ELECTRONIC

FLASH GUIDE

NORMAN ENTERPRISES
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LET'S START FROM THE BEGINNING

WHAT IS ELECTRONIC FLASH?

Electronic flash is LIGHT! It is more commonly called the "strobe light". This light is generally produced by a xenon gas filled lamp which is referred to as a flash tube or flash lamp.

The light emitted by the flash tube has three major characteristics:

1. **EXTREMELY BRILLIANT** – permits the use of relatively small lens aperture openings.
2. **VERY SHORT IN DURATION** – prevents unsharp photographs due to camera movement.
3. **COLOR SPECTRUM** – approximates that of the sun, can be used with daylight color films.

These three qualities make electronic flash very useful for producing artificial photographic lighting.

HOW DOES IT WORK?

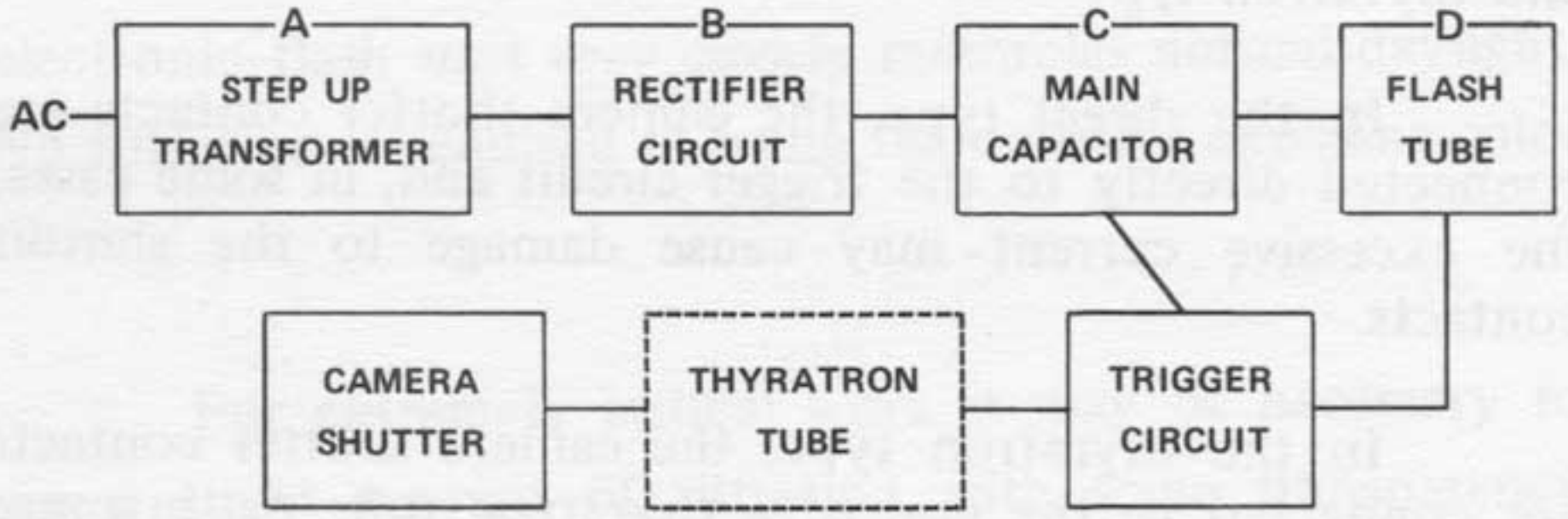


Figure 1. BLOCK DIAGRAM
TYPICAL AC OPERATED ELECTRONIC FLASH

In figure 1, the incoming AC line voltage is raised from 115 volts to a higher value at circuit A. For electrical safety, the transformer will automatically isolate the remaining circuits from the AC source.

At circuit B, the high voltage is rectified. Now the electrons will flow in one direction only which will enable circuit C to operate.

Circuit C consists of a high voltage storage capacitor which stores the energy that will later be released in the form of light at the flash tube, circuit D.

The capacitor energy will not be released until the trigger circuit is pulsed. The camera shutter contacts are used to pulse the trigger circuit.

TRIGGER CIRCUITS

There are two basic types of trigger circuits - direct and thyratron type.

