

# Lenses for 35mm Cameras

## Interchangeable Eyes

by Jack and Sue Drafa

One of the greatest advantages SLR cameras have over point-and-shoot cameras is the capability to change lenses. Lens-choice flexibility allows you to go beyond the norm in your endeavor for creative imagery. Camera manufacturers have designed an arsenal of lenses for your camera, with new ones continually being introduced. There are wide-angle, telephoto, zoom, mirror, and even fisheye lenses to get your creative juices flowing. Let's take a quick look at how a lens works before we decide which ones you should buy.

### Lens Construction

Interchangeable lenses are simple to use yet complex in construction. In the past few years, lens design has been aided by special computers that defy the laws of physics in an effort to create fantastic lens designs. Fortunately, most

of this sophisticated lens construction is hidden behind the lens body itself.

The back of the lens hosts the most fragile part of the lens. Remove the lens from the camera body, and you can easily see the bayonet mount, back lens elements, aperture controls, and electronic control contacts. When lenses are stored separate from the camera body, be sure to use a rear lens cap that bayonet-mounts to the back of the lens for protection.

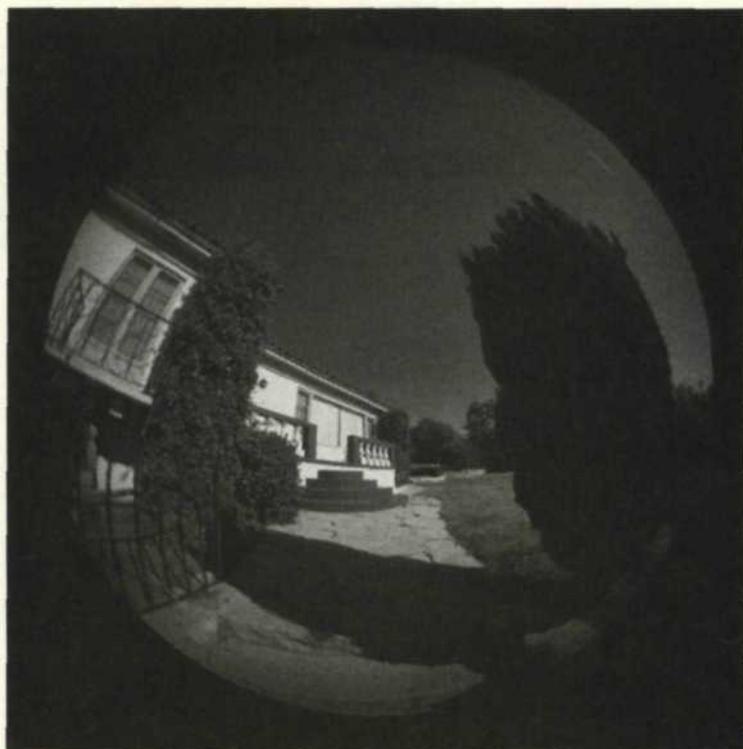
With most lenses today the aperture control ring is near the back of the lens very close to the bayonet mount. Many of the lenses with electronically controlled apertures will have an aperture lock to keep the aperture ring in a specific location allowing the camera body total control. The focus ring is usually located in the middle section of the lens and can be easily rotated for easy manual focus control when needed. Many of the new lenses with macro capability require extreme focus

ranges, so limit switches are used to minimize the amount of distance an autofocus lens must search to achieve correct focus.

The front of the lens is another fragile area, since the glass must face all the elements of mother nature. A good lens hood, lens cap, and even a skylight filter are great tools to keep your lenses in tip-top condition. Since photographers carry several lenses when photographing on location, be sure you select a camera bag that provides

Normal lenses show things about as the eye sees them. For 35mm cameras, a 50mm lens is considered "normal."





Fisheye lenses come in two varieties: circular (above), and full-frame (right). The 180° angle of view is diagonally with the full-frame.

adequate padding between lenses. Check out the section of this book on camera bags to help you make the right purchase.

## Focus Control

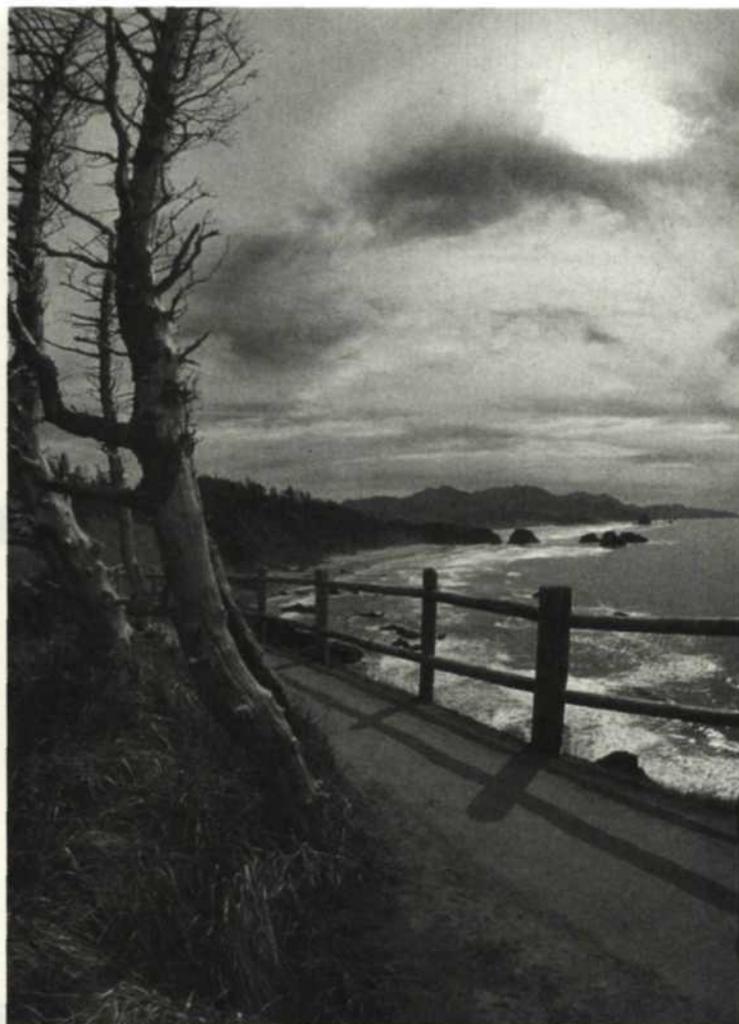
With the new autofocus camera capability, most of the lens operation has been electronically transferred to the camera body. When the autofocus system is activated by depressing the shutter release, a motor in the lens or in the camera body adjusts the lens focus to match sensors inside the camera body. Wide-angle lenses will have a very short focus range and you will hardly see them move as they focus from inches away to infinity. Telephotos will have a long focus throw and it may take a considerable lens rotation just to change the focus a few feet. If you decide to take focusing into your own hands, you can deactivate the autofocus switch and manually rotate the focus ring.

