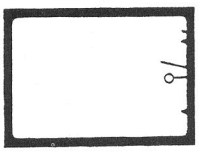
CHAPTER 5 FILM EXPOSURE



The most important technical step to a good print is a good negative. The key to a good negative is correct *film exposure*, the quantity of light that reaches the film. This point cannot be overstressed. A good negative will produce a good print with relative ease; a bad negative will be difficult and sometimes impossible to print satisfactorily.

Controlling Exposure

A well-exposed negative has good overall density. Both highlight and shadow areas must retain some detail. The highlight areas must be dark but not too dense; and the shadow areas must be light but not too thin. To this end, the correct amount of light must reach and expose the film. Too much light will cause too great a silver buildup on the film, thus a dense negative; too little light will cause a thin negative, lacking silver buildup. (Of course, film exposure creates a latent image only; the film must be developed chemically before that image is visible.)

Three variables control film exposure:

lens opening
shutter speed
film speed

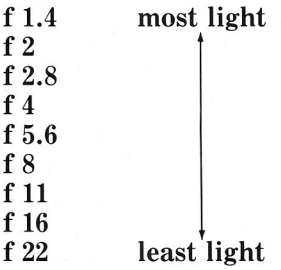
The first two have been described earlier, but bear reviewing:

Lens opening. The amount of light traveling through the lens is controlled by the lens opening, or the aperture.

The larger the opening, the greater the amount of light that reaches the film.

Therefore, a brightly lit subject requires a smaller aperture than a dimly lit subject.

The size of the lens opening is measured by f-stop numbers: the larger the f-stop number, the smaller the opening, and the less light reaches the film. Here again are full f-stops:

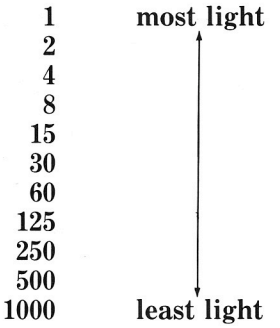


Each full f-stop represents a doubling or halving of the light that travels through the lens. For example, f 11 allows half as much light through as f 8.

Shutter speed. The time for which film is exposed to light is controlled by the shutter speed.

The faster the shutter speed, the shorter the duration of film exposure, and the less light reaches the film.

A dimly lit subject requires a slower shutter speed than a brightly lit subject. Here again are typical shutter-speed settings, representing fractions of a second:



Each setting represents a halving or doubling of the light that reaches the film. For example, 1/8 allows light in for twice as much time as 1/15.

Film speed. The third film-exposure control is *film speed*, or the sensitivity of film to light. *Fast films* receive and record light more readily than *slow films*. (The terms "fast film" and "slow film" should not be confused with "fast" and "slow" as applied to shutter speed or lens.) Imagine two strips of film, one with a fast speed and the other with a slow speed. If both strips are exposed to equal amounts of light, upon development the fast film will produce a greater density than the slow film.

The faster the film speed, the less the required exposure.

A fast film is needed in dimly lit conditions to capture the little light that exists. A slow film is adequate for brightly lit subjects where light is plentiful.

Fast films have emulsions that consist of larger silver crystals than slow films. These crystals, when exposed and developed, clump together to create the density that makes an image. These clumps are frequently visible in the final print. They are referred to as *grain*, and look like fine particles of sand. Grain can make the image appear fuzzy and less sharp. The faster the film speed, the larger (or *coarser*) the grain. (More on grain in chapter 7.)

Film speed is rated by an ASA number. ASA stands for the American Standards Association. The higher the ASA rating, the faster the film speed. Here are ASA ratings for common black-and-white films, along with some guidelines for their use:

- 32 ASA: Slow film; best with brightly lit subjects; produces very-fine-grain negatives.
- 125 ASA: Medium-speed film; best for general outdoor use; produces medium-fine-grain negatives.
- 400 ASA: Fast film; best for indoor or dimly lit subjects, though can be used outdoors; produces acceptable, but coarser, grain than slower films.

(There are other ways to rate film speed. The German system — DIN — is rarely used in the United States. ISO is an international standard that includes both ASA and DIN. For example, 400 ASA film is also rated 27 DIN and 400/27 ISO. For practical purposes, use only the ASA film-speed rating system.)

Combining the Controls

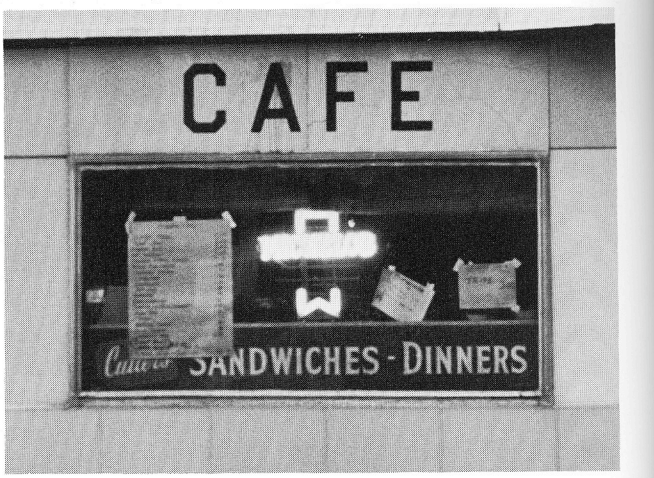
The relationship between f-stop and shutter speed is the key to understanding film exposure. The combination of these two controls determines how much light actually reaches the film. As noted, each designated f-stop or shutter speed doubles or halves the amount of light allowed in by the next designated f-stop or shutter speed. F 11 lets in half as much light as f 8, and twice as much as f 16; a shutter speed of 1/60 lets in light for half as much time as 1/30, and twice as much time as 1/125.

Therefore, f-stop and shutter speed have a reciprocal relationship. If the shutter speed is slowed down (to allow more light to reach the

Grain

The faster the film speed, the coarser the grain.

A print made from a section of a 400 ASA negative; note the coarse grain.



A print made from a section of a 32 ASA negative has finer grain.

film), the f-stop must be closed down (to let less light strike the film) to make an equivalent exposure. The following combinations of f-stop and shutter speed will produce the exact same film exposure:

f 16 at 1/30
f 11 at 1/60
f 8 at 1/125
f 5.6 at 1/250
f 4 at 1/500

Five pictures, shot one after another, of the same subject with these five different exposures will render five negatives of equal density.

How changing f-stops and shutter speeds affects exposure

f 16 at 1/30 | f 11 at 1/60 | f 8 at 1/125 | f 5.6 at 1/250 | f 4 at 1/500

Five different negatives taken at the same time with the same exposure achieved by five different combinations of f-stop and shutter speed.

Note that the smaller the aperture, the slower the shutter speed. (Remember, small aperture means larger f-stop number.) With less light passing through the lens, the shutter-speed time needs to be lengthened to compensate. Conversely, the larger the aperture, the faster the shutter speed.

