ACCESSORIES

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CAMERA BAGS

Q.: The camera bag I have is unsteady because the center of gravity is as high as the attachment point of straps. Can you advise which camera bag I should buy?
A.: I have ten camera bags, including the Lowepro, Tamrac, and Tenba bags. Most bags are inconvenient in the field and seldom leave the house. I have three bags I like. The Lowepro Mini Trekker backpack holds two SLR cameras with lenses mounted, two additional lenses, two flash units, with diffusers, filters, a small flashlight, a sweater, a plastic poncho, and other accessories. The Mini Trekker fits under the seat of an airplane. The only drawback is the access to the contents while the bag is on the back. Tamrac solved this problem with the Velocity 7 Photo Sling Bag and Adorama improved the design with the Slinger bags. The Slinger bag is used as a backpack but can be rotated and opened in front. The bag holds a SLR camera, an electronic flash and small accessories. The Slinger Pro is larger and has space for an additional lens.

A practical camera case for travel by car is an 18" long Arctic Zone cooler, customized with cardboard partitions. The insulation keeps the camera cool and the case is stealthy, in case the trunk is opened. On location, I transfer the equipment needed into a photographers vest.

CLOSE-UP EQUIPMENT

Q.: What is close-up photography?
A.: The purpose of close-up photography is to create a large image of a small object.
The reproduction ratio is the ratio of the image size on film or print to the real size of the object.
Close-up photography has a reproduction ratio larger than 1:4.
Macrophotography has a reproduction ratio larger than one. (The image is magnified).
When the reproduction ratio increases, (i) the distance between the camera and the subject decreases, and (ii) the distance between the lens and the film (or sensor) increases.

Q.: What equipment is needed for close-up photography?
A.: A lens with a short minimum focusing distance, a close-up lens, extension tube, bellows, or a teleconverter.

A close-up lens is attached to the front of the lens, like a filter. The extension tubes, bellows, and teleconverters are mounted between the lens and the camera.

Other useful materials:

Tripod with a low minimum elevation (8 to 12 inches).
Electronic flash
Bracket, for mounting one or two electronic flash units.
Reflector
Right angle viewer
Cable release or a remote release
Macro copy stand
Focusing stage
Cardboard for the background
Plastic sheet on the ground
Knee protectors
A spray bottle with water or an aqueous glycerol solution.
Small vial with honey and toothpicks, for feeding the insects

Q.: What is a macro lens?
A.: Macro lenses are special lenses which have a flat field and can produce sharp images at reproduction ratios up to 1:1.

Macro lenses have focal lengths in the 50mm to 200mm range. A macro lens of a long focal length has (i) a narrow view angle advantageous for background control, and (ii) a large working distance.

The working distance is the distance between the front of the lens and the subject. The working distances at the reproduction ratio 1:1 are 90, 136, and 260 mm for 60mm, 105mm, and 200mm macro lenses, respectively.

A short focal length has the advantage that a short extension is needed between the lens and the camera for macro photography. A life size (1:1) reproduction doubles and a 2:1 magnification triples the nominal focal length.

True macro lenses are expensive. The price and weight increase with the focal length.

Q.: Are the macro zoom lenses suitable for close-up work?
A.: “Macro” is not always macro. Some zoom lenses focus to a 1:2 reproduction ratio. The quality of the image varies from lens to lens but some lenses are quite satisfactory when stopped down. The advantage of the “macro” zoom lenses is the long working distance at 200 mm or 300 mm.

Q.: What are the advantages and limitations of close-up lenses?
A.: The close-up lenses are attached to the front of the lens like filters. They are compatible with zoom lenses and do not need much space in the camera bag.. The magnification increases with the diopter number from +1 to +10. Close-up lenses are usually sold as a set of +1, +2, and +4 diopters. The close-up lenses shorten the focal length and widen the view angle but do not change the exposure. The optical performance is satisfactory if the prime lens is good and is stopped down. Achromatic attachment lenses are optically superior to single element close-up lenses but are heavier and more expensive.

Q.: What do the numbers on close-up lenses stand for?
A.: The numbers are diopters, just like the numbers used in prescriptions for eyeglasses. The diopter of a lens is the reciprocal of its focal length, expressed in meters. As an example, a +4 lens has a focal length of 0.25m or 250mm.

Q.: Can several close-up accessories (attachment lenses, extension rings, teleconverters, or bellows) be used together?
A.: Yes, this is done quite frequently. Two close-up lenses can be combined for a lager magnification, for example, a combination of +2 and +3 diopters is equivalent of a +5 diopter lens. Which of the lenses should be mounted closer to the main lens, is a matter of opinion. Usually the lens with more curvature (larger diopter) is mounted on the main lens first but the opposite order has proponents as well.