When using a macro lens to autofocus on a very small subject, the camera sensor searches the entire focus range from very close to distant subjects. Many of the lenses have a limit switch to control the extent of your focus range. Often it is easier to switch to manual focus in order to zero-in on your focus point, set the limit switch and then re-activate the autofocus function.

## Aperture

The size of the lens opening, or aperture, is controlled by the f-stop ring. The numbers on the ring represents a relationship between the focal length of the lens and the diameter of the opening of the aperture blades inside the lens. If you divide the focal length of any lens by the diameter of the opening in the aperture blades, you will end up with numbers such as  $f/2.8$ ,  $f/4$ ,  $f/5.6$ ,  $f/8$ ,  $f/11$ ,  $f/16$ ,  $f/22$ , and  $f/32$ . Many zoom lenses have a variable maximum aperture, like  $f/3.5$ – $f/4.5$  because the aperture narrows as you zoom.

The larger the aperture opening, the smaller the f-number, and the more light passes through the lens striking the film. A lens that opens to  $f/1.4$  allows more light to strike the film and is considered a “fast” lens compared to one that opens only to



$f/4$ . Fast lenses allow you to use higher shutter speeds to get the image in low-light situations.

Smaller apertures, with larger f-numbers, allow less light and require decreased camera shutter speeds to compensate for the light loss. For this reason many of the more expensive fast lenses are larger and have wide maximum apertures to allow enough light so you can use higher shutter speeds.

When lens focal lengths become very long, the slightest lens movement is magnified. This makes it really tough to hand-hold long lenses and you often need a tripod. A good rule of thumb is to set your shutter speed and aperture combination so the shutter speed exceeds the focal length of the lens (e.g., shoot at at least  $\frac{1}{500}$  when using a 400mm lens).

## Depth of Field

Another aspect of the aperture control is the depth of field created by using various aperture settings. The depth of field is the area in front of and behind the subject that is in sharp focus for a given f-stop. As the aperture becomes smaller and less light comes through the lens, the depth of field increases, and more becomes in focus. Small hash marks can be found on some lenses that tell you the approximate depth of field for any f-stop setting. Most modern camera bodies feature a depth-of-field preview button. When this button is depressed, the aperture blades close to the lens setting to give you a visual reference of the actual depth of field you will have using that particular f-stop.

## Which Lens Do You Buy?

So, how do you decide just which lens to buy? The decision as to which lens to add to your camera bag is largely dictated by your subject preferences and shooting style. Every photographer

## 35mm Lens Suppliers

### CAMBRON

Cambron offers a wide arsenal of economical lenses for most all 35mm SLR camera models, both auto and manual focus. Their lenses are precision crafted and multicoated on all glass surfaces.

Prime lenses range from a 20mm f/2.8 wide-angle to a 1200 f/6.8 lens and most every possibility in-between. They feature zoom lenses to satisfy everyone with an 18–28mm, a 24–70mm, a 35–300mm, an 80–200mm, and even a 75–300mm lens with macro capability.

Cambron also offers compact mirror lenses from 300mm to a whopping 2500mm. Some of these mirror lenses, like the 500mm MiniMirror, are so small that they fit in the palm of your hand. They also offer several tele-converters, from 1.4X to 3X, to round out and expand this expansive array of lenses.

Cambron continually expands their lens offerings in order to keep pace with the fast pace technological advancements in lens design. Cambron lenses are available from Cambridge Camera Exchange.

### CANON

Canon is a name renowned for their ultrafast, quiet, precision-crafted autofocus lenses. Each of Canon's EF lenses has its own microprocessor-controlled focusing motor for optimum performance. Many lenses also feature Canon's exclusive Ultrasonic Motor technology.

