THE MANUAL FOR *Correct* EXPOSURE

IN DAYLIGHT OR ARTIFICIAL LIGHT • FOR MOVIES
OR STILL PICTURES • WITH COLOR OR
BLACK AND WHITE FILM

NORWOOD EXPOSURE METER *Director*

Correct EXPOSURE

THE EASY WAY

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PHOTOSPHERE • PHOTODISK • PHOTOGRID
NORWOOD DIRECTOR
DIRECTOR

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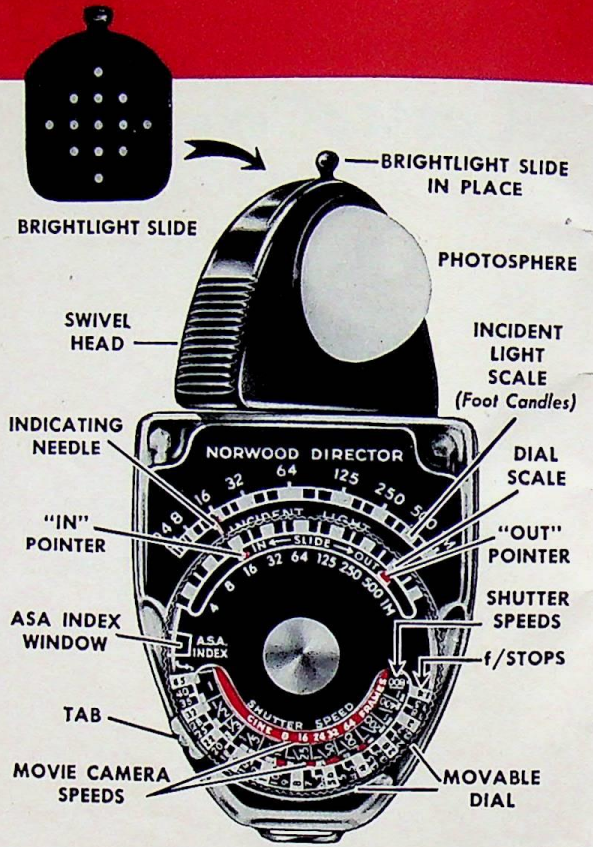


DIAL CONSTANT C=26

THE NORWOOD DIRECTOR

The Norwood Director attains its high accuracy in exposure determination by measuring all the incident light that illuminates the camera side of the subject.

Incident light scale

The dials on the Norwood Director have been designed for maximum legibility and accuracy. All numbered white blocks represent 100% increases. On the incident light scale, the numbers double at each large white block. Actual values for the unnumbered divisions will be found, if needed, on the next page. The highest figure on the incident light scale is 1000, but with the slide IN, this indication represents 30,000 foot-candles. With the slide OUT, the scale reads directly in foot-candles.

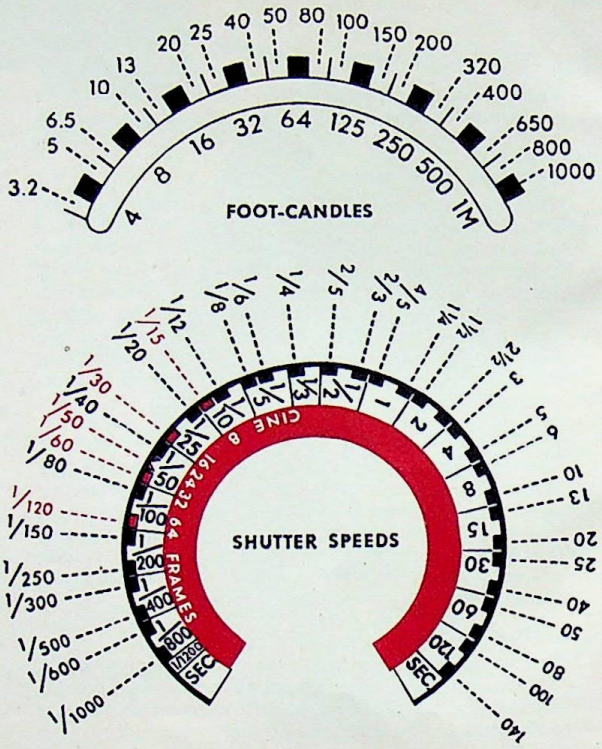
Shutter speed dial

The shutter speed movable dial has all common shutter speeds indicated. Intermediate values are represented by small white or red blocks whose actual values, if needed, will also be found on the next page. Shutter-speed blocks representing common motion picture camera shutter speeds are shown in red under the corresponding frames-per-second figure.

f/stop dial

The f/stop dial shows all common iris diaphragm stops. Those most frequently used are placed in white blocks. From one white block to the next as numbers decrease represents a 100% increase in light.

INTERMEDIATE VALUES



HOW TO DETERMINE EXPOSURE

1. Getting ready

(A) Look up ASA index of the film you have in your camera. For example: Kodachrome (Miniature Camera) Film, Daylight Type has a film speed or index of 10.

(B) Move tab to the window marked ASA INDEX.

(C) Hold tab firmly with a very *slight* upward pressure.

(D) Then rotate lower dial by its edge until desired index number is seen *in the tab opening*. Fig. 1. (Upward pressure disengages a pin on the underside of the tab from one of a series of recesses in lower dial.) When pressure on tab is released and tab pressed down gently, the tab and lower dial lock and together can now rotate freely. (The cover dial is not designed to turn.)

(E) Remove the slide from the top of the swivel-head.

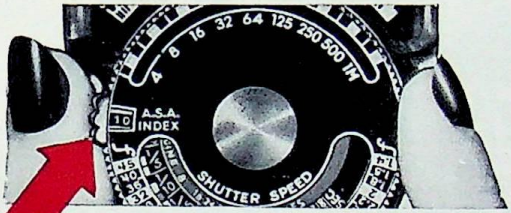
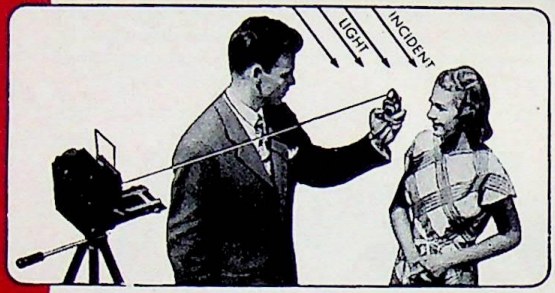


Fig. 1
SETTING ASA INDEX

2. Measuring the incident light

(A) Be sure the Photosphere is firmly seated in place on the Director. Now hold the Norwood Director close to the subject and point the Photosphere *at the camera*, or at the position which the camera will occupy when taking the picture. Maximum accuracy will be achieved by holding the Director at arm's length.