In the direct type, the camera shutter contacts are connected directly to the trigger circuit and, in some cases, the excessive current may cause damage to the shutter contacts.

In the thyratron type, the camera shutter contacts are connected to the grid of a thyratron tube or, in more recent designs, to the gate of a Silicon Controlled Rectifier. When the camera shutter is tripped, the sync pulse is used to trigger the thyratron or SCR, and the current which could cause damage to the shutter contacts is absorbed by the thyratron or SCR. All Norman Enterprises units use thyratron type triggering utilizing a Silicon Controlled Rectifier.

HOW MUCH LIGHT?

For many years the common term used to describe the output of an electronic flash unit has been watt seconds. Unfortunately this is very misleading in that the term 'watt seconds' is used to describe the amount of energy stored in the main discharge capacitors and is not directly related to the amount of actual light output.

In describing our units, we have chosen to list the energy storage as well as the more important B.C.P.S. (beam candle power seconds). B.C.P.S. is the measurement of the light output of a given lamphead when operated in conjunction with a given power supply at a given watt second level. This measurement is more realistic in that you are measuring the actual light that will fall on your subject and affect exposure.

COLOR BALANCE

The color quality of light from a Norman Enterprises electronic flash unit very closely resembles normal daylight. No filtration is required in using the units for exposing color films.

For extremely critical work it may be necessary to use a slight amount of filtration with some transparency color films.

With negative color films there is never any need for light balancing filters as any slight difference in color balance can easily be corrected in making final prints from the color negatives.

IMPORTANCE OF ACCURATE EXPOSURE

Accurate exposure is of prime importance to the quality of finished photographs. With color films you do not have as much latitude as in black and white materials, nor do you have the contrast controls in making finished prints from color negatives.

It is very important that you take the time to establish an accurate guide number that will result in optimum exposure. Once you have established this guide number, you will be able to adapt it to different situations so as to be sure of accurate exposure at all times.

GUIDE NUMBER CHART

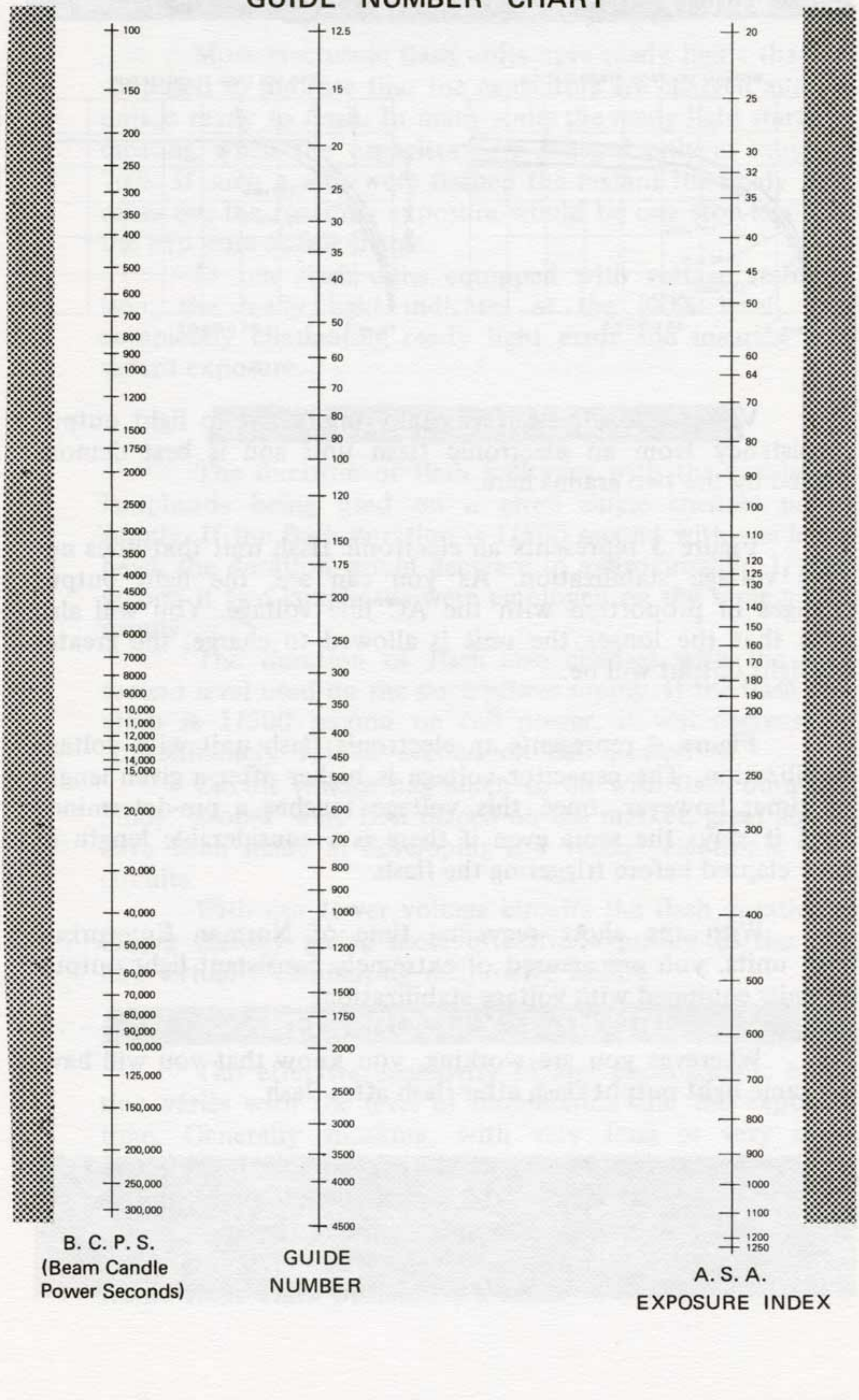
The Norman Guide Number Chart is very useful in determining photographic guide numbers. To use the chart, just select the ASA Exposure Index of the film to be used and locate the number on the right hand column. Then locate the B.C.P.S. rating of your electronic flash unit on the left hand column. Lay a straight edge across these two points and the proper guide number will be found at the point where the straight edge intersects the center line.

