

CHAPTER 7 THE NEGATIVE



A good negative is the key to a good print. Well-exposed and well-developed negatives print easily, while poorly exposed and poorly developed negatives print with difficulty. In most cases, average film exposure and normal development produce highly printable negatives, but sometimes manipulation of exposure and development can produce even better negatives.

The basics of film exposure and development have been covered. Now it is important to understand how negatives can be further controlled, manipulated, and evaluated. This chapter covers these issues.

Adjusting Negative Contrast

Contrast is the difference between highlight and shadow areas. *High-contrast* subjects have dark shadows and bright highlights, such as occur on a bright, sunny day, and are said to be *hard*. Normally exposed and normally developed negatives taken in this kind of lighting will also be high contrast and produce prints of high contrast.

Low-contrast subjects are gray, lacking either very dark shadows or very bright highlights, such as on cloudy days or with shaded light, and are said to be *flat*. Normally exposed and normally developed negatives taken in flat light will be low in contrast and produce low-contrast prints.

Negative contrast can be controlled by manipulating film exposure and development. The key to this control is understanding how exposure and development work.

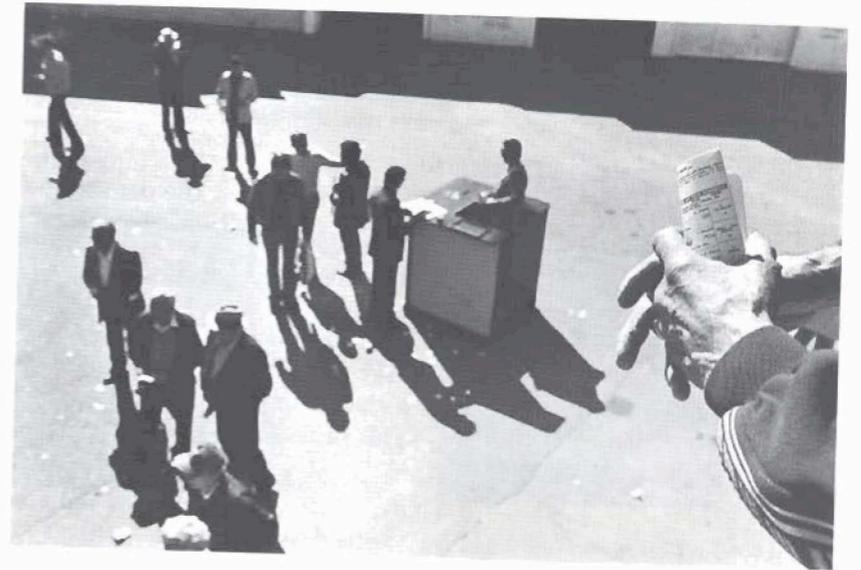
The shadow areas of the negative are controlled by exposure — the amount of light that reaches the film. The highlight areas are affected by exposure but controlled primarily by the developing time — the amount of time the film is allowed to react with the developer. Thus the rule of thumb:

**Expose for the shadows;
develop for the highlights.**

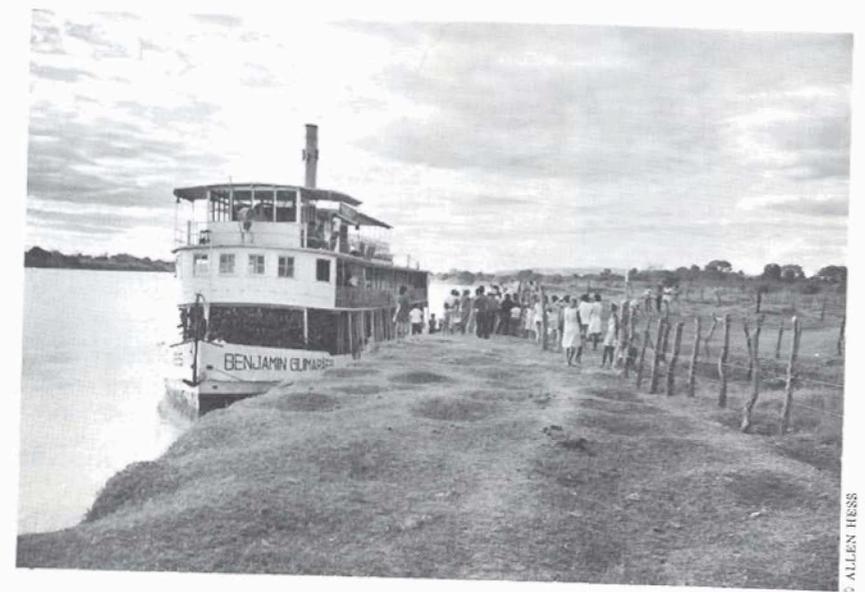
The shadows represent areas of little exposure. Dark parts of a subject reflect less light back to the film than bright parts of a subject.