In some cases it will be found more convenient to step to one side, always keeping the Photosphere pointing toward the camera, and revolving the meter body until it faces you for easy reading. (Revolving the body of the Director has no effect upon the exposure indication as long as the Photosphere is kept pointed at the camera position.)



Hold Director at subject, point Photosphere at camera

(B) Read the needle indication on the incident light scale. (If the needle reads more than 1M, insert the brightlight slide behind Photosphere.) See page 45.

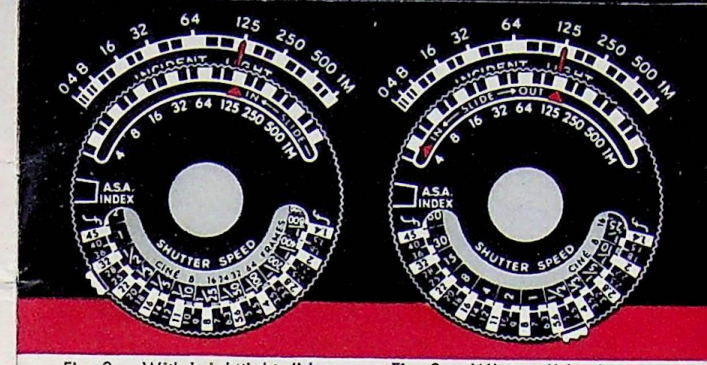


Fig. 2 — With brightlight slide in use, set IN pointer as illustrated. The strength of the light is 30 x 125.

Fig. 3 — When slide is not used, set OUT pointer as shown. Here the strength of the light is only 125.

Compare the camera settings in the two illustrations above.

3. Obtaining the camera setting

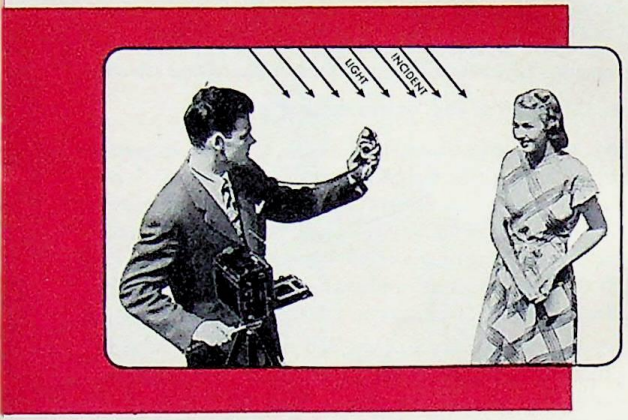
(A) If the brightlight slide is IN, with the fingertip rotate the dial until red IN pointer is set to the block on the *dial scale* which corresponds to the block indicated by needle on the *incident light scale*. Thus, if the needle indicates 125, turn the red IN pointer to 125, Fig. 2. (If the slide was not in place behind the Photosphere turn the red OUT pointer to 125 instead, Fig. 3.)

(B) On the lower half of the dial and adjacent to each other will be found all combinations of shutter speeds and f/stops for correct exposure. With ASA index of 10 for Kodachrome, Daylight Type, and a needle indication of 125 with the brightlight slide IN, correct exposure would be, for example, 1/50 second and f/5.6.

Other combinations of shutter speed and f/stop that are shown may also be used. (See Page 13.)

That's all there is to it. Hold the Director at the subject, point the Photosphere at the camera, and read the correct exposure.

For most outdoor photography, where the general illumination is the same at the camera position as at the subject, the Director may be held at the camera position instead. Be sure, however, that the same light falls upon the Photosphere in the same way it would if you were holding the Director at the subject. When shooting above or below eye level, tilt the Director to the same angle as your camera.



The Director may be held near the camera position when the same light illuminates the camera location as the subject, no matter how far away the subject may be.

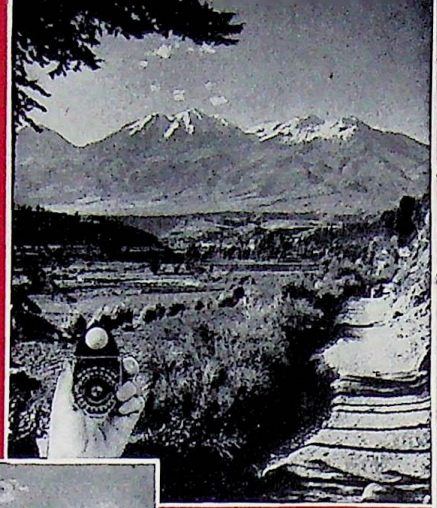
Motion picture photography

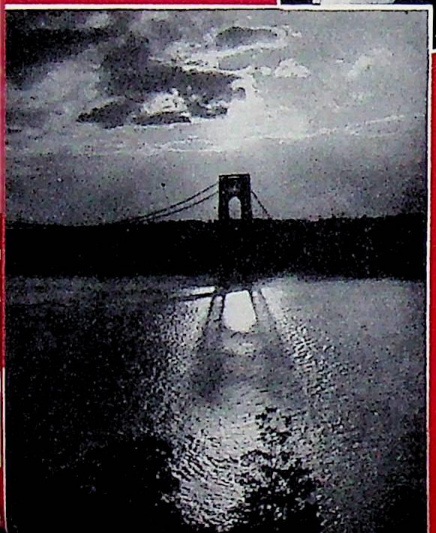
For motion picture photography, look for your cine camera speed in frames per second in the red band on the dial. Normal movie camera speed is 16 frames per second. The red block below 16 represents 1/30 second, the corresponding movie camera shutter speed. Opposite this red block read the correct f/stop to use. For other cine camera speeds use the red block below the corresponding frame speed. The red block under 8 represents 1/15 second, under 24—1/50 second, under 32—1/60 second, under 64—1/120 second.

(If your camera operates with shutter speed other than 1/30 sec. at 16 frames you can, if you so desire, make compensation in ASA Index. For example: 1/40 sec. at 16 frames; Kodachrome film, Index 10. Then by proportion $\frac{1}{30} : \frac{1}{40} :: \frac{10}{} : 7\frac{1}{2}$. Nearest setting is 8. Therefore, ASA Index 8 is used instead of 10 and red blocks can be used directly.)

For interior photography under artificial light, it is essential to hold the Director close to the principal subject rather than near the camera because the light is usually quite different in these two locations. If the cine frame speeds are not visible when the dial is correctly set to the needle indication, there is not sufficient light for correct exposure.

Distant views with cross- or back-lighting will usually be improved by slight under-exposure because the aerial haze as well as the subject reflect light to the camera causing the subject to photograph lighter than it appears to the eye. See page 31.





Correct exposure for silhouettes or brilliant sunsets is obtained by reversing the normal procedure and pointing the Photosphere *toward* the scene. The main source of light must come toward the camera for either type of subject.

