Photography I
Tripods and Camera Supports

When beginners first start using their cameras seriously, they may tend to think of a tripod or other camera support only being necessary when the shutter speed gets to slow to easily hand hold the camera. This is mostly considered to be at shutter speeds below 1/60 of a second. Actually, camera supports should be used whenever possible. It makes it easier to set-up and compose an image as well as the more traditional use of keeping the camera steady.
There are a number of camera support options. Here are some of the most useful.

The Camera Strap-
The camera strap you currently have attached to your camera can be used for more than just holding it around your neck. The strap needs to be adjusted properly, but once set, you have a handy new use for an item you already own!

Another option is a clamping device that has a camera screw adapter attached to it.

You may also want to consider a pistol grip. This allows you to easily hand hold longer lenses. You can also use this in conjunction with the camera strap.

Monopods

Another option, moving up the scale, is a monopod. Think of this as a one legged tripod. You can keep it with your camera bag most of the time and it will help stabilize most shots down to about 1/8 of a second, lower if you have image stabilization technology in your lens or camera. Adding a ball head to the top of it will help you level the camera and compensate for rough terrain.

The final step would be the use of a tripod. A tripod gives the greatest amount of flexibility and stability, but it also weighs the most. However, not all tripods are alike and you should consider your options carefully before you purchase one.

Look for options such as easy to adjust legs, strength and the ability to position legs independently. Quick release clamping devices for the camera are also useful, saving both time and possibly even the tripod thread on your camera.

Try to avoid tripods that have a large number of extensions to the legs. Each extension joint is a weak point on the tripod and can possible flex or even slip with usage. If you spent a couple of hundred dollars for the camera, spend at least $75 on the tripod.

If you do a great deal of fieldwork (or plan to) weight will be important. Don't give up strength for weight. It is always better to have a tripod that is a little heavy, than one that is a little unstable.

Lenses

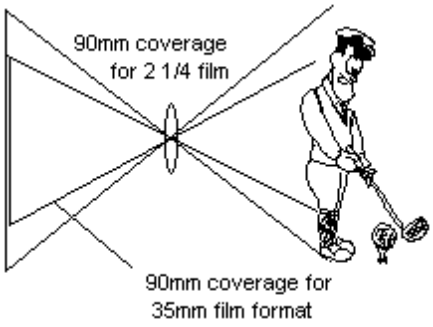
There are basically three types of lenses:

- Normal Focal Length
- Wide Angle
- Telephoto

What we call a "Normal" lens is called that because it captures an image in normal human perspective. Distances and sizes of elements in the image will appear as they would if seen with the naked eye. The focal length of such lenses (the focal length is the distance from the rear focus plane, called focal point, to the film plane) depends on the size of the film. Typically, the focal length would be equivalent to the diagonal of the frame of the film. For instance with 35mm film, this would be about 40mm. However, this relationship is not an absolute. Typical focal lengths for the 35mm format are 40, 50, 55 or 60mm.
For other film sizes the focal lengths would be different. Below is a table indicating the film format and the typical focal length:

Film Size	Reduced frame digital	35mm	6 x 4.5cm	2 ¼ x 2 ¼	2 ¼ x 3 ¼	4 x 5 in
Focal Length of a Normal Lens	24 to 40mm	50mm	75mm	80mm or 90mm	90mm to 120mm	180mm to 210mm

Any lens larger than the normal lens would be considered a long focal length or telephoto lens (though there is a difference that will be explained shortly) while any lens shorter than the normal lens would be considered a wide angle. This is not to say that a 90mm lens for a 2 ¼ square format would be a telephoto lens for a 35mm film format. There is also the coverage of the lens. An example of a 90mm normal lens and a 90mm telephoto lens is illustrated at right.



As you can see, although the lenses have the same focal lengths, they will see different portions of the image.

Telephoto Lenses

The next type of lens to discuss is the long focal length or telephoto lens. These lenses are used to "pull" a subject closer or magnify it. Although these two lenses may have the same focal length and angle of views (what the lens will actually see) and same angle of coverage, they will differ significantly in size.