So why choose one combination of f-stop and shutter speed over another? The exposure choice is made according to the needs of the particular picture. If a lot of depth of field is needed, use a smaller aperture (and slower shutter speed), say, f 16 at 1/30, at the risk of a blurred image. If a fast shutter speed is important to stop the action of a moving subject, choose f 4 at 1/500 and sacrifice some depth of field. In effect, the choice of exposure is a trade-off between maximum depth of field and minimum image blur.

Film speed affects exposure as surely as the aperture and the shutter speed. Fast films are more sensitive to light than slow films, so require a smaller lens opening or faster shutter speed. For example, a subject shot with an exposure of f 16 at 1/125 with 400 ASA film will need an exposure the equivalent of two f-stops more light, such as f 11 at 1/60, with 100 ASA film. (Remember that because of the reciprocal relationship of f-stop and shutter speed, many exposure combinations can be chosen. F 11 at 1/60 "equals" both f 8 at 1/125 and f 16 at 1/30, as well as several other combinations.)

The advantage of fast films is that they produce more depth of field or less potential image blur than slow films. But remember that slow films produce images with finer grain than fast films.

The relationship among different film speeds is reflected in their respective ASA numbers. Film rated 125 ASA is approximately four times faster or more sensitive to light than 32 ASA film ($4 \times 32 = 128$). If f 4 at 1/60 is a correct exposure with 32 ASA film, film rated at 125 ASA needs f 5.6 at 1/125 (or f 4 at 1/250, or f 8 at 1/60, and so forth) for an equivalent exposure. The difference between 32 ASA and 125 ASA is the equivalent of two f-stops (one f-stop provides double the exposure, and another provides four times the exposure).

A change of two shutter-speed settings or one f-stop and one shutter speed provides the same results.

Film rated at 400 ASA is almost four times more sensitive to light than film rated at 125 ASA (4 × 125 = 500). The equivalent exposure with the above example and 400 ASA film is between f 5.6 and f 8 at 1/250 (or between f 4 and f 5.6 at 1/500, or between f 8 and f 11 at 1/125, and so forth). Again, faster film requires a smaller aperture or faster shutter speed than slower film.

The reciprocal relationship between f-stops and shutter speeds breaks down at very slow (and extremely fast) shutter speeds. This breakdown is called *reciprocity failure*. When used at speeds of 1 second or slower (and 1/1000 or faster), films respond more slowly to light. Therefore, although f 8 at 1/2 is equal to f 5.6 at 1/4 second, it is not equal to f 11 at 1 second, since at 1 second, reciprocity failure occurs and the film needs even more exposure. In practice, f 8 at 1/2 is approximately equal to f 11 at 2 seconds.

Use the following chart as a general guideline to compensate for reciprocity failure with black-and-white films. The exact compensation required will vary, depending on the film used.

indicated shutter speed	**Either/Or**		**and change development time as follows**
	open aperture by	**use this shutter speed instead**	
1/1000 of a second	no adjustment needed	no adjustment needed	10% more time
1 second	1 f-stop	2 seconds	10% less time
10 seconds	2 f-stops	50 seconds	20% less time
100 seconds	3 f-stops	1200 seconds	30% less time

Note that reciprocity failure is tied to long shutter speeds, so as the speed gets longer, reciprocity failure becomes more pronounced, and extremely long exposure speeds are required. When making an adjustment for reciprocity failure, open up the aperture if possible to avoid these long shutter-speed times.

(Film development is covered in chapter 6. The changes recommended are to compensate for highlight areas of the film. These respond less critically to slow shutter speeds than shadow areas.

However, most film is shot in rolls at various shutter speeds, so a single development adjustment is not practical. Besides, controls in the printing stage can generally compensate for these differences. However, for using sheet film or roll film at a constant very slow or very fast shutter speed, use the above film development changes.)

About Light Meters

A *light meter* measures light and translates that measurement into a workable set of f-stop and shutter-speed combinations, appropriate to the lighting conditions of the subject. As such, it is a guide to using the three exposure controls: lens opening, shutter speed, and film speed.

Meters have a light-sensitive cell to register a reading. These cells in modern meters are battery operated.

For use, the meter must first be set for the ASA rating of the film being used. This setting is made by turning a dial on the meter (or on the camera, if the meter is built into the camera). Then the meter is pointed in the direction of the subject, and reads the light reflecting back off the subject. Some meters, called *incident-light meters*, read light falling onto the subject; they are discussed later in this chapter.

Once the meter reads the light, it indicates an appropriate f-stop and shutter-speed combination. Some types of meter indicate a variety of choices, while others indicate only one. Remember that several combinations are possible. If a meter indicates an exposure of f 8 at 1/60, any equivalent exposure, such as f 5.6 at 1/125 and f 4 at 1/250, will work as well.

Some cameras have built-in light meters and some do not. All camera models can be classified as manual, semiautomatic, or automatic:

Manual cameras. Both the f-stop and the shutter speed must be chosen and set manually with the aid of a built-in or a separate light meter.

Semiautomatic cameras. Either the f-stop or shutter speed is chosen and set, and the camera automatically sets the other control. In *shutter-priority* models, the photographer chooses the shutter speed, and the camera automatically sets the f-stop; in *aperture-priority* models, the photographer chooses the f-stop and the camera sets the shutter speed.

Automatic cameras. Once the film speed is set, the camera chooses the f-stop and shutter speed automatically when pointed at the subject.

Many camera models combine features. A semiautomatic model, for example, may offer an override option so the f-stop and shutter speed can be set manually. Or a camera may offer both shutter priority and full automation.

Each model has advantages and disadvantages. However, serious photographers should retain as much control over film exposure as possible. Remember, good film exposure is the key to a good print. Light meters are not infallible, and sometimes exposure readings need to be interpreted. More on this later, but a manual camera (or a semiautomatic or automatic camera with a manual option) should be used for maximum exposure control.

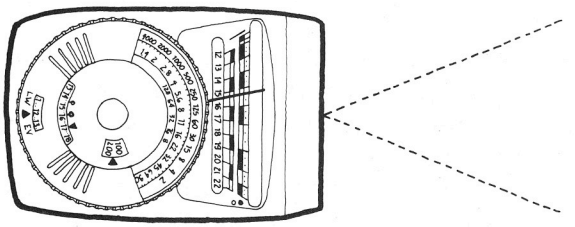
Light meters are available in many sizes, shapes, and types. There are too many types to be covered in detail, but there are two major categories: through-the-lens meters and hand-held meters.

Through-the-lens light meters. These meters are built into the camera and read the light that passes through the lens. The reading is then translated into an f-stop and shutter-speed combination in a variety of ways, depending on the camera model, such as with matching needles, electronic diodes, or digital readouts.