Bellows and extension tubes are can be used together with a close-up lens on the main, preferably a macro, lens.

It should be kept in mind that the attachment close-up lenses and teleconverters degrade the image of some extent but the bellows and extension tubes do not.

Q.: Can the image size in close-up photography be increased by reversing the lens?

A.: A lens is sometimes reversed in close-up photography (the front of the lens towards the camera) for two reasons: (i) to get a larger image and working distance, and (ii) to improve the optical performance. The lenses, other than macro lenses, are designed to make images much smaller than the real size of the subject. In macrophotography the image on film (sensor) is larger than the real size of the subject. Therefore the lens should be turned around.

Reversing the lens requires two accessories: (i) a reversing ring which screws into the threads of the lens and has a male bayonet mount on the other end for attaching the lens to the camera, and (ii) a ring for operating the automatic diaphragm of the lens with a double cable release. If the lens has a diaphragm ring, the second ring can be omitted by manually opening the diaphragm for composing and closing the diaphragm for exposure.

Reversing the lens changes the distance between the optical center of the lens and the film (sensor). Firstly, the reversing ring between the lens and the camera increases the distance. Secondly, with short focal length lenses the distance between the front glass surface and the end of the filter threads becomes a significant additional extension and the magnification increases accordingly. With short focal length lenses (20-24mm on a 35mm camera) an image larger than life size can be achieved. To the contrary, with some long focal length lenses the reversal of the optics may actually decrease the extension and lower the magnification. Another reason for reversing only short focal length lenses is the mechanical stress on the lens. Because the front of the lens has to carry the weight of the lens, the lens reversal technique is suitable only for short focal length lenses with a non-rotating front element.

A short focal length lens can be reversed and attached to the front end of a tele lens mounted on the camera. The stacking of the lenses requires a coupler ring with male-to-male threads.

Q.: What are the advantages and limitations of extension tubes?

A.: The extension tubes and extension rings increase the image size without interacting with the optics of the lens. They serve only as a physical extension of the lens. Therefore the optical performance is not degraded.

The extension tubes are compatible with auto aperture, TTL metering, and the autoexposure mechanism. The Kenko Uniplus DG tube has the "Gate-Array IC" circuitry to function with digital SLR cameras and some digital lenses. The Canon extension tube EF II is compatible with the Canon digital EF-S lenses.

The extension tubes require an exposure increase commensurate with the effective focal length. With TTL metering the exposure adjustment is automatic.

The extension cannot be continuously varied because the length of a tube is fixed. The extension can be varied in steps by using a set of several extension tubes.

Q.: When are bellows needed for close-up photography?

A.: Bellows are the classic tools for close-up photography, especially for high reproduction ratios. The extension is variable but bellows are bulky and fragile. With a 20mm lens reproduction ratios up to 22:1 can be achieved but the working distance is then extremely narrow. The diaphragm of the lens needs an accessory for stopping down with a double cable release. The bellows are for film SLR cameras only.

Q.: Do I need a special macro flash for close-up photography??

A.: A built-in electronic flash in the camera is not useful because the lens may shade the light from the flash. The options are:

Ringlight flash, attached to the lens
Twin flashes mounted on the lens
Two flashes mounted on a bracket
One flash hand held or on a bracket

The light from a ringflash is very flat, suitable for record or copy work but not for pictorial lighting. The close-up twinlight flash units attaches to the front of the lens. The light output from the flashes can be varied. A flash unit of the Nikon R1 wireless twinlight (R1-C1 with the commander unit) can be positioned off camera and fired with the commander unit or a SB-800 flash.

Two small flashes mounted on a Lepp bracket are the most versatile light source for close up photography.

Sometimes only one flash is needed, especially as a fill light with sufficient ambient light.

Q.: I am getting into close-up insect photography and have been trying to learn enough about the Lepp macro bracket. Can the bracket be used to position the flash directly over the lens? Is the Lepp II an earlier version of the standard and deluxe models currently offered?

A.: The deluxe version of the Lepp II bracket has very useful ball heads, otherwise the standard version is the same.

The Lepp bracket is extremely versatile albeit somewhat cumbersome. The bracket holds the camera and has two adjustable rods with ball heads for flash units. One flash serves as the main light, the other one as a fill. The length of the rods holding the flashes can be adjusted by moving the rod in and out through a socket and rotated. The socket

can be rotated around a horizontal and a vertical axis. The flash can be positioned directly above the lens, if desired. To hold the frame vertically is less convenient but the flashes can be properly positioned for a vertical shot. The Lepp frame is more versatile than a ring flash (flat lighting!) or two macro flashes attached to the front of the lens, except for extremely short working distances.

