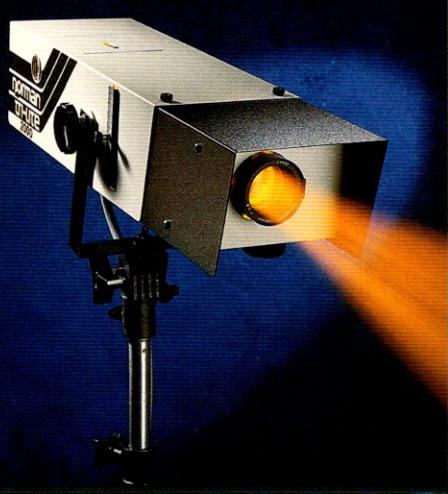
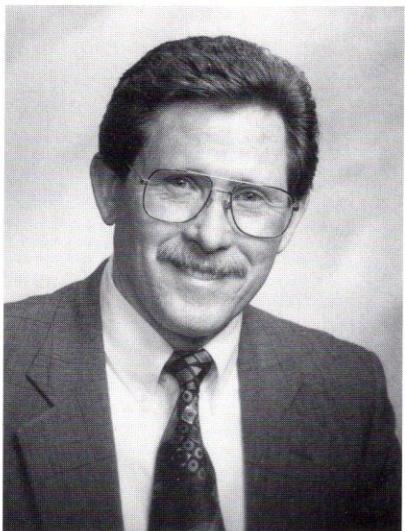




norman
enterprises, inc



PROFESSIONAL ELECTRONIC FLASH EQUIPMENT



A Word From The President

I would like to thank you for purchasing Norman products over these past 30+ years. We have enjoyed working with professionals who depend on our products, and we want you to know that Norman is producing the most dependable equipment in it's history.

Each Norman design is now put through rigorous shake-table testing and is flashed continuously for several days to insure that it will perform under the most demanding conditions. In addition, our computerized testing analyzes circuit boards and individual components to spot any potential weaknesses so that they may be corrected before being permitted to effect the performance of the unit.

We are striving for perfection and this confidence is passed on to you with a full two-year limited warranty on each new Norman product.

Please feel free to contact me personally if you have any suggestions on products that Norman can produce to make your work easier. And thanks again for purchasing Norman flash equipment.

Sincerely,

A handwritten signature in black ink that reads "Bill Norman".

Bill Norman
President

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PICK A SERIES AS THE FOUNDATION TO YOUR GROWTH

Norman is one of the largest manufacturers of professional electronic flash equipment in the world. We offer a very extensive line of power packs and accessories, each suited to specific needs of our diverse photographic industry.

As you review the equipment in this catalog, you will notice three distinct equipment series — the 900, 500, and 450. Each has been produced to provide you with optimum value and design characteristics.

Each group of power supplies and lampheads are interchangeable within their respective series; however, they cannot be used with those of another series since each has been manufactured with its own unique circuitry features and power rating limits.

The advantage of the series classification is that the equipment is not over engineered nor over priced for your needs. You should remember, as your business grows, your need for more sophisticated electronics and flash capabilities can also increase. Look to the future as you evaluate equipment so you have room to grow within the selected series.

The extensive line of Norman accessories are generally interchangeable with all three series of equipment (900, 500, 450). You will find a complete range of reflectors, barn doors, grids, diffusers, color gels, neutral density filters, umbrellas and other quality products to complete your lighting system.

A DECISION OF NECESSITY BLENDED WITH CONVENIENCE

There are dozens of strobe manufacturers, hundreds of light units and thousands of accessories. What can you really base your purchase decisions on other than personal experience, a sales pitch, a seminar demonstration or a friend's recommendation? While these inputs can be helpful, they may not necessarily be accurate nor always guide you to the *best value* — equipment that satisfies your current needs *and* what you will need in the future, at a price you can afford.

A search for an electronic flash system generally blends the primary elements of necessity with specific features for convenience. Each manufacturer's equipment should be carefully compared by the specific features, quality, performance and reliability. Having the right equipment will give you the ability and confidence to do most any assignment.

Since lighting has no foolproof formulas or steadfast rules, it is important to carefully examine your own business, creative style and lighting needs before going into the dealer's store. All systems will create light from stored energy, but it is up to you, and only you, to

Series 900

2,400 w-s per lamphead maximum (4,000 w-s on LH4000 Lamphead)

High power, versatile and rugged equipment for general use

Utilizing 900 volt circuitry which is more costly to produce, the Series 900 provides excellent efficiency in light output per watt-second. In fact, it is one of the best values on the market today in light output for the dollar. The higher flash tube voltage provides faster flash durations so you can use higher power levels to get durations between about $\frac{1}{240}$ and $\frac{1}{3,000}$ second.

Although primarily designed for commercial and industrial applications, portrait photographers often choose Series 900 equipment because of its great versatility. The wide range of power levels provided in one pack can accommodate the low light needs of portraiture and can also be used on high power assignments.

A goal of the flash manufacturer is to maximize the efficiency of the conversion of energy (watt-seconds) stored in the power supply into usable light output.

select the proper tools that are suited to the way you work. A long list of features in a flash system does not necessarily mean that it is the best in your specific situation. You don't need a lot of features if what you select has the *right* ones for you.