Subject lighting

High-contrast subjects have dark shadows and bright highlights.



Low-contrast subjects are gray, with neither dark shadows nor bright highlights.



Because they receive so little light, the shadows form much more rapidly on the negative during development than do highlights. If the normal developing time for a roll of film is 10 minutes, then the shadows form fully in about half that time, or 5 minutes. The remaining 5 minutes of development affect mostly the highly exposed areas — the highlights.

**The longer the developing time,
the denser the highlights.**

Shadows, because they are determined by the film exposure, are not affected much by changes in developing time. If the film is developed for 15 minutes, rather than 10 minutes, the highlights continue to become denser. The shadow density still does not change appreciably (it is already fully formed), so the increased development means a change in the difference between the highlight and shadow density. This difference — or the contrast — becomes more pronounced, so:

**The longer the film developing time,
the greater the contrast of the negative.**

If the developing time is shortened, say to 7 rather than 10 minutes, the highlight areas become less dense. Since the shadow density would still remain constant, the difference between the highlight and shadow density is reduced, and the contrast of the negative is decreased.

**The shorter the film developing time,
the lower the contrast of the negative.**

So the contrast of the negative can be controlled by changing the amount of time the film is kept in the developer. More time increases the contrast; less time decreases the contrast. However, negative contrast can be altered even more dramatically by manipulating both film exposure and development.

**To decrease contrast: overexpose and underdevelop the film.
To increase contrast: underexpose and overdevelop the film.**

In most cases, all that is needed is a minimal exposure and development adjustment. Each film-and-developer combination works a little differently, but here are some general guidelines:

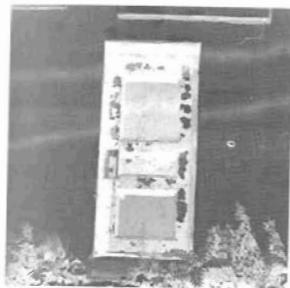
To reduce contrast:

Overexpose by the equivalent of one f-stop and underdevelop by 20%, or in extreme cases:

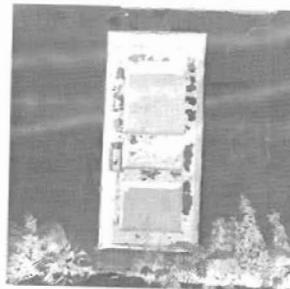
Overexpose by the equivalent of two f-stops and underdevelop by 40%.

The longer the film developing time, the greater the contrast of the negative

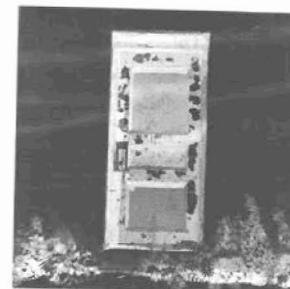
All three negatives were exposed for the same length of time. Note that the shadow areas of all three have approximately the same density, regardless of development times. Only the highlight areas are appreciably affected. The greater the development time, the denser the highlights and the greater the contrast.



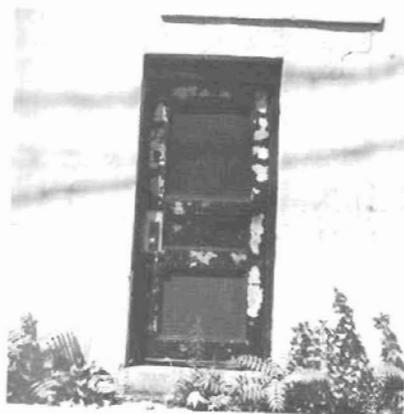
A negative developed for 10 minutes, the manufacturer's recommended time.



A negative developed for 6 minutes.