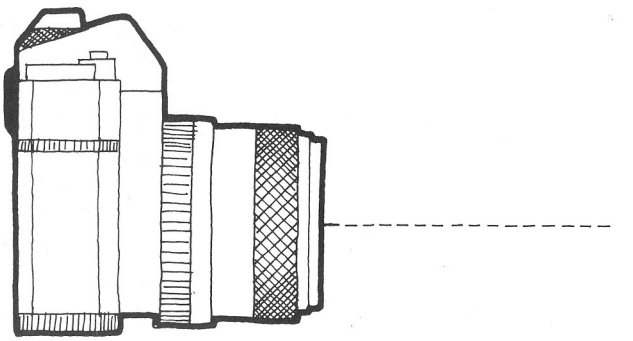
In a matching-needle system, the viewfinder contains two needles on an edge of the image frame. One needle moves up and down with the intensity of light reaching it; the other needle moves up and down as the f-stop and shutter-speed choices are made. The needles match up on reaching the correct combination for the given subject lighting.

A variation of this system has a single needle that moves as f-stops and shutter speeds are set. The correct exposure is indicated when the needle is centered between stationary markings in the viewfinder.

Light meter types



Hand-held light meter.



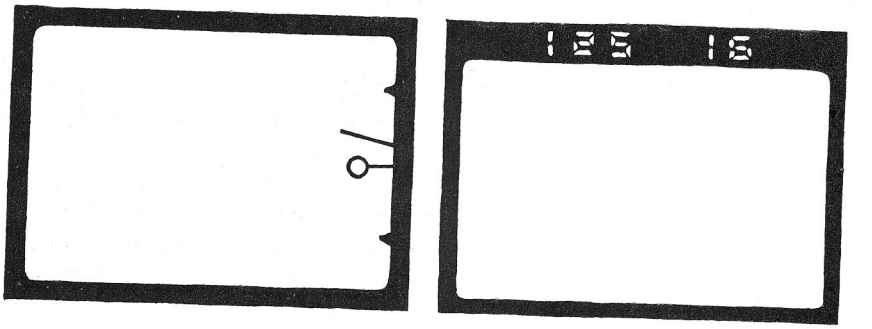
Through-the-lens light meter.

Through-the-lens light meter types

(as seen through the viewer)

Left:
Matching-needle. The two needles move as the f-stop and shutter speed are changed. They come together (or "match") when the correct exposure combination is reached.

Right:
Electronic diodes. A readout of the chosen f-stop and shutter speed as they appear through the viewfinder.



Some cameras use electronic diodes instead of needles. One system has three diodes positioned vertically on the edge of the viewfinder. The center diode lights up when the correct f-stop and shutter speed are chosen. The top and bottom diodes indicate under- or overexposure.

Digital readouts in the viewfinder are used in many modern cameras. Sometimes the readout simply displays the f-stop and shutter speed chosen, and sometimes additional information, possibly related to a coupled flash attachment, is provided.

It is easy to get carried away with or confused by camera technology. The wide variety of through-the-lens metering systems seems endless and is ever changing. Most all systems work well. Some photographers find electronic readouts in the viewfinder a serious distraction; others like the clarity they provide. Make choices after trying out different cameras. Camera stores are the best sources of the latest information on the variety of features of the current models.

Hand-held meters. These meters are separate from and work independently of the camera. (Some cameras have light meters attached to the body that function like hand-held models; these attached meters do not read light through the lens.)

To use a hand-held meter, first set the ASA of the film being used, then point the meter at the subject. The meter reads light reflecting back from the subject, and translates that reading into one or more f-stop and shutter-speed combinations.

There are several types of hand-held light meters. Some use a needle to indicate exposure, while others use a digital readout. Here is how a typical hand-held meter works:

A needle on the meter indicates how much light reflects back from the subject. The needle points to a *light-intensity scale*. One end of

the scale represents a maximum amount of light, while the other end represents the absence of light.

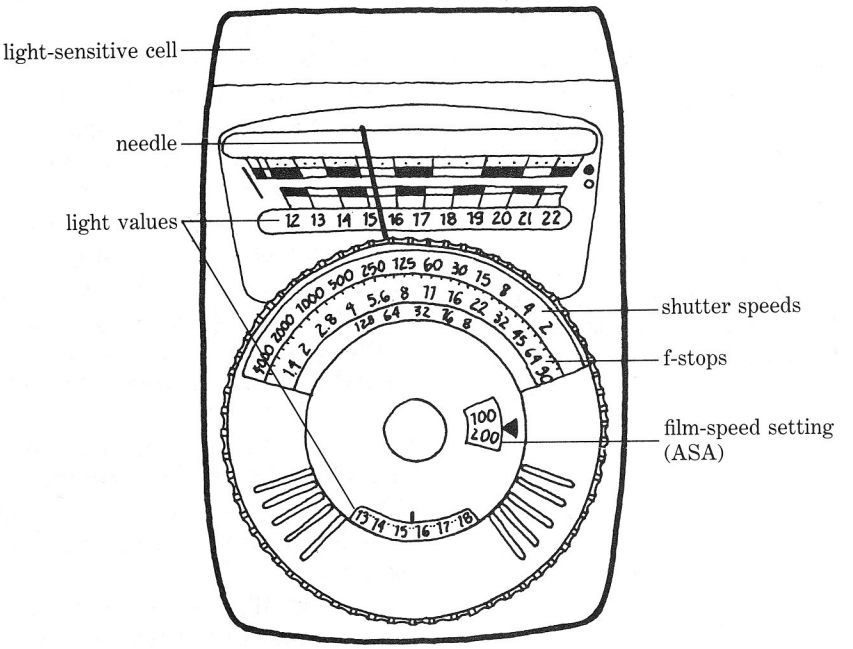
With many hand-held meters, the light-intensity scale is rated numerically. These ratings vary depending on the meter used. The low numbers represent little light; the high numbers represent a lot of light. The needle responds to light from the subject, and indicates a numerical value on the light-intensity scale. This value can be matched up to a dial with f-stop and shutter-speed combinations located elsewhere on the meter. A marker on the dial can then be matched up to the light value and several f-stop and shutter-speed combinations will be indicated.

Some hand-held meters do not use light values. Instead, the needle points directly to possible f-stop and shutter-speed combinations. Other types of hand-held meters use charts of f-stops and shutter speeds rather than dials.

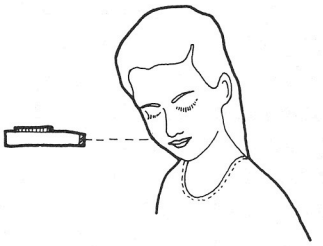
Digital hand-held meters have no needle. When pointed at the subject, they provide a direct readout of a recommended f-stop and shutter speed or a light value.

Hand-held light meter

When pointed at the subject, the meter reads light and points with a needle to a numerical light value — here, 15½. Once the arrow on the dial is set at that value, several combinations of f-stop and shutter speed are provided — such as f 5.6 at 1/250, f 8 at 1/125, and f 11 at 1/60.



Reflected light



The light that reflects off the subject. To take a reflected light reading, point the meter at the subject.

Incident light

The light that falls onto the subject. To take an incident-light reading, point the meter back toward the camera position.

Light meters read either reflected or incident light. Some read just reflected light; others read just incident light; many read both. Reflected and incident meters will produce the same exposure information when correctly used. They vary in how they determine that exposure.

Reflected light is the light that reflects off the subject and bounces back to the meter. To read reflected light, the meter is pointed directly at the subject. Most light meters read reflected light.