Essentials of good picture taking

1. Correct exposure
2. Sharp focus
3. Steady camera

Selecting shutter speed

For each light condition, the Norwood Director displays a series of shutter-speed and f/stop combinations, any matching pair of which will give correct exposure. The following table may assist in selecting the proper shutter-speed to stop the action of the subject.

Subject	Shutter-speed
Landscapes, quiet subjects, etc.	1/25, 1/50 sec.
Walking people, active children, etc.	1/100 sec.
Automobiles, trotting horses, etc.	1/200 sec.
Aircraft, fast trains, etc.	1/500 sec.

When action crosses field of view, double shutter-speed to freeze motion.

Depth of field

Some photographs require several objects at various distances all to be in reasonably sharp focus. In this case the appropriate f/stop is decided upon first. For example, a certain camera with the lens set to f/8 will photograph with acceptable sharpness subjects from 5 to 8 feet distance. However, to focus sharply from 4 to 12 feet, the same lens must be set to f/16. Thus the higher the f/stop number, the greater the depth of field in sharp focus.

Camera errors

The Norwood Director has been carefully calibrated to give perfect exposures under practically all situations with standard equipment in good operating condition. However, diaphragm and shutter speeds indicated on a camera are often in error. Because equipment errors are common, consistent over- or under-exposure would suggest that a test should be made with that particular camera in order to match the meter to it. Consistent over-exposure may be balanced by adopting a higher film index than the published figure. Under-exposure consistently obtained may be corrected by the use of a lower film index.

Helpful information

You will find under Questions and Answers starting page 30 additional information to help you understand your Director. The proper care of your Director and instructions in the event service is required will be found on page 45.

Zero setting

When the palm of the hand is pressed over the Photosphere to exclude all light, the needle should indicate zero. When it becomes necessary, set the needle to zero by turning carefully the screw on the back of the Director using a small screw driver or the tab on the brightlight slide.

(See page 45 for suggestions on the proper care of your Norwood Director)

THAT'S ALL THERE IS TO THIS MODERN WAY OF DETERMINING THE CORRECT EXPOSURE — JUST USE YOUR NORWOOD DIRECTOR CORRECTLY AND THEN *shoot with Confidence!*

THE PAGES FOLLOWING OFFER HELPFUL GUIDANCE FOR THE ADVANCED AMATEUR AND PROFESSIONAL PHOTOGRAPHER

The Norwood Director is different

The Norwood Director attains its high accuracy because its readings are based solely on INCIDENT LIGHT, the light that falls upon the subject. The Norwood system of measuring all the incident light illuminating the subject has been tested by Hollywood motion picture experts as well as the leading professional photographers in the country. The Norwood Director is unanimously acclaimed by amateur and professional as the one meter that gives perfect exposure for color or black and white.

The exposures determined by the Norwood Director assure fidelity when photographing flesh tones in color or black and white. Flesh color is the only tint in color photography which the untrained eye readily recognizes as either good or bad. All other colors may acceptably be lighter or darker, warmer or cooler, but flesh tones must be right.

However, any photographic subject may be rendered darker or lighter than it appears, according to the artistic desires of the photographer. The Norwood Director establishes a consistent and known point of reference from which departures may be made to achieve special effects. When desired these effects may be duplicated at any time by utilizing the same departure in exposure as determined from previous experience.

To reproduce the principal subject as you see it, always use the exposure as determined by the Norwood Director.

3-WAY VERSATILITY

PHOTOSPHERE FOR EXPOSURE DETERMINATION

PHOTODISK FOR LIGHTING CONTRAST CONTROL

PHOTOGRID FOR BRIGHTNESS RANGE CONTROL

With two accessories, the Norwood Director becomes an extremely versatile instrument with which it is possible to measure and thereby control all factors in lighting and exposure.

The PHOTOSPHERE is used only for exposure determination and indicates effective foot-candles of incident illumination.

The PHOTODISK is used for lighting contrast control and measures foot-candles of incident illumination.

The PHOTOGRID is used for brightness range control and indicates relative brightness. The Photogrid may also be used for emergency exposure determination under those few conditions where an incident light reading cannot be made.

THE PHOTODISK

Using the Photodisk

The Photodisk converts the Norwood Director into a foot-candle meter which may be used to measure illumination not only for photography but for other purposes as well. Held at the subject position and pointed at a light source, it measures the intensity of the light that falls on the subject. By measuring each light in this way it is possible for the photographer to make records of any set-up and so enable him to duplicate his lighting at any future time. However, by far the most important use of the Director with the Photodisk in place is to measure the contrast ratio between main and fill-in lights for closeups.

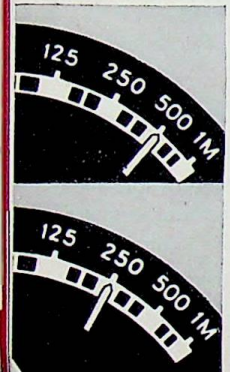
Light intensity measurements

1. Replace the Photosphere with the Photodisk.

2. Point the Photodisk toward the light source to be measured holding the meter at the subject position.

3. Read needle — which when the slide is out, indicates foot-candles. With the slide IN, the needle reading must be multiplied by 30.

With the slide out, the meter needle reads directly in FOOT-CANDLES.



LIGHTING CONTRAST CONTROL

Measuring contrast

1. Turn on main light.

2. Hold Director at subject position and point Photodisk at light. Read light intensity.

3. Turn on fill-in light and point Photodisk toward it from subject position. Shield Photodisk from main light with your hand. Read fill-in intensity.

4. Divide intensity of main light by intensity of fill-in light to get contrast ratio (light balance).

EXAMPLE: Main light reads 500. Fill-in light reads 250.

Lighting contrast ratio $= \frac{500}{250} = \frac{2}{1}$ or 2 to 1 (See page 21)

After the lighting contrast ratio is set to the value required by adjusting the position or strength of the fill-in light, the Photodisk is removed from the Director and the Photosphere replaced. The exposure is now determined in the usual way.

Measuring main light

Measuring fill-in light

Exposure determination

Brilliance is the result of complete control of all three lighting factors.

1 to 1

2 to 1

Keeping the main light constant, varying the fill-in light changes the contrast ratio of the lighting.

4 to 1

16 to 1

8 to 1

OUTDOOR CONTRAST CONTROL

Balancing sunlight

The same precise control of lighting contrast may be achieved outdoors as is obtained in the studio. The sun is usually the main source of light. White- or silver-surfaced reflectors are used to brighten the shadow side of the subject. Both the sunlight intensity and the reflector light intensity should be measured separately and their ratio carefully controlled for consistently good results.