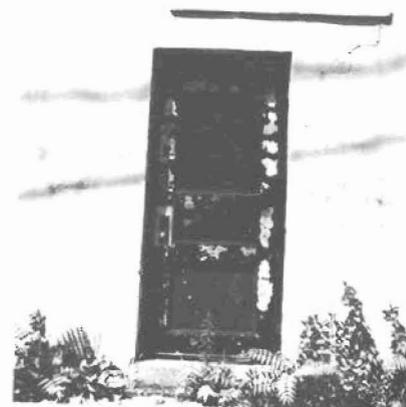
A negative developed for 20 minutes.



A print from that negative.



A print from that negative. Note the decreased contrast.



A print from that negative. Note the increased contrast.

To increase contrast:

Underexpose by the equivalent of one f-stop and overdevelop by 50%, or in extreme cases:

Underexpose by the equivalent of two f-stops and overdevelop by 100% to 150%.

Of course, one of the problems with manipulating film development is that an entire roll of film must be under- or overdeveloped, so try to shoot all the frames on the roll in similar lighting conditions. Otherwise, develop for the frames that are most important, and accept the fact that the rest of the roll will be under- or overdeveloped. (A major advantage of sheet film is that each sheet can be developed separately, at different times, for different contrast requirements.)

Here are some specific examples of changing film exposure and development:

Overexpose and underdevelop. On a bright, sunny day, the lighting is high contrast. The shadow areas of the subject will be quite dark and the highlights will be especially bright. In order to decrease this contrast, overexpose and underdevelop the film.

With high-contrast light, dark (shadow) areas of the subject are rendered thin (lacking in density) on the negative because relatively little light is reflecting back to the film from these areas. Extra film exposure is needed to build up the density to render more shadow detail. So overexpose the negative.

If the meter indicates an exposure of f 16 at 1/500, overexpose by the equivalent of one f-stop: f 11 at 1/500, or f 16 at 1/250.

With high-contrast light, bright (highlight) areas of the subject are rendered dense on the negative because a lot of light is reflecting back to the film from these areas. When the film is overexposed, the highlights become even denser. Dense highlights can *block up*, or become so dark that they print with little or no detail.

To decrease highlight density, underdevelop the film. If normal developing time is 10 minutes, underdevelop by 20%, so develop for 8 minutes.

The resulting negative will have less extreme shadow and highlight density. As a result, it will print more easily and with less contrast than if normally exposed and developed.

Underexpose and overdevelop. In flat lighting, such as on a cloudy day or after a rainstorm, the lighting is low contrast with lots of grays and few (if any) very bright or dark areas. To increase this contrast, underexpose and overdevelop the film.

With low-contrast light, shadow areas of the subject are not very

Manipulating film exposure and development

A negative given normal exposure and development — f 8 at 1/125 — developed normally for 10 minutes.



Negative of the same subject that has been overexposed by the equivalent of one f-stop — f 5.6 at 1/125 — and underdeveloped by 20% — 8 minutes.



A negative of the same subject that has been underexposed by the equivalent of one f-stop — f 11 at 1/125 — and overdeveloped by 50% — 15 minutes.



A print from that negative.



A print from that negative shows decreased contrast.



A print from that negative shows increased contrast.

dark, so will be rendered too dense on the negative. To reduce that density, underexpose the negative. Less exposure means thinner shadows (which, in turn, will print darker).

If the meter indicates an exposure of f 8 at 1/125, underexpose by the equivalent of one f-stop: f 11 at 1/125 or f 8 at 1/250.

With low-contrast light, areas of the subject are not very bright, so will be rendered too low in density on the negative. When the film is underexposed, the highlights become even less dense.

To increase highlight density, overdevelop the film. If normal developing time is 8 minutes, overdevelop by 50%. Use 12 minutes.

The increased development will not appreciably affect the shadow detail (which is determined by exposure), but it will increase highlight density. Therefore, the difference between shadow and highlight density — the contrast — will increase, which will make for a more printable negative.

When film is to be overexposed or underexposed, it may be easier just to change the ASA setting on the meter, rather than try to remember to compensate with each exposure. For the equivalent of one f-stop more exposure, cut the ASA in half (400 to 200; 125 to 63; 32 to 16). The extra exposure is like assuming the film speed is slower, or less sensitive to light than it really is.

