How to Use KODAK Gray Cards

To Determine Exposure

- The gray card is for use with reflection-light exposure meters. Exposure-meter readings of the gray card are reflection measurements of incident illumination on the card reflected to the meter. For accurate exposure measurements, make the meter readings from the camera position or from the same direction as the camera, and be sure the gray card is illuminated by the same light as the subject you are photographing.
- Position the gray card as described below so that there are no shadows on it, no brightly colored objects reflecting light on it, and no glaring (specular) reflections on the card itself.
- In artificial light, position the gray card in front of and as close to the subject as possible. Aim the surface of the gray card toward a point one third of the compound angle between your camera and the main light. For example, if the main light is located 30 degrees to the side and 45 degrees up from the camera-to-subject axis, aim the card 10 degrees to the side and 15 degrees up. See the diagrams below.
- In daylight, orient the gray card the same way as recommended for artificial light using the sun as the main light. In shade, under overcast skies, or in backlighted situations, use the brightest area in front of the subject, usually the sky, as the main light. In daylight, you can make the meter reading of the card located at the subject or at another position, such as near the camera, as long as the card receives the same illumination as the subject and is oriented correctly, the same way as you would orient the card at the subject position.
- Normally you should use the gray side of the card and the rated ISO speed (or EI—Exposure Index) of the film to determine exposure. (If the light is so dim that your meter will not respond to the gray side, divide the film speed by 5, reset your exposure-meter calculator dial to this value, and read the white side of the card. Or read the white side with your meter dial set normally, and then use a lens opening 2 ⅓ stops larger than indicated by the meter).
- To be sure you read only the card, hold your exposure meter about 6 inches (15 cm) away. Of course, if you are using a single-lens-reflex camera with a built-in meter or a spot meter, you can see exactly what you are reading. Be careful not to cast a shadow on the card.

  When you use the 4 x 5-inch (10 x 13 cm) card, it's especially important to be sure that the card fills the metering area of your camera or exposure meter completely.
- Meter readings of the gray card should be adjusted as follows:
  - For subjects of normal reflectance, increase the indicated exposure by ½ stop.
  - For light subjects, use the indicated exposure; for very light subjects, decrease exposure by ½ stop.
  - If the subject is dark to very dark, increase the indicated exposure by 1 to 1 ½ stops.

  Note that these are moderate exposure adjustments compared with the large errors that may result from making reflected-light exposure-meter readings directly from very light or very dark scenes.
- Bracket your exposures in situations where you are unsure of the best exposure. For example, you could take pictures at 1 stop over and 1/2 stop over the calculated exposure, at the calculated exposure, and at 1/2 stop under and 1 stop under the calculated exposure.

To Determine Lighting Ratios

- Lighting ratio expresses the relationship between the illumination from the main light plus the fill light and the illumination from the fill light alone.
- Generally, the lighting ratio should not exceed 3 to 1 for color or 5 to 1 for black-and-white when you want full detail in the photograph.
- You can use a KODAK Gray Card to determine the lighting ratio of a particular setup even if the lighting arrangement is complex. You can also adjust the lighting ratio, if necessary. To do this, follow these suggestions:
  - Position the card as close to your subject as possible.
  - To read main plus fill illumination, turn on all lights except those positioned so far to the side or back that they might illuminate the meter cell directly and produce a false high reading. Turn the card to the position that gives the maximum reading on your light-meter scale with no glaring reflections on the card. You will usually obtain the maximum reading with the card pointed toward the main light. Record the meter reading.
  - To read fill illumination, turn off the main light or lights, and turn the card so that it faces the camera lens. Record the meter reading.
  - With both readings recorded, you can determine the lighting ratio of the scene by using the following table. This will give you the ratio of the area that receives illumination from both lights to the area that receives only the fill light.

Stops Difference*	Lighting Ratio	Stops Difference*	Lighting Ratio
⅔	1.5:1	2⅔	6:1
1	2:1	3	8:1
1⅓	2.5:1	3⅓	10:1
1⅔	3:1	3⅔	13:1
2	4:1	4	16:1
2⅓	5:1	5	32:1

*Difference in meter reading between main light plus fill light and fill light alone.

To Determine Color Balance and Density

- **Color Balance.** Including a KODAK Gray Card in the scene will help you to evaluate color balance when you make color prints. You can position the card in a corner of the photograph where you can trim it off later, or you can just take an extra picture that includes the gray card. Make sure the illumination on the card is the same as that on the subject.