The tremendous light range of the Director makes it easy to read the intensity of the sun. With the Photodisk in place, it is first turned toward the sun and the needle indication noted. The Photodisk is now turned toward the reflector and shielded with the hand if necessary to prevent the direct rays of the sun from shining on the Photodisk. This fill-in light should be from ½ to ¼ the intensity of the main light for best results in color. For more dramatic effects in black and white, a higher ratio may be used, such as having the reflected light as little as 1/16 the sunlight intensity.

Remember that with the brightlight slide IN, the number indicated by the needle must be multiplied by 30: thus, if it points to 125, the intensity of the light is 125 x 30 = 3750 foot-candles. With the brightlight slide OUT, the needle indicates foot-candles directly.

After the light balance has been adjusted, the Photodisk is removed and the Photosphere replaced to make the exposure determination as usual. Be sure now that *all* the light, from the reflectors, the sun, and the sky falls upon the Photosphere.

COPYING

A S A indexes for copying

The ASA index for some copying films and plates are published for "meter readings made from a white surface in the copying position." These indexes have been compensated to produce acceptable exposures with readings made by ordinary reflected light exposure meters. To use these indexes, the Photogrid must be placed on Director and reflected light readings made according to the film manufacturer's instructions.

However, greater accuracy will be achieved by the use of the Photodisk or Photosphere on the Norwood Director and using the indexes as converted in the following table.

PUBLISHED ASA INDEX FOR COPYING	CORRESPONDING ASA INDEX TO USE WITH DIRECTOR FOR COPYING
80	400
50	250
25	125
20	100
16	80
12	64
8	40
3	16
2.5	12
2	10
1.5	8

THE PHOTOGRID

Dual purpose

The Photogrid is used in place of the Photosphere for two purposes:

1. Brightness range control
2. Emergency exposure determination

Brightness range control

The effective foot-candles measured by the Photosphere for correct exposure determines the mid-point of the brightness range.

1. *Determining correct exposure*

Determine exposure in usual way, holding Director at most important part of subject. For example, with slide out needle indicates 500. On Kodachrome Film Type B (ASA INDEX 10) the exposure would be 1/10 second at f/4.5.

2. *Determining mid-point of brightness range*

Brightness is determined by a reflected light measurement. To transfer from the *incident* light scale to *reflected* light, all indications must be read at the IN pointer which has been designed for use with the Photogrid in addition to its normal function.

For example, the exposure determination in 1. required setting the OUT pointer to 500. The IN pointer then reads 16. 16 is the exact midpoint of the *BRIGHTNESS* range. It represents the reading that would be obtained from a medium-gray card with the PHOTOGRID (Regardless of whether the IN or OUT pointer was used in determining the correct exposure, the IN pointer always indicates the center of the brightness range. If, however, the IN pointer cannot be seen when the OUT pointer is set to the needle indication, the light level is so low that no usable reading could be obtained with the Photogrid.)

3. *Determining brightness range of subject*

(a) Replace the Photosphere with the Photogrid. Be sure slide is *out*. Needle now indicates relative brightness.

(b) Point Photogrid toward various areas of the subject, holding the meter approximately 6 inches from the subject. Avoid casting a shadow of the meter on the area being read (about a 6" diameter circle).

(c) Divide the highest reading by the lowest to obtain

Measuring brightness range

the brightness range. For example: say the brightest area reads 64, and the lowest 4.

$$\text{Range} = \frac{64}{4} = 16 \text{ to } 1.$$

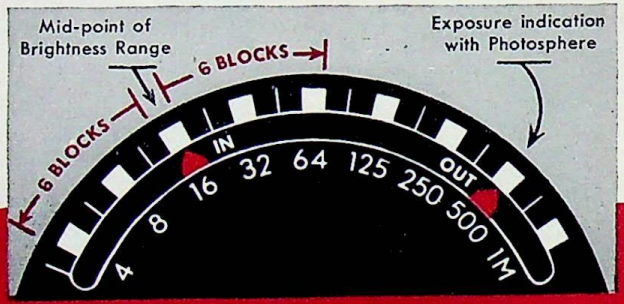
4. *Determining limits of good color rendition*

(a) Most color transparency materials will reproduce color properly provided that objects in the scene are not more than 4 times brighter than the mid-point nor 4 times darker than the mid-point (total 16 to 1).

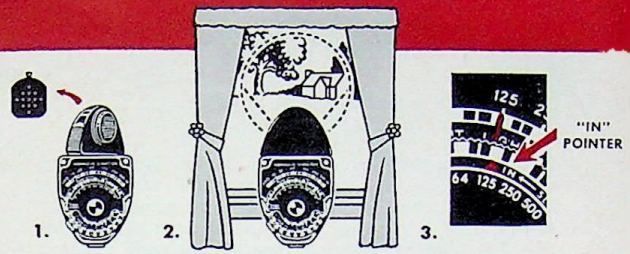
(b) If any area read with the Photogrid in the previous example was higher than 64 (16 mid-point x 4 = 64) its color will appear washed out. The light intensity falling upon it should be reduced by shading slightly that area from the light.

(c) Areas darker than 4 (16 ÷ 4 = 4) will have to be brightened by concentrating more light on these areas if proper color is to be expected. In the previous example, no area was darker than this limit, hence no light need be added.

On the Director, 6 divisions or blocks either way of the mid-point mark the limits of normal brightness range for color.



PHOTOGRID FOR EXPOSURE



1. With the Photogrid—always remove "slide."
2. Point Photogrid at subject.
3. Set "IN" pointer to block indicated by needle.

Exposure by reflected light

Under certain conditions where it is not possible to hold the Director in the light falling on the subject, the Photogrid will make it possible to get an exposure reading. When making photographs out of a window, making pictures of a shop window at night or of stained glass windows, the Photogrid is used in place of the Photosphere. The slide *must* be OUT. Point the Photogrid at the subject and note the needle indication. Set the *IN* pointer to this indication and read the exposure.

IMPORTANT: With the Photogrid, never use the brightlight slide, but always set IN pointer to needle indication.

Exposures obtained with the Photogrid are not nearly as accurate as those made with the Photosphere, so this method should be used only when absolutely necessary.

MODERN LIGHTING CONTROL

The Director with its capabilities for full lighting control, makes studio set-ups quicker and more certain than ever before. Here are the steps recommended for setting up a motion picture scene with complete control. The same method may be applied to still photography. Required:

Lighting set-up for the following
Kodachrome A (ASA 16)
Lens Diaphragm f/2.8
Shutter 1/50 second (24 frames-per-second)

Step 1. **Finding intensity for general light level**

(a) Set tab on Director to ASA 16

(b) Bring 1/50 sec. to f/2.8.

(c) Opposite OUT pointer read 650 (1 block above 500). This is the light level required for the specified conditions.