For one stop less exposure, set the meter at double the ASA rating of the film (400 to 800; 125 to 250; 32 to 64). Giving less exposure is like assuming that the film is faster, or more sensitive than it really is.

Some camera models have exposure compensation settings that make it easy to over- or underexpose quickly. Cameras with this feature have a dial with numbers such as +1, +2, -1, and -2. Each number represents the equivalent of one f-stop change. Set the dial at +1, and the film will automatically receive twice as much exposure; set the dial at -2, and the film will automatically receive the equivalent of two f-stops less exposure.

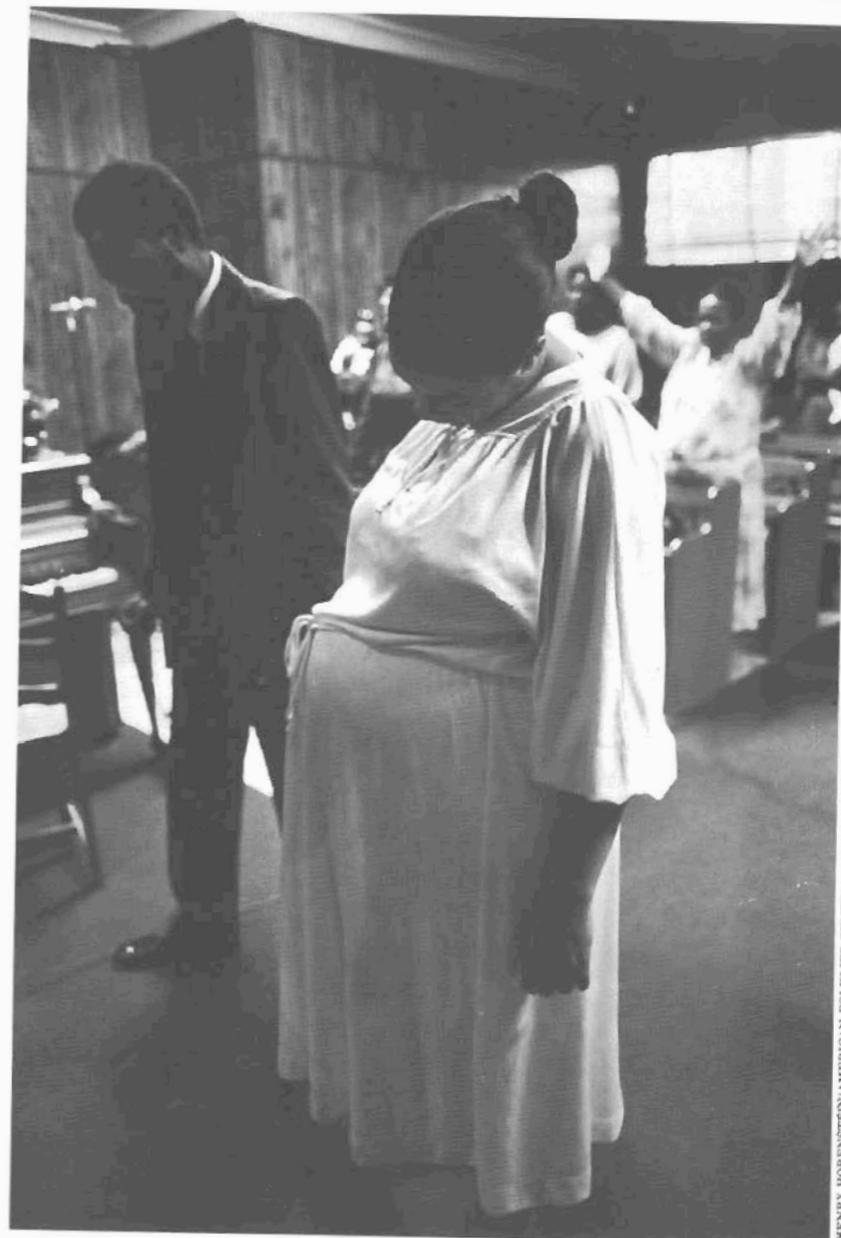
Pushing Film

Pushing film means overdeveloping to simulate increased film speed. For example, film rated at 400 ASA can be pushed to a rating of 800 or 1600.