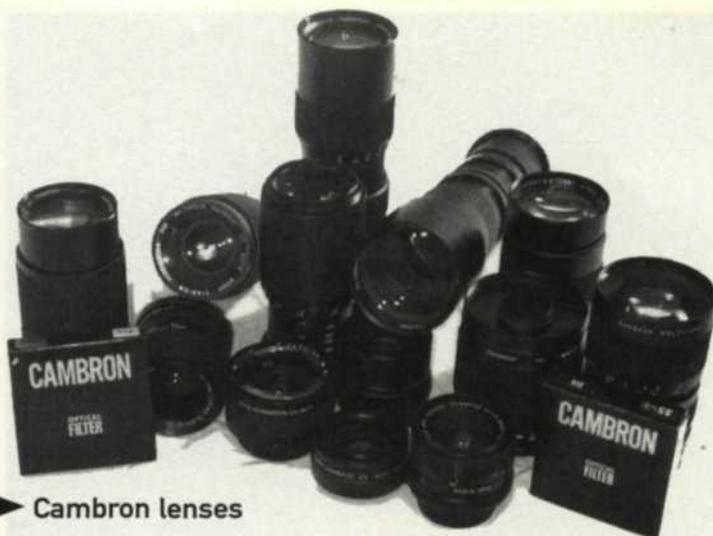
The vast assortment of focal lengths run the gamut from 14mm superwide and 15mm full-frame fisheye to 600mm supertelephoto. In between, they feature several macro lenses, tilt-shift lenses, and an array of zoom lenses like 20–35mm, 35–80mm, and even a 35–350mm.

They have a very fast 50mm f/1.0, a 135mm f/2.8 with Softfocus for portraits and a totally new version of the popular 100mm f/2.8 macro lens.

Canon also offers a series of telephoto lenses that feature Image Stabilization to compensate for camera shake. It allows you to utilize two shutter speeds slower than the 1/focal length rule. Just think, you could use 1/125 with a 500mm IS lens. Currently there are five telephoto lenses with IS capability—the 300mm f/2.8L IS USM, 300mm f/4L IS USM, 400mm f/2.8L IS USM, 500mm f/4L IS USM, and 600mm f/4L IS USM. All share lightweight, weather-resistant construction, superb AF speed and optical quality. The 28–135mm f/3.5–5.6, 75–300mm f/4.0–5.6 and 100–400mm f/4.5–5.6 zoom lenses also feature Image Stabilization.

### CONTAX/YASHICA

Contax and Yashica camera users have the luxury of sporting Carl Zeiss T\* lenses, known world-round for their optimum performance. You will find lenses that go the distance from the Distagon 16mm fisheye to the Mirotar 500 f/4.



Cambron lenses

has a different style of taking pictures, so what is right for one person may be way off base for the next. That's why it is so important for the photographer to identify the type of photography they want to do, and then match the proper lens to the task.

## Types of Lenses

Some of the most powerful tools in the creative imaging

process are interchangeable

lenses. When properly used, lenses allow photographers to change the angle of view, subject focus, depth of field,

exposure, and perspective.

Manufacturers understand

this and have created a vast selection of interchangeable lenses for your buying pleasure.

The 50mm lens is considered a "normal" focal length lens for 35mm cameras, as it approximates what the human eye sees. Most new cameras come with a standard 50mm lens, and will adequately service the beginning photographer for quite some time. Eventually though, most photographers want wider and longer lenses in order to expand their creative skills.



Canon IS supertele-photos



Wide-angle lenses take in a wider field of view than normal lenses.

## Fisheye Lenses

The widest of wide-angle lenses is the fisheye lens and it comes in two flavors. The older version projects a full circle on the film frame. The images are small and don't even fill the film frame. The newer version is the full-frame fisheye, which covers almost the same angle of view but fills the entire frame. The upside to both these lenses is that they can help create some very interesting images. The downside is that they have considerable distortion, and really don't capture an accurate representation of the scene.



Zeiss T\* 35-70mm  
f/3.5-5.6 zoom for Contax

## Wide-Angle Lenses

When you want to capture more in the viewfinder than possible with your normal 50mm lens, you turn to the wide-angle lens. You will find the smaller the focal length, the wider the lens's angle of view. Normally you would have to move back away from your subject in order to capture more expanse in the scene. The best part of all is that these lenses allow you to capture more in the scene without moving an inch.

Wide-angle lenses also allow you to add more perspective to an image than you can get with a normal lens, because you can move very close to a subject and still get it all in the picture. For example, if you approach the front headlight on a car with a super wide-angle lens, the headlight appears to be as big as the rest of the car. This perspective "distortion" can give tremendous depth and add emotional impact to a normally bland image. Another plus is that the depth of field increases as the focal length of the lens becomes shorter. Superwide-angle lenses can be in focus from a few inches to infinity even without using the smallest aperture.

Superwide-angle lenses in the



Leica Tri-Elmar-M  
f/4 28/35/50mm  
ASPH lens



Telephoto lenses magnify things, letting you zero-in on distant subjects.

Photographers partial to zoom lenses will appreciate Contax's 28-70mm, 28-85mm, 35-70mm, 35-135mm and a 80-200mm. Especially popular is the 100-300mm zoom because of its one-touch design, rapid focusing and correction for aberrations at any focal length.

They also have a fast Tele-Apottessar T\* 300mm f/2.8 and a 200mm f/2 lens that are ideal for wildlife or sports action photography. The PC-Distagon T\* 35mm f/2.8 is the perfect lens for 35mm architectural photography.

To go with their new N1 AF 35mm SLR, Contax has introduced four new N-mount lenses Zeiss T\* lenses (three with Ultra Sonic focusing motors): the Vario-Sonnar T\* 24-85mm f/3.5-4.5 and 70-300mm f/4-5.6, the Planar T\* 50mm f/1.4 and the Makro-Planar T\* 100mm f/2.8.

Contax also added a new zoom lens for its G-series AF rangefinder cameras. The Vario-Sonnar T\* 35-70mm lens, the first zoom interchangeable lens in the rangefinder AF system, is destined to be a hit.