The ball heads can hold full size flash units when more fire power is needed. I use two Micro Nikkor lenses and a Sigma APO 70-300mm zoom. The Sigma is not quite as sharp as the real macro lenses but produces a half life size image at a working distance of almost three feet, sufficiently long to prevent frightening of insects. A longer working distance requires more flash power.

I have equipped the Lepp frame with the Strobonar quick release mount which I use on all of my cameras and tripods. A quick release accessory is not necessary but convenient in the field.

Q.: What is the Scheimpflug technique for increasing the depth-of-field in close-up photography?
A.: The Scheimpflug technique increases the depth-of-field by tilting the lens. When photographing a flat field at an angle to the camera, as an example, leaves on the ground, one can visualize three planes: The plane formed by the subject being photographed, the film (or sensor) plane, and the plane formed by the front of the lens.

The Scheimpflug principle states that the maximum depth-of-field is achieved when the three planes meet at a common point or line. This requires tilting of the lens, something the view cameras can do. The film (sensor) plane and the lens plane of a conventional lens on a SLR camera are fixed in the parallel position and cannot be tilted to meet the Scheimpflug principle. However, a special micro lens makes this possible. The Nikkor 85mm f/2.8 PC Micro lens can be tilted to increase the depth-of-field. The lens has a maximum reproduction ratio of 1:2 at a working distance of 1.3 ft (40 cm) and the minimum aperture is at f/4.5. The price ($1320 street) of the lens may discourage a casual shooter.

ELECTRONIC FLASH

Q.: How good are electronic flash units made by independent manufacturers?
A.: Electronic flashes made by Canon and Nikon are so good that a low price would be the only incentive for buying an independent brand flash unit for these cameras. Flash units made by Sunpak and Vivitar are less expensive but very reliable and are often used by pros. Very good flash units are made by Metz as well but they are more expensive. Some independent brand electronic flashes have an AC adapter to save batteries during portrait or copy work.

The main problem with independent brand electronic flashes is their compatibility with the electronics of the camera. Some models are dedicated to AF cameras and perform most of the dedicated flash functions. Digital cameras have made the compatibility problem more complicated. As an example, the Nikon SB-80DX designed for digital cameras does not function with the i-TTL flash system of the Nikon D70 digital camera! New Metz and Sunpak electronic flashes are said to be compatible with the Canon and Nikon (including the i-TTL system) digital cameras.

A potential problem with using an independent brand unit is the risk of damaging the camera electronics. The synchronization voltage may be too high for some cameras. As an example, the older Vivitar 283 flashes have damaged Canon EOS cameras, although the recent production Vivitar 283 flashes may be used safely.

To test the synchronization voltage of an electronic flash, measure with a voltmeter the voltage across the contacts of the flash. The contact on the shoe is the negative terminal. I measured the sync voltages of Sunpak flashes with the following results: Model 2215 45 V, 433D 2 V, and 444D 2 V. The maximum allowable voltage, according to the information I have, is 6V for Canon EOS, 25 V for Minolta Maxxum, and 250 V for manual focus Nikon cameras for many years without any problems.

A flash used as a slave is not directly connected to the electronic circuitry of the camera and damage is not possible. Because the dedicated functions are not needed, any electronic flash can be used. Some slave sensors, lime the Nikon SU-4 slave sensor, enable TTL flash control and require a dedicated flash. The Nikon i-TTL system uses Nikon SB-600 and SBN-800 flashes as the slaves.

Q.: Does wireless flash photography use radio transmitters?
A.: Yes and no. The wireless flash photography is either optical or radio transmitted. The wireless flash photography advertised by the major camera manufacturers is essentially the old optical slave technology with some new refinements using infrared signals. The light output of modern slave units can be controlled by the camera TTL system.

Radio transmitters for wireless flash photography are available from independent manufacturers: the Pulsars from Bogen and the PocketWizard Plus system from Wein. Each unit can be operated either as a transmitter or as a receiver. The electronic flashes controlled by a radio transmitter can be placed anywhere, even outside of the light beam of the master flash unit. The radio transmitted flashes give the photographer an unlimited freedom to control lighting. The use of radio transmitted flashes may invalidate the manufacturer's warranty of the camera but a damage of the camera is unlikely.

