Accurate Exposure with Your Meter

INTRODUCTION

Accurate exposure is fundamental to creating a high-quality photograph. With an exposure meter, you can venture into a wide variety of lighting conditions and be confident that you will consistently get good results. You can use an exposure meter to make selective light readings, to handle unusual and difficult lighting, or to make special creative effects.

Exposure meters, or light meters, are light sensing devices that are good a t doing what the humane eye can't—quantifying light. With an exposure meter you can relate the brightness of light reflected from a subject toward the camera, or the brightness of the light illuminating the subject, to the sensitivity of the film. The meter expresses this relationship in terms of lens openings and shutter speeds.

Most of today's 35 mm cameras have exposure meters built into them. In a single-lens-reflex (SLR) camera, the built-in meter's photocell measures the intensity of the light passing through the lens. In a non-SLR camera, the photocell is on the front of the camera body or lens. Some in-camera meters set exposure controls for you automatically, but with the exception of non-SLR auto-focus cameras, most models have overrides that enable you to change the camera's aperture and shutter speed. The desire for added flexibility and control is why some photographers still prefer to use a separate handheld meter. Whether you use a camera with a built-in meter or a separate handheld meter, the following information will help you to use your meter to its fullest potential to give you exciting and well-exposed pictures.

Film Speed

The first step in getting good results is to set your meter or camera for the correct speed of the film you are using. Many cameras automatically set the film speed when you load DX-encoded film. DX-encoded films can also tell the camera the exposure latitude and the number of exposures. If your camera has this feature, the camera instructions will explain how it works.

The film ISO speed is a number that indicates the relative sensitivity of the film to light. The higher the number, the more sensitive or "faster" the film; the lower the number, the less sensitive or "slower" the film. For example, a film with a speed of ISO 200 is twice as light-sensitive or fast as a film with a speed of ISO 100. Similarly, and ISO 200 film is only half as fast as a film with a speed of ISO 400. Your film carton (and the film cartridge) will tell you the speed of your film.

Exposure Latitude

Correct exposure is necessary for getting the best possible picture quality from your film. However, because of the exposure latitude inherent in most films, exposure can be off slightly and you'll still get good pictures.

Some types of films have more exposure latitude than others. Color slide films, for example, usually produce the best results when they are within a ½ stop over or under the correct exposure. But you will have somewhat more latitude—often two-stops or more—with black-and-white and color negative (print) films. The printmaking process is the difference in exposure latitude for these films.

Because it is possible to compensate for variations in the camera exposure when the negative is printed, the prints made from incorrectly exposed negatives can often appear properly exposed. Slides, on the other hand, don't offer the opportunity for exposure correction that is available through a printing step—the finished slide that you project is the same film that went through the camera. The end result is that slide films have less exposure latitude.

HOW EXPOSURE METERS WORK

The kind of meter you have determines not only how it measures light, but how you should use it. There are two basic kinds of meters: reflected-light (they measure the light reflecting from a scene) and incident-light (they measure the light falling onto a scene). Each type has its advantages and its disadvantages. Some meters have accessories that enable you to use them to read either reflected light or incident light. Reflected-light meters that read a wide angle of view are also called averaging meters. They account for most of the reflected-light meters in use, including those built into cameras. Another type of reflected-light meter, the spot meter, is designed to take reading from only a small part of the scene.

Meter-Reading Area

Virtually all in-camera meters are the reflected type—they measure the average brightness of the light within the lens' field of view. As you look through the lens of a 35 mm SLR camera, you can see what the meter sees. Change the lens and you change the area being metered. Most handheld meters are also reflected-light meters. Many photographers prefer reflected-light meters because they can use them to take light readings from the camera position. To take a light reading with a handheld reflected-light exposure meter, you usually stand at the camera position and aim the meter at your subject. To use an incident-light meter, on the other hand, you usually position the meter as near the subject as possible, in the same light that is illuminating the subject, and aim the meter back at the camera (unless the meter instruction book recommends a different technique).

A spot meter has a unique and helpful feature—an extremely narrow angle of coverage. Instead of measuring the brightness of an entire scene, a spot meter measures the brightness of a small area or "spot" within the scene, usually only a few degrees or less. Handheld spot meters have a built-in viewing lens so you can see precisely what part of a scene you're metering. As you'll see, this feature can be very helpful.

Most through-the-lens SLR camera meters are the averaging type, reading the entire picture area. Many read the entire area but are biased for the central part of the viewfinder. The center has the greatest influence over the exposure reading, although the remaining picture area still has some effect on exposure. Other cameras can be switched to modes similar in principle to spot meters; they read only a small segment of the scene. With the advent of advanced electronics, it is possible to make several spot readings that are automatically integrated for optimum exposure.