Incident light is the light that falls onto the subject. Meters that read incident light have a diffuser attached over their light-sensitive cell. The meter is brought to the subject, and pointed back toward the camera position for a reading.

Some meters are *averaging meters* and some are *spot meters*. The difference is the angle of light each reads. An averaging meter reads a large angle of light, perhaps 30° to 50°, while a spot meter reads a much narrower angle, perhaps 1° to 10°. A few meters offer a choice of either a spot or an average reading.

Some models, called *center-weighted meters*, combine an average and a spot reading. These meters read light through the lens, and assume that the subject area shown in the center of the viewer is of more importance for the purpose of determining exposure than the area on the edges of the viewer. The light from the center is thus "weighed" more heavily than the light from the edges when the meter calculates the recommended exposure.

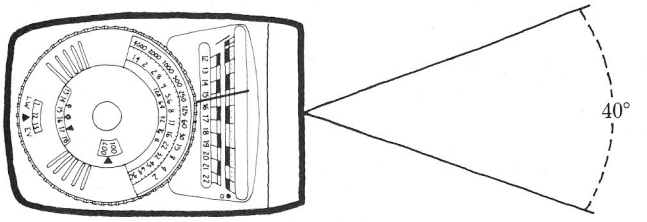
Actually, the terms "average" and "spot" are a bit deceptive. Both meter types "average" light; that is, they record all the light values, dark and light, in the subject, and average them to arrive at a recommended exposure. A spot meter simply averages light off a smaller section of the subject than an averaging meter. Some photographers prefer a spot-meter reading to guarantee correct exposure for specific parts of the subject. For example, if the main subject is a tree in the middle of the forest, a spot meter is ideal to guarantee an accurate reading of the light reflecting off that tree, regardless of the light reflecting from the rest of the forest.

Modern camera technology is so advanced that nearly anyone can use a through-the-lens meter and get accurate exposures most of the time. So why bother understanding how meters work? Why not simply aim the camera, line up the meter or switch to an automatic mode, and shoot?

First of all, light-meter readings are not always accurate. Meters are only machines; they are dependent on the information fed to them.

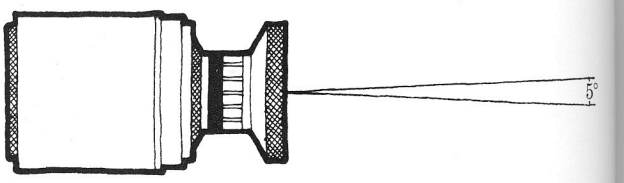
Averaging meter

Reads a large angle of light — here, 40°.



Spot meter

Reads a narrow angle of light — here, 5°.



Sometimes that information must be interpreted and adjustments made.

In addition, "accurate" exposure does not always mean the best exposure. Sometimes underexposure or overexposure will provide a more printable negative. (More on this in chapter 7.)

Furthermore, not everyone owns a camera with a through-the-lens meter. Many sophisticated cameras, especially large-format models, have no built-in meter. And many older cameras without through-the-lens meters are still in use.

Some photographers argue that hand-held meters can provide more accurate film exposure. These meters generally provide more information, such as a wider range of exposure choices, than through-the-lens meters. Good hand-held meters are extremely sensitive to light, though most newer through-the-lens meters are also sensitive. Being independent of the camera, a hand-held meter can be brought up close to the subject for precise readings more easily. And some hand-held spot meters can read a far narrower angle of light than through-the-lens models.

The main rule-of-thumb for understanding how light meters work is:

Meters read for a middle gray.

That is, meters average whatever light they read, whether from a dark, light, or gray subject. The average represents the gray, that is, halfway between black and white.

This average reading usually works well enough, since most subjects have approximately equal amounts of dark and light areas. However, when the subject is primarily either dark or light, the meter reading will be inaccurate. Meters do not discriminate among different

subject matter. They are calibrated only to average the light. Therefore, the photographer must do the discriminating.

For example, a meter pointed at a dark (or shadow) area of the subject will read on the low end of the light scale. Since dark areas absorb light, the meter will indicate that little light is reflecting back from the subject. It will recommend an f-stop and shutter-speed combination that allows a lot of light to reach the film to compensate for this relative absence of light. Let's say the subject is a woman with dark hair. If the meter is pointed only at the hair, it might give a reading of f 4 at 1/60.

If, instead, the meter is pointed at a light (or highlight) area of the same subject, it will read on the high end of the light scale, and indicate much more light reflecting back. Light areas reflect light. Therefore, the meter would provide an f-stop and shutter-speed combination geared to compensate by allowing less light to reach the film. A reading made off the woman's white sweater might be f 16 at 1/60.

A meter reading made off the same woman's middle-gray skirt would provide still another reading. Her gray skirt will reflect less light back to the film than her white sweater and more light back than her dark hair. Say this reading is f 8 at 1/60.

So, three entirely different readings are given for the same subject, depending on where the meter is pointed. Both the readings from the dark and light areas would produce inaccurate exposures. Why? Because meters read for middle gray. Most subjects combine enough light and dark areas to simulate that gray. However, when light readings are made largely from either dark or light areas, the resulting exposure will be inaccurate.

