MINOLTA

FLASH METER IV
USER GUIDE

The Minolta Flash Meter IV: unlimited creativity at your fingertips.

The Minolta Flash Meter IV is the most advanced exposure meter available today for measuring light from both flash and continuous light sources. It makes precise incident or reflected light readings of electronic or bulb flash, continuous illumination, or even combinations of them.

Using the combined advantages of a built-in microcomputer, memory function, analog scale and liquid-crystal display, the meter then determines all necessary exposure information.

The Flash Meter IV does more than merely measure light. Its analyze function enables separate metering and adjustment for ambient and flash exposures. These virtues make the Flash Meter IV invaluable in a variety of practical applications.

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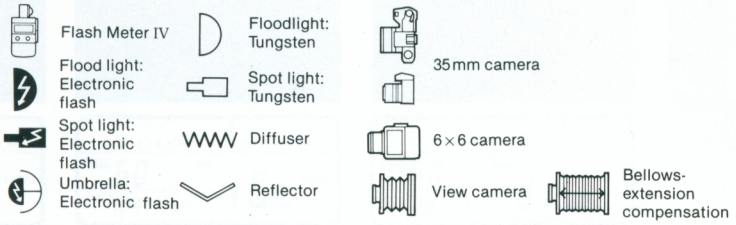


Incident and Reflected Light Metering

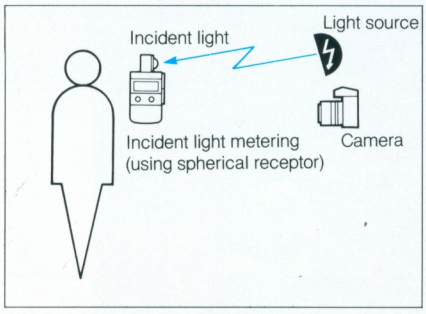
Whether working under continuous light sources such as sunlight or tungsten bulbs, or with instantaneous light sources such as electronic flash, photography is a process in which illumination from the light source strikes and is reflected off the subject, passes through the camera lens and forms an image on a light-sensitive surface. A mechanism for controlling the lens aperture and shutter speed, as well as flash output when using flash light, is required to make sure the right amount, of light reaches the film plane.

There are two basic ways of measuring this brightness: incident light metering systems which indicate the required exposure by measuring the amount of light (illumination) illuminating the subject, and reflected light metering systems which indicate exposure by measuring the amount of light reflected off the subject (luminance) and received by the camera (See Fig. 1).

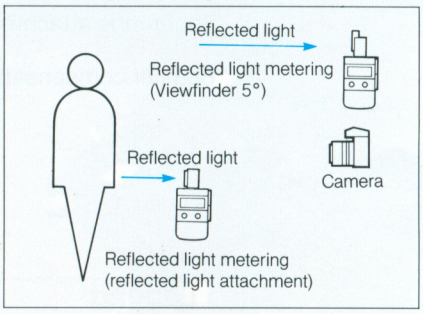
The Minolta Flash Meter IV permits incident light metering with spherical diffusers, mini receptors or flat diffusers, or reflected light metering with Viewfinder 5° or Viewfinder 10° II, a reflected light attachment (40° acceptance angle) or the Minolta Booster II. Selecting which metering system should be used cannot be reduced to simple guidelines based on specific photographic situations or whether the receptor is directed at the subject or the camera. Rather, the selection should be based on a thorough understanding of the differences between the merits of the two systems.

To demonstrate the differences between incident and reflected light metering systems, we photographed black, gray, and white wallpaper samples (respective reflection factors [i.e., the ratio of reflected light to incident light on the subject] of approx. 4%, 18% and 90%) shown on page 3 under the same light conditions and metered with the Flash Meter IV. The pictures in group A were exposed as indicated with incident light metering; those in group B were exposed as indicated with reflected light metering.

Fig. 1 Incident light metering



Reflected light metering



Incident light metering

In incident light metering, light illuminating the subject (illumination) is measured and exposure is calculated with the formula [illumination (light striking the subject) × standard reference subject* reflection factor (18%) + film sensitivity = exposure] so that a reference subject with an 18% reflection factor will be reproduced as a neutral density (gray) image.

Accordingly, incident light metering will indicate the same exposure level (f/16 in group A photographs) for all subjects, i.e. irrespective of the subject reflection factor, when photographing under the same light conditions, and therefore render the neutral gray sheet as gray, the high reflection factor white sheet as white, and the low reflection factor black sheet as black.

*Standard reference subjects may have a reflection factor anywhere between 12% and 26%. Minolta bases its readings on a reference subject with an 18% reflection factor.

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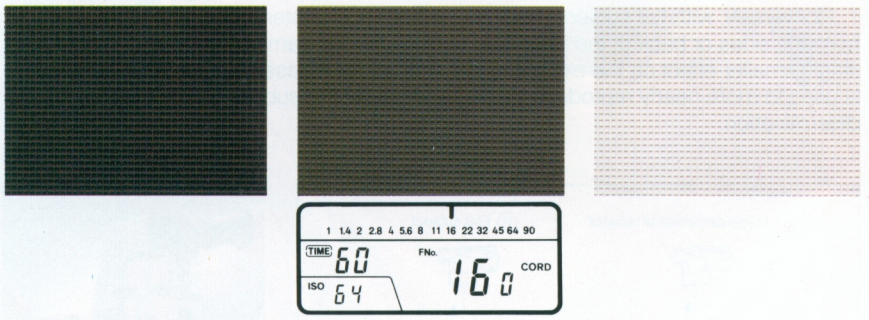
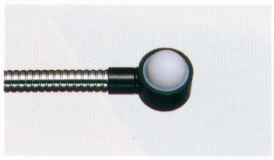


Spherical diffuser

Flat diffuser

Mini receptor



Reflected light metering

Reflected light metering measures the light reflected by the subject luminance and calculates the exposure so the specific subject luminance is rendered in neutral tones. The formula used in this calculation is: [subject luminance (illumination) × subject reflection factor + film sensitivity = exposure.]

Accordingly, reflected light meters will indicate different exposures (f/5.6$_7$, f/16$_0$, and f/32$_3$ for the black, gray, and white sheets, respectively; see group B) for subjects with different reflection factors when photographed under the same light conditions. The result is that black, gray and white subjects will all be rendered in the same neutral gray.

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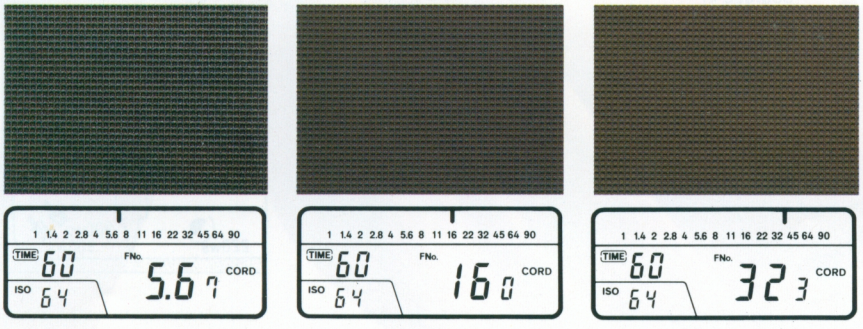


Reflected-light attachment

Viewfinder 5°

Booster II

Incident Light Metering: characteristics

The most outdoor scenes have a reflection factor close to 18%, the reflection factor of the reference subject on which most incident light meter readings are based. This makes the incident light meter quite effective for portraiture, and is the reason incident light meters are most frequently used for this and similar applications.

In addition, most photographic situations include objects with reflection factors both higher and lower than the 18% reference. As previously explained, incident light meters will reproduce these subjects in respectively lighter and darker tones. The incident light meter is therefore suited to situations requiring exposure averaged across the scene, as well as to shots of open scenery, everyday street scenes and most indoor photography.

Another reason why incident light meters are so frequently used is that the light receptor accepts and exposure calculations are based on the full range of light striking the subject. In most situations the surface of any three-dimensional subject is covered by both light and dark areas (shadows). What's more, some amount of light from all light sources, including the sides and back of the subject, is reflected towards the camera and has some effect on the picture. (See Fig. 2-a.) Spherical receptors are able to reproduce and measure the same illumination as that striking the subject for a more precise exposure determination.

Conversely, with flat subjects such as pictures and posters, less light originating from the sides or back of the subject is reflected to the camera, and has a correspondingly smaller effect on the exposure. (See Fig. 2-b.) In these situations, the flat diffuser is used to more nearly reproduce the illumination on the subject for exposure determination.

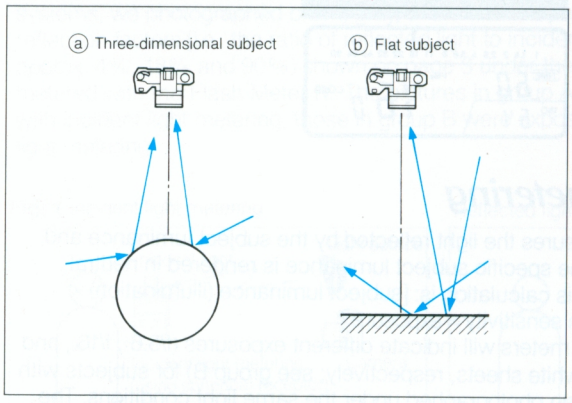
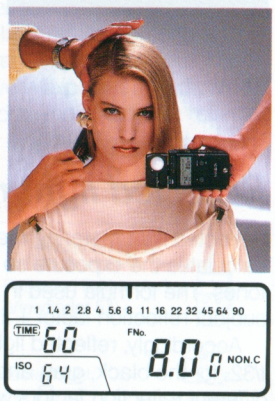
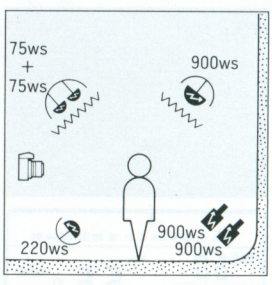


Fig. 2 Effect of illumination sources in photography of three-dimensional and flat subjects

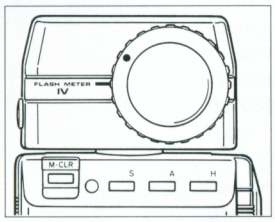


Exposure: f/8, 1/60 sec.

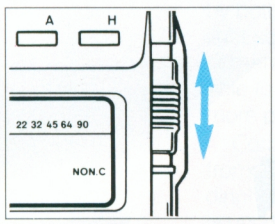


Incident light metering: Basic operation

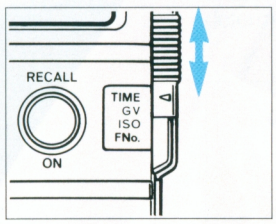
Minolta Flash Meter IV operation in the incident light meter mode is shown below.



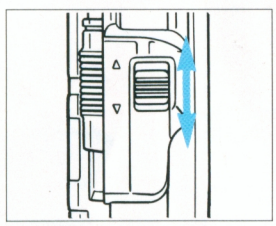
1 Attach the spherical diffuser or flat diffuser to the receptor, or use the mini receptor.



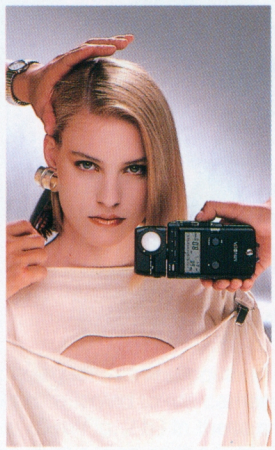
2 Set the mode selector to the desired meter type. (AMBI, CORD, NON. C.)