This catalog is designed to give complete technical information on our Norman products from a working photographer's point of view. We also hope to provide additional information on lighting with flash, plus techniques and tips that may be helpful in the selection and use of electronic flash systems.

The following three steps may be helpful in gathering the information that you need to evaluate flash equipment for your studio.

1) Analyze your work.

- a) What could be done better or faster with additional equipment or accessories? Keeping a diary over a period of time could reveal common needs or wants.
- b) Know what you are shooting and what you would like to shoot more of in the future. If it's people, location, fashion, industrial or still life work, determine what percentage of each you do and what equipment features would apply to that specialty.

Series 500

400 w-s per lamphead maximum

Medium power, moderate priced equipment offering exceptional versatility

This is the newest series in the Norman family, requested by school and studio portrait photographers who need higher flash output in their work, including group photography.

The Series 500 products utilize 500 volt circuitry matched with several medium priced flash tubes. The efficiency of watt-seconds to light output conversion is maintained, providing similar flash duration ($\frac{1}{300}$ to $\frac{1}{1,000}$ second) as found in the Series 450.

Since the Series 500 equipment can produce up to 400 w-s per lamphead, the lower power Series 450 lampheads *cannot* be used with Series 500 power supplies. A cable is available, however, to adapt the newer Series 500 lampheads to Series 450 power supplies.

Series 450

250 w-s per lamphead maximum

High quality, budget-priced equipment for portrait photography

The Series 450 equipment line utilizes 450 volt circuitry, matched with the economical FT120-UV Pyrex flash tube. This combination provides an efficient conversion of watt-seconds to light output. Flash duration range is between $\frac{1}{300}$ to $\frac{1}{1,000}$ over the various power levels, providing excellent color balance and adequate action-stopping ability.

2) Determine your basic needs.

- a) Number of lampheads required and the function of each.
- b) Total amount of power in watt-seconds for each lamphead and total power needed.
- c) Type of reflectors for each lamphead.

3) Establish your budget.

- a) What units fall into your price range? Look for the best overall value.
- b) Can rental of incidental needs enable you to upgrade major elements?
- c) Should you buy, lease or rent?

Look for the system that you can grow with. Buy or lease the pieces of equipment that will work best with the majority (70-80%) of your work. Rent accessories and extra pieces that would only be needed occasionally.

If all of the equipment seems to look alike and the difference between the models is vague, it may be a sign that you are not getting sufficient information or that you may need to take a more serious look into your business and equipment needs. When you begin to see the uniqueness of the products on the market clearly, you will find the decision on what will be best for you is much easier to make.

COMMON BASE IN ALL LIGHTING

Lighting is determined by a combination of the subject's characteristics and what you want the subject to look like in the printed image. The surface of the object being illuminated often suggests, limits or even dictates the type of lighting we use. Understanding the effect of individual lights allows us to create and experiment from the solid foundation of the principals of illumination.

Each variation we introduce creates a distinctive change in our photographic result. Testing different light sources, reflectors, distances and adding light panels, grids or bounce lighting, builds our experience and knowledge to guide future judgments. Although we have many tools available in our work to vary the quality of the light source all subjects share common elements of the lighting process.

EVALUATING AND SELECTING ELECTRONIC FLASH SYSTEMS

Power (light output) is the primary reason for purchasing most electronic flash equipment. The ideal purchase routine should look not only at the power supply, but also the heads, cables, accessories, the service, and the company — all important aspects to avoid orphan components or unserviceable pieces of equipment in the future.

The following topics highlight some of the major points that may help in your review and evaluation of which Norman equipment may be the best for you.

□ Total Value

How much usable light do you get for the watt-seconds? How does the cost of the equipment compare to the features you want and need?

□ Lasting Value

Will the company be around in years to come? Will new models of the future remain compatible with the unit purchased today? Is the equipment interchangeable and are the accessories compatible throughout the product line? How accessible is service? Are parts available in the United States, or are repairs subject to delays from overseas parts orders?

□ The Company

Over the past 30 years, Norman has built a reputation of reliability, value and customer service, with a commitment to the needs of professional photographers. You can buy Norman equipment with confidence knowing they will be there to support the product in the future.

□ Service Support

Norman has the largest network of service centers in the business. Many dealers and repair businesses are factory trained to repair your equipment quickly and economically.

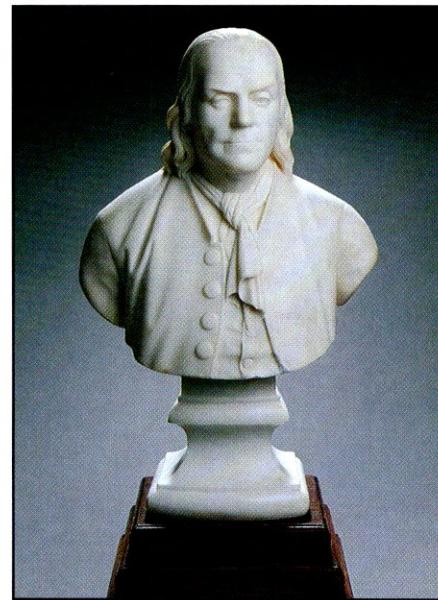
Main Light (Key Light) — Establishes the shadows, provides the modeling of the subject; defining form, dimension and texture.