Step 2. **Setting the key light**

(a) Turn on main light (key light) and adjust to desired direction for lighting subject.

(b) Hold Director at subject with slide out and point Photosphere toward camera.

(c) Increase or decrease intensity of main light until needle points to 1 block below 650 (500). This assumes that when the fill-in lights are added it will increase the reading to 650 as required by Step 1-c.

Step 3. **Adjusting lighting contrast**

(a) Replace Photosphere with Photodisk.

(b) Measure intensity of key light (probably it will read 500 foot-candles).

(c) Turn on fill-lights.

(d) Adjust fill-lights for proper lighting contrast as explained in section on Lighting Contrast Control (for 2 to 1 ratio, fill-light should read 250). Back lights will have very little effect on this ratio.

Step 4. **Adjusting brightness range**

(a) Replace Photodisk with Photosphere.

(b) Hold Director at subject position with Photosphere pointing toward camera and note needle indication. It should read 650 now with all the lights on. If it doesn't, vary key light intensity until it does. This should require very little adjustment.

(c) Turn OUT pointer to 650 and note reading of IN pointer. It will read 20 which is the mid-point brightness of the subject. If a brightness range of 16 to 1 has been found by previous experience to produce the desired results, a subject brightness of 80 (4 times the mid-point) is the maximum that will reproduce in good color. The darkest object must have a minimum brightness of 5 (one-quarter of 20) if good color reproduction is required in this area.

(d) Replace Photosphere with Photogrid and measure brightness of light and dark areas in the subject to make sure none is brighter than 80 or darker than 5.

Step 5. **Finding correct exposure**

(a) With reading obtained with Photosphere in step 4b, obtain the correct exposure which with normal lighting should come out exactly as required—f/2.8 at 1/50 second.

With the method just outlined, the Norwood Director makes possible for the first time direct and positive control of all lighting factors with speed and assurance.

QUESTIONS and ANSWERS

Many questions have been asked by persons who, never having used the Norwood Director, fail to appreciate its utter simplicity.

Here are some of them

Q. Why don't I get the same exposure indication with the Norwood Director as I get with a reflected light type meter?

A. Do not expect to get the same indications from the Norwood Director as you might get with a reflected light meter. The basic principle of the two meters is different. Use the exposure indicated by the Norwood Director and if you should wish to satisfy yourself, make one with the reflected light meter reading for comparison. The results will show that your confidence in the Norwood Director has not been misplaced.

Q. How does the brightness of the background influence the Director?

A. Because the Director does not measure the background but only the light falling on the subject, the exposures are not influenced by the background.

Q. Why don't you point the Director at the subject like you do with other meters?

A. The Norwood Director is a true incident light exposure meter, measuring all the light falling on the subject. The Photosphere is a miniature model of the camera side of a three dimensional *subject*. It should receive the same light as the camera subject, therefore the Photosphere is pointed toward the camera from the subject position.

Q. How is the Director used to photograph distant scenic views with the sun coming toward the camera?

A. With no important subject in the foreground, the pictorial effect of a backlighted or cross lighted distant scene may be improved by reducing the indicated exposure one stop or ½ stop respectively.

Q. How is the exposure determined for silhouettes or brilliant sunsets?

A. Reverse the normal procedure and point the Photosphere *toward* the scene and determine the exposure. (The main light must be coming toward the camera to make a silhouette.)

Q. Is the Norwood Director more sensitive?

A. While the Director is only slightly more sensitive electrically than other meters, the Norwood Director utilizes all the light coming directly from the source rather than the reflected light. Therefore the Norwood Director will give usable exposure data under less light than other meters.

Q. At light levels below which even the Director cannot be expected to show a needle movement, how can an emergency indication be obtained?

A. Remove the Photosphere and slide and point the open photoelectric cell at camera. Open up about 3 stops or 10 times the exposure indicated. (This method is an emergency procedure only which has a very low order of accuracy.)

Q. How is the Director used for an outdoor picture of a person backlighted by the sun?

A. By using the Director in the usual way the face will be correctly exposed. However, if you are more interested in getting correct exposure in the horizontal ground surfaces that are brightly lighted by the sun, close down lens one-half to one stop.

Q. How is the Director used in an airplane?

A. Hold the Norwood Director up to a window in which the sun is shining, pointing the Photosphere toward the sun. Determine the exposure. Take the picture out of a window on the opposite side of the airplane with the exposure so obtained. (The light reaching the exposure meter is reduced by the window pane but the light entering the camera lens is reduced by the same amount so one compensates for the other.)

Q. How do you obtain correct exposure for making movie titles?

A. Hold the Director against center of title and point Photosphere toward camera. The exposures will be accurate for black and white or color.

Q. How do I make a color picture of an extremely light colored subject like a white wall in full sunshine?

A. Use Director in normal way, but close the lens down ½ stop smaller than indicated aperture. If a person is in the picture prominently, make no compensation or proper flesh tones may be lost.

Q. How do I make a color picture of a very dark subject like dark foliage?

A. Use the Director in the normal way but open up lens aperture ½ stop larger than indicated. If a person is in the picture prominently, use the meter indication without change to preserve flesh tones.

Q. How do I get the correct exposure on black and white film with a filter over the camera lens?

A. From the manufacturer of the film or filter find the correct filter factor. This factor gives the additional exposure required because of the absorption of light by the filter. Divide the needle indication on the Director by this filter factor and set the red pointer to this new light value. For example, a certain yellow filter on a specific film has a factor of 2. Suppose the needle on the Director indicates 250. Divide 250 by 2 and then set the red pointer of the dial to 125.

Q. Are the exposure indications of the Norwood Director accurate for telephoto lenses?

A. Use the exposure directly as given by the Norwood Director without change for telephoto lenses.

Q. Is correct exposure the only requirement for obtaining good color in color photography?

A. Not only is correct exposure essential, but the color of the light falling on the subject must match the color balance of the film. Pictures made shortly before sunset appear much too yellow or even orange because of the reddish color of the sunlight. Reflections from nearby foliage may produce a green

cast on your subjects. Pictures taken in the shade on a clear day will appear too blue because of the lack of sunshine.

Q. Can I tell how bright a background will appear in a portrait?

A. Hold the Director against the background with the Photosphere pointing at the camera. With the same incident light reading as at the subject position, both will come out as you see them. If the background light measures ½ as much as at the subject position, the background will come out appreciably darker than it appears.

Q. Are the exposure indications of the Director correct for anti-reflection coated lenses?

A. The coating on most lenses affects them so little that the Norwood Director exposures may be used without compensation.

Q. Why is the Norwood Director so accurate?

A. The Director is accurate because experience has shown that incident light is the true criterion for correct exposure. All the incident light that falls upon the camera side of the subject is correctly measured and integrated by the Photosphere to provide the one single correct setting for your shutter and diaphragm.