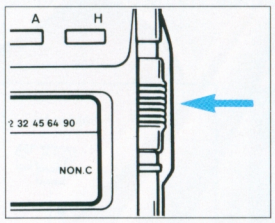
3 Set the function selector to TIME or FNo. TIME: shutter priority metering
FNo.: aperture-priority metering



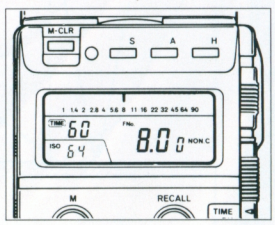
4 Use the decrease/ increase control to select either the shutter speed or aperture (f-number). (This should normally be set to the flash sync speed during flash photography.)



5 Hold the Flash Meter IV near the subject with the receptor pointing directly at the camera.



6 Press the measuring button to take a measurement.



7 Read the required exposure setting from the data panel.

- AMBI: measures ambient (continuous) light.
  CORD, NON.C: measures flash light or flash light and ambient light.
- Please read the Flash Meter IV instruction manual for details on operation.

In incident light metering, step 5 in the above procedure is the most important: the light source (illumination), subject, Flash Meter IV (receptor alignment), and camera (the optical axis of the lens) must all be properly coordinated. (See Fig. 1 on page 2.)

Following a few simple rules, like "point the receptor at the camera lens from the subject position" and "shield the receptor from extraneous light from backlighting and other sources," will more closely duplicate the actual lighting situation and enable the meter to produce a more accurate reading.

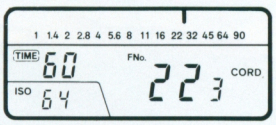
As stated before, incident light meters make exposure calculations based on the exposure required to reproduce a neutral density subject with a reflection factor of 18%. Special consideration is therefore required when metering and photographing subjects with a significantly higher of lower reflection factor than this 18% standard.

(A) Exposed at metered values.

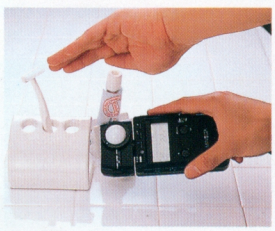
(B) Slightly "underexposed"

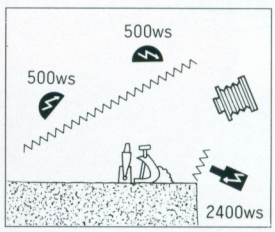
If the reflection factor is high: lighter subjects

For example, if the scene is of predominantly white, i.e. has a high reflection factor, and these white subjects are to be reproduced with maximum detail, better results will be obtained by underexposing the picture one-half to one stop from the exposure indicated by the incident light meter.



Exposure: (A) f/22, 1/60 sec.; 1/3 stop
(B) f/32, 1/60 sec; 1/3 stop

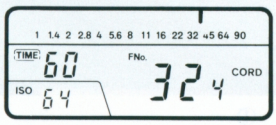




If the reflection factor is low: dark subjects

Similarly, if the scene is dark overall, i.e. has a low reflection factor, and the dark areas are to be emphasized, the exposure should be increased one-half to one stop from the exposure indicated by the incident light metering.

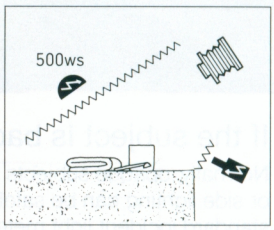
Note that the exposure compensation described here and above should not be used when photographing people and other subjects having an average reflection factor.

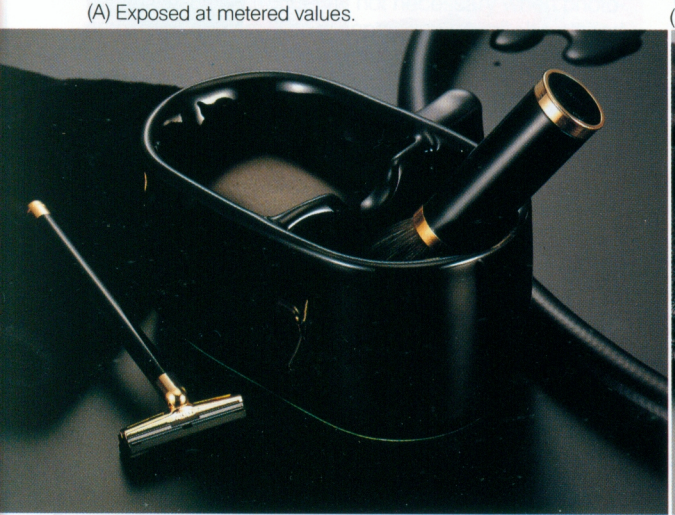


Exposure: (A) f/32, 1/60 sec.; 1/2 stop
(B) f/22, 1/60 sec.; 1/2 stop

(A) Exposed at metered values.

(B) Slightly "overexposed"



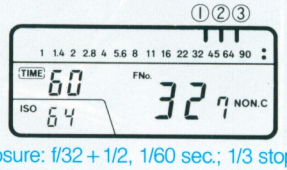


If the subject is backlit

Normally, opaque subjects illuminated by backlighting or side lighting can be safely metered by following standard incident light metering rules, but there are also times when the subject is translucent and/or illuminated by backlighting and the receptor must be directed at the light source itself in order to meter and determine the proper exposure.

In such situations light from all sources will have a direct effect on the exposure, and it is necessary to point the receptor in numerous directions in order to properly meter the overall light situation.

In such situations, a standard reading should be taken with incident light metering, and the receptor should be pointed both up, away from the light source, and directly at the source. The exposure must then be determined with respect to the composition, desired results and other lighting factors.



Exposure: f/32 + 1/2, 1/60 sec.; 1/3 stop

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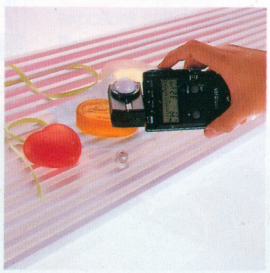

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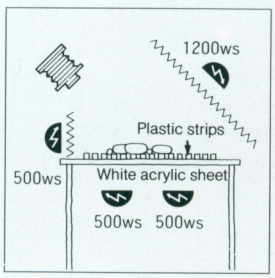
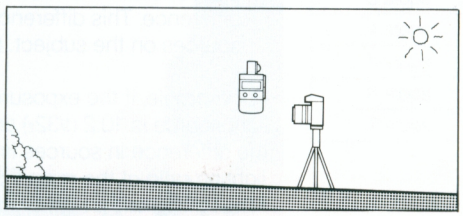
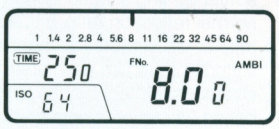


Open scenery

Although the light receptor is normally placed near the subject and directed at the camera lens, this is often not possible and frequently not necessary when photographing outdoors. The receptor can usually be placed near the camera with acceptable results. This is because a light source such as the sun will provide the same illumination at the camera as at the subject.





Exposure: f/8, 1/250 sec.

Determining the lighting ratio

The lighting ratio, or contrast, is the ratio between the highlight and shadow areas of a subject. In normal color photography, a lighting ratio of between 4:1 and 8:1, or two to three stops, will produce the most natural rendition of colors and contrast.

The lighting ratio can be used to control the overall lighting effect, including the relationship between the main subject and background or the effect of shadows on the main subject during portrait or product photography in a studio environment.

The Minolta Flash Meter IV can meter illumination of the subject from a number of individual light sources using a flat diffuser and store readings in the memory for easy comparison on the exposure index number (ExIN.) display and contrast scale to determine the lighting ratio.

To illustrate how the lighting ratio can be determined, refer to the photographs on the page at right. This shot was illuminated with two lights: the main light source and a fill light. The lighting ratio was determined as follows:

(1) Attach a flat diffuser to the light receptor.

(2) Set the film speed and metering mode as described in "Basic operation" on page 9.

• Make sure the function selector is set to TIME.

(3) Point the flat diffuser directly at the main light source from the subject position and store the reading in the memory.

(4) Now meter the fill light in the same way and store the reading.

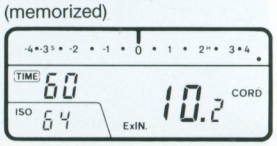
• The flat diffuser should be shielded that no illumination from the main light source directly strikes the flat diffuser.

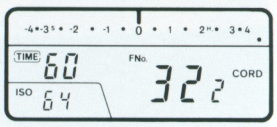
(5) The difference between these two readings can be read from the contrast scale (or the f-number scale). Stored values can also be recalled to obtain the difference. This difference is the ratio of the two light sources on the subject. (See Table 1 and Fig. 3.)

For example, if the exposure index number for the main light source is 10.2 (f/32$\sqrt{2}$) and that of the fill light is f/22, the difference in sources is 10.2 − 9.2 = 1.0 stop, or a lighting ratio of the main light to the fill light of 2:1.

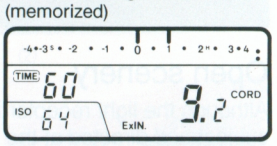
*The lighting ratio is normally determined in order to check the actual lighting situation when photographing subjects with a normal reflection ratio. Extreme differences in the reflection ratio of the subjects composing the picture may exceed the latitude of the film even after the lighting is adjusted. In such situations the techniques used for determining exposure based on subject contrast as described on page 22 under reflected light metering should be used.

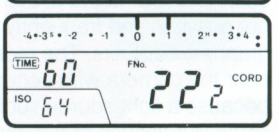
Meter the main light (memorized)

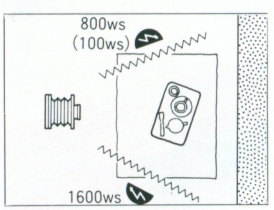




Meter the fill light (memorized)







(A) Lighting ratio: 8:1
Exposure: (A) f/22 + 2/3, 1/60 sec.; 1/2 stop

These two exposures were made with different lighting ratios to demonstrate the effect of differing ratios on the final exposure. The top photograph had a lighting ratio of 8:1 which was adjusted to the 2:1 ratio of the lower photograph by filling in shadows.

Fig. 3 Lighting ratio

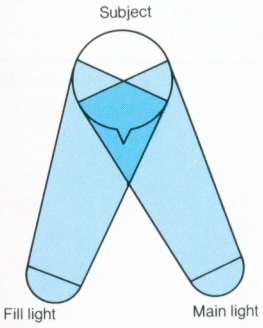


Table 1

Difference in metered exposure (Ex IN.)	Lighting ratio
1 stop	2:1
2 stops	4:1
3 stops	8:1
4 stops	16:1
5 stops	32:1
6 stops	64:1
7 stops	128:1

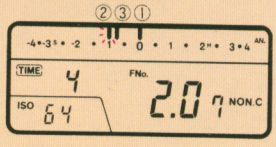
(B) Lighting ratio: 2:1
Exposure: (A) f/22 + 2/3, 1/60 sec.; 1/2 stop

Flash Meter IV analyze function

In actual flash photography the total light used for the exposure contains some degree of ambient light—unless you're working in total darkness. This means conventional flash meters (e.g. the Minolta Flash Meter III) express the required exposure as the sum of both constant and flash illumination striking the receptor within the period the shutter is open. Accordingly, the photographer does not know the amount of illumination provided by only the flash or ambient light, and the meter seems to indicate a constant exposure even if the shutter speed was changed after light metering was completed.

The Flash Meter IV employs separate metering and adjustment for ambient and flash exposures. It then stores these values to calculate the exposure setting. Accordingly, the ratio between flash and ambient light can be read from an analog scale on the Flash Meter IV and used to retain the effects of ambient light (whether natural light or modeling lights) or to emphasize shadows. Furthermore, this ratio can be controlled by changing the shutter speed to vary the amount of the ambient light or the guide value can be adjusted to vary the amount of flash light after metering is completed.