Fill Light — Conventionally used to lighten shadows so the film can record the full tonal range desired for optimum quality and detail.

Rim Light — An edge light from the side or back of the subject used for added depth and separation of the subject from the background. Also an accent light for effect and mood.

Background Light — Used to provide adequate tonal separation between background and subject, and produce the detail and color in the background as desired for the overall photographic dimension and impact. Lit by ambient light or a direct source. It does not necessarily need to be an even illumination.

See the *Reflectors & Accessories* section, beginning on page 48, for more information and samples of light quality variations.



Manufactured in the United States, replacement parts, circuit boards and electronic components are readily accessible. Norman also maintains a large on-the-shelf inventory of product ready to ship immediately when the dealer order is received.

□ The Product Line

Norman offers one of the most complete and extensive lines of accessories on the market. They are affordable, easy to use and adaptable throughout the product groups. The company is dedicated to maintaining a lasting value in the equipment that you purchase. Every effort is made to make the line interchangeable and enable new model units to continue to work with equipment you already own.

□ Energy Output

When you compare the *real* power generated per watt-second of energy, Norman equipment is one of the best at converting this stored energy to efficient illumination. A wide variety of power supplies are offered, in the three "series" groups, to give you a choice in maximum output, switching capability, features and of course, reasonable costs.

□ Power Adjustments

Determine the number of lamphheads you use and the power levels required. Norman offers methods of switches and plugs or dialed variable output controls. Compare the output range in f-stops to assure sufficient high and low end light levels for the subjects and film sizes you use regularly.

□ Weight and Size

Performance and reliability remain our primary concern in engineering. Norman will not sacrifice component quality for the sake of size alone. Products including the new Series 500 packs, P404 and P808; the 200C battery portable; and the P12/12, P24/24, and P4000-PS in the Series 900 group prove that very good things can come in small packages.

□ Lamphheads

Compare the number of heads that can be used on different models. Do you require symmetrical or asymmetrical power distribution between lamphheads? Convection or fan cooled heads? Maximum watt-seconds per head? (Additional information in lamphead article on page 4.)

□ Model Lamp

The model lamp systems throughout the line allow you to switch to full brightness or use the ratio control to adjust the brightness in f-stop increments. Coordinates lamp level to the "real" difference in lamp output even when using several different power packs. An accessory RP-1 Diffusion Dome is also offered to cause the model lamp and flash tube to radiate from the same axis for optimum previewing of your lighting.

□ Safety

Our concern in design and engineering extends to our product's safe operation as much as its power level or control features. The flash tubes are mounted on plug-in housings to prevent accidental contact with wires. State-of-the-art circuit design and superior quality electronic components are used. Our cables and connectors are strong, flexible and have good strain relief to prevent breakage and shorts. The new Friction-float Stand Adapter provides secure stand mounting and confident control of lamp position.

What Is The Right Reflector?

Information on the quality and characteristics of light sources and a photographic comparison of different lamphead reflectors on pages 48-54.

A GOOD LAMPHEAD IS THE HEART OF THE SYSTEM



It's not all watt-seconds, pack size and recycle time when it comes to selecting the best equipment for your studio. All too often,

the lamphead is taken for granted — carefully picking the power supply and saying "Oh, by the way, throw in a couple of heads." The lamphead plays a major role in the overall performance of your flash system. Our new Norman LH2400 and other lamphead models are designed with the following considerations in mind.

Flash Tubes

Most Norman lampheads now include a UV-corrected flash tube to absorb unwanted ultraviolet light in critical color situations. The flash tube itself is covered, protecting the operator from possible shock hazard while shielding the helix from damage. Mounted on a base that the user can easily plug-in or change.

Modeling Lamp

The lamp is a standard type that is easy to replace and readily available. Important to be bright enough for focusing ease, yet cool enough to minimize heat buildup. Most units are capable of ratio balancing the modeling lamps with the flash outputs, and the modeling lamps can be turned off at the lamphead.

Fan Cooling

The Norman Constant-speed Blower runs quietly and blows gently to avoid excess vibration and draft that can balloon the light box panels or blow dust on the set. (A lamphead without a fan is convection cooled by the normal movement of air and heat rising from the lamp through vents.)

Lamphead Housing

A small, lightweight lamphead is preferred especially for compact and convenient travel. Norman high impact resin housings are designed to take this rough treatment. Strength is a requirement to resist dents and scratches and protect the tube and electronics over years of hard use. A metal lamphead cover is available to cover the flash tube and modeling lamp during storage or transport.

Lamphead Cables

Norman provides 20-foot cables that have an improved design to optimize the electrical current flow and maintain maximum flexibility. Cable lengths under 15 feet generally limit light placement and require the use of an extension cable that can lose 5%-10% of your energy output.

Stand Adapter

The Friction-float Stand Adapter has a smooth, pan-tilt action for unrestricted movement and fine adjustments. Positions easily and accurately without the need to loosen and re-tighten the adapter knob. Comes with a standard $\frac{3}{8}$ " insert. Optional $\frac{1}{2}$ " and $\frac{5}{8}$ " inserts are available.