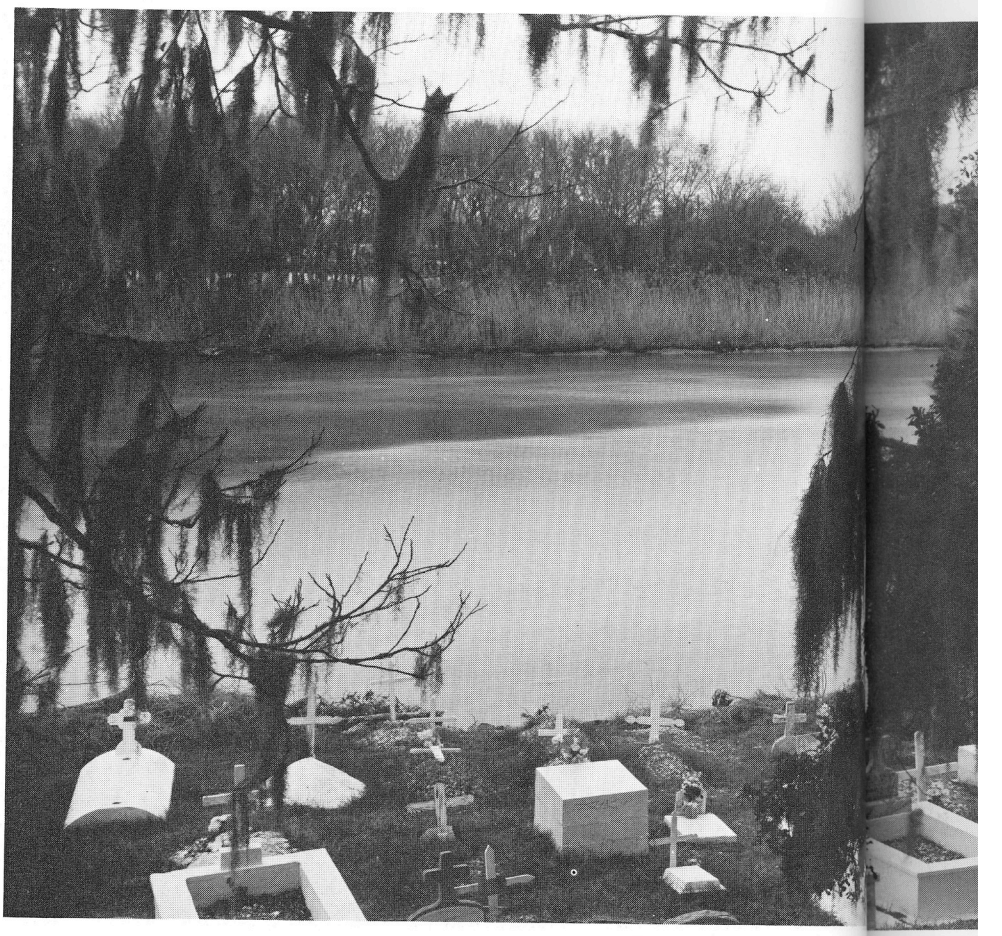
Exposure Systems

What follows are several systems for accurate film exposure. Each system works well, in most conditions, for either through-the-lens or hand-held light meters.

Take a general reading.
Use a gray card.
Expose off skin.
Read incident light.
Average the shadows and highlights.
Bracket.
Expose for the shadows and compensate.

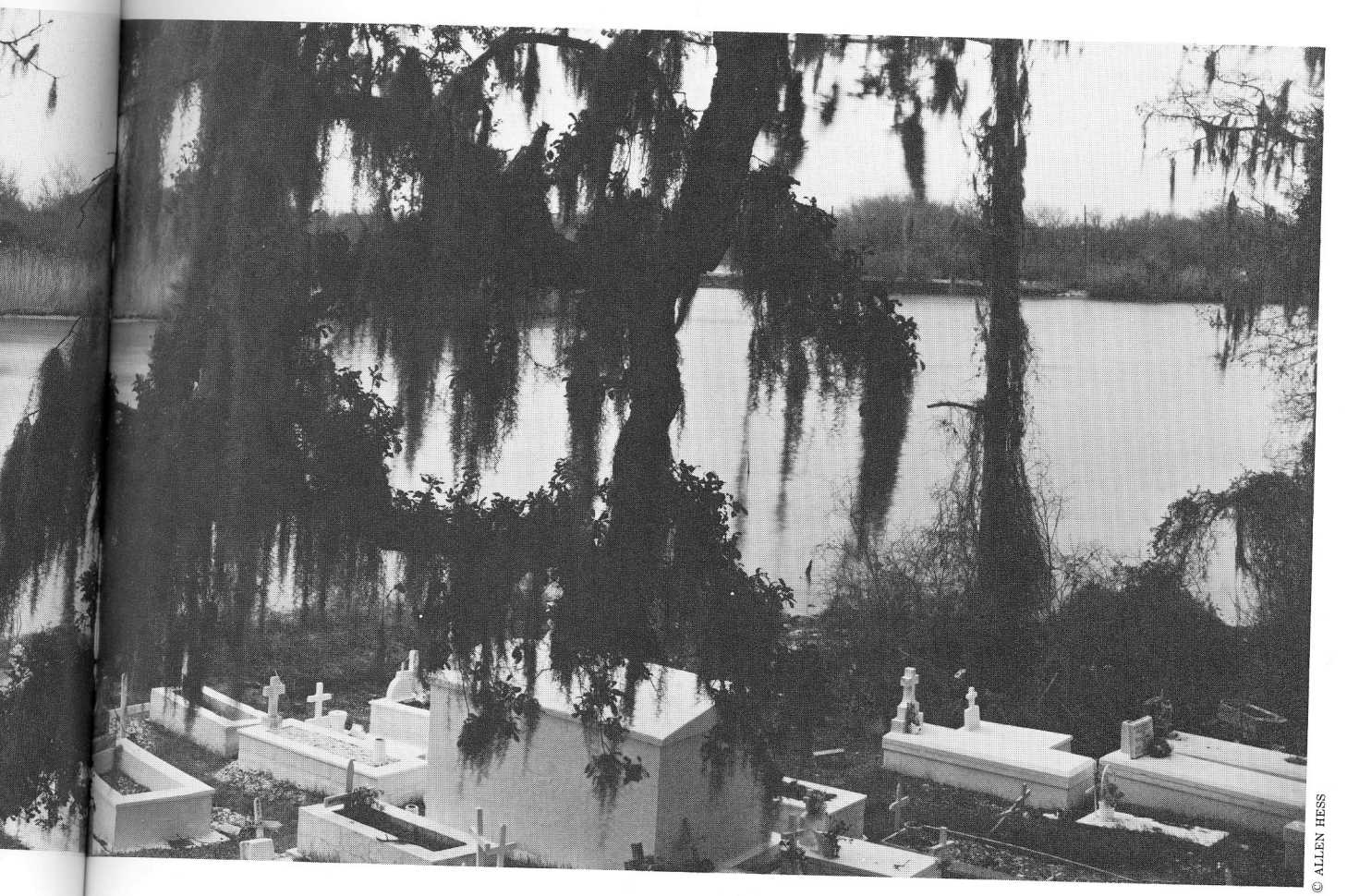
Take a general reading. Most of the time a general light-meter reading of an entire subject produces an accurate exposure recommendation. However, before accepting that reading, examine the sub-

A general light-meter reading produces accurate exposure most of the time — when the dark, middle, and light values of the subject roughly average out.



ject carefully. Try to previsualize the image as it will look in black and white. Do dark, middle, and light values roughly average out? If so, use an f-stop and shutter-speed combination from the general reading without correction; if not, make one of the following adjustments to that reading.

For *predominantly white or light subjects*, add more light — by the equivalent of one f-stop or more — than the meter suggests. Either open up the aperture or slow down the shutter speed. If the meter reading is f 8 at 1/500, use instead f 5.6 at 1/500 or f 8 at 1/250. (For especially light subjects, add even more light.)



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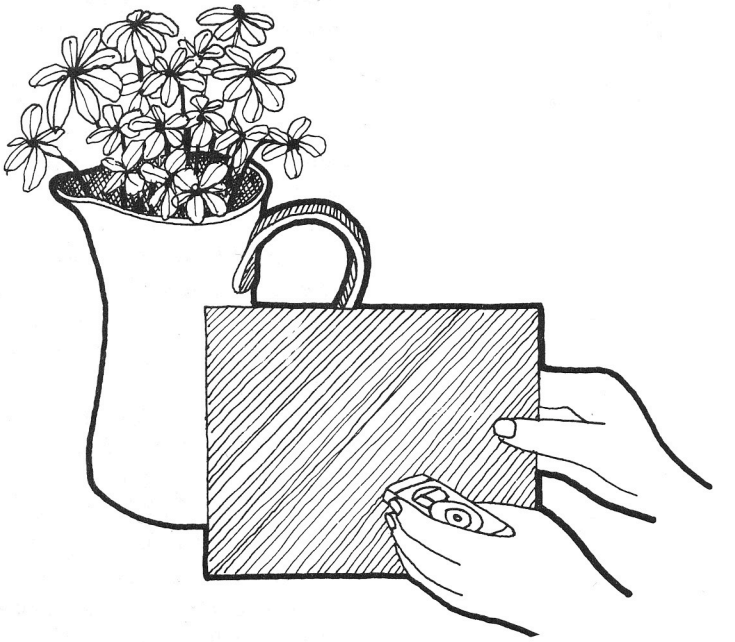
For *predominantly dark subjects*, cut back on the light the meter suggests; close down the aperture or make the shutter speed faster. If the meter reading is f 4 at 1/60, use instead f 5.6 at 1/60 or f 4 at 1/125. (For especially dark subjects, cut back the light even further.)