When metering the scene shown in the photographs at right with the Flash Meter IV, set the normal/analyze switch at ANALYZE to meter the flash light; the three pointers appear on the analog scale and the exposure required for the overall light level is shown on the digital display. The pointers in photograph B indicate:

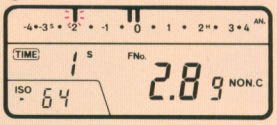


(1) Total exposure value of the ambient light and electronic flash light (the pointer at 0 on the contrast scale)
(2) Proportion of the flash light (blinking pointer)
(3) Proportion of ambient light

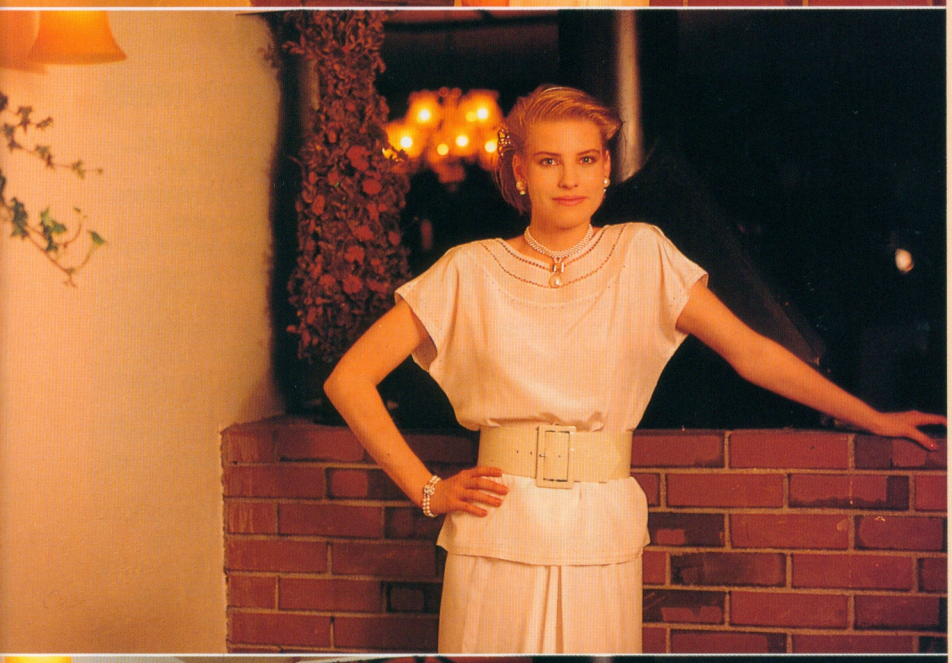
The difference between flash and ambient light levels can be determined with pointers (2) and (3). The difference here is approximately 1/4 stop, indicating nearly equal portions of flash and ambient light in the exposure (see photograph B at right). In photograph A, the shutter speed was lowered to increase the tungsten (ambient) light component. As shown on the contrast scale, the ratio of flash to tungsten light is clear: the flash light to total light ratio is indicated at 2 stops while tungsten light is indicated at 1/4 stops.

In photograph C the situation was reversed: the flash units power level was increased to increase the amount of flash light in the exposure. The tungsten light to total light ratio is −2.5 stops, making the flash the main light source. (While the same ratio can be obtained by increasing the shutter speed, the total light level will also change, and the display will indicate a larger aperture is required.)

Ⓐ



(A) Exposure: f/4, 1 sec.



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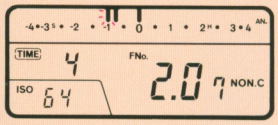
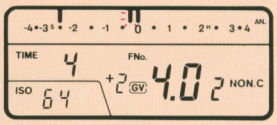


(B) Exposure: f/2 + 3/4, 1/4 sec.

Ⓒ



(C) Exposure: f/4 + 1/4, 1/4 sec.

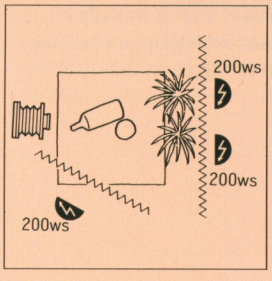
Aperture-priority flash metering

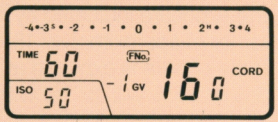
The Flash Meter IV permits aperture-priority flash metering in addition to ambient light metering of daylight and tungsten light.
Since ambient light exposures are controlled by the aperture, which controls the amount of light striking the film, and shutter speed, which controls the length of time this light strikes the film, one must determine the aperture for shutter-priority metering and, conversely, the shutter speed for aperture-priority metering.

However, the flash unit's duration is very short, and with most cameras, it is not possible to control the amount of time light from the flash strikes the film plane. Accordingly, the aperture is normally adjusted to control the amount of light reaching the film. (On automatic flashes the flash duration is controlled.) In conventional metering systems (the Minolta Flash Meter III), the shutter speed was set (within the camera's X-sync range) and the aperture was calculated for the amount of flash and ambient light which would strike the receptor at this shutter speed.

Since the Flash Meter IV employs separate metering and adjustment for ambient and flash exposure which can indicate the amount of flash light, the scene can be metered with the required X-sync shutter speed and desired aperture, and the meter will indicate how much additional flash light (expressed as a "guide value" [GV]) is required for the exposure. This figure is based on a constant (unvarying) ambient light level, and indicates how many stops the power level must be increased or decreased to provide a proper exposure at the specified aperture.

For example, less depth of field was desired in the photograph at right. Accordingly, the aperture was set to f/16, and the meter indicated −1 GV, indicating that flash illumination must be reduced one stop, i.e. power should be reduced to 1/2 the current level. Similarly, if +1 GV is indicated, the power level should be increased one stop.





Exposure: f/16, 1/60 sec.; + 1/3 stop for bellows extension

Exposure meters and film sensitivity

It is important to know the characteristics of the film when thinking about exposure. When the film is developed, the amount of light (exposure)* on the film appears as the density of images on the film. The line graph illustrating the relationship between exposure and density is the film characteristic curve. The characteristic curve indicates film sensitivity, which is required when determining exposure, film latitude and other factors important to a obtaining correct exposure.

*Exposure = illuminance × time

Fig. A shows the typical characteristic curves for color reversal and color negative films. As would be expected, these curves indicate opposite tendencies for each of the three primary colors, red: green, and blue. We will refer to the composite curve of Fig. B to simplify the discussion here.

The X-axis indicates the logarithm of the exposure, and the Y-axis is the transmission density of the film. Color reversal film becomes increasingly transparent as the exposure increases, and becomes increasingly opaque as the exposure decreases, producing an inverted S-curve descending to the right. The curve indicates that exposure and density are not proportional at the two extremes (the top and bottom of the curve) but are proportional through the straight line in between. This straight line indicates that part of the film which most accurately reproduces variations in light intensity on the subject.

This range is referred to as the film's exposure latitude, most commonly a difference of about five stops between maximum and minimum exposures with color reversal film. (The area between S and H on the Flash Meter IV contrast scale is the exposure latitude of the film.) At about the center of this range is reference exposure Hm, which is used to calculate film sensitivity; the intersection at which reference Hm produces midtone density Dm is film sensitivity M.

With incident light metering, the required exposure is obtained by measuring illumination on the subject. Exposure calculations in this system are designed to reproduce an 18% gray subject exposed at the indicated aperture and shutter speed in neutral tones, i.e. at mean density Dm.

In reflected-light metering systems, the light reflected by the subject is measured to determine subject luminance, and exposure is adjusted so this is equivalent to reference exposure Hm. In other words, all subjects, no matter what their reflection factor, will be reproduced as a mean density Dm image. In actual photography, the highest reflection factor encountered for white objects is about 85% to 90%, and the lowest reflection factor is that of black objects, about 2.5% to 3%.

In terms of exposure differences, this range breaks down into about five stops of approximately 3%, 6%, 12%, 24%, 48%, and 96%, placing the 18% gray subject roughly the middle. Accordingly, the exposure indicated by an incident light meter and the exposure indicated by a reflected light meter using a subject with a reflection factor of approximately 18% will be nearly equal under equivalent lighting conditions. If the picture is exposed at the metered levels, subjects with a reflection factor of from 3% to 95% will still be within the latitude of the film.

Fig. A Color film characteristic curve

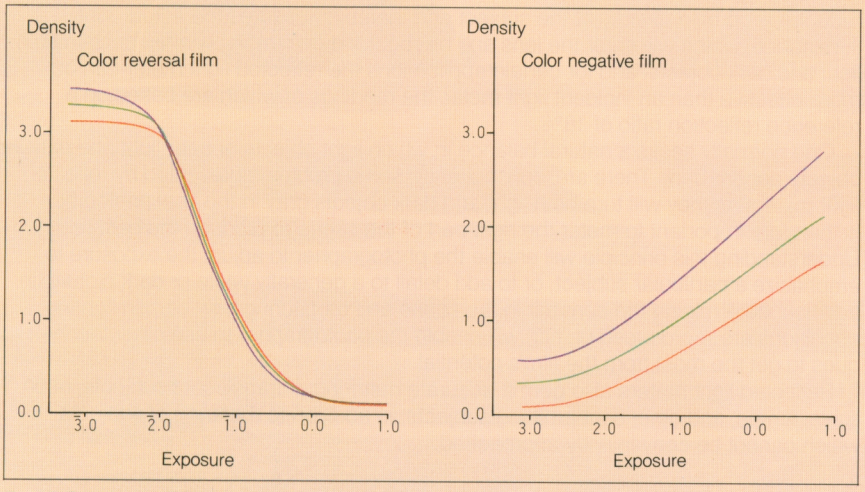
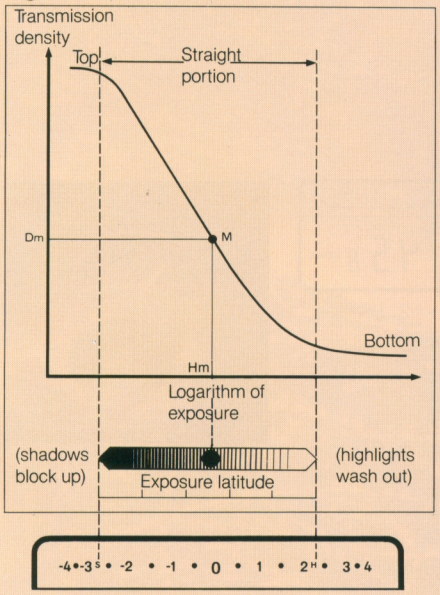
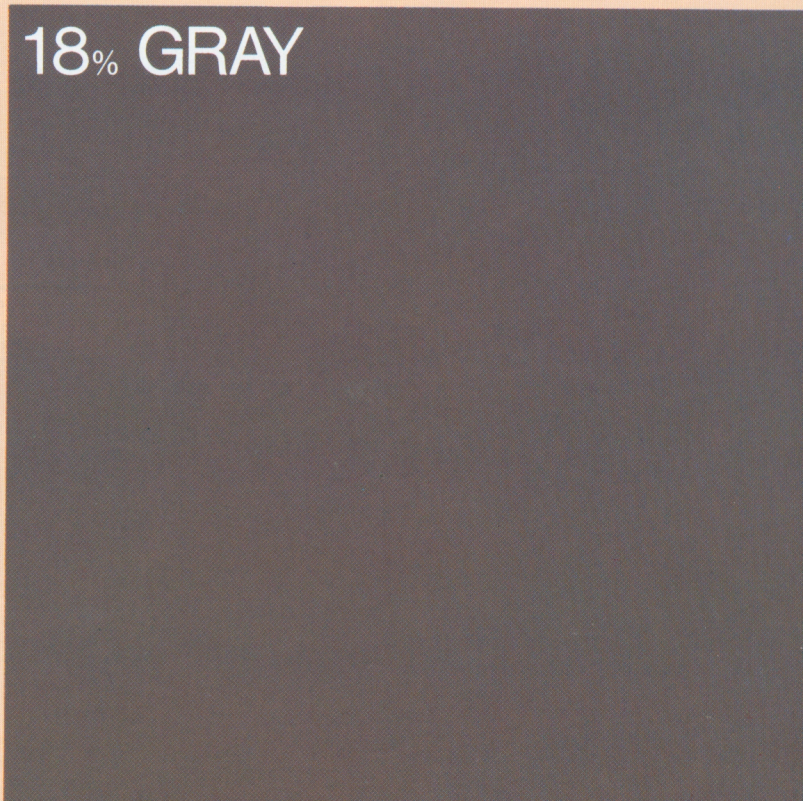


Fig. B Composite film characteristic curve



This example approximates an area with 18% reflectance.