Q. Why should the Director be held at arm's length for best results?

A. Under some conditions light colored clothing worn by the photographer may reflect enough light to the Photosphere to influence it slightly unless it is held away.

PHOTOGRAPHY OF SMALL OBJECTS

Exposure compensation

Whenever the subject is closer to the camera than 10 times the focal length of the camera lens, the exposure indicated by the Director must be increased. For instance, with a 5 inch lens in a camera, any object closer than 50 inches requires more exposure than normal.

Measuring the incident light

Hold the Director as close to the subject as possible and point the Photosphere toward the camera lens. If the lights are very close to the subject, it is recommended that the subject be removed and the Photosphere held exactly in the spot the subject will occupy. In this way the light received by the Photosphere will be exactly equal to the light striking the subject.

To obtain exposure corrected for closeup

1. Determine exposure in regular way.
2. Measure size of object and also its image in the groundglass.
3. Divide the larger dimension into the smaller to obtain magnification (if the image is larger than the subject) or reduction (if the image is smaller than the subject).
4. Find correction factor in table on next page.
5. Multiply the exposure time obtained on the Director by the correction factor.

EXPOSURE CORRECTION FOR CLOSEUPS

(Correction Factor = $(M+1)^2$ where M is the magnification.)

Reduction		Magnification	
Ratio of object to image	Correction Factor	Ratio of object to image	Correction Factor
20 to 1	1.10	1 to 1	4
19 1	1.11	1 1.25	5
18 1	1.12	1 1.50	6
17 1	1.12	1 1.75	7.5
16 1	1.13	1 2	9
15 1	1.14	1 2.25	10.5
14 1	1.15	1 2.5	12
13 1	1.16	1 2.75	14
12 1	1.17	1 3	16
11 1	1.19	1 3.5	20
10 1	1.21	1 4	25
9 1	1.24	1 4.5	30
8 1	1.27	1 5	36
7 1	1.31	1 6	49
6 1	1.36	1 7	64
5 1	1.44	1 8	81
4.5 1	1.50	1 9	100
4 1	1.56	1 10	121
3.5 1	1.65	1 11	144
3 1	1.78	1 12	169
2.75 1	1.86	1 13	196
2.5 1	1.96	1 14	225
2.25 1	2.09	1 15	256
2 1	2.25	1 16	289
1.75 1	2.47	1 17	324
1.5 1	2.78	1 18	361
1.25 1	3.24	1 19	400
1 1	4.00	1 20	441

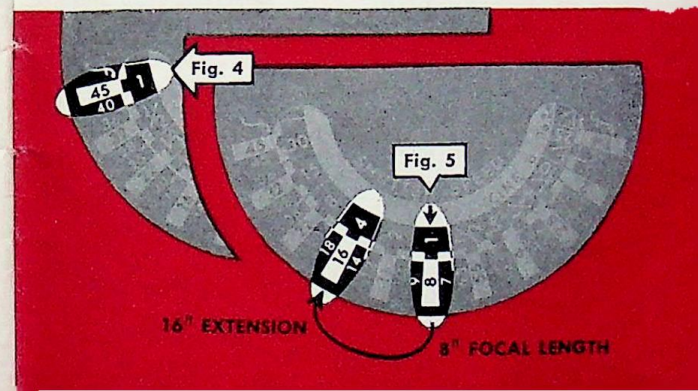
Exposure corrections for closeups without table

1. Determine exposure in regular way. Note on paper the shutter time and diaphragm stop combination selected—for example: f/45, 1 second (Fig. 4).

2. Assume that the f/stop scale on the Director represents focal lengths. Set the exposure time just computed (1 sec.) to the focal length in inches of the lens in use. Thus if an 8-inch lens is used, set 1 second to 8 on the f/stop scale (Fig. 5).

3. With the camera focused on the closeup subject, measure the distance in inches between the lens diaphragm ring and the ground glass or film plane.

4. On the f/stop scale find the number equal to this lens-to-film distance. Adjacent to this figure will be the new exposure time automatically corrected for the closeup. For example: say the 8" lens is 16 inches from the film when focused for the closeup. Opposite 16 on the f/stop scale will be 4 seconds, which is the new exposure time to use with the previously determined aperture of f/45.



SUNLIGHT-FLASH PHOTOGRAPHY

The Norwood Director offers the photographer the simplest and quickest method of accurately balancing sunlight with flash. For the first time the same basic method of light balance is applied to flash as is used daily by professional studio photographers in achieving their brilliant results. Accurate control of highlight to shadow balance is easily achieved by this new and by far the simplest method yet devised.

1. Determine intensity of sunlight by turning Photosphere *directly toward sun* from the subject position. For example: The sun reads 200 with the brightlight slide in. Actual effective foot-candles 200 x 30 = 6000.

2. Choose main to fill-in light ratio. A popular ratio is 4 to 1 which means the fill-in is ¼ the intensity of the main light. For the above condition of 6000 effective foot-candles, the fill-in should be 6000/4 = 1500 foot-candles.

3. In the tables starting page 39 corresponding to the flashbulb in use, look down along the left hand column to 1500 (closest number is 1600). Read across to find distance lamp must be held from subject for shutter speed in use. For a Sylvania Press 25, shutter 1/100 second, lamp must be held 22½ feet from subject to produce proper fill-in light for a 4 to 1 ratio in the above example.

4. Camera settings may be determined by using light value obtained in 1.

SYLVANIA SUPERFLASH LAMPS

	≠0			Press 25 & Press 40			Press 50		
	1/25 sec.	1/50 sec.	1/100 sec. & over	1/25 sec.	1/50 sec.	1/100 sec. & over	1/25 sec.	1/50 sec.	1/100 sec. & over
16,000	4′	5′	5⅔′	5′	6⅓′	7′	6⅓′	8′	9′
13,000	4½′	5⅔′	6⅓′	5⅔′	7′	8′	7′	9′	10′
10,000	5′	6⅓′	7′	6⅓′	8′	9′	8′	10′	11¼′
8,000	5⅔′	7′	8′	7′	9′	10′	9′	11¼′	12½′
6,500	6⅓′	8′	9′	8′	10′	11¼′	10′	12½′	14′
5,000	7′	9′	10′	9′	11¼′	12½′	11¼′	14′	16′
4,000	8′	10′	11¼′	10′	12½′	14′	12½′	16′	18′
3,200	9′	11¼′	12½′	11¼′	14′	16′	14′	18′	20′
2,500	10′	12½′	14′	12½′	16′	18′	16′	20′	22½′
2,000	11¼′	14′	16′	14′	18′	20′	18′	22½′	25′
1,600	12½′	16′	18′	16′	20′	22½′	20′	25′	28′
1,300	14′	18′	20′	18′	22½′	25′	22½′	28′	32′
1,000	16′	20′	22½′	20′	25′	28′	25′	32′	36′
800	18′	22½′	25′	22½′	28′	32′	28′	36′	40′
650	20′	25′	28′	25′	32′	36′	32′	40′	45′
500	22½′	28′	32′	28′	36′	40′	36′	45′	50′