Use a gray card. Photographers sometimes use a *gray card* to reflect an average amount of light falling onto the subject rather than the light reflected off specific parts of the subject. A gray card is a small, rectangular piece of cardboard colored middle gray on one side and white on the other. It is inexpensive and available at most camera stores.

Gray card

To take light reading with a gray card, place the card in front of the subject, toward the camera position, and meter off the card.



To use a gray card, place it in front of the subject, and aim it toward the camera position. Take a meter reading off the card only; take care not to cast a shadow onto the card while reading the light. Use the f-stop and shutter-speed combination indicated by the meter without adjustment.

Gray cards are easiest to use with hand-held meters, but can be used with through-the-lens meters. They are most useful in stationary shooting situations, like still-lifes or formal portraits, when there is time to approach the subject, hold out the card, and take the meter reading.

Expose off skin. Skin can be a substitute for a gray card. Take a light reading off the palm of a hand, flattened out and positioned directly in front of the subject, toward the camera position. Or take the reading off the subject's face. Be careful not to cast a shadow onto the hand or the face when taking the reading.

Skin tones vary, and the indicated meter reading will probably need adjustment. For "average" Caucasian skin, add the equivalent of one f-stop more exposure. If the meter reads f 16 at 1/250, use instead f 11 at 1/250 or f 16 at 1/125. Dark skin may simulate a gray card perfectly, so use the meter reading without adjustment. Extremely

dark skin may need as much as one-half to one f-stop less exposure than the meter suggests. If the meter reads f 8 at 1/125, use instead the half-stop between f 8 and f 11 at 1/125, or perhaps f 11 at 1/125 or f 8 at 1/250.

Read incident light. Incident-light meters read light falling onto the subject rather than light reflecting off the subject. They do not read specific dark, gray, or light areas of the subject. As such, they provide an average exposure for the given subject lighting conditions, much like a gray card.

Incident readings are especially useful in extreme lighting conditions, such as on bright sunny days or when either light or dark areas could dominate a reflected meter reading.

Directions for using an incident-light meter were detailed earlier in this chapter.

Average the shadows and highlights. Since meters read for middle gray, the correct exposure will be somewhere between the meter readings for the dark and light areas of the subject. Meter a dark area, then a light area, and average the two readings. If the reading off the dark area is f 4 at 1/60, and the reading off the light area is f 16 at 1/60, use f 8 at 1/60.

Most of the time this exposure system works well enough. However, the dark and light areas metered should be approximately equal in darkness and lightness. Do not average meter readings from a jet black car and mildly tanned Caucasian skin.

Bracket. Bracketing means taking exposures on either side of the recommendations of the meter. It is a safe way to guarantee good exposure.

Use any system to determine exposure. If the recommended f-stop and shutter-speed combination is f 8 at 1/60, take an exposure at that setting, but also take an exposure allowing twice as much light to reach the film — f 5.6 at 1/60 or f 8 at 1/30 — and an exposure allowing half as much light — f 11 at 1/60 or f 8 at 1/125.

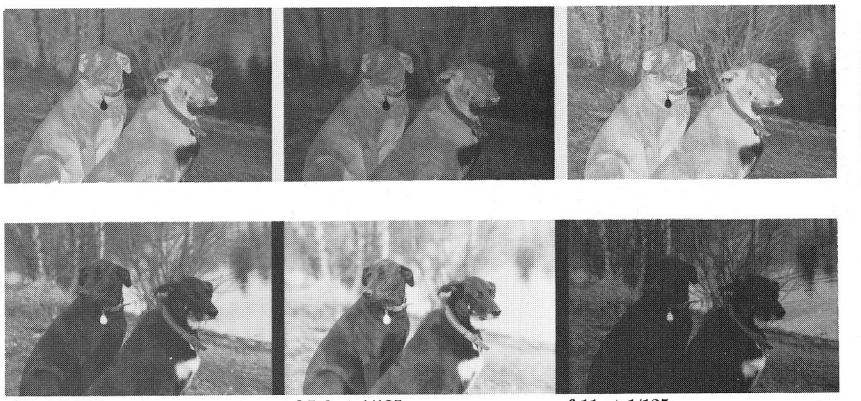
Bracketing produces several different exposures of the same image. At least one exposure should be ideal.

Bracketing is not always practical, such as with candid or moving subjects, so do not approach it as a crutch. Learn to expose well, and bracket only when practical and with especially important pictures.

Expose for the shadows and compensate. A more exact system for exposing film is to take the meter reading in a dark shadow area of the subject and then make an adjustment to that reading. The area should be the darkest part of the subject where detail is desired in the final print.

Bracketing exposures

The first negative was made with an exposure taken directly from the meter's recommendation — f 8 at 1/125. The second negative was taken with an exposure the equivalent of one f-stop more — f 5.6 at 1/125, and the third negative was taken with an exposure the equivalent of one f-stop less — f 11 at 1/125.



f 8 at 1/125 | f 5.6 at 1/125 | f 11 at 1/125

The rule-of-thumb is:

Take the meter reading in the darkest shadow area and expose for the equivalent of two f-stops less.

Let's say a dark sweater represents the deepest shadow area where detail is desired. Read off the sweater only. (A spot meter would be helpful.) Suppose the meter indicates f 2.8 at 1/60. Use instead an exposure of two f-stops (or the equivalent) less, such as f 5.6 at 1/60, f 4 at 1/125, or f 2.8 at 1/250.

If the darkest areas of the subject are not particularly dark, the adjustment should be one stop, rather than two. In the above example, use f 4 at 1/60 or f 2.8 at 1/125.

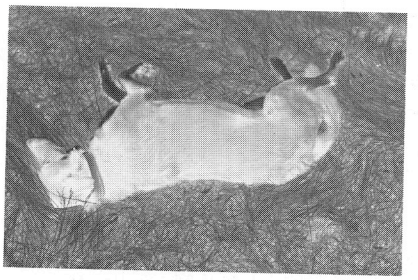
Meter readings off dark areas always suggest too much exposure. Since little light is reflecting back from the shadows, the meter recommends allowing a lot of light in. Therefore, if the shadow area reading is used without adjustment, the silver buildup on the negative will be too dense. By exposing for less light, the amount of silver is reduced, so the shadows will be thin on the negative, but just dense enough to render detail. In other words, the shadow density will be exactly what it should be.