## LEICA

Leica offers two lines of lenses—one for its rangefinder M-series cameras and the other for the single-lens reflex R-series. The M-series lenses offer extremely compact design, featuring focal lengths ranging from 21mm to 135mm with speeds up to f/1.0. The ever-popular Tri-Elmar M f/4 28/25/50mm ASPH incorporates three focal lengths. This unique lens is not a zoom, since it only operates at the three distinct focal lengths. Nevertheless, this gives M-camera users the flexibility of three of the most popular focal lengths in one single, compact unit. The newest addition is the APO-Summicron-M f/2 90mm ASPH lens. For the first time in a Leica lens, both apochromatic correction and aspherical lens surface are utilized. This lens is going to make photojournalism and portraiture even easier.

The R-series lenses are compatible with the Leica R reflex cameras. This impressive array features 30 lenses with focal lengths that run the gamut from 15mm to 800mm. All these lenses have components protected from corrosion to guarantee reliable functioning under almost every climatic condition. This attention to quality is what makes Leica a trusted name in the industry.

## MINOLTA

Minolta's lens history dates from 1946 when it became Japan's first camera maker to begin coating lenses. Ten years later they introduced the first multi-layer-coated lens. Their continued leading-edge advancements in lens design guarantee Minolta camera users quality, innovation and performance.

G-series lenses are the "elite" of the Maxxum line, precision-crafted and offering a distinctive level of photographic performance. They feature large maximum apertures for flexibility and depth-of-field control. The G lens list includes the 35mm f/1.4, a new 85mm f/1.4

GD, fast 200mm, 300mm, 400mm and 600mm APO telephotos, and 17–35mm f/3.5, 28–70mm f/2.8 and 80–200mm f/2.8 zooms.

Minolta offers a wide selection of autofocus lenses to compliment their entire Maxxum line. The focal lengths extend from 16mm fisheye to a 100–400mm zoom lens. New to the line are the 24–105mm f/3.4–4.5D, 100–300mm f/4.5–5.6APO D, 100 f/2.8 Macro D lens and the previously mentioned 85mm D lens. Each of these new lenses has a built-in distance encoder and an auto clutch mechanism that works to stop the rotation of the widened focus ring while in AF. ADI flash metering is also possible with these lenses combined with the new 5600HS(D) program flash.

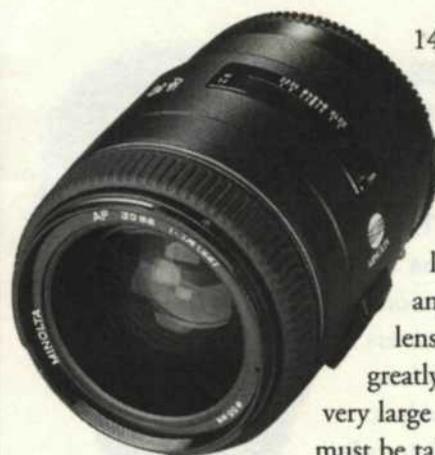
While Minolta has discontinued many of the lenses in its MD line of manual-focus lenses for X-series Minolta manual-focus SLRs, there are still 13 in production, from 24mm f/2.8 wide-angle to 100–300mm f/5.6–6.7 zoom, plus a 2X tele-converter. X-series camera users can sometimes find discontinued MD lenses (from 7.5mm circular fisheye to 1600 mirror) can sometimes be found on the Used shelves at camera stores, and at photo swap meets.

## NIKON

Nikon, known for its optical excellence and advanced lens technology, produces a wide assortment of lenses for every type of photography. From the 16mm f/2.8 full-frame fisheye to the 600mm f/4 super telephoto, Nikon has it all. Nikon offers over a dozen AF Zoom-Nikkors, more than a half-dozen wide-angles, four close-up lenses, almost a dozen telephotos, and even a couple of normal lenses. They are constantly developing new lens technologies, and adding new lens designs to expand your photo creativeness.

The ED lens series uses an Extra-Low Dispersion glass to minimize chromatic aberrations. Subject-position information is sent to the camera metering system for accurate exposure with the AF D-type lenses. Other lens designs include IF (internal focus) so the lens does not change length or rotate when focused, and RF (rear focus) so that only the rear elements move when focusing. Nikon's AF-S lenses use Silent Wave Motors for extremely fast and smooth operation of the lens focus system.

In the AF lens group you can select from either prime lenses or some really incredible zoom lenses. The recently introduced 18–35mm f/2.8 zoom uses the silent motor design and has internal focusing (IF) for smooth action. The new AF VR Zoom-Nikkor 80–400mm ED F/4.5–5.6D uses new advanced vibration-reduction technology. Prime lenses includes the new superwide-angle 14mm f/2.8D ED with a 114° angle of coverage with 35mm film cameras, and 90° with the new D1 digital camera. Nikon even has an 85mm medium telephoto that can tilt and shift focus, much like the 4x5 large-format camera systems.



Minolta AF 35mm  
f/1.4G

14–20mm range are becoming more common, less expensive, and much higher quality thanks to new computer-aided lens design. Many of these lenses offer only a little less angle of view than the fisheye lenses, but the distortion is greatly minimized. Most have a very large front glass element, so care must be taken to protect the lens during use and transport. A lens hood is a must in order to avoid flare from the sun. Not to worry though, as most have one built right into the lens itself.

When you want to take in a large viewing area, but need to keep the perspective distortion to an absolute minimum, you might consider using the wide-angle lenses from 20mm to 35mm. These lenses are very compact, usually offer fast maximum apertures, and are fairly inexpensive. That combination makes them a good choice for one of your camera bag additions.

## Telephoto Lenses

On the other side of the normal lens we have the telephotos. These lenses are designed to bring subjects closer to the camera without having to physically move any closer. Since wildlife and sports photographers need to get close-up images of action in the distance, these are often their lenses of choice. Telephoto lenses range from short (80mm) to supertelephoto (up to 2000mm). They usually have special tripod mounts so you can attach the lens to a tripod for stability. In your search for lenses, you will quickly find that price increases with larger apertures or longer focal lengths.

