes to meters.

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Photography e-Book Chapter 5 Subsection - Holding the Camera

You got your great camera and a few lenses to use with it but wonder about how to hold the camera and lens properly for the best images possible. There is actually only one way to ensure sharp images all the time with your camera, use a tripod. However, we cannot always have access to a tripod and use it whenever we wish to take photos, especially on the street. Proper handholding technique is vital to ensuring a high percentage of sharp images.

Be sure to use the rule of thumb of using a shutter speed equal to the focal length of your lens.

- 24mm lens should be used at 1/30 of a second
- 50mm lens should be used at 1/60 of a second
- 100mm lens should be used at 1/125 of a second
- 200mm lens should be used at 1/250 of a second
- 300mm lens should be used at 1/500 of a second to ensure your best chance at obtaining a sharp image, despite the nominal shutter speed requirement of 1/300 of a second - err on the side of conservatism with regard to your handholding prowess, as you become more experienced with the handholding technique, the better you will be at slower speeds

This is only a general guideline but it is one that I pay attention to and dictates what my aperture will be for the lens being used. I know from experience that my hit rate with a 200mm lens at 1/60 of a second is about 50/50 but the percentage improves as I move up in shutter speed and at 1/180 and faster, it will be more focusing error on my part rather than handshake that ruins a shot.

Below are a series of shots for proper technique. Thanks to my lovely cousin Tanya, for her modelling the various stances.



With the basic camera and lens, start with your left hand to cradle the lens and body as shown here. Your left hand is the one that actually provides the support instead of your right hand.



If manually focusing and/or exposing, the left hand and the cradle you create with it, provides plenty of support for focusing or changing apertures the old fashioned way via the lens.



After you have created the solid platform and cradle with the left hand, your right hand is merely the guide for the placement of the camera for landscape or portrait orientation,



After holding the camera correctly in the hands, bring the camera up to the forehead and press against the forehead to provide a stable shock absorber if you will, for the camera. Your head should be leaning into the camera at the same time as you are pressing the camera against your forehead.

Breathing is important too, especially at slow shutter speeds and/or with long lenses. Breathe in before the exposure and release your breath as you release the shutter. It is very much the same as firing a rifle in technique.



Your elbows should be brought into the body as tightly as possible to create a tripod of sorts between your two arms and your forehead. Practice this stance if you have a tendency to flap your elbows at your side like a pair of wings.

And for goodness shakes, avoid the dreadful technique used by those who don't know, of gripping the camera by the ends with your fingers instead the "manly" way of holding the camera as shown here :-)



A portrait orientation of the camera just means an adjustment of your right arm. Your left arm is kept the same, tight into the body and cradling the lens and camera while your right arm is the guide.



Using a longer and heavier lens is no different and is actually easier as the larger lens provides more to grip with for the left hand. In this instance your left hand is at the center of gravity of the lens and body. This will provide the most stable platform.

A heavier lens and camera combination can also be beneficial by providing more mass for your handhold. Of course, by a certain lens size, the benefit of mass loading is off set by the weight and bulk of the lens.



View of handholding the larger lens from the other side. Notice the elbows tight into the body to create the human tripod.



Your standing stance is also important for correct technique. Notice the left foot out to provide greater stability. This allows you to lean into the left leg while the right leg is back and provides the rigid support required.

Elbows locked into the body, head leaning into the camera, legs set correctly and we have as good a human tripod as we can achieve without other support accessories.

Practice makes perfect and good technique will improve your percentage of sharp images.

An important component of camera support is the strap. Small, lightweight cameras do not require a massive neck strap to support the weight but if your camera is large and weighty and if you have a few pro-calibre lenses to go along with that pro-size SLR, your neck and shoulders will thank you for the use of a neoprene strap as seen on the left.



This thick and well-supporting strap is from Op/Tech USA and is considered their deluxe strap. Op/Tech also makes a less wide strap but without the rubber grab nibs of the deluxe strap (seen below).

I use Op/Tech or similar straps on all of my main cameras, including one on the Yashica FX-3, which is so lightweight, it really does not need one. They are not inconspicuous but the comfort they afford is tremendous when carrying the F100 and 80-200mm f2.8 lens. It can be a bit bouncy if running or walking at a brisk pace but I cannot think of using any other type of strap with my cameras now, especially the ones using thin, non-stretch materials.



Here we see the underside of the Op/Tech deluxe strap and the rubber nibs that help to grab at your shirt or vest to stay put. Note the very wide middle section that helps to distribute the weight over a larger area than the near-useless nylon straps that come as freebies with other cameras.

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Photography e-Book Chapter 6 - The Lenses

All right, you bought yourself a decent body but now you need some glass to mount to that body and start taking some photos. What to buy, what to buy?

The old adage comes through again, buy the best you can afford but before you blow the kids' college fund on all those high tech lenses with built in motors and image stabilizers, ask yourself what are you going to be photographing? What compelled you to learn more about this hobby? What kind of images inspired you and moves you emotionally and intellectually.

If your thing is landscapes then you need not concern yourself with super long and fast telephoto lenses (400mm and longer) or ultra wide-angle lenses (wider than 17mm). In all likelihood, your basic focal length range will be between 20mm to 200mm and anything wider or longer than this range is a bonus but not wholly required. In fact, between this range and the technique you will need to obtain a sharp image, you will have to question whether 35mm format is even suitable at all. If you are honest about the question, you will discover that 35mm format is not suitable at all but that is for another section to deal with.

If your thing is wildlife photography and if you want to do it right with the best image quality then be prepared to dip into the retirement savings to buy some big, heavy, fast, and expensive glass. There just does not seem to be away around this as even third party lenses such as those offered by Sigma are still quite expensive.

There are some generalities about lenses,

- The best built lenses are found among the most expensive lenses
- The best optics are found among the most expensive lenses
- The fastest optics are found among the most expensive lenses
- If you want both fast and quality optics, be prepared to let the camera company have their way with you because they'll be shaking the coins out of your pocket the same way as the elementary school bully did for your lunch money (and it will cost you a lot of lunches to pay for a monster 600mm f4 lens).

In case you are wondering to go with zooms or prime lenses let me just acknowledge that prime lenses will indeed provide you with superior results in most cases but given the compromised nature of the 35mm format and its ultimate enlargement capabilities, the differences between zoom lenses and prime lenses is not one to be overly concerned about. If you were that fussy to eschew high quality zoom lenses over primes then you would be using something much better than the 35mm format, or at least you should be.

Some things to look out for in various types of lenses:



- **Wide-angle lenses** have a very wide field of view measured in degrees similar to your geometric protractor (remember the plastic half circle with numbers that measured from 0 to 180 degrees).
 - Wide-angle lenses have greater depth of field than normal and telephoto lenses and much of the time you could get away with shooting at the lens' sweet spot instead of stopped all the way down to the smallest apertures. The sweet spot is generally within two or three stops down from the maximum aperture. However, the mark of a truly excellent lens is one that provides you with excellent results wide-open, not just stopped down, a feature that Leica and Zeiss lenses are known for. Also how well the lens keeps light fall off in check, meaning the more even the illumination from the center of the lens to the edges, the better it is but sometimes even the best companies cannot overcome fall off with ultra-wide lenses such as the 14mm f2.8 types.
 - Wide-angle lenses are not just for obtaining wide vistas of a scene but also to get as close to the subject as you can while still providing something of the background to provide contrast or a relationship between the subject and background. Photojournalists use wide-angle lenses a lot for this relationship. Wide-angle lenses focus much closer than other lenses and this allows you to get very close, sometimes within inches of the subject but still allows you to place the subject within a context for compositional purposes.
 - Subject matter will look much smaller in the camera's viewfinder than with longer lenses due to the immense field of view BUT your perspective will remain the same if you stand in the same spot and take photos of the subject with longer lenses. All that changes is the magnification of the subject. What this means is that if I take a photo of something with a 20mm lens and then take another photo with a 200mm lens, all I have to do to get the same image from the 20mm lens as with the 200mm lens is to magnify the subject on paper or in the computer to the same size as the 200mm image. There is no change in perspective, just magnification. However, if I were to take the shot first with the 200mm lens and then moved in closer to the subject in order to get the same subject size on film with the 20mm lens, the perspective will be altered radically. Check out the [example images here](#) to see what I am talking about.
 - Wide-angle lenses can suffer from flare due to their large field of view, so use the dedicated lens hood for your particular lens. Unfortunately, lens hoods for wide-angle lenses are often little more than metal lips protruding barely above the front element. Learn to recognize flare and its effects so that you can use your hand, body or even a hat or jacket to block out the sun from your shooting position. Preventing flare can be dramatic in how much your image will improve. The use of a tripod and cable release will easily allow you to position yourself to block out the sunlight. I do this all the time when caught shooting in harsh sunlight with my medium format Bronica 40mm wide-angle lens (about 24mm in 35mm format) and its immense 95mm filter size negates the use of a lens hood. If you are in the habit of using protective UV or Skylight filters on your lenses, you should remove the filter from the wide-angle lens when shooting in the bright sun, as filters will exacerbate any flare problems you encounter.
 - Wide-angle lenses are NOT the preferred types for human portraiture unless the distortion is actually desired. Wide-angle lenses are often used for group shots in constricted spaces but the unfortunate byproduct of their use is that subjects at the edges of the frame will be spread out laterally while those in the middle will maintain correct perspective. If the space allows, use a 50mm lens for group portraits to minimize distortion
-



Modest amount of flare is seen in the top right hand corner of this shot



A simple shade with the hand blocks out the flare to provide a cleaner looking image

- **Normal lenses** in the 40 to 60mm range are a bit of a misnomer as they are not normal in any sense of the human eye's field or magnification of view. They are considered normal lenses because they most closely resemble the diagonal measurement of the 35mm film frame. The actual measurement is about 43mm but 50mm is considered close enough.
 - I have read various claims that the human eye sees from as wide as 16mm to as long as 28mm, so far as field of view is concerned but the centre portion of the eye that we pay attention to can be constricted from 80mm to 300mm (Reference: Thom Hogan's web site). As you can see 50mm is not within these focal lengths.
 - 50mm lenses do offer the least amount of distortion and in this way can be considered "normal" as they neither spread out the subject laterally as wide-angle lenses do or compress the subject as telephoto lenses do. A professional airplane photographer who contributes to the (new) Nikon Mailing List, states that he uses the 50mm focal length for exactly this reason when shooting airplanes with large portions of the wings in the frame. A 50mm lens keeps the wings in their proper perspective

and the photographer remarks that some aficionados who collect images of airplanes will reject anything not taken with a 50mm lens due to the distortion factor.

- The lack of distortion means that 50mm lenses will be perfect for full-length human portraits such as commonly done for weddings.
 - 50mm lenses are generally the cheapest of the prime lenses ((the f1.8 or f2 variant whereas the f1.4 and faster can be three or more times as expensive) as they are the easiest to design and manufacture because lens companies have been making them for so many decades.
 - 50mm lenses are generally the fastest available and are worthwhile to have if your thing is low ambient light photography. Canon and Leica have offered super fast designs and both currently have a 50mm f1 lens in their lineup. Canon has even offered a 50mm f.95 lens for their rangefinder cameras of the 1960s.
 - Despite the pooh-poohing of the 50mm lens as being boring and not particularly useful (and I dispensed with my own 50mm lenses sometime ago) I have found that I often use an intermediate focal length when using my 35-70mm f2.8 lens and guess where that intermediate range falls around, 50mm.
- **Moderate telephoto lenses** are the preferred choice for portrait photography and for good reason.
 - You can buy a very fast 85mm f1.8 lens for not too much more than a 50mm f1.4 type of lens. The extra 35mm gets you a more compressed perspective and this is a good thing for human portraiture. The fast aperture allows you to blow out the background when using wide-open apertures in the f2 to f2.8 range and this helps to separate the subject from the background for a more pleasing image.
 - The compression factor means that your subject's nose will not appear larger than it really is unless you wanted to make your mother-in-law look like the wicked witch of the east. Use a wide-angle lens only for purposely-distorted looking portraits - the closer you get the greater the distortion.
 - Moderate telephoto lenses in the 85mm to 105mm range are often times the sharpest lenses offered by a lens company, on par with the 50mm lenses. Nikon 85mm lenses are legendary for their sharpness, however some regard Nikon's 105mm f2, to be the finest that Nikon has ever produced. You will find similarly excellent lenses from the other major brands.
 - For portraits, you do not need to go past 135mm and even a 135mm may be too long depending upon your working space.
 - **Telephoto lenses** up to the 200mm range straddle a middle ground that is sometimes too long for portraits yet too short for wildlife. For the generalist and landscape photographer, this can be a wonderful range to work with as this range provides the Goldilocks-like just right range.
 - You will probably most often see this range covered by the 80-200mm lenses, particularly the fast f2.8 type. These are big, heavy, and expensive lenses to use but given how much they cover and the superb quality that accompanies most f2.8 zoom lenses, they are well worth the extra cost. This is probably my favorite range to work with for everything from general photography to landscapes.
 - There are some wonderful 180mm or 200mm prime lenses available from the major companies and they are considered superior to the 80-200mm zoom lens, especially wide open. However, the quality of the zooms can be so good that you have to consider whether you want to carry three smaller lenses or one larger one to cover the same range (and remember 35mm is qualitatively, a compromise format).
 - This is also a good range for macro lenses as the longer focal lengths provide greater working distance between the lens and the subject while still providing 1:1 magnification. Just be aware that 180mm or 200mm macro lenses are quite expensive in comparison to regular lenses and the shorter macro lenses.

- **Super telephoto lenses** are the stuff of wet dreams and hernias. Everyone wants one but so few really need one and fewer still can actually afford one. This is serious business and you had better have a passion for the type of photography these big bastards do best.
 - You will most often see these lenses on the sidelines of the sports field, used by the sports photographer. You are likely to see these men and women haul not one but two such artillery-like lenses along with some smaller lenses such as the 80-200mm for closer range shots (low-wage assistant to carry it all often in tow). Sports photographers fight for positioning on the sidelines but of course the play is going to be all over the field or surface, so long lenses are required to isolate the action. The choice of fast telephotos is twofold as it allows the photographer a faster shutter speed to freeze action while also blowing out the distracting background. The choice of lenses depends on the size of the field and how close the photographer is to the action. Football fields will see all manner of super telephoto lenses from 300mm f2.8 to the monster 600mm f4 whereas hockey may be shot comfortably with an 80-200mm f2.8 lens for much of the game.
 - Photojournalists may utilize long lenses to cover an important event as nowadays photographers are often pushed away from the staging areas of importance. Generally, though, 300mm f2.8 lenses are probably the biggest lenses used by photojournalists day in and day out as the 17-35mm and 80-200mm zoom lenses appear to be the most oft used lenses in their arsenal.
 - Fashion photographers often use long lenses for the same reason as photojournalists, because they have been pushed well away from the catwalks. Space is at a premium and you are neck and jowl beside the other photographers. You get there early to stake your turf and you stay there until the bitter end.
 - Wildlife photography is the other major arena (besides sports) for long lenses to shine and show their worth. Moose Peterson and Arthur Morris will never be without their 600mm f4 lens, as these photographers never seem to get enough focal length range. Right now Moose Peterson has the edge with his use of the Nikon D1 and its 1.5x magnification so his 600mm becomes in effect a 900mm f4 lens. However, these people do not always require big glass and will often use smaller and much lighter zoom lenses such as the Nikon 80-400mm VR or Canon's 100-400mm USM IS. These smaller lenses that max out at 400mm f5.6 seem to excel at capturing birds in flight.
- **Macro lenses** are used to magnify a small subject to various ratios of magnification on the film. Most of today's better macro lenses offer 1:1 magnification meaning that the subject is life size on the film surface, meaning a pretty damn good size enlargement. A few zoom lenses offer macro capability to as much as 1:2 ratio meaning half-life size on the film but generally, such capabilities are not of the same quality that dedicated macro lenses offer. The one exception is Nikon's 70-180mm lens that was designed to be a macro zoom lens from the get go and apparently suffers none of the compromises save for ultimate magnification ability, to single focal length macro lenses.
 - 50-60mm macro lenses are the most cost effective but also the most restrictive. Their performance for general subjects is somewhat limited as their optical qualities have been refined for extreme close focusing and not for infinity focusing that normal lenses excel at. However, in real world use, you may be satisfied with the use of 50-60mm macro lens as your standard lens too. Do be aware that these lenses are usually f2.8 maximum aperture types and you will not enjoy the near one-and-a-half stop advantage that a much cheaper 50mm f1.8 lens offers. The working distance for these lenses is also of concern as your subject is scant inches away from the front element. If you do have one of these lenses you will probably find it to be an exceedingly sharp lens as macro lenses are among the sharpest lenses made by a lens company and few macro lenses seem to be dogs, even from third party brands.
 - 90-105mm macro lenses are the compromise choice that many photographers make with regard to cost and working distance provided. The working distance can still be a bit short but it is usually double what is available from the 50-60mm macro lenses. Lenses in this range are much more reasonable than the big macro lenses and a third party lens, the Tamron 90mm, is very well regarded for optical performance and costs

much less than Nikon's equivalent 105mm Micro. One factor about these mid-level macro lenses that few know about is that the effective focal length of the lens decreases as you get closer to 1:1. The Nikon 105mm macro lens actually only offers a focal length of about 70mm at 1:1, which is not a whole lot better than Nikon's 60mm lens but you do get an extra 6 inches of working space with the 105mm. (Reference: Really Right Stuff catalogue)

- 180-200mm macro lenses are the biggest and most expensive but also provide the greatest working distance between you and the subject, something not to be taken lightly if your subject is a poisonous snake, skittish insect. or small animal.
 - Some photographers who carry big artillery into the field will also use the monsters as macro lenses with the use of extension tubes. Extension tubes reduce the minimum focusing distance of lens so that the lens can get closer to the subject. Telephoto lenses are the opposite of true macro lenses in the 50-60mm range that have too little working distance. The monster telephoto lenses have minimum focusing distances in terms of feet not inches but get closer with a tube and you can take advantage of the high magnifications offered by such lenses.
 - Extension tubes can be an affordable way to get into macro photography without the need to spend big bucks on a true macro lens. Kenko sells a kit of three tubes for modest cost and far less than what Nikon would sell its cheapest 60mm Micro lens. Just be aware that you lose light with the use of tubes as the added space reduces the amount of light traveling through the lens to the film. TTL metering is a Godsend when using tubes or teleconvertors to increase magnification.
 - The rule of thumb for extension tubes is that you need the same amount of extension in mm as the focal length of the lens being used for 1:1 magnification. A 50mm lens requires 50mm of extension while a 100mm lens requires 100mm of extension and so on.
 - Teleconvertors can also be used in conjunction with extension tubes to increase the magnification. For example, if you have a normal 50mm lens and wish to use it for 1:1 macro but only have the use of a 25mm extension tube, you could use a 2x TC mounted to the camera body first, then the tube, then the lens. The 2x TC "doubles" the 25mm tube to an apparent 50mm extension, which would then allow you to obtain 1:1. Just keep in mind that you will lose a lot of working distance and at least three stops of light when using such methods as the 2x TC robs two-stops and the extension tube also robs a stop meaning your 50mm f1.4 lens becomes a 50mm f4 macro lens. If you mounted the tube to the camera first, then the 2x TC, then the lens, what you will end up is adding 25mm of extension to an effective 100mm lens. If you did not get that, read it over again and work it out.
 - The closer you get to a subject, the less depth of field you have to work with and the more you have to stop a lens down in order to have adequate sharpness throughout the subject. If your subject is a still life shot indoors with no wind blowing around and buffeting it a like a mini-hurricane, then by all means use the very slow shutter speeds that the camera's TTL meter will calculate for you when you shoot a macro subject at f22. Otherwise, pull out your flash and blast the subject with a burst of light that runs in the tens of thousandths of seconds to freeze it on film. Use some care with your flash so that it does not create unsightly shadows on one side of the subject. Many pros use dual-strobe or specialized macro-ring light setups to blast the subject with even illumination. Others make sure a fill-light source such as a bounce card or disc is used.
 - Shooting outdoors in natural light can be problematic for the macro photographer. Using flash is not conducive for a natural look to freeze wildflowers and wind is the enemy of every photographer who wants a subject perfectly still for a shot with a slow, fine grain film.
- **Fisheye lenses** can offer some intriguing perspectives for everyday subjects. Fisheye lenses come in two separate flavors and adapters can be bought to attach to lenses to mimic the effect.

- There is the full frame fisheye lens such as the Nikon 16mm f2.8 or the Canon 15mm f2.8. These lenses cover a 180-degree field of view and can be used for regular landscapes or other similar uses when the horizon line is kept smack in the middle of the frame. Full frame fisheye lenses have no distortion in the center of the lens but pronounce the barrel distortion of the edges by curving the normally straight lines. These lenses cover the entire frame of the 35mm film, hence the term, full frame.
 - There are fisheye lenses that have even wider fields of view and can even look behind them and can capture the photographer in the scene if the user is not paying attention to everything seen in the viewfinder. These lenses are not full frame, meaning the image is a circle in the center of the film frame. These are big, heavy and extremely expensive with fields of view up to 220-degrees. The Nikon 6mm f2.8 fisheye sets the standard for all such lenses and is probably among the rarest current production lenses (actually, made to order only) due to its enormous cost.
 - Adapters can be bought to attach to lenses to mimic the fisheye look. The wider the lens used, the greater and wider the effect. I have such an adapter and when used on a 50mm normal lens, the effect is a mild version of what a 16mm fisheye lens produces. On a 24mm wide-angle lens, the fisheye adapter creates an effect similar to that of the more expensive, ultra-wide lenses, with a half-frame circle image on the film. The quality of these adapters is not very good so if you have one, use it for fun rather than for serious use.
 - **Tilt/Shift (TS) lenses** for SLR cameras provide the user with similar, if limited, control of perspective and depth of field, as a view camera. A view camera would offer far greater control but at greater expense, weight, and bulk. There are not many true TS lenses available for 35mm or medium format cameras and the ones that are, are usually quite expensive.
 - Canon is the leader in providing its users with three TS lenses of different focal lengths of 24mm, 45mm, and 90mm. Essentially, medium format sized optics mated to a 35mm sized lens mount to provide enough coverage to handle all the tilting and shifting.
 - Nikon has one TS lens at 85mm and two ancient 28mm and 35mm Shift only lenses.
 - Most of the other major companies offer some sort of shift lens but not full TS lenses.
 - If you shoot medium format and want tilts and shifts then your choice is a bit better but it will cost you dearly especially if you actually want to buy the Schneider TS lens for the Rollei system. Hasselblad has a couple of options but apparently one of them, the Arc Body, is being phased out meaning having to live more limited options from the largest medium format system, such as the less versatile Flex Body or the Mutar Shift teleconverter.
 - TS lenses for SLR bodies are a very small market so a lot of companies prefer not to spend R&D money to develop and produce such lenses. I would love to have a TS lens available for my Bronica but unless I can find some extremely rare and almost mythical Schneider TS lens made for the SQ body back in the days before the Tamron buyout of Bronica, I have no choices available. Even third party companies making TS adapters ignore Bronica bodies but in actuality, it probably has more to do with trying to create a lens shutter compatible adapter as most of the adapters are for focal plane shutter cameras. The third-party adapters for Hasselblad bodies are for the focal plane series and not for the more common 500 series lens shutter ones.
 - If your thing is for landscapes or architecture, a company offering a good TS or at least a Shift lens should be given prime consideration.
-



The basics of a lens

- 1 - Focusing ring
- 2 - Focus distance window - the ∞ symbol that looks like a sideways 8 is the infinity indicator
- 3 - Depth of field markings
- 4 - Aperture ring - some companies' lenses do not have the old style and mechanical aperture ring in favor of a wholly electronic interface, Canon and Minolta being the two main ones. Nikon has chosen a hybrid lens mount to allow the use of mechanical and electronic linkages for maximum

versatility in its vast lens offering.

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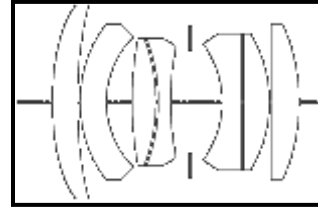
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Photography e-Book Chapter 6 Subsection - Lens Technical

I commented on some basic types of lenses and how or why they are used for different types of applications but what of the lens itself? At the risk of overlapping some other sections of this e-book project, I will try to provide some rudimentary basics about the lens.



This is pretty dry stuff to work through and understand and truth be told I never bothered to until I decided to do this project. It is insomnia busting material, especially when looking at equations and I assure you that I still wonder how I got into university with my math grades. If you can slog through the reference material I link to at the end of this chapter, you will actually benefit in understanding a little of what an optical engineer and designer has to take into account to create those wonderfully sharp lenses in our camera bags.

The aficionados of fine lenses often use MTF charts to get a measure of a lens's characteristics but for me and others who are less technically inclined, the results on film are what count.

History

The first lens was not even a lens, as we know it now but actually a hole in the wall, specifically a pinhole camera also known as a camera obscura. This pinhole camera goes back to ancient times when it was discovered that light passing through a tiny hole would project an image of an object that light passed by first before entering the pinhole. The light was projected in a dimly lit or darkened room; yes, camera obscuras were huge room sized projectors.

With camera obscuras, there was the recognition of what the subject was but not a whole lot of definition or resolution to the subject. This changed when the camera obscura had an optical lens placed in front of it, around 1550 AD. Now definition of the details of subject were detected but it would be hundreds of years later before a viable means of capturing the image in permanent form would be developed in the 19th century with the Daguerreotype in 1839.

The physical properties of light were not developed until around 1000 AD, by an Arabic physicist, Ibn el-Haitam. With the properties known, development of optical lenses progressed so that by the time the Renaissance era was in full bloom, microscopes and telescopes were being used by the leading scientists of the time. By the time Daguerre came up with the idea of bringing together optical lenses with a relatively portable camera box and light sensitive silver salts to permanently record the image, a whole new means of expression was born and a new art form was created.

The latter 19th century saw significant improvements in optical lens production but the real golden era was in the first half of the 20th century when two venerable German optics companies gave the world the first usable cameras using the 35mm film format. Carl Zeiss (Contax) and Ernst Leitz (Leica) had some remarkable scientists working for them during this early stage of the 35mm format camera.

Lenses in this era were/are capable of fine image quality but they were plagued with some problems that all optical companies had to contend with,

- Slow film and slow lens designs made for difficult handheld photography, which is the whole point of the portable 35mm format
- Faster lenses were developed but they suffered from severe flare problems with backlit and side-lit subjects - keep the sun behind you was the rule of thumb for photographers back

then

- Complex lens designs to combat distortion and other optical anomalies were unworkable due to the flare problems
- Very simple lens designs were favored such as the venerable four-element Zeiss Tessar (still popular and in use today)

These and other problems were not resolved until the lens coating process was developed, which allowed optical designers to work with more complex lens designs to correct the problems in the favored simple lens designs.

With the lens coating process in place, the differences between old classic lenses of the 1940s and 1950s are considered minimal to those of the current era. Of course, we have had some meaningful progress since the first half of the 20th century. Such improvements as the multi-coating process (apparently co-developed by Zeiss and Pentax, T* Coating and SMC respectively) and the computer aided design of lenses has made for enough improvements that even Leica considers its modern designs to be superior to their old ones.

If you are the proud owner of elderly optics (1960s and 1970s) from companies such as Nikon, Canon, Olympus et al, and if they are in good shape, there is no need to get rid of them. Proper technique with your present equipment will often be more meaningful than an overhaul of the kit. Consider that my Nikkor 35-70mm f2.8D AF lens is getting old in design and upgrades to it have been more about features such as auto focus and Nikon's "D" chip rather than optical improvements. This lens dates from 1987 but is still considered to be among the best zoom lenses produced by Nikon and holds its own against the Nikkor 28-70mm f2.8D AF-S when comparing Photodo's ratings. The 35-70mm is still being produced in parallel to the 28-70mm and at less than half the price of the motorized lens 14 years after being introduced.

Modulation Transfer Function or MTF

MTF graphs can be a difficult process of understanding optical theory. This is hardcore technical data used by lens designers to formulate the compromises inherent in optical design. Improvements are made on a regular and gradual basis but we still live in an imperfect world and building the perfect lens is not possible at this time if ever.

We want a high level of resolution and a high level of contrast. Resolution refers to how well we can detect all the fine details on film but contrast refers to how well we can define the boundaries of similarly toned subjects at a micro level.

Humans being greedy by nature want the perfect lens with 100% resolution and 100% contrast but this is impossible and so the trick or art is how well the lens designer compromises to achieve the result photographers find pleasing.

The basis of measuring resolution and contrast is via closely spaced pairs of black and white lines. One black line and one white line equal one line pair and how many of these pairs can be resolved by the lens is taken as line pairs per millimeter or lp/mm. The more lp/mm a lens can record, the better its resolution. The greater the ability of the lens to differentiate the lp/mm at the micro level, the better its contrast. Resolution and contrast may sound similar but they are actually different and the physical representation of this is the MTF graph.

Another way of describing the MTF is that it represents just how much of the subject is actually resolved by the lens on the film, the loss being represented by the MTF graph. On the MTF chart, we have an X and Y grid box with both starting from the same 0 point at the lower left corner of the box. The 0 and extreme left vertical line represents the center of the film where resolution and contrast should be the highest and as we follow the measurements outwards towards the film edge, this represents how much resolution and contrast drop off.