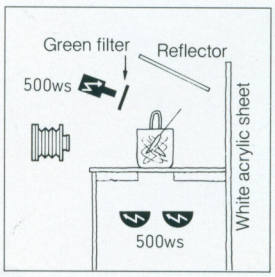


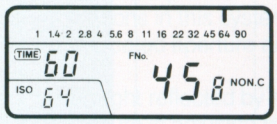
Reflected Light Metering: characteristics

Reflected light metering systems measure the light reflected by the subject. The receptor is pointed directly at the subject and thereby measures the actual light (luminance) which will enter the lens and be recorded on film. All scenes contain both light and dark objects, and for certain applications the reflected light meter can be more effective than an incident light meter, the readings of which are based on a reference reflection ratio of 18%.

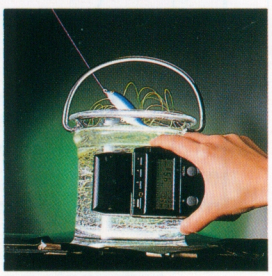
One normally seeks a natural balance in which light objects appear light and dark objects appear dark. There are, consequently, some problems presented by reflected light meters as they will turn both light and dark objects gray in the final photograph. It is therefore important to meter the right part of the scene to produce the best results. Understanding this principle will enable the photographer to adjust the exposure to emphasize a particular subject, or to add detail to a generally white or dark picture. In addition, determining the contrast in the scene and monitoring how certain lighting conditions are reproduced on film will enable the photographer to use other techniques to get the most from the film's potential.

Reflected light meters also permit accurate metering of translucent subjects, neon lights, lamps, and other light-emitting subjects, in addition to metering of subjects which cannot be conveniently approached.



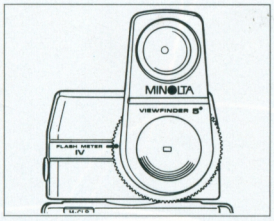


Exposure: f/45 + 1/2, 1/60 sec.; 1/3 aperture

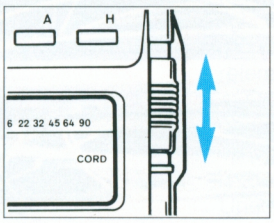


Reflected light metering: Basic operation

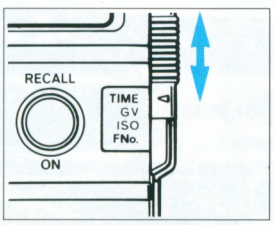
Minolta Flash Meter IV operation in the reflected light meter mode is shown below.



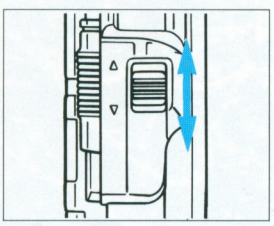
1 Attach the Viewfinder 5°, the Viewfinder 10° II or reflected light meter attachment to the receptor, or use the booster.



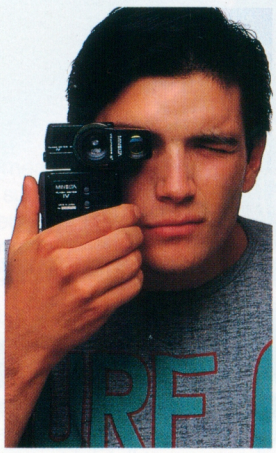
2 Set the measuring mode selector to the desired meter type. (AMBI, CORD, NON.C.)



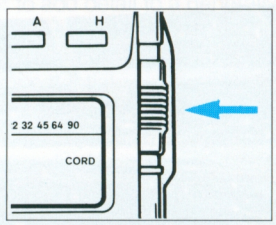
3 Set the function selector to TIME or FNo. TIME: shutter-priority metering FNo.: aperture-priority metering



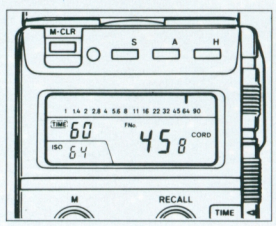
4 Use the decrease/increase control to select either the shutter speed or aperture (f-number). (This should normally be set to the flash sync speed during flash photography.)



5 Point the receptor directly at the subject.



6 Press the measuring button to take a measurement.



7 Read the required exposure setting from the data panel.

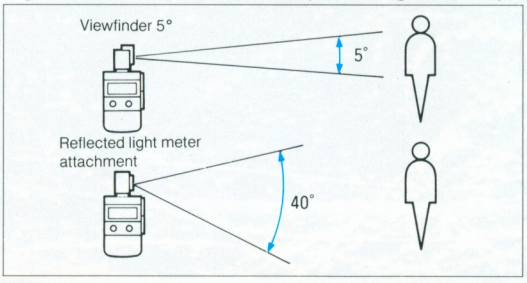
• For further details, refer to the instruction manual.

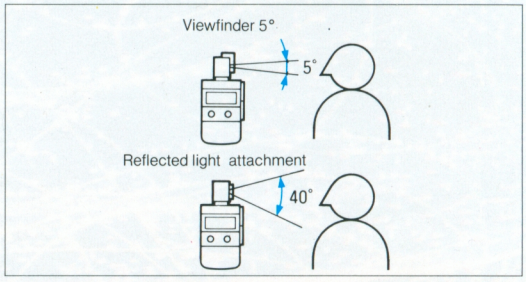
The biggest difference between metering with a reflected light meter and an incident light meter is in step 5: in reflected light metering the receptor must always be directed at the subject from the direction at which the camera will be located.

There are two major techniques used in reflected light metering: (1) averaging*, in which the entire subject is metered from the camera position, and (2) spot metering, in which a narrow acceptance angle is used to meter a specific part of the subject. (See Fig. 4.)

*Care must be taken so that shadows from the meter or photographer do not cover the subject.

Fig. 4 Relationship between acceptance angle and subject





Average metering

In average metering, the receptor acceptance angle (40° on the reflected light attachment, 10° on the Viewfinder 10° II, 5° on the Viewfinder 5°) permits metering of light reflected off the subject, thereby producing an averaged reading and exposure.

If the reflection factor of the overall scene is approximately 18%, the exposure will be equivalent to an incident light metered exposure of the same scene. See photographs A and B.

Although this technique produces a quick, easy reading, the exposure will be unbalanced if large parts of the scene are extremely light, dark, or backlit. See photographs C and D.

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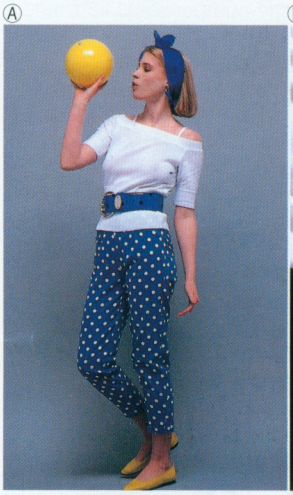

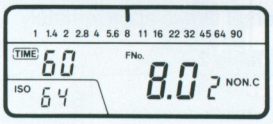

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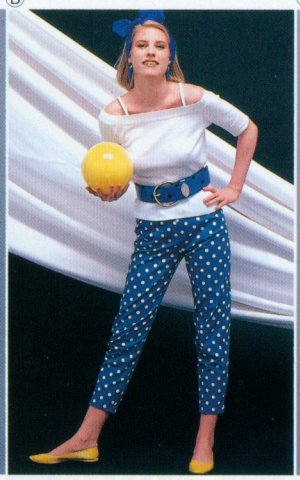

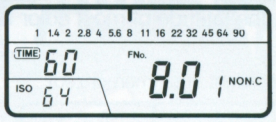

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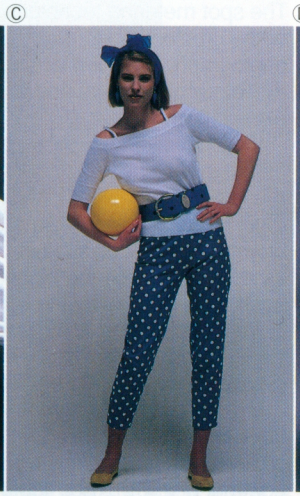

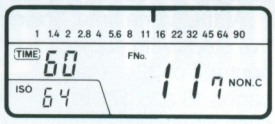

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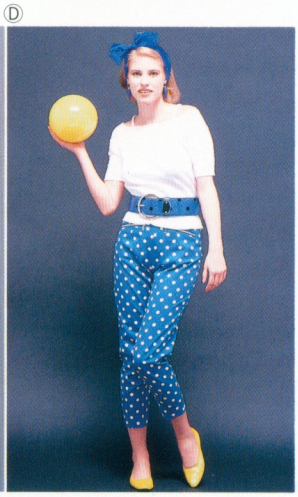
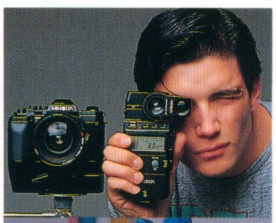
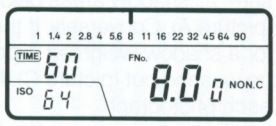


Spot metering

A narrowed acceptance angle is used for spot metering, thus permitting metering of a closely defined part of the subject. This narrow angle prevents interference from surrounding lights and reproduces the metered area as a midtone density. If the metered area has a reflection factor of about 18%, an averaged exposure similar to that produced by an incident light meter will result. See photographs E and F.

With the Flash Meter IV, the photographer can meter either light (whites) or dark (blacks) areas, and press the highlight (H) or shadow (S) key to retain maximum detail in that part of the subject while maintaining a natural balance on the overall exposure. Accordingly, best results are obtained with spot metering by first determining the overall composition before metering.





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Subject contrast and exposure determination

The spot metering technique described on the previous page compensates for many of the problems inherent in reflected light metering and can be used to produce photographs exposed for specific objectives. To really optimize the possibilities of reflected light meters and to get the most from the film, the following technique should also be mastered.

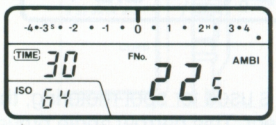
This technique involves spot metering of both highlights and shadows, and then determining the exposure from these metered exposures and the exposure latitude of the film. In other words, knowing the brightness, i.e. luminance, of the subject is the most effective way to reproduce these images on film. This range of subject brightness is called subject contrast* (or subject brightness range) and is expressed as a ratio between the highest and lowest luminances on the subject. Subject contrast is defined by the lighting ratio and the subject reflection factor.

The Flash Meter IV includes both a memory function and analog scale for easy, visual confirmation of subject contrast. It is also equipped with highlight (H), shadow (S) and averaging (A) keys which let the photographer determine the exposure by monitoring subject brightness before shutter release.