SYLVANIA SUPERFLASH LAMPS (Continued)

	#2			#3		
	1/25 sec.	1/50 sec.	1/100 sec. & over	1/25 sec.	1/50 sec.	1/100 sec. & over
16,000	8′	10′	11¼′	9′	12½′	17½′
13,000	9′	11¼′	12½′	10′	14′	19⅔′
10,000	10′	12½′	14′	11¼′	16′	22′
8,000	11¼′	14′	16′	12½′	18′	25′
6,500	12½′	16′	18′	14′	20′	28′
5,000	14′	18′	20′	16′	22½′	31¼′
4,000	16′	20′	22½′	18′	25′	35′
3,200	18′	22½′	25′	20′	28′	39′
2,500	20′	25′	28′	22½′	32′	44′
2,000	22½′	28′	32′	25′	36′	50′
1,600	25′	32′	36′	28′	40′	56′
1,300	28′	36′	40′	32′	45′	62½′
1,000	32′	40′	45′	36′	50′	70′
800	36′	45′	50′	40′	56′	79′
650	40′	50′	56′	45′	64′	88′
500	45′	56′	64′	50′	72′	99′

For SYLVANIA blue bulbs, figure half the light output of the corresponding clear lamps.

Note: Two lamps at 1.4 times the distance, three lamps at 1¾ times the distance or four lamps at twice the distance give the same intensity of light as one lamp at any specified distance given in the tables.

G.E. PHOTOFLASH LAMPS

	#5				#6	SM			
	1/25 sec.	1/50 sec.	1/100 sec.	1/200 sec. & over	1/50 sec. & over	1/25 sec.	1/50 sec.	1/100 sec.	1/200 sec. & over
16,000	4¼′	6′	7′	8½′	4′	2¼′	3′	4½′	4¾′
13,000	4⅔′	6⅔′	8′	9½′	4½′	2½′	3½′	5′	5½′
10,000	5⅓′	7½′	9′	10½′	5′	2¾′	4′	5½′	6¼′
8,000	6′	8½′	10′	12′	5¾′	3′	4⅓′	6¼′	7′
6,500	6⅔′	9½′	11¼′	13½′	6½′	3½′	5′	7′	7¾′
5,000	7½′	10⅔′	12½′	15′	7⅓′	4′	5½′	7¾′	8¾′
4,000	8½	12′	14′	17′	8¼′	4½′	6¼′	8¾′	9¾′
3,200	9½′	13⅓′	15¾′	19′	9¼′	5′	7′	9¾′	11′
2,500	10⅔′	15′	17½′	21′	10½′	5½′	7¾′	11′	12½′
2,000	12′	17′	20′	24′	11½′	6¼′	8¾′	12½′	14′
1,600	13⅓′	19′	22½′	27′	13′	7′	9¾′	14′	15½′
1,300	15′	21′	25′	30′	14½′	7¾′	11′	15½′	17½′
1,000	17′	23¾′	28¼′	34′	16½′	8¾′	12⅓′	17½′	18⅔′
800	19′	26⅔′	31⅔′	38′	18½′	9¾′	13¾′	19⅔′	22′
650	21′	30′	35½′	42′	20⅔′	11′	15½′	22′	24′
500	23¾′	33½′	40′	47′	23′	12⅓′	17⅓′	25′	27½′

SYLVANIA SUPERFLASH LAMPS (Continued)

	#2			#3		
	1/25 sec.	1/50 sec.	1/100 sec. & over	1/25 sec.	1/50 sec.	1/100 sec. & over
16,000	8′	10′	11¼′	9′	12½′	17½′
13,000	9′	11¼′	12½′	10′	14′	19⅔′
10,000	10′	12½′	14′	11¼′	16′	22′
8,000	11¼′	14′	16′	12½′	18′	25′
6,500	12½′	16′	18′	14′	20′	28′
5,000	14′	18′	20′	16′	22½′	31¼′
4,000	16′	20′	22½′	18′	25′	35′
3,200	18′	22½′	25′	20′	28′	39′
2,500	20′	25′	28′	22½′	32′	44′
2,000	22½′	28′	32′	25′	36′	50′
1,600	25′	32′	36′	28′	40′	56′
1,300	28′	36′	40′	32′	45′	62½′
1,000	32′	40′	45′	36′	50′	70′
800	36′	45′	50′	40′	56′	79′
650	40′	50′	56′	45′	64′	88′
500	45′	56′	64′	50′	72′	99′

For SYLVANIA blue bulbs, figure half the light output of the corresponding clear lamps.

Note: Two lamps at 1.4 times the distance, three lamps at 1¾ times the distance or four lamps at twice the distance give the same intensity of light as one lamp at any specified distance given in the tables.

G.E. PHOTOFLASH LAMPS

	#5				#6	SM			
	1/25 sec.	1/50 sec.	1/100 sec.	1/200 sec. & over	1/50 sec. & over	1/25 sec.	1/50 sec.	1/100 sec.	1/200 sec. & over
16,000	4¼′	6′	7′	8½′	4′	2¼′	3′	4½′	4¾′
13,000	4⅔′	6⅔′	8′	9½′	4½′	2½′	3½′	5′	5½′
10,000	5⅓′	7½′	9′	10½′	5′	2¾′	4′	5½′	6¼′
8,000	6′	8½′	10′	12′	5¾′	3′	4⅓′	6¼′	7′
6,500	6⅔′	9½′	11¼′	13½′	6½′	3½′	5′	7′	7¾′
5,000	7½′	10⅔′	12½′	15′	7⅓′	4′	5½′	7¾′	8¾′
4,000	8½	12′	14′	17′	8¼′	4½′	6¼′	8¾′	9¾′
3,200	9½′	13⅓′	15¾′	19′	9¼′	5′	7′	9¾′	11′
2,500	10⅔′	15′	17½′	21′	10½′	5½′	7¾′	11′	12½′
2,000	12′	17′	20′	24′	11½′	6¼′	8¾′	12½′	14′
1,600	13⅓′	19′	22½′	27′	13′	7′	9¾′	14′	15½′
1,300	15′	21′	25′	30′	14½′	7¾′	11′	15½′	17½′
1,000	17′	23¾′	28¼′	34′	16½′	8¾′	12⅓′	17½′	18⅔′
800	19′	26⅔′	31⅔′	38′	18½′	9¾′	13¾′	19⅔′	22′
650	21′	30′	35½′	42′	20⅔′	11′	15½′	22′	24′
500	23¾′	33½′	40′	47′	23′	12⅓′	17⅓′	25′	27½′