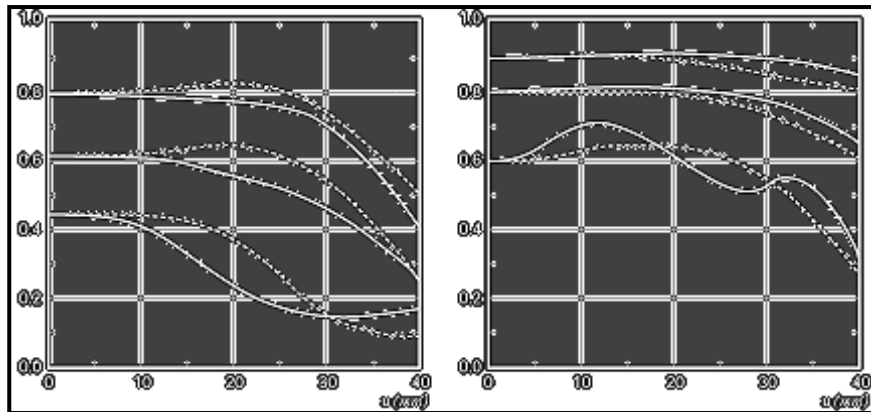
The X coordinates are horizontal and measures resolution. The closer it is to 100, the better the resolution in lp/mm.

The Y coordinates are vertical and measure contrast. The closer it is to 1, the better the contrast.

There are usually two graph lines that are shown in a MTF graph, one solid line and one dotted line. The solid line refers to sagittal and the dotted line refers to tangential measurements. I will be honest here and admit that I am still trying to grasp just what the differences between sagittal and tangential measurements are. What I can tell you is that you do not want to see a MTF chart in which there are sudden drops in the lines resembling a waterfall that either bulges inwards or bulges outwards.

An inward bulging line indicates good resolution but poor contrast. An outward bulging line indicates good contrast but poor resolution. What you want to see is a gentle drop off for the contrast as you move further outwards on the horizontal X scale.

For fast lenses it is likely that you will see more sudden drop offs at wide open apertures than for when the lens is stopped down to middle apertures. It takes a bit of time to try and understand what a MTF graph is telling you but one thing to look out for is how closely the solid and dotted lines are to each other. The closer they are the better the out of focus elements of the image will be whereas the



farther apart they are, the harsher the out of focus elements will be and will indicate some astigmatism in the lens design. Note though that astigmatism for optical lenses is not the same as astigmatism for human eyes. Optical astigmatism has to do with off-axis focusing problems of the lens whereas human astigmatism has to do with on-axis focusing problems. Not that this really matters all that much in the whole scheme of things like trying to end world hunger and bring about world peace but some people care about this stuff.

A good lens should have high contrast (Y) going far out along the X coordinates. Contrast falls off as you try to resolve ever more detail as the "noise" between the lp/mm will make it harder for the lens to distinguish between the lines.

MTF charts are a good place start to get a measure of a lens but they are not conclusive in actual real world use. MTF charts are usually given for two apertures only, wide-open and one stopped down to a middle aperture and usually at infinity. To get the full measure of the technical aspects of lens you need dozens of charts at all apertures and at varying degrees of focus from close up to middle values to infinity. This is not practical obviously but what we want to see is consistency from the lens company for their choice of compromise between excellent contrast and excellent resolution.

To be quite honest, it would be hard to believe that any reputable lens company would turn out any dogs these days, outside of their lower end consumer-oriented products. Purchasing a lens from a company's top range pretty much guarantees you an excellent piece of glass no matter what the brand name. It is just a matter of flavor and which company's you prefer for your use. Does this mean all lenses are equal in resolution and resolving power? No, but are the small differences worth the extra cost for you? Having said that many people appreciate that companies such as Leica and Zeiss do not compromise on any of their lenses and none can be considered less than professional in build and quality produced, unlike the Japanese brands that do build consumer lenses to obvious price points.

Diffraction

F8 and be there, is a common refrain heard by amateur photographers starting out in photography but why f8?

When early optical scientists were discovering the various properties of light, it was discovered

that light passing through a small hole produced sharper looking images than from light passing through a large hole. However, there is a limit to how small the hole can be before a nasty artifact known as diffraction rears its ugly head and counteracts the sharpness of a small hole.

Diffraction occurs when light waves (and light does travel in waves) travel through a small hole and the light near the edge of the hole becomes bent. In photographic terms, the hole is the aperture or diaphragm and the smaller the aperture the more diffraction plays a role in masking the sharpness of small aperture settings.

I have taken test shots from wide-open to fully stopped down. I found that as I went down the lens stops, the images improved and reached a maximum resolution by f5.6 or f8 and then gradually went down in quality as I moved further down the aperture scale. By the time I reached f22 and then compared it to f2.8 (on a Nikkor 80-200mm f2.8 lens), I found them almost identically poor in resolution compared to what I received with the mid-level apertures..

The loss of resolution from f11 on down for the 80-200mm lens is a result of diffraction as the light waves at the edges are bent more when they pass through the aperture. The light at the edges become softened and are added to the unaffected light waves, the smaller the aperture, the more softened-light is added. This softening effect occurs whenever light travels near a hard edge, as aperture blades are.

There are other reasons to use moderate apertures instead of wide-open. When the diaphragm is fully open, the entire lens surface is used and the slight imperfections of the glass can cause problems. Stopping down a lens allows the use of smaller portion of the lens surface and produces higher quality results. Stopping down to middle apertures can also alleviate other factors such as light fall off.

In theory, if you could build a lens with a diaphragm that had a setting of "0", you would obtain zero diffraction and 100% contrast. In reality, it is very hard to design and produce lenses of exquisite quality at fast, wide-open apertures even without shooting for the unattainable f/0. Lenses that can perform as good wide-open as they do stopped down are also exquisite in price, read Leica optics.

Other Problems Afflicting Lenses

- Distortion** - The mark or a good of lens is the how well controlled the distortion is at the film plane to that of the subject in reality. This is another situation in which how well a lens performs at the edges will mark it as being one of heavy or low distortion. Positive distortion is known as pincushion type, in which the straight lines at the edges bow inwards, as if being squeezed whereas negative distortion is known as barrel type, in which the edges bulge outwards, like a...barrel. Zoom lenses often suffer from barrel distortion at the wide end of the lens and then suffer from pincushion type at the long end. The ubiquitous 80-200mm is an example of such distortion changes when zooming in and out on a subject. You do not even need to shoot film to see this, as the camera's viewfinder will reveal the distortion quite well. Of course, viewfinders themselves suffer from distortion too.
- Flare** - is often taken for light that is bounced and reflected off of the front element and causes light streaks or prism like distortions on the film. The closer we get to having the sun in the scene, the greater the risk of flare. Flare can also be looked at in a different but still associated manner. When light enters a lens and then finally hits the film to create an exposure, the light travels through all the glass (or plastic) elements and groups of elements. If we consider the light before entering the lens to be at 100%, the light hitting the film will be less than 100% due to the light having to travel through and ultimately having some reflected by the lens elements. The higher the percentage that makes it to the film, the superior the lens will be. Some of the lost percentage of light will still make it to the film but out of phase with the main waves of light and that is flare. Dealing with flare is a double edge sword for an optical engineer. Try to minimize flare and the engineer has to deal with a myriad other optical problems. Add more elements and groupings to a lens to correct the problems and the more flare is induced into the equation by virtue of all the extra surfaces the light has to pass and reflect off.



An example of light flare with prism effects



An example of heavy flare with overdone prism effects

- **Curvature of Field** is when the center of the lens is in focus and the edges of the lens are out of focus or vice versa. This has to do with a lens trying to capture a 3-D object and projecting it onto a 2-D plane, the film.
- **Spherical Aberration** is when light entering a lens's center is focused at a different distance than light entering the lens's edge.
- **Coma** is when a point source of light that is off center from the lens, becomes elongated to an extent when captured on film. The elongation resembles a comet, hence the term "coma".
- **Chromatic Aberration** occurs when different wave lengths of light (red, green and blue) are not focused at the same point by the lens. The result is color fringing, usually seen in highlight details. The use of Extra-low Dispersion glass (ED elements) allows the wave lengths to be focused at the same point and prevent the fringing from occurring. Chromatic Aberration is usually a problem with telephoto lenses when shooting film, which is why until very recently, ED glass elements were only seen on telephoto zoom and prime lenses. However, with the increasing popularity of digital cameras being used by professionals and well-heeled amateurs, new problems specific to digital capture arose that also created chromatic aberration and ugly color fringing in images (green and purple being the most common). It is my belief that lens makers have chosen to use ED elements in as many new lenses as possible so as to minimize the fringing due to ED glass being better able to focus light tightly for digital capture. A few people scratched their heads wondering why Nikon would incorporate ED elements in such lenses as the 17-35mm AFS, 18-35mm, and 28-70mm AFS lenses when the predecessor lenses did not and showed no problems on film. Nikon was thinking ahead with the research done on digital capture and its specific lens requirements.

Have you stayed awake through this chapter? Obviously, these comments are very basic from a person trying to understand and explain them to the best of his abilities. If you want to read the actual material I used to write these comments, they are below.

References - this section has been heavily influenced and in some parts, merely regurgitated, by a few articles on the topic of optical theory and history. In particular,

- [Photodo's](#) series of articles on lens theory and how to read MTF graphs. Articles by Lars Kjellberg, Peter Hennig and Hiromasa Ohehara provide an understanding of lens basics.
- Mike Johnston's article, [Understanding Lens Contrast and the Basics of MTF](#), published on the Luminous Landscape website.
- David Jacobson's [Lens Tutorial and Lens FAQ](#) on the Photonet website, are also detailed in lens theory but although Mr. Jacobson considers his articles to be basic, they are still tough

reading for laypersons such as me.

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Photography e-Book Chapter 7 - Tripods and Heads

If you have done some reading of photography books and other photography web sites, I am quite certain that you will have come across the maxim that a good tripod and head are the next most crucial pieces of equipment to own. Actually, that depends. If your photographic style is more towards street shooting and photojournalism/documentary styles, then I do not think you are going to much like carrying a 7lb tripod and head combination with you all day. Same goes for the wedding photographer taking candid shots. However, if you are a stickler for sharpness and maximum quality for enlargements then you better damn well get the best tripod and head you can afford.

There are several manufacturers of tripods but you will most likely hear of two companies most of the time, Manfrotto and Gitzo. If you are swimming in cash from short-selling the high tech stocks on NASDAQ then just go ahead, buy the carbon fiber Gitzo tripod and Arca Swiss ball head, and be done with it. If you still have to suck up to the boss everyday and live within modest means then buy a Manfrotto.

Manfrotto tripods are very good tripods for the money but only up to a certain size. There are three models I am familiar with, the 190, 055C, and 075. For American readers you will have to translate the Manfrotto model numbers to Bogen numbers. Some points about Manfrotto tripods:

- They have among the best leg releases with quick flip levers to lock or release the legs. They even have a model that will release all the legs at once but convenience comes at a price. The release levers are made from plastic which will limit the ultimate load bearing capacity of the Manfrotto tripods.
- The larger the tripod you want from the Manfrotto line, the more monstrously huge it becomes and worse, the heavier it will weigh. Manfrotto tripods are made from aluminum alloy but they seem less sturdy than Gitzo tripods for the same size and weight. Hence, the leg tubes have to be much larger than comparable Gitzo legs in order to support a given weight.
- Stick with the smaller to mid-sized tripods and avoid the ones with the center struts that splay out. The 075 is a major pain in the butt to deal with in this regard. Every time an adjustment is required in positioning, not only did the main leg release require adjustment but so too did the center struts. Did I mention the 075 is a pig to haul into the field? It is twice the weight of the 055C for twice the load bearing but it is far surpassed by the Gitzo 134x series of tripods for weight to load ratio.
- The overall best tripod from Manfrotto is probably the 055C because it can handle reasonable loads up to about 12 lbs but is not particularly heavy and it can be raised high enough so even people 6 feet and taller do not have to stoop. The 055C is not particularly expensive either at around \$175 CAN and it is probably the best selling tripod in North America with constant references to it by amateur photographers in their equipment bios.
- If you are pushed for money and only have a lightweight 35mm kit then buy Manfrotto's 190 tripod and be happy. This tripod combined with a small quick-release ball head such as the Manfrotto 352RC, can happily accommodate a lens the size of Nikon's 80-200mm f2.8 attached to a moderately sized body such as the Nikon F90x or F100. I would NOT try to support a 300mm f2.8 lens on these small legs and ball head though, despite the theoretical load bearing being capable of it. I always like to leave room for comfort and big 300mm lens on the 352/190 would NOT make me comfortable at all. Even the larger 055C would be questionable with such a large lens on it.

Gitzo tripods are well known among the



professional and serious amateur markets. Their sturdiness and long-life reliability is legendary with the moniker, buy a Gitzo for life. They are also depressingly expensive and even an average tripod in the Inter Pro Studex line can set you back a good chunk of change but it is all in perspective.



- If you buy aluminum Gitzo tripod and if you have chosen it with care and future needs in mind, then buying for life can be a very real possibility.
- Gitzo has many, many models of tripods to choose from with five major groups. Each group is based upon the largest diameter of the tripod legs.
- If you can afford to look at a Gitzo then you should not be overly concerned about cost so buy the one best suited to your requirements now and for future use if you have visions of 600mm f4 lenses in your head. I personally have many visions of large, fast super telephoto lenses in my head but my bank account provides a slap across the face for a reality check. I also do not need a super telephoto for the images I like to create and can therefore live with a mid-level Gitzo from the 134x series. However, your future 600mm f4 lens will require at the least, a tripod in the next series up, the 14xx and probably in the 15xx series for maximum stability.
- Gitzo tripods are quite stiff to spread apart compared to Manfrotto tripods but this is a good thing actually, as you do not want a tripod to be easily splayed or compacted, especially when heavy loads on sitting atop of it.
- Gitzo tripods require the user to pull a tab outward to spread the legs apart and this is not exactly the easiest thing to do even in warm weather without gloves on your hands. Just accept it as part of Gitzo's desire for sturdiness.
- Most Gitzo tripods come in models with and without center columns. A center column is not necessary unless you happen to be as tall as Shaquille O'Neal and even then, he could just buy a 15xx tripod that can go as high as 10 feet tall. Do not bother with a center column, as it will allow you to get down very low to the ground for macro photographer and new perspectives.
- Many Gitzo tripods also have the option for three or four sections per leg. The more sections per leg, the shorter the tripod can be compacted to but be aware that compactness comes at the cost of stability. I chose a four-section tripod for my own use because I favored compactness for packing with my backpack over the last little bit of rigidity from the tripod. My four-sectioned Gitzo 1345 is still well within comfortable tolerances for load bearing my heaviest equipment.

Carbon fiber tripods

If you thought Gitzo's aluminum tripods are expensive, just look at the price for their carbon fiber models. Even the cheapest 12xx series is still nearly a \$1000 in Canada and the largest 15xx series will set you back \$1500 CAN, about a \$100 per kilogram of load bearing on top of the high tech material. There are other makers of carbon fiber tripods but these tend to be in the lower end range in price and load bearing.

- Manfrotto has a couple of models to choose from at prices a little less than Gitzo's 1228 model. I would spend the extra \$100 and just buy the Gitzo instead as the Manfrotto does not seem as robust as the Gitzo (my opinion only of looking over and handling the tripods in the store - not from actual use).

- Slik and Mamiya also have carbon fiber tripods but I have not seen let alone handled them.
- If you require a tripod with lightweight qualities but with superb load bearing then there really is no choice but the Gitzo 13xx or 15xx series. Many nature and wildlife photographers have taken these two series of Gitzo tripods for use with their big lenses or medium and large format systems.
- Ask yourself if you really need a carbon fiber tripod. My 1345 tripod is 2.8kg in weight for its 10kg of load bearing compared to 2.2kg and 12kg for the 1348. Is 0.6kg and 2kg really worth more than double the cost over an aluminum tripod? I decided it was not and went for the classic metal Gitzo tripod. It does not stop me from continuing to desire a carbon fiber tripod but I will not put my money where my desires are in this case.

Although Gitzo and Manfrotto are the two most popular brands for photographic tripods, there in fact many other companies to choose from, some offering unique capabilities. If you have the opportunity to view and demo these products, do so. Just because a company has the biggest distribution network, does not mean the products are the best. Manfrotto and Slik probably have the biggest dealer network in Canada but I think most would acknowledge Gitzo tripods as being superior overall.

There are also tripods made from material other than metal or carbon fiber, such as wood. Wooden tripods are a rare sighting these days and in the days when they were more widely used, you would have seen a large format system sitting atop of it. Ansel Adams working his big cameras on wooden tripods is a classic image of this bygone era.

Wood is known for its superior vibration channeling properties over metal. When vibration is a problem, there are two main ways of dealing with it, dampening or tuning. Dampening involves the use of mass to minimize vibration as much as possible. Using high-end hi-fi equipment stands as an example, some models use hollow tube construction for the frame but allow for mass-loading with sand or metal shot to make the stand as heavy as possible. Some stands weigh 500lbs or more once they have been mass-loaded. The equipment itself can also be mass-loaded with weights sitting on top of them to further dampen vibration or resonance in the chassis. The idea is to dampen the vibration to such a low level that it no longer embellishes itself upon the audio signal.

That would be the idea with massive metal tripods, to create such a large mass that vibration is pushed way down in levels to not inflict any loss of sharpness on the image. However, note that I never mentioned the elimination of vibration. Some believe that vibration is not something that can be dampened away but can be tuned down with a lot less effort than mass-loading.

Using another audio example again, speakers are sometimes very large and heavy and hence have a lot of mass. That mass, even for 500lb speakers still does not eliminate unwanted vibration or resonance and spikes are recommended for tuning the resonance and vibration to an even greater mass, the floor of your house. You will also note that most stereo speakers are made from wood products. This is because wood offers the best cost effective compromise over other materials for helping to tame most (but not all) of the speaker's vibration. Gitzo tripods even have spikes to help with this although the main reason is to couple the tripod more firmly in soft ground.



My educated guess about wood tripods is that they act similarly to channel or tune vibration from the camera equipment to the tripod and ultimately to an even more massive entity, the ground the tripod is sitting on. However, there are also some very massive wood tripods and are not particularly practical in the field for most people.

Whatever your tastes or needs from a tripod, get a good one and even if that tripod seems to cost an arm and leg, just be aware that you may well be using it the rest of your photographic life.

Tripod Heads

These companions to tripods come in two flavors for photographers, ball heads and pan/tilt heads (pan heads). Both have their place on top of a photographers tripod but for your first one, buy the type of head that will most fit in with what you wish to photograph.

The consensus is that ball heads are more flexible for all around use than pan heads, and especially for nature and wildlife photography, you will most often see heavy-duty ball heads in use. The king of ball heads is Arca Swiss. Arca Swiss designed their elliptical ball head decades ago and has merely refined the basic design over the years. It is the ball head that all others are compared to. It is also atrociously expensive, costing more than most photographic tripods but just as with some tripods, you buy for life, so to the Arca Swiss ball head.

- Arca Swiss has an excellent reputation thanks to their vice grip-like clamp that secures the quick release plate like no other system available. It is a much-copied design with [Kirk Enterprises](#) being one example of a third party manufacturer of the venerable Arca Swiss B1. The Kirk head is well regarded and used by many pros. Kirk makes their adapter plates for the quick release system but the best plates are made by Really Right Stuff. Kirk plates are a bit more generic whereas RRS makes plates specific for the body or lens you use. **Update** - Kirk has improved their product line in recent years and now their products seem to be the equal of Really Right Stuff products, in fact the two companies seem to copy each other with similar products.
- As mentioned, the Arca Swiss ball head is not wholly round but is actually elliptical. This design is a blessing as well as a curse for some as the design allows the ball head much stability in handling heavy loads but is also the cause of the infamous lockup of the ball.
- There are reports of the Arca Swiss B1 head (the one that most refer to) as being capable of handling up to 90lbs loads. In theory perhaps but most users of big lenses would agree that the B1 is not up to the challenge of handling a 600mm f4 lens with any pretense to obtaining consistently sharp images. 600mm f4 lenses typically weigh in at 14lbs and if the B1 cannot provide sharp results with that much weight, how on earth do you expect it to handle five times that much weight?
- Also, consider that the 90lb theoretical load capacity is only for when the ball head's clamp is upright and probably only in the dead center of clamp. Imagine how massive your tripod would have to be in order to support 90lbs if the ball head were flopped onto its side. Ignore the 90lb capacity bovine excrement and keep in mind that the real world load capacity of the B1 is probably a 500mm f4 lens.
- Users of the 400m f2.8, 600mm f4, and larger lenses prefer the larger Arca Swiss B2 or B1G. The B2 is a unique design that can be described as a ball head within a ball whereas the B1G is a giant version of the B1.
- It seems like vast majority of the professional nature photographers use an Arca Swiss head on top of a Gitzo tripod. There is good reason for this so think about the reasons why before blanching at the price required for your own rig.

Contact [Really Right Stuff](#) for their catalogue, which includes lots of information about ball heads and tripods as well as other photo tips.

There are of course other makers of ball heads and Manfrotto is a leader in this field too. Studioball, Giotto, and Gitzo are some other known brands of ball heads but I am not familiar with their offerings. Manfrotto use to be an also ran to Arca Swiss for quality ball heads as Manfrotto heads were massive designs for strength but two factors made them less favorable to photographers.

- The Manfrotto quick release system uses several different sized and shaped plates, utilizing a spring loaded locking system to secure them in. This release system is actually very fast and easy to use but simply not as secure as the Arca Swiss vice grip clamp.
- The smaller plates do not provide much confidence in handling large and heavy loads as

they use a cork pad to keep the plate secure without a safety lip. The lack of a lip means the camera or lens can slip and become insecure if you have not applied enough torque to keep the plate on.

- The larger hex plates are too big for pretty much all 35mm bodies and again, the lack of a lip makes slippage a constant risk. John Shaw use-to-use Manfrotto products and custom modified his hex plates to provide a lip. I am not sure if Manfrotto has corrected this and offer a lipped version of the hex plate or not. An expensive option is to buy Kirk's Manfrotto to Arca Swiss adapter, which is a heavy-duty hex plate with an Arca Swiss style clamp mated on top of it. Not perfect, as it is still a two-piece design but nice to have if you wish to convert a Manfrotto head to the superior Arca Swiss system.
- The other major problem with Manfrotto ball heads is that their choice of material requires thick grease to lubricate the ball and the well so they do not stick. This means gumming up of the ball head out in the field and eventual drying out of the lubricant necessitating a service call to apply new grease if you do not do it yourself.
- Manfrotto has attempted to compete against Arca Swiss in a serious way with a new line of ball heads. They are massive heads and use self-lubricating materials, however, their quick release system is still based upon the old system and is still the critical weak point in the head. If the Manfrotto quick release were easy to disassemble then replacement with an Arca Swiss clamp would be a nice upgrade.

Pan/tilt heads are not favored by nature and wildlife photographers because the long handles get in the way for packing and can be caught up in bushes and branches. For general-purpose photography pan heads are actually superior to ball heads as pan heads offer more precise placement of the camera/lens in relation to the subject. Pan heads can really come into their own when doing macro photography in which tiny increments of placement changes can result in major compositional changes. I use to own two pan heads and although I do not miss the smaller and cheaper pan head, I do miss the larger and more brutish head. Both were from Manfrotto and I had even gone to the expense of buying the ridiculously expensive Kirk adapter to convert the hex head to Arca Swiss quick release.

The 229 3-D Pro head is massive and weighs a reassuringly solid four lbs. This head was so well built it could easily handle a large format system and placing my medium format system on top was nothing to it. I am confident this head could handle a 500mm f4 lens with ease if not a 600mm f4 but the hex head system would not be how I would choose to mount such big lenses.

Where I do really miss the 229 head? When I shoot portraits or weddings in which control of camera and lens axis are so much easier to do than with a ball head, even one as good as the Arca Swiss. The 229 have two built in levels to easily allow for correct orientation. With the ball head, I always have to carry around a hot shoe spirit level to ensure correct placement of the camera. In addition, when a medium format body with its laterally reversed waist level finder is used on a ball head, it can make for pretty disorientating viewing. The ball head's positioning versatility works against itself in more prosaic shooting sessions.

Dedicated sliding macro platforms with ruler measurements are available for ball head users. They are an expensive accessory but are available from Kirk Enterprises and Manfrotto.



What makes the Arca Swiss the king of ball heads?

1 - Arca Swiss quick release plates have safety lips that prevent slippage - the best plates are from Really Right Stuff and Kirk Enterprises

2 - A vice-like grip on the quick release plate makes for a very solid clamping action to secure the plate

3 - A massive ball head that does not require external lubricants to keep the action smooth

4 - Not marked out in the image but on the side of the main release knob is a small tension dial that controls the amount of drag allowed when the main release knob is loosen

5 - Absolutely solid construction that provides much satisfaction and confidence

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Photography e-Book Chapter 8 - Camera Bags and Packs

You have bought yourself a nice kit with a good body and a complement of lenses suited to your personal style. Although you gratefully accepted the freebie camera branded shoulder bag from the store clerk, you are finding that,

1. The camera brand bag makes you look like a dork or worse yet, a dorky tourist just ripe for plucking by the seedier citizens of your city, looking for quick cash to feed their drug and/or booze habits.
2. The freebie bag is too small to comfortably hold all the equipment and accessories you have accumulated since you first walked into the photo store.

Do yourself a favor and invest in a good camera bag, case, or pack before you are plucked or break something. I know of one person who has bought himself a decent Canon-based kit but continues to use the freebie bag he received when he did his first major purchase. The branded bag does not even have Canon on it (Pentax) and is so small that he packs his flash in between the hand straps on top of the bag. I suppose he figures the thin leather case for his flash will somehow guard against a drop on a hard surface. No mishaps have occurred but to save himself a piddling amount of money, he has decided to eschew a superior case from Lowepro, Tenba, or any other quality company. An accident or incident waiting to happen and yes he does look like a dork carrying around that cheesy case.

Your choice of camera case is dependent on your style of photography. There are cases and packs for just about every style there is. The best ones are made from very thick ballistic nylon (the classic Domke differs with the use of heavy duty canvas) that offer superior resistance to scuffing from branches and shrubs, throwing around in a car trunk, or the occasional downpour. There are several companies offering good products but the largest and most consistently excellent company is [Lowepro](#) (and I'm not saying that because I'm Canadian and Lowepro is Canadian-owned, eh).

- o Street photography needs are met by Lowepro's Street and Field system of products from shoulder bags to vests to combination backpacks and utility belts.
- o Serious field photographers choose from Lowepro's Trekker series of backpacks.
- o Location shooters tend to go for the Pro-Roller series or the Magnum series of cases.
- o For everyone else, you can confidently find a Lowepro case or bag to suit your own needs.

Having praised Lowepro for their wonderful products, I will admit that I have yet to find the ultimate case or pack but their Street and Field system may come the closest yet. When out in the city doing handheld photography my Street and Field Reporter 400 shoulder bag is what I normally use but even with a modest amount of equipment (35mm or medium format) the weight of the bag will eventually tear at my shoulder and wear me down. Although my shoulder will ache after several hours of supporting the bag, my back is also where the stiffness will surface the next day.

Some users prefer adding a waist belt to their shoulder bags to help take the weight off of the shoulders and to distribute it to the waist and legs. Galen Rowell was probably the first to have marketed this idea in a series of bags bearing his name. Lowepro's Street and Field system adopts the idea by allowing a thick and generously sized waist belt to be incorporated with their shoulder bags. Lowepro's Street and Field will even allow you to create a military style harness system in which small bags and pouches can be added as you need. Note though, you WILL stand out in a city environment with such a system on you as most street shooters and pros prefer a photo vest instead.

Ah, yes, the photo vest, an accessory that every photographer should own for its versatility. The

leader for photo vests is [Domke](#) and even wearing a new Domke vest will instantly transform you into a world-weary veteran because new Domke vests look like they have been through hell and back. Industrial-quality cloth here folks so for the fashion conscious, you may prefer Nikon's own boutique leather vest (get real!).

Do not wear the vest with your heavy packsack on the trails but do carry it inside and use it to work with the packsack once you have reached your destination. Your heavy packsack can be left at your main campsite and your vest can be used for all the myriad accessories and small lenses you need. If you carry a huge telephoto lens with you, a harness system can be adapted to them or you could use a dedicated lens case to help lighten the load of a Super Trekker sized pack. Noted avian photographer, Arthur Morris uses a custom vest from the [Vested Interest](#) for his fieldwork.

For heavy-duty fieldwork, many pros and serious amateurs use one of Lowepro's Trekker series backpacks. They range in size from single camera systems to packs big enough to handle a large format system. I prefer a pack larger than what is actually required of the equipment at hand. The major downfall of photography packsacks is that they are all equipment oriented and leave little room for other field needs, like food and water as well as protective clothing.

Forget about the marketing crap about how much stuff can be packed in these backpacks because you will not want to hump it all day long with a similarly equipped pack as seen in the glossy brochures. If you did try to pack in everything as seen in the ads you would be as large as an astronaut out for a space walk. The nature of photography backpacks means stuffing in a Gore-Tex rain jacket will cause it to bulge out un-seemingly. The front flap side pockets are often not bellows in design meaning little room for anything thicker than your Kodak gray card (maybe an ultra thin Sony Vaio or Apple Mac Titanium notebook computer but then you would not have any protection for it). Buying a pack larger than is required will at least provide some space for the food and water and if you are very good at it, a tightly compressed rain jacket.

I live on the "wet coast" of Canada in case you are wondering why the constant reference to a rain jacket. The best Lowepro packs and cases have the wonderful all-weather cover that will protect your gear in a downpour but what about you? The redeeming feature of Lowepro photo packs is their ability to attach accessory cases or pouches to them but they are also predominantly gear oriented. A small accessory day pack can be attached to a large Trekker pack for the field essentials. The drawback of course is an even bulkier overall pack to carry in the bush.