A telephoto lens uses multiple lens elements and groups to bend the light. This makes the lens shorter and easier to handle, however every time light passes through glass, there is a possibility that the glass will distort the light. If improperly designed, the lens can be unsharp and cause the

image to appear blurry. Long focal length lenses have fewer elements and groups, but the overall size of the lens is greater. An example of the size difference between a long focal length and telephoto lens that would produce the same sized image is illustrated below:

Diagram of a long focal length lens

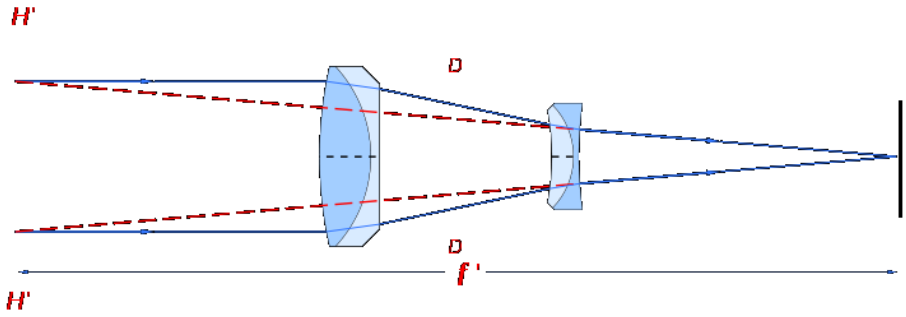
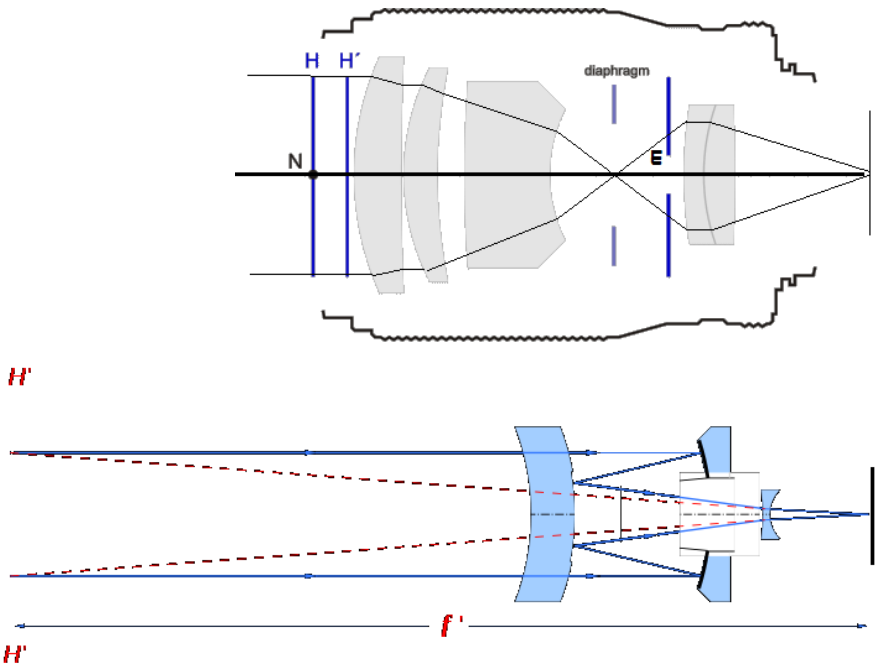


Diagram of a telephoto lens



Another type of telephoto lens that is commonly used is called a *catadioptric* or *cat* lens. This is also known as a mirror lens. Large astronomical telescopes use this technology. The greatest advantage to these lenses is their size. The lens literally folds light. The overall length can be as little as half the size of a conventional telephoto lens or a third of a long focal length lens. Mirror lenses are found at focal lengths of 300mm and above.

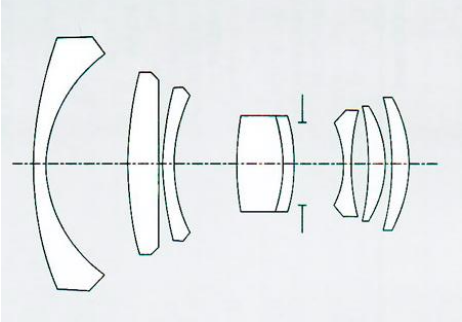
There is a significant disadvantage to this type of lens however. Due to the action of folding light, there is no place to locate an adjustable iris. These lenses therefore always have a fixed focal length. To allow for exposure control, special gray filters are used between the back of the lens and the film.

One disadvantage of telephoto lenses in general is their characteristic of reduced depth of field. Because of this, focus may need to be very critical to ensure a sharp image. This same draw back will also give the photographer an important creative tool, as we will see.