Another type of system offers multi-pattern metering. Also called matrix or segmented metering, these systems work by dividing the viewing area into a set pattern or grid of several segments. The meter reads each segment and makes a comparative analysis of things like subject size and the brightness of each zone. The camera compares this data with programmed information it contains to calculate exposure. This type of metering system can adjust automatically for backlighting, snow and other unusual scenes to give better exposure. Check your camera manual for specific instructions and information about the area of coverage fore your camera's meter.

How Exposure Meters "See"

Both reflected-light and incident-light meters are made to "see" the world as a medium gray. The assumption is that most subjects, most of the time, are of average tone and reflectance. So long as there is and even distribution of light and dark subjects in the scene, correct exposure is usually as easy as pointing the meter or camera at the scene and using the reading you get. But the real world does not always present subjects to you in such a straightforward way. For example, with either a reflected-light meter or an incident-light meter, if the main subject is very dark or very light, the indicated exposure will make the subject appear as a medium tone in the picture. The result will be incorrect exposure unless you apply your own judgement to the information the meter gives you.

Use a meter reading as a guideline rather than a dictate for correct exposure. This makes it important that you understand how your particular meter works so you can consistently get good results no matter what the lighting. The place to begin this understanding is the instruction manual that came with your meter or camera. The instructions should familiarize you with the meter's specific features, its flexibility, and its limitations. Most camera and exposure meter instructions provide the basic techniques of light measurement and mention some of the situations that may "fool" the meter. If you can't find the instructions, write to the manufacture for them.

USING REFLECTED-LIGHT METERS

Once you have set the proper film speed on your camera or meter, you are ready to make the exposure-meter reading. With a reflected-light meter (in camera or handheld), point the camera or meter at the subject. The meter will measure the average brightness of the light reflected from the various parts of the scene. With an in-camera meter, a needle or diode display in the viewfinder or an LCD display on tip of the camera will tell you when you have achieved the proper combination of lens and shutter-speed settings. If the camera is fully manual. you must set both the aperture and shutter speed. Automatic cameras may set both shutter speed and aperture; or they may set just one of the controls, leaving you to set the other.

If you're using a handheld meter, read the information on your meter and set the camera controls accordingly. An overall exposure reading taken from the camera position will give good results for and average scene with an even distribution of light and dark areas. For many subjects, then, exposure-meter operation is mostly mechanical; all you do is point the meter (or camera) at the scene and set the aperture and shutter speed as indicated. But your meter does not know if you need a fast shutter speed to stop action or a small aperture to extend depth of field. You will have to select the appropriate aperture and shutter combination for the effect you want. There will be other situations where either the lighting conditions or the reflective properties of the subject will require you to make additional judgements about the exposure information the meter provides, and you may have to adjust the camera controls accordingly.

A reflected-light meter reading is influenced by both how much light there is in the scene and how reflective the subject is. The meter will indicate less exposure for a subject that reflects little light, even if the two subject are in the same scene and in the same light. Because reflected-light meters are designed to make all subjects appear average in brightness, the brightness equivalent to medium gray, they suggest camera settings that will overexpose (make too light) very dark subjects and underexpose (make too dark) very light subjects.

Although reflected-light meters are influenced more by the largest areas of the scene, the results will be acceptable even when the main subject fills the picture but it's still of average reflectance (neither very light nor very dark). However, what happens if a relatively small subject is set against a large dark or light background? The meter will indicate a setting accurate for the large area, not for the smaller, but important, main subject. Therefore, when the area from which you take a reflected-light reading is very light or very dark, and you want to expose it properly, you should modify the meter's exposure recommendation as follows:

- For light subjects, *increase* exposure by ½ to 1 stop from the meter reading.
- For dark subjects, *decrease* exposure by ½ to 1 stop from the meter reading.

Selective Meter Readings

To determine the correct exposure for contrasty scenes with large areas that are much darker or much lighter than the principal subject, take a selective meter reading of only the subject itself. How do you do this? Move the meter or camera close to the subject. Exclude unimportant dark or light areas that will give misleading readings. In making close-up readings, also be careful not to measure your won shadow or the meter's shadow.

