of the film, and double-perf film indicates that there are perforations along both edges of the film. 16 mm film contains one perforation at the top of the frame and one at the bottom, either on one side or on both sides of the frame. As stated previously, double perf film is generally used for shooting standard 16 mm projects with an aspect ratio of 1.33:1. Single-perf film is specifically used for shooting Super 16 mm projects with an aspect ratio of 1.66:1, although it can be used for standard 16 mm shooting. Using single-perf film when shooting Super 16 mm enables you to get a wider aspect ratio on the same size piece of film because there are only perforations on one side of the frame. Figure 1.2A shows a standard 16 mm film frame on double-perf film; Figure 1.2B shows a Super 16 mm frame on single-perf film.

FILM SPEED

All motion picture film is sensitive to light in varying intensities. The term *film speed* is the measurement of a film stock's sensitivity to light. The film speed is most often expressed as an EI (Exposure Index) or ISO (International Standards Organization) number. The terms *ASA* (American Standards Association) or *DIN* (Deutsche Industrie Norm) may also be used to indicate the film speed. Eastman Kodak and Fuji both designate their film speeds using the term EI, so I will use that term in all examples.

Film with a lower EI number requires more light to obtain an exposure and is called *slow film*. Film with a higher EI number requires less light to obtain an exposure and is called *fast film*. For example, a film stock with an EI of 500 is more sensitive to light than a film stock with an EI of 200. Therefore, to obtain a proper exposure, you need less light with EI 500 film than with EI 200 film.

There is a standard series of EI numbers used to rate film's light sensitivity: 12, 16, 20, 25, 32, 40, 50, 64, 80, 100, 125, 160, 200, 250, 320, 400, 500, 650, 800, 1000, etc. In theory, these numbers go infinitely in both directions. If you look carefully you will notice that for the most part the values double every three numbers. There are a few variations to this rule, as when going from EI 12 to EI 25, from EI 64 to EI 125, and from EI 320 to EI 650. What this translates to is that the change in exposure from one EI value to the next is equal to one-third of an f-stop. In other words, if you double or halve your EI value, it equals one full f-stop change in exposure.

In the upcoming section about f-stops, you will see that there is also a standard series of f-stop numbers. As stated in that section, each f-stop number admits half as much light through the lens as the f-stop number before it. This means that a change of one full f-stop either

doubles the amount of light or halves it. Doubling or halving the EI number is the same as doubling or halving the amount of light. As an example, the same amount of light that gives you an exposure of f/4 at EI 200 will require an f/5.6 at EI 400 or an f/2.8 at EI 100.

The EI is determined by the film's manufacturer based on extensive testing of the film. This number is what the manufacturer feels will give the best or ideal exposure of the film. Each film can label should show the recommended EI rating for the film stock for both daylight and tungsten light. The ultimate decision on what speed to rate the film is up to the Director of Photography (DP) and is usually based on his or her experience in using the particular film stock.

ASPECT RATIOS

The shape of the image frame is expressed as a ratio of its width to its height. This is referred to as the *aspect ratio* of the image. The three most commonly used aspect ratios for filmed productions are 1.33:1, read as "one three three to one"; 1.85:1, read as "one eight five to one"; and 2.40:1, read as "two four oh to one." The 1.33:1 aspect ratio may also be referred to as *academy aperture*. It is 1.33 times as wide as it is high. Many of the early motion pictures were shot using this aspect ratio. Academy aperture may also be said to have an aspect ratio of 1.37:1. Present-day television still uses the academy aperture, and any films shot strictly for television are usually shot using the academy aspect ratio (see Figure 1.7).

The standard aspect ratio for most theatrical motion pictures is 1.85:1. This format is usually referred to simply as "one eight five." This wider format is obtained by chopping off the top and bottom portions of the academy aperture to give an image that is exactly 1.85 times as wide as it is high (see Figure 1.7). The 2.40:1 aspect ratio is called *Cinemascope*, and the image is 2.40 times as wide as it is high. In most cases, to obtain this aspect ratio, a special anamorphic lens is used that squeezes the wider image onto a standard 35 mm frame of film. It is then projected through an anamorphic projection lens that unsqueezes it to produce the widescreen image. The other way to achieve Cinemascope is to shoot Super 35 mm and frame it for Cinemascope, then print anamorphic. During the printing process, the Cinemascope image is compressed or squeezed onto a square frame. During projection the image is projected through an anamorphic lens and stretched to fill the screen. Depending on whom you speak with or what reference material you use, the anamorphic or Cinemascope aspect ratio may also be listed as 2.35:1 or 2.36:1 (see Figure 1.7).