Budget, speed of the lens, weight concerns, and focal length all factor in when deciding which telephoto lens to purchase. If you want to shoot in low light, or capture fast action, you will probably want a faster lens with a larger aperture. It will cost you more to buy a 500mm f/5.6 lens than a 500mm f/8 lens, but it will be worth the extra money if you find yourself in a tough photographic situation. Before you make your buying decision, consider the possibility of using faster film to compensate for the slower lens. (This is an especially attractive option if you're on a tight budget—fast telephoto lenses are quite expensive.)

There is no correct buying decision. It is more of a situation of what your pocket book can handle and your arms can carry. When looking at a substantial investment in a long telephoto lens, be sure to research what's out there and check your local camera store before you buy one.



AF Zoom-Nikkor  
18–35mm f/2.8D zoom

## Zoom Lenses

One of the most popular types of lenses in most every camera bag is



Macro lenses let you focus closer than standard lenses—true macros let you focus close enough to record the subject life-size on the film.

the zoom lens. The quality of zoom lenses has improved considerably over the years, and now gives prime lenses a run for your money. More recently faster zooms with wider zoom ranges have been introduced with price tags that make them very desirable.

The biggest advantage to zoom lenses is they allow you to change from one focal length to another with a quick twist or slide of a zoom collar. Camera manufacturers realize the popularity of zoom lenses and keep introducing more effective zoom ranges.

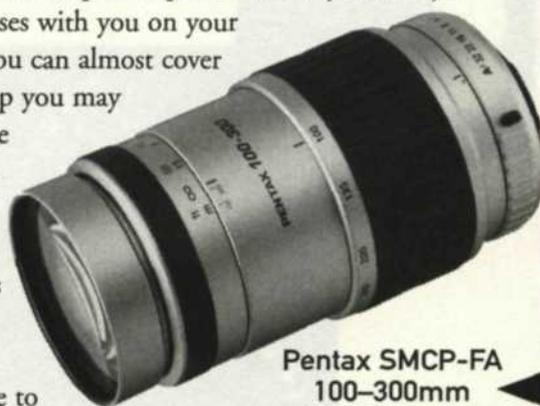
Keep in mind when purchasing a zoom lens, you need to analyze the most common focal lengths you work with and your most common aperture. No sense spending money for a 75–300mm f/2.8–3.5 when you'll never take advantage of the wide aperture. Remember that the faster a zoom lens, the bigger and more expensive.

Let's say you buy two lenses—a super wide-angle to short telephoto and a wide to super telephoto. When you take just these two zoom lenses with you on your photo adventure, you can almost cover most every photo op you may encounter. This sure makes your camera bag a little lighter to carry or your photo vest a bit less bulky. It also saves you some money, since you don't have to purchase as many lenses to cover the same focal-length range.

Many of the better zoom lenses also have macro capability. This allows you to continue past the normal close focus range and focus down to a 1:4 macro range. Now you really can accomplish most everything with just a handful of lenses.

For newer photographers, we recommend selecting a zoom lens that runs the gamut from wide angle to telephoto. New lens technologies have generated lenses that allow you to cover the focal length from 28–300mm all in one lens. That extensive

Olympus Zuiko  
35–80mm f/2.8 zoom



Pentax SMCP-FA  
100–300mm  
f/4.7–5.8 zoom

## OLYMPUS

Prime lenses are the norm for the Olympus Zuiko line for OM-series SLRs, starting with a 16mm f/2.8 fisheye and extending through the 1000mm f/11 super telephoto. Many of the focal lengths come in fast and slower varieties so that you can pick between size and speed. For example the 24mm, 28mm, and 35mm lenses each come in f/2.0 and f/2.8 versions. Architectural photographers will love the 24mm f/3.5 shift lens that can shift 10mm up and down and 8mm to the left or right.

If you like macro photography, the Olympus line is hard to beat. Several macro lenses from 50mm to 90mm, and a special group of bellows macros from 20mm to 135mm, cover just about every situation in the world of the small. Magnifications up to 13.6X can be accomplished with the 20mm macro and the auto bellows.

The 35–80mm f/2.8 zoom uses both extra-low dispersion glass and high refractive index glass lenses to put it on the quality level of prime lenses. Wildlife photographers will love the superfast 350mm f/2.8 telephoto lens which incorporates UD glass and can focus down to 9.8 feet.

## PENTAX

Pentax offers the FA, F, and the A/K series of lenses that span a wide range of focal lengths. The FA autofocus lenses offer power-zoom capability and use extra-low dispersion elements, internal focusing, and one-touch manual focus. FA lenses start with 20mm and continue up to 600mm with a wide assortment of zoom lenses in-between. Three new zoom lenses include the 35–80mm f/4–5.6, 80–200mm f/4.7–5.6, and 100–300mm f/4.7–5.6 super zoom lens. The 35–80mm uses Pentax's original Ghostless Coating which reduces lens flare in backlit situations. If you want a faster lens, the f/2.8 80–200 ED(IF) gives you the perfect tool for low-light situations. At the supertelephoto end Pentax has the SMCP-FA 250–600mm f/5.6 zoom, with its very own trunk.

The F series has fewer lenses but covers a broader range starting with a very unusual 17–28mm fisheye zoom lens that has a 90° to 180° angle of coverage. The series ends with a 250–600mm f/5.6 zoom that would be perfect for nature and sport photographers alike.

The A/K manual-focus series includes a broad range of lenses from 15mm superwide-angle to 2000mm supertelephoto. Both traditional telephoto and mirror lenses are available at the longer end of the scale.