Selective meter readings are useful for dark subjects against a bright background like snow or light sand, or for subjects in shade against a bright sunlit background. There is also the reverse of this: The subject is in bright sun and the background is in deep shade. In all these situations, your camera has no way of knowing which part of the scene is the most important and requires the most accurate exposure, so you must move in close so the meter will read only the key subject area. For example, if you want to photograph a skier posed on a snowy slope on a bright, sunny day, taking an average reading of the overall scene will result in underexposure. The very bright snow will overly influence the meter and the reading will be too high. The solution is to take a close-up reading from the skier's face (or a piece of medium-toned clothing) and then step back the desired distance to shoot the picture. Some cameras with built-in meters have an exposure-hold button or switch to lock the exposure setting when you do this.This technique is useful anytime the surroundings are much brighter or darker than your subjects.

Landscapes and other scenes with large areas of open sky can also fool the meter. The sky is usually much brighter than other parts of the scene, so an unadjusted meter reading will indicate too little exposure for the darker parts of the picture. One way to adjust for this bias without having to move in close is to tilt your lens or meter down to exclude the sky while taking your meter reading. The sky will probably end up slightly overexposed, but the alternative would be to find a different shooting position excluding most or all of the sky. There are also graduated neutral density floaters that work well in such situations. A neutral density filter absorbs all colors of visible light evenly, and you can position a graduated filter so that the darker portion is at the top of the image where it will darken the sky without affecting the ground below. Incidentally, some built-in meters are bottom-weighted to automatically compensate for situations like this, so check your manual.

Bright backlighting with the subject in silhouette can also present a challenge. With the light shining directly into the lens or meter, aiming the meter into the light can cause too high a reading. If you don't want to underexpose the subject, take a close-up reading, being especially careful to shade the lens or meter so that no extraneous light influences the reading.

Substitute Readings

What if you can't walk up to your subject to take a meter reading? For instance, suppose that you're trying to photograph a deer in sunlight at the edge of a wood. If the background is dark, a meter reading of the overall scene will give you an incorrect exposure for the deer. Obviously, if you try to take a close-up reading of the deer, you're going to lose your subject before you ever get the picture. One answer is to make a substitute reading off the palm of your hand, providing that your hand is illuminated by the same light as your subject, then use a ens opening 1 stop larger than the meter indicates. For example, if the reading off your hand is *f*/16, open up one stop to *f*/11 to get the correct exposure. The exposure increase is necessary because the meter overreacts to the brightness of your palm which is about twice as bright as an average subject. When you take the reading, be sure that the lighting on your palm is the same as on the subject. Don't shade your palm.

Another subject from which you can take more accurate and more consistent meter readings is a KODAK Gray Card, sold by photo dealers. These sturdy cards are manufactured specifically for photographic use. They are neutral gray on one side and white on the other. The gray side reflects 18% of the light falling on in (similar to that of an average scene), and the white side reflects 90%. You can use a gray card for both black-and-white and color balance. Complete instructions are included in the package with the cards.

Handling High Contrast

How do you determine the correct exposure for a high-contrast scene, one that has both large light and dark areas? If the highlight of shadow areas are more important, take a close-up reading of the important area to set the exposure. With color slide film, keep in mind that you will get more acceptable results if you bias the exposure for the highlights, losing the detail in the shadows. In a slide, the lack of detail in the shadows is not a s distracting as overexposed highlights that project as washed-out color and bright spots on the screen. If you are working with black-and-white film, you can adjust the development for better reproduction of the scene contrast, particularly in highlights.

But what if the very light and very dark areas are the same size and they are equally important to the scene? One solution is to take selective meter readings from each of the areas and use a *f*-number that is midway between the two indicated readings. For instance, if your meter indicates an exposure of $\frac{1}{125}$ second at *f*/22 for brightest area and $\frac{1}{125}$ second at *f*/2.8 for the darkest area—a range of six stops—set your cameras $\frac{1}{125}$ second *f*/8. This is a compromise solution, but sometimes it is your only choice short of coming back another day or changing your viewpoint, and the composition of the picture, to eliminate the contrast problem.

USING SPOT METERS

Perhaps the best solution when you need a selective meter reading is offered by the spot meter. Handheld averaging meters generally cover about 30°, while handheld spot meters typically read a 1° angle The angle of spot meters built into the camera are usually wider, about 3 to 12°. The biggest advantage of a spot meter is that is allows you to measure the brightness of small areas in a scene form the camera position without walking in to make a close-up reading. Since a spot meter measures only the specific area you point it at, the reading is not influenced by large light or dark surroundings. This makes a spot meter especially useful when the principal subject is a relatively small part of the overall scene and the background is either much lighter or darker than the subject. Spot meters are also helpful for determining the scene brightness range.