As an example, if you are using a film with an ASA exposure index of 100 and your electronic flash unit is rated at 4000 B.C.P.S. the correct guide number to use is 160.

It should be remembered that due to variables in film processing and personal preference, it may be necessary to slightly alter the guide number from that indicated on the Guide Number Chart.

NORMAN ENTERPRISES

GUIDE NUMBER CHART



B. C. P. S.
(Beam Candle
Power Seconds)

GUIDE
NUMBER

A. S. A.
EXPOSURE INDEX

VOLTAGE STABILIZATION

WITHOUT VOLTAGE STABILIZATION

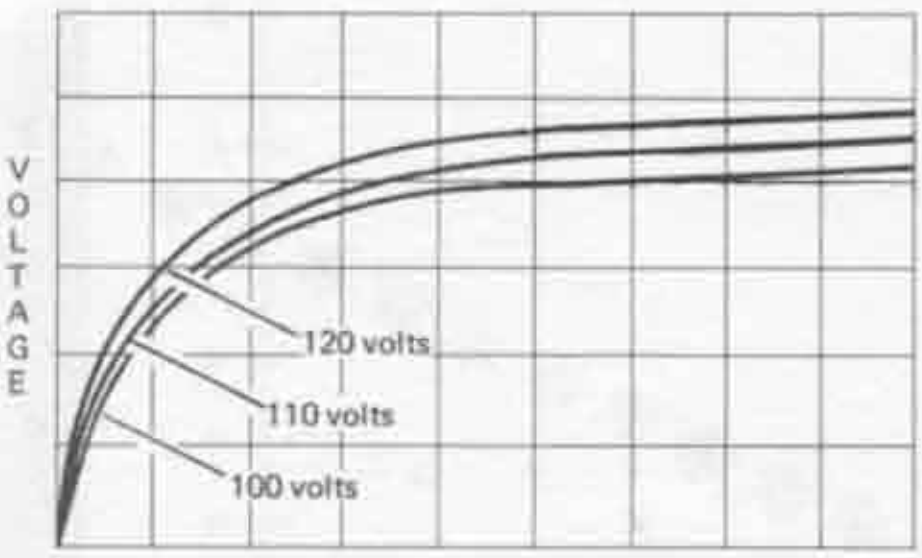


Figure 3.