Accessories

A wide range of reflectors, grids and barn doors is available from Norman to assure full control of lighting quality. Being a popular national brand, Norman adapters allow easy retrofits with light boxes and other accessories available in the industry.

SYMMETRICAL IS EQUAL ASYMMETRICAL IS UNEQUAL

The energy stored in the capacitors of an electronic flash power supply can be distributed to the lampheads by two distinct methods.

SYMMETRICAL — The selected power level in watt-seconds is divided *equally* by the number of lampheads plugged into the power supply.

Easy to adjust or calculate changes in power level without charts or diagrams. Generally provides more watt-seconds per dollar from simpler electronic design. A good buying decision, when using only one head per pack or in simple lighting assignments.

ASYMMETRICAL — Divides the intensity of light *unequally* between lampheads either by ratio controls or by internal electrical connections at fixed levels.

Provides more flexibility with a single flash pack option. Allows ratioed power distribution when using more than one lamphead. More choices mean more solutions to more problems, from one pack; also, generally means higher cost.

THE INVERSE SQUARE LAW

"Light falls off at the square of the distance."

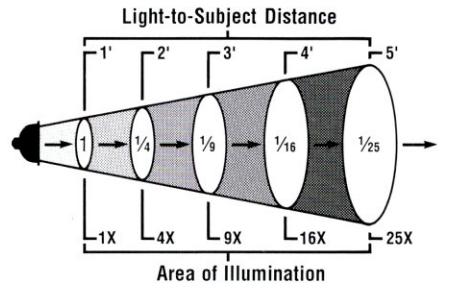
This elementary rule of physics is perhaps one of the most basic principals in lighting and a factor in large group photography, background illumination, and portraits of couples and families, to name just a few. By reviewing the concept, the next time we find ourselves confronting the inverse square law in **depth of light**, we can use a more knowledgeable approach to solve the problem.

The "inverse" in the law refers to the fact that the *remaining* amount of light (illuminating the subject) is equal to the inverse square of the distance from the light to the subject. In other words, if you place a light source 5 feet from the subject, the amount of light remaining to illuminate the subject equals the inverse square of 5 feet, or $\frac{1}{25}$. This is $\frac{1}{25}$ of the amount of light measured at the source. If the distance is doubled by moving the light back to 10 feet, the remaining light on the subject is calculated as $\frac{1}{100}$ or $\frac{1}{4}$ of the intensity at the source. Therefore, the light making up our film exposure is only one-fourth of that available at a 5 foot distance and requires 2 f-stops to compensate for the loss. (See Figure 1.)

Figure 1

The Inverse Square Law

Light diminishes at the square of the distance from light source to subject. The illumination level becomes less bright (less effective) as it gets farther from the source since it has a greater area to cover. As the area of illumination increases, the subject illumination level decreases by the same proportion. (As shown, at 5 feet, the area of coverage is 25X larger and the illumination level is only $\frac{1}{25}$ as much.)



F-stop numbers are also an inverse value. The greater the f-stop number gets, the smaller the lens aperture becomes. Using this relationship, you can also interpret another comparison that becomes a handy reference.

If you refer to the Light-to-Subject Distance Scale on page 5 (Figure 2), you will notice that by doubling the distance in feet, the effective exposure changes by two f-stops. A one f-stop change is made when you move the light from the subject to a distance equal to 1.4 times its previous distance. This relates exactly to the f-stop scale for quick and easy calculations.

Norman has published a booklet containing useful, detailed information on the Inverse Square Law. If you are interested in learning more about this subject to improve your mastery of lighting, contact Norman Enterprises or your local dealer for a copy of *The Battle Between Depth of Light and Depth of Field—The Inverse Square Law*.

DOUBLE THE DISTANCE

= OPEN 2 F-STOPS

DOUBLE THE LIGHT INTENSITY

= CLOSE 1 F-STOP

POWER IS WHAT YOU MAKE IT

Over the years, we have seen the use, misuse and oversimplification of the terms used in rating electronic flash.

While keeping it simple is important, simplicity can result in misleading claims. For example, we can accurately state that our 200 w-s flash unit will produce an exposure of f-45 at a distance of 10 feet (ISO 100, Guide Number of 450). While that may sound impressive, the statement is misleading because the angle of coverage of the reflector was omitted and the quality of the light (diffused or specular) was not considered.

This leaves the potential buyer and user of flash equipment at a loss, since there is little fact to base a purchase decision on. Throughout this catalog we will attempt to share information that can be taken into consideration to properly analyze and understand flash systems.

With all of the variables in photography, the only true evaluation of the light efficiency of a flash system is by exposure tests. In a critical situation, side-by-side film tests taken under identical conditions would be the only true way of comparing two brands of equipment.

WATT-SECONDS IS NOT LIGHT

The accepted term in the industry for the amount of energy stored in the main discharge capacitors in an electronic flash power supply is **watt-seconds** (w-s), also referred to as Joules.

Watt-seconds is related to the power pack light output, but many other factors affect your real output including efficiency of internal electronic components, design of the lamphead; the characteristics of the flash tube and reflector and length of the lamphead cable.