The corrected exposure should guarantee a negative with properly exposed shadows. When the shadows are exposed correctly, the gray and highlight areas should fall right in place, because they will always be rendered as denser than the shadow areas. After all, they reflect more light back to the film than the shadows.

Meter for the shadows

A negative made with an exposure taken in the shadow area of the subject — f 8 at 1/60 — is overexposed. It is too dense.

A print from that negative.



A negative made after exposing for the equivalent of two f-stops less exposure than above — f 16 at 1/60 — is correctly exposed.

A print from that negative.

Problem Exposure Conditions

Difficult lighting conditions can make any exposure system less accurate. Here are solutions to three common problems:

A backlit subject. The subject is *backlit* if the primary light source (such as the sun or a lamp) is aiming at the front of the lens and in back of the main subject. Backlighting causes the subject to be in shadow. Instructions with simple cameras say "stand with your back to the sun to take a picture." This is to avoid backlighting.

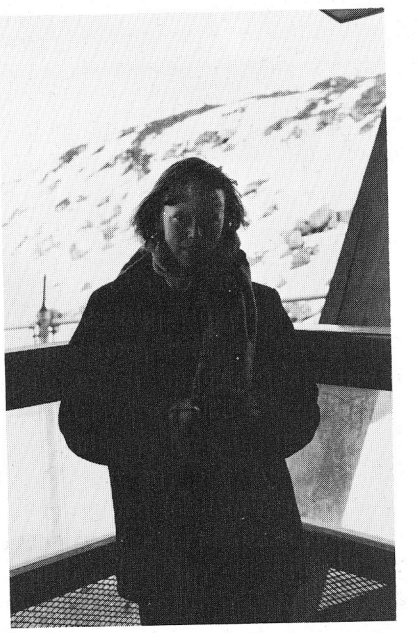
A general reading will reproduce the existing lighting. Because the subject is in shadow, it is dark and will lack detail. Sometimes backlighting is desirable because it renders the subject in silhouette or evokes an interesting, mysterious feeling.

However, if good subject detail is needed, the meter reading must be adjusted. Add the equivalent of one or two f-stops to the meter reading (depending on how dark the subject is) to guarantee good subject detail. Say the subject is a man, lit by the sun from behind, and the meter recommends f 8 at 1/125; use instead f 8 at 1/60 or f 5.6 at 1/125. If the sun is especially bright, the man will be especially dark, so add the equivalent of another f-stop of exposure, such as f 5.6 at 1/60 or f 4 at 1/125.

Backlighting

Left:
A subject lit from behind is exposed at the meter reading of f 11 at 1/125. It is in shadow.

Right:
The same subject has greater detail when exposed for the equivalent of two f-stops more exposure — f 8 at 1/60. However, the background is now too bright.



A subject in shadow

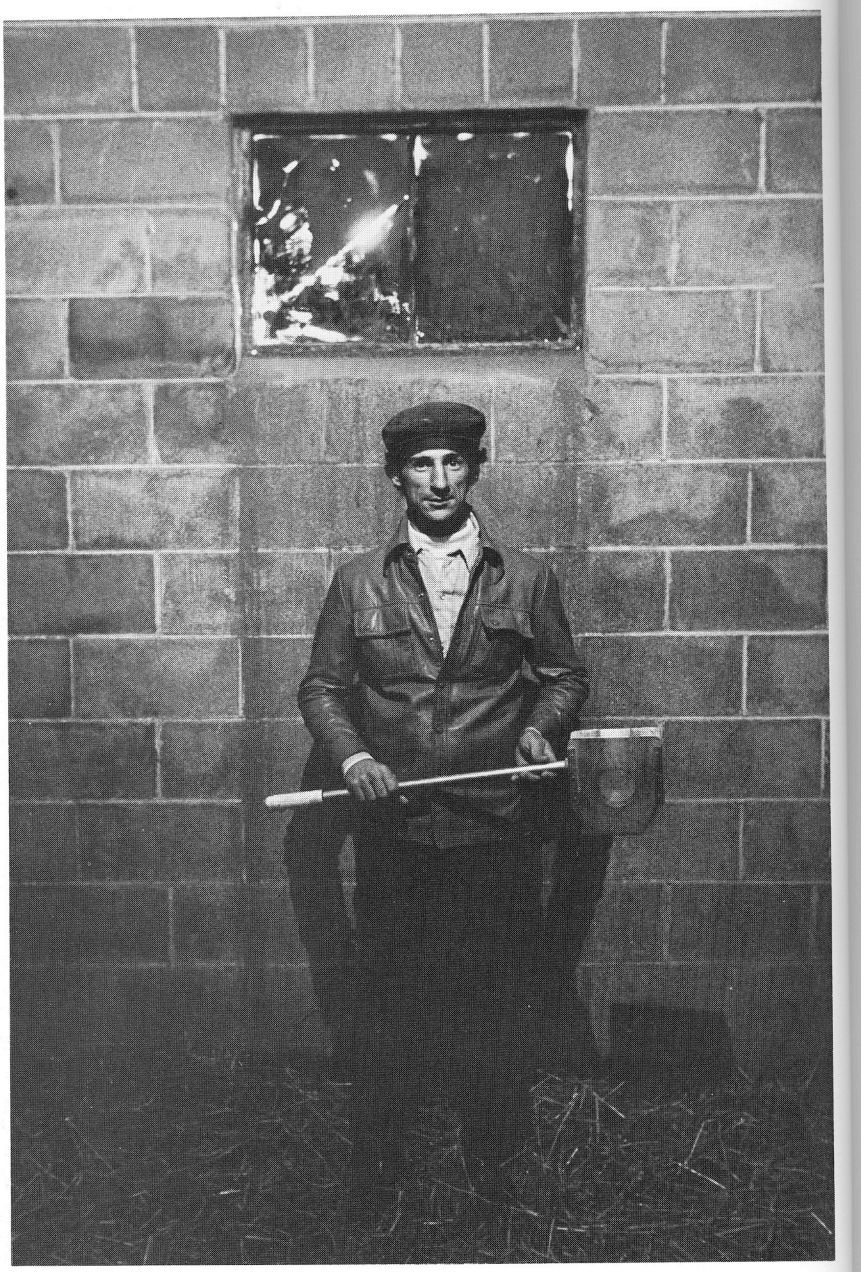
If the main subject (here, the girl) is in shadow, and the rest of the picture is in brighter light, add light to a general light-meter reading to guarantee that the main subject will be well exposed. This photograph was taken at an exposure of 1/250 at f 8, even though a general reading suggested 1/250 at f 11.

The problem with increasing exposure in this way is that the background may receive too much light, and become *blocked up* — too dense on the negative and too bright in the print. This problem can be compensated for by using a flash, developing the film for less time, or "burning in" the background during the printing process. These solutions are explained in subsequent chapters.

