Light Meters

The correct use of a light meter greatly increases the accuracy in determining your camera exposure. This is especially true when you are shooting digital or slides.

When shooting film, you have some latitude with exposure. You will get better color saturation if you are about one stop over exposed. Usually you have plus and minus three stops of latitude.

However, when you are shooting slides, you will find that your exposure has to be very accurate. You will find a deeper saturation if you are under exposed by about half a stop, but no more.

When you shoot digital, you have to shoot as if you are shooting slides. Some people say that it is acceptable to be under exposed with digital, but I personally disagree. In those situations, you will find that in order to make corrections in a program like Photoshop, it adds a bit of noise into the final image. Some might not notice this, but the scrutinizing photographer will see it.

You should also understand that the incorrect use of a light meter could result in consistently unacceptable results. To assure consistently acceptable exposures, you must become thoroughly proficient with the correct operation of a light meter.

A light meter can be built either into the camera or into a separate hand-held unit. Both types are sensitive instruments and should be handled with care. There is little maintenance, but they do require batteries. When you think a light meter is not working properly, the first thing to do is to check the battery. If that is not the problem, have it checked by a qualified technician. Always be sure to check your equipment before leaving on an assignment. Like all camera equipment, careless handling and excessive heat and moisture limit the life of a light meter. A light meter must not be subjected to high temperatures for prolonged periods.

There are two methods of measuring light with hand-held light meters. These two methods are the incident-light method and the reflected-light method.

Incident-Light Meter

An incident-light meter has a diffusing dome that covers the photoelectric cell. When an incident-light meter reading is taken, the meter is held at the position of the subject with the photoelectric cell pointed toward the light you are measuring. The meter measures the light falling upon the scene. The incident-light method of measuring light is used extensively in motion-media photography. It also gives fast accurate results in all photography. Most light meters are designed for use as both incident-light and reflected-light meters. Most wedding and commercial photographers use incident-light meter readings for their photography.

Reflected-Light Meter

By removing the diffusion dome from the photoelectric cell, you can use the meter to measure reflected light. When you are taking this type of light meter reading, the diffusing dome should be removed from the photoelectric cell and the meter pointed toward the subject – usually from the camera position. A reflected-light meter receives and measures the light reflected from a scene within the angle of acceptance of the meter.

The term angle of acceptance is similar to the term angle of view of a lens. Both are predetermined during manufacturing. The angle of acceptance and the distance between the meter and the scene are the controlling factors as to how much of the reflected light from the scene is measured by the meter. When the angle of acceptance is greater than the angle of view of a lens (when using a telephoto lens for example), the meter should be moved closer to the scene.

Light meters that are built into the camera are reflected-light meters. When these meters are used, the angle of acceptance is not greater than the angle of view of the lens being used. The meter measures the light from the scene as seen by the lens.

Spot Meters

Some reflected-light meters have angles of acceptance between one and four degrees. These meters can be used from a distance to measure the reflected light from specific objects within a scene. Exposure meters with angles of reflectance this small are called spot meters.

Understanding the Light Meter

In order to determine if the information supplied by your light meter is accurate, you must understand the way it operates. One of the things I tell people is that they should consider the light meter as a Moron. Just like a moron can only understand one thing, so too a light meter; it only understands one thing. That one thing is eighteen-percent gray. No matter which type of light meter you use, an electrical-mechanical device can only provide information for which it is designed. You are responsible for translating this information into useful exposure data. Light meters are calibrated to see one shade only – middle gray. This means the information that the meter provides, no matter how much light is falling on the subject or what the reflection characteristics are, reads the subject the same as though it were middle or neutral gray (eighteen-percent gray).

Theoretically, if you take a reflected-exposure meter reading from an eighteen-percent gray card, and expose your film according to the reading, the result should be a picture that matches the tone of the gray card exactly. However, when you take a reflected-light meter reading of a white or black object, the light meter still reads the objects as though they were eighteen-percent gray. When you take a photograph that includes a gray, white, and black card, you will see how, depending on where you take the light meter readings, they affect your photograph. For example, when you take the light meter reading from the black card, the final picture reproduces the black as middle gray, and the gray and white cards as white. When you take the reflected-light meter reading from the white card, just the opposite occurs. In your final picture, the white card reproduces as middle gray, and the gray and black cards reproduce as black.

I will give you another example. If you were to take a reflected-meter reading of snow, the meter will try to convert the snow into eighteen percent gray. You as the photographer should use your brain, realize this, and set your camera to over-expose your photograph accordingly. Alternatively, if you were trying to photograph something pure black as coal, the reflected-meter would tell you that the scene is too dark and you should open up the aperture. You are smarter than that and realize that if you want to have a proper exposure, you will have to close down your lens appropriately.

These examples demonstrate overexposure and underexposure. When the reading was taken from the black card, the meter raised the black tone to middle gray, and the gray card tone was raised so it reproduced as white. Thus, both the black and gray cards were overexposed. The opposite occurred when the exposure was based on the reading from the white card. The white tone was lowered to middle gray and the gray card tone to black, resulting from underexposure. Only a light meter reading taken from the gray card allows all three cards to be imaged at their true tone.