If your style of photography is outdoor-related then you should own at least two photo packsacks. One large Trekker series to haul the gear to your base of operations but another smaller one for those light day hikes in which you are not carrying a portable bazooka of a lens. Lowepro answers this need again and for the money, their Street and Field Rover AW is probably the best mid-sized photo backpack there is. I like this pack a lot and will probably buy one soon for use in the city as well as the trails.

The Rover AW (there is a slightly cheaper non-AW version that is not as versatile as the Rover AW) is a two-section pack in which the lower section holds the main equipment and the upper section can be used for anything else. The main pack portion of the Rover AW can be removed from the waist belt and shoulder harness, allowing you to use a military style webbing system if desired instead of a packsack (the non-AW Rover is not detachable). If need be the Rover can handle a 500mm f4 lens by removing the middle partition and using the whole pack for equipment. That would be missing the point of what the Rover is all about, as it is meant for light duty shooting.

My ideal configuration of the Rover would be to add the custom Street and Field pouches such as the AW70 to handle a camera and lens attached and a couple of utility pouches for easy access to other sundry items. This configuration allows for quick access to a camera and lens for immediate shooting instead of having to take the pack off the shoulders and opening it up to access the equipment. The pack itself would be used for, guess...food, water, and a rain jacket.

I think the Rover AW with a small Gitzo or Manfrotto tripod would be a wonderful way to carry equipment when riding a mountain bike along the trails. The generous size of the waist belt would provide a secure yet comfortable ride. Lowepro's shoulder harness is the best among photo

backpacks but it does have a tendency to squeak when walking along the trails.

For general-purpose use, there are many choices. I use to own an upright oriented Lowepro Magnum case but grew tired of the two-layer method of stacking equipment. I prefer to see everything I pack all at once and now I use a briefcase style case from Lowepro called the Omni Trekker (this Trekker does NOT have the AW feature). The Omni Trekker is the size of a small suitcase or larger laptop carrying case and works beautifully for my needs whether it is for 35mm or for medium format. The Omni Trekker can also be mated with a Pelican hard case for the ultimate in protection.

Whatever your needs, whatever your brand of choice, a dedicated case or pack for your expensive photography equipment is a must and should be given its proper consideration. You spent a lot of money of your gear, why would you protect it with some cheap piece of junk the photo store is willing to give away (actually, because they have been provided with all the freebies direct from the company for promotional purposes).

Things to look for in a good camera bag

- 1 - Thick exterior padding
- 2 - Plenty of pockets for all the accessories and incidentals
- 3 - Plenty of padded inserts to allow you to configure your gear as you need them
- 4 - Waterproof cover to protect the bag and its contents
- 5 - This is bonus waterproof cover for the front flap only - so far only seen on Lowepro Street and Field bags
- 6 - Although not seen in the image, a solid and comfortable shoulder strap - but no matter how good the strap, sooner or later a heavy shoulder bag is going to weigh you down



The Lowepro All Weather cover for the Street and Field 400 bag



The top flap cover is often all that is required for a minor rain shower

An example of the type of bag to avoid, though this one is a bit less objectionable in that the Canon logo is not blasted right across the entire width of the bag itself.



The style of the bag and its outward appearances give away what you are carrying and does not blend in well in any sort of setting.

There are some styles of bags that seem to work well at blending in as an everyday bag such as those from Billingham.



The makings of a good photo packsack include the ability to add extra compartments or accessory utility pouches



The packsack will have,

- 1 - An excellent shoulder harness that will help to reduce the amount of strain on your shoulders and help distribute the load
- 2 - A generously sized waist belt to work with the shoulder harness for absolute comfort

These two will make your life on the trails and backwoods much more comfortable. The shoulder and waist belt system of Lowepro's best backpacks are very good but they do tend to squeak now and then with heavy loads.

Once on a day hike with a friend, after we had reached the peak of a short hike, yours truly was winded from carrying a full load of medium format gear in the Pro Trekker - too much of the sedentary life at that time. My friend trades packs with me and commented that it was very comfortable to wear and that the weight was evenly distributed despite its 50 lbs plus weight. I with his almost next to nothing pack was reinvigorated without the load on my back.



1 - A backpack must have thick padding to protect your equipment from mild drops or accidents. Lowepro packs have thick nylon exterior shells with a very generous padded casing that fits inside the shell. The grey interior can actually be lifted out and allow you to use the pack for other than photographic use but the shell then lacks the support the interior casing provides.

2 - The pack must also have numerous dividers to allow for custom fitting of your equipment needs.

3 - Accessory pockets are a must to hold all the other incidentals of being in the outdoors. Unfortunately, this is one area where almost all photo backpacks fall short of, providing enough storage space for food, water, and clothing.



The front flap shown here has a nice size mesh pocket but the protective inner flap does not actually allow you to make use of the mesh pocket for anything other than very flat objects, maybe a very thin rain jacket.



The inner compartment dividers come right up against the front flap, which also restricts the amount of extra supplies you may want to bring along with you on the trail.



How about a waist pouch? Seems like a good idea for carrying around a small system but that is all you will be able to carry in small pouches such as this. Open the flap up and...

You can see just how little space there actually is in these photo waist pouches and forget about the larger ones because they really are not very comfortable to wear for long periods of time or for carrying a lot of equipment.



A photo vest is so cliché but it really is a very handy accessory to have for use in the field or on the street.

Good ones have a generous amount of pockets that are also generously sized too.

1 - The generous number of pockets for a vest also apply for the interior of the vest.

2 - Domke vests also look after the comfort of the photographer with padded shoulders as well as a mesh back to keep you cool.



Sometimes though you really do not want to call attention to yourself with any indication of being a photographer. A look through your closet may turn up something useful. I found that my barn jacket, used during the cooler spring and fall days, fits the bill nicely with its good sized pockets that can fit a small SLR with a small prime lens attached. The other pockets can hold more small lenses as well as film.

The idea of being discreet is not new and there have been various ideas bandied about to try and allow the photographer to blend in with the surroundings. Apparently the now ubiquitous black camera came about when a Life magazine photographer taped his chrome cameras black so that they were less noticeable to his subjects. The less notice to the photographer the more candid and natural the images of the subjects. Some photographers tape over the logo on their cameras to make the camera look generic and less "pro" like. The approach to candid photography can also be diverse too with some going about the photography in a stealth-like manner while others prefer to let their photographic intentions be known so that there are no surprises to the subject.



On the "wet" (west) coast of Canada, a Gore-Tex jacket is de rigueur...okay maybe it isn't a great fashion statement, derisively known as the plastic jacket to transplanted easterners. However, it is practical and more importantly it keeps you and your equipment dry, what little you can actually fit into one of these types of garments.

Gore-Tex jacket designers did not have photographers in mind because one can carry nothing larger than a point and shoot camera as seen here. At least it won't get wet.

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Photography e-Book Chapter 9 - Flash

Flash is sometimes a weird thing to understand. As much as we wish to capture the world around us in its natural light, we cannot always do so due to the conditions of the scene and what it imposes on the film we use to create the image. Flash provides us with a supremely portable burst of sunlight that provides us with an opportunity to adjust the contrast range of a given scene and try to equalize it to a degree.

Flash is sometimes called the portable sun because most portable flashguns are referenced to noontime light. The quality of light can be measured and we use the Kelvin scale to indicate the color temperature at a given time of day. Noontime light in sunny conditions measures 5500 degrees Kelvin and that is the reference for portable flashes.



There is just one problem, as you may have guessed, most photographers eschew the lighting conditions in noontime light due to its flat, harsh, and contrasted nature. Why have we accepted our portable flashes to be referenced to a quality of light temperature that few would choose to photograph in? Many photographers attempt to modify the light by using warming filters on their lenses or portable soft boxes and other flash accessories, trying valiantly to avoid or modify the 5500K color temperature.

The dedicated hotshoe contacts for Nikon flashes at right

Filters can be bought for flashes but it would be nice if flash manufacturers could produce flashes with different color temperatures suited for the healthy skin tones many photographers desire but perhaps better the devil we know now than one we do not. Now that I have that beef out of the way, let us talk about flash equipment.



Simple advice, buy the best flash from the same company as your camera brand. As a Nikon user I have the SB 28, the most advanced and powerful flash in the Nikon line. Brand flashes are more expensive but worth the money to avoid compatibility hassles and to ensure that all the features of your camera's flash capabilities are allowed. Brand-mate flash and camera communicate with each other and provide access to all the advanced features made available by the company, such as rear-curtain sync, high-speed sync, slow-speed sync, and stroboscopic mode among others (the Canon EX550 for example, has advanced slave capabilities that cannot be copied by third party flashes).



If you can afford the top-level flash from your camera company, do not stop there. Spend a little more and buy the off-camera TTL cord too. This TTL cord will allow full functionality of the flash and camera while providing you with additional creative options for



your flash work.

If you cannot afford your brand's first or even second flash gun and are interested in third party flashes, there are some features to watch out for to allow you some flexibility. I do not know much about third party flashes so do not expect detailed comments on

the likes of Lumidyne or Quantum or more appropriately for the budget conscious, Sunpak or Vivitar.

I do own a flash from Metz and I also own two of Vivitar's venerable 283 flash, the de facto standard for flashes before the age of dedicated automation (around the time Nikon introduced the F801 and SB24 flash). These flash units were purchased more for my medium format Bronica SQ-Ai kit than for the Nikon kit and it is with the Bronica that I use the flashes with most often but I have started to dabble with the Metz 45 CL-4 with the Nikon F100 since the purchase of the Metz SCA adapter for Nikon. The Metz 45 CL-4 and the SCA 345 Nikon flash adapter are limited in features and only provides TTL flash control as the Metz 45 CL-4 is an old flash model using non-current technology. Old but still quite capable and provides plenty of power when I require it.

The Vivitar 283 was/is a very popular flash from decades ago. The original 283 flash guns had lethal voltages that would fry the electronics of modern day cameras but the current Vivitar 283 is quite safe to use on today's high tech bodies. The 283 is now made in China and is quite affordable for such a capable Auto flash but I would certainly want to check out the offerings from Sunpak too before putting down the hard cash for a third party flash unit. The old Vivitar 283 is now limited in use with today's popular ultra-wide angle lenses.

Once you have used your flash unit for some time for a variety of shots, you will probably come to despise the flash despite its necessity. Direct flash shots can be abhorrent in quality and painfully obvious that the subject has been flashed. We all want that natural look of a subject in ambient light but truth be told ambient light can be trying for portraits (low light levels or contrasty light) or macro photography (subject matter moving or being moved by the wind and low light levels). You need that pocket sun to blast the subject and freeze it at speeds measured in the 1/10,000ths of second.

Photographers have tried to work around the limitations of direct flash and its quality of lighting. Certainly, I have tried some accessories and techniques myself to get away from the horrible results of direct flash.

- I have off camera cords for my Nikon SB 28 flash. Using a TTL flash cord is great idea but when you one-hand a weighty 35mm body with a weighty lens attached, you are not exactly getting the most stable shot as your left hand holds the flash out and above the shooting position. A tripod is way around this but is not always a practical solution.
- I have Sto-Fen flash adapters for my three main flash units, the SB 28, Vivitar 283 and Metz 45 CL-4. Sto-Fen flash adapters are thick plastic boxes with one side open to slip over the flash head. They were originally white colored but now come in gold to get away from the color temperature problems I mentioned above. They will rob two-stops of flash power from your unit unless you use a dedicated TTL flash that can compensate for the thick plastic of the adapter. This adapter has become quite popular with many professional photographers and you will see them use the Sto-Fen with direct flash or with the 45-degree bounce flash technique. If you use an Auto flash with the Sto-Fen you will need to use it in 45-degree bounce mode otherwise severe underexposure will result, or use the flash on Manual mode instead. Check out National Geographic's July, 2001 issue for the On Assignment section at the back of the magazine. You will notice photographer Michael Yamashita using a Sto-Fen adapter on his flash unit. Unfortunately, my results with the Sto-Fen have been lacking and I do not find myself wanting to reach for them when doing flash shots.
- I have flash brackets for my Nikon and Bronica bodies, one from Stroboframe and one from Newton Brackets. Both work well for their respective bodies and when I shoot weddings, I am not ever without them. But both are a hassle for mounting and dismounting of the bracket to the camera, as the user requires a hex key or flat head screwdriver to secure or loosen the retaining bolt/screw. Thankfully during serious shooting applications, you would rarely want to break the camera and bracket apart. For less serious shoots, laziness sets in

and I do not bother with the flash brackets. Some people complain of receiving red eyes when using directly mounted flash but I have not. I have experienced red-eyes with built-in flash units on SLR cameras as well as point and shoot cameras that have the flash extremely close to lens axis but a full size flash for a SLR should not provide red eye problems. What is a problem is flat and harsh light that results from directly mounted flash and the shadows that plague the scene when the subject is too close to a background. A flash bracket helps a little bit as the shadows are moved further down but shadows will always be a problem unless you use a dual flash setup to cross fire the subject and eliminate the shadows.

- I have tried one of the pocket soft boxes from Lumiquest but other than robbing a bit of power from the flash head, I have not noticed much benefit from this attachment. A friend of mine with the Shell flash adapter likes the results he receives from it and it is an interesting accessory but it is hard shell material that is not so easy to pack away. Lumiquest also has similar accessories to spread the power flash around a larger area and soften the light before reaching the subject. The Lumiquest products are soft plastic and can be folded down flat for storage in a bag or case.
- I have tried bounce lighting with little white cards attached to the back of my flash heads and for quick informal shoots, I like this technique quite a bit. However, this is only for the 45-degree bouncing method and not for the 90-degree bouncing method as the light becomes too diffused and causes problems of its own. 45-degree bouncing is a compromise between direct flash and bounce lighting. Enough light still falls on the subject in a manner that does not create problem shadows as 90-degree bouncing would.
- I have umbrellas for my larger Multiblitz flash heads and this by far the best quality lighting I have available for portrait shots but given the time it takes to setup and break down, it is not an option unless time has been dedicated for such a shoot.

There are certainly many more techniques and accessories than what I have listed but few have pleased me enough to use on a regular basis. The compact size of the portable flash is also the problem as the flash head is more point source than diffused, hence the tricks used by photographers to adapt to an unpleasant reality.

When researching about portrait photography or for that matter, many other types of photography, you will often find reference to overcast days being the best for soft diffused light. The clouds act as a gigantic soft box that spreads out the sunlight, which is normally a point source of light during the hours between sunrise and sunset. The more point source your light, meaning narrow and confined, the harsher and greater the contrast the light is due to the beaming nature of it. Shadows are short and dark and light is directionless. Your subject is either in severe backlight or facing harsh light. Only in sunrise and sunset conditions does the light change and become directional, creating long shadows that add contours over the landscape.

Spreading out the light, either the clouds with the sunlight or a flash bounced into an umbrella or through a soft box, acts as a diffuser to broaden the point source of light. The light is now more evenly distributed and the quality is attractive to human subjects and in fact, for many still life subjects.

Suffice to say that my short comments here on flash are rudimentary and more detailed use of flash is beyond my basic knowledge. I marvel at how corporate and advertising photographers can create amazing images in the studio and use direct flash in such ways as to bring out the nuances of the subject while keeping certain sections in shadow to create drama. This is the stuff of gobos, scrims, and snoots among others and far beyond what I actually desire to know about studio flash techniques. There are a few books available that explain the concepts and techniques in the studio should you wish to learn more.



TTL cords allow for off camera flash use and can provide more pleasing flash exposures than simply direct flash



Sto-Fen Diffusers on different types of flashes - paying \$30 CAN for a cheap piece of plastic is rather offensive but buying three as I did without trying one out first and buying on hype is stupidity

If your brand's flash offer wireless TTL slave control, it would be a worthwhile option to look into for advanced flash techniques. Here we have the Nikon SU-4 attached to the SB28 flash unit. The left circle indicates where the optical sensor is and the right circle shows some basic controls.



The SU-4 is not quite what should be in a well-designed wireless unit. As an optical unit, the SU-4 can be triggered by other flashes resulting in frustrations in coordinating your flash exposures with others. A better way is for a infrared or radio channel dedicated to your own system. Other third-party options are available but at high costs and much added bulk.

The Canon EX550 wireless slave capabilities are second to none and is what a wireless TTL flash system should be.

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Photography e-Book Chapter 9 Subsection - Flash Technical

Manual Flash

Manual flash has often been the bane of a photographer's existence and until the arrival of Auto flash and then TTL flash, learning the intricacies of Manual flash meant some mental gymnastics in calculating proper flash exposure. Some diehards who learned how to work with Manual flash effectively, still swear by it and will trust no other method of flash exposure. Years of experience has provided them all that they need to do things right. Steve Sint of Popular Photography Magazine is such a professional who eschews automated flash work.

The tiny Cullman flash seen here is a Manual only flash with a built in slave sensor, allowing it to be used a "kicker" secondary fill in flash.



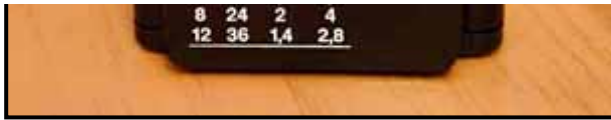
Manual flash in its basics is not that difficult as it comes down to a few things only, distance, aperture, film speed, and flash power otherwise known as the Guide Number or GN. Your shutter speed does NOT play a role in flash exposure except in terms of the flash-sync speed available on your camera but more on that later.

Take a flash, any flash, and it will have a Manual setting no matter how high tech it is or how basic, in fact the most basic flashes are only Manual flashes. Using the venerable Vivitar 283 as an example of an affordable flash with a decent amount of power, this flash unit has a Guide number of 120 feet at ISO 100. Caveat here, the GN is just a guide number to use to calculate your aperture and it does not mean that the flash can actually output enough power to reach to 120 feet, especially if using relatively slow ISO 100 film. Most if not all flash manufacturers pad their power ratings and experience from use is the real determinant of what your flash can do.

From your known guide number, you then divide the GN by the distance to your subject. Therefore, if your subject is 10 feet away, you divide 120 by 10 and receive 12. This is your working aperture but as you may well know, 12 is not exactly a common aperture setting and only if you have a camera capable of 1/3 stop settings could you actually come close to this desired number. Another way to do the calculation is to divide the GN by your desired aperture and receive the working distance you have to be at to properly illuminate the subject. If your desired aperture is a moderate one of f5.6, you divide the GN of 120 by 5.6 and receive a working distance of 21 feet (rounded down to nearest whole number).



That is really all that manual flash requires and all manual flashes have a calculator dial or table to indicate what the proper aperture setting should be for a given ISO based upon the power output of the flash. Since flashes come in so many sizes, you have to be aware of the particular requirements for the flashes you use and be very ware of your film speed in the camera because an ISO 400 film will alter your flash calculations by two-stops from the base ISO 100. You would actually benefit from using faster film as your flash power can be



extended farther due to the sensitivity of the film. However, using a slower film means losing working distance as the flash has to compensate for the slower film - actually the flash does not

compensate anything in Manual mode, it is your working distance and apertures that would be modified for the slower film.

Doing fill flash with Manual flash is not that hard once you have your working distance and aperture figured out. If you desire a minus one-stop fill, you would merely stop the aperture down by one, so using the example of f5.6 above, your aperture setting for minus one would be f8 and if you wished for a minus two-stop fill, then you would set f11 on your lens. Using flash to overexpose the subject is just the opposite with f5.6 being opened up to f4 for a one-stop overexposure or f2.8 for a two-stop overexposure, not that you would really want to overexpose anything by two-stops.

Manual flash is really not that hard to figure out but a pain to setup on occasion, as I have heard stories of photographers from the old days before automated flash, pulling out the tape measure to make absolutely sure that the distance was correct and religiously using the recommended aperture for a given ISO no matter what the lighting conditions were, indoors or out - like my father with his old Canon FTB and small manual flash unit, f5.6 and 1/60 and be there for him.

Where manual flash becomes a true pain in the ass to work with is with macro photography or when trying to do bounce lighting. God help you if you were to try to calculate the working distance and aperture under those circumstances. The fastidious photographer would probably take a number of test slides in various bounce lighting situations to understand what sort of compensation is required. Macro photography is where the major brain hurt occurs especially if you are using extension tubes and teleconverters to get closer to the subject. John Shaw wrote the book on macro photography in the field but today he does not bother advising anyone to learn the old manual flash calculations as he himself uses TTL flash for macro shots via his Nikon kit.

A lot of manual flash brain hurt can be alleviated with the purchase of a flash meter. Fire off your flash with the meter held in front of the subject and the meter will calculate a working exposure for you based upon the parameters you set. When working with my Multiblitz flash units and umbrellas, I manually meter the flash exposure with a Sekonic 508 based upon the aperture I wish to work with. I simply adjust the flash output until I receive the correct amount of light for the aperture.

Auto Flash



Manual flash obviously has its limitations so thank goodness for the arrival of the Auto flash. I am not certain when Auto flash arrived in the history of photography but I am aware that the Vivitar 283 auto flash has been a favorite of photographers since its arrival in the early 1980s. The 283 still goes on strong and remains a popular option for photographers on a budget or for those seeking a no-nonsense backup flash.

An Auto flash is capable of Manual operation in which it dumps out its full rated load at the subject but we want a bit more flexibility from our flash and we do not always want to do a full dump or be stuck with a given distance for our film being used. We need a bit more control and finesse.

The Auto flash answered this need by installing a sensor on the front of the flash. This sensor reads the amount of flash-light reflected back from the subject and cuts off the flash once it receives a reading that the subject has been properly lit for the parameters the flash has been set to.

The better Auto flashes have a number of aperture setting choices for the photographer to choose

from, the Vivitar 283 has four while other flashes may have more (such as my Metz 45 CL-4). Film speed is still an important consideration with Auto flash but now the photographer can choose more than one aperture to work with. Distance is still a factor but with Auto flash, the photographer just has to be aware of the maximum working distance for his choice of aperture instead of one rigid working distance.

The main caveat to Auto flash is that changing the aperture setting on the lens means changing the setting on the Auto flash otherwise the subject will no longer receive proper illumination. Unless, of course, you wish to do some fill flash work in which case the photographer must alter the aperture to achieve the desired flash compensation.

Bounce lighting is bit easier with Auto flash but still not, what we would desire from an automated flash system. Off-center subjects can also present problems because the flash sensor will always read from the middle that it sees. Direct mounted Auto flash requires the subject to be centered and if the subject or the flash itself is off centered, inaccurate flash exposures may result, depending on the exact circumstances of the flash to subject relationship. **Update** - Metz users can purchase an Auto flash adapter that has a sensor mounted on the camera's hotshoe with a cable extending out to the flash allowing bounce lighting techniques or off camera flash while still having the Auto sensor seeing very similarly to what the lens sees.

Although Auto flash is now dated, it remains a favorite among wedding photographers using manual medium format kits. I currently use a TTL adapter with my own medium format kit and find it highly convenient to do fill flash outdoors.



The Calculator Dial on a Vivitar 283



The Calculator and Mode Dial on a Metz 45 CL-4 - the green aperture settings are for the Auto flash mode



I do not care for the dial on the Vivitar 283 flash so I taped my own guide to the top of the flash, which allows me to glance what settings I need while shooting quickly. The #1 signifies one of two Vivitar 283 flashes I own.



The venerable Auto sensor on the Vivitar 283, still going strong after two decades.

TTL Flash

Auto flash provided a very nice workaround to Manual flash limitations but there are still weaknesses to Auto flash and the next advancement in flash technology is TTL flash or *Through The Lens* flash readings.

Instead of relying on a sensor built into the flash, camera companies installed flash sensors into the camera body and allowed the sensor to see through the lens instead of being placed many inches away from the lens. Whatever the lens sees the flash sensor sees and can make quick adjustments as required of the subject.

In a very simplified explanation of the TTL flash sensor, the sensor resides behind and under the mirror and when the mirror rises to allow light onto the film, the sensor reads the amount of light being reflected back by the subject. Due to the sensor being at an angle, it cannot read the reflected light directly so it reads the flash-light being bounced off the back of the mirror, which is traditionally painted 13% gray (or perhaps 18% depending on the company and how secretive they are about it). Once the correct amount of light has been read for the parameters in which the



flash has been set to, the sensor cuts off the flash from dumping anymore light.

TTL flash results compared to a good Auto flash to that of a properly exposed Manual flash setting should be minimal. What sets TTL flash apart from Auto and Manual is its ability to adjust the shutter speed automatically on some systems. You must experiment with your brand's TTL flash and what it provides you in various lighting situations. The more you know how your TTL flash works the better and more consistent your results will be.

TTL flash has evolved so that camera companies can now tie the flash sensor into the Matrix or evaluative metering patterns developed since the early 1980s. Since I am less familiar with what other companies offer by way of their latest flash technology, I will provide some examples of Nikon flash capabilities but I suspect most if not all features are also available with other brands and perhaps even more than what Nikon offers today.

- Off-center subjects are no problem for TTL flash sensors since Nikon introduced the D upgrade to its flash and lenses in 1994. The D chip in the lenses allow for the full 3-D (Distance Data Detection) capabilities in which the photographer can lock onto an off centered subject for focus and metering and expose correctly for that distance provided to the ambient/flash sensor. Minolta now offers a similar D feature for their newest lenses and flash units and unoriginally calls them D lenses too.
- Bounce lighting can now be done with a large degree of confidence due to the greater accuracy of the TTL flash sensor seeing what the lens sees as far as the subject is concerned. The sensor detects the light falling on the subject and cuts off the flash burst once the correct amount has been read. When I tried my hand at bounce lighting with my Nikon kit some years ago, I did not trust the TTL sensor to do the job and compensated the flash burst by plus one-stop. I ended up with overexposed prints that even generous latitude print film had difficulty with.
- I am also doing more 45 degree bounce lighting with the built in white card of the Nikon SB28 flash and have been pleased with the results to date. No need to fuss around with plus compensation, as I would have to do with my Auto flashes.
- Using flash diffusers or adapters does not require any adjustments either as the TTL sensor will continue to output light until the correct amount has been read for the subject - dependent upon the limitations of your flash's power output.
- Use of TTL flash cords provides all of the same benefits of direct flash connection yet also provide you with better control of the lighting. The flash sensor still sees through the lens no matter where the flash is located and will still control the burst of light correctly.
- Slave flash units are now available with TTL capabilities. Nikon offers the SU-4 as a TTL slave adapter but the real way of doing TTL slave is the way Canon has done with their EX550 flash units. The EX550 has separate channels to communicate with the master flash or control unit and thus has no risk of being fired by other flash or radio units around you as the Nikon SU-4 has with its optical only sensor. Optical meaning that it is line of sight to the master flash or trigger, no sight line for the slave unit due to a blocked sensor means no flash burst.

TTL flash allows you complete control of the aperture with the flash adjusting its power output and distance scale as required. Modern day flash units will have a bar graph display of the working distance for the aperture set and film loaded into the camera. This graph will show a minimum and maximum distance scale and the photographer need only pay attention to ensure he/she is within that distance scale. After that, everything is automated.

Unless something wrong is with your flash unit or flash sensor in the camera, flash provides a known quantity that can be reviewed and compensated for. Experience is the key to understanding how your flash will work under various conditions and the effect that you desire.

There are some other factors to keep in mind with flash work. When using Matrix or evaluative flash metering, you have to have a little bit of technical knowledge, of the parameters set by the camera company for its flash and camera units. Generally, Nikon's 3-D Matrix flash metering will

underexpose the background by one-stop via a vis the flash exposure in low ambient light conditions. The result will be a correctly exposed subject in a wash of black if taking shots with a low ISO film. Higher ISO films will register more of the background in the scene but many people are not satisfied with this default flash exposure from Nikon.

The alternative is to take the shutter speed into your control and adjust according to your choice of lens and desired result on film. When using Nikon flash in Aperture Priority or Program Auto mode, the camera defaults to 1/60 of a second in very low light on the basis that you are using a standard lens and you would desire minimal handshake. However, the shutter speed does not change no matter what lens you mount so, if you are using a 24mm lens and would assume safe hand-holding speed of 1/30 of a second or conversely if you were using a 180mm lens and required a 1/200 shutter speed, you would need to be in Shutter Priority or Manual control of the exposure in order to change the shutter speed.

In lighting conditions that require flash but are not wholly dark, such as an indoor-daylight scene, the Nikon 3-D flash will provide acceptable results, as the shutter speed will increase to match the light. However, the more discerning photographer will be fully aware of the ambient light conditions and adjust accordingly. What some photographers like is a more equal ambient and flash exposure, meaning often having to use slow shutter speeds or higher ISO films to bring the background closer to matching the flash exposure.

Other photographers do not bother with the complex Matrix or evaluative flash metering capabilities with their expensive brand flashes. It seems silly to spend so much money on a basic TTL flash but it always seems the case that a camera company will pack every high tech feature it has into its most powerful and most expensive flash units, despite the small number of photographers who would actually make use of every last feature offered. Many outdoor photographers work in Standard TTL mode to get away from the nuances of Matrix flash metering and manually adjust the flash compensation for their desired results. Galen Rowell's much ballyhooed minus 1.7 compensation is a result of using the Nikon flash in Standard TTL and Moose Peterson is another who chooses to leave his flash on Standard TTL with a minus 1 setting. Manual compensation of Standard TTL provides the photographer with a known quantity and quality to work with. In other words Matrix flash metering is not trusted.