WITH VOLTAGE STABILIZATION

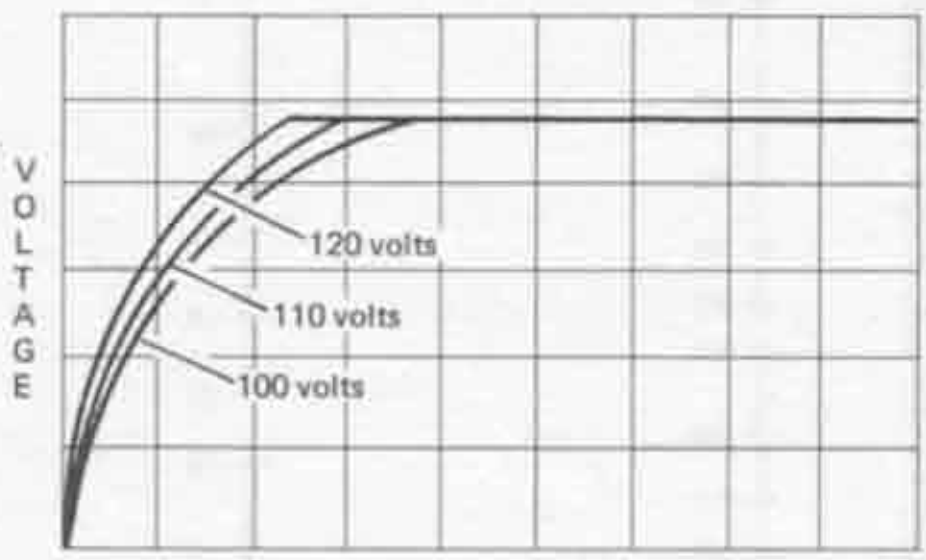


Figure 4.

Voltage stabilization is vitally important to light output consistency from an electronic flash unit and is best demonstrated by the two graphs here.

Figure 3 represents an electronic flash unit that does not have voltage stabilization. As you can see, the light output changes in proportion with the AC line voltage. You will also note that the longer the unit is allowed to charge, the greater the light output will be.

Figure 4 represents an electronic flash unit with voltage stabilization. The capacitor voltage is higher after a given length of time; however, once this voltage reaches a pre-determined level it stays the same even if there is a considerable length of time elapsed before triggering the flash.

With the short recycling time of Norman Enterprises flash units, you are assured of extremely consistent light output on units equipped with voltage stabilization.

Wherever you are working, you know that you will have the same light output flash after flash after flash.

READY LIGHTS

Most electronic flash units have ready lights that are supposed to indicate that the capacitors are charged and the unit is ready to flash. In many units the ready light starts indicating when the capacitors are charged only as much as 70%. If such a unit were flashed the instant the ready light came on, the resulting exposure would be one stop less than the exposure at full charge.

In our flash units equipped with voltage stabilization, the ready light indicates at the 100% level, thus completely eliminating ready light error and insuring consistent exposure.

FLASH DURATION

The duration of flash will vary with the number of lampheads being used on a given single channel power supply. If the flash duration is 1/500 second with one lamphead, the duration would decrease to approximately 1/1000 second if two lampheads were employed on the same power supply.

The duration of flash also changes with the watt second level used on the same power supply. If the flash duration is 1/500 second on full power, it will decrease to approximately 1/1000 second on half power.

Circuit voltage has much to do with flash duration. Since 'strobes' were first placed on the market, great strides have been made in developing low voltage electronic flash circuits.

With our lower voltage circuits the flash duration is longer thereby giving more effective exposure to the film and virtually eliminating reciprocity failure.

RECIPROCITY FAILURE

The effective sensitivity of any photographic emulsion varies with the level of illumination and the exposure time. Generally speaking, with very long or very short exposure times the sensitivity of a film is decreased, resulting in under exposure and color shift.