## PHOENIX/SAMYANG

The Phoenix Corporation makes economical lenses for many popular AF 35mm SLR cameras. They feature several new lens offerings like the AF 70–300mm f/4.5–6.7 which combines 4X zoom capability with a long telephoto to make it the perfect lens for sports photography. The AS/IF 28–210mm lens features internal focusing, and aspherical elements for sharp, crisp pictures. Phoenix also produces an AF 28–80mm

f/3.5–5.6, and its manual-focus cousin, which serve as a great replacements for the standard 50mm lens.

Phoenix has a full line up of autofocus zooms from 19–35mm to 100–400mm. There is even a do-it-all lens with an incredible range from 28–300mm! Phoenix has a 100mm f/3.5 macro telephoto and auto-focus teleconverters. There is also a full roundup of manual-focus lenses.

Phoenix also markets the reasonably priced line of Samyang lenses. They include an AF 28–70mm and 18–28mm, 28–70mm, 35–70mm and 75–300mm manual-focus zooms. Also included are a manual-focus 500mm mirror lens and a 500mm preset telephoto.

## SIGMA

Sigma manufactures lenses to fit Minolta, Nikon, Canon, Pentax, Olympus, and Contax cameras. Zoom lenses start with the 17–35mm EX Aspherical zoom that covers from 103.7° down to 63.4°, and can focus as close as 19.7 inches. A second version has the HyperSonic Motor with ultra-quiet focus. Another new EX zoom that has an impressive range is the AF 50–500mm f/4–6.3 with apochromatic lenses, rear focus, and a HyperSonic motor. Angle of view can be changed from 46.8° to 5° with one zoom function. Numerous other new zooms include a 28–300mm, 28–200mm, 28–135mm, 70–300mm, and a 28–105mm Aspherical lens with internal focusing.

In the prime lens group, two new fisheye lenses give you either a circular view with the AF 8mm f/4 EX, or a full-frame view with the AF 15mm f/2.8 fish-eye lens. If you want full lens correction, the new Sigma 14mm f/2.8 Aspherical lens will give you a 114.2° angle of view. At the other end we have the new APO 800mm f/5.6 EX lens with the HyperSonic motor which would be great for nature and sports photography.

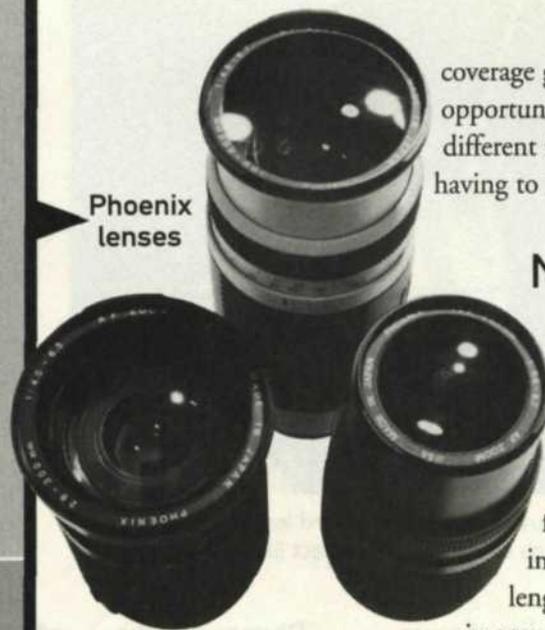
Macro photographers have a wide choice of either prime or zoom macro lenses. The 50mm f/2.8 EX, 105mm f/2.8 EX, and 180mm f/3.5 EX all focus down to 1:1 reproduction ratios. Most impressive is the 70–300mm f/4.5–5.6 Macro Super zoom that can focus down to 1:2 reproduction ratio.

## TAMRON

Tamron, known for its expertise in optical technology and manufacturing innovations, celebrated its Golden Anniversary in 2000. Their T-mount was the first interchangeable mount system for 35mm SLR cameras. Tamron's continued research and development allows them to offer a full line of AF lenses dedicated to Canon, Nikon, Minolta and Pentax camera systems.

The powerhouse in the Tamron line has been the 28–200mm f/3.5–5.6 LD Aspherical IF zoom with over a million units sold. Now they have come up with a 28–300mm f/3.5–6.3 LD Aspherical IF Macro lens that has taken off like a rocket. This lens distinguishes itself

Phoenix lenses



coverage gives you the opportunity to try a lot of different focal lengths without having to buy multiple lenses.

## Macro Lenses

The macro lens is one of our favorites because it makes the world of the small bigger than life. The first macro lenses were in the 50mm focal length, but

improvements in lens design have extended them to 100mm and 200mm. The advantage of the longer macros is that you can photograph skittish subjects from further away and still accomplish 1:1 life-size reproduction.

Macro lenses are unique in design because their sharpest f-stop is not two stops down from wide open as with most other interchangeable lenses (f/5.6–f/8). Since macro lenses are generally used with electronic flashes to stop the action and capture the minute detail, smaller apertures are the norm. For that reason these lenses are unusually sharpest at two stops from the *smallest* aperture (f/16–f/22).

Sigma AF 800mm f/5.6 EX



Great macro subjects include flowers, insects, coins or just capturing fine detail in larger subjects. One of the problems you encounter when using macro lenses, is shallow depth of field. Even using the smaller apertures, it is tough to get everything in focus, so selective focus is often necessary to isolate your subject from the background.

Zoom lenses provide a whole range of focal lengths in a single lens—and they allow you to produce this effect, by zooming the lens during a one- or two-second exposure.