A more practical example on the way a light meter reads eighteen-percent gray is illustrated in the following example. Suppose you are going to photograph a ship alongside a pier. Bright sunlight is striking the ship from the side, causing part of the ship to be in shadow. This creates a brightness difference between the highlight area and the shadow area. Both highlight and shadow areas are equal in size and importance. When you get close to the ship and take a reflected meter reading of the highlight area alone, you expect the finished photograph, like the white card in the above example, to be middle gray. When you stop down the aperture to the recommended exposure of the meter, you are also reducing the amount of exposure from the shadow area. This results in a loss of detail in the shadow area of the ship, because it is underexposed. The opposite effect occurs when you take a meter reading from the shadow area. In this case, the shadow tones are raised to middle gray and have detail, but the highlights are overexposed and completely “washed out.” If, however, there was an area in this scene whose tone was midway between the highlight and shadow areas, you could use it to take your light meter reading (as was the gray card used in the previous case). In this example, assume there is no tone midway between the two extremes. You can still get an accurate light meter reading of the entire ship. Since the highlight and shadow areas are of equal size, the average light meter reading you get will represent a tone that is midway between the two extremes.

Reflected Light Meter Reading Variations

There are variations of light meter readings used to provide accurate light meter readings of different types of scenes. These methods are as follows:

1. The average method
2. The brightness range method
3. The darkest object method
4. The brightest object method
5. The substitution method
6. The bracketing method

We will now discuss each of these methods in detail.

The Average Method

The technique of making reflected-light meter readings from the camera position is called the average method. This method was used and explained in the examples above. This method is accurate for the majority of photographs taken. The average method of measuring reflected light is acceptable for scenes that consist of approximately equal portions of light and dark areas. However, when a scene is composed of either predominately light or dark areas, the meter reading may not be accurate. The reason for these inaccurate meter readings can be more easily understood by using an example of photographing a checkerboard with alternating black-and-white squares. When the meter is held at a distance that includes the entire board, the reflected light from both the black and the white squares influence the meter. In this case, an average reading results. The light measured from this position is the integrated sum of both the white and the black squares, as though the checkerboard were one gray tone. The light meter reading from this point should produce an acceptable image.

If you hold the meter so close to one of the white squares that the black squares have no effect on the meter reading, the reading is higher than the integrated reading, and the meter indicates that the scene requires less exposure. The same principle applies when a reading is taken close to a

black square, but in reverse. The reading indicates that the scene requires more exposure. Each of the meter readings is a measurement of eighteen-percent gray. You can apply this checkerboard example when you photograph scenes that are predominately light or dark. Compensation is required to expose such scenes correctly, as we briefly mentioned above. As a general guide, you should double the indicated exposure when the light measurement is taken from a predominately light scene and detail is desired in the shadows. When you take a light meter reading from a predominately dark scene and detail is desired in the highlight areas, you should reduce the exposure by one half.

Brightness Range Method

This method requires you to take two readings from the scene: one reading from the highlight area where detail is desired and another from the shadow area where detail is desired. You then base your exposure on a point midway between the two readings. The brightness range method of determining exposures for most scenes usually provides detail in both the highlight and the shadow areas. The exception to this is when the exposure latitude of a film is not capable of recording the brightness range of the scene. This can occur with scenes that have extremely great brightness ranges.

Darkest Object Method

The darkest object method of determining exposures is actually a variation of the brightness range method. When you desire detail in the shadow area or darkest object within the scene, you take the light meter reading from this area. This method actually overexposes the film overall, causing the highlight areas of the scene to be greatly overexposed. This overexposure occurs because the light meter averages the light reflected from the shadow area and indicates an exposure to produce middle gray. When a great amount of detail is not needed in the shadow area and you want to expose the overall scene normally, you can take your light meter reading from the darkest object or shadow area and stop down two f/stops. This method provides a good overall film exposure of the shadows, mid-tones, and highlights.

Brightest Object Method

Another variation of the brightness range method is the brightest object method. The brightest object method of calculating exposures is used when a highlight area within a scene is the only area within the scene from which you can take a light meter reading. This method can also be used when you want to record detail in the highlight area. In both situations, you take only one light meter reading of an important highlight area. When you do not want the highlight to record as a middle-gray tone and desire a good overall exposure of the scene, you simply open up one or two f/stops from the indicated exposure. When you need maximum detail in the highlight area, you can use the reading that the light meter provides. This records the highlight area as medium gray. This method underexposes the film in other areas of the scene that reflect less light.

Substitution Method

With the substitution method, you replace an object within the scene with an object, such as a gray card. You then take a reflected-light meter reading from this object. You use this method when the other methods of determining exposure are not possible. Such situations may be caused by excessive distance between the light meter and the scene, barriers in front of the scene, or the size of the scene makes it impossible to get an accurate light meter reading. The substitution method is often used in studio situations where objects may be too small to obtain an accurate light meter reading. You should select substitution objects that match the light reflectance quality of the object in the scene. For example, a white card can be used to substitute highlight areas of a distant scene. A dark or a black card can be used to substitute a shadow area. An eighteen-percent gray card can be used to represent middle gray or skin tones. Even your hand can be used to substitute a gray tone.