In effect, pushing film is the same as underexposing and overdeveloping; however, the term is usually applied when shooting under low-light conditions. Generally, film is not pushed to increase negative contrast (though that is a result), but to render enough density on the

Pushing film

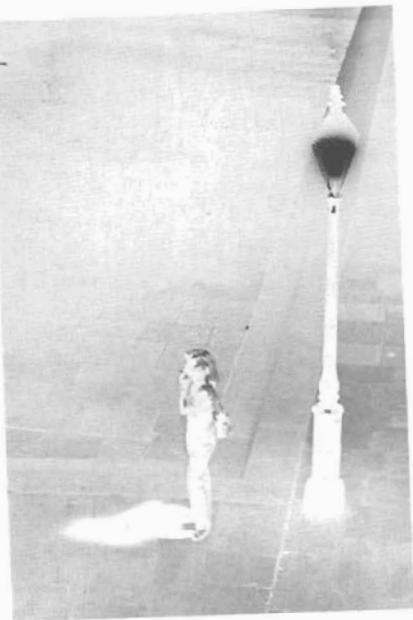
Because of the low-light conditions, to make this picture, the film was “pushed” — underexposed and overdeveloped.



HENRY HORENSTEIN/AMERICAN FOLKLORE CENTER, LIBRARY OF CONGRESS

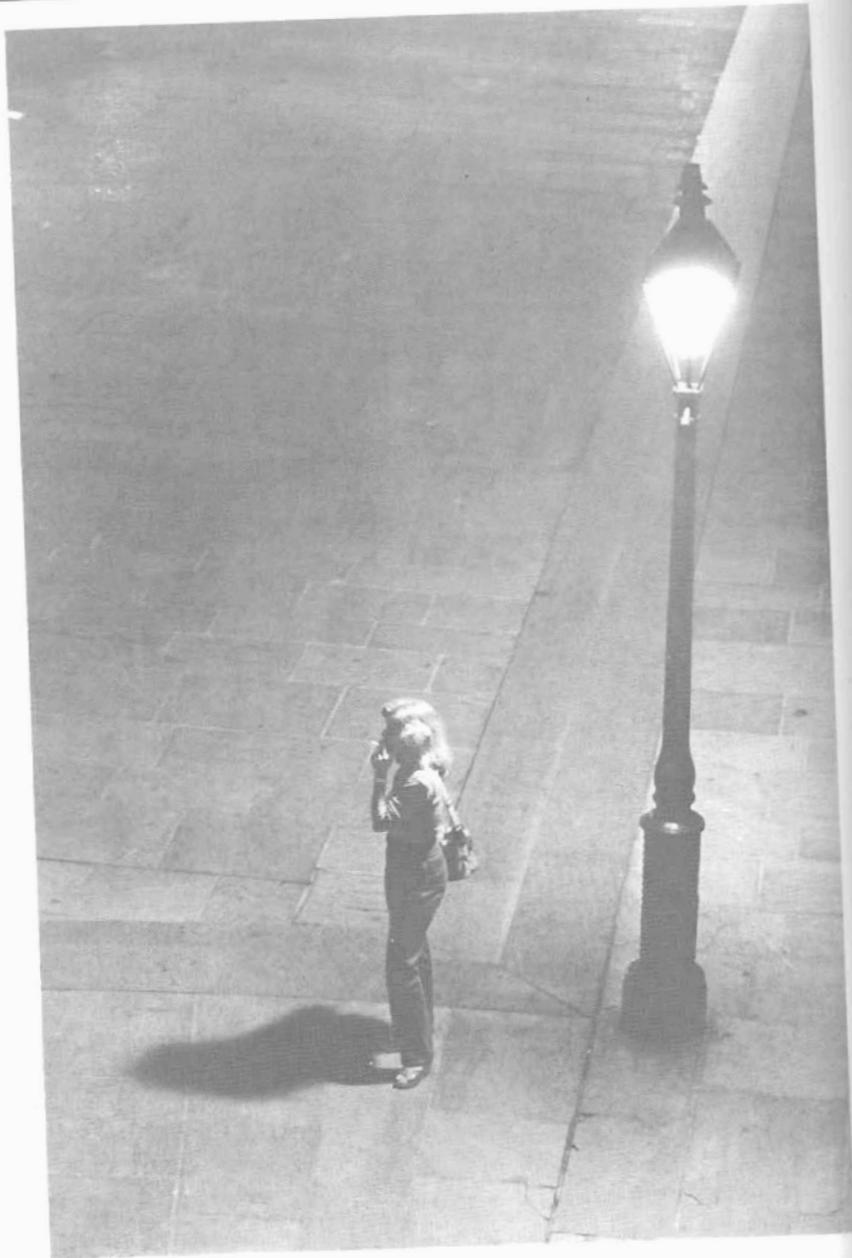
Pushing film

Both these negatives have been shot on 400 ASA film rated at 1600. At 1600 ASA, the light-meter reading suggested the equivalent of two stops less exposure: f 2 at 1/60. So, at this reading, the film is underexposed and must be "pushed" for enough contrast to make a good print.