  You can use the gray-card image for evaluating color balance visually or with a densitometer or color analyzer. Photographing a full-frame negative or transparency of a properly oriented gray card will help the operator of an automatic printer determine the optimum color balance and density for the associated negative or transparency of the scene.
- By photographing the gray card, you are actually recording the color of the light illuminating the scene. Variations in the color of the light are largely responsible for differences in filtration in color printing.
- Most color films will not produce an absolutely neutral gray when the rest of the scene is properly balanced because of the flesh-to-neutral balance concerns. It may be necessary to print the gray card slightly off neutral to produce the print with the best appearance. The important thing to remember is that the gray card is a constant that you can use as a reference.
- **Density.** You can also use the image of the gray card as a neutral reference of mid-tone gray to evaluate density, either visually or with a densitometer, in black-and-white and color negatives, transparencies, and prints. Many Kodak publications provide aim-point densities for normal exposure for the KODAK Gray Card photographed on Kodak color negative films.

To Determine Exposure for Close-Up and Copying Work

- To make an exposure reading for copying, place the KODAK Gray Card in the same plane as the original you are copying. Set your camera's built-in exposure meter or handheld exposure meter at the normal film-speed rating, and compute the exposure directly from the meter reading of the gray card. Make the meter reading of the gray card from the camera position or direction, and stop down the lens opening 1/2 stop from that determined by the meter.
- If your subject is closer than eight times the focal length of the camera lens, you should allow for the decrease in effective lens opening due to lens extension—unless your camera makes the reading through the lens and compensates automatically. You can make the exposure correction by increasing the lens opening or increasing the exposure time with these equations:

  Effective f-number = f (M + 1) or

  Exposure Factor = $(M + 1)^2$

  $$M = \frac{\text{Image Size}}{\text{Subject Size}}$$ f = f-number indicated on lens opening scale

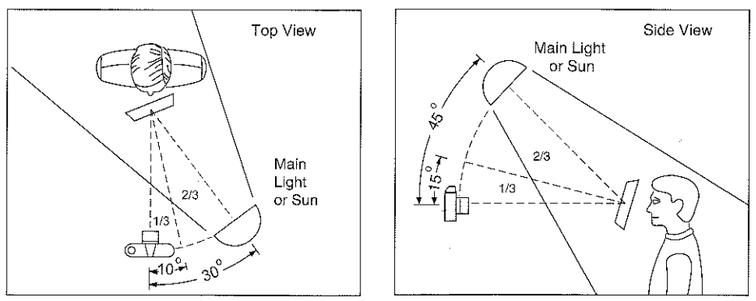
  To apply the exposure factor, multiply the calculated exposure time by the exposure factor.

To Set the White Balance for Video Cameras

- With many video cameras, you set the indoor/outdoor switch for the proper condition, and the camera automatically adjusts the white balance. However, if your camera requires an adjustment for fine-tuning color sensitivity, you can use the white side of the KODAK Gray Card to set the white balance.

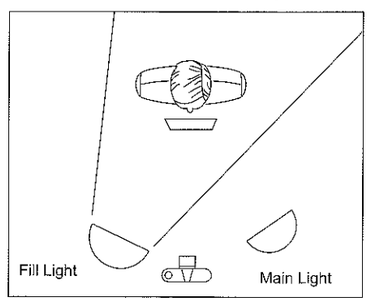
  First set the indoor-outdoor switch for the lighting conditions. Place the card near your subject. Aim your camera at the white side of the card, and then press the white-balance button. Usually a symbol appears in the viewfinder to confirm that the camera has adjusted itself properly.

Aiming the Gray Card in Artificial Light or Outdoors in Daylight



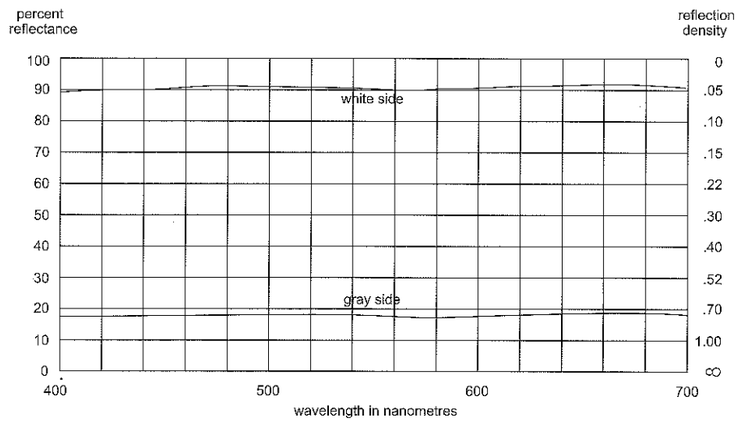
Aim card one third of angle between camera and main light or sun both horizontally and vertically. (The number of degrees shown here is for one example.)

Determining the Lighting Ratio



Fill light should be close to camera axis for typical lighting arrangement.

Spectral Reflectance



This graph shows the percent reflectance and the reflection density of a KODAK Gray Card in relation to light wavelength in nanometres.