In conclusion, flash is determined by a few basic factors,

- Flash Guide Number - the power rating of the flash divided by,
- The desired distance you wish to work at to provide you with,
- The working aperture required by the GN and distance and,
- Film speed

All flash exposure is based upon these parameters and the difference between Auto and TTL flash is merely about the convenience of measuring flash lighting reflected off of the subject and providing you with more choices for aperture desired. From there on, how you use flash and adjust for its known weaknesses is up to you according to your desired results.

Studio flash requires further comment to come in a future chapter.



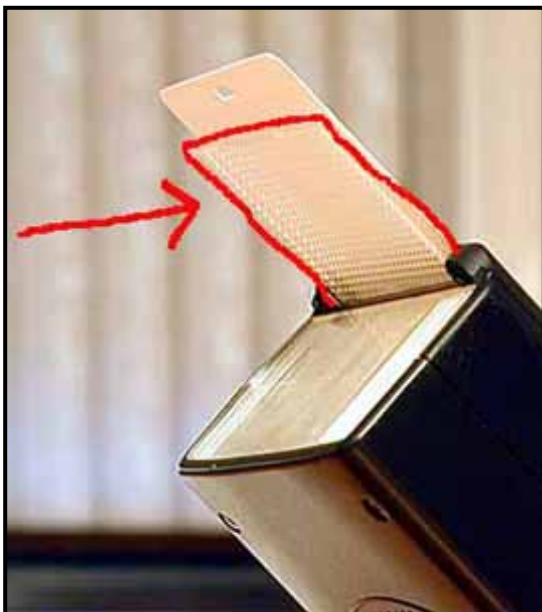
The Vivitar 283 hotshoe compared to the TTL Nikon SB28 hotshoe - one hot pin versus four hot pins on the Nikon



A cheap way to add slave capabilities to your flash but of course you would need to set the flash to Auto mode to keep the flash exposure relatively painless. Manual mode would mean having to use a flash meter to obtain the correct flash exposure. Optical slave devices can be set off by other flashes too so beware.



One feature that a flash purchaser should look for is a tilt/swivel flash head that allow for flexible bounce flash. All the top flash heads from camera companies have this feature. Note that bounce flash may cancel out some features of the flash. In the case of the Nikon SB28 above, bounce mode cancels out the monitor pre flash impulses sent out by the flash before the actual flash burst occurs. Monitor pre flashes help to obtain more accurate flash exposures due to the flash meter in the camera body taking those pre flash readings into account and then calculating the overall flash exposure, all milliseconds before the actual picture taking process. Not everyone is sold on this feature and quite frankly I am not so sure I would ever be able to tell any difference between a pre flash exposure and one without.



Another feature to look out for is a wide-angle diffuser, outlined in red above on the Nikon SB28. In normal mode without the wide-angle diffuser, the SB28 can cover down to a 24mm wide-angle lens. The diffuser allows the flash to cover a very wide 18mm, which means that the overall distance reach is shortened but the lateral spread of the flash is much wider. Many photographers choose to leave this diffuser down all the time to achieve the wide spread for all their flash shots. I do this too most times because my subjects are usually within the distance scale for the flash power reach. When doing bounce lighting, I may put the diffuser back in if I decide I need the extra reach of the regular flash head - depending on the lens I am using at the moment.



Modern day TTL flashes provide bar graph displays to provide you with an accurate account of flash power and reach for your choice of film and aperture.

In this example shot on the right, the film speed is ISO 100 and the flash has been set for a 50mm lens with an aperture setting of f5.6.

These settings are automatically taken into account by the TTL flash and the bar graph indicates that the flash is good from a minimum distance of 2.5 feet to about 25 feet. Within these distances the flash can control the burst of light for accurate flash exposures.

Closer than 2.5 feet and your subject will be over exposed and farther than 25 feet means your subject will be underexposed due to loss of flash power. Once the subject distance is beyond the flash power reach, the light from the flash falls off exponentially.

Flash Lighting

Flash lighting can be divided into three different types, key, balanced, and fill (there is also bounced lighting but that can be a combination of the three types of lighting).

Key flash is when the external or built in flash unit is your primary source of light and the ambient light is either fill or background light. Key flash will usually be used in situations of low ambient light, such as indoor and nighttime settings.

One of the more commonly seen byproducts of key flash lighting is the spotlight look of your subjects being flashed but the area around and behind them being a mass of darkness. This is often the result with flash and camera set to a Program Auto mode with slow films. Nikon (perhaps others) sets the flash to a default 1/60 of a second when using flash in low ambient light in Program Auto and Aperture Priority modes. This is to provide photographers with a fail-safe for handshakes using normal range lenses. This feature along with slow films can mislead a photographer into believing that the camera and flash are underexposing the background in flash exposures.

This spotlight look is not one that many would find endearing yet some camera companies believe this what the consumer wishes. To avoid the spotlight look and bring about a better balance to the scene there are a couple of things you can do,

1. Use a slower shutter speed. By slowing down the speed to provide proper ambient exposure, you can still have the pop of a flash exposure for your subjects to highlight them while putting in a more balanced lighting environment. Watch the exposure bar in your camera's viewfinder to see when the shutter speed is slow enough to bring about an equal flash to ambient balance. If you are using wide-angle lenses, this will be easier as the wide focal lengths allow you to shoot at slower speeds following the rule of thumb of shutter speed equals the reciprocal of your lens focal length, i.e., a 24mm lens should be easily

handheld for sharp looking images at 1/30 of second. However, use of longer focal lengths will make the slow shutter speeds required to bring about balance difficult to achieve when hand-holding the exposure.

2. Another way to work around the issue of key flash, ambient light levels, and handheld shooting is to use a faster ISO film. ISO 400 is nice film to use that can bridge outdoor light shooting with indoor shooting and provide some balance to key light shots but you may wish to consider moving up to ISO 800. Film technology improves every couple of years and the faster films have seen a lot of progress in recent times. Some ISO 800 films have tight enough grain structure to rival ISO 400 films. Fuji NHG II 800 is one of the new breed of high speed films that can produce great results when processed and printed by a good lab.

Key flash lighting can also occur in outdoor sessions too, it is all a matter of shutter speed if your flash lighting is set for a balanced 1:1 ratio. By setting a faster shutter speed than dictated by the ambient light metering, you will underexpose the background but because your subjects are flashed, they will be properly lit.



When in low ambient light, Nikon cameras default to a shutter speed that tries to minimize handshaking. On the CP950 digital camera, that speed is 1/30 and in this spotmeter (off of the central flower) shot above, caused severe underexposure of the background for a spotlight look.



This shot was handheld for about two-seconds, hence the blurred image, without flash. However, it reveals what the scene on the left actually looked like in the late summer evening light.



No flash



Flash at 1:1

Balanced Lighting is when your flash exposure is equal to your ambient light exposure, known as 1:1 ratio. Simply put, if your ambient light exposure is 1/60 for an aperture of f8 then your flash is set for f8 light too. Adjusting the shutter speed to a faster speed of 1/125 would result in a one-stop underexposure of the background only while your subject will continue to receive proper f8 lighting. You would not normally overexpose the background when doing flash photography by setting a slower shutter speed.



Ambient light exposure - chandelier behind the bear is the only source of key light, f3 @ 1/4



f3 @ 1/4 with flash for Balanced Lighting - since the CP950 digital camera offers no flash compensation, it is essentially 1:1 all the time



f3 @ 1/2 second for one-stop ambient overexposure with flash - ambient is key light as it is stronger than the flash lighting



f3 @ 1/8 for one-stop ambient underexposure with flash becoming key light



f3 @ 1/30 for three-stop ambient underexposure - flash is now very much key light in the scene

Fill flash is when your flash exposure is below that of the ambient light exposure. Fill flash is most often used for outdoor photography and as such, benefits mostly from cameras that are capable of high speed flash sync speeds in the 1/250 to 1/500 range (some Schneider lenses can sync at 1/1000!) If your camera is not capable of high speed sync then you will be forced to use small apertures and/or neutral density filters to drop the ambient exposure down to the range of the camera's shutter sync speed. The medium format Pentax 67 is not known as a flash photographer's camera (but a great field camera) due to its very slow 1/30 sync speed whereas Hasselblad and Bronica medium format cameras are favored by many wedding and portrait photographers for their 1/500 sync speed.

Oh yes, sync speed means that is the fastest shutter speed the camera is capable of synchronizing the shutter blade movements with a single flash burst. The best 35mm cameras sync at 1/250 and some can even do 1/300 but going beyond these speeds and the shutter is no longer fast enough to keep up with the flash output. The result of shooting faster than the sync speed will result in the shutter being captured on film as it moves across or down the film plane, obscuring portions of your scene on the film. Yes, cameras today can fire off a shutter at 1/8000 of a second or faster but flash bursts are much faster being in the multiple 1/10,000 speeds.

Some companies, such as Canon, have devised a method of mimicking extremely high-speed sync without the problems of actually syncing the shutter and flash output. The flash units will not output one continuous burst of flash as would normally happen with regular flash sync exposure but instead will emit a series of flash bursts that will seem like one flash pop to the human eye. Nikon flash can do this too but Canon has automated the feature to make it much easier to use for those times that you actually do want to fire off a flash while shooting at 1/4000 with the camera. The downside is that your flash power output is severely curtailed, meaning your subject needs to be very close to the camera location for best effect.

Now, while cameras are limited by the fastest sync speed they are not limited by the slower shutter speeds. In fact, slow speed sync is the best way to balance a flash exposure with low background light.

I digress, back to fill flash. Fill flash is normally in the range from minus one-stop of flash to ambient to minus two-stops to ambient light.

- Let us say you are outdoors shooting some portraits and want a touch a fill flash for your subjects to fill in some shadows here and there on the faces. Your film speed is ISO 100 as a reference.
- Your ambient exposure as metered by your camera or handheld meter is 1/125 for an aperture of f8.
- Your camera's settings are the same as the above, 1/125 and f8
- Your flash settings will be for ISO 100 and f5.6 for a minus one-stop fill
- If you want a minus two-stop fill then your flash setting is ISO 100 and f4

Remember, your camera settings remain the same because 1/125 and f8 at ISO 100 is for the ambient light. Change these settings and you will alter the whole look of the scene as far as the background is concerned. Only the flash settings are modified to adjust for the desired fill. These instructions assume that you are using an Auto flash or a TTL flash on standard mode. Use of a TTL flash in the more advanced Matrix or Evaluative modes can bring about a mix bag of results depending on how the Matrix meter reads the background and attempts to compensate the flash and exposure. This is one of the major reasons why many pros and serious amateurs eschew the more advanced fill flash features of their top of the line flash units for the more constant and known values that standard TTL provides.

My own results with Matrix TTL fill flash usually results in a bit too much flash output and that compensating the flash in Standard TTL mode with a minus 1 to minus 1.7 results in more natural looking flash fill. This really depends on what you consider the right amount of fill so experiment and dial in what pleases you or if you are happy with what the camera and flash calculate for you, more power to you.

In these five shots we see the use of flash for contrast control to try and bring about some balance to garden plants. Notice how the varying levels of flash alters the look of the plants and overall scene compared to the ambient light exposures.

I used a Nikon SB28 flash via an SC18 sync cord to the CP950 digital camera. The SB28 was set to Auto mode as being in TTL mode does not offer any output control of the flash. I merely changed the aperture setting when doing minus compensation.



Flash at f5.6 to ambient f5.6 @ 1/750



Spot meter for highlights f5.6 @ 1/750



Flash at minus 1 stop from f5.6 @ 1/750



Spot meter for shadows f5.6 @ 1/60



Flash at minus 2 stops from f5.6 @ 1/750

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Photography e-Book Chapter 10 - Filters

Filters come in two main variants, those for protection and those for effect. The vast majority falls under the effect category but first let us discuss the protection issue. This is a topic that is among the most contentious issues, such as Nikon versus Canon or film versus digital, as there are those who see no reason to use a protective filter except in the extreme cases and those who think protection is a wise investment. I fall in the latter camp and believe protective filtration is a good thing.

Okay, filters will degrade the image quality by a certain degree because light has to travel through another optical element. Lenses are designed and optimized for the number of elements in the design and filters, no matter how good add a non-optimized addition to the lens. There are those who claim to be able to see the difference between filtered and non-filtered images. Unless we are talking about flare, these people must have eagle eyes to be able to see such differences, just as they are likely able to count every last hair on a gnat's ass from 5 feet away. Folks, a high quality filter from B+W or Heliopan is not going to inflict enough meaningful, real world differences that you are going to be able to tell except in certain circumstances. The use of a lens hood will eliminate most flare situations but if flare is still a problem, it is quite fast and simple to remove the protective filter, shoot the scene then replace the filter back on the lens. Better yet use your hand or type of shade to block the flare from hitting your lens.

Okay, I lied; there is another condition that would allow differences to be seen. The most commonly used protective filter is the clear UV filter and when shooting in higher elevations where there is actually enough UV for the filter to do its thing, you will receive a clearer image than if you had not used a filter. In most other shooting applications the UV filter is of no consequence except as protection against drops, knocks, and bangs to the lens.

The idea is very simple, let the filter absorb the drops and bangs and protect your lens' front element from potential damage. John Shaw is a well-known landscape photographer who sees no point to using filters for protection and that is fine. He buys and uses his own equipment so he can do what he wishes with his lenses just as I buy my equipment and choose to protect them.

Let me put it this way, if you drop your \$1000 lens on the rocks and if the brunt of the impact is absorbed by the front element, you are out that lens until it is repaired and no warranty that I know of, covers that type of accidental damage (your insurance will replace the lens if it is beyond repair though, another reason for insurance - get some!) Your front element will probably cost you a pretty penny, more than a \$50 UV filter. Would you rather be out \$50 or would you rather pay \$200 or more for a front element replacement.

I actually have no idea what a front element would cost for a typical \$1000 lens but my own experience with Nikon Canada's repair service leads me to believe it would be grossly expensive. I bought Nikon's one-ring 80-200mm f2.8D AF lens used and during my time with it, pressed the little silver button used to select between AF and MF (auto and manual focus) modes too hard once. The button fell inside the lens structure between the exterior casing and internal lens element casing. This very simple repair, which in no way altered the optics of the lens or the quality of images it took, cost me over \$200 plus tax. No parts were required, just labour so you can imagine the cost of replacing the front element plus the exorbitant labour costs. Now if you are a big time pro, you just note it in your expense column and write the repair off but for amateur photographers, the costs come out of pocket.

Another contentious issue about filters is the quality of the materials used for the filter. When this topic comes up Cokin is usually mentioned as the filter company with questionable products. After all, how much sense does it make to put a \$30 plastic filter in front of a \$1000 plus lens? Despite the marketing terms describing Cokin filters as being made from "C39 organic glass", it is still a

plastic filter and will be scratched if the user is not careful with them. Does it make sense?

Does it make sense for Daryl Benson to put his reputation on the line by owning and using some 50 odd Cokin filters to create his images? Does it make sense for Singh Ray to produce and market specialty filters that fit Cokin's P system holders - including some inspired by Daryl Benson and Galen Rowell? Does it make sense that Singh Ray also uses similar plastic materials for some of their widely respected filters? Or how about Hi-tech and Lee using "organic" materials, read plastic, in their respected filters?

Push comes to shove and I will prefer using a high quality glass filter from B+W over a plastic Cokin filter but I am not losing sleep over it and Cokin filters offer a very affordable way to build a collection of filters, especially for those that are seldom used, such as my four-point star filter. Additionally, when using certain types of filters, the rectangle makes more sense than the screw on circle. Graduated Neutral Density filters work best when they can shift up or down to match your composition of a scene. With a round GND, the filter dictates the composition. Plastic square or rectangular filters are also more impact resistant than glass, much lighter, and far more compact.

Daryl Benson uses a CD wallet to store his square and rectangular filters and I have copied his suggestion myself. The case fits easily in one of the larger pockets of my Domke vest and does not add much bulk at all. Try doing that with 50 round glass filters sized to cover 82mm diameter lenses.

Now having boosted Cokin in your eyes let me reveal some concerns others have with them. Cokin filters are suppose to cover up to 82mm diameter lenses in the P series - ignore the Cokin A series as they are far too small for any worthwhile photographic purpose - and they fit in holders that can accommodate up to three filters. If your penchant is for wide-angle shooting, you will likely find that the Cokin P holder is too deep and causes vignettes (semi-circle shadows in the corners of film). Solution, hack the holder so it can only accommodate one filter. Ultra wide-angle lenses may still vignette though and will require the use of an over-sized filter system such as Cokin's X-Pro or Lee filters.

Cokin ND and GND filters are not "neutral" in color cast and Cokin admits as much by calling these filters "gray" filters instead of neutral - the graduated color filters are obviously not "neutral". Galen Rowell eschews Cokin filters because of their lack of neutrality and the insinuation of a mauve colorcast in the gray segments. Other users such as Daryl Benson and Dale Wilson consider this as a bonus and certainly, their images are no less impressive than Galen Rowell's. Different strokes for different folks.

There are some filters I prefer to use as round, screw on types, such as polarizers. However, the square or rectangular filter system compatible across format types would be a very nice investment to make if the costs are not too high for you. A single, large round polarizer can be used with step-down rings but in the field, fumbling around with step-down or step-up rings can be a pain. The filter system approach would be to use individual adapter rings for each lens and simply mount the holder onto the adapter ring.

Filters can be slid in and out as required for the effect desired. You want to warm up that scene AND use the polarizer, go ahead and slide them both in. Oh, you wanted to enhance the scene for some hyper-saturated colors, go ahead and do so. Now, when you start mounting or inserting in multiple filters, this is where the degradation of the image can occur and just because your Lee or Hi-Tech filter system can accommodate six or more filters does not mean that you ever should. Be judicious with your filter use and this goes for both glass and plastic filters.

An annoyance with filter systems and step-up rings is that leaving these rings on for maximum convenience makes them inconvenient to use when you do not wish to use filters and want to use a lens hood. A work around this is to buy a collapsible rubber hood for the step-up rings or to use combination filter holder/hoods.

Lee is the company I look favorably on for their system approach to filters and because they have a wonderful hood that is self-supporting (meaning no guide rods under the filter, adding weight and bulk) and allows for up to three filters to be inserted (the hoods come in one, two, or three

slot configurations). You can buy a combo hood/holder for the Cokin P system or for Lee's larger 4x4 inch series. You cannot cross rotate the filters without the use of additional filter holder but again, why would you want to add the option for another three filters?

Filter Brands

There are several brands of filters on the market and most offer decent products. Among the camera brand companies, Nikon seems to have garnered consensus praise as being among the best but their selection of filters is quite low and the filter sizes are obviously limited to Nikkor lenses. B+W and Heliopan are also considered top-notch filter brands for their use of German Schott glass (part of the Zeiss group) and brass rings instead of aluminum.

Why is brass such a big deal? It is more expensive than aluminum and many lenses' filter threads are made from aluminum too. When aluminum and aluminum meet, the bond between the two can be very difficult to disengage even when the threading of the filter is not overly tight. The use of two dissimilar metals prevents the tight bonding between two of the same metals. Note, although B+W is known for using brass in their filter mounts, B+W does make a line of slightly cheaper filters using the same glass but in aluminum mounts. Be sure to request the brass mount B+W filters otherwise you will encounter the bonding problems with your lenses.



In the image of the B+W filter above, the red markings indicate where a thin retaining ring is located to secure the glass element in the filter casing. Something that Hoya filters lack, causing them to have loose glass elements in their filters, especially in the smaller sizes.

Schott glass is a big deal among the cognoscenti because this is the glass Zeiss uses for their highly rated lenses (probably Schneider too). Apparently, the ultra expensive Zeiss 300mm f2.8 lens for focal-plane shutter Hasselblad bodies are all made from a single block of ultra high quality Schott glass and once that block has been used up, the 300mm f2.8 will be discontinued. Heady stuff for those who can afford it, last known price is \$25,000 US. B+W and Heliopan use Schott glass for most of their filters but note that B+W also uses plastic for certain types of filters too.

Hoya is probably the largest filter maker in the world and is widely available in most photo stores. I have not tried their top of the line Super Hoya Multi Coated (S-HMC) filters but have tried their mid-level HMC line of filters and frankly, I am not impressed with the quality.

The mechanical build quality of Hoya HMC filters are not reassuring for long term use as many samples of HMC filters do not wholly secure the glass element. The glass can be moved around whereas B+W filters are completely secure. I would hope that the expensive S-HMC filters have superior build quality and integrity.

Hoya glass also seems to be vulnerable to dust and dirt attraction. Cleaning Hoya filters will often result in a haze coming over the glass with streak marks being left. The haze and marks do go away after a few minutes but my B+W filters have never exhibited such tendencies. I chalked it up to poor quality glass but I came across a photo mailing list post that may explain why Hoya filters have such tendencies.

The plastic containers that Hoya filters come packaged in degrade over time and expel gas. This gas is exposed to the glass element and causes it to exhibit the haze and streaks. The longer the filter has been in the package, the more likely the filter will suffer. This would explain why a few of

my Hoya filters seem fine with no problems from cleaning and why others are such dogs. If you live in the US, THK USA will replace a filter if it turns out to be a very bad sample for haze and streaks.

The use of filters

The use of filters can affect the tone or mood of an image and add a bit of pizzazz and drama to an otherwise dreary scene. Be judicious and ensure your technique is unassailable, including shooting in good light. Good light can often negate the need to use a filter except in certain circumstances. There are only a few filters that most photographers should not be without.

The UV filter, as mentioned earlier, is popular as a general protection filter but does have its uses in higher elevations to cut down haze and produce a clearer image. There are special and much stronger UV filters available from most of the major brands such as B+W and Hoya.

Warming filters have a slight pinkish, amber, or salmon tone to them to help add a bit of warmth to scenes with excessive blue tones, such as shady areas or overcast conditions. The Skylight filter is probably the most popular one used by consumers but not often used by serious photographers. In between the clear UV and the warmer 81A, the Skylight probably gained its popularity by default, as many stores will give away cheap ones with lens sales. When I bought the Nikkor 24-120mm lens, the sales clerk tossed in a Hoya Skylight filter as a freebie incentive (yes, sometimes I can be bought so disgustingly cheap but I made sure to get the price of the lens down to a more palatable amount for me). I would not otherwise bother with a Skylight filter and would rather go straight to one of the 81 series warming filters.

81 series of warming filters come in six different strengths and the second and third ones, the 81A and 81B, are the most oft used. The 81A is a key filter to own in your filter arsenal as it provides the Goldilocks, just-right amount of warmth to most scenes and only when in deep shade would the 81B be required. Using the higher strengths is not generally required for most situations unless you work in excessively blue-toned scenes. Some photographers love the 81A so much they use it as their standard protection filter too.



Notice in the two examples above how the color balance changes the flowers with the use of a warming filter. Original non-filtered shot at left and filtered at right. The red arrow points to the very obvious change in the "tone" of the patio rocks behind the flower.

Polarizers

A polarizing filter is another key filter to own and for many, it is THE filter to own over all others. Most know of the traditional use of polarizers to induce a rich, dark blue sky into a scene but this use can be over done in today's world of super saturated films.

- o Polarizers also have another wonderful use of cutting out reflections in a scene and are often called upon by nature photographers after a rain shower. The filter cuts through the reflections from the water and allows the colors of leaves and plants to come through. Cutting out reflections works for sunlight too and I am sure most have also seen the example of shooting through glass or water. Without the polarizer, reflections mar the scene but with the filter, the scene can see to the other side of the glass or down to the bottom of the pool of water.
- o Polarizers in landscapes are best used when the sun is at a 90-degree angle to your subject, i.e. keep the sun out of your scene in order for the polarizer to work. If the sun is in the scene, put the polarizer away because it will not do much at all except give you a slower shutter speed.
- o Yes, polarizers will cause a typical loss of two-stops in shutter speed so be sure to use that tripod of yours to maintain sharpness. You could also use the polarizer as a two-stop ND filter since polarizers will not induce a color casts on the scene.
- o Exercise some care when using polarizers with wide-angle lenses. The wide field of view of these lenses will create a disparity in the scene between those portions affected by the polarizer and those portions unaffected. When you look at the sky with your eyes only, you will notice that the portion of the sky right above you is a deeper shade of blue than the sky in the distant horizon. The affect is similar with a polarizer on a wide-angle lens. Try not to get wider than 28mm as even a 24mm will exhibit the discrepancy in a polarizer's coverage. Of course there are creative ways of using a polarizer with wide-angle lenses but I leave it to you to figure it out.

In this series of photos, we see what the scene looks like without a polarizer and with a polarizer. Use a prism to test out the effectiveness of your polarizer and ensure that so-called polarizing filters are indeed true polarizers.



Without polarizer



Reflections without polarizer

With polarizer



Decreased reflections with polarizer



Prism from sprinkler



Adjust a polarizer one way for minimal effect



Adjust a polarizer another way for maximum effect



Cokin Pola 173 filter at Yellow bias



Cokin Pola 173 filter at Blue bias

There are a number of special effects filters with polarizer-like attributes such as Cokin's popular BY 173 (blue and yellow) but strictly speaking, these filters are not true polarizers, as they do not cut out reflections in scenes. An intriguing way to see if a filter claiming to be a polarizer is in fact so, is to rotate the filter over a prism or rainbow. If the prism or rainbow disappears as you rotate the filter then it is in fact a polarizer. You need not chase down a rainbow for this effect, as a garden hose spraying water in sunlight will create a mini rainbow for you to test this out. I did this with the BY 173 and a water fountain that was creating some rainbows and found out that it was not a true polarizer, as the rainbow never disappeared from sight. I believe Cokin no longer markets their dual color filters as polarizers now.

A polarizer with a red filter is how to achieve deeply dark skies in black and white images while keeping the clouds pristinely white. A red filter already creates a contrast between the blue sky and clouds by darkening the sky but a polarizer maximizes the effect for a very dramatic look.

The polarizer is indeed a valuable filter to own and be sure to buy one that can be fitted on all of your lenses. If your largest lens is 77mm in diameter, buy a 77mm sized polarizer and use step-down rings with your smaller lenses. If you use a filter system such as from Lee, be prepared to pay some big bucks for a square 4x4 inch filter. Good polarizers do not come by cheaply but you need not spend huge dollars on B+W/Zeiss Kaeseman polarizers.

Your camera system will dictate the choice of polarizer too. Polarizers come in two flavors to accommodate manual focus or auto focus systems, linear for the former and circular for the latter. Linear polarizers can be quite good in price but be wary even if you do own and use a manual focus system. Some manual focus cameras come with spot meters or can be equipped with one such, as my Bronica SQ-Ai with a prism finder. These spot meters still use similar technology as auto focus systems so you may still have to spring for a circular polarizer.

Linear polarizers can cause auto focus systems to stop working because they cut out the contrast required by the AF system to work and lock focus. Circular polarizers have an extra component to them that allow the polarizer to work its effect while allowing AF systems to work properly. Since I have both systems, I bought circular polarizers to use with my lenses and will continue to do so for future filters.

Graduated Filters

Graduated neutral density filters are another important part of the landscape photographer's kit. They provide an opportunity to balance out the light values of foreground and background in a scene. GND filters come in hard or soft gradation options with the hard version having half of the filter clear with an abrupt start to the ND portion of the filter. The soft version has the half clear portion too but the ND portion has a gradual level of density until the top portion provides the rated amount of density. You will often see these hard and soft GND filters in a range of colors for

different looks and effects, one of the more popular being the orange fake sunset or the super-saturated blue skies.

The typical use for GND filters is for landscape scenes with light backgrounds and dark foregrounds. You would first take a reading for the foreground and compare it to a reading for the background to ensure that the difference in exposures is within the range of your GND filter. The recommended first GND filter to buy is the two-stop version but stronger densities can be purchased and some companies such as Singh-Ray can even custom make filters for your needs.

After taking a reading of the foreground and background and being satisfied your GND will be beneficial for the shot, slide the filter in and adjust according to the horizon line or closest alternative. You need not just use a GND for horizontal shots as some users utilize GND filters successfully for diagonal shots too. The result of the GND should be to provide you with detail in the foreground and background scenes.

Slide films (the overwhelming choice of landscape photographers) have about a five-stop exposure range between the deepest blacks to the whitest whites. Wherever or whichever part of the scene or subject you choose to be your middle value will have a plus and minus two-stop range between going black or going white. If the difference between the foreground and background is beyond this exposure range, the film will not be able to record the details in the exposure extremes.

Even if the scene is within the range of a GND filter, many photographers are caught without one and have to make a choice between exposing for the highlights, the shadows, or a mid-range exposure. In the days before Photoshop, you chose one or the other and hoped to tweak the film in the darkroom. Nowadays, you can take two exposures, one for the background and one for the foreground and merge the two scenes digitally to obtain a digital GND effect. Read more about this at Michael Reichmann's Luminous Landscape web site.

Thus far, I have mentioned the clear protective UV, the 81A, the Polarizer, and the GND filters. These are the basic filters every photographer should have in their kit and will often times be the only filters required in a photographer's kit but there are a many more filters available and can be bought and used according to the photographer's requirements.