A negative exposed at f 2 at 1/60 and developed normally for 10 minutes.

A print from that negative has low contrast.

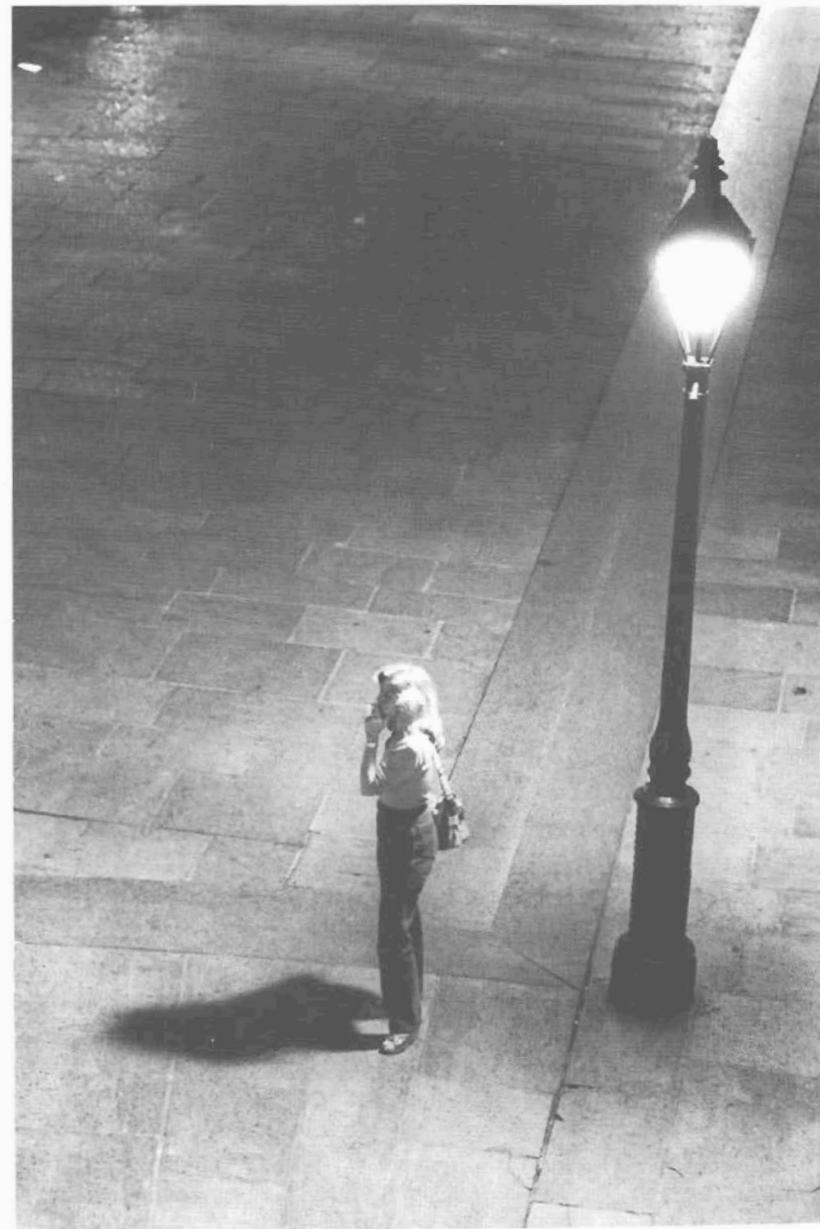


Pushing film



A negative exposed the same way — f 2 at 1/60 — but overdeveloped by 100%, or 20 minutes.

A print from that negative has higher contrast and prints more easily.



negative for photographing in low-light situations, or to allow for increased depth of field or a faster shutter speed to meet the requirements of a picture.