For example, the difference between highlights (the wall of the outside building) and shadows (the car radiator grill inside) in the pictures at right is eight stops, or a subject contrast of 256:1. (See Table 2.)

At the same time, however, the latitude of most color reversal film is approximately five stops with subject contrast of 32:1 (see pages 16 and 17). In such situations where contrast exceeds film latitude, exposing the scene with an averaged [(A) key] exposure will produce washed-out highlights and dark shadows (picture B).

Highlight area (memorized)



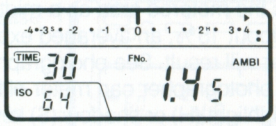
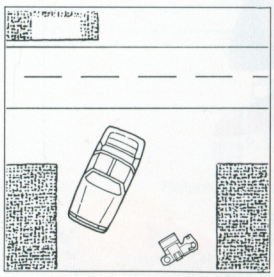


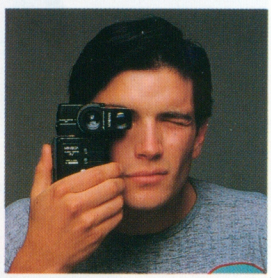
Table 2

Difference in metered exposure (Ex IN.)	Subject contrast
1 stop	2:1
2 stops	4:1
3 stops	8:1
4 stops	16:1
5 stops	32:1
6 stops	64:1
7 stops	128:1
8 stops	256:1

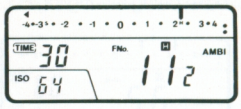
If the situation allows the highlights to be emphasized and the shadows dismissed, press the H (highlight) key to meter for a highlight-weighted exposure; all shadow areas below the S mark on the contrast scale will be completely black (picture A). Conversely, if the shadows are to be emphasized, press the S (shadow) key for a shadow-weighted exposure; all highlights above the H on the contrast scale will be washed out (picture C). Refer to the scales and exposures indicated to the right of each photograph.

*It is important to selectively meter the brightest and darkest points essential to the composition, not simply measure any two indiscriminate points of maximum contrast. It is also important to consider the differences in brightness related to color hues.



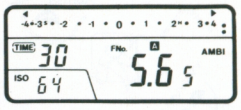


(A) Highlight-weighted exposure



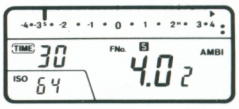
Exposure: f/11 + 1/4, 1/30 sec.

(B) Averaged exposure



Exposure: f/5.6 + 1/2, 1/30 sec.

(C) Shadow-weighted exposure



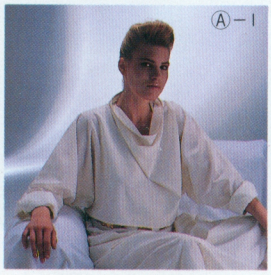
Exposure: f/4 + 1/4, 1/30 sec.

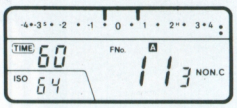
The photographer can judge the subject's brightness level and decide where in the film's latitude the tones should be reproduced.

In the scene shown in photograph A-3, the subject contrast is 1.5 stops, a 3:1 ratio. The darkest tones were the shadows in the face, and the lightest tones in the white clothes. When the photo was exposed using an average meter reading, the white clothes became a light gray and the face was a slightly darker gray, as shown in A-1. When exposed using a shadow-weighted reading, the face was reproduced very darkly, as shown in A-2. Since the most important areas in the scene are white or very light tones, it is clear that a highlight-weighted reading should be used to give added detail to the face without loss of detail in the white dress, as shown in photo A-3.

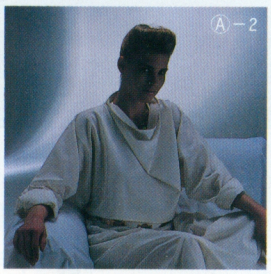
In photograph B, the subject contrast was approx. 4 stops, 16:1. The scene was exposed with a shadow-weighted reading to retain tonal detail of the clothes. By metering the face, it was determined that it would appear lighter in the final results.

The Flash Meter IV will fix the exposure value on the digital display derived from an incident or reflected light measurement. After taking a measurement, additional areas can be measured to determine the tonal relationship between different parts of the picture. These measurements can be compared on the contrast scale. For example, if the face in photo A-3 is to be a midtone density, meter the face and press the A key was pressed to lock the reading on the display. Then the clothing and highlights can be metered and compared with this reference point to determine how brightly they will reproduce in relation to the face.

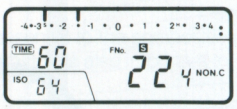




Exposure: f/11 + 1/4, 1/60 sec.

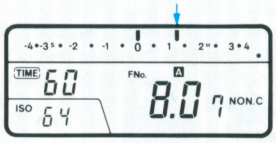


A-2 Shadow-weighted exposure



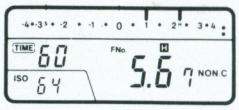
Exposure: f/22 + 1/2, 1/60 sec.

Meter the face, monitor the clothes.

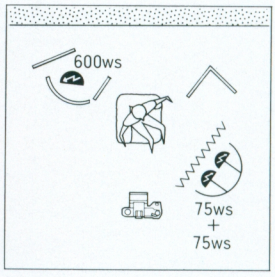


(This example shows that the photograph will be slightly underexposed compared to photograph A-3)

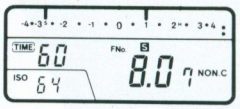
A-3 Highlight-weighted exposure



Exposure: f/5.6 + 3/4, 1/60 sec.



B Shadow-weighted exposure



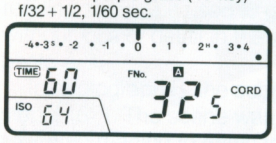
Exposure: f/8 + 3/4, 1/60 sec.

Monitoring subject contrast with reflected light metering as described on the preceding page is a particularly effective means of adjusting lighting to control reflections, to depict of translucent objects and to accurately place of highlights and shadows. Consider the scene on the page at right.

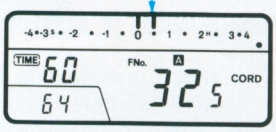
To emphasize the tones of the purple glass illuminated by light from below, the scene was metered with reflected light metering and the reading locked with the A key. The blue glass on the transparency beneath the purple glass and the bright white were then monitored.

These readings showed that when the exposure is weighted for the purple glass (which then becomes the 0 reference), the white areas will appear as highlights on the printed film and the blue glass will be reproduced at approximately the same density as the 0 reference for the purple glass.

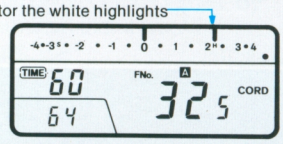
• Meter the purple glass ("A" key) f/32 + 1/2, 1/60 sec.

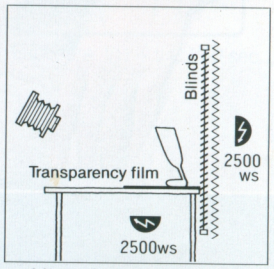


• Monitor the blue glass



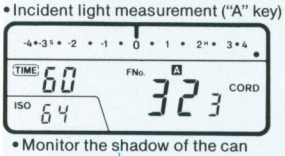
• Monitor the white highlights



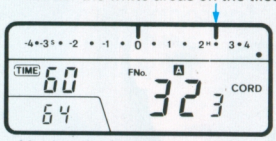


Another application is demonstrated by the photograph below. Here the exposure was determined with incident light metering, then the digital display was locked by pressing the "A" key. The tiles and shadow of the can were then monitored with reflected light metering to confirm that colors would appear in the shadow with the remaining tiles being a bright white.

• Incident light measurement ("A" key)

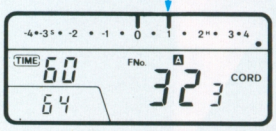


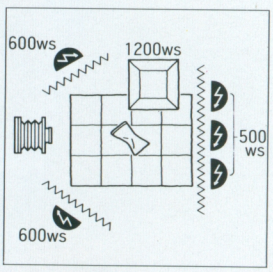
• Monitor the white areas on the tiles



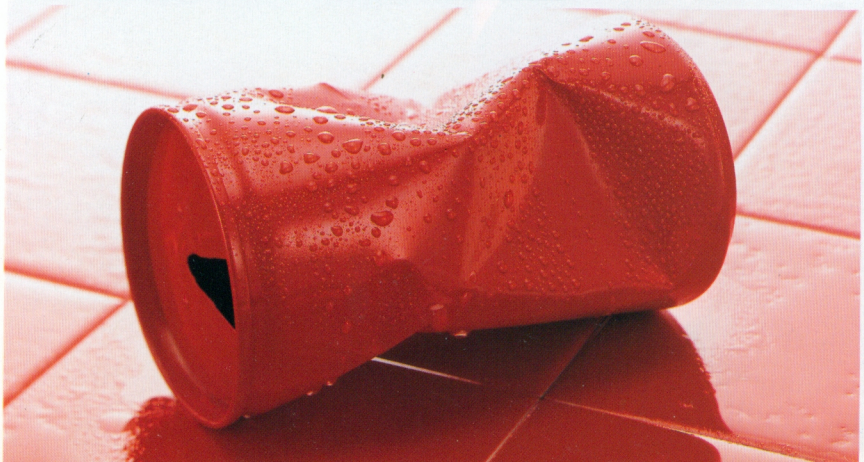
• Monitor the shadow of the can

• Monitor the front tiles





Exposure: f/22 + 2/3, 1/60 sec.

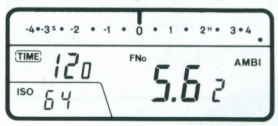


Contrast control

When the subject contrast exceeds the latitude of the film, shadows or highlights are often sacrificed the composition (see page 23). Both in the studio and out, lighting can be controlled to adjust subject contrast without losing any detail in the picture. In the scene at right, the outside is brighter than the inside (the contrast is high), and the subject contrast exceeds the film latitude.

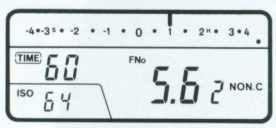
If the exposure is adjusted for the outside, the model and car will be too dark as shown in photo C at the bottom right. Similarly, if the exposure is adjusted to the inside, the outside will be grossly overexposed (photo B, bottom left). In such situations, daylight synchronized flash* will add light and decrease the contrast, producing photograph A. In short, additional lighting (flash light in this case) lowers the subject contrast to within the film latitude.

Metered outside (memorized)



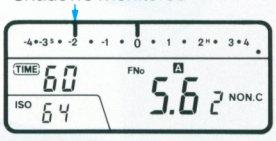
Metered indoors, on face

Metered indoors, on face with synchronized flash

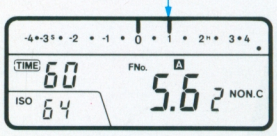


In the photograph (A) the natural (ambient) light outside is metered, the flash is then synchronized to fill the shadows inside and lower the contrast to approximately 2:1 so that the background is slightly overexposed. Shadows (on the radiator grill), the model's face and highlights (on the wall) were then monitored with reflected light metering.

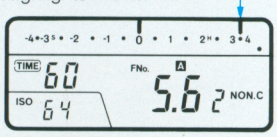
Shadows monitored



Face monitored

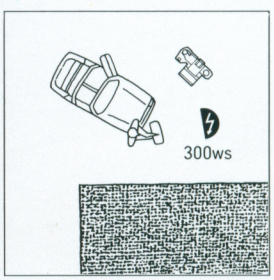


Highlights monitored



*Daylight flash sync is a process is which sunlight (ambient light) and flash light are both used in the exposure. The analyze and memory functions of the Flash Meter IV are very effective when photographing scenes using both daylight and flash light.

(A) Exposure: f/5.6, 1/60 sec.



