Nicholas Laham, *Rugby Action*

Sometimes photographers can't get physically close to their subject, such as at a sporting event when the action is on the field and the camera is relegated to the sidelines. Here, Laham uses a telephoto lens to make a tightly framed picture from a distance, while keeping himself out of harm's way.

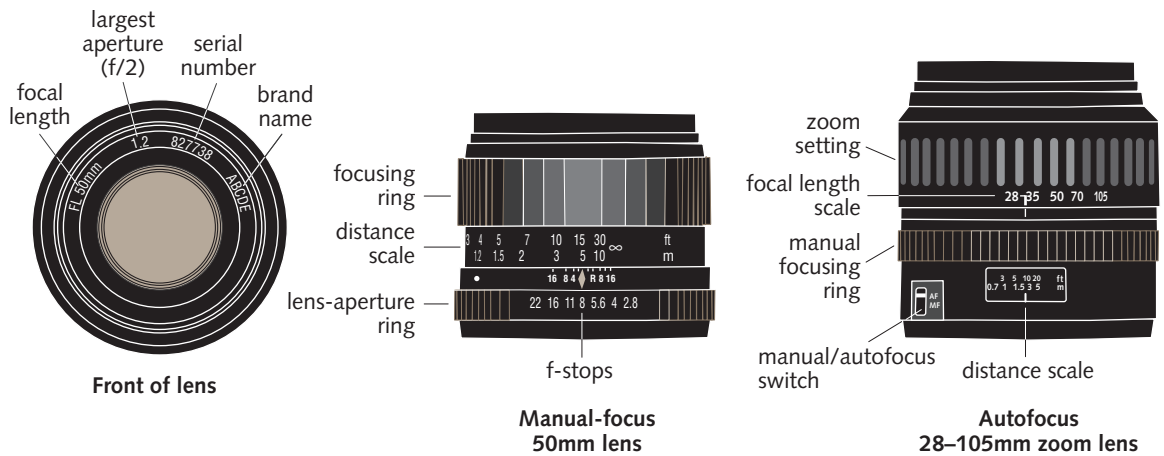
4 The Camera Lens

Enlarging lenses: pages 164–65

The lens is one of the fundamental tools of photography. There are two main types: camera lenses and enlarging lenses. The camera lens is located on the front of the camera body and has several functions: It gathers light from the subject you are photographing, allows you to focus that light on the film, and controls the amount of light that reaches the film. It also determines how much of the subject will be included in the picture and which parts of the subject will be in or out of focus. You will learn about these controls in this chapter.

Some cameras have a **fixed lens**, one that is permanently attached to the camera body. Fixed lenses are a common feature of point-and-shoot and other snapshot-style camera models. They also are found on a few more expensive, sophisticated cameras. Most fixed-lens cameras are relatively compact, but have limited versatility.

Camera Lens



Camera lenses vary in appearance, depending on the manufacturer, but all share some common characteristics. Manual-focusing lenses have somewhat different features than autofocusing lenses.

Other cameras have **interchangeable lenses**, which offer a lot of creative control. Interchangeable means you can remove the lens from the camera body and replace it with a variety of other lenses for a wide range of uses. For example, you might choose to replace your lens with one that's better for low-light situations, close-ups, or shooting distant subjects. Cameras that accept interchangeable lenses include the very popular 35mm single-lens-reflex (SLR) models and medium-format SLRs, some rangefinder models, and view cameras. There also are digital SLRs that accept interchangeable lenses.

The lens is fixed on some cameras and interchangeable on others.

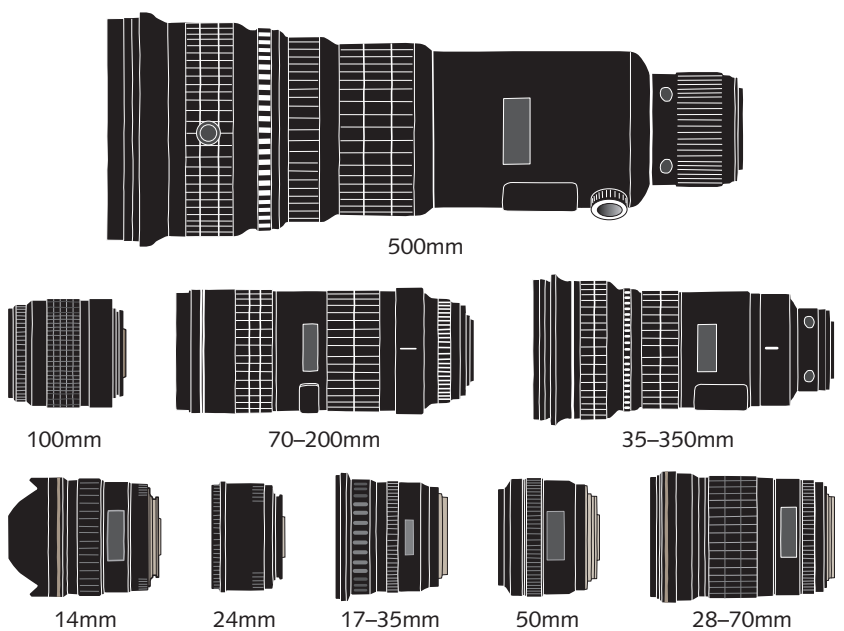
SLR, rangefinder, and view cameras: chapter 2

When buying an interchangeable lens, note that compatibility is crucial. A lens from one camera manufacturer usually doesn't fit on a camera from another manufacturer. Your best bet is to buy lenses made specifically for your camera, either from the camera's manufacturer or from an independent lens maker. Many independent brand lenses are of good quality and relatively affordable, but make sure you specify your camera model when buying any lens to make sure it is compatible.