Light cannot be denoted in watt-seconds. The light output of a flash is best stated in terms of BCPS. However, watt-seconds are necessary to communicate how powerful a given flash power supply is. This is particularly important when the power supply is independent of the lamphead, since the power supply itself cannot be identified in terms of BCPS.

All else being equal, a power supply of twice the watt-second rating will produce twice the light output of the smaller unit. In other words, when using the SAME lamphead and reflector,

an 800 w-s power supply would produce one f-stop more light than a 400 w-s power supply. (See watt-seconds to f-stop scale on page 6.)

BCPS RATINGS BEAM CANDLE POWER SECONDS

BCPS is the common measurement of light output of a flash unit. This reading is taken with the reflector pointing directly at the specially calibrated laboratory flash meter, generally at a distance of 10 feet or 3 meters.

Since the coverage of the reflector is not considered, it is incumbent upon the manufacturer to state the angle of coverage along with the BCPS rating. Otherwise, the BCPS rating could be misleading. Narrowing the angle of coverage generally results in a higher BCPS output. (See article on pages 48-49).

Flash units are generally rated in BCPS rather than f-stops because BCPS is a definite light output rating whereas, f-stops are subject to other variables including light-to-subject distance, film speed and diffusion.

BCPS can be easily converted into workable f-stops by using the Norman BCPS/Guide Number Chart on this page. The industry has generally adopted **ISO 100** and **10 feet** as unofficial standards when rating electronic flash units in terms of f-stops. Given these factors, use the table below (Figure 3) to convert BCPS into f-stops.

Generally speaking, when a lamphead reflector or attachment is made to produce a softer (more diffused) quality of light, its BCPS output is lowered. Therefore, maximizing BCPS is *not* always the goal of the manufacturer. The goal is to maximize the efficiency of the conversion of energy (watt-seconds) stored in

the power supply. It is also important to provide an assortment of reflectors and accessories that yield the efficient transfer of this light, to best meet the objectives of various photographic lighting techniques.

PRACTICAL APPLICATION OF GUIDE NUMBERS

A Guide Number is a numerical constant generally used to calculate the correct f-stop at various light-to-subject distances when using a particular flash unit (and known reflector) with a given film speed. See Figures 4 and 5.

Figure 4

Formula for Guide Number

$$GN = f\text{-stop} \times D$$

or more useful:

$$f\text{-stop} = GN/D$$

Where: **GN** = Guide Number
f-stop = Camera Aperture
D = Light-to-Subject Distance

Manufacturers will normally publish Guide Numbers (or the flash unit's BCPS rating). Using the Guide Number Chart (Figure 6 on this page, you can easily calculate the correct f-stop at various light-to-subject distances as shown in the examples below (Figure 5).

Figure 5

If 160 is our Guide Number:

$$\begin{aligned} f\text{-stop} &= 160/14' = f-11 & (\text{at 14 feet}) \\ f\text{-stop} &= 160/10' = f-16 & (\text{at 10 feet}) \\ f\text{-stop} &= 160/7' = f-22 & (\text{at 7 feet}) \\ f\text{-stop} &= 160/5' = f-32 & (\text{at 5 feet}) \end{aligned}$$

BCPS / GUIDE NUMBER CHART

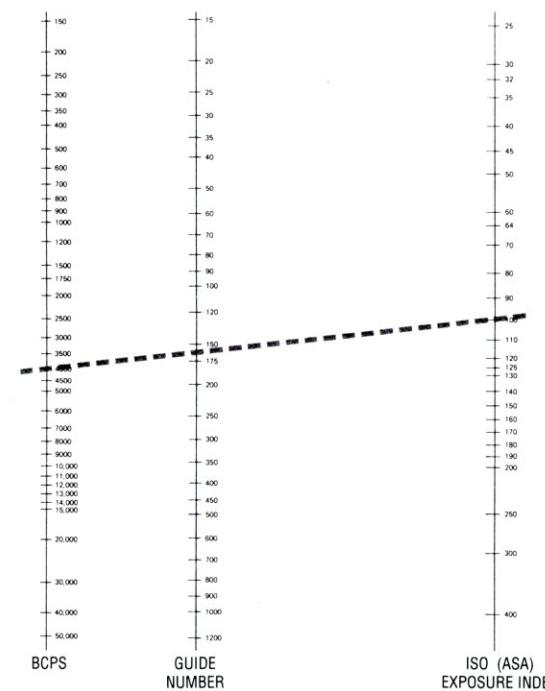


Figure 2 Light-to-Subject Distance vs. F-stop Gain / Loss

Light-to-Subject Distance in Feet

1	1.4	2	2.8	4	5.6	8	11	16	22	32	45	64
+6	+5	+4	+3	+2	+1	X	-1	-2	-3	-4	-5	-6

If an f-stop is calculated at any particular light to subject distance, use the f-stop scale on the camera lens to easily determine the correct exposure for any distance by converting the f-stop numbers to feet. If "X" is f-11 at 8 feet, moving the light to 22 feet would cause a 3 f-stop gain. Moving the light from 8 feet to 2 feet would result in a 4 f-stop loss. The "X" point can be moved along the scale to match your actual light-to-subject distance. It bears repeating that, due to the numerous variables in photography, all guide numbers should be verified by photographic testing.