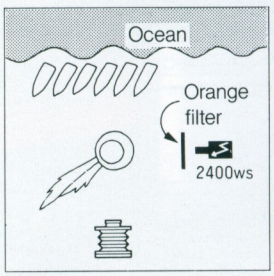
(B) Exposure: f/4, 1/4 sec.

(C) Exposure: f/5.6, 1/125 sec.

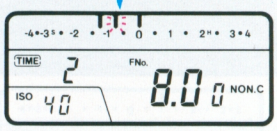
Creative exposure measurement:
mixing ambient and flash lighting

Mixing ambient light with a flash and an orange filter can effectively create a twilight atmosphere on cloudy days. In the photograph right, exposure was balanced for the background.

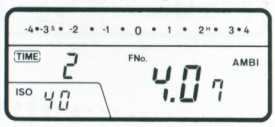
The hat was then measured and a strong flash added to enhance contrast and accents, turning an otherwise non-descript, cloudy sky into a bright evening sky with sunlight slanting down through the clouds.



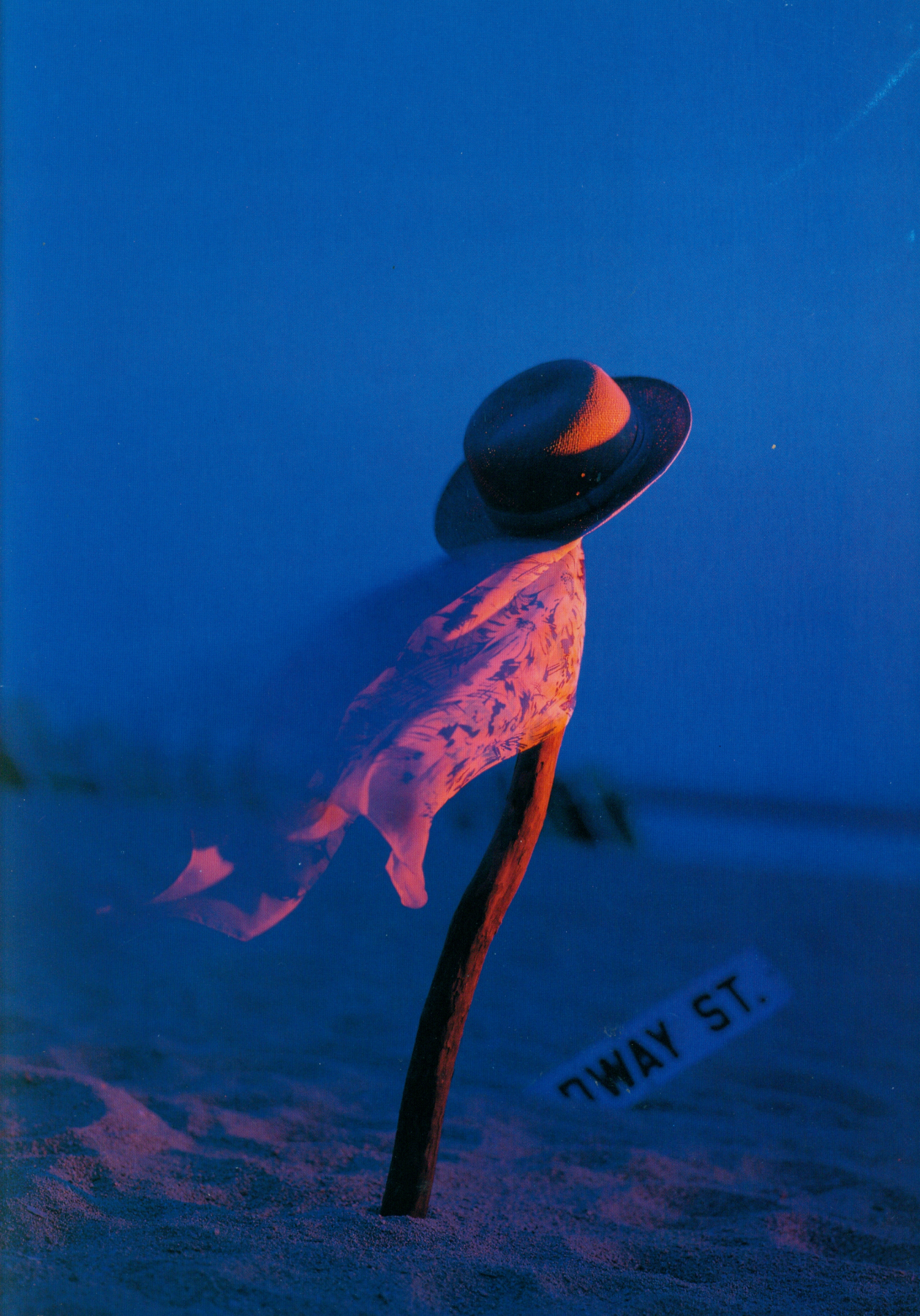
• Flash exposure was meterd.

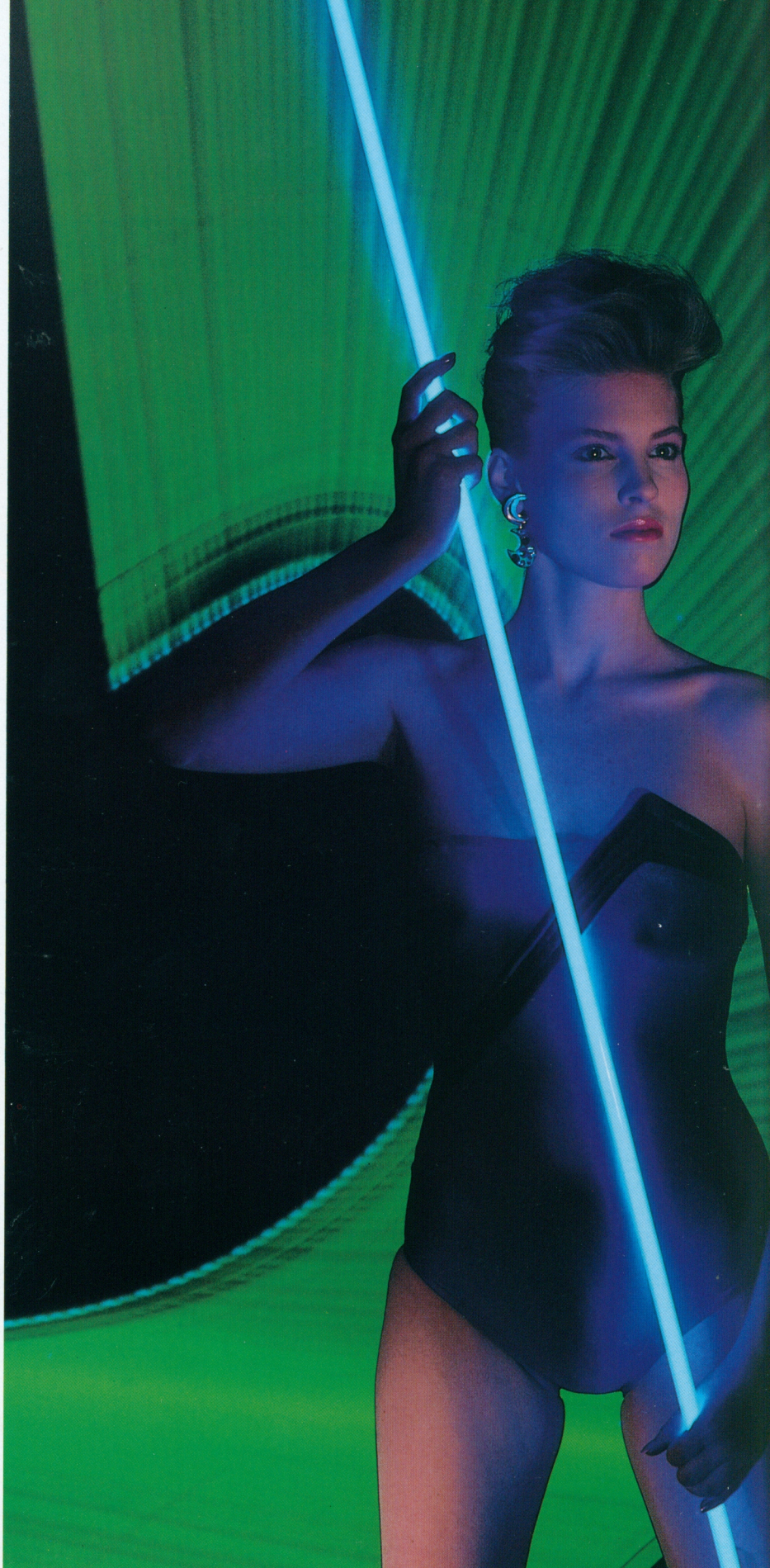


• Measure ambient light



EXposure: f/5.6 + 1/2, 1/2 sec.

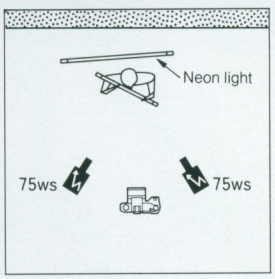

7WAY ST.



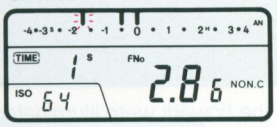
Mixed lighting control: neon and flash lighting

Flash light was added to the model holding a blue neon tube and the green neon light in the background was moved throughout the one-second exposure to create a flickering effect.

The model's face and legs, illuminated by both the blue neon light and flash, were metered. The analyze function was then used to determine the ratio between ambient and flash light on the face and legs to adjust the lighting. Flash intensity was decreased to emphasize the blue light from the neon tube.



On face



On legs

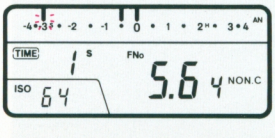
Exposure: f/2.8 + 1/2, 1 sec.

Mixed lighting control: TV screen

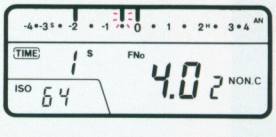
The model's body and the flowers were illuminated with a spot flash, letting light from the television screen illuminate the face.
Using the analyze function, a measurement of the model's face indicated additional lighting was needed on the body and flowers; the spot flash was positioned to help accent the face.

The Flash Meter IV handles such assignments easily. Conventional metering techniques have a hard time determining the effect that subtle changes in lighting will have on exposure coming from sources such as a TV screen.

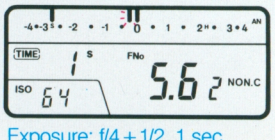
Reading on face



Reading near waist

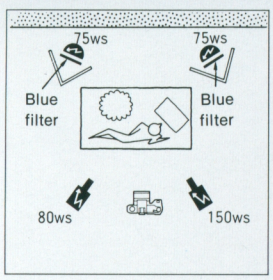


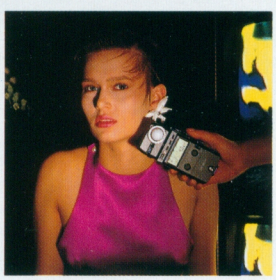
Reading on flowers



Exposure: f/4 + 1/2, 1 sec.

and flash lighting

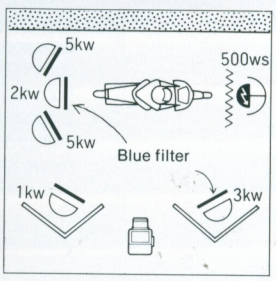


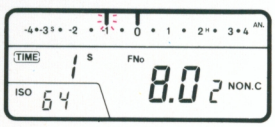


Mixed lighting control: Tungsten and flash lighting

A sense of dynamic action was captured by moving the camera during a one-second exposure under mixed lighting consisting of a blue filter over a tungsten light and normal flash. While the blurs are accented highlights illuminated only by the tungsten, flash light was added when the camera was stopped.