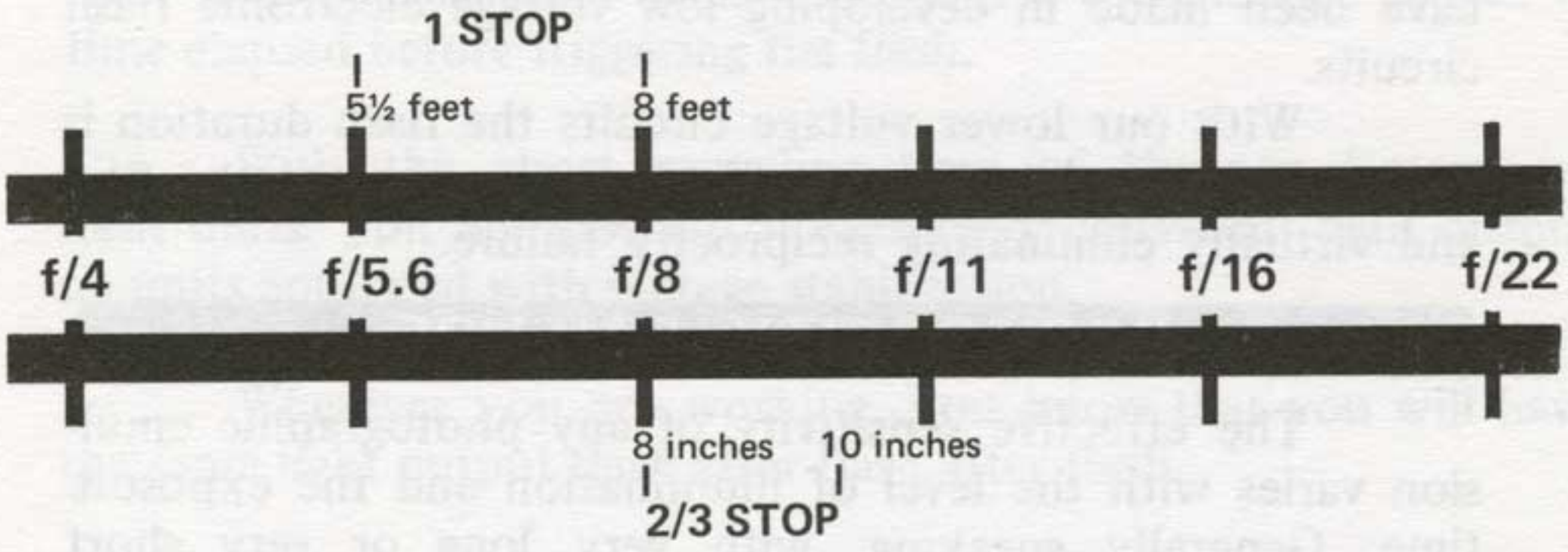
For all practical purposes this reciprocity failure need not be considered in using Norman Enterprises electronic flash units with today's films.

ARRIVING AT LIGHTING RATIO

The ratio between the key light and the fill light in making portraits is governed by the film used, the effect desired and the particular taste of the photographer.

For color portraiture the lighting ratio should generally be 3 to 1. In computing this ratio, you must keep in mind that the fill light is adding illumination to the highlight areas as well as the shadows. Let us assume that the fill light has a value of 1. The light on the shadow areas and the highlight areas would both have a value of 1 with the key light turned off. To arrive at a 3 to 1 ratio we must add 2 units of light to the highlights, or the key light must be one stop brighter than the fill light.

An easy way of computing this is to use the f stop scale as shown here. If the fill light is at 8 feet, we must place the key light at 5½ feet to arrive at the desired ratio. (In mathematical terms we could say that the square of the fill light distance is twice the square of the key light distance.) Using the f stop scale and converting f numbers to feet, you can easily arrive at any desired lighting ratio.



This same system can be used to determine exposure increase needed for bellows extension. From the lower side of the scale you can see that if you are using an eight inch lens and the bellows are extended to ten inches, you would need to increase exposure by 2/3 of a stop.

A WORD ABOUT MODELING LIGHTS

We would like to caution you about the possible effect of modeling lights on the color balance of photographs.

When using a camera with a Packard shutter or when using a regular compur type shutter at slow shutter speeds, the light from the modeling lamps may register on the film in addition to the flash exposure.

There will be no real problem with color films if the modeling lights are left on all the time, but if you make part of your exposures with the modeling lights on and part with them off you may see a different color balance in the finished prints or transparencies.

There are two simple rules to follow to prevent this problem. First, always use a shutter speed high enough to eliminate the effect of the modeling lamps. As a general rule 1/100 to 1/250 second should be used.

Second, establish a pattern of making all exposures with the lights on or all exposures with the modeling lights off.