## Mirror Lenses

This unique lens type incorporates one of the oldest lens designs, utilizing a concept similar to reflecting telescopes. It uses internal mirrors to bounce the light back and forth inside the lens before forcing the image through the lens. This provides a long focal length in a small package. Some 500mm mirror lens are only a few inches long and weigh only a couple of pounds. These lenses cost less than a telephoto lens of the same focal length, but are not quite as sharp. The mirror lens is usually manual focus and has a fixed aperture of typically  $f/8$ .

The front mirror in these lenses creates an unusual effect, causing out-of-focus highlights to take the appearance of donut-shaped circles of light. That makes it really easy to spot when your picture was taken using a mirror lens.

**Tamron 28-300mm  
f/3.5-5.6 LD  
Aspherical IF Macro zoom**



## Perspective-Control Lenses

This type of lens has also been around for quite some time and is mostly used by architectural photographers. When you photograph a tall building with a standard wide-angle lens, the lines converge. The resulting image looks like the building was falling backwards. With the perspective-control (PC) or shift lens, the photographer simply points the camera lens straight ahead, and shifts the lens up to capture the top of the building, thus keeping all the lines parallel to each other. Before PC lenses, photographers had to rely on larger-format cameras to be able to make these corrections.

More recently new PC lenses have been introduced that actually tilt and shift the plane of focus so that near and far objects are both in focus even when using wide apertures. That makes these lenses valuable for macro work, where the depth of field is limited. Using PC lenses now gives you total control over the plane of focus.



**Tokina AT-X 280 AF PRO  
28-80mm f/2.8 zoom**

## Soft-Focus Lenses

Several manufacturers make a specialty lens called a soft-focus lens. These are popular with portrait photographers who like



**Vivitar Series 1 28-210mm  
f/4.2-6.5 zoom**

from the pack by employing Hybrid Aspherics applied to a Low-Dispersion glass element. What this means is that it provides brilliant color, great contrast and edge-to-edge sharpness.

If those two lenses weren't enough, Tamron features AF lenses including a 20-40mm wide-angle zoom, a 90mm Macro, a 300mm telephoto and a slew of zooms. They also feature an entire lineup of manual-focus lenses that use an interchangeable mount system instead of a fixed-mount.

## TOKINA

Tokina makes a full line of both autofocus and manual-focus lenses for Nikon, Canon, Minolta, and Pentax camera systems. In addition, they also make manual-focus lenses for Yashica and Olympus. The bulk of the lenses are in the zoom category, with the latest introduction being the AT-X 280 AF PRO 28-80mm  $f/2.8$  fast constant-aperture lens. Two aspherical lens elements and one SD (super low dispersion) glass element are used to insure critical sharpness across the entire film plane. The multi-coated elements were created by the Hoya Corporation, the world's largest manufacturer of optical glass. A new focus clutch mechanism gives this lens very fast autofocusing capability.

In the long telephoto zoom category, Tokina makes an AF 100-300mm, and an AF 80-400mm to expand the focal-length range even more. Wide-angle prime lenses, such as the AF 17mm  $f/3.5$  super-wide lens, use aspherical elements and a floating lens system to provide high resolution across the full image. On the long lens list is the AF 300mm  $f/2.8$  super telephoto lens with SD (super-low dispersion) glass, and an internal rear focusing system.

## VIVITAR

A half dozen premium optics lenses comprise Vivitar's Series 1 AF team. Some of these lenses are compatible with Pentax cameras and all are fully functional with Nikon, Minolta and Canon cameras. The first in the series is a 19-35mm compact, lightweight extreme wide-angle zoom that is perfect for capturing both confined spaces and wide-open scenics.

Vivitar Series 1 has three lenses that capture an extensive focal length range that all start with 28mm and go to 105mm, 210mm and 300mm. These lenses make it possible to carry a minimum of equipment and capture most any shooting situation you may encounter.

The 100-400mm AF  $f/4.5-6.7$  zoom allows you to cover great distances with a compact lens that only weighs 25.9 ounces and measures 6.3 inches. It even features macro capability and a close-focusing distance of 6.2 feet. The 70-300mm offers a 1:2 macro ratio in a lightweight extensive focal-length range lens.

Vivitar also offers more than a dozen moderately priced, but excellent quality lenses for both autofocus and manual-focus cameras.

to create images with a dreamy effect. With this lens the subject remains sharp, but an overlay of soft focus blends into the subject, keeping wrinkles and complexion flaws at a minimum. Some of these lenses also offer controls to adjust the degree of image softening.