The analyze function was used to determine the illumination and color reproduction of the motorcycle while the camera was still. The bike was almost completely exposed with a 1/30 sec. exposure following shutter release and prior to camera movement. With an f/5.6 aperture, the tungsten light had virtually no effect on colors.





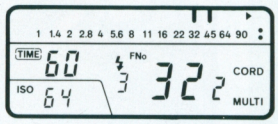
Exposure: f/5.6, 1 sec.

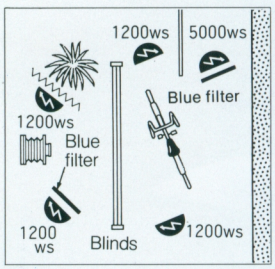
Cumulative exposure metering

The first exposure captured the blues of the blinds. The second exposure turned the spaces between the slats white and caught the tire peeking through from the bottom. In the third exposure, the blinds were removed and the bicycle was exposed as a blue silhouette.

Cumulative readings with reflected light metering enabled the photographer to control the contrast between the slats and monitor the exposure of those areas silhouetted by the bicycle through the blinds and those areas not silhouetted.

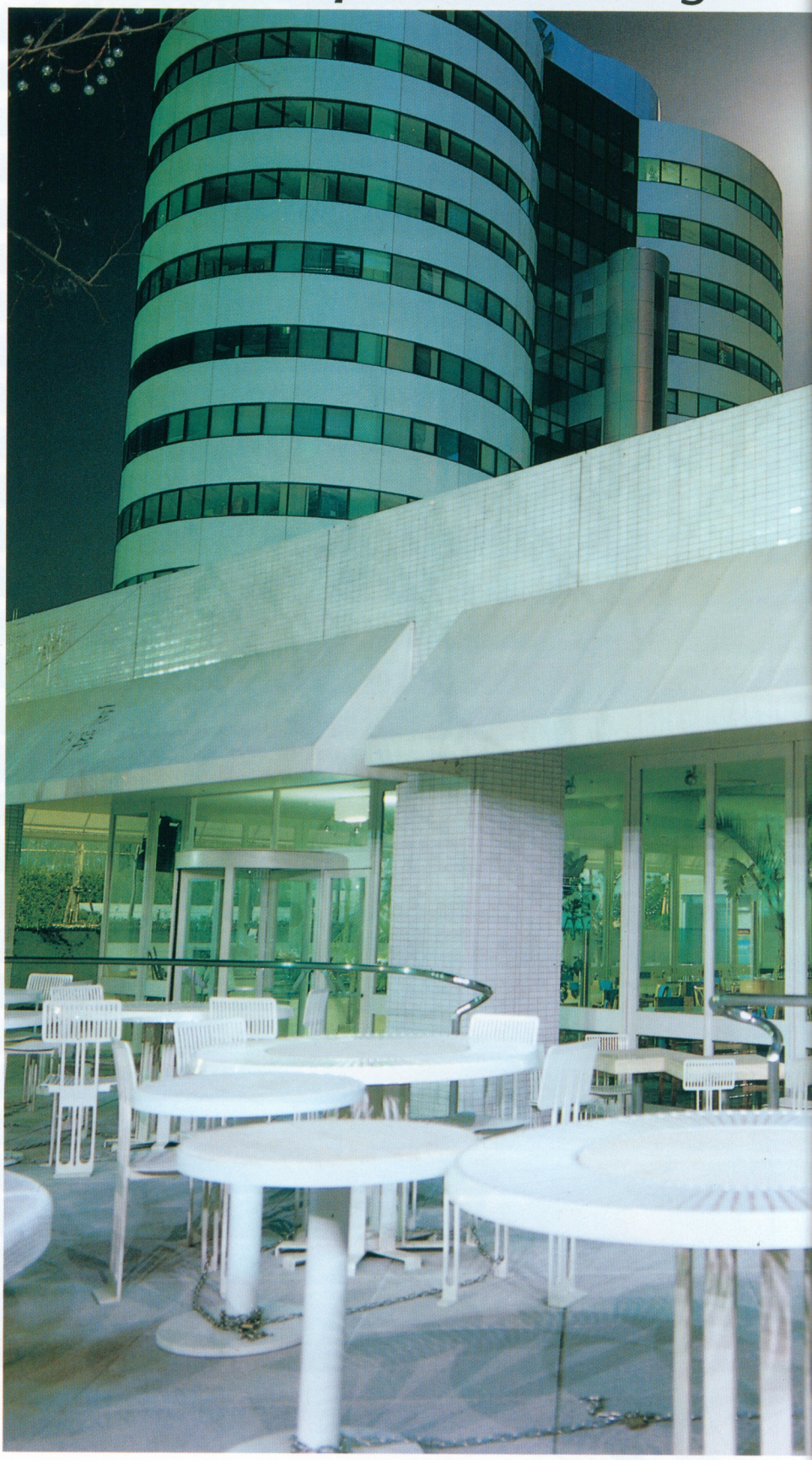
The digital display indicates the integrated value of the three exposures creating the bicycle silhouette. The pointer above f/45 on the analog scale indicates the part of the slats which will not be silhouetted; f/90 is the cumulative exposure for the spaces between the slats.





Exposure: 1st Blinds exposed blue.
2nd Tires visible through blinds exposed: illumination from behind the blinds; blue lights in front extinguished.
3rd Bicycle silhouetted: white background lit with blue lights; blinds have been removed.

Cumulative exposure metering: Mu

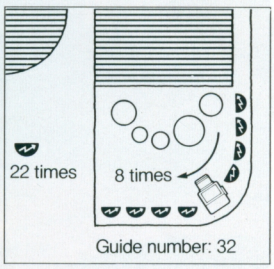


...iple bursts of flash

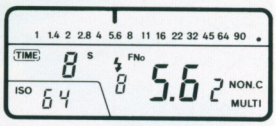
To illuminate these large buildings with a small flash (GN 32), the tables were exposed by firing a flash 8 times. The building was exposed by firing a flash 22 times with the flash unit as shown in the figure below.

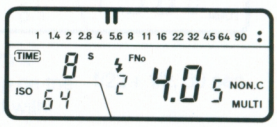
The tables and patio were metered eight times with incident light metering and the cumulative readings; the building was metered 22 times with the reflected light metering and the cumulative readings.

The exposure was adjusted so the background would be slightly underexposed because ambient light has an effect on the exposure during the duration. Flash recharge per exposure was 8 seconds with the camera set at "bulb".



Meter the building



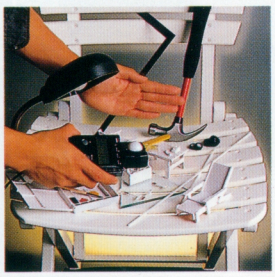


Exposure: f/5.6, bulb exposure (approx. 4 min.)
Flash fired 8 times towards the tables, 22 times towards the buildings.

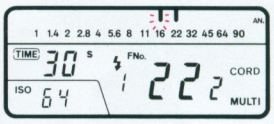
Cumulative exposure metering

Cumulative exposure metering of this scene indicated most objects would be fully exposed with the first and second exposures, leaving the lamp-lit miniatures to be finished with ambient and flash light. The miniatures on the chair were illuminated by both the lamp light and blue-filtered flash light. The miniatures on the chair were slightly overexposed, compared with the edges lit only by the flash.

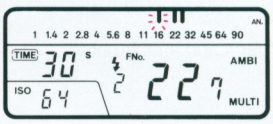
In the third exposure, the photographer sought to flare the light coming through the openings in the chair and illuminated from behind. An aperture-priority cumulative reading indicated that the flash should be fired four times with the lens at f/90 to overexpose the gaps by about three stops compared with the main lighting in exposures one and two.

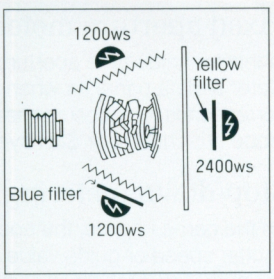


1st exposure reading

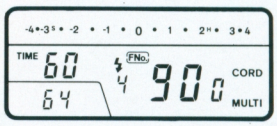


Cumulative reading of 1st and 2nd exposure





3rd exposure reading



Exposure: 1st Exposure made with a small tungsten lamp on the chair and flash light with blue filter. **f/22 + 1/2, 30 sec.**

2nd Exposure from small stand lamp on chair top; soft effects filter on lens. **f/22 + 1/2, 30 sec.**

3rd All lights on chair turned off; illumination from background flash with yellow filter; soft effects filter on lens. **f/22 + 1/2, "bulb" exposure; flash fired 4 times.**

Booster II

Booster II and attachments

The Minolta Booster II is a TTL exposure meter cell which permits direct metering of low light levels using any of the Booster II reflected-light receptors. The receptors enable direct metering via Flash Meter IV* of light levels which cannot be metered with a flash meter alone.

Some examples: brightness at the focusing screen of large format cameras, at the film plane of SLR cameras or at the eyepiece of the viewfinder, in the eyepiece of a microscope and other applications in which light has already passed through an optical system.

The booster's cable plugs into the accessory jack on the Flash Meter IV, and the spot-probe attachment, SLR eyepiece attachment, microscope receptor or 35mm film plane attachment is attached to the booster. One of two metering techniques is used:

Fixed aperture metering

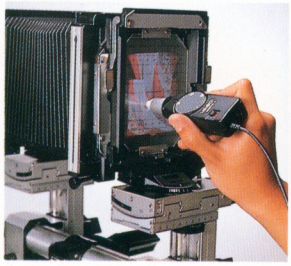
In this technique the aperture is preset. The meter reading can be read from the Flash Meter IV data panel as when metering with Flash Meter IV alone. This technique corresponds to exposure measurement at open aperture and is used with the spot-probe attachment or SLR eyepiece attachment.

Stop-down metering

As the name implies, the aperture is stopped down to the desired aperture and the shutter speed or guide value (GV) is read when the Flash Meter IV indicates a specified aperture. This technique corresponds to stopped-down, TTL metering and is used with the 35mm film plane attachment or microscope receptor.

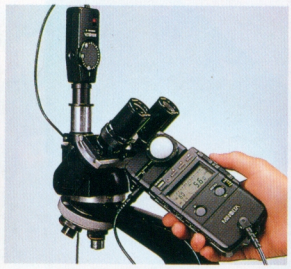
When first using the booster, it is also necessary to obtain the compensation factor indicated on the compensation scale according to the optical characteristics of the photographic equipment used, including the camera and lens.
If the same equipment and materials for which this compensation factor is determined are used, TTL metering is possible under the same conditions as reflected light metering.

• For details refer to pages 48 and 49 and the Booster II instruction manual.
* The Booster II can also be used with Minolta Flash Meter III, Flash Meter II, and Auto Meters III, IIIF, and II.