A Matrix meter reading on a late summer evening



A spot meter reading of the golden highlights



A spot meter reading of the shadows, blowing out the highlights



Enter a 2-stop graduated Cokin "grey" filter



A half/half split



The final result of using the Cokin filter in the scene for balance



2-stop Cokin filter on a summer afternoon



Cokin graduated blue filter



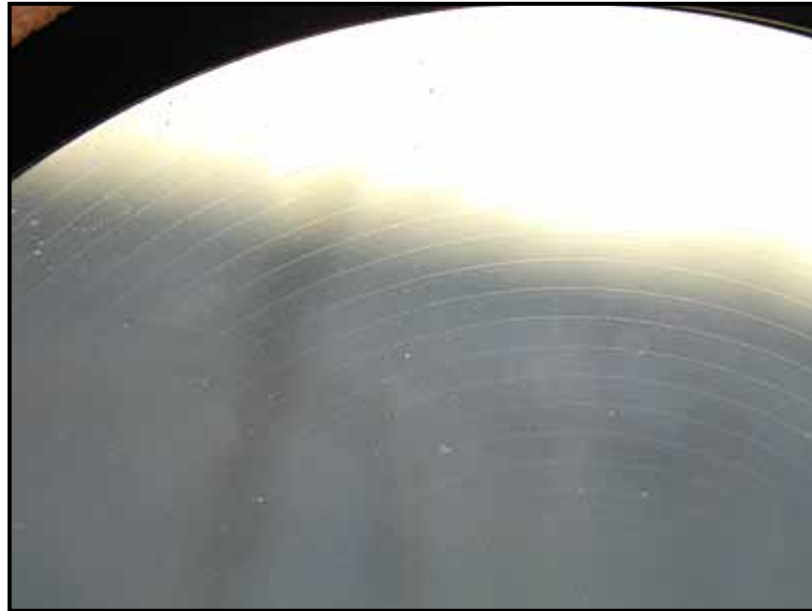
Cokin graduated Tobacco filter

Examples of some "fun" filters from my Cokin collection. The blue and tobacco graduated filters are not ones I would normally use for serious shoots. They were bought back in the days of wanting to buy up every cheesy filter I came across.

Soft Focus Filters

B+W Soft Focus #1 filter at right - concentric circles is part of the design to soften highlights and reduce contrast

The soft focus filter, popular among wedding and portrait photographers for the dreamy look induced onto the image. I am rather hesitant to recommend these filters despite owning several (B+W and Cokin). Of the ones I own, I tend to use the B+W Soft Focus #1 most but the Cokin has a look to it that can also be attractive. Why do I hesitate to suggest them, because you could create your own with a minimum of fuss or expense.



If you have an old clear UV filter no longer being used (like some of those blasted Hoya HMC types) you can smear some Vaseline on it and create a center-hole filter for a modest vignette effect. I personally do not prefer to have an old filter messed up with Vaseline that can mess up my other equipment in the bag and some of you may not have an old filter to abuse in such manner. No need to worry but there may be a slight fuss here because you need to raid your own, your wife's, or girlfriend's pantyhose drawer and "liberate" an old pair for the good of your photographic abilities.

A black or white pair works best and all you have to do is wrap the old hose tightly over the lens and take the shot for a soft focus effect. If you have some fine scrim material, that will also work too but again, black or white works best, as other colors will add their colorcast to the subject. If your wife really objects to you taking a pair of scissors to her favorite panty hose and if you are too manly to buy a cheap pair from the drugstore, and if you already own a Cokin P system, perhaps buying a \$30 Cokin diffuser filter would be less troublesome.

The idea of a soft focus lens is rather perverse as we intentionally try to wreck all that those fine German or Japanese optical engineers have produced in their super sharp lenses. Unfortunately, Father Time is not kind to facial blemishes and wrinkles and if you want to get in good with the mother-in-law, you better learn to take some attractive portraits. Today's lenses are much sharper than necessary to capture a face effectively, hence the Vaseline, the Zeiss Softar, and other myriad methods to soften the effect and add some glow to the subject. However, spending

several hundreds of dollars on a Zeiss Softar is not tops among most photographers' must-have lists, or even a mere \$100 for a B+W Soft Focus #1 (77mm size in Canada).

The ideal is to try to capture details with subtlety without the loss of resolution as often accompanies soft focus lenses, my B+W Soft Focus #1 included. The B+W approach is concentric rings around the filter's glass element to induce a soft look. The Zeiss Softar approach is to use many smaller circles or lenses on the main surface of the plastic element. Having never used a Zeiss Softar nor desiring to own one for a measly \$500 CAN, I can offer no comment as to which technique is superior. Interestingly enough Hoya has a soft focus filter that seems to copy the Zeiss Softar technique for far less.

Aperture will play a role with most soft focus filters with smaller apertures having less effect than wide-open apertures. The Zeiss Softar is apparently aperture independent for its effect.

Filters for Black and White Films

Filters for B&W films differ from color as for obvious reasons you are affecting shades of gray instead of color. For example, when taking shots of scenes with significant sky content, B&W film will have a difficult time trying to reveal any differences between the blue sky and the clouds. Blue skies and white clouds have similar contrast and while color films can certainly tell the difference between the two if your chosen exposure allows it to, B&W films cannot tell the difference and you will often be left with a featureless white or gray sky.

The use of colored filters will provide the contrast required to separate the clouds from the skies. Yellow is the mildest B&W filter to start with and many B&W photographers never venture out without it being the standard filter for their lenses. As you move to orange, green, and then red, your contrast increases. The ultimate is to use a polarizer with your deep red filter for black skies and white clouds. Of course, just ensure you have a tripod to shoot that minus five-stops scene as a deep red will rob three-stops and a polarizer robs another two.

The color of the filter will also affect the gray tones in your scene according to the color wheel of complimentary and opposite colors.

- Red primary is opposite to Cyan secondary
- Green primary is opposite to Magenta secondary
- Blue primary is opposite to Yellow secondary

Sorry for the short thrift on B&W filters but I do not have much experience with B&W films so can offer no example images.

Here is a color temperature chart for the various types of light available and the filter required to provide a neutral color cast.

The Wrattan is the standard that Kodak invented many years ago and is the one most filter makers refer to.

B+W filter company of Germany has their own K series code.

Type of light	Kelvin	Mired	Mired deviation	Wratten	B+W H-blad
Incan-descent light	3000		-150		KB15
B-light				80A	
A-light		300			KB12
				80B	
	3500		-100		
				80C	
	4000	250			
Moon light					KB6
				80D	
			-50		
	4500			82C	
				82B	KB3
	5000	200		82A	
Hazy weather				82	KB1,5
Sun 30°	5500		0		
				81	
Sun 50°	6000				KR1,5
				81A	
	6500	150		81B	KR3
				81C	
Clouded sky	7000			81D	
			+50	81EF	
	8000				KR6
	9000				
Clear blue sky	10000	100		85C	
	12500		+100		
	15000			85	KR12
	20000	50		85B	
	30000		+150		KR15

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Photography e-Book Chapter 11 - Film Choices

With all this talk about equipment, I seemed to have forgotten one vital piece that makes it all possible, the film. For those not yet down the eventual path of zeros and ones for digital photography, film is the manner in which we actually record or create our images. Just as there is a plethora of equipment available to the budding photographer, so too is there an abundance of films to choose from, hundreds in fact but most photographers are probably only ever going to need to be familiar with a half dozen, if that.

There are two main types of films to choose from, negative and positive, otherwise known as transparency, chrome, or slide. Within the negative types of films there is black and white (B&W) and color. I am not so familiar with B&W films and cannot provide an intelligent explanation on the differences between Kodak Plus-X, Tri-X, or T-Max films other than that T-Max films are among the sharpest and most archival of ALL films. B&W films can also be "cooked" to a certain flavor with the choice of chemicals in the darkroom and the choice of papers for printing. It is more than I am willing to pursue and I would much rather digitally cook my images with Photoshop and Epson printer papers than spend countless hours smelling foul fumes in the dark (no disrespect to those who do). It is not something I enjoy but many others do and I wish them all the best in the darkroom.

Negative films

I can at least offer some comments on color negative films, the choice of the vast majority of the world's consumer photographers and the product that keeps Kodak and Fuji afloat so they can invest big R&D money into digital. Just as there are do-it-all lenses such as the 28-200mm or the 28-300mm lenses, there are films that try to be all things to all people. Films such as Kodak Max, an ISO 800 film (with an ISO 400 brother now) attempt to be your low-light film, your action-stopping film, your be all, be anything film that just never seems to do anything really well. I suggest you choose and use your film just as you would your photographic equipment, use the right one for the job.

If you need action-stopping qualities of a high-speed film then use a good high-speed film instead of a do-it-all type. Forget the marketing hype that Kodak throws around about Max because it is meant for users of zoom lens Point and Shoot cameras that have slow maximum apertures when zoomed out to their focal length extremes. If you are using an SLR with a fast or even a consumer lens with a plodding f5.6 max, you probably do not need ISO 800 unless you are using very long lenses or shooting in low light or both.

Unless I have a specific need for ISO 800 films, I tend to stick around the ISO 400 range for most of my color negative film needs. Kodak and Fuji have very nice consumer films in this range that can provide good results when processed and printed by someone who cares but if you do a lot of family snapshots you probably want to buy into the better, professional grade color negative films. Kodak calls its pro films Portra and has ISO 160, 400 and 800 speed films in this range. Within Portra, you can also buy NC (natural color) or VC (vivid color) types of films to help out with the background colors while preserving good skin tones. Fuji, has the N series of films in NPS and NPC 160, NPH 400, and NHG 800. NPC 160 is a newer film that seems to be competing with Kodak's Portra 160VC film.

Why use the pro-grade films? Skin tones for the obvious choice. Ever shot with the cheaper consumer films and received prints in which everyone looked like they had just come back from a Hawaiian vacation? But you had in fact shot in the middle of winter and nobody had seen the sun for weeks? Consumer films have pretty good saturation that add pizzazz to your prints but that pizzazz also contributes to a pronounced skin tone quality that is generally not pleasing. Fuji films some times give subjects that pending heart attack color unless the printer really works on the

prints.

Consumer films also have high contrast to go along with those boosted colors, meaning being able to balance dark subjects with light subjects becomes a one or the other decision because you cannot have your cake and eat it too. Pro-grade films are moderate contrast and offer that ability to balance out the extremes, which is why professional wedding photographers choose the good stuff. Black tuxes and white wedding dresses are as high contrast as they get and pro films offer the hope of not only getting the details in the tuxedo but also in the expensive wedding dress. If you ever get stuck in a wedding shoot and you have to figure out which to compromise for with your consumer film, go with the wedding dress, as that is far more important than the groom's penguin suit.

Pro films also offer more realistic color balance and gets away from the hyper saturation of consumer films. When looking at prints of the same scene of subjects taken with a consumer film and a pro film, most people will notice a distinct lack of snap to the print from the pro film. However, if the shot had some blue sky in the scene, the pro film should reveal the blue in balance whereas the consumer film has likely blown out the blue sky to a white mass. Consumer films have difficulty handling the low contrast of background skies and either provides vivid blue skies if the scene is highlight based or blows them out if the scene has lots of shadow detail.

In short, I guess I am saying use the expensive pro films for your good family shots but if paying \$10 CAN per roll of 36 exposures before processing and printing gets a bit much for you, stick with the better consumer films such as Kodak's Royal Gold or Fuji Superia. If all of your shooting is in bright outdoor conditions then by all means use ISO 100 speed films but since we don't often do this, using ISO 400 films is a nice compromise and as it is very likely you will not require anything beyond a 4x6 size print, you will not notice the difference in grain. That is the fact of life of consumer photography, that the vast majority of the images taken around the world will never see a life beyond the 4x6 print. I shoot the same way too when using 35mm color negative films, I generally do not expect to shoot anything that needs to be larger than 4x6 and when I do shoot for enlargements, I use my medium format system. Now that I have a [Nikon Coolpix 950](#) digital camera, I do not expect shoot very much 35mm color negative film anymore.

Transparency (chrome) film or positives

For most serious photographers, chrome film is where the action is as it provides a more honest representation of what we are trying to create or capture. Photographers learning the craft need to know where they are making exposure errors and chrome film provides that lesson very well thanks to the lack of printing stage and to their narrow exposure latitude.

Transparency (or slide or chrome) films are usually slow to middle ISO speeds because their grain structure is not as tight as negative films. Until recently, an ISO 400 transparency film was avoided by serious photographers like the plague because the grain structure was akin to golf balls. My own subjective opinion on the older ISO 400 transparency films is that the grain resembles what you would receive from an ISO 3200 negative film. This has apparently changed with Fuji's introduction of its latest Provia F 400 and now offers photographers with a viable ISO 400 film - note though I offer second hand comments as I have not used the new Provia F 400 and have only had recent experience with an ISO 200 film from Kodak, the E200 (quite decent).

Most users of transparency films stick within the ISO 50 to 100 range but there are exceptions of course. Kodachrome still has many followers and you may still be able to buy some old stock of Kodachrome 25 as Kodak has discontinued this film after many decades of existence (as of July 2001). Kodachrome 64 and 200 are still available though and some pros such as Steve McCurry, prefer them for their archival qualities. Kodachrome is actually a black and white film that has the color added during the complex and rather toxic processing stage. Unfortunately, Kodak has many quality control issues with Kodachrome, which is why I do not use it anymore - that and the horribly long turnaround times of two to three weeks to send the film to New Jersey or New York for processing as Kodak shut down all Kodachrome facilities in Canada. There may still be some independent processors though.

The king of the transparency films is Fuji Velvia. Now a decade old and still going strong despite the rise of its stable mate Provia F 100 and Kodak's excellent E100 series of films. In this day of

Photoshop enhancement, having to deal with Velvia's ISO 50 speed is probably not required anymore as Provia F 100 offers even superior grain structure than Velvia, which use to be the finest grain slide film. I confess that I still buy Velvia when I want to get serious about my photography despite having rolls of Provia or E100 in the fridge too. There is nothing like looking at super saturated 6x6 chromes on a light table to amaze one at how good today's films are. The colors can really pop out at you and even the lower saturation Provia is quite amazing.

Oh yes, why are films classified as negative or positive? When you look at a slide, you are seeing the colors as you saw them in reality, highlights are highlights and shadows are shadows. It is a positive representation of the scene.

A negative is the opposite, shadows are the light portions on the film and the highlights are the dark portions of the film. With color negative film, there is also the orange mask that adds the color cast. The printing process filters out the orange cast and corrects the negative aspects of the film on paper.

General rule of thumb for shooting negative films is to bias your metering to open up the shadow details and let the highlights fall where they may due to the generous latitude of negative films. Negative films benefit from a small amount of overexposure too so your highlights benefit from an exposure for the shadows. Positive films are the opposite and require biasing for proper highlight exposure and letting the shadows fall where they may. If you blow out the highlights on positive film, the detail is lost forever and more often than not, ruins the chrome. If the highlights are correctly captured on film, post-development editing can be done to extract the details from the shadows, easier to do if you work within a digital darkroom environment.

Color balance of film

Film have color balances you must be aware of. The vast majority of the films in use today are daylight balanced, meaning they provide neutral color casts when shot in daylight but neutral has to be kept in perspective because daylight means sunny noontime conditions, hardly what many photographers would consider to be ideal lighting.

When using color negative films for prints, the processor/printer will usually be able to compensate effectively to correct the color balance but when using slide film, you get what you shoot so be aware of the lighting conditions and the effect you desire on film.

Tungsten films are favored by some studio photographers using flood lamps to provide a neutral cast for the warmer lights used. Tungsten films have pronounced blue tones and will render a scene wholly blue if used in daylight or with electronic flash.



Auto White balance on the Coolpix 950 - digital allows you to cheat and avoid the problems of color cast that can result depending on what film is used in a given lighting condition.

Flash White Balance on the CP950 mimics what daylight balanced film looks like when use in incandescent light with no flash - the majority of films used are daylight balanced including the consumer color negative films.



The color cast of incandescent light creates a pronounced orange cast in the shot because daylight balanced film is biased to counter the blue tones of daylight or flash. How many times have you taken snapshots in low light indoors with flash and had your subjects look relatively okay but noticed that the background ambient light had turned orange?

Flash is daylight balanced and thus works well with most films to provide proper color cast but the choice of flash being referenced to noon time sunlight is another matter.



Incandescent White Balance on CP950 mimics what tungsten film would look like if shot in daylight or with flash, as was the case in this example shot.

Tungsten film is balanced for the warm light of incandescent light and thus is very blue biased in tone. Shoot it in light that already has blue overtones such as daylight or with flash and you will end with a Smurf colored world.



Auto White Balance for daylight - a daylight balanced scene.



Incandescent White Balance mimics what tungsten film looks like when used in natural daylight

Daylight balanced film will also suffer from color casts when florescent light is the key source. Green overtones will result, although in this sample image, the green is not overly pronounced. Real film images will show heavy green tones, especially when using long shutter times to record a low light scene. Take a look at



nighttime shots of city buildings and notice how the office lights are all green tone due to the use of florescent light.

Some films such as Fuji Superia Reala have superior abilities to obtain a neutral look in many different lighting conditons, including florescent. Color negative films can usually be balanced adequately but not slide films.



To counteract the green tones of florescent light, a magenta-colored filter is required, often called a FLD filter. How strong the florescent light is will dictate how strong the FLD filter has to be to provide a neutral balance.

Another way to counteract ambient light color tones is to use flash and overpower the light to be the key



source. Unfortunately, a bit of subtlety is lost and of course the qualities of direct flash shots can cause problems of their own.

Film Grain

Your choice of film speed will have a direct result in the quality of your enlarged prints. The slower the film ISO the smaller the grain and the larger your print can be without grain effects. The faster the film ISO, the larger the grain and the less you will be able to enlarge while keeping the grain in check.

Film grain is the random silver particles of the film that constitute the image and provides you with recognizable subjects. Fast films have larger grain particles due to their superior sensitivity to light. In certain conditions such as sports photography in ambient light, professionals use fast films in order to obtain the fast shutter speeds required to freeze the action.

For most photographers, grain is something to be avoided for quality prints but for some fine art photographers, grain, especially those from black and white films, offer another method of creative expression.

Self portrait in a mirror with Ilford



Delta 3200, scanned from the 5x5 machine proof print at 300 ppi on an Epson 1200U flatbed scanner.



Crop of above shot at 100% from the 300 ppi 5x5 inch scan. You can see that even at a small print size, an ISO 3200 film speed has pronounced grain particles that would not be visible in slower films. Even an ISO 800 print film in 120 format reveals no grain at only 5x5 inches but some photographers prefer this look.

Grain is one factor that keeps some photographers from taking digital seriously. In a debate similar to vinyl versus compact disc, analog grain is considered "organic" and random compared to the blocky pixels of digital images.

It is a pervasive argument as a film enlargement does have a naturalness to it that digital cannot compare to when an image is enlarged to a greater factor than would normally be recommended and consider I am a proponent for digital imaging taking over from film.

I have noticed more and more obviously digitally-originated images being published in newspapers and they do fall apart quite quickly in comparison to film images which tend to keep a wholeness to them despite the

encroachment of film grain.

Ever flip through National Geographic Magazine and view the images from a more technical perspective? Before becoming interested in photography, I would read through my issues with more of an interest in the writing and merely glanced at the images with only the most compelling ones forcing me to look again. After taking up photography and becoming more interested in the images of the magazine, I noticed so many of the images had pronounced film grain visible, especially the double page spreads. I am not so sure if I personally would find that kind of grain to be acceptable but when it comes to National Geographic and their images, it is often the case that the subject is so compelling enough that the technical merits of the image are secondary.

Protection for Film

How about after you have had the film processed, what do you do with it? You need to protect the film in some manner to ensure that they will be available when called upon at a later date. Since many serious photographers choose to use slide film, I will discuss this first.

I use Printfile Archival sleeves, available at most if not all of Vancouver's serious photo stores. They are not extravagantly priced and offer thick and durable sleeves that do not stick to the film or prints like other sleeves purporting to be archival in nature. I use various types of Printfile sleeves for the films I shoot and the prints I store away in binders.



- There are 35mm sized sleeves for 20 slides per page
- There are 120 format sized sleeves that come in either four rows of three or three rows of four - I use both depending on how I cut the 120 film
- There are print sleeves that range in size from 8x10 all the way to 20x24 and perhaps even larger - I use 16x20 sleeves to protect the 13x19 sized prints I obtain from the Epson 1270 printer
- There are sleeves to fit 12 mounted 6x6 slides - I find that mounting my 6x6 chromes and negatives first before scanning results in the film being flatter and easier to scan than using the Epson film holders

Since I have limited space to store my film and slides, I use regular office binders to store the sleeves and file them away on a bookshelf. Eventually I will have the space to setup a hanging file system with a dedicated filing cabinet to keep the film completely in the dark.

I use to go to the trouble of archiving and labelling my negative films too but I found that I was shooting too much of the stuff for me to keep up with it and I abandoned the negatives. After receiving the prints and film back from the processor I leave the film in the sleeves from the processor and toss them away into a box that is a step above the common shoebox. With a digital point and shoot camera in hand, the box should remain stable in size.

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Photography e-Book Chapter 12 - Cleaning and Care of Equipment

If you have an abundance of money and can afford to buy every camera and lens from a brand's range then you probably do not need to concern yourself with cleaning the equipment. You either have Jeeves the butler clean it for you or you will probably sell it in favor of the next greatest body and lens before it really gets used too much. For the rest of us, our equipment at whichever level we have bought at, represents a significant investment that should be maintained properly for long lasting use and enjoyment.

There is not a lot that is required, just a few pieces,



- Large hand blower bulb that can move a lot of air
- Blower bulb with fine hair brush to delicately clean of dust and other loose particles, if you can find one made of camel hair so much the better but these are quite hard to find and you may have to order from B&H Photo in NYC
- Can air for those times when the hand blower cannot do the job but exercise caution in use of this product and never use compressed air to clean focusing screens inside the camera's mirror box. The screens are quite delicate and blasting dirt and other particles around the screen may scratch the screen and also cause it to be knocked out of alignment. I use the can air mostly for cleaning really hard to remove dust from film and off of my flatbed scanning bed
- Micro fibre cloth for lens cleaning or general cleaning use - some people may cringe at this but I do actually use the micro fibre cloth for cleaning my lenses - I find it easier and better to use than lens tissue
- Lens cleaning solution and lens cleaning tissue for the serious lens cleaning jobs
- Toothbrush for cleaning hard to reach areas of the camera or the lens exterior - NOT the lens surface

Other useful items to have,

- Anti-static brush to get rid of stubborn dust particles - if you do your own scanning, this could be a very useful accessory given the way dust clings to a scan bed or the film
- ROR or Residual Oil Remover claims to remove carbon residues on a lens that can reduce the amount of light being transmitted through - I have not tried this product myself though
- A very soft leather chamois for cleaning the exterior of the equipment during shooting sessions in the rain - an accessory used by noted landscape photographer Galen Rowell when he is caught in the rain.

Cleaning the lens involves a specific technique,

1. Blow off all dust and particles seen - a hand blower is the safest way to do this but stubborn dust may require canned air
2. If you are using lens tissue, wet the tissue NOT the lens surface
3. With the lens tissue folded up to a comfortable working size, start the cleaning process in the center of the lens element
4. Work in small circular motions in the center and work your way to the exterior by using larger and larger circular motions
5. DO NOT clean in a radial pattern, meaning in straight lines from center to edge or edge to edge, ALWAYS work in a circular pattern
6. If there is still some lens cleaner fluid left on the lens, use a new dry piece of lens tissue to wipe off the excess, again in a circular motion

I like to ensure that there is slight moisture on the lens and if this means having to blow on the lens with my breath, I do so. I know some people will object to the the idea of using your breath but I would not dry clean the original lens element - a filter I hold in less regard and I will cheat now and then with them but NEVER with the original lens

Tools to never leave home without,

- Leatherman or similar multi-purpose tool that can be compacted in a small package for the pocket or for the belt. My leatherman is the standard version with pliers, a blade, scissors, and most useful, four screwdrivers.
- Small flashlight - I use Maglight's ultra small minilight on my keychain
- Jeweller's size screwdrivers for the tiny screws found on almost all major pieces of photo equipment - detail of this tool below.



With any sort of equipment that uses screws, it is wise to ensure that the screws are tight on a regular basis. I have not experienced screws coming loose but others have reported that the vibration of an airplane can be enough to loosen screws in a camera.

* Since the September 11, 2001 attacks on the US, airlines have been very intolerant of any device being brought on board that could be used for a potential hijacking. Use some common sense and pack your tools away in the check-in luggage and not with your carry on bag, so as to minimize explanations and hassles during the check-in process.

I consider myself lucky to have the presence of mind to buy this screwdriver when I saw it on sale in a package with some lens cleaning accessories. The cleaning accessories I basically ditched because they were worthless but this tool is quite a gem with a flat-head and Phillips head, mini screwdrivers. I regret not buying more as I have not been able to find this



tiny tool since.

The screwdrivers are small enough to do work on eyeglasses and is just a wonderful multi-use tool to have for everyday use with modern day electronics.



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Photography e-Book Chapter 13 - Insurance for your Equipment

If you have ever been ripped off either in a break and enter or a mugging and wonder as to where your goods might be fenced, try the large flea markets that are sure to be in every major city. There are probably enough unscrupulous pawn shop owners around that would take in stolen goods and although in Vancouver, they are monitored by the police on a regular basis I am not so naive to believe that that would stop the flow of stolen goods in those shops.

The flea market came to be known to me from an incident that a visiting cousin experienced while visiting the big city. His car was broken into (thankfully not in my neighborhood) and various items were stolen including his cell phone. His cell phone was found a few weeks later when some idiot bought it at the big flea market in town and tried to activate it with the cell phone service provider. My cousin obviously had reported the theft and stopped activation to ensure the thieves would not get much use from it. Alas, he misplaced his receipts and has been unsuccessful in getting his other stolen goods replaced - moral of the story, buy insurance and ALWAYS keep your receipts in a safe place.

I have my own story of theft to tell. Back in 1997 with a brand new Nikon F90x body and MB10 grip attached in a packsack along with a Nikkor 50mm f1.4D AF, Nikkor 24mm f2.8D AF, Nikon SB26 flash, and Manfrotto 190 tripod, I went off to work with the idea of taking some sunset photos off of the Cambie Street bridge on my walk back home after work (back in the days when I still lived in the city).

I was given the boring task of watching over thousands of files during a department move that lasted a week. Many of my workplace files were stored in an area that still had some public traffic through the building and I stupidly left my packsack on a counter around a corner, out of eyesight. I had a misguided sense of security that only the movers would be going in and out of the storage area and my task was to ensure that no person from the public would steal glances at our files stored in their moving containers.

During my coffee break I went around the corner to where the counter was located, I felt sick on the spot as I did not see the packsack on the counter. I ran over and checked all around the counter to no avail. My mind is racing like an indy car trying to think of other possible scenarios, did one of my coworkers notice my pack and bring it back upstairs to our work area; did one of the movers move it out of the way? I knew that neither would be the case after thinking of them and glance over to an exit door leading into a stairwell that ultimately led to the outside alley behind the building.

I went over to the door and at the bottom of the staircase was my pack opened up with the contents strewn out. My Sony walkman was left in the bag and reaching in deeper found my Nikkor 24mm lens along with my Manfrotto tripod but no F90x with the 50mm lens attached to it nor the SB26 flash.

There is always that feeling of violation when you realize you have been ripped off and I went through some mild despair and then anger at the thought of some asshole street junkie making off with my prized camera and hocking it for a few days worth of heroin hits or booze. Then I went through the paranoid stage of wondering if maybe one of the movers took it or even one of the white collar power suit types that do use the storage area regularly - the storage area use to be an old raquetball club and for some reason after the club closed, former members were still able to use the changing rooms, which were right beside the counter I left my packsack on.

I got over the anger and I calmed down quite a bit after confirming with my father that he had indeed kept the insurance on the condo up to date and that he would file a claim on my behalf. A call from the adjuster handling the claim in Vancouver led to an appointment in which I brought in

every receipt I had pertaining to the lost goods. Everything was ship shape as I had reported the theft to police so it was in their records and my insurance was good enough to cover out of home theft with a mere \$200 CAN deductible.

Everything was resolved within a couple of weeks with the insurance company and they forwarded a check to the photo store of my choice when they received the approved price quote to replace the gear. What could have been an expensive \$2500 loss that I would have been hard pressed to recover from turned into a \$200 inconvenience because **I WAS INSURED!**

Not all insurance stories turn out so well though. A friend of mine in my university town of Victoria on Vancouver Island eventually became so frustrated with his claim that he ended the process and replaced the equipment out of his own pocket. The irony is that he purposely bought extended coverage for his gear for his jaunts around the world with his wife (DINKS - Duo Income No KidS). On one of his trips some of his Pentax equipment was damaged and he filed a claim as he bought the type of insurance to cover replacement of the gear.

Basically, the insurance company gave him the runaround with stories of his adjuster going on vacation in the middle of his claim process. A wholly unprofessional experience and the type of story to make you cringe and stay away from small insurance shops. Try to get referrals from friends and family who have already had to go through a claims process and research the insurance company as best as possible before buying a policy.

My current photo insurance coverage is an extension of my home insurance. Now if I were still at the same level of equipment ownership as in 1997, I doubt the insurance company would care much about extra coverage or restrictions on use but this is 2001 and I have accumulated far more equipment than I would have dreamed back in the heady days of only owning one body and few lenses.

My independent insurance broker had to do quite a bit of phoning around and research to find a company that would actually cover what I owned and for the uses I had in mind. In the end she advised that I stay with the same company that was already covering me (different than from the one that originally covered my theft claim). No other insurance company would touch me without a commercial policy to cover the amount of equipment I own.