When the substitution method is used, take the light meter reading from the substituted item under similar lighting conditions that exist in the scene. When the scene is in bright sunlight, the substituted object must also be in bright sunlight. Likewise, a scene in shade requires a substitute light meter reading in shade. You can use each of the methods discussed previously

with the substitution method. An eighteen-percent gray card can be used for the averaging methods; a dark and a light card can be used for the scene brightness range method, a dark card for the darkest object method, and a light card for the brightest object method.

Bracketing Method

There are times when unusual lighting or subject brightness prevents you from getting an accurate light meter reading. In these cases, a good insurance policy is to bracket your exposure. To bracket, you should take one picture at the exposure indicated by the light meter, and then take two more exposures: one or more at one f/stop under the indicated exposure and another (or more) at one f/stop over the indicated exposure. When you are in doubt about the correct exposure for a negative type of film, as we mentioned above, it is always better to overexpose than underexpose. Even though over- exposure produces excess densities in the negative, it still provides a useable image that can normally be corrected in the printing stage. When underexposed, if the image does not exist on the film, no corrective printing techniques can provide image detail. When shooting reversal film (slides), you should bracket in ½ f/stop intervals. Because the exposure latitude of slide film is limited to ± ½ f/stop, you should bracket in ½ f/stop increments, both under and over the indicated light meter exposure reading. Color slides that are ½ f/stop underexposed have more color saturation and are more usable than ones that are ½ f/stop overexposed and appear "washed out" and light.

When shooting digital, you should also consider it as if you are shooting slide and shoot in ½ bracketed f/stops. As we have mentioned before, when shooting digital, there is almost no latitude, however, it is better to be under exposed than over exposed.

Taking Light Meter Readings

When taking light meter readings, you must be sure the reflected light that influences your light meter is actually from the object you want to photograph. Stray light, backlighting, large dark

areas, and shadows can all cause erroneous light meter readings. When using a light meter, be sure that shadows are not cast from the light meter, camera, or yourself. When a hand-held light meter is used, the distance of the light meter to the subject should not exceed the shortest dimension of the object. For example, when taking a light meter reading of a person's face that is approximately 9x6 inches, you should hold your light meter under 6 inches from the face of your subject when taking the meter reading. When using a light meter that is built into a camera, be sure to focus on the image before taking a light meter reading.

Causes of False Light Meter Readings

There are a number of reasons why light meters give erroneous or bad readings that produce under exposed or over exposed images. You can prevent these bad readings by being aware of the conditions that cause them. We talked about the most obvious one earlier – dead battery.

Light Entering the Viewfinder

Light entering the viewfinder and falling on the viewing screen can cause underexposure. Most TTL meters read the light falling on the viewing screen from the lens. When strong lighting is coming from behind the camera, it can also influence the light meter. When an occasional underexposed frame in an otherwise successful series occurs, the cause may be light entering the SLR viewfinder. Make a point of shielding the viewfinder if you do not have a rubber eyecup. When you use a tripod, have the camera set on automatic and cap the viewfinder to prevent exposure errors.

Incorrect Film Speed Setting

When the majority of frames on a length of film are consistently underexposed or overexposed, the most likely cause is you have the wrong ASA/ISO set on the film speed dial. For black-and-white film and color reversal film, it may be possible to compensate for this in developing if detected before the film is processed.

Bright Subject

A bright object or highlight area can affect the sensing area of a spot or center-weighted TTL meter. This will result in an underexposed image. In order to prevent this from occurring, you should ensure the sensor is pointed directly at a mid-tone within the scene, and use this for the camera exposure. When you reframe and compose your image, the light meter may indicate a different setting than before. Be sure to leave your camera set at the indicated mid-tone setting. Normally, light meters that take averaged readings of the field of view cannot be fooled in this instance. However, remember, even averaged systems cannot cope with extremely bright areas that take up a significant portion of the frame.

Bright Background, Dark Subject

When you are taking photographs that are back-lighted or are against a light background, there is always the danger of underexposing the main subject (unless you use special techniques to fill in shadows, such as using a reflector or a flash unit). Be careful to take a reading from only the shadow side of the subject in these situations.

Too Little Light

The most frequent cause of underexposure is trying to take pictures when there is not enough light. Light meter readings are not very accurate at these low-light levels. When you want to make photographs under these conditions, be sure to use a tripod and bracket to provide more

exposure than indicated by the light meter. You also can switch to a higher ASA/IS0 film. Some of the high-speed films marketed today can provide remarkable results. Several other causes may result in your images to be exposed incorrectly. Some of the most common causes are listed as follows:

- Wrong camera settings are set when transferring information from a hand-held light meter to the camera. This can also occur when you attempt to override an automatic camera.
- Using a camera with TTL metering and placing a color filter with a high-filter factor over the lens
- Wrong aperture setting when flash is used.
- Shutter speed is not synchronized with camera flash.
- Aperture or shutter speed setting is knocked while carrying the camera. Always check the camera setting before taking a photograph.
- Weak or incorrect battery in the light meter