Spot-probe attachment

SLR eyepiece attachment

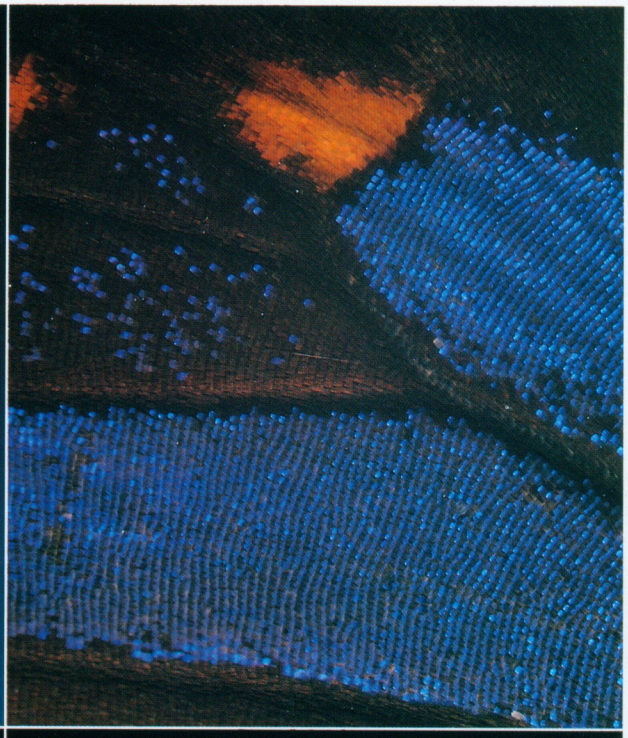


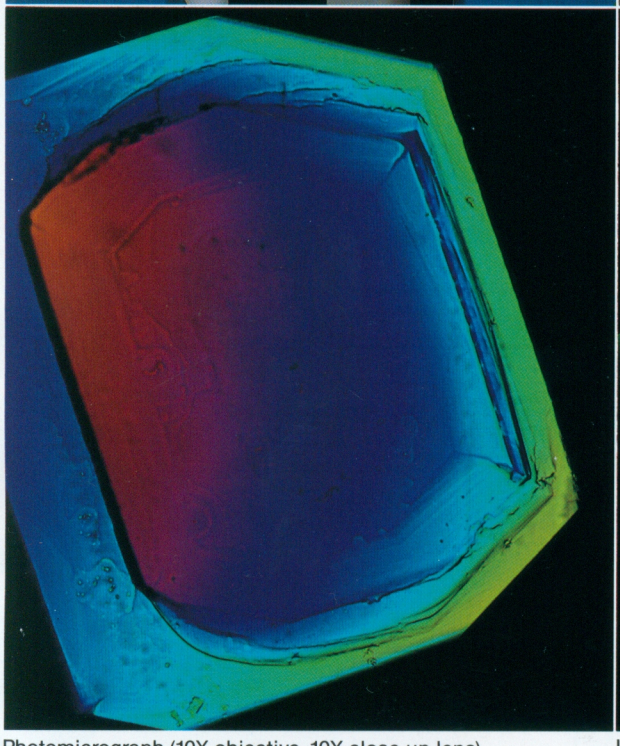
Microscope receptor

35mm film plane attachment

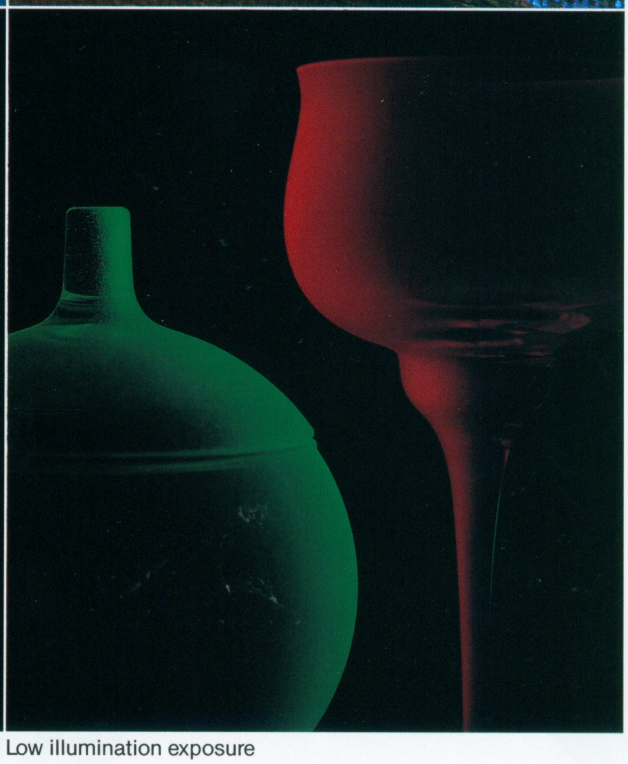
Taken with large format view camera
(using spot-probe attachment)
4 × 5 view camera; f/32, 1/250 sec.

Macrophotography with 35mm SLR, magnification 3.35X
(using SLR eyepiece attachment)
35mm camera; f/11, 1/60 sec.





Photomicrograph (10X objective, 10X close-up lens)
(using microscope receptor)
35mm camera; using polarizing light



Low illumination exposure
(using boosted sensitivity, reflected light receptor)
4 × 5 camera (with UV filter); f/22, 12 min.; 30 ws ultra-violet light source

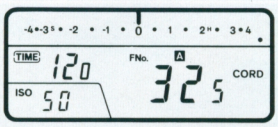
Exposures with the spot-probe attachment:

view camera exposures

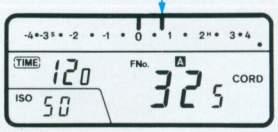
TTL metering within a 5mm diameter circle on the focusing screen of a view camera is possible by attaching the spot-probe attachment to the Booster II. Commonly used in product photography, on-screen metering with the spot-probe permits accurate metering of the exposure and subject contrast without calculating exposure increases. Even more precise measurement is made possible by using three choices of exposure (highlight biased, shadow biased and averaging).

For example, the photograph at right was taken with illumination shining through the glasses. The spot-probe attachment was used to carefully meter the subjects and various locations in the background to determine the exposure so that subject contrast remained within the latitude of the film. To emphasize the tones of the bird, the bird was metered and key [A] was pressed to lock the reading. Numerous spots from highlights to shadows in the background, various parts along the stem of the purple glass and the glass with liqueur were all then metered.

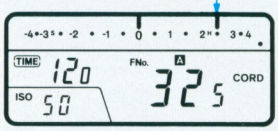
Reading: Glass bird



Purple glass stem



Background highlights

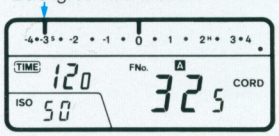


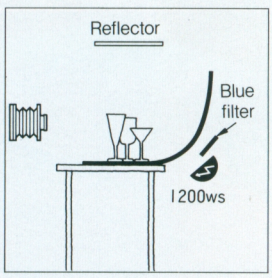
Blue in center glass

Blues in the background

Green liqueur

Background shadows





Exposure: f/32 + 1/2, 1/125 sec.

Reading: Flash Meter IV with Booster II and spot-probe attachment

Booster compensation

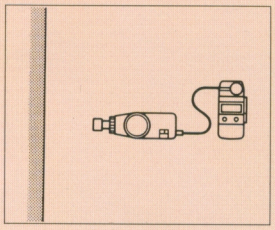
The Booster II contains a built-in increased sensitivity feature which boosts meter sensitivity in 1/3 stop intervals; when the compensation dial is set to C, sensitivity is boosted five stops; when set to H, sensitivity is boosted approx. eight stops.

Booster sensitivity matches that of the Flash Meter IV when the dial is set to L, allowing the booster to be used as a reflected light receptor with a 60° acceptance angle by extending the receptor hood.

The difference in sensitivity between optics of the photographic system and spot-probe attachment must be determined with the booster set up as a reflected light meter before using the spot-probe attachment. After calibrating the booster, the scene is metered with either fixed aperture or stop-down metering.

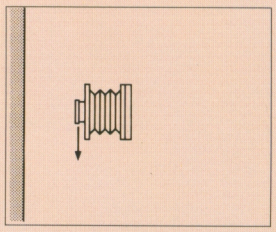
Fixed aperture metering

Calibration

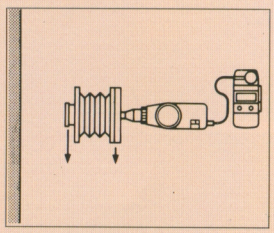


1. Set the sensitivity dial to L and meter a flat surface with even reflectance* using reflected light receptor. Jot down the reading.

*The surface should be an evenly illuminated surface, such as a wall, large enough to cover the angle of the lens to be used.



2. Direct the camera at the same even reflectance surface and hold it firmly. Focus the lens at infinity and close the aperture to the desired setting.



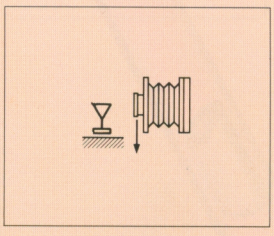
3. Set the spot-probe attachment to the focusing screen and turn the compensation dial until the reading matches that noted in step 1.

- Setting the dial to H may in some circumstances not be sufficient. If this happens, increase the ISO setting on the Flash Meter IV until the readings match or use the stop-down metering technique.
- Block any light which does not come directly through the lens when metering on the focusing screen.

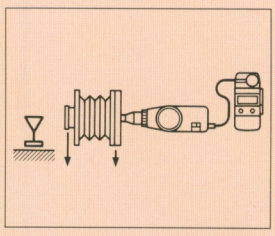
Metering: Fixed aperture

The compensation dial should be set to the position determined in step 3 above before metering. As the compensation factor differs according to the lens in use, the compensation factor has to be changed when the lens is changed.

Adjust the camera and lights and set the lens to the aperture used when calibrating the booster.



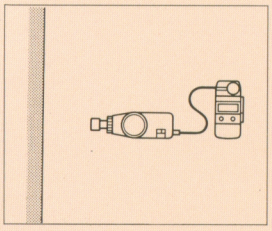
Set the spot-probe attachment on the groundglass and take a reading. Readings indicated on the Flash Meter IV display can be used as is.



Stop-down metering

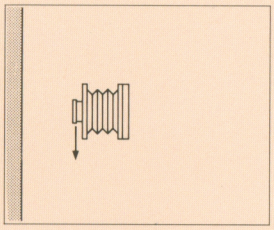
Calibration

Compensation required for the stop-down metering mode is determined as explained below:

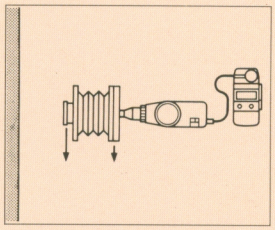


1. Set the sensitivity dial to L and meter a flat surface with even reflectance* using the reflected light receptor. Jot down the reading.

*The reading should be a shutter speed and aperture smaller than the full lens aperture.



2. Direct the camera at the same even reflectance surface. Focus the lens at infinity and close the aperture to obtain the same reading as in step 1.

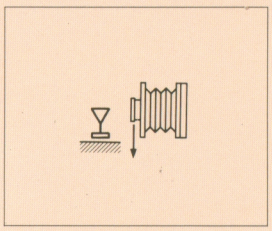


3. Set the spot-probe attachment on the focusing screen and meter with the shutter speed noted in step 1. Turn the compensation dial until the display on the Flash Meter Ⅳ indicates the same aperture setting.

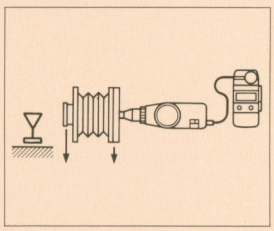
- Block any light which does not come directly through the lens when metering on the focusing glass.

Metering

The compensation dial should be set to the position determined in step 3 above before metering. (If the booster is calibrated in fixed aperture metering with an f/5.6 aperture, that setting on compensation dial can be used in stop-down metering, too.)



Adjust the camera and lights and close the lens to the desired aperture.



Set the spot-probe attachment to the groundglass and take a reading. Use the shutter speed or GV reading indicated when the display on the Flash Meter Ⅳ for correct exposure.

- Either aperture-priority or shutter priority metering can be used. If aperture-priority metering is used, set the Flash Meter Ⅳ to FNo. mode. Use f/5.6 to take the reading.

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FM IV SG509E-A1 9242-4552-91 Printed in Japan