My current insurance covers me for,

- Replacement value of the equipment, meaning if my F100 is stolen and if Nikon had replaced it with the F200 but at \$500 more than the F100, the insurance company would pay the cost for the F200
- Only covers me for equipment I take outside of the house that I have scheduled with the insurance company - I'm SOL (Shit Out of Luck) if anything happens with unscheduled equipment I take outside of the house
- Covers me fully for all equipment inside the house
- Covers me for personal use only, meaning no commercial work whatsoever although the insurance company does allow me to shoot the occasional wedding for friends and family, pro-bono - basically I cannot make any money with my gear otherwise my use is commercial and requires such coverage
- Charges no deductible for the extra coverage on the photo gear in the event of a claim

This coverage is not bad for an amateur photographer and was the best I could do without resorting to putting metal bars all over my house and having an alarm system hotwired to a monitoring company and at the cost of a commercial policy, well over \$1000 CAN per year. The coverage still costs me a pretty penny every year and my wife is none too pleased with the added expense but I see it as being worth the cost for the peace of mind it provides me.

You only need to be bitten once to learn a lesson and I have learned mine and thankfully at minimal cost. Do not leave yourself unprotected and do not assume that your present home insurance will cover you if you start accumulating more and more equipment. Talk to your agent or representative and make sure you have everything in writing for the terms of coverage.

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Photography e-Book Chapter 14 - Seeing

How to see the world and interpret it on film is going to be the most difficult aspect of photography, at least it is for me. Is the ability to "see" the world a gift or is it something that can be taught and trained into a person through hard work and perseverance? Most of us have heard of claims in which a novice photographer picks up a camera and creates images that are beautiful to behold while another photographer that is able to afford the latest and greatest equipment is unable to create anything memorable.

Or how about the poor student using his manual Yashica FX-3 and 50mm f1.8 lens creating "art" while the rich dentist using his Nikon F5 and Silent Wave motorized lenses produces crap. I think both examples are canards and stereotypes that need not be propagated.

I certainly do believe that there are gifted people who can "see" and capture wonderful images with a minimum of fuss towards the technical minutiae but I also believe that one can also be taught how to see too. This is a fence sitting, gray type of position to hold but life is all about the middle position and it is best to avoid extreme positions one way or the other.

The student using the FX-3 may have some promise as an amateur photographer but not until receiving the discipline of a formal education in photography will the student be able to focus and channel the creativity within and show it externally in his or her art. The rich doctor using his state of the art system can similarly have promise and through books, courses, and workshops, be able to bring out his or her creativity too. What matters is the passion to learn and be the best that you can in your circumstances, not the system equipment at hand.

Without the passion to be a great photographer, amateur or professional, it will matter little what type of low-level or high-level equipment the person uses, for the work will reveal themselves to be passionless. If a rich person truly did purchase a state of the art camera system for prestige factor and never bothered to it take the camera of Program Auto mode, do you really think the images will have any redeeming quality to them? Not likely but the rich person would probably still receive a high percentage of technically correct images but technically correct does not equate to artistically meritorious.

So long as you have the passion for the craft, your photography will indeed improve and reward you with much personal satisfaction. Let us now look at some basic factors that will help us to see an image.

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Photography e-Book Chapter 15 - Rule of Thirds

The most oft-advised technique to good composition is to use the rule of thirds. There are two aspects to the rule of thirds and understanding how they work and interrelate is not difficult at all.

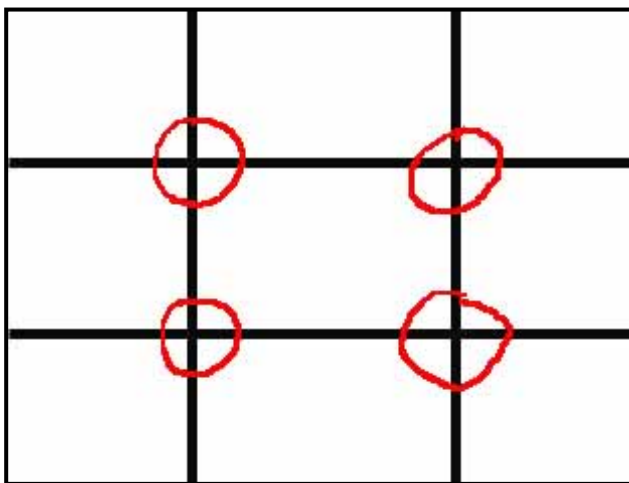
The basic picture scene will have three major elements of:

- 1 - Foreground
- 2 - Middle-ground
- 3 - Background

These elements are self-explanatory and although they may seem more appropriate for a landscape image, they can still be used and applied to other photos such as portraits or abstracts. Being aware of these three elements and how they should be positioned, isolated and enhanced will provide you with a basis to avoid the typical subject-centered image with a 50/50 split that many novices seem to do in the beginning. Yours truly has several of these types of images hiding away in a shoebox somewhere under the bed.



The middle orientation probably has a lot to do with the central focusing sensor of cameras and people's tendency to lock focus and then just shoot. I do the Nikon Shuffle of locking focus on the subject and then recomposing the scene. If your camera allows you to remove auto focus start from the Shutter Release button, do it! This allows you to control when to AF or not and usually, the Shutter Release becomes an Exposure Lock button when pressed half way. You can focus on one subject yet meter for another, a great feature that more and more companies are copying from Canon.



The rule of thirds that most photographers will tend to think of is the viewfinder grid division into nine sections, as seen here. The central four points of the middle rectangle - outlined in red - represent the key points of the composition and it is at one of these four points that you would place an important subject matter. This concept of the rule of thirds is so prevalent and accepted that some companies are offering cameras with auto focus points at the important grid sections as above. The Contax 1N is an example of such a camera.

There seems to be something about the rule of thirds that seems to provide humans with a just-right view of things. The rule of thirds can even be seen in the world of audio in which you have three main audio signals of treble, mid-range, and bass. Harry Pearson of the Absolute Sound Magazine is an advocate of the rule of thirds for speaker placement in which the listener is placed one-third of the way into the room and the so too are the speakers. It is a quick and dirty way of getting acceptable sound but not necessarily the best sound, from a given speaker and room combination.

The advocacy of the rule of thirds is good one to teach learning photographers but it should not be

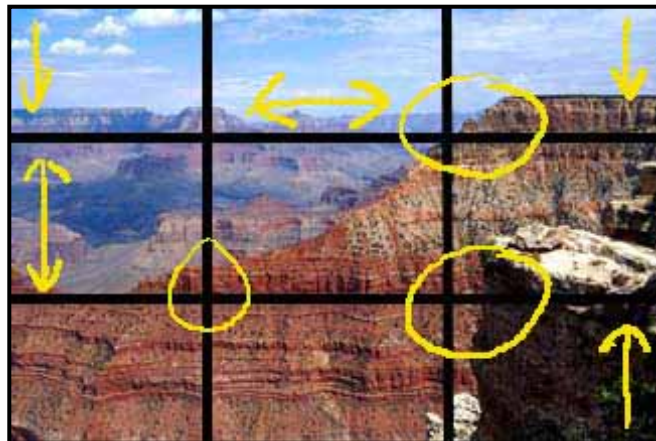
a rule written in stone. For once, you know and recognize the rule of thirds, you will find it everywhere and it holds the danger of being routine and unoriginal as a 50/50 scene split or centered subject. Be bold and experiment for every subject will have a composition that could focus in on it and that may or may not be the rule of thirds. Therefore, while the rule of thirds is a quick and dirty method of getting an acceptable composition, it may not be the best method for your subject.

One of my favorite photographers is Richard Martin, a contributor to Canada's Photo Life magazine. He advises photographers to not become overly tied down to rules otherwise the photographer runs the danger of doing everything the same and never being able grow beyond those restrictions.

I find myself using the rule of thirds quite often but each image is unique and you should try to see the scene from different angles and perspectives. You may find that a rule of thirds composition is not the way to do the shot. Reading through the National Geographic Photography Field Guide can be enlightening thanks to the photographer profiles within the book. Two of the best, Michael Yamashita and William Albert Allard, indicate that they shoot through hundreds of slides in order to get just the right shot to convey the message or idea they have in mind. William Albert Allard considers the film and camera to be a sketch pad for him to try many different ideas and approaches to photography.

The message? Simple, take the rule of thirds composition but do not stop at one or two shots but take many images and thoroughly work the subject if it is worthy enough. Now of course we all do not have National Geographic expense accounts that allow us to shoot hundreds of rolls of film for a trip or outing, so cost can and will be a factor. A digital camera would make the experimentation process much easier to bear.

Take another look at the Grand Canyon shot with a rule of thirds grid imposed on it. I did not know about the rule of thirds when I took this shot in 1997 and the camera I used, the Nikon F70 did not have a grid screen in it - nor can it. The shot is full frame with no cropping. It would lend some credence to the notion that subconsciously, humans may see a scene a certain way and without any preconceived ideas of what is a "good" composition, they will gravitate towards those tendencies.



You will notice that near the four middle points in the grid are some important elements to the scene.

- The foreground rock mass is near the lower right point
- The middle ground diagonal line starts at the lower left point
- The middle ground plateau starts off near the top right point
- The background canyon area starts one-third of the way down from the top of the frame leaving the sky to occupy the top third
- The middle ground area occupies much of the lower third of the frame

I am not suggesting that this is a wonderful image, merely that we may all have natural rule of thirds tendencies.

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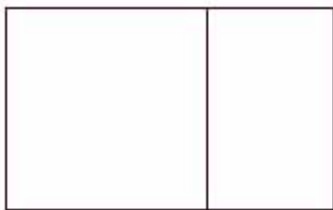
Photography e-Book Chapter 16 - The Golden Ratio

Loosely related to the rule of thirds is the Golden Ratio also referenced to the Golden Rectangle. This is, as far as I am able to decipher from a layperson's perspective, a mathematical look at human aesthetics. Mathematicians seem to love to apply numbers to what seemingly could or should not have numbers applied to them but what do I know, as there are many geniuses out there seeking a single mathematical formula that would explain the nature of the universe and of life itself. Mathematicians have even come up with a formula for the human decision-making process, better known as Game Theory or the Zero Sum Gain.

The Golden Ratio has purportedly been a profound influence since ancient times with Greeks utilizing the Golden Ratio in their buildings such as the Parthenon at the Temple of Athena on the Acropolis. During the Renaissance when European artists rediscovered the styles of the ancient world, the Golden Ratio was utilized for their sculptures and paintings. Leonardo da Vinci being the most prominent Renaissance artist known to have used the Golden Ratio for great works such as the Mona Lisa.

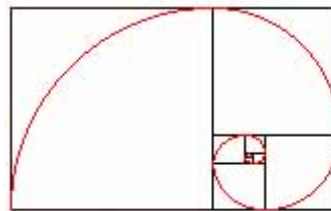
The shape of the Golden Ratio in physical form is supposed to be considered very esthetically pleasing to humans. One of the most interesting graphic forms of the Golden Ratio is the nautilus shell and the way the shell starts from a central origin and then spirals outward around itself until it reaches the horn or opening of the shell where the cephalopod's head is located. The Bowers and Wilkins speaker company of Britain, better known as B&W, designed a reference speaker with the nautilus design and called it...the Nautilus. A most intriguing and apparently an excellent sounding speaker.

The more traditional physical shape of the Golden Ratio is the golden rectangle. This rectangle is comprised of a square and one-half of another square that is the same dimension together, as seen below. It can be seen as another example of the rule of thirds as the rectangle can be comprised of three equally sized smaller rectangles. Technically, the golden rectangle is comprised of two parts that follow the Fibonacci sequence.



1, 1, 2, 3, 5, 8, 13, 21, 34 etc. Each succeeding number after 1 is equal to the sum of the two preceding numbers.

Add enough golden rectangles arranged a certain way and soon you will have the golden curve that spirals around like a nautilus shell.



The Golden Mean or Phi and the Golden Ratio abound in nature and perhaps humanity has been genetically programmed to recognize the ratio as being pleasing. Flower petals and pinecones are two examples of spiral designs that use the Golden Ratio. Why this ratio of 1.618? This ratio provides the flower petals and leaves with maximum exposure to sunlight and allows rain drops to flow down to the root in the most effective manner. The sunflower positions its seeds in a Golden Ratio spiral because it is the most effective manner of having as many seeds in a given amount space possible and allowing them to remain un-crowded within that space.

Below is a flower that one can still see a spiral pattern emerge from the middle buds.



Ancient Greeks were not the only ones who understood the Golden Ratio. Egyptians used the Golden Ratio for their pyramids and the layout of the three great pyramids of Giza use the curve of the Golden Ratio that is predominant in a nautilus shell.

This is all heady stuff, especially for math idiots like me who can barely remember the multiplication table. I am sure I have offended the logical readers who actually know about this stuff with my most basic of descriptions for the Golden Ratio. What does this have to do with photography?

Photography is a pursuit that can be many things to different people. If we look at photography as being an art form like painting (and really they are no different) then the artist must have at least a cursory understanding of artistic principles. Aesthetics, what is it and why is something considered aesthetic?

Since it is naturally abundant, the Golden Ratio, once discovered, would obviously have profound influences on human art. Place a number of similar artifacts in a room and the one that adheres to the Golden Ratio is the one most people will choose as being the most pleasing. As humanity is a part of the natural world, it should hold that we ourselves could be some sort of derivative of the Golden Ratio in terms of the relationship of our limbs to the torso to the head.

Understanding some of the basic technique can help us understand why it is that we find something to be pleasing to the eye. However, I still believe that the majority of the photographer's development must be borne from experience rather than theory. It is not so much what we do right that teaches us but what we do wrong or do not know. As we attempt to correct the wrong or understand what is unknown, the process has more meaning and teaches us. If we do something correctly right away, there is less incentive to understand how we did it right, if we did it correct once we will do it again. Try to keep the conceit in check on those occasions when you hit all the right factors and create a special keeper photograph. Use it as the basis to inspire you to keep on producing high quality and creative work.

There are some photographers who adhere strongly to mathematical or technical placement of the subject in the scene. I do not believe there is a need to be so strict and vigorous in composition, also because I would not even know how to use the Golden Ratio for my composition anyway. My opinion is that humans have the ability to "see" what is pleasing and what is not and the more you practice the craft the better you will develop your sense of seeing. Being rigid with your photography will reveal themselves soon enough.

We witness something and we feel compelled to explain it. We see a certain trend in how humans react to certain types of designs and try to explain that too. Sometimes it is better to look, feel, and experience rather than take cold numbers or equations to an idea or concept, especially when dealing with the creative process. Science and math have their place though for I would rather live

in a house designed by a trained architect instead of an untrained artist, no matter how brilliant.

Update September 1, 2001 - As I type this now, I have just watched The Learning Channel's (TLC) special on the human face, hosted by John Cleese of Monty Python fame. A short segment of the special dealt with a ratio, a certain 1.618 ratio in fact, otherwise known as the Golden Ratio. I mentioned above that the Golden Ratio is associated with what humans consider to be attractive and the TLC special made it very clear how this ratio pops up over and over again for the human body and face. Why are models considered so attractive and why is it that only certain girls are recruited to become models? The TLC special revealed that all of the top models and faces in general that are considered beautiful have an abundance of the 1.618 ratio.

Take a measurement from you feet to your torso, then from your torso to the top of your head. The second measurement on an attractive body will be a ratio of 1.618 to the first measurement. Measure the width of your mouth at rest then measure the width of your nose, the ratio on an attractive face will be...1.618. The Golden Ratio pops up over and over again for what humans consider to be attractive and it is becoming more and more clear to me that it is a natural phenomenon so pervasive that Pythagoras called it a universal beauty so many thousands of years ago.

Now the challenge is how to incorporate this universal ratio of beauty into our photography as artists. I am going to have to research the art of the Renaissance era to gain some more insight into how the masters of old saw and created.

[Reference page](#) for more detailed and technical information on the Golden Ratio.

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Photography e-Book Chapter 17 - Perspective

Perspective is an important part of being able to "see". Perspective is all about the distance between photographer and the subject. The choice of lens is an important factor in perspective but the example photos below will show how perspective changes as you alter the distance between yourself and your subject.

The important factor to keep in mind is that if you take photos of your subject at a given distance away from it, your perspective will NOT change no matter which lens you use. Whether it be a wide-angle lens or a telephoto lens, your perspective will be the same so long as you remain at the same shooting distance to the subject. All that has changed is the magnification of the subject on film. Take two images of the subject with different lenses and all you need to do to get the same image from the wide-angle lens as the telephoto, is magnify the subject until they are the same size. You will find that the view is the exactly the same with no difference whatsoever in perspective.

If you alter the shooting distance to the subject then your perspective has changed. It is easier for me to direct you to the sample images below to help understand what I am discussing.

The more you use your lenses, especially the wide-angle ones, the more you will understand the nature of perspective and what exactly it is in the viewfinder you wish to emphasize and reveal in your image. Photojournalists love using wide-angle lenses to get in tight to the subject yet still be able to reveal the subject in its environment. It is just not the same for the photographer to sit back and use a telephoto lens to get the subject the same size. Although the use of a telephoto lens would be most effective to isolate the subject with its narrow angle of view, the perspective of the subject within its environment will have been lost.

If you have the time to contemplate and reflect upon what it is you wish to capture on film, you can experiment with different lenses and see which one will convey your message or ideas across the best in your final image.

Here we have a series of shots of Mr. Teddy, a most gracious and undemanding model. The first three shots were taken at the same location for the wide-angle and telephoto images. Perspective does not change at all, only magnification. By magnifying the portion of Mr. Teddy's head to the same size as the telephoto shot, we can see that it is the same shot in that the background chandelier and plant are exactly the same in relation to the head.



Wide-angle shot of Mr. Teddy at 38mm



Telephoto shot of Mr. Teddy at 115mm at the same location as the wide-angle shot



Wide-angle shot of Mr. Teddy at 38mm but cropped in and magnified to similar size as the telephoto shot at left

The two images below show what happens when different lenses are used to keep the subject matter the same size, revealing a change in perspective.



Wide-angle shot of Mr. Teddy taken by moving up to the bear until the head was similar in size to the telephoto shot at right. You will notice that despite the subject being the same size, the background is still visible in this shot and that they appear to be farther in the background.



Telephoto shot of Mr. Teddy taken at a farther location than the example shot at left. You will notice that the background objects seem much closer than with the wide-angle shot and the angle of view is much tighter. This obviously a completely different perspective than the wide-angle shot at left despite the subject being the same size.

Print Perspective

Perspective is also a factor in print sizes and the distance required to view the image properly, as in breathing space. It is said that the vast majority of prints made around the world are the small 3x5 or 4x6 types that people receive after dropping off their film at a one-hour processor (because the vast majority of film shot around the world are color negative types). These small 4x6 size prints are usually viewed in close proximity to the viewer, say about a foot from the eyes to the print. This comfortable viewing distance may in fact be the wrong perspective depending upon how the image had been taken.

There is one rule of thumb I have come across to provide a guide as to how far away a print should be in order to convey proper perspective. That is to use the diagonal length of the print as the proper viewing distance, meaning that a 4x6 print should be viewed from a distance of about 7 inches and an 8x10 at a distance of 13 inches. However, I am not so certain that this a good rule of thumb to follow for one main reason, most of the time we will not know which lens has been used to take the image and this is an important consideration for proper viewing perspective.

Now, certainly, the larger the print, the greater the distance required from the print to the viewer's eyes. One should not view a poster size print from 6 inches away, as we need to step back some feet in order to allow the eyes to take it all in but what if we had taken a portrait image with a very wide-angle lens?

The resulting image on print viewed at rule of thumb distances will appear distorted, however if we were to bring the print closer to our eyes, the perspective of the image on paper will begin to lose its distortion and start looking "normal". Wide-angle lenses focus much closer than normal or telephoto lenses and images taken with wide-angles require a closer viewing distance to maintain proper perspective. The reverse is true of images taken with telephoto lenses as the focusing distance of telephoto's farther away than wide-angle or normal lense, so we must be farther away to maintain proper perspective.

Try this with the example image below, a portrait taken with a 20mm wide-angle lens that from a normal viewing distance appears obviously distorted but will look normal when your nose is a scant few inches away from the screen. Of course, your eyes' minimum focusing distance must be fairly close to allow this to work. My eyes cannot focus closer than 6 inches and such close viewing gives me headaches so wide-angle portraits do not work for me.



One last note, proper viewing distance is why we can get away with lower dpi print resolution for large prints and why we need higher dpi resolutions for smaller prints. The closer the eyes are to a print, the more details we will notice and thus a smaller print that is held closer to our eyes will require much higher resolution to maintain its photographic appearance. A larger print is viewed from greater distances, such that our eyes cannot pick out all the micro details. The print can be "sloppier" and still appear as a photographic print. Billboard size prints are usually nothing more than a series of large dots when seen up close but since billboards are meant to be seen from great distances, we do not see the coarseness of the actual print.

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Photography e-Book Chapter 18 - Depth of Field

Depth of Field or DOF is an important part of a photographer's developing sense of seeing the world. It is probably the one aspect of seeing that you will most often come across in reading about how a photo was taken and what the photographer was trying to achieve, such as, "I was trying to limit the depth of field to isolate the subject", or "I was trying to maintain as much depth of field as possible for this grand landscape."

For every image captured on film, there is only one true plane of focus that will be assuredly sharp because a photo is merely a two-dimensional representation of a three-dimensional reality. DOF refers to the zone in front of and behind the true plane of focus and your choice of lens and aperture will dictate how sharply rendered those DOF zones are on film or prints. Depending on your subject matter, you may desire more or less DOF. Generally speaking, landscapes require more DOF and portraits require less DOF.

DOF is comprised of two parts, the zone in front of your subject focus and the zone behind your subject focus. Often times DOF is taken as a combination of the two. The DOF behind the subject is larger than the DOF zone in front of the subject. The rule of thumb of focusing one-third of the way into a large landscape scene in order to maintain maximum depth of field is due to considering the shallow front DOF zone. This maximizing of the DOF is related to the Hyperfocal distance.

There are a few rules of thumb to understand about DOF,

- Stopping down the aperture will increase your DOF, i.e., f11 has more depth of field than f4 - this based upon experiments of old discovering that smaller aperture produced sharper images but only up to the point that diffraction comes into play
- Wide-angle lenses have greater depth of field than telephoto lenses - people often complain about their digital cameras having far too much depth of field to the point where just about everything is seen as sharp and isolating a subject is very difficult to do. This is because digital cameras generally use CCD capture devices that are much smaller than 35mm film format or even APS and only by using very short focal length lenses can a camera have what we would consider to be a normal angle of view. These short focal lengths would be ultra-wide angle lenses or fisheyes in 35mm format.

***Update** - Since writing this piece, I realized that I did make myself clear about this point with wide-angle lenses. Wide-angle lenses do have greater depth of field when you are merely changing lenses at one shooting location, however, if you were to use a telephoto lens at one location to take a photo and then switch to a wide-angle lens and move closer to the subject in order to have it the same size on film as what the telephoto lens provided from farther back, the depth of field will be the same. What will change drastically though is the perspective and relationship of the subject to its background. Basically, as long as the subject remains the same size on film, no matter what lens you take the shot with, the DOF will not change but I wrote the above from the perspective of the photographer shooting from one location only. More about this aspect of depth of field is available at Michael Reichmann's [Luminous Landscape website](#).*

- The closer you get to a subject, the less DOF you have. Macro photographers know this all too well, as they increase their magnification of the subject on film, they must stop down the lens in order to have more of the subject rendered sharply on film. Often, the lens must be stopped down all the way to the minimum aperture available just to ensure that the subject itself is wholly sharp looking. DOF in the macro world amounts to mere inches or less instead of many (hundreds of) feet when shooting at infinity.

The immediate way of controlling the DOF is by adjusting the aperture. DOF is so important that experience has revealed to me that the majority of photographers choose to shoot in Aperture Priority mode with their cameras. With a given lens mounted on the camera, the photographer can choose to set the aperture wide open to help blur out the background for a portrait session or the aperture can be stopped down to render the background sharp. The important aspect here is that the photographer maintains control of DOF while still being able to enjoy semi-automation from the camera setting the shutter speed for the aperture chosen.

Now of course, the use of certain lenses makes controlling DOF more restrictive, such as with wide-angle lenses. However, the photographer still maintains control because the conscious choice of using a wide-angle lens usually means the photographer desires immense depth of field. It is simply the opposite with telephoto lenses, in which the photographer may want a completely blurred out background to ensure that all the attention is on the subject by the viewers.

Related to DOF is Hyperfocal distance and Circle of Confusion, or COC.

Hyperfocal distance is the maximum DOF possible for a given aperture setting for a given lens focal length. Another way of defining hyperfocal distance is, the closest distance that will be rendered sharply when the lens is focused at infinity (Photonet Lens FAQ). There is a specific calculation that one can use to determine the hyperfocal distance but since I am not so good with numbers, I decided not to pain myself by including it and trying to explain it. Others have done the job already and sell charts for many popular focal lengths and aperture settings.

If you have prime lenses or use manual focus zoom lenses, then it is very likely you have some basic hyperfocal distance information already. Some photographers do not trust DOF charts or what the lens DOF setting tells them for a given aperture. Charts and settings are based upon a known physical calculation and would be right on for perfect lenses but due to vagaries of quality control and sample to sample variation and the fact that the perfect lens cannot be produced, experience has led some to be more conservative with DOF considerations. Instead of setting the focus and DOF for a desired f11, they will use the distance for f16 but still use f11 as their actual aperture setting.

Circle of Confusion

Circle of Confusion may get a bit esoteric for those starting out in photography and after you learn more about it, you may find it to be nothing more than the delight for the anal-retentive among us. I have never thought or worried about what the COC would be for any of my images in the four years I have been involved in photography. However, since it is related to Depth of Field, I thought I should add some comment about it.

COC relates to the scene detail outside of the one true plane of focus in your image. The out of focus points become small circles and if the circle is small enough, it will be considered sharp by the human eye (Photonet Lens FAQ). COC is dependent upon the film format you use and the smaller the format, the smaller the COC must be in order to appear as a sharp point in the image. For 35mm film format, the COC is generally accepted as 0.03mm but some lens companies apparently apply a stricter standard of 0.025mm. This is considered the threshold for the human eye to consider something as being sharp or blurred, hence the term Circle of Confusion.

The smaller the film format, the sharper the lenses must be to resolve the details in the scene and withstand enlargement. Medium and large format lenses are not as technically sharp as 35mm lenses but the results with the larger films will still be superior to that from the best and sharpest 35mm lenses. Simple reason why, the larger film images do not have to be enlarged as much as the smaller films for a given print size. This generality can be proven wrong though if a photographer were to use a super high resolution film with 35mm format and uses a lower resolution film with a larger format. Photodo did such a test and the results revealed surprising parity between 35mm format using Kodak TMAX film and large format using the older Kodak Tri-X.

COC is obviously related to your enlargement factor. Viewing a 35mm slide with a 4x loupe will probably lead you to believe that most everything is in sharp focus but move up to a 8x loupe which basically provides you with what an 8x10 would look like (8x10 being a 8x enlargement of a 35mm slide), and you will likely change your mind about how sharp the image is. The greater the

enlargement, the tighter the COC must be in order to maintain sharpness. The distance of the viewer to the print is also a factor as a person would not normally keep his nose scant inches away from a 20x24 size print but would instead be a few feet back to take in the whole print.

The relation to depth of field is that if you are concerned about the COC then it is likely that you are trying to maximize your zone of sharpness in a landscape scene, from very close up to infinity for the purposes of large print sizes. With only one true plane of focus, you need the other scene elements encompassed by your depth of field to be as sharp looking as possible to maintain integrity in your enlargement.

Sometimes, no matter how stopped down a lens is and no matter how wide a lens is, we just simply cannot obtain enough depth of field to cover everything from the foreground to the background into sharp focus. Now when I say, no matter how wide a lens, I qualify that within reason because normally, landscapes are not taken with ultra wide lenses such as those available from Voigtlander for their Bessa bodies (and Leica).

When you use larger film formats, the wide-angle lenses are actually normal or even moderate telephoto in terms of 35mm format. Example, my Bronica PS 40mm lens is the widest rectilinear lens available for the 6x6 SQ-Ai body. This lens if mounted to a 35mm body, would be a near normal lens but for 6x6, equates to an angle of view approximating 24mm in the 35mm format. Although it is a wide-angle lens, the 40mm does NOT have the DOF as a 24mm focal length in 35mm format. It still has the DOF of a 40mm lens.

This is true of any focal length for any film format.

- 150mm lens is a middle telephoto lens in 35mm format
- 150mm lens is only a moderate telephoto in medium format
- 150mm lens is a normal lens in large format (4x5)

In all three cases, the 150mm lens maintains the same DOF in each format. Just because a medium format 150mm equates to an 85mm lens view in 35mm, does not mean the lens has the same depth of field as an 85mm lens in 35mm format. I hope you understood that because this is a common misconception among beginning photographers.

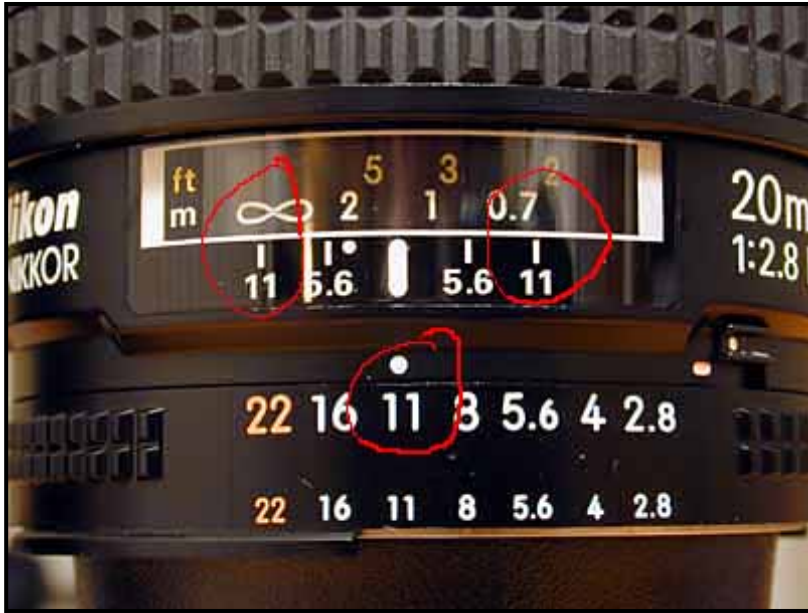
The point is this, the 150mm lens will **appear** to lose DOF as you move up in film format but it does not actually lose anything. The problem for users of large format is that the shallow depth of field offered by a 150mm lens means greater difficulty in having an expansive DOF from very close foreground to infinity, despite it being a normal view lens. This shallow DOF is exacerbated with large format but thanks to large format cameras having tilt and shift capabilities, the shallow DOF can be ameliorated with the use of the Scheimpflug Principle. Since I am not a large format photographer **YET**, I would direct you to [other online sources](#) of what this technique is about and how it works.