Q.: I am a sports photographer and need a flash unit for my Nikon D1H and D2X cameras that will keep up without burning up – I recently burned up a Nikon SB-80 flash unit. I take several hundred photos within about 30 minutes and need a flash that can handle it. Any suggestions?
A.: I use two flash units for rapid consecutive shooting with an external power source. When one flash gets warm, I switch flashes and continue with the second flash while the first one is cooling.
Nikon recommends a maximum of 15 full power shots before a cooling period. Some time ago, I exceeded this limit and my SB-80DX started to smell. I am more careful now. I have not stressed my SB-800 but I believe overheating can harm it as well.

Q.: My electronic flash is not compatible with the latest Nikon cameras. If I buy the new Nikon SB-800 flash, will I have to buy a new synch cord as well?
A.: No, the old SC-17 cord does not need to be replaced. The new SC-28 is like a SC-17 with a locking mechanism added. The other new cord, the SC-29, has an AF-assist illuminator which aids autofocusing in dim light when the flash is hand held. The street

price is $74.95. The SC-29 cord comes with a curious warning for users in the State of California: “Handling the cord will expose you to lead, a chemical known in the State of California to cause birth defects and other reproductive harm. Wash hands after handling.”
Apparently the users of the cord in Delaware do not need to wash their hands.

Q.: How can I adjust the lighting ratio of two electronic flashes?
A.: The lighting ratio is the ratio of the light intensities provided by two light sources. The lighting ratio of two identical electronic flash units can be changed by (a) reducing the light output of one of the flashes, (b) using a neutral gray filter or a diffuser on one of the flashes, (c) changing the distance of the flashes, or (d) the angle of the flashes.

In portrait photography the main light is usually twice as strong as the fill light. However, the actual exposure on the film is not determined solely by the light falling on the subject but by the light reflected by the different areas of the object. This is what you and the film can see. Portrait photographers measure lighting ratios of flood lights by using an incident light meter, or more accurately, measure the reflectance of the lighter and the darker side with a spot meter. This technique is not usable for electronic flashes, however.

In a studio modeling lights (small lights with a light bulb) on top of the electronic flash units can approximately predict the illumination by the flashes. The distance and the angle of the lights (and the attached flashes) can be adjusted until the desired lighting has been achieved. On location this may not possible. The lighting technique must be simple to be practical. One of the flashes should be stronger than the other flash but the lighting ratio does not need to be exactly a typical 1:2 or 1:3 ratio. When photographing flowers with two flash units one of the flashes is usually aimed at the flower in the 45^{o} position and the weaker one from the other side or from above. A good guess is needed to decide where the shadows are going to be in order to avoid double shadows.

Q.: Many of the pros use for nighttime shooting of car races either a Norman or Lumiquest studio head on a Stroboframe bracket. The big units are rated in watt/seconds but my Metz 70MZ-5 flash unit has a guide number. Is there an equation that I could use to convert a conventional guide number to watt/seconds and vice versa?
A.: The guide numbers (GN) of an electronic flash unit are given by the formula GN (in feet) is equal to the square root of the product (factor x ISOx BCPS). The factor depends on the reflector, the flash tube, the zoom setting for zooming flash heads, and diffusers. The factor may vary between 0.03 and 0.07. Usually the factor is around 0.05-0.06. ISO is the rating of the film. BCPS, the beam candle power seconds, indicates light output and is measured by a standard procedure. The BCPS values of some older flash units were: 2500 for Vivitar 285, 3400 for Vivitar 292, and 2550 for the Sunpak 444D. Most manufacturers no longer state BCPS values and give only guide numbers for their electronic flash units.

For some flash units only the watt/seconds (Ws) are given. Watt/seconds indicate the electrical energy in the capacitor. A watt/second rating is not directly related to the light output of the flash and the guide numbers. Units with a lower Ws rating may have a higher guide number and vice versa. Usually the Ws ratings are given for studio units where guide numbers or BCPS values are meaningless. A studio flash may be aimed

directly, bounced off an umbrella or a reflector, projected through an umbrella, and so on. The watt/second ratings are not used to derive guide numbers. The light output is measured with a flash meter to determine the exposure for the given set of conditions.

In conclusion, the answer to your question is quite simple. An equation for converting watt/seconds to guide numbers does not exist, because these two variables are not independently related. The guide number can be determined by test exposures or by using a flash meter to compare the light output to that of a flash unit with a known guide number.