USING BASIC PRINCIPALS IN COMPLEX LIGHTING PROBLEMS

Photography is writing with light and our tools to create images on film are as diverse as those available to put words down on paper. Just as the pen in the hand of a skilled lettering artist can produce beautiful calligraphy, the reflectors, diffusers and accessories of a flash system can be the means to create dynamic visuals through photography.

There are no secrets to successful lighting with electronic flash. This logical process of applied physics and math is brought to life by your creativity and ability to manipulate the rules of science. Your objective being to convey mood, impact and a desired message.

An understanding of the principles of lighting allows you to control light rather than be controlled by it. Selecting the right source is an acquired skill and once mastered will enable you to convey the visual information about form, space, texture and pattern on a two-dimensional photographic medium by control of the presence and absence of light.

The ultimate task is not to light the subject in general, but to illuminate its various aspects and dimensions. For example, in portraiture our concentration is on face, clothing, hair and background; whereas, in product photography our attention is on rendering the subject detail, texture, color and background to the best advantage.

Norman offers a complete line of power supplies, lampheads, and accessories, interchangeable throughout the system, to provide the tools to meet almost any specialized application. Combined with a photographer's ability to manipulate light, the possibilities of style in image-making become unlimited.

Understanding the basic control elements of light and learning to see what light is actually doing to the subject allows you to solve lighting challenges regardless of subject matter or light source available.

A MATTER OF EXPOSURE

Changes in film exposure and processing cause dramatic changes to the color and mood of a photograph. The exact "normal" exposure is difficult to calculate. We cannot always predict what this ideal balance should be nor anticipate or visualize the results of

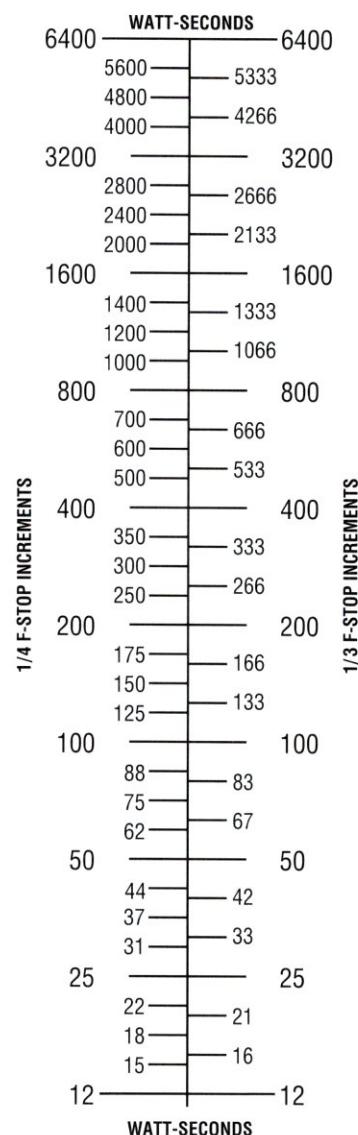
Mastering these qualities of light helps develop a personal lighting style and lets you categorize lighting problems to efficiently solve new challenges. At the same time, you will begin to appreciate the advantages and disadvantages of various light sources.

As a rule of thumb, photographers should keep options open and continue to strive for lighting quality. To avoid falling into a lighting rut, consider the following suggestions.

- **Camera angle comes first.** Finalize the lens selection and camera position first. Lighting is physics and relies on angles, surfaces, reflections and contrast of the subject.
- **Use the simplest light possible.** As a lighting set up becomes more and more complicated, you can become trapped and begin "fixing the fix". Sometimes, starting over is the best way to reach perfection.
- **Follow your instincts.** Equipment must not pre-empt intuition. Rules were made to be broken. Keep an open mind about other possible lighting solutions and have the initiative to explore those options.
- **Avoid lighting by formula.** A standard solution is often applied before the best method is identified. Good lighting is knowing what you want to see and understanding how to create this mental image with your lighting equipment.
- **Know what you need.** The latest trade show special is not a substitute for learning what light is doing to your subject so that you can make an effective visual statement.

QUALITY LIGHTING
*Is the learned ability
to envision the final result in
your mind's eye and to produce
that desired effect on film.*

Figure 7
**WATT-SECOND RELATIONSHIPS
IN F-STOP INCREMENTS**
(Using same Lamphead & Reflector Combination)



VISUAL F-STOP REFERENCE — The series of photographs below represent $\frac{1}{2}$ f-stop graduations of exposure to use as a visual guide to the relationships of light to f-stops as described throughout the catalog. These include output variations of reflectors, watt-second power changes and other technical information.

Figure 8



IT ALL STARTS THE HARD WAY

Most lampheads produce light that is relatively specular in nature. This light must be modified to create the soft and diffused shadows that we often require.

In its purest form, hard specular light originates from a "point-source," illuminating the subject with mostly parallel light rays; thus producing shadows with distinct edges and highlights with small bright reflections.

Similar to sunlight or spot lighting, this high contrast light quality is primarily a factor of the relative size of the source in comparison to the size of the subject and the distance between the two.