Photographing in low light. When photographing indoors (or anywhere there is low light), it will be difficult to allow enough light to reach the film for a good exposure. The lens may be opened wide, say to f 2. The shutter speed may be set as slow as it can be (and still allow for hand-holding the camera), say to 1/60. Yet the light meter may still indicate that f 2 at 1/60 does not allow enough light in for a good exposure.

The solution is to "fool" the light meter by setting it at a higher film speed. For example, set 400 ASA film at 800. The higher number tells the meter that the film is faster, or more sensitive to light than it really is (by the equivalent of one f-stop), and therefore needs less exposure. At a rating of 800, the meter may indicate that f 2 at 1/60 will provide an adequate exposure. If so, take the picture at that setting, and overdevelop (or push) the film by 50%.

A major problem with pushing film is that the film will actually be underexposed. After all, increasing the ASA setting on the meter does not increase the sensitivity of the film to light. It just causes the film to receive less exposure. In low-contrast light, film may be underexposed deliberately to reduce shadow density, which might otherwise be rendered too dense in the negative. But under low light, chances are that the shadows will not be illuminated enough to register even adequate density on the negative. Therefore, in most cases, pushing the film reduces or eliminates shadow density (and detail) in the negative and ultimately in the print.

When pushing, the film must be overdeveloped to keep the negative from becoming so thin and flat (from the combination of low light and underexposure) that making a decent print is impossible. Added development means more highlight density, thus increased contrast for a more printable negative.

Allowing for more depth of field or a faster shutter speed. Even if a meter reading of f 2 at 1/30 at 400 ASA is adequate to make a well-exposed negative, f 2 might not provide enough depth of field for the subject. By pushing the film to 800, the lens can be closed down to provide more depth of field. Use f 2.8 at 1/30 at 800 ASA. If the film is pushed farther, the lens can be closed down again to f 4 at 1/30 at 1600 ASA.

If subject or camera movement, not depth of field, is the concern, push the film to make the shutter speed faster. Instead of f 2 at 1/30 at 400 ASA, try f 2 at 1/60 at 800 ASA, or f 2 at 1/125 at 1600 ASA.

The general underexposure and overdevelopment guidelines given earlier apply when pushing film. For example, to push 400 ASA film:

new film speed rating	underexpose by	overdevelop by
800 ASA	one f-stop or one shutter speed setting	50%
1600 ASA	two f-stops, two shutter speed settings, or one of each	100% to 150%

To push films with a rating other than 400 ASA, double the rating for each time the exposure is halved. For example, 125 ASA film, underexposed by the equivalent of one f-stop, should be rated at 250 ASA, then overdeveloped by 50%.

Obviously an entire roll of film must be pushed at the same time.

Special extra-active, "high-speed" developers are made for pushing film. These work by simulating increased development times, so that normal developing times with these developers are like increased times for normal developers. Follow the developing times provided with these developers, not the above guidelines for increasing development. Appendix Four provides a list of brand names of some of these products.

The following are potential disadvantages to pushing film:

- Shadow detail will be lost owing to underexposure.
- Contrast is increased owing to overdevelopment.
- Grain size is also increased owing to overdevelopment.

These should be considered before deciding to push a roll of film. However, since pushing film may make the difference between actually getting the picture and having to pass it up, these technical deficiencies may simply have to be accepted.

Grain

Grain refers to the tiny, sandlike particles visible in some prints. It is an inherent part of film emulsions, and is caused by the clumping together of silver crystals after film is exposed and developed. Grain is small and not really noticeable in the negative, but it is magnified and sometimes quite obvious in an enlarged print.

In general, grain is not desirable. It tends to make the image appear less sharp and clear. However, sometimes grainy photographs are effective; they can seem soft, fuzzy, or even romantic. In these specific cases, coarse grain can be used as a tool, but it should be used sparingly.

Some negatives have *fine grain*, barely noticeable, while others have *coarse grain*, obvious and obtrusive. Here are some of the many factors that affect how grain appears in the final print:

film used
 film developer used
 negative density
 processing temperatures
 enlargement
 negative size

Film used. The faster the film speed, the coarser the grain structure. A film rated at 400 ASA is useful in low-light situations, but expect negatives with coarser grain than when using film rated at 32 ASA.