A spot meter can take more time to use since it usually requires more than one reading of the scene. This is particularly true when the scene includes many different bright or dark areas. To determine the best exposure in such a situation, use the same technique described previously for high-contrast subjects: Select the exposure halfway between the reading for the lightest important area in the scene and that for the darkest important area in the scene. Bear in mind, though, all films have inherent limits on the range of contrast they can accurately record. Remember too, you can sometimes create more dramatic pictures by intentionally exposing for one small area, such as a bright spot of sunlight on a mountain peak, and letting the dark areas fall into black shadow without detail. Spot meters are ideal for such creative applications.

USING INCIDENT-LIGHT METERS

To use an incident-light meter, hold it at or near the subject and aim the meter's light-sensitive cell back toward the camera. The meter reads the amount of light illuminating the subject, not light reflected from the subject, so the meter ignores the subject and background characteristics. As with a reflected reading, an incident reading provides exposure information for rendering average subjects correctly, making incident readings most accurate when the subject is not extremely bright or dark.

When taking an incident-light reading, be sure you measure the light illuminating the side of the subject you want to photograph, and be careful that your shadow isn't falling on the meter. If the meter isn't actually at the subject, you can get a workable reading by holding the meter in the same kind of light the subject is in. Because the meter is aimed toward the camera and away from the background light, an incident reading is helpful with backlighted subjects. This also the case when the main subject is small and surrounded by a dominant background that is either much lighter or darker.

The exposure determined by an incident-light meter should be the same as reading a gray card with a reflected-light meter. Fortunately, many scenes have average reflectance with an even mix of light and dark areas, so the exposure indicated is good for many picture-taking situations. However, if the main subject is very light or very dark, and you want to record detail in this area, you must modify the meter's exposure recommendations as follows:

- For light subjects, *decrease* exposure by ½ to 1 stop from the meter reading.
- For dark subjects, *increase* exposure by ½ to 1 stop from the meter reading.

You will notice that these adjustments are just the opposite from those required for a reflected-light meter. An incident meter does not work well when photographing light sources because it cannot meter light directly. In such situations you will be better off using a reflected-light meter or an exposure table.

If the scene is unevenly illuminated and you want the best overall exposure, make incident-light readings in the brightest and darkest areas that are important to your picture. Aim the meter in the direction of the camera position for each reading. Set the exposure by splitting the difference between the two extremes.

HOW TO CHECK YOUR EXPOSURE METER AND CAMERA

If your results are consistently too light or too dark, your meter may be providing erroneous readings because of age, extensive use, or malfunction. The first thing to suspect, when a meter fails or readings become erratic, is the battery. Handheld and in-camera meters require fresh batteries to provide accurate reading; you should replace batteries at least once a year. Cold weather is particularly hard on batteries, so if you're shooting in winter, carry backup batteries in a warm inside pocket where they'll retain their charge. If new batteries don't cure the problem, have your camera or meter checked by a professional repair technician or by the manufacturer.

Simple Meter Check

To check the accuracy of your meter, you can compare its readings with a guide such as the daylight exposure table found inside a Kodak film carton. On a sunny day, aim your camera meter at frontlighted, average subject. The exposure indicated by the meter should match the film carton recommendation within a ½ stop. For example, the suggested exposure for KODACHROME 64 Film is 1/60 at *f*/16 or an equivalent shutter-aperture combination. If your meter indicates another setting, it may need repair or adjustment. If your meter indicates the correct exposure but your pictures are still too light of too dark, then your camera's shutter or lens aperture may be at fault.

This simple daylight exposure guideline works because it is based on the relatively constant light from the sun plus the sky on sunny days. Sometimes called the "*f*/16" rule, the exposure for a frontlighted, average subject in bright sun (distinct shadows) is *f*/16 at a shutter speed that matches the film speed. For example, if you are using KODAK GOLD 200 Film (ISO 200), the exposure should be 1/250 second at *f*/16, the same as the film carton recommendation.

Incidentally, even though most cameras do not have a 1/200 second shutter speed setting, the exposure latitude of the film will easily cover the slight underexposure at 1/250. If you are using a slide film with less exposure latitude, you can slightly adjust the aperture setting as needed when the shutter speed does not exactly match the film speed.

As with a meter reading, the exposure is adjusted for changes in the lighting level, the direction of the light and the reflectivity of the light, and the reflectivity of the subject. For example, you should *decrease* exposure by one stop fro bright sun on light snow or sand, and *increase* exposure by one stop for an average subject in weak or hazy sun (soft shadows). There is an additional stop increase for cloudy bright conditions (no shadows), and another for heavy overcast or open shade. Using the previous example with GOLD 200 Film, the change from bright sun to heavy overcast or open shade for and average subject is three stops —a suggested exposure for *f*/5.6 at 1/250. Increase exposure by one stop (either a slower shutter step or larger lens opening) from the normal for sidelighting, and two stops for backlighting.