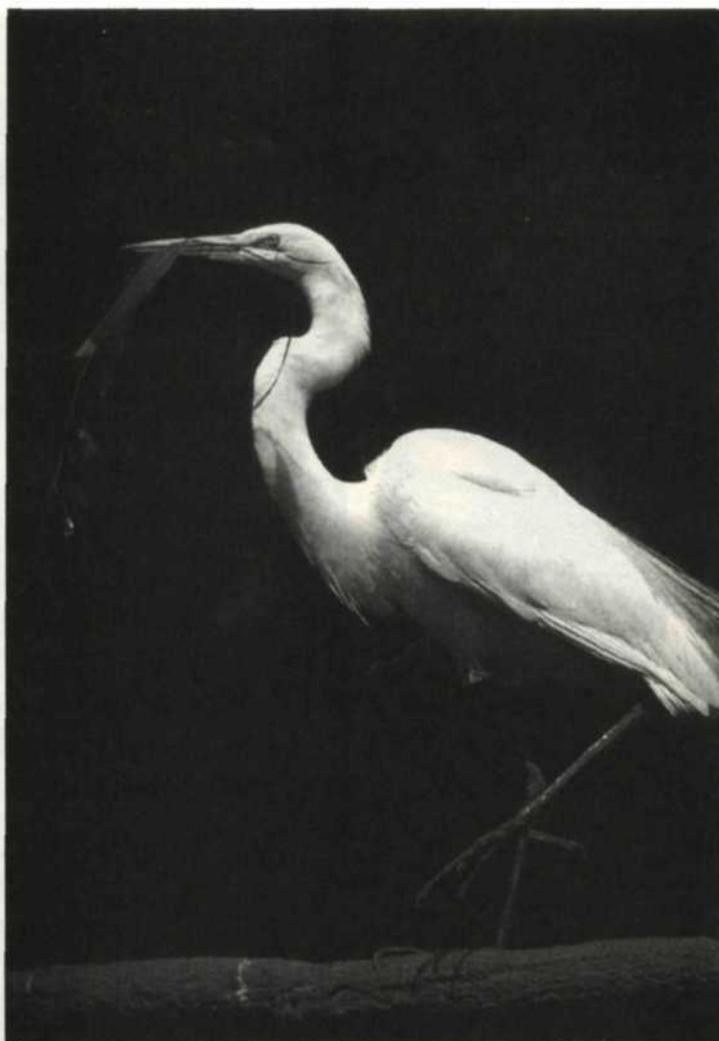
## Tele-Converters and Life-Sizers

When these accessories came out, they were considered a poor-man's supertelephoto. Today the quality of these devices is excellent and extends a photographer's capabilities without expanding their camera bag by adding lenses. The tele-converter is placed between a telephoto lens and the camera body to magnify the focal length anywhere from 1.4X to 3X. Most link all the electronic connections so all the lens functions are still intact. Their advantage is that you have double the amount of the telephoto lenses in your camera bag with one accessory, but you lose 1 to 2 stops exposure (i.e., a 1.4X converter turns a 100mm f/2.8 lens into a 140mm f/4 lens, and a 2X converter turns the 100mm f/2.8 lens into a 200mm f/5.6).

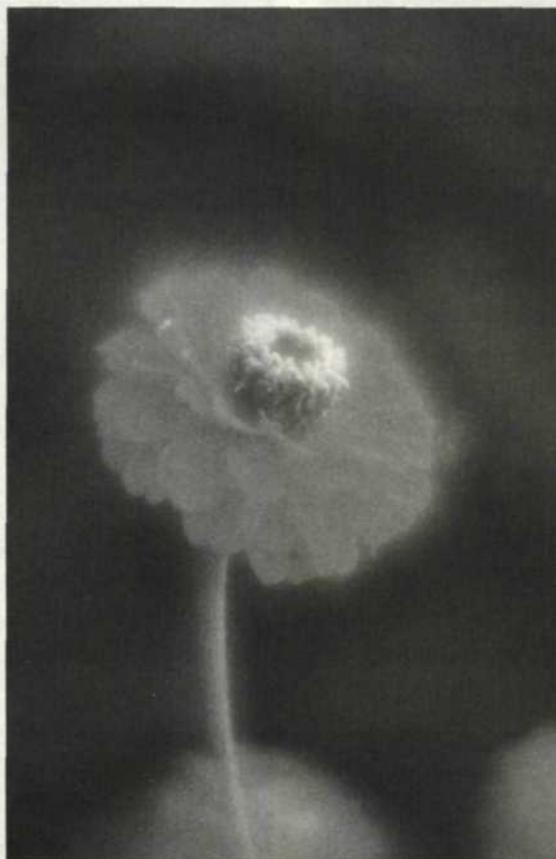
The life-sizer is like the tele-converter except it is used with macro lenses to expand their magnification range to at least twice the reproduction ratio of the original lens. Both accessories are designed for a specific lens or lens system, so make sure to check the compatibility charts before buying one.

## Fine-Tuning Your Interchangeable Lenses

As you add new lenses to your camera system, you need to run several tests to see how they perform in different shooting situations. Check to see how each lens handles scene contrast ranges in different kinds of lighting. Try some test images with fine detail to see how the center to lens edge holds up, especially with your zoom macro lenses. Every lens will have its weak points, and it's best to know



Mirror lenses are much shorter physically than conventional telephotos, cost less and focus closer, but aren't quite as sharp.



Soft-focus lenses combine sharp and unsharp images, for a glowing ethereal effect.

that ahead of time to guarantee successful shooting expeditions. For example, we have found that some of the superwide-angle lenses start to fail when you shoot objects close up with a wide aperture.

Each lens will perform one task better than another. You should also have a good understanding of how each lens you own compares to the others. If you test your lenses ahead of time, you will be sure that you are taking the right lens out on your next shoot.

Your lenses are delicate instruments and require special handling. The life and efficiency can be increased by keeping your lenses clean and clear of dust, smudges and scratches. Be sure that you use front and back lens caps to protect the elements when not in use. A lens hood will help reduce flare and protect the front element when the lens is in use. Be sure to use the correct

hood for your lens or you might experience vignetting, or darkened areas in the corners of your photos.

When selecting your camera bag, be sure it offers adequate padding for your lenses. Use padded dividers to keep your lenses from bumping together when you travel. Remember you don't have to take every lens you own on your travel expeditions. Just take what you need, so that you don't damage your lenses by taking excess equipment.

Keep a plastic bag handy filled with lens-cleaning solution, cleaning tissues and a lens brush. Don't be overzealous when cleaning your lenses as excessive rubbing could damage the lens coating. Use a blower brush for light dust removal. Then squeeze a drop of lens cleaning solution onto lens-cleaning tissue and gently clean in a circular motion to remove grease or fingerprints.

So, now that we have gotten you excited about buying a new lens or two,

we need to provide you with some information on where to buy. Accompanying this section is an alphabetical listing of some camera manufacturers and a couple of independent lens manufacturers to help you with your buying decision. ■