Film developer used. Most manufacturers classify their developers according to whether they produce fine, moderate, or coarse-grained negatives. All other factors being equal, fine-grain developers produce negatives of the finest grain. Some fine-grain developers produce finer grain than others.



ail from a negative enlarged
 times shows what grain looks
 iny, sandlike particles.

Negative density. The denser the negative, the coarser the grain. Dense negatives are the result of overexposure or overdevelopment, so the greater the exposure and development, the coarser the grain. For example, pushed film tends to have coarser grain than normally developed film.

Processing temperatures. Grain size is increased when warm film processing temperatures are used — negatives processed at 78° will tend to have coarser grain than those processed at 68° — or when the processing and wash temperatures are not kept consistent throughout. To minimize grain, try to keep all solutions at approximately the same temperature throughout all the processing steps.

Enlargement. Grain is magnified as a negative is enlarged, so the greater the print size, the more apparent the grain. An 8" × 10" print shows coarser grain than a 5" × 7" print of the same negative.

Negative size. Small-format negatives need to be enlarged more than large-format negatives to make the same size print. Therefore, grain tends to appear coarser on prints made from small negatives than on prints made from large negatives. A 35-millimeter negative needs to be enlarged much more than a 4" × 5" negative to make an 8" × 10" print, so the print from the 35-millimeter negative will have coarser grain.

Evaluating the Negative

Learning to read or evaluate a negative can be very helpful. Are the exposure and development correct? How will it be rendered as a print? With low or high contrast? With good or poor shadow or highlight detail? For guidance, refer to the rule:

**Expose for the shadows and
 develop for the highlights.**

To evaluate film exposure, look only at the shadow areas of the negative. Ignore the highlights. If the shadows appear dense, the negative has been overexposed. If they appear thin, the negative has been underexposed. A well-exposed negative has the minimum density necessary to render full shadow detail. Shadows should be light, but not clear.

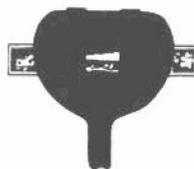
To evaluate film development, ignore the shadow areas of the negative and look only at the highlights. Well-developed negatives should be dense but not opaque. If the highlights are thin, the film has been underdeveloped and the negative will lack contrast. If they are too dark, the film has been overdeveloped and will likely have a lot of contrast.

Film development is a little harder to judge than exposure because highlight density is inevitably affected by film exposure. Underexposed negatives will have both thin shadows and thin highlights; overexposed negatives will have both dense shadows and dense highlights. So if a negative is either underexposed or overexposed, it is harder to tell whether it has been correctly developed.

The judgment of what constitutes good shadow and highlight density takes experience. Use the accompanying illustrations as a guide, and continue to check and evaluate negatives on a regular basis.

It is worth repeating that a good negative is critical for a good print. Film exposure is the most important factor, but film development is also important. Sometimes exposure and development should be altered to obtain the best possible negative. After all, the better the negative, the better the print. It is well worth the extra care needed to understand and use the controls available to reach that end.

CHAPTER 8 MAKING THE PRINT



Equipment Needed

Prints are made from negatives in a darkroom. However, making prints requires a larger and more expensive investment in equipment and materials than developing film. Here is a list of both necessary and useful tools for printing:

- enlarger
- enlarging lens
- enlarging timer
- focusing magnifier
- processing trays
- print tongs
- safelights
- easel
- brush or air blower
- film cleaner and soft cloth
- print washer
- print drier
- paper safe (optional)
- paper trimmer
- graduates, funnels, and storage bottles
- print squeegee
- piece of glass
- towel

Enlarger. An enlarger makes prints from negatives in sizes greater than the negative size. For example, a 35-millimeter negative measures approximately 1" × 1½", yet it may be "enlarged" to a print measuring 5" × 7", 8" × 10", or larger.

Enlargers are available to handle different size negatives. If an enlarger uses negatives as large as 4" × 5", it is referred to as a "4" × 5" enlarger," but it can handle smaller formats as well. A "35-millimeter enlarger" can handle that size and smaller negatives.

Enlargers can be formidable in appearance, but are simple to operate. A long post holds the *enlarger housing*, which in turn holds a light bulb, condenser (or diffuser), negative carrier, bellows, and lens. At its bottom, the post is attached to a baseboard.