Whether fixed or interchangeable, all lenses control or affect these basic functions: focus, film exposure, angle of view, and depth of field.

Interchangeable Lenses

SLR cameras allow you to use interchangeable lenses that come in a variety of sizes and shapes. Each lens captures a different view of the subject, depending on its focal length. Fixed-focal-length lenses offer only one view of the subject, while zoom lenses provide a range of views. Focal lengths are discussed in detail on pages 41–48.



and thus is critical in controlling correct film exposure. In simple terms, you need a relatively large (wide) opening in low-light conditions to allow enough light to expose the film, and a smaller opening in brightly lit conditions so you let in no more light than is needed. Note that your other primary control, shutter speed, is equally important in determining film exposure.

Shutter speed: pages 57–60

The term **f-stop** refers to the size of the lens aperture. Most lenses offer a wide variety of f-stops, sometimes set manually by the photographer and sometimes set automatically by the camera. The terms **lens aperture** and **f-stop** are often misunderstood and confused; lens aperture refers to the physical lens opening and f-stop represents a measurement of that opening.

The following f-stops are among those available, although the range will vary depending on the model of lens:

f/1.4, f/2, f/2.8, f/4, f/5.6, f/8, f/11, f/16, f/22, f/32

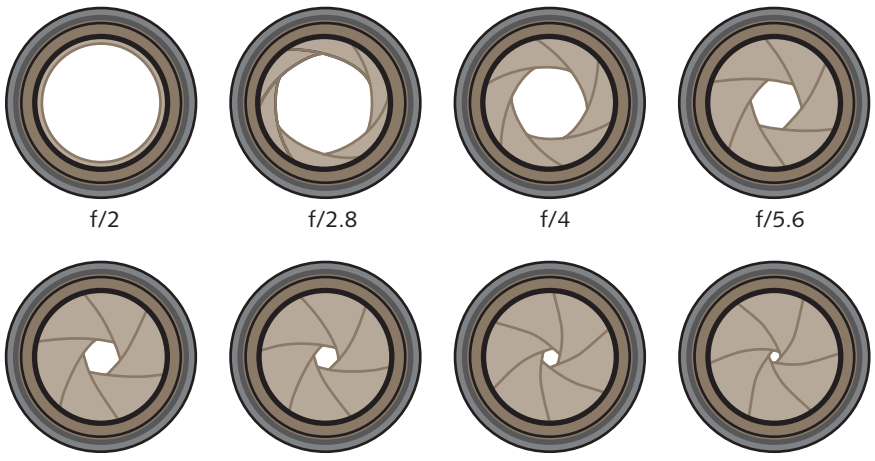
The higher the f-stop number, the smaller the lens opening; the lower the number, the larger the opening.

The f-stop numbers are counterintuitive. A higher f-stop number indicates a smaller lens opening, which means that less light passes through; a lower f-stop number indicates a larger lens opening and more light passing through. A lens set at f/16, for example, allows much less light to pass through than a lens set at f/2.

Setting the f-stop. Some lenses permit you to set the f-stop using numbers printed on an **aperture ring**, a movable control on the lens. To set an f-stop, you simply turn the aperture ring on the lens until it matches up with a marker, such

Lens Aperture and F-stop

The lens aperture is controlled by a series of overlapping blades that can be opened and closed to let in more or less light. The relative size of the opening is indicated by its f-stop number; the larger the number, the smaller the opening. The f-stops shown here are sometimes known as whole, or full, f-stops. When you change from one whole f-stop to another, you let in half or twice as much light, depending on whether you make the opening smaller or larger. Note that your lens may not offer a full range of whole f-stops.



Depth of Field

Depth of field is the area of sharpness from the closest part of the picture to the farthest part.

The term **depth of field** refers to the depth of the zone that is visibly sharp in the picture, from the closest to the farthest parts of the scene. Suppose you focus your lens on a tree 10 feet away. Even though you focus precisely on the tree, an area in front of and an area in back of the tree also will usually be sharp. The degree of that sharpness, from front to back, is the depth of field.

The depth of field of a picture may vary widely and is controlled by these factors: lens aperture, distance to subject, and lens focal length.

Lens aperture. The smaller the lens aperture you use, the greater the depth of field. Thus if you set your lens at f/16, you will produce an image with far greater depth of field than if you set the lens at f/2, other factors being equal. Lens aperture is probably the most understood factor in controlling depth of field, but the next two factors are just as important.

Distance to subject. The greater the focusing distance (from camera to subject), the greater the depth of field, assuming the lens aperture and focal length stay the same. If you use a 50mm lens and focus on a subject 20 feet away with the lens aperture set at f/8, you will get much more depth of field than if you focus with the same lens at f/8 on a subject five feet away.

Lens focal length. The shorter the focal length of the lens, the greater the depth of field. If you use a 28mm wide-angle lens, you will get far more depth of field than if you use a 200mm telephoto lens set at the same lens aperture and focused at the same distance; for example, a 24mm lens set at f/8 and focused 10 feet from the subject has greater depth of field than a 200mm lens that is also set at f/8 and focused at 10 feet. A zoom lens produces more or less the same depth of field at a certain setting as a fixed-focal-length lens of that same length; thus, a 28–80mm zoom lens set at 50mm will produce the same depth of field as a fixed 50mm lens.

You can increase or decrease depth of field by changing any of the above variables, but keep in mind that they are interrelated. For example, you can increase depth of field by closing down your lens aperture to a smaller f-stop. But if you move closer to the subject and refocus, you may actually end up decreasing the depth of field.

The ability to render your subject uniformly sharp is one of photography's great strengths, so most times you will want as much depth of field as the situation allows. However, there are times when you will want to have the subject (or another part of the image) sharp and the background or foreground blurred, such as when you focus on a portrait subject and let the background go out of focus.