EXPOSURE METERS

Q.: Are the hand held exposure meters obsolete?
A.: Not at all, hand held meters are very useful tools. Handheld meters are used for incident light, reflected light, spot and flash metering. The meter in the camera can measure only reflected light. However, the incident reading is the most important exposure information because it measures the amount of light illuminating the object independently of the darkness of the subject. Incident light can only be measured with a hand held meter equipped with a hemispherical dome. Incident light measurement is very useful and essential under certain situations, for example, when adjusting lighting ratios. An accurate exposure determination requires the metering the light reflected from object and the incident light falling on the object. The average of the two readings is more accurate than the exposure determined by the camera.

The brightness range of a scene may be wider than the film or sensor can handle. A reflected light meter with a narrow acceptance angle, the spot meter, can measure small areas in the scene. The discrete readings define the average exposure for the desired range of highlights and shadows. A hand held spot meter has a narrower acceptance angle and is therefore more effective than the spot meter in the camera. .

The use of hand held meters is not always straightforward. The effective f-stop of the lens must be known and corrected for the filter factor if a filter is used. Lenses with a constant f-number are therefore essential. Zooms which vary the f-number when zooming exclude, or at least complicate, the use of a hand held meter. This is one of the reasons why pros prefer lenses with a constant f- number.

FILTERS

Q.: Because images can be modified digitally, are filters on the lens still needed?
A.: The unequivocal answer is yes, filters on the lens are still needed. The effect of a polarizer cannot be duplicated in the computer. A graduated neutral gray filter is essential for holding back bright areas. A computer cannot generate information absent on the film. The color of the image can be easily corrected digitally but at a considerable expense if the output is a slide. A digitally corrected slide costs 3 dollars, a slide with the color corrected in the camera costs 30 cents. Lastly, a filter protects the lens.

Q.: Which filters should I buy for my digital camera?
A.: You will need a UV filter, a circular polarizer, and a graduated neutral gray filter.

The UV filter protects the lens and reduces excessive UV radiation at high altitudes.
The circular polarizer reduces reflections, increases color saturation, and darkens the sky.
The graduated neutral gray filter can balance the dark and light areas of the image, as an example, darken the overcast sky. Square or rectangular graduated gray filters are more useful than the screw in types. The square filters come in 1, 2 or 3 stop densities of gray and the transition line can be sharp or soft. The filter with 2 stop density and soft transition is the most useful. Better (and more expensive) graduated filters are made of scratch resistant resin or glass and optically superior to the less expensive polyester ones. Popular brands are Cokin (the least expensive), Hi-Tech, Lee, Optiflex, Singh-Ray (expensive but very good) and Tiffen.

A filter is a part of the optical system and must be of the same high quality as the lens. A good filter must me planar, have the proper transmission characteristics, a durable antireflection coating, and a durable mount. Usually a higher quality means a higher price.

Popular brands, such as Hoya and Tiffen, have a satisfactory optical quality. Although I have not measured their planarity or transmission, in practical photography I have not seen any significant differences between Hoya, Tiffen, Canon, Nikon, and B&W filters. However, the quality of the filter mount varies considerably. More expensive brands, like B&W and Helioplan, have brass mounts which lasts longer and do not bind.

The quality of the step-up rings is very important as well. Interchangeable lenses have different filter sizes and require step-up rings to be compatible with one filter size only. The threads of cheap aluminum rings may bind and make it difficult to attach filters. Brass rings cost more but the price difference is well worth it.

Q.: I store Cokin filters in their original plastic cases but retrieving the filter case from the camera bag and removing the filter from the case is a cumbersome process. Is there a better way of doing this?
A.: Yes, there is. I use a FC-4 filter pouch made by F64 (B&H Cat.# F6FC). The pouch has a Velcro closure and a loop for wearing it on a belt. The pouch can hold four filters up to the 3.75 ” x 3.75 “ size. The price may be still $ 9.95.

Q.: Can two filters used together?
A.: The answer is yes but with some caution. With two filters on a lens, the added glass surfaces increase reflections and flare. With multicoated filters the loss of contrast and resolution may not be noticeable. A polarizer combined with an 81A filter was very popular for film cameras until warming polarizers appeared.

A serous limitation of using two filters is vignetting with wide angle lenses. Special filters for wide angle lenses have a thin ring but do not have a thread for attaching a lens hood. A solution to the vignetting problem is to have one filter attached to the lens and hold a square filter, like Cokin, Lee etc., in front of the lens. The square filters are not coated and two square filters cause a noticeable loss of contrast.

Q.: Can you tell me in which order should I mount a UV filter and a polarizer on the lens?
Should the polarizer mounted first or does not it really matter?