Current autofocus zoom lenses do not have DOF markings anymore



Older lenses including zoom lenses, have DOF markings as indicated by the red markers



Depth of Field markings on a prime lens provide a guide as to the zone of sharpness for a marked aperture setting. In the example here, the lens aperture is set to f/11 and by moving the infinity marker to the left side f/11 setting, our DOF reading would be a sharp zone from 0.7 meters or 2 feet to Infinity. Our Hyperfocal setting would be about 1.5 meters or 5 feet in order to achieve maximum DOF, which is in line with what a 20mm wide-angle lens should provide.

Hyperfocal distance may seem a bit off-putting as we focus the lens at a distance slightly further ahead than our desired start of the zone of sharpness but this is the technique

used by many landscape photographers to achieve maximum depth of field for a given aperture in their images.



Shallow DOF allows the subject to stand out from the background - use of wide open apertures can blow away distracting backgrounds, very useful for portraits (this image had the background digitally blurred even more than was provided by the wide open aperture on the Nikon CP950 digital camera to better enhance the idea of shallow DOF)

Stopping down a lens will increase the DOF and allow the background to become more clearer and give the appearance of increased sharpness but there is only one true plane of focus for the subject - although the lens was stopped down to minimum aperture on the CP950, it was still not enough to get Piglet really sharp looking

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Photography e-Book Chapter 19 - Digital Imaging

Digital imaging is everywhere these days and it would be difficult for many of us to try and avoid it completely. Even shopping mall photo outlets are now using digital technology to scan film negatives before outputting to prints. Digital conjures up a debate amongst those traditionalists wanting to keep silver halide film as the standard bearer while others have abandoned film and gone wholly digital.

Is there a right and wrong to this debate? No, because at this particular time there is room enough for film and digital users to stand beside each other, each having their own strengths and weaknesses to be exploited or avoided by an experienced photographer. However, even many film users find themselves drawn to digital technology and the ranks of the craftsmen still plying their skills in the traditional darkroom is dwindling.

There are different ways to experience digital imaging or photography, so let us first look at it from the perspective of a film user.

As I mentioned already, film users may be experiencing digital technology and not even know it. A typical consumer may drop off a roll of film at the local Walmart or shopping mall store and then come back in a little while to pick up the developed film and a bundle of 4x6 prints. The consumer may be wholly unaware that their roll of film was developed, scanned and then printed via a Fuji Frontier system, which is now available in many places.

For photographers wanting more control of the editing and printing process, they can either work in a darkroom or move onto the digital darkroom and work with their film images on the computer. More and more film users are greatly enjoying the benefits of the digital darkroom and getting away from the foul smelling chemicals hidden away in a dark closet or spare bathroom. However, a means of digitizing their film images is still required before being able to edit the image.

Film Scanning

Photographers with the financial means will purchase their own film scanners and printers (typically a good inkjet) to facilitate the digital darkroom, whereas those without the good chunk of change required to purchase a good film scanner can still have their film scanned at a professional photo lab.

Having a professional photo lab scan the film has the added benefit of having the lab's technician do the grunt work of cleaning and spotting the scan for dust, the bane of a photographer working in both the traditional and digital darkroom. Unfortunately, high end scans at a pro lab can cost upwards of \$100 per scan or more depending on how big a print you want. Although expensive at first, purchasing a film scanner can make much better financial sense in the long run from not having to pay large scanning fees.

Photographers working primarily with 35mm format have an embarrassment of choices available to them. There are literally dozens of film scanners available on the market that run the range from low resolution to very high resolution



with different feature sets and benefits such as Digital Ice, which works very effectively to counter dust on film. Prices vary from a few hundred dollars to a few thousand dollars depending upon the quality desired from the scanner.

Photographers working with larger format films such as 120 and 4x5 and larger have far fewer choices and the price of admission can become beyond the reach of many of these photographers.

At present there are a few medium format film scanners that provide very high quality scans at prices that may be achievable even by the serious amateur. However, as good as these film scanners from Minolta, Nikon and Polaroid are, they are limited in format lengths and preclude the continuous scan of a panoramic size such as 6x12 or 6x17, typically maxing out at 6x9. This class of scanner is in the \$5000 CAN range.

For the large format photographer, there may still be a Polaroid film scanner able to handle 4x5 sheets but no other and even this Polaroid 4x5 scanner cost a very pretty penny of \$10,000 CAN. There are other options available for film scanning, such as the very highly regarded Imacon scanners from Denmark, but this class of scanner can be priced like a decent mid-level car, such as a Toyota Corolla or even higher up. The benefit is that you could scan super large format film sheets up to 11x14 if you had the bank busting outlay for the top of the line Imacons.

There a few professional photographers shooting film who have made the investment in an Imacon class film scanner because of the quality provided; however, even a lot of pros would be hard pressed to come up with the outlay needed for an Imacon or similar quality film scanner. Even fewer would be able to invest in a drum scanner for what is considered the ultimate in film scanning technology. If the average Imacon costs like a low-end Toyota, then a drum scanner costs like the average Acura.

Many medium and large format photographers compromise on the scanning of these larger pieces of film with a flatbed scanner. Now before going further, we should acknowledge that there are flatbed scanners out there that make the Imacons look cheap and can rival drum scans in quality, but this is not the type of flatbed scanner I'm talking about.

Right now, the darling of the affordable flatbed scanners is the Epson Perfection 2450, which will soon be supplanted by the Epson Perfection 3200. The Epson 2450 costs under \$700 CAN and more than a few users claim to be getting results that are more in keeping with the \$5000 Nikon and Minolta film scanners. Whether true or not, the general consensus is that this unassuming flatbed scanner punches well above its weight and provides a quality that its asking price would not normally be associated with. I can only imagine what the new Perfection 3200 will be like, as I look to upgrade my own very cheap Epson Perfection 1200 flatbed scanner.



Just keep in mind that when considering a flatbed scanner, if the unit does not already come with or integrates a transparency adapter into its design, you need to ensure that there is a transparency adapter available. A transparency adapter fits on top of the flatbed in place of the normal lid and provides a secondary light source required to scan film. Without it, a flatbed's bottom integral CCD and light source is not strong enough to scan film.

Newer flatbed scanners designed with film scanning in mind usually come with the transparency light source built in, as found in the Epson 2450.

Digital Capture

Going with straight digital capture alleviates the muss and fuss of working with film and then

having to get a scan done. A faster turnaround is highly advantageous to those on strict deadlines, such as photo and sports journalists. Many studios creating commercial images have also gone wholly digital because of the ability to work much more quickly with the client's art director instead of taking endless Polaroid images and then discussing what should be done next without benefit of knowing truly what will be on film until it has been processed.

There are three main ways of doing digital capture, so here we go.

Digital Point and Shoot

- The entry level digital camera that now sees a very large range of products with varying prices and resolution to go with them.
- Cameras are now as low as \$100 CAN and typically max out at around \$1800 CAN with most of the action occurring in the \$600 to \$1200 range.
- 5 mega pixels (MP) is the current maximum for the higher end models such as the Sony F717 and the Nikon Coolpix 5700; however more and more 4 MP cameras are showing up in the popular \$600 range.
- The \$600 class of camera may be popular but this is still consumer quality stuff with serious photographers needing to look at the \$1000 plus range for a camera with good resolution, features and a control set that allows for some manual control of the exposure modes. The Canon G3 and Nikon Coolpix 4500 are good examples of these better class of cameras, which have good manual control options as well as the ability to do more advanced flash work thanks to the ability to connect an accessory flash unit.
- Compact Flash cards are the most popular means of storing digital captures in the camera but at the lower range and with certain brands such as Fuji and Olympus, Smart media cards are quite prevalent. Sony cameras utilize their own Memory Stick media, which comes in a maximum 128 MB size; however Sony has announced new Memory Sticks with higher capacity, but these new media may not be compatible with the older Memory Sticks.
- Compact digital cameras are becoming smaller and smaller every day with innovative approaches to design, a 3 MP camera can be no bigger than a cassette-tape. It facilitates a take it anywhere you go approach to photography and allows the real hardcore photographer to always be prepared for a photo opportunity.
- Some people will claim the ability to do fairly large print sizes from compact digital cameras (11x14 or so), but do be wary of such claims until you see the results with your own eyes. I find 200 dpi to be the minimum required to ensure the digital image looks like a true photo and not as a bunch of pixels trying to render a facsimile of an image, but others will not accept anything except 300 dpi, and that does limit the maximum output of all of the compact cameras available now.



The point and shoot class of camera can certainly produce some stunning images within appropriate print sizes and the all-in-one design eliminates the dust problems faced by digital SLR (D-SLR) users; however, there are limitations to the design that users need to be aware of.

- The all-in-one design generally does not have ultra wide-angle capability with most digital compacts going no wider than about 38mm equivalent in 35mm format. Even with lens adapters and converters, the maximum wide-angle coverage is usually 28mm. Nikon is the exception to this rule with most of their digital compacts being able to utilize wide-angle converters that can cover as wide as 19mm on some camera models.

- The imaging chip used in digital compacts is puny in comparison to D-SLRs and unfortunately, such small chips will not be able gather as much light and resolve as much detail as the D-SLRs. Small imaging chips will also suffer when called upon to do long timed exposures and higher ISO speeds are limited and quality can suffer significantly too.
- Related to the tiny imaging chips is the use of very short focal lengths for the lenses in these digital compacts. A user is going to have tremendous depth of field for almost all of their images even at the maximum telephoto range with a wide open aperture. Thankfully, digital editing can help to alleviate such problems.
- Many compact cameras are slower to operate with precious time taken for the camera to motor and power up to be ready to take a shot; however, the time lag seems no worse than some film point and shoot cameras, which also require a significant amount of time to be ready for a shot. Fortunately, camera makers are starting to address this liability and although not quite there yet the speed of certain camera models and their ability to do a burst of shots is helpful.

The Digital SLR

- This is where all the action is for serious photographers who want to be able to buy into high quality digital without re-mortgaging the house, as would be needed with our last look at digital capture (later on in this report).
 - Still more expensive than most photographers would care to pay for, but the consumer class of D-SLR (Canon D60 and Nikon D100) now cost no more than a top notch film camera such as the Nikon F5 or Canon EOS 1v HS.
 - The best D-SLR bodies are built every bit as good if not better than their film counterparts. The Canon 1D and 1Ds lead the field in robust build and environmental seals. However, consumer quality D-SLR cameras are built like their film counterparts too, which leads to big discrepancy in price when you look at a \$700 CAN Nikon F80 and compare it to the \$3300 CAN Nikon D100.
-
- The ability to use existing lenses is a large benefit; however, the capture chips like very high quality lenses in order for the user to obtain maximum quality from the camera. Unfortunately, this usually means a brand's most expensive lenses that have been designed with digital capture usage from the get go.
 - With the exception of only three D-SLRs to date (Canon EOS 1Ds, Contax N Digital, and Kodak DCS Pro 14n), all other D-SLRs have a smaller than 35mm size capture chip. Typically a 1.5x magnification factor is in play but 1.6x and 1.7x factor are also found in certain camera brands. This means a tighter field of view than would be the case if using a full-size 35mm capture chip. It does NOT mean an actual magnification of the subject, as commonly inferred by digital photographers, as it is merely a crop. So your 200mm lens does not become a 300mm lens just like that; however, you do enjoy the same field of view as that 300mm lens would have on a 35mm film camera.
 - Related to this crop factor is a misunderstanding of Depth of Field (DOF) considerations with D-SLRs. Ask many photographers about DOF from a digital camera and they will likely respond that a digital camera has greater DOF than a 35mm kit, but do they know why? A 50mm lens is the normal lens for 35mm format. On a D-SLR with a 1.5x factor, that same 50mm lens would now provide the equivalent angle of view of a 75mm lens; however, the DOF has not changed one bit, as the 50mm lens has the same DOF no matter what body it is mounted to. But if we want the same angle of view as that 50mm lens on a 35mm body, then we have to use a 35mm lens on a D-SLR. Optical theory states that a wider-angle lens

will have greater DOF, thus our D-SLR user, although seeing the same angle of view as the 35mm user with his 50mm lens, will have greater DOF.

- The large capture chips used in D-SLRs allow the ability to do long timed exposures of several minutes without needing a liquid nitrogen cooling pack built in (astrophotography) and very high ISO speeds can be enjoyed with similar or better results than comparable film products. However, keep in mind that if your thing is long timed exposures, film is still a better choice because of the amount of excessive noise that can build up in a digital capture device due to the heat generated by the chip being on for an exposure.
- The move to a D-SLR can be fairly seamless and work hand and hand with an existing film system. The speed of a D-SLR is comparable to film camera, so no waiting around for the camera to power up, but of course a few high resolution D-SLRs are limited in the frame rate and burst capture ability while others with more modest resolution were built for speed. People are still waiting for that one D-SLR that can do it all, from very high resolution capture to super fast burst frame rates with a large buffer to allow for longer shooting times. High speed is great but without a large buffer, not as useful.
- No need to carry a variety of films with you, as you can adjust the colors, contrast, tone even saturation in editing. Turn that color shot into a B&W just like that.
- No more worrying about airport X-ray machines toasting your exposed films as flash media are quite robust and take up a whole lot less space than a comparable amount of film. The other popular form of storage is the IBM Microdrive, which is physically, a tiny hard drive, which means moving parts and greater susceptibility to knocks and drops. Microdrives are also limited to a maximum altitude due to the way certain parts "float" on top of a layer of electrons and high altitudes can change that floating relationship and cause problems.

There are some drawbacks to the D-SLR, which can also apply to digital in general:

- Power, you always need it and with some cameras, you always need to carry around extra battery packs and the dedicated charger with you due to their power hungry CCDs.
- Storage of images - while flash cards are much easier to pack than film there is still a finite amount of space available on each card, so you either need a digital wallet or a laptop with you to download the image files and be able to reuse the flash cards for very long or extended shoots. Neither extra flash cards nor digital wallets or laptops are inexpensive.
- Dust - for D-SLR users using CCD capture devices, dust can be a problem; however this usually only makes itself known in light continuous tones in the sky.
- Cost of repair can be quite hefty if your camera is no longer under warranty and will require the expertise of the original manufacturer whereas many film cameras can be serviced by local shops.
- High initial capital costs to purchase that expensive camera and all the attendant accessories such as batteries and flash cards to make it run, on top of any computer gear you need to purchase to edit the images afterwards.

The Digital Capture Back *(image courtesy of Creo)*

Once upon a time the high-end digital photographer worked only in the studio to produce high quality digital images. This was because their digital capture devices required so much ancillary equipment to work that taking the kit into the field or location would have been a logistical headache. These digital capture devices had a passing resemblance to medium format film backs, of which most of these digital capture backs were used in place of. However, it would not be uncommon to see them attached to large format cameras in order for the photographer to take advantage of the movements offered by such cameras.



The original digital backs required a tethered operation in order for them to work, tethered meaning being directly connected to a computer. This is because most digital backs do not have storage capability thus requiring an external device to facilitate the capture review and storage of the file, i.e. the tethered computer.



Another reason for their lack of use in the field is because these digital backs were/are slow in operation and their relative delicacy really made them suited to an indoor studio environment.

Oh yes, I suppose I should mention that most of these digital backs cost like a Toyota Camry, a fine upscale sedan (sorry for all the car analogies). Spending \$30,000 CAN for a top-notch digital back would not be unheard of, even today with the greater choices available on the market.

Despite these disadvantages and horrendous costs, digital backs are found in more and more commercial studios and even wedding and portrait studios too thanks to the immediacy that digital provides and the very high quality offered by these digital backs. Until recently when 35mm based D-SLRs finally came with full-size digital chips (24mm x 36mm), the large capture chips were wholly the domain of the digital capture back.

The larger chips allowed for large, high quality print capability and photographers were finding their productivity to be so improved, they could take on more business and recoup the high cost of the digital back. Plus, they no longer had film and processing expenses to deal with.

Time moves on though and Kodak has led the way with the next generation digital back. A few years ago when I dreamt of the ideal digital back for my Bronica medium format cameras, I wished for a self-contained back that was little larger than the existing film backs. It would have its own power source to allow it to be taken into the field and it would have its own storage capabilities so that tethered operation would just be a quaint memory.

The original Kodak DCS Pro Back provided all that I asked for and Kodak has continued to refine the back to mate to individual camera bodies, such as the Mamiya 645AF, Contax 645 and the new Hasselblad H1. The newer DCS Pro backs have a much more elegant power pack and they even seem a bit more svelte than the original DCS Pro Back. Very delicious, very stuff of wet dreams, and depressingly, still very expensive at around \$20,000 CAN.

For those with only slightly less cash to spare but still wanting to utilize a medium format system with digital capture, CMOS technology offers the path of the future. Cheaper and less fussy to manufacture than the CCD devices used in most digital backs and D-SLRs, CMOS still offers very high quality imaging as attested to by Canon users who are now enjoying the benefits of the EOS 1Ds.

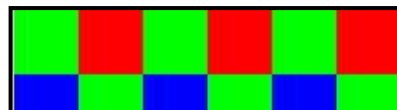
CMOS even appears in digital backs too, specifically, the backs made by Leaf, a division of Creo Systems Inc. Still not cheap but cheaper than their competitors such as Phase One and Leaf has just recently introduced their Volare back, which is a self-contained back similar to the Kodak DCS Pro back. Should make for a very competitive arena once the Leaf product becomes more well known and widespread.

There other variations on the digital capture method such as scanning backs, but the three of digital point and shoot, D-SLR, and digital backs are the primary means of creating an image wholly within the digital domain. Whether this method of digital imaging or still using film and then scanning instead works best for you is a personal choice based upon what you have invested and what you need now.

Types of Digital Capture

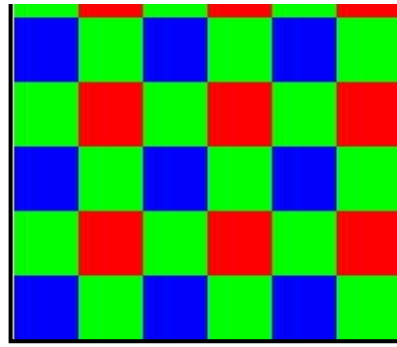
Bayer Pattern *(image courtesy of Kodak)*

This is the predominate method of digital capture, named after the Kodak scientist who invented it. The Bayer pattern is a single layer



of pixels or photo detectors arranged into an RGB color scheme as seen in the example image at right.

As can be seen in the example, red and green lines alternate with blue and green lines. This means that 50 percent of the photo detectors are filtered for the color green with only 25 percent filtered for red and blue. In order to obtain a full color value for each primary color, interpolation is required, in essence, the camera must guess at the value of corresponding pixels.



The interpolation required by the Bayer pattern CCD can cause artifacts in the image and the common approach to reducing these artifacts is to use an anti-aliasing filter in front of the CCD. This filter reduces the artifacts at the cost of ultimate sharpness and is one of the reasons why many digital capture files need generous sharpening in the editing stage.

CCD and CMOS

The charged coupled device (CCD) has been the predominant capture device used in digital cameras and backs. It is a relatively expensive process that may see many rejects during the production stage. Power requirements are high and the amount of charge in the device is very dust attractive; however, at present, it is also the fastest digital capture device with the Canon EOS 1D providing up to an eight frames per second shooting rate. CCD devices are more light sensitive than CMOS devices with a slightly different method of gathering light information than a CMOS device.

Complimentary metal oxide semiconductor (CMOS) are relatively new to the quality digital scene with Canon being the primary champion of this type of capture chip. At first CMOS was poo-hooed by those championing CCD, as a cheap and less qualitative alternative. CMOS is indeed cheaper and easier to produce compared to CCD devices; however, as Canon has proven first with the D30 and then the D60 and now the 1Ds, CMOS is capable of excellent image quality.

CMOS devices have less charge going through them helping to alleviate the dust problem suffered by users of CCD cameras. CMOS is also known to be very noise free; however, the CCD device is actually supposed to even more noise free than CMOS, it is actually the in-camera software processing of the CMOS image that produces the very clean images.

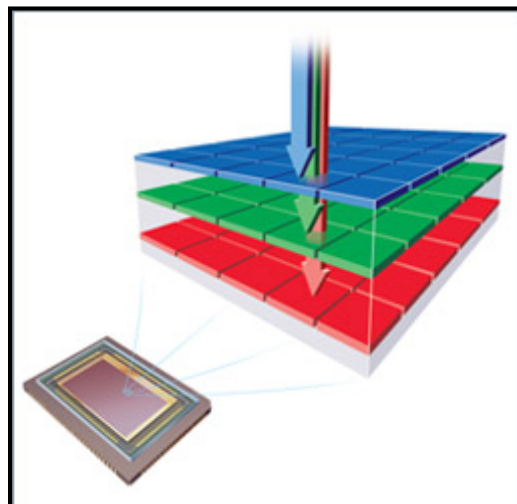
CMOS devices also have their digital to analog processing done on the same chip whereas the CCD requires an additional chip for this conversion. This can help produce more compact digital products utilizing CMOS devices.

Canon is no longer the only game in town with regard to CMOS devices with Kodak introducing their DCS Pro 14n and Leaf having digital capture backs based on CMOS devices too. Additionally, the vaunted Foveon X3 device is actually a modified CMOS chip.

Foveon X3 *(image courtesy of Foveon)*

The Foveon chip presents a novel new approach and appears to resolve the problems of the Bayer pattern. Instead of a single layer of photo detectors of a Bayer pattern, the Foveon has three layers, each receptive to a particular primary color of red, green and blue.

This approach allows each layer to capture the full amount of color information and no interpolation is required, thus artifacts are either greatly reduced or non-existent. It is a very promising technology that many would love to see used by more digital camera makers. At present only Sigma offers a D-SLR with the Foveon X3 chip, but a rumour is out that another brand will offer a 10 megapixel D-SLR in Spring of 2003.



From reviewing the tests at other websites about the Sigma SD-9 D-SLR, this 3 MP camera equals

the resolution and quality of a 6 MP camera, so you can imagine what the potential a 10 MP camera with a Foveon sensor will be like.

The Digital Darkroom

Once we have a digital image to work on, we then open up the image file via a computer system and begin any edits we may wish to do. The computer system is the heart of the digital darkroom and it pays to have it set-up right.

Before proceeding, I'll make some brief comments about the Mac versus PC debate and state that I am a PC user and have been since my early university days (realizing that an electric typewriter I had in first year was not going to survive for the rest of my student years). I have very limited experience with Mac systems, but given their widespread praise, I believe that the Mac is a formidable digital darkroom system with Photoshop. However, since upgrading the Windows OS to 2000 and now XP Pro on a Pentium 4, I have few qualms about the PC not being suitable for the task.

The cost of setting up top-notch systems from either system is going to be high, but I think the edge goes to the PC with a greater ability to upgrade and customize a system to your liking. Where the PC likely still lags behind the Mac is not really processing power (my P4 runs plenty fast thank you) but with color management. Mac's Colorsync provides the ability to sync all your devices from scanners, to monitors to printers effortlessly whereas I'm still a bit in the dark about how Windows XP handles color management via its ICM 2.0 (it apparently is suppose to be similar to Mac Colorsync).

Lastly and specifically to Nikon users, Nikon software apparently runs much faster and smoother on PC systems than on Macs and from the grumblings I've read from Mac users, it would seem that Nikon did a band-aid job of creating Mac versions of their Nikonview and Nikoncapture applications until very recently. The problem was significant enough for some users to switch from Mac to PC to improve their workflow, something to think about if you're a Nikon D-SLR user with Nikoncapture (or even Bibble) software.

So, further comments about the computer system are going to be all PC based, which is just an indication of my limited experience with Macs.

Computer Anatomy

The central processing unit (CPU) is where all the nuts and bolts of the computer system are located.

- First off, you want a motherboard that is going to be able to handle all the RAM you can cram into it. Not all motherboards are created equal and you want to ensure you do it right the first time around. Look for one that can handle more than a gigabyte of RAM.
- Ah yes, RAM. You've heard it once and a dozen times elsewhere and like a broken record, I'm going to repeat it here again, the more RAM the better if your software is Photoshop. The general rule of thumb is four times the RAM of the largest file size you will work with. If all you work with are small JPEG images from a 3 MP camera then your RAM requirements won't be much at all; however, if you work with say, 700 MB file sizes from a 6x9 scan via a Nikon 8000ED scanner, you would need 3 gigs of RAM to have enough resources available for doing the edits. I personally think 512 MB is the minimum needed with 1 GB being a nice comfortable amount to handle most things you could throw at Photoshop. RAM is not particularly expensive and would be the single most cost effective upgrade you could do for the benefit of your system.
- Working with such large file sizes is going to require some monster sized hard drives and the norm nowadays seems to be 120 GB as a start with additional drives added as required, or even moving up to the 180 GB drives. Gee, wasn't there a time not long ago when a 1

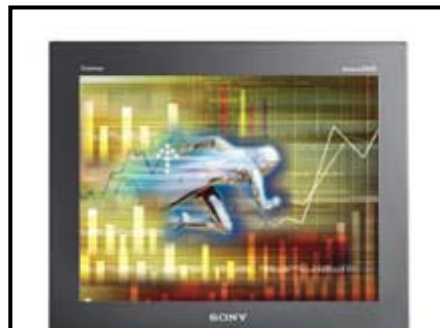
GB drive took up the same space as a large CPU box? (Okay, maybe it was more like 12 years ago :-)

- I recommend two physical hard drives but if cash is crunched then get one large one and partition it. This so that Photoshop will stop complaining that its scratch disk is the same as your system hard drive. Photoshop uses hard drive space for storing files in history beyond what can be accommodated in physical RAM and the larger the scratch disk, the better for Photoshop.
- CD-R or DVD-R drive to burn your image files for backup purposes. I'm not sure how standardized the DVD format is at this time and the jury is still out on just how reliable DVDs will be for the long term, so it may make more sense to continue with the known and much cheaper CD-R format until DVD proves itself over the long haul. CD-R is not without its own problems too though, as some users are finding their CD-Rs to deteriorate and lose data after only five years, this is even with good name brand disks. However, given how affordable CD-Rs have become, it is not a large financial outlay to create two backup disks at once.
- Video cards are a bit tough to quantify since most of today's video cards are oriented for gaming needs. I would think that graphics intensive gaming would still benefit Photoshop editors, but this is something I know little about. I do recommend getting a decent name brand card and not use something built into the motherboard, as would be found on the cheapest PCs (not recommended anyway). If you're really hardcore, getting a dual-monitor capable video card will certainly help to alleviate any compensatory afflictions you may suffer. Seriously though, having two monitors is actually something I would like to have myself because then I could have all the Photoshop windows open on one monitor while just having the image itself open on the other. Just be wary of the need for extra space and power requirements for the second monitor. Lastly, buy a video card capable of 24 bit color at the appropriate resolution for your monitor. A 17 inch monitor's sweet spot resolution is 1024x768 pixels and you want your video card to be able to provide True Color capabilities of at least 24 bits. Pay particular attention if you use larger monitors because a cheap video card may not be able to provide True Color at higher resolutions.
- Little thought is probably put into the power supply and cooling system of the computer, but this is something you should pay attention to if you plan long hours of editing or would leave the computer on all the time. A robust power supply to power all the goodies you've packed into the CPU is a good thing and having multiple fans inside the computer is recommended to keep everything nice and cool given how toasty circuit boards can become when crammed together in a confined space. The CPU case itself can also play a role in helping to keep things cooler with newer cases being very lightweight and designed to allow for heat dispersal. All of this will cost a few extra dollars, but given what you will have invested in the overall system, not a particularly onerous cost to bear.
- Misc. accessories such as a Firewire card and Firewire Compact Flash card reader can make life easier for the digital camera users. Firewire will also allow you to take advantage of faster speeds for other equipment such as scanners and printers. Upgrading the existing USB ports to the new USB 2 standard will obtain nearly as fast access times as Firewire, so long as the equipment supports USB 2.

The Monitor

Like most other parts of the computer system, you can spend a lot or you can spend very little for a monitor. While it would be nice to go all out and blow a few thousand on top notch and very professional Barco or Lacie monitors, you can get by with a middling monitor.

Do not go for the Costco monitor special that will get you a 17 inch monitor for a couple of hundred dollars. You are going to have a cathode ray tube (CRT) screen that is going to bulge out which will lead to distortion in the monitor's field of view. Cheap monitors also lack the crispness needed for serious editing and likely will cause eyestrain compared to a decent monitor, as you need to have your eyes closer to the screen to try resolve the details you think are in the image. *Image courtesy of Sony*>>



The good monitors come in two different flavors, the Sony Trinitron type and the Mitsubishi Diamond type. Both types are popular amongst other monitor brands for re-badging as their own and either type should do well for photo editing purposes. From what I could gather, the Mitsubishi Diamond is actually a tweaked version of the Sony Trinitron tube technology, but Mitsubishi have advanced the design further and have kept the price very competitive compared to similar Trinitron products.