As the direct sunlight is softened by an overcast or hazy sky, hard photographic light sources can be altered by reflectors and/or

diffusers to provide this softer and more even illumination, larger transparent highlights and less distinct, diffused shadow edges.

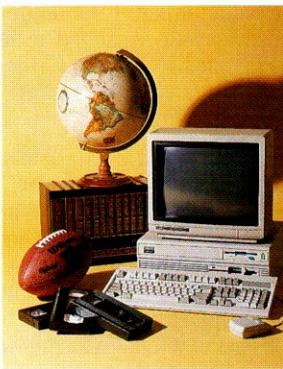
When a light is altered by a reflector or diffusion device, the light rays are scattered and emitted in various directions. Because of this scattered, random light pattern, the overall contrast is lower with less difference in the subject's highlight to shadow density. With this soft lighting, the mid-tones are more apparent and color saturation is less than with a harder, more specular source. As the physical size of the reflector, light box or diffusion panel becomes larger in comparison to the subject size, a softer light will be produced.

The lighting quality of a hard or soft source should not be confused with lighting ratio. Hard, parabolic light sources are commonly used in portraiture because they produce good color saturation, bright specular high-

lights and have a tendency to bring out excellent skin texture. The ratio of highlight to shadow density is balanced with auxiliary lighting to maintain proper detail and exposure level. Hard lights are also preferred for soft focus lenses since the specular highlights are diffused and blended into the mid tones.

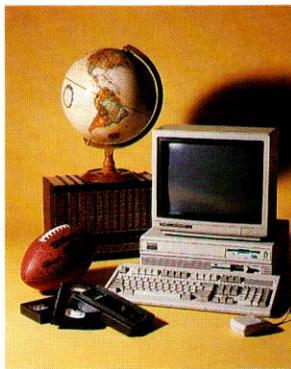
Throughout this catalog, references to the relative quality of lighting will be assigned to one of the four classifications shown below (Figure 9). These are intended as a basic representation of the characteristics of individual reflectors. They can, of course, be altered with changes of light-to-subject distance or by adding diffusion, bounce panels or other accessories. The examples were photographed under identical conditions with a single lamphead positioned five feet from the subject.

Figure 9



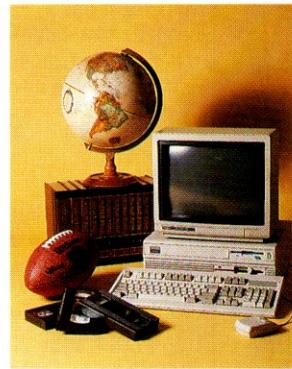
BARE BULB

140° reflector angle spills light on background plus dilutes the sharp point source of bare bulb with some bounce light. Creates open, hard edge shadows.



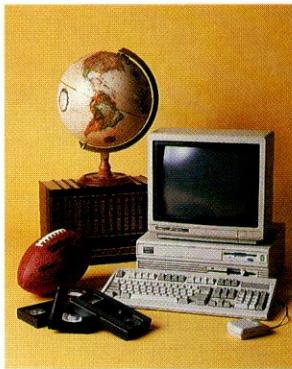
SPECULAR

Direct, 10" reflector enhances texture and color saturation. Less spill light with 60° angle. Provides strong specular highlights and deep shadows.



MEDIUM

Larger, 22" diffused source provides softer edges between highlights and shadows plus it maintains excellent form, texture and color intensity.



SOFT

A 60" white umbrella bounce source evenly wraps around subject diluting the shadows. Broad, diffused highlights, less texture. Soft lighting mood.

IN TERMS OF LIGHTING

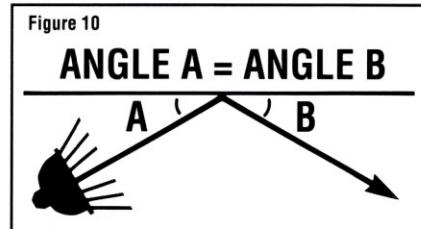
Knowledge of several basic terms is the key to understanding photographic lighting and useful in the selection of proper equipment and light sources.

Ambient Light: Light not coming directly from a primary light source, but being reflected by the environment, such as that generated by the use of bare bulb flash. It has no directional quality, no obvious light or shade and keeps shadows from becoming totally black. Control of the ambient light level is a primary control of lighting contrast.

With high ambient light, the lighting contrast (ratio) between light and shade will be lower. If no ambient light is present, lighting contrast is at a maximum because the shadow receives no illumination.

Specular: A beam of light that emanates from one specific point and travels in straight lines to and off of the subject. This "mirror-like" reflection of the light source bounces directly

off the surface of the subject at the "angle of incidence"—light leaving the surface at the same angle as it strikes the surface. Glass, chrome or other shiny or wet surfaces are specular surfaces. See Figure 10 below.



Diffused: "Scattered" light traveling in many directions, simulating the effects of ambient light. Created by a large area light source. Can be manipulated to blend the effects of directional or specular lighting for a variety of effects.

To reach your desired effect, be aware of light sources that pass more of one quality than another. A specular, primary source, such as the bare flash tube, must be modified in order

to create a diffused source. Norman offers various reflectors and accessories that will vary the quality of light, change the angle of coverage or boost effective light output.