Wide Angle Lenses

Wide-angle lenses give the effect of backing up to get more of the subject in the frame. Where telephoto lenses bend light to produce a smaller lens, wide-angle lenses bend light to allow for the use of shorter and shorter lenses. Twenty years ago, a wide angle lens shorter than a 24mm focal length would require the mirror of the camera to be locked up and a separate view finder to be used. Now, lenses as short as a 7mm ultra wide angle or "fish-eye" lens can easily be used without the use of these auxiliary viewfinders.

The wide-angle lens accomplishes this be spreading the light coming from the back lens element. An example is illustrated at right.



As telephoto lenses reduce depth of field, wide-angle lenses increase it. Depending on the lens, this difference can be substantial. This increased depth of field gives its own creative tools that will be discussed on the next few pages.

Zoom Lenses

If we look at the focal lengths and different types of lenses available, it becomes very evident that a camera bag can become quite heavy if we were to have a full compliment of focal lengths. One way to reduce this weight is with zoom lenses.

Zoom lenses can be thought of as an entire series of lenses in one package. Originally designed for just long focal length lenses, they are now available as wide-angle zooms, wide angle to normal, wide angle to telephoto, telephoto to telephoto and telephoto to "super" telephoto zooms.

Zoom lenses use special mechanisms inside the lens barrel to shift the different elements around. After the lens is focused, these elements can move up then back while the photographer "zooms".

Zoom lens diagram

the focus group, **the variator group**, **the compensator group**, and **the master group**.

When using a zoom lens, the photographer should follow some simple procedures to make using it more convenient and flexible. The most important of these is the proper way to focus. Unlike a fixed focal length lens, the zoom lens must take into account the fact that it will be used to speed up the composition process by using the zoom. We can stay in one spot and then change the focal length to achieve the best possible image. To avoid the tendency to re-focus, you should first zoom in completely and then focus. You can be more critical of the focus at the longer focal length. When you then zoom out, the image will remain in focus. If you focus with

the lens zoomed out and *then* zoom in, you risk the chance of your image falling out of focus, usually at a critical point in the action.

Another point is to become very familiar with the operation of the lens so images can be composed quickly, one of the reasons we use the zoom lens. There are the "two touch" zooms (one ring for focus, one for zooming) and the "one touch" where you focus normally but zoom by sliding the lens barrel in and out.

OK, so what's the catch? If zooms are this flexible, why are there still fixed focal length lenses? There are two reasons. First, because we are forcing the lens to do so much, we have to add extra lens elements and mechanisms. These mechanisms take up room and the lens elements and coatings (to reduce internal reflections) reduce the amount of light coming through the lens. The maximum aperture is smaller. A 200mm-fixed lens could have a maximum aperture of 2.8 while a zoom of 75 – 200 could have an *f* 3.5 or 4. That's ½ to ¼ the light at *f* 2.8.

The other drawback of zoom lenses is that extra glass. Each time light passes through glass, the light can be distorted. The more glass the better the chances for distortion. In addition, there is a greater the chances for extraneous reflections between the lens elements, or flair. For this reason zooms tend to be less sharp than fixed lenses.

Even with these drawbacks, zoom lenses will probably be the most useful lenses you will own. Their speed and versatility make them indispensable.

Visual and Creative Effects of Lenses

There are a number of effects different lenses can afford the photographer. If normal lenses give normal human perspective, then the other lenses must change that.

Wide-angle lenses generally enhance perspective. Because of their wider angle of view and greater depth of field, we can place elements very close and far and have them remain in focus. The end of a baseball bat *and* the batter can both be in focus when framed very tightly for a powerful image.

Telephoto lenses compress perspective. Because they magnify the image, the subjects may seem unusually close to each other although they are actually a fair distance apart. Hollywood cinematographers use this technique quite effectively in chase scenes. A great example of this is in the film "Stand By Me". In this film a bunch of kids are going to see their first dead body. During the story, they walk across a high railroad trestle and are forced to run from an oncoming train. The sequences between the boy and the train make it seem that the train is just about to hit the boy. Logic tells us otherwise (child safety laws)!

The lack of depth of field can also help us remove unwanted background clutter in an image. A composition of a flower blossom in close-up becomes much more powerful if the background foliage is blurred away. The use of the proper *f*-stop or lens focal length can help achieve that very easily.

If a long shutter speed is used (¼ or ½ a second) and the camera zoomed during the exposure, a ghost image will be created of the zoom. Everything will be sharp and in focus. This may appear as a series of meteor-like trails in the image.