SYNC CORD POLARITY

One problem that plagues photographers is correct polarity in sync cord connections. For safety's sake, most electronic flash units are grounded and in most cameras the shutter contacts are also grounded to the frame of the camera.

A very simple way to check polarity is to attach the sync cord to the camera and then touch any exposed metal on the camera to the light stand supporting one of the lamp-heads. If the unit flashes, you should reverse the sync cord plug to achieve correct polarity. Remember that anodized metal is non-conductive and should be considered in making the above check.

FOCAL PLANE SHUTTERS

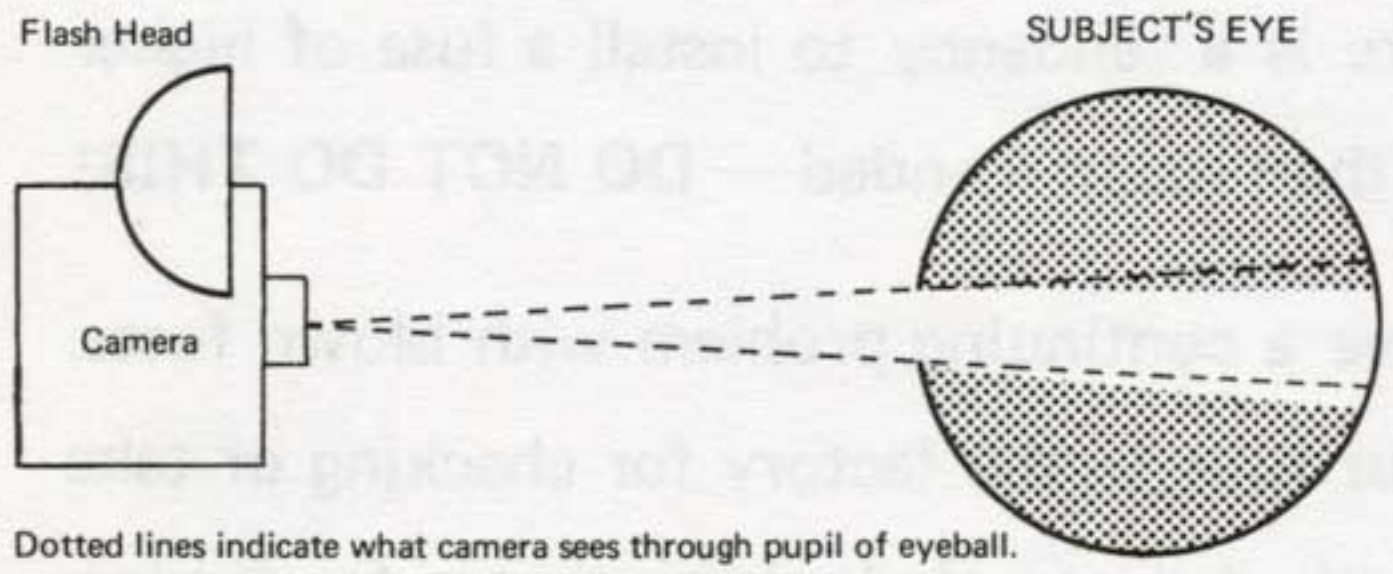
Practically all focal plane shutters are completely open only at the slower speeds and therefore must be used at these speeds with electronic flash. Generally you should use the highest speed on your focal plane shutter that is completely open. This will vary from camera to camera and you should make a photographic test if you are in doubt as to the highest speed that you can use.