A.: The polarizer should be mounted on the outside. A lens hood, screwed into the polarizer, can be turned to rotate the polarizer conveniently. Actually, a UV filter is not really needed when using a polarizer. The UV filter adds two glass-air surfaces to the optical path and should be removed before attaching the polarizer. A warming polarizer can be used, if UV is still of a concern.

Q.: A lot of diffusion filters are on the market. How do they differ?
A.: The diffusion filters reduce small skin imperfections, soften wrinkles and create a dreamy look of portraits and landscapes. These filters diffract some of the light rays and do not affect other rays passing through the filter. The unaffected rays create a sharp image while the diffracted rays produce an overlaying soft image. The overall effect depends on the type of the filter. Some diffusers affect both the contrast and sharpness (resolution), some reduce mainly contrast and others mainly sharpness (resolution). The softening effect of some diffusion filters increases with the focal length and the aperture of the lens. A slight overexposure increases softening and an underexposure decreases softening.

The diffusion filters are sold with a confusing variety of names but the softening effect of all diffusion filters is caused by (a) irregularly distributed particles on the filter surface (b) concentric rings on the surface, or (c) a net in the filter.

Particles on the filter surface act like little lenses and dissipate the light striking them. As a result, the overall contrast as well as the resolution of the image is reduced. The softening effect depends on the shape, size and the distribution of particles on the filter surface. These "lenslet" filters are the most common (Zeiss Softars, Tiffen Soft/FX, Hoya Diffuser). The Zeiss Softars are the favorites of professional portrait photographers in spite of the very high price. The particles on the filter surface may be colored (Tiffen Black and Gold Diffusion/FX) or the particles are on a colored filter (Tiffen Warm Soft/FX).

Diffusion filters with concentric rings etched on the filter surface (Hoya Duto) keep the center of the image is usually sharp while the contrast is reduced and the highlights are softened. The etched lines may be symmetrical or asymmetrical. Tiffen's Pro Mist/FX filters have a textured glass surface.

The effect of net the diffusion filters increases with the decreasing size of the mesh. The finer the mesh of the net, the stronger is the effect. Net filters come in three colors: white, flesh color, and black.

The diffusion filters come in three or five grades. A larger number indicates a stronger effect.

Center clear diffusion filters have a clear center spot surrounded by a diffusing area. The size of the clear spot on film depends on the focal length of the lens. A longer focal length produces a larger clear area. Focal lengths shorter than 50mm are not recommended.

Some diffusion filters may interfere with the autofocus operation of the camera.

To choose a diffusion filter is not easy. The diffusion effects of different filter types are not expressed in simple quantitative terms and the large variety of filters excludes comparative testing. Once the decision is made which type to buy, then the grade of the filter requires another decision. Usually a set of three or five grades is purchased.

Do-it-yourself diffusion filters are made by smearing petroleum jelly on a filter or by spraying a lacquer on a glass plate.

Q.: How do circular polarizers work?

A.: The Maxwell theory visualizes light as a electromagnetic radiation consisting of waves which vibrate in all directions perpendicular to the direction of travel. Light reflected from a non-metallic surface is linearly polarized, that means, the reflected light propagates within a single plane. The blue color of sky is caused by reflections on atmospheric particles. Therefore the sky light is polarized.

Reflected light from non-metallic surfaces can be controlled with a polarizing filter. A linear polarizer may be compared to a slot or a grid which allows polarized light to pass through when the filter is oriented in the same direction as the plane of the polarized light. The filter blocks reflected light when it is turned crosswise to the plane of reflected light.

Unfortunately, linearly polarized light interferes with the proper functioning of autofocus sensors. Therefore, the plane of the light passing through the linear polarizer must be scrambled again. This is done with a circular polarizer. A circularly polarized light wave does not propagate within one plane but the direction of the vibration (the vector) is rotating in a circular fashion. The filters called circular polarizers consist really of two components: (i) a linear polarizer, and (ii) a circular polarizer mounted behind the linear polarizer.

An experiment explains how polarizers work. Screw two linear polarizers together. When rotating one of the polarizers light passing through the filters diminishes gradually.

Replace the second polarizer with a circular polarizer. Again, light can be blocked by rotating the filters. Now make the circular filter the first filter and the linear polarizer the second filter, behind the circular polarizer. With this combination, light is not blocked when the filters are rotated. This observation, that light transmitted by a circular polarizer cannot be blocked by a linear polarizer, shows that polarized light entering the linear polarizer is not vibrating in one plane when leaving the filter.

Q.: How can I use a polarizing filter on my rangefinder camera?