There is a form of backlighting that occurs when the main subject is in shadow and the background contains brightly lit areas. For example, if the subject is positioned under a tree, in shadow, and the entire image includes brightly lit areas around the tree, the subject is effectively backlit. If the bright background areas take up a small part of the picture, then a normal meter reading will probably be accurate. If the bright areas are more dominant, an exposure increase equivalent to one or two f-stops is needed.

Low-light conditions

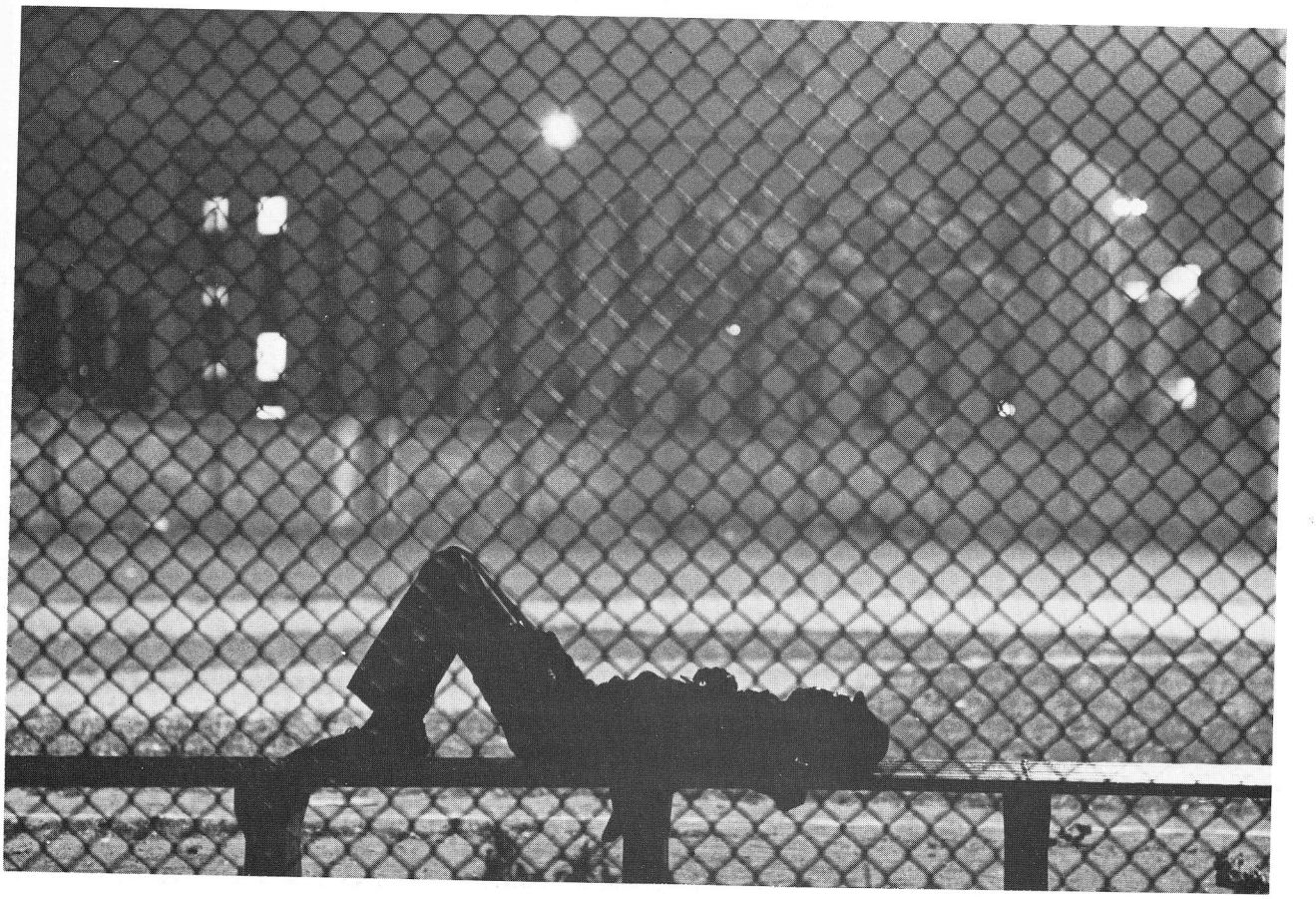
Subjects in low light require a fast film, a slow shutter speed, and/or a wide aperture. Sometimes, additional exposure is required since light meters may underestimate the amount of exposure needed. This photograph was taken with 400 ASA film; the meter suggested 1/60 at f 2.8, but the exposure was made at 1/60 at f 2, just to be sure.



Low-light conditions. Photography in dim light is sometimes referred to as *available-light* photography, and causes a whole set of technical problems. The crux of the matter is how to capture what little light exists.

Inevitably, low-light photography requires a fast film, a slow shutter speed, and/or a wide aperture. As a result, the pictures will be relatively grainy. They may also be blurred and will probably have minimal depth of field. (Slower film can sometimes be used in a camera on a tripod with longer exposures to make less grainy pictures, possibly with greater depth of field.)

To complicate matters, light meters are least accurate under low-light conditions. They frequently underestimate the amount of exposure needed. Additional film development, known as "pushing film"



This picture was exposed at f 2 at 1/30, even though the meter recommended the equivalent of one f-stop less (f 2 at 1/60), to guarantee a good, printable negative.

Subject with mostly highlight areas

JOHN VACHON/FARM SECURITY ADMINISTRATION COLLECTION, LIBRARY OF CONGRESS

Subjects consisting of predominantly bright tonal values, such as snow or sky, frequently need more exposure than a general light-meter reading suggests. Take a general reading and add the equivalent of one or two f-stops of exposure.

(see chapter 7), can sometimes solve this problem. However, at other times, the light is simply too low and artificial light (such as flash) must be used.

There are few choices available when taking pictures in low light. A fast film, probably 400 ASA, is a must. The shutter speed has to be slow, with 1/30 or 1/60 the likely possibilities unless a tripod is used. The aperture must be wide open, say f 1.4, f 2, or f 2.8. Some combination of these shutter speeds and f-stops will work under many low-light conditions.

If possible, add the equivalent of one f-stop of exposure to the recommended meter reading. Here, overexposure is far better than underexposure because detail in the shadow areas is more likely to be preserved. Besides, indoor light is so variable (for example, a lamp in one place and total darkness in another) that some sort of backlighting is common, so more exposure is desirable. If the main subject is sitting on a couch in a low-lit room, and the meter reads f 2 at 1/60, use instead f 2 at 1/30 or f 1.4 at 1/60.

A subject with mostly highlight areas. If the subject has mostly highlights (such as brightly lit sky, sand, snow, or water), the meter will read too much reflected light and suggest too little exposure. The result will be an underexposed negative. To compensate, add the equivalent of one to two f-stops of exposure to the meter reading.

For example, if the subject is framed by a lot of bright sky and the meter reading is f 16 at 1/250, use instead f 11 at 1/250 or f 16 at 1/125. Extreme cases, such as a skier framed by brightly lit snow, may require still another f-stop of exposure.