G.E. PHOTOFLASH LAMPS (Continued)

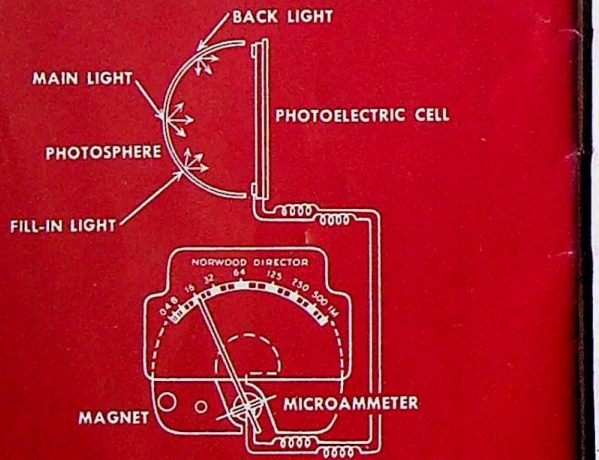
	#11				#22				#31	
	1/25 sec.	1/50 sec.	1/100 sec.	1/200 sec. & over	1/25 sec.	1/50 sec.	1/100 sec.	1/200 sec. & over	Regular Reflector	Studio Reflector
16,000	4⅓′	6⅔′	7¼′	9′	6¾′	9¾′	11¾′	13⅓′	4¾′	6¼′
13,000	5¼′	7½′	8⅔′	10⅓′	7¾′	11′	13⅓′	15′	5⅓′	7′
10,000	6′	8⅓′	9¼′	11½′	8⅔′	12¼′	14⅔′	16¾′	6′	7¾′
8,000	6⅔′	9⅓′	11′	13′	9¾′	13¾′	16¾′	19⅓′	6¾′	8¾′
6,500	7⅓′	10½′	12⅓′	14½′	11′	15½′	18¾′	21′	7¾′	9¾′
5,000	8⅓′	11¾′	13¾′	16⅓′	12¼	17⅓′	21′	23¾′	8⅔′	11′
4,000	9⅓′	13½′	15½′	18⅓′	13¾′	19½′	23½′	26¾′	9¾′	12⅓′
3,200	10½′	15′	17⅓′	20⅔′	15½′	21¾′	26½′	30′	11′	14′
2,500	11¾′	16¾′	19½′	23′	17⅓′	24½′	29⅓′	33½′	12¼′	15½
2,000	13¼	18¾′	22′	26′	19½′	27½′	33½′	38¾′	13¾′	17½′
1,600	14⅔′	21′	24½′	29′	21¾′	31′	37⅔′	42⅓′	15½′	19⅔′
1,300	16¾′	23¾′	27½′	32¾′	24½′	34⅔′	42′	47½′	17⅓′	22′
1,000	18¾′	26⅔′	31′	36¾′	27½′	39′	47′	53⅔′	19½′	24¾′
800	21′	30′	34¾′	41¼′	31′	43⅔′	53′	60′	21¾′	28′
650	23½′	33½′	39′	46⅓′	34⅔′	49′	58⅔′	67′	24½′	31
500	26½′	37½′	44′	52′	39′	55′	67½′	77½′	27½′	35′

G.E. PHOTOFLASH LAMPS (Continued)

	#5B				#22B			
	1/25 sec.	1/50 sec.	1/100 sec.	1/200 sec. & over	1/25 sec.	1/50 sec.	1/100 sec.	1/200 sec. & over
16,000	2⅔′	3¾′	4½′	5⅓′	4⅓′	6′	7½′	8⅔′
13,000	3′	4¼′	5′	6′	4¾′	6¾′	8⅓′	9⅔′
10,000	3⅓′	4⅔′	5⅔′	6⅔′	5½′	7¾′	9½′	11′
8,000	3¾′	5⅓′	6¼′	7½′	6′	8⅔′	10½′	12′
6,500	4¼′	6′	7′	8½′	6¾′	9¾′	11¾′	13½′
5,000	4⅔′	6⅔′	8′	9½′	7¾′	11′	13½′	15′
4,000	5⅓′	7½′	9′	10½′	8⅔′	12¼′	14⅔′	16¾′
3,200	6′	8½′	10′	12′	9¾′	13¾′	16¾′	19⅓′
2,500	6⅔′	9½′	11¼′	13½′	11′	15½′	18¾′	21′
2,000	7½′	10⅔′	12½′	15′	12¼′	17⅓′	21′	23¾′
1,600	8½′	12′	14′	17′	13¾′	19½′	23½′	26¾′
1,300	9½′	13⅓′	15¾′	19′	15½′	21¾′	26½′	30′
1,000	10⅔′	15′	17½′	21′	17⅓′	24½′	29⅓′	33½′
800	12′	17′	20′	24′	19½′	27½′	33½′	38¾′
650	13⅓′	19′	22½′	27′	21¾′	31′	37⅔′	42⅓′
500	15′	21′	25′	30′	24½′	34⅔′	42′	47½′

Design Features

The Norwood Director sets a new high standard for exposure meters. Embodied in the design is the combined experience of top-flight Hollywood studio technicians in color and black and white photography. The features of the Norwood Director include a much longer and more visible light scale—over 100° in angular length, unbreakable wide-angle vision Plexiglas face, high-power Alnico V magnet, extremely high-torque movement, selected top-grade photoelectric cells tested to meet exact tolerances, high-speed fully damped needle, precision formed and tested Photosphere, individual meter calibration with precision photometric standards. The inspection slip enclosed with your meter includes the final calibration.



Taking care of your Director

Your Norwood Director is an accurate electrical instrument. With ordinary care and handling it will give long and dependable service. Under no circumstances should it be opened or tampered with in any manner. Do not drop it or subject it to sudden shocks.

Keep the Photosphere clean and give it reasonable protection from scratches. These do no harm except to collect dirt and in this way slightly reduce light transmission. The Photosphere may be washed with soap and tepid water.

Brightlight slide may be made to fit snugly by bending it to maintain a slight camber.

The Director should not be subjected to conditions of extreme heat or humidity. Avoid keeping the Director in the glove compartment of a car during hot weather.

Service

Should your meter become inoperative, return it for repair. The Director should be placed in its case and surrounded with at least one inch of cushion packing to prevent further damage and then shipped in a corrugated box. Address plainly to the Director Products Corporation, Stark Street Gate, Manchester, New Hampshire.

THE NORWOOD DIRECTOR

is protected by

U. S. PATENT NO. 2,214,283

other patents pending

Index

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