A.: The use of a polarizer with a rangefinder camera is possible but somewhat cumbersome. The effect of the polarizer cannot be seen through the lens and must be determined by viewing the scene through the filter. Rotate the filter in your hand to the desired degree of polarization. Note the position of the outer ring (Older polarizers had a handle or a dot on the outer ring. You may have to make a dot yourself.). Attach the polarizer to the lens and rotate the outer ring to the same position. As an example, if the dot is at a two o'clock position when the polarizer is handheld, rotate the outer ring of the mounted polarizer to the same (two o'clock) position. The rotation of the inner ring of the polarizer has no effect. Hence the exact position of the inner ring on the lens is irreverent.

Instead of detaching the polarizer from the lens and mounting it again, the procedure can be simplified by using two identically marked polarizers. One polarizer is for handheld viewing and the other one remains mounted on the lens.

The TTL exposure meter of a Contax G, Bessa R, Hexar, or Leica M6TTL will correct the exposure for the loss of light caused by the polarizer. For other cameras the handheld meter reading has to be increased by about 1_ stops.

Q. How can I remove a stuck filter or a step-up ring?
A.: The plastic filter wrenches are useful only for filters smaller than 55mm. A rubber band can improve the grip on larger filters. A rubber disk used for opening jars is the most effective tool, even for 77mm filters. Hold the lens barrel firmly just below the filter with one hand and grasp the sides of the filter with the rubber disk. Loosen the filter with a short turn and rotate the filter by hand.

LENS HOODS

Q.: Are lens hoods useful?
A.: A lens hood has two functions: (i) to reduce flare and reflections caused by sun rays, and (ii) to protect the lens. Rubber lens hoods can absorb blows from the front.

Most lens hoods are useless for zoom lenses. Wide angle to tele zoom lenses come with a butterfly shaped lens hood which bayonets on the lens. The hood shades the lens in the widest zooming position but is ineffective for tele photography. Telescoping hoods, like the Telematic made by Hama, are effective but require an adjustment every time the lens is zoomed.

Lens hoods supplied with single focal length lenses are effective as shades but offer no protection against a front impact because they are made of metal.

Adjustable bellows, the Compendium by Lindahl and the Ambico shade) are very effective for reducing flare. The bellows can be extended to exclude extraneous light without causing vignetting. The bellows used as a lens shade are indispensable for portrait photography and other work using a tripod.

MONOPODS

Q.: I will buy a monopod. Which are the most important features to consider?
A.: A monopod is a very useful and versatile tool for making sharp images. Before buying a monopod several decisions have to be made. Ideally, a monopod should be short when closed but tall and rigid when extended. The monopod should be light to carry but heavy to provide solid support. Obviously, all of these requirements cannot be met and the design of a monopod must involve several trade-offs. Many good monopods are on the market. Some may fit your style of photography better than others.

The first feature to consider is the length of the monopod. Most monopods are sufficiently long for an average person when fully extended (about 53 to 80 inches, or 135 to 205 cm). The length of the closed monopod, from about 11 to 25 inches (28 to 64 cm) is important as well. The shortest ones have 5 or 6 sections and easy to carry but not very rugged. When the monopod is closed, a lower section must fit into the adjacent upper section. As a consequence, the diameter of the section decreases sequentially from top to bottom. The lowest of the 5 or 6 sections is much smaller and weaker than the first one and the monopod is top heavy. More sections mean also more locks to open, unless the monopod has some sort of a quick opening mechanism. Some monopods are spring

loaded and open automatically by squeezing a grip action handle. Some monopods, like the short and light Adorama Podmatic and the now discontinued Linhof Monomatic have an automatic system for height adjustment.

Monopods having only 3 sections are more rigid but their longer length makes them a less convenient companion than the monopods with more sections.

The weight of monopod varies from less than a pound (284 g) to 4 pounds (1.8 kg). A light monopod is easy to carry but a heavy one is more stable. Carbon fiber monopods, made by Gitzo, Velbon, and others, provide rigidity with less weight and a higher price.

A monopod must open quickly to be useful and the design of the leg locks makes a big difference. Lever or wing locks are easier to open and less troublesome than collar locks.

Some monopods have a built-in ball joint, others need a ball joint. A small ball head is adequate because minor adjustments are made by tilting the monopod. A quick release system is essential for attaching the camera in a hurry. The Stroboframe Quick Release is light and its spring action is instantaneous.