Easy "No Repair" Adjustment

If your pictures are consistently too light or too dark under a variety of lighting conditions, your lens diaphragm or shutter may be sticking or your meter may be slightly off. You can temporarily compensate for minor meter or shutter/aperture errors by adjusting ISO setting on your camera or exposure meter (or your camera's exposure-compensation control) based on the following test procedure. For this test, you will probably find it easier to use a slide film rather than a print film. Color-slide films work best because they have more critical exp0osure requirements, and there won't be any corrections made during printing that would make it more difficult to judge the accuracy of the initial exposure. Accurately evaluating results from print film requires an examination of the negatives—something that isn't as easy as judging slides.

To begin, set the appropriate film speed on your camera or meter and make a light reading of an average frontlighted subject. Then, using this reading as a starting point, make a series of test exposures beginning with the recommended exposure. If your pictures have been consistently too dark, make a second exposure with a lens opening ½ stop larger than the meter indicates and a third exposure with a lens opening that is 1 stop larger. For example, if the meter indicates 1/250 at *f*/8, use these settings for the first exposure, then shoot the second at an aperture midway between *f*/8 and *f*/5.6 (without changing the shutter speed); shoot the third at 1/250 at *f*/5.6.

If your pictures have been consistently too light using the recommended exposure, make these exposures with lens openings ½ stop and 1 full stop smaller than the one the meter recommends. Using the example of $\frac{1}{250}$ at *f*/8, make your first test exposure at $\frac{1}{250}$ second at *f*/8. Shoot the second at a lens opening halfway between *f*/8 and *f*/11, and make the third at $\frac{1}{250}$ at *f*/11. Be sure to writ e down the meter reading, exposure, and frame number for each test picture. One sure way to remember the exposure settings is to include them right in the picture. You can write the lens opening and shutter speed on a large piece of paper and include it in the scene you're photographing. (Don't include it when you're metering.)

View the processed slides on a light box or under your usual projection conditions and select the best exposure. Then use your exposure notes for that slide to find the best film-speed number for that particular meter and film combination. For example, if your best exposure is the one that was a full stop less exposure, the correct ISO speed for the meter/film combination would between the recommended speed (ISO 200 instead of ISO 100, for instance), since this would give you a stop less exposure for all future shots. If the best test exposure was the one that was shot at a full stop more than the meter indicated, you should halve the ISO number (ISO 50 instead of 100) or set the exposure-compensation control to +1. Each doubling or halving of the film speed is equal to a 1-stop adjustment. If you want to increase exposure, use a lower number; if you want to decrease exposure, use a higher number.

As a result of your exposure test with color-slide film, you can change the film-speed number of other films by the same percentage.

BRACKETING

When you are faced with a scene that challenges your normal metering techniques, a good solution is to bracket your exposures.

Bracketing doesn't simply mean guessing. It is a calculated technique to obtain a few additional insurance exposures that are based on your best estimate for correct results. The key is to recognize those unusual situations or unorthodox lighting conditions where a single exposure may not assure you of success. Because slide films have less exposure latitude than negative films bracketing is a technique that is more useful for slide films.

Bracketing is a simple procedure. First take a reflected-light meter reading of the subject from the camera position or use the recommendation in an exposure table. This will give you an approximate exposure and provide a starting point for making any subsequent adjustments. Take one picture using this exposure. Then bracket your exposure by suing one stop larger and then on stop smaller than the indicated exposure. For extra assurance, you can use a bracketing range of ± 2 stops. For more subtle control, particularly with slide films, you can bracket in ½-stop increments.

Negative films for either black-and-white or color prints, are generally more tolerant of overexposure than underexposure, so bracket toward more tether than less exposure unless there is a significant risk of badly overexposing important elements of the scene. Usually, one-stop increments are enough because of the film's exposure latitude. Whatever you do, it's a good idea to write down the meter reading and the settings used for each exposure so you can compare them with your results to help you judge similar situations in the future.

MORE INFORMATION

Kodak has many publications to assist you with information on Kodak products, equipment, and materials.

Additional informations is available on the Kodak website and through the U.S.A./Canada faxback system.

The following publications are available from Kodak Customer Service, from dealers who sell Kodak products, or you can contact Kodak in your country for more information.

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