RED-EYE

AND HOW TO AVOID IT

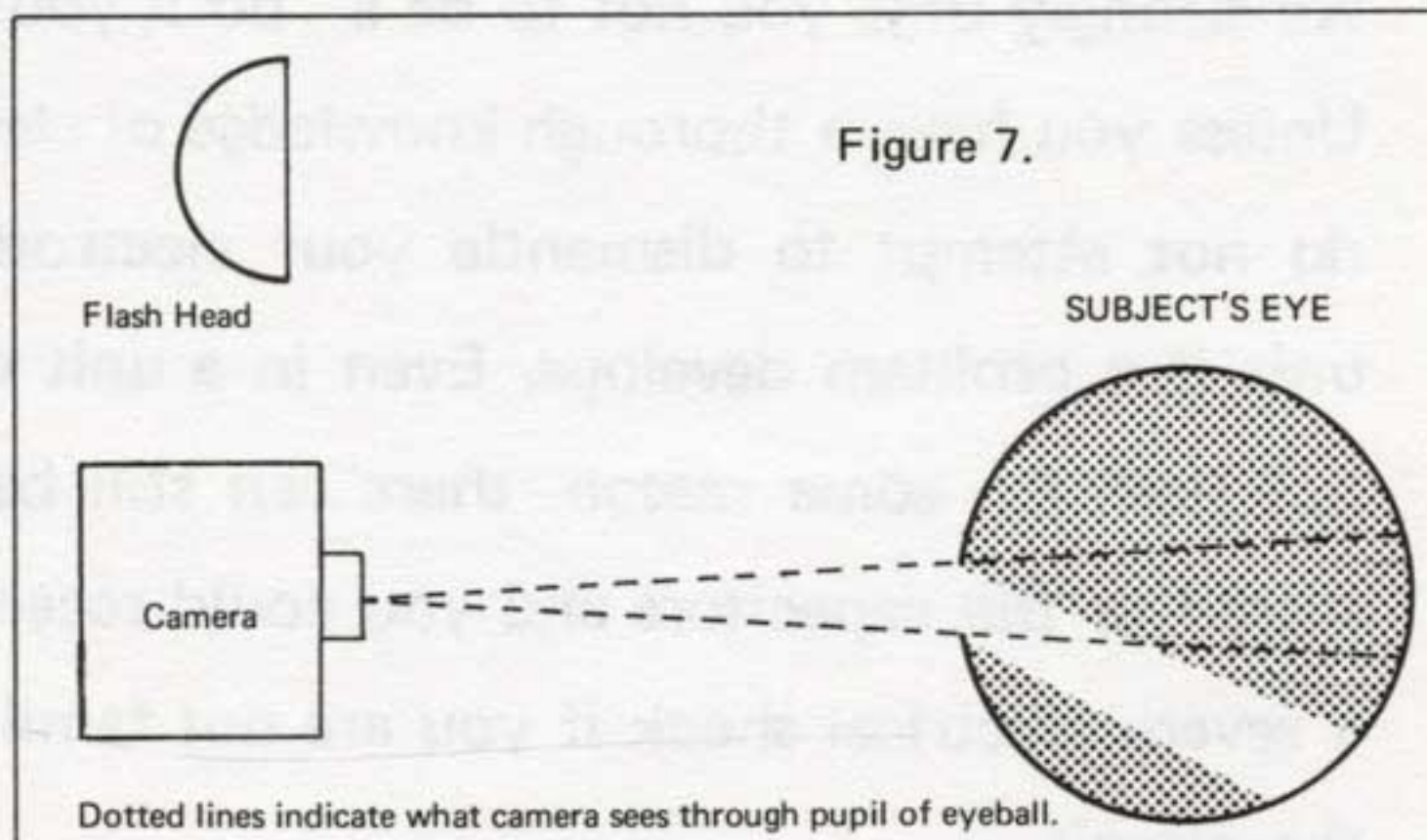
We are sure that at some time you have encountered 'red-eye' in color photographs. What appears to be a red pupil in the eye is really an image of the retina of the eye, which is a maze of blood vessels, being illuminated by the flash. This occurs when the lamphead is located very close to the axis of the taking lens. This can be averted by moving the lamphead further from the axis of the camera lens as shown in Figure 6 and Figure 7.

Figure 6.



Dotted lines indicate what camera sees through pupil of eyeball.

Figure 7.



Dotted lines indicate what camera sees through pupil of eyeball.

Electronic flash units are equipped with fuses for safety's sake. If a fuse blows it is generally an indication that there is something wrong in the circuit.

Often there is a tendency to install a fuse of higher amperage than recommended — **DO NOT DO THIS!**

If you have a continuing problem with blown fuses, return your unit to the factory for checking or take it to a qualified electronic flash repairman for service.

We strongly urge you not to be a "do it yourselfer". Unless you have a thorough knowledge of electronics do not attempt to dismantle your electronic flash unit if a problem develops. Even in a unit that will not flash for some reason, there can still be energy stored in the capacitors and you could receive quite a severe electrical shock if you are not familiar with the circuit.