Some monopods have concealed legs and can stand up like an ersatz tripod. An old monopod, the Mida MB-494, has 4 sections and a built-in ball joint. The foot of the monopod can be unscrewed and reversed to expose three square legs which lie flat on the ground. The other monopod I have, the Manfrotto Professional 3230 (new version 682B) has three sections. The minimum height is 27 inches (68 cm), the maximum height is 67.5 inches (170 cm), and the weight is 2.3 lbs (1040 g). The monopod has three legs hidden in the lowest section. Unfortunately, the legs cannot lie flat on the ground and support the monopod like the legs of the Mida monopod. In spite of this limitation, the legs are still useful.

A monopod with concealed legs is made by Cullman as well. Some monopods by Benbo and Gitzo convert to a hiking stick. The inexpensive Slim Pod by Slik weighs only 10 oz (284 g). Which monopod is the best depends on the individual needs of the photographer. Some photographers like convenience, others prefer stability.

It is very practical to have both hands free when carrying a monopod. I replaced the carrying strap of the monopod with a camera strap. I looped the original carrying strap through the camera strap and around the monopod. With both ends of the strap attached to the monopod I can carry the monopod conveniently like a rifle.

TRIPODS

Q.: Which tripod ids the best?

A.: The best tripod for outdoor photography is the sturdiest and the heaviest you can carry. Ina studio the weight of the tripod is not a limiting factor but lugging a heavy tripod for hours is not fun. Once you limit the weight limit acceptable for you, look for other features. Pinch (lever) locks are easier to operate than collar locks. The old favorite for nature photography, the Bogen Manfrotto 3021BN has a minimum weight of 3 inches (8.1 cm. The maximum height is 70.1 inches (178 cm) and the weight without a head is 5.3 lb (2.4 kg). The Manfrotto 3001BD is lighter (3.8 lb, 1.74 kg) and shorter (57 inches, 145 cm) but the height is adequate for most outdoor shots and the tripod is sturdy.

Carbon fiber tripods are now popular. They combine a light weight with sturdiness and do not transmit vibrations. Their price is considerably higher.

An essential part of a camera support is the tripod head. Three types are being used: a ball head, a three-way geared head, and a pan head, useful mostly for video cameras. . Ball heads are most convenient. As a rule of the thumb, a larger ball is better but heavier. A medium ball head can support cameras and lenses of moderate weight but is not as smooth as large ball heads with friction control. Large ball heads can carry heavy load . A premium quality ball head, the Arca-Swiss, weighs about 3.5 lbs (1.59 kg). Your ability to carry loads and the financial resources may decide which ball head to buy.
Hydraulic ball heads use a hydraulic mechanism to lock the ball tighter with less effort. A single action grip ball head allows a quick movement of the camera but lessens the stability of vertical shots. The geared head with three controls is the most precise but the slowest to adjust.

The stabilization (vibration control) does not eliminate the need for a tripod. A tripod helps to select the best composition and to adjust a graduated filter.

An important tripod accessory is the quick release. Several designs are available, some more rugged than others. I have been using the Stroboframe Quick Release for years with good results. The plates are light, yet reliable and very easy to use.

Q.: I am looking for a carbon composite tripod and the choices are overwhelming. Can you give me advice on what tripod and ball joint I should buy?
A.: The carbon fiber tripods were pioneered by Gitzo. Most carbon fiber tripods are Gitzo look-alikes, except for the Manfrotto tripods. The Gitzo listing of tripods is very confusing with many Model numbers and Series numbers. The carbon fiber tripods have the Mountaineer designation. A higher Series number indicates a wider upper leg diameter and a sturdier construction. Manfrotto tripods are less expensive and very popular among professionals.

The most important properties of a tripod are the weight, maximum height, minimum height, and ease of opening. The fundamental rule is – the heavier the better. Carbon fiber tripods combine a light weight with sturdiness and do not transmit vibrations. However, when the wind is blowing, the weight of the tripod counts.

The selection of a tripod depends on the intended use: a lightweight tripod for travel (better than nothing), a medium weight for outdoors, and a heavy weight for studio use. A tripod weighing about 4 lbs (without the head) is quite comfortable outdoors. I have the tripod in a tripod bag and carry it on my shoulder like a rifle. The bag has enough space for a light sweater. When I open the tripod, I drape the strap of the bag over the tripod and the bag does not get lost. I used to carry an 8 lbs tripod all day on a rough terrain but prefer now a lighter version.

The maximum height of 70” is sufficient for every situation but a height of 55” is a reasonable compromise. A center post adds instability and is useful only as a last resort. The minimum height of the tripod, preferably 8-12”, is important for low level nature photography.

The length of the tripod when folded is important as well. A shorter tripod is easier to carry but a larger number of sections means more time needed for opening the tripod.
Lever (pinch) locks are easier to operate than collar locks.