No matter which type of monitor you choose, select a model that has a true flat screen to minimize distortion. I recall my first experience with a flat screen Trinitron at work a few years ago having always used non-flat CRT monitors in the past and thinking that the Trinitron was itself distorted. The crispness was such that my own 17-inch MAG monitor, which was a great monitor for its time, was soft in comparison.

This leads us nicely to the next topic about monitor size. When I bought my 17-inch MAG in 1995, it cost a princely sum of \$900 CAN. That same monitor now would cost no more than a couple of hundred dollars, although I still consider the MAG to be superior to all current budget monitors despite its age. I bought the MAG around the time that 17-inch monitors were becoming the standard and realizing this I was actually ahead of the pack for a short while. Today, the 19-inch monitor is the standard size and this is what I feel is the appropriate size to go with; however, if the budget allows then I do recommend getting as large as you can afford without compromising on the quality required to do the job. I'm looking to buy a Sony 21-inch monitor that will cost about the same as what the MAG cost me 7 years ago.

Spending good money on a monitor is the way to go because it is likely the longest lasting piece of computer gear you'll invest in. Since 1995 when I bought my original Pentium 120 with the MAG monitor, I have upgraded the CPU to a Pentium Pro, Pentium II, Pentium III to the current Pentium 4 along with all the guts inside of those CPUs, all the while still using the original MAG monitor. In case you're wondering, no I'm not rich and stupid to go through so many computer upgrades, I just happen to have contacts in the computer industry that have allowed me to upgrade so often at very minimal cost to myself.

The CRT is still the current standard for professional graphical and photo editing purposes; however, flat panel screens are gaining in popularity thanks to decreasing prices and increasing quality. Is a flat panel worthy of consideration?

Yes, if you're willing to spend the money. I went through this tough choice myself before deciding on getting another CRT monitor. I did the pragmatic thing and went for the product that would give me the biggest bang for the buck and as of this writing (early 2003) the CRT still leads the way.

It used to be that the flat panel screen was laughed at by serious photo and graphics editors because of the particular characteristics of such viewing devices. Anyone with experience using elderly laptop computers will know of these characteristics, which were a very narrow field of view for optimum quality, a washed out view if one was not directly centered in the sweet spot and poor handling of gradations of tone.

Flat panels became much better when TFT technology was utilized and in addition to addressing the field of view problems, now a bit of indirect light on the screen would not lead to a wash out either. However, even TFT flat panels still were not considered good enough for critical editing applications.

This was likely the prevalent attitude until Apple introduced their astounding Cinema Screen flat panel products, which are incredible with an incredible price tag to match. Now, flat panel technology was good enough that serious photo editing could be done with none of the detrimental characteristics of the old flat panel screens. *Image courtesy of Apple*>>



Now does one really need to become a Mac user and

have to pay \$6000 CAN for the latest 24-inch Cinema Screen? No, as there are other PC compatible flat screens available that could also be used for high quality photo editing. Eizo is one name that comes to mind, being a Japanese made product and surprisingly, the Korean Samsung is another that may offer good flat panel products. A more familiar name is Viewsonic and as long as you use one of their flat panels with MVA technology then the quality could also be very good too. Note though that I have no personal experience with any of these products other than salivating over the Mac Cinema Screen in store demos, I'm just passing along what I have gathered from my travails over the Internet.



One thing I can tell you with great fact is that a high quality flat panel is not cheap and the difference in cost from one size to the next is considerably more than with CRT monitors. For photo editing you would not want to go smaller than a 17-inch flat panel; however if you were to look at the next size up of 18 inches, you will have to pay a near 50 percent increase in price to get that little bit of extra viewing space. The last I looked, an average quality 18-inch flat panel was still near \$2000 CAN.

Now, granted that 18-inch flat panel is going to provide a similar amount of viewing space (or even more) as a 19-inch CRT, but at nearly four-times the cost of that good CRT. However, the benefits of a flat panel are very attractive.

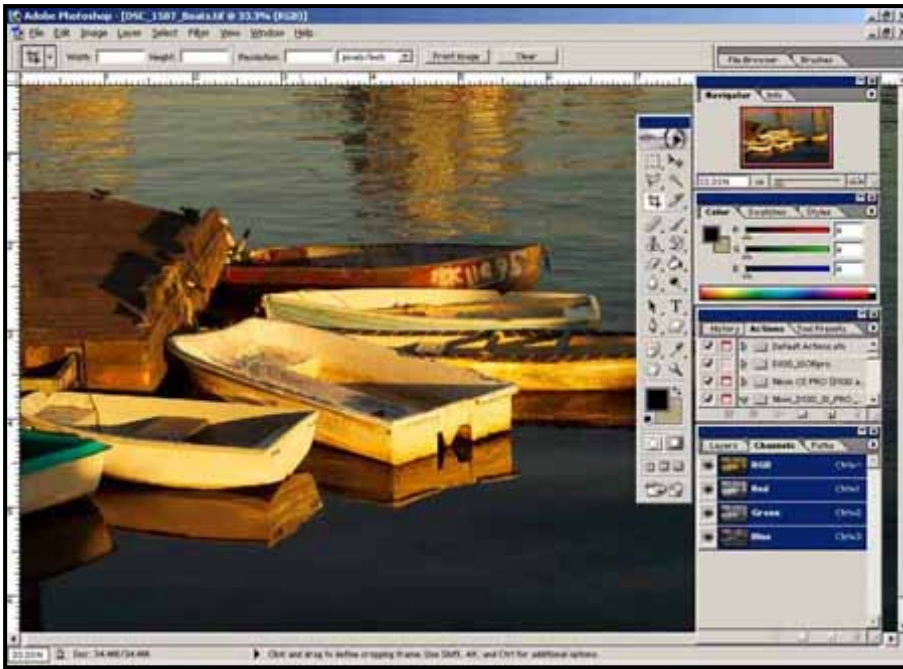
- Flat panels take up far less space than a comparable CRT
- Which of course means the flat panel is a whole lot less in weight
- Without a huge CRT, a flat panel runs much cooler and is much nicer on the eyes for long editing sessions – no worrying about all those electrons being emitted by the CRT and going straight through your eyes into your brain
- The best flat panels will likely outlast the CRTs in usable viewing life – either product will have a finite life span measured in the thousands of hours of usage

It is your money therefore your choice as to which type of viewing device you want, a CRT or a flat panel. Whichever you decide on just ensure that you've invested in a good product because as I mentioned earlier on, it is likely to be the longest lasting computer product you buy.

Software

Okay, you've got your scanning options settled, you've got a smokin' new hot rod computer that can handle the monster-sized scans you can generate and you can view those scans or digital captures on a crisp, high quality monitor. Now you need to be able to edit those images and as you become more prolific in creating those images, you need to be able to track and print them all easily.

The king of the photo editing applications is [Photoshop](#). Since the early 1990s when Photoshop first appeared, the software application has become the professional standard that all other photo-editing suites are compared to. When you read the digital editing tips offered in magazines or websites, almost all the time, they use Photoshop as the default-editing package, such is the predominance and preeminence of Photoshop.



Adobe has continued to evolve Photoshop to maintain its industry lead and relevance by making it more functional and powerful to handle whatever photographers and editors can throw at it. Soon, Photoshop will even be able to handle the RAW image files that are created by digital cameras instead of needing a separate RAW converter, as is the case now.

Photoshop is not cheap at about \$900 CAN for the full package with continuous upgrades every couple of years to the newest version; however, it is money well spent if the digital darkroom is going to be your main means of working on your images. Just as you would not use regular grade gasoline in your Porsche, neither should you be using regular grade software for your expensive computer system.

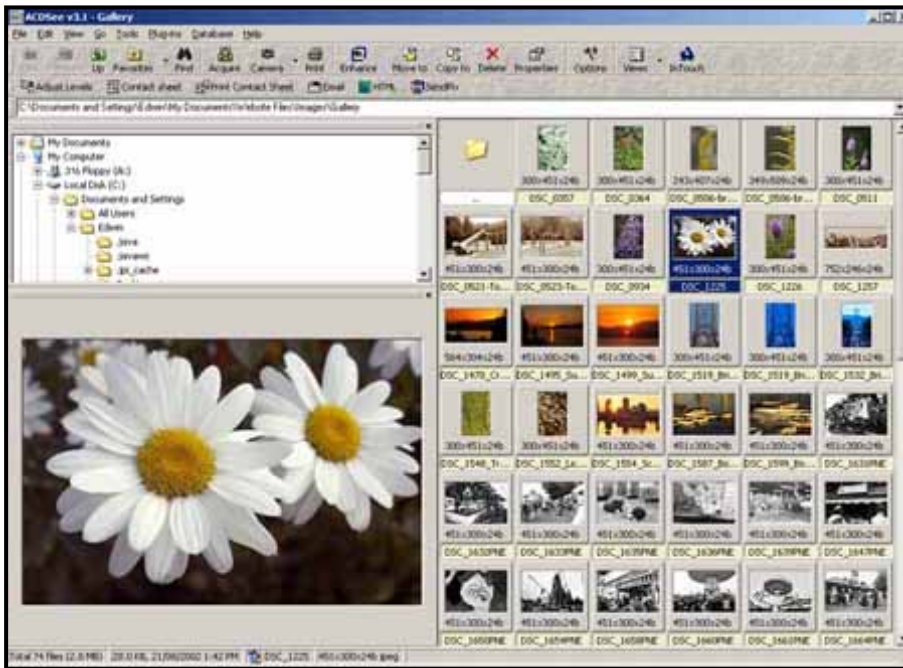
However, realizing that \$900 is a bit much for many of us, Adobe comes to the rescue with [Photoshop Elements](#), which is a stripped down version of the full Photoshop and provides enough of the editing power to satisfy many at a much more palatable cost of about \$150 CAN. Photoshop Elements is far superior to previous Adobe products, which were so stripped down and so Disneyfied for the mass consumer, as to be wholly useless for the serious photo editor (Photo Deluxe, Photoshop LE).

Now Photoshop is not the only game in town with other products available at varying costs too. [Corel](#) has a couple of software suites that may be of interest and [JASC's Paintshop Pro](#) is regarded as being a good editor for the money. There are a few other minor editors on the market, but Adobe has such a stranglehold that it would be a good long-term investment to buy into either Photoshop or Photoshop Elements. One of the benefits of buying Photoshop Elements first is the ability to upgrade to a full version of Photoshop if and when you decide the cost is warranted.

So, now you have the photo editor application, but you've got hundreds of images you have to sort through, what to do. There are a number of applications available to help you sort through the images you will have created and edited. Some are quite complex because they utilize a real database application in its core, such as [Cumulus](#) while others were developed by professional photographers tired of not having the right product available on the market. Professional wildlife photographer Moose Peterson worked with David Cardinal to create [DigitalPro](#) to handle and sort the many digital images that a professional photographer would create.

Other products such as [ACDSee](#) provide fast processing of thumbnail views of images in a given folder on the hard drive and allow for some basic editing of the image such as rotation and renaming. If you've ever had to wait through Windows XP trying to generate thumbnail images of JPEGs through Windows Explorer, you will greatly appreciate a third party product cutting through JPEGs like a hot knife through butter. Curiously, though Windows XP has no speed problems

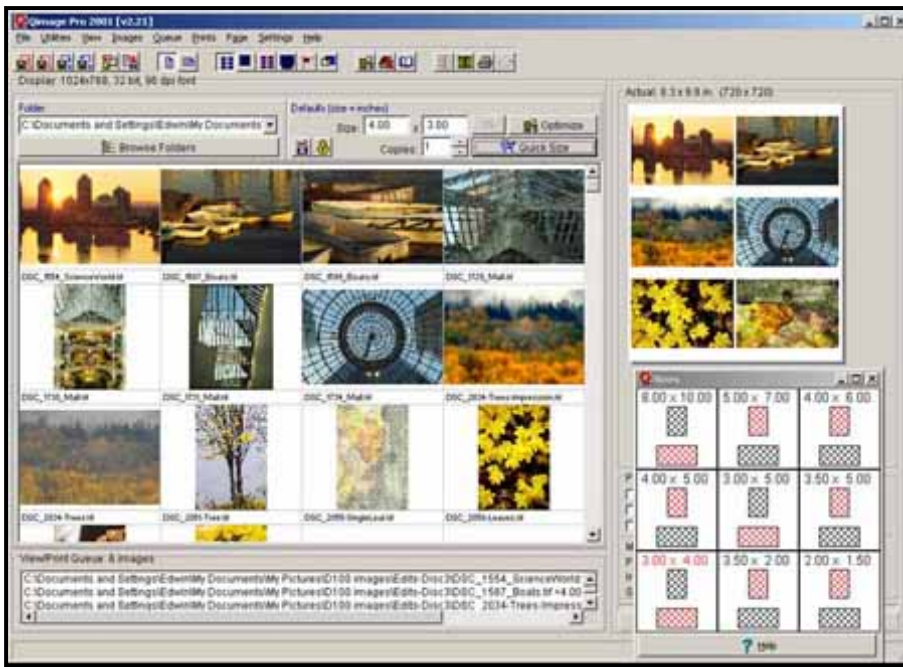
handling compression-free image files such as TIFFs, Adobe PSD, or RAW files.



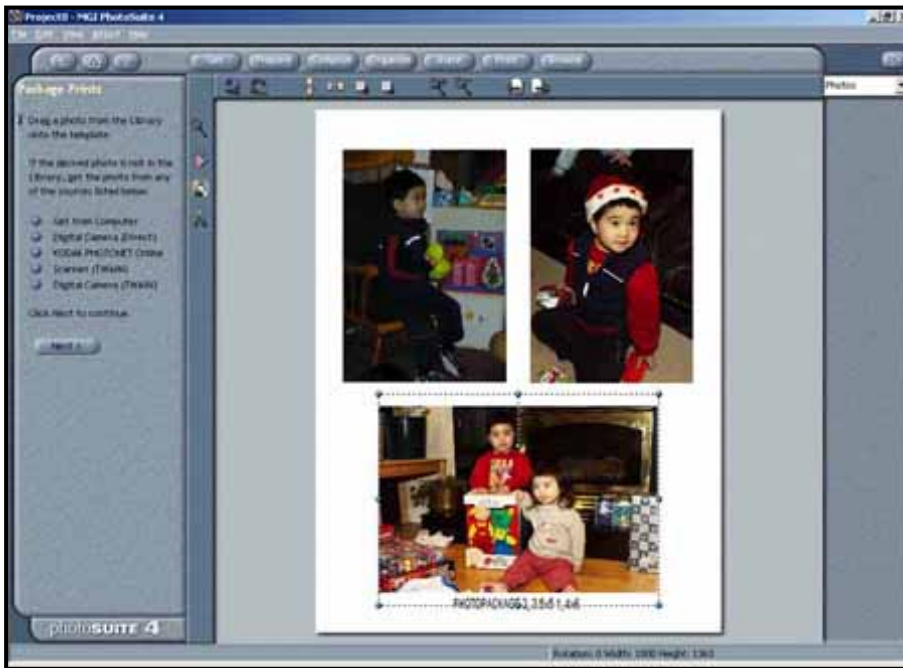
Use and experience will determine which products work best for your needs. I haven't found a need for a third party cataloguing application for my images. I have worked out my own system of sorting through images by subject matter and then sorting them through folders based upon the size of a CD-R. Once enough material has gathered in a particular disk folder, the contents are burned to a CD-R and a label is marked with the contents and the date range of the images.

Family images are always kept together and burned to CD-R separately whereas my personal photography may be sorted by subject matter or event or whatever is appropriate. Again, once enough material has gathered in a folder approaching 700 MB, a CD-R will be burned for safekeeping. My system works for me, but then I am not terribly prolific in creating new images all the time. If I did generate many thousands of images per month as some photographer do then it is likely I would need a third party application to help me sort through all the images.

A printing application would also be a good investment for providing more flexibility in printing than what is provide for with your primary editing suite. [Qimage Pro](#) is a popular and quite effective printing software that also happens to do some RAW file conversion too. It allows you to set a number of different printing options from the size of the image to its layout within the limitations of the print size. You can print multiples of the same images on one sheet or print different images for each space allowed. Very effective and not particularly expensive at \$40 US.



Another alternative is [Roxio Photosuite](#) (formerly MGI Photosuite). This piece of software also has a variety of printing options; however, they are less flexible than Qimage Pro. If you like crafts and doing your own cards and such, Photosuite may work out for you. There are a number of border and framing options available as well, but keep in mind that you're restricted to either letter or A4 sized prints (or at least my two-year old version is).



One last word on software for the digital darkroom, if this computer system is also used to connect to the Internet, especially via broadband connection such as ADSL or cable modem, you MUST install a firewall to protect you from hackers using automated port detection software. Hackers finding an used port through your system can hack in easily and you would never even know it without the firewall set-up. A firewall is even more critical than a virus protection package; however I highly recommend you get both with [Norton Professional Internet Security](#) providing everything you need in one package.

The Printer

Printing at home has never been easier nor has the quality ever been better for the digital



darkroom enthusiast. It is indeed a remarkable time we live in when affordable inkjet printers can rival the quality offered by professional labs and indeed some professional labs utilize inkjet printers which differ only in the size of print offered vis a vis the home inkjet printer.

Even just a cursory amount of research into a suitable home printer is going to come up with one brand over and over again, Epson. Epson has dominated the photo inkjet printer market and continues to advance the technology to provide the capability of producing stunning image quality that is fully photographic and not as some close facsimile of a traditional photo.



Other companies are approaching the quality that Epson has, notably Canon and Hewlett Packard; however neither offers the longevity that Epson has developed with their archival inks. Epson has also lowered the prices of their very large format printers compared to their previous versions, which just helps to solidify the market share and lead enjoyed by Epson. It used to be that Epson's 7000 series printers cost \$10,000 CAN but now the latest 7600 printer can be bought for \$6000 CAN, a remarkable reduction in price given the short time span between the 7600 and the predecessor 7500.

Most users are not going to need a 24-inch wide printer such as the 7600 and thankfully Epson makes a 13-inch wide printer using the same Ultra Brite inks as the 7600 in the 2200 desktop model for much less (around \$1000 CAN). You can consider the 2200 to be a merging of two different Epson printers. The 2200 does not have the ultra long print life feature of the Epson 2000 and its pigment based inks and neither does it quite have as wide a gamut as the Epson 1280 printer with its dye based inks. However, the 2200 straddles the middle ground very nicely to provide print life up to 75 years on Archival Matte paper while having better colors and far less problems with metamerism (shifting of colors depending upon what kind light the print is viewed under) than the old 2000 model.

If inkjet printing is for you, investing in a printer with individual ink cartridges is the way to go because certain colors are used much faster than others and with the older style printers using one large color cartridge, much ink can be wasted. You would also want to ensure that the printer brand you select has a good range of papers to use. Although there are many different brands of paper available, my experience has been that Epson papers work best with my Epson 1270 printer and that the Epson papers are of very good quality for a photo finish and weight. This would also apply to Canon or Hewlett Packard printer owners and their same brand papers will work best with their printers.

One caveat about inkjet printers to note is that you should be modestly prolific in your use of them. Ink cartridges usually have a finite lifespan in which colors will be accurate after opening the sealed package. Printer heads can also become clogged if not used for long periods of time.

Another printing option is the dye-sublimation (dye-sub) printer that uses colored rolls of ribbons instead of ink to create an image on paper using thermal heat technology. The print quality from a dye-sub printer is quite excellent and offers a quality that may better inkjet printers in terms of smoother tonality and gradations. The dye-sub process can also be archival too, rivaling the Epson 2200 for print life. Some printers will also laminate the print to provide even more durability. *Image courtesy of Kodak >>*



There are a few caveats about dye-sub printers though:

- Running cost of the ribbons or ribbon cartridges for certain printer models are generally higher than

inkjet printers

- Limited number of paper choices
- Maximum print size is usually 8x10 and in truth some 8x10 printers do not actually produce a full size 8x10 print
- Small print size dye-sub printers can be quite affordable, but become much less so as you move up in print size capability with professional models nearing \$10,000 CAN

There are not any more options available to the digital darkroom editor wanting an affordable printer beyond the inkjet or the dye-sub. The best professional printers are probably those made by Cymbolic Sciences, known as the Lightjet printer, which uses lasers to create an image on actual photographic paper, such as Fuji Crystal Archive. Given the several hundred thousand dollars needed to purchase one, this is not likely to be an option for even the wealthiest photographer.

A more affordable printer using similar technology would be the Fujix (Fuji) Pictography printer. More affordable is relative though since the cheapest Pictography printer is around \$6,500 CAN with the larger 13x19 inch capable printer being nearly \$16,000 CAN. However, the cost is low enough for some professional photographers and editors to invest in one for their printing needs.

Some notes here on proper print care to ensure the maximum benefit from whichever type of printer you choose. All prints, even those from professional labs will suffer from fading and color shift if improperly displayed. The print should be protected by plastic archival sleeves if stored in an album or properly framed if displayed on a wall or shelf. This means using a mat to provide a space between the print and the glass or plastic surface of the frame. The framed print should also not be displayed in direct sunlight, as UV will work to fade the print despite the framing.

Related to print care is the issue with some inkjet prints of color shifts and out-gassing. Epson 1270 and 1280 printers use dye-based ink and the prints produced by these printers is very good; however, a number of users worldwide have experienced problems with their prints shifting to orange after some time. The orange shift has been identified as the cyan ink oxidizing and allowing the other colors to become dominant, creating an orange cast. The choice of papers made a large difference with the glossy papers being the worse culprits; however, even those using matte papers suffered orange shift problems. There have been many discussions on printer lists trying to isolate the exact cause of this orange shift as some users experienced it almost immediately while others have never seen it.

Framing a print before it has fully dried can cause out-gassing. This particular problem seems to have become a more topical issue with the introduction of Epson's Ultrabrite inks and their latest generation of printers. It is not a problem that only afflicts Epson, as prints from other brands can also suffer from out-gassing if not dried fully. The telltale sign of out-gassing is a fogging of the glass surface of the frame and if touched, would feel a bit oily. Unlike the dye-based inks, which had super fast drying capabilities, certain photo papers (glossy or semi-gloss types) do not absorb archival inks as quickly and it could even take several weeks before the print is dry enough for framing. Epson has recommended that a clean sheet of paper be placed on top of a drying print for 24-hours to help absorb the excess ink and for a very ink-heavy print, to do so again for another 24-hour period.

Color Calibration and Color Management

Okay, at this point I've suggested an investment of several thousands of dollars in computer gear, scanner or digital capture device, software and printer. Now I'm telling you to pony up a little bit more for a proper color calibration device, commonly known as a spyder or puck and the companion software to create a color profile for your monitor.

As with all things related to the digital darkroom you can spend several thousands of dollars on such calibration packages, but unless you actually work for a graphics house that will buy the package for you, why be stupid about it? Spend only what you need to obtain a good profile.

If you happen to be one of the few editors using a flat panel screen, well you're going to spend a bit more money because the calibration spyders capable of handling a flat panel cost more. If you are in the majority with a CRT and plan to use a CRT well into the future then you can save a hundred or more on a CRT-only spyder.

There are several products available on the market, but the one that seems to pop up everywhere as being very good for the money is the [Colorvision](#) spyder with the companion OptiCal software. The flat panel capable spyder and software package will run you about \$500 CAN whereas the CRT version is just over \$300 CAN. You can even go cheaper with the more basic PhotoCal software package and this would be fine for a basic digital darkroom; however, if you're really serious about the digital darkroom, the OptiCal software is the way to go with its finer controls and variables available to the user.

If you're really on a budget and cannot afford a spyder then you need to at least use the Adobe Gamma feature that comes with Photoshop. Once Photoshop has been installed on a PC, you can access Adobe Gamma through the Control Panel (older versions of Photoshop had access directly from Photoshop). Follow the step-by-step procedures to calibrate your monitor and at the end, you will at least have something that is better than nothing.

Adobe Gamma can get you close to matching what your prints will look like, but not exact. Since I am not a professional photographer with very stringent needs for exact color matching in my prints, I wasn't overly concerned when certain colors on print did not match with what I saw on the monitor when I had nothing better than Adobe Gamma. Now with a more capable digital darkroom set-up I am becoming more critical in how accurate my prints look.

You can take calibration to a system-wide level by including the scanner, digital camera and printer into the equation via their ICC profiles (International Color Consortium). Mac users benefit here from a seamless integration of the various devices connected to the computer. The latest versions of Windows will also apply the stock ICC profile for each device connected to the computer through the ICM 2.0 software, but you will need to check the "Color Management" of each device under "Properties" to ensure that Windows has recognized the ICC profile.

Taking calibration to the extreme would mean doing a number of technical tests of each device and creating custom profiles for each. For a scanner that means scanning a known test target that conforms to IT8 standards, such as the Kodak Q-60 test target to create a profile based upon how the scanner scans the target. For a printer, the very critical would create a custom profile for each type of paper that would be used for output. However, most users would likely be satisfied enough with the stock profiles that come with each device because to become very serious about system calibration can cost more than your whole computer system is worth.

Related to all this and what Microsoft cryptically refers to as "rendering" is the color management or space that your images have. No digital image is going to be able to hold all the color information available in nature; however, using the appropriate color space will extract as much as possible. Converting the image to different color spaces will alter how certain colors may be rendered or even not rendered at all.

The accepted standard is Adobe RGB (1998) if your output is for printing purposes through a desktop printer, as this provides a decently wide color gamut for your images. It has also become the professional standard used by most critical users. However, if your images are to be posted to the Internet, it would be better to convert to the sRGB color space because of the way colors are rendered by that type and because sRGB has become the Internet standard for color rendition. Additionally, there are CMYK spaces used by the professional pre-press industry, but that is not something one is likely ever going to have anything to do with from a home digital darkroom perspective.

Using the wrong color profile for your image for a given application (print or Internet) can create muted colors and a very drab look to the image that may be very far from what was expected. Also, Fuji Frontier processing and printing machines apparently work best when a digital image is tagged with the sRGB color space, so while I would recommend working with Adobe RGB (1998) for all of your own digital darkroom work, be wary of what external output devices require for best results.

The "room" in Digital Darkroom

In an ideal world, or just a rich one, we would have a dedicated room for our digital darkroom.

One painted in neutral colors with a functional placement of desks and shelves for our equipment. It would have no windows allowing in stray light that could cause us to see the image colors on our monitors incorrectly.

Not everyone can create a digital darkroom from scratch, but there are some who can and have taken it to very stringent standards by covering up their windows and taping them down so to eliminate all daylight coming in. Doors are closed to the rest of the house so that no stray light comes in to create any unwanted distractions or reflections on the monitor either and light sources in the room are calibrated to the same color temperature, usually 5500 degrees Kelvin.

For many of us the digital darkroom is just whatever space is available in an already full house and we make the best of it despite having to compromise. Keep the blinds or curtains closed when editing an image and try to orient the monitor so that no window or door reflections can be seen during the day. Keep the ambient lighting subdued and if you can, look into buying daylight calibrated florescent light bulbs to replace the incandescent bulbs. Not as warm in tone but cheaper with less heat in the long run and more accurate to view your prints and compare them to what is seen on the monitor.

Concluding Comments

Digital imaging has come a long ways in a very short period of time, but that was expected given how related it is to the computer industry, which has catapulted in usage and technology throughout the 1990s. Many will not consider it as a legitimate medium in its own right, keeping film as their standard bearer. However, digital is now the de facto professional standard for photojournalists. It is slowly becoming the standard in the commercial studios and as prices continue their downward trend, will become the standard for everyday consumers.

Film cameras are becoming loss leaders for the camera makers nowadays with little to no growth and more likely on a downward trend. All the action is happening in the digital realm and just as film point and shoot cameras were the bread and butter of most camera brands, digital point and shoots will become the major source of revenue for those companies.

Camera companies have heard the whisper in their field of dreams and that whisper says "build digital and they will come". It does not mean that film is dead anytime soon, not even close, but that is because of the already installed base of millions of film cameras that have already been produced and are out in the worldwide market. There is little market for high-end prestige cameras such as the Nikon F5 or Canon EOS 1v because the professionals that use to buy them are now using Nikon D1H and D1X or EOS 1D bodies.

Well to do amateurs that copied what the pros do are similarly buying D-SLRs. The not so well to do are also chomping at the bit to enter into the digital realm and when that first D-SLR becomes available for about \$1000 US, I think that is when the damn will burst and we can sweep away the legacy of film for the serious amateur crowd. And we are very close to that time now that we have D-SLR cameras rivaling 35mm quality for under \$2000 US.

If you are interested in digital imaging, these are very exciting times to be in, but if you're still into shooting film, these times are still great for you too. Scanners are so capable and can be so affordable that most anyone with an inclination to can afford one; however I do recommend buying at least a Nikon Coolscan IV quality scanner if film is still your primary medium.

No matter which method you prefer for creating a digital image, the ability to print your own work after you have done your own custom editing is intoxicatingly liberating from worrying about that lab is going to do with your film or image file. Printing at home can be fully the equal of the results from a professional lab, you just need to have the desire to learn and then enjoy the fruits of your labour.

The learning curve can be steep, the cost high, and the time required can be immense; however, many people would never go back to the traditional darkroom after experiencing what can be accomplished in the digital environment. It isn't for everyone and indeed one will be spending

plenty of time in front of the computer editing the images, but then we had to do that with the hundreds of slides or prints that came back from a large shoot too, except on a light table with a headache inducing loupe. I much prefer the digital realm than the old one based on film.

Welcome to the brave new world.

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