The specular/diffused quality of these reflectors can be further modified by altering the distance between subject and light source. The larger the source becomes as related to the size of the subject, the more diffused and less specular the illumination becomes.

Looking For More Information?

Norman offers four booklets summarizing practical concepts of photography with electronic flash. See your local dealer or order directly from Norman Enterprises.

- *Electronic Flash Guide*
- *Why Umbrella?*
- *Syncro Sunlight — Mixing Strobe with Sunlight*
- *The Battle Between Depth of Light and Depth of Field — The Inverse Square Law*

SHOOTING FOR REPRODUCTION

For many of us, our daily assignments require us to create photography for advertising or other lithographic printed reproduction. It is only common sense to believe that the better the transparency is suited for this halftone dot process, either B&W or color, the better results we may expect on the final printed page.

Until recently, the two disciplines of photography and lithography have been too distant from each other; normally buffered by the agency, designer or client. There was not much interaction between the two primary influences in reproducing the image. In today's computer environment, it seems that much more direct information and communication exists. And, as a consequence we are learning more and more about each other's responsibilities, capabilities and limitations.

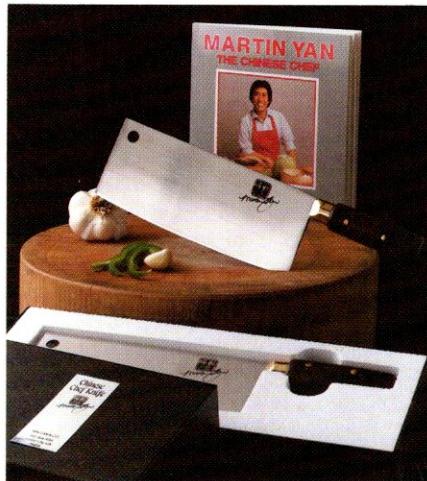
Let's face it, as photographers, our success is often judged on how well the separation or printed page is executed. Throughout the process, many variables and controls exist that can alter the halftone interpretation of the original print or transparency and produce very different renderings of the same photo. Along with the controllable variables, there are just as many uncontrollable ones.

These limitations in the process are part of reality. If we begin to learn more about the printed image and how it gets there, we will be able to adjust our photographic standards to be more in keeping with the lithographic needs. Communication will create better quality images and less costly corrections that are necessary to manipulate the photo after seeing the printer's proofs.

The key area of interest in this article is the **tone reproduction compression** of the printing process as compared to the **image brightness range** of the photographic process. This brightness range in a transparency, for example, is more than 1:64 (a 6 f-stop difference), whereas the 4-color printing process can reproduce only about 1:16 (4 f-stops), only two-thirds of what is available in the transparency. To accommodate this limited range, color separators must compress the transparency's tonal range — the area bridging the lightest highlights to the darkest shadows — to fit into the reproduction curve. Similar problems exist in the B&W process, but to a lesser degree.

Since this process, called **tone reproduction compression**, is a rather subjective one, the integrity of the original art can suffer if the color separator is not sensitive to the high-light end of the range, which the human eye usually sees first. Add to this, a poor original and it is more than likely that the impact of the original will not withstand the rigors, and inherent deficiencies, of the entire litho separation and printing process.

The combined industries representing printers, lithographers, photographers and ad agencies have taken steps to understand



what the best "aim point" would be for transparency reproduction. When measuring image contrast (at the film plane) between the lightest and darkest areas that require significant detail, a 4 f-stop (1:16) range is desired. The center point of this four f-stop range is the exposure level and this density can be adjusted as desired.

When you want a strong contrast range, most film or print materials require that highlight and shadow extremes (that require retention of detail) should not exceed 2 f-stops above or below the camera lens setting. For example, if the camera lens is set at f-11 (without causing the highlights to wash out) the reflective density reading of the brightness area of the subject should be f-22 (2 f-stops more light). The darkest part of the subject should have an illumination level providing a reflective reading of f-5.6

(2 f-stops less light) in order to maintain minimal shadow detail.

If the contrast of the image exceeds 4 f-stops, several adjustments can be made to reach the desired brightness range:

- **Reposition the lighting** or add additional lights to fill in the shadows.
- **Add diffusers or reflector cards** to lower the highlight level and increase the illumination in the shadows.
- **Change the style of lamphead reflector** or add a light diffusion panel or soft box for lighting with less contrast.
- **Use scrims, dots, gobos** to reduce light on local highlight areas that are too bright.
- **Add a local spotlight**, such as the Norman TRI-LITE, to add light into isolated dark areas that are losing detail.
- **Modify the subject**, if possible, to change the color, density or reflective characteristic.
- **Use other film emulsion types** or alter processing techniques to change the contrast range of your sensitized materials to compress the subject contrast. (Color photographic prints are much closer in tone range to the printing process.)

Finally, when viewing transparencies to evaluate highlight and shadow detail, it is recommended that several inches of illuminated surface remains around the image. This extraneous light is a more realistic way to preview the potential results on a printed sheet. If the transparency is masked in black, viewed in the dark or through a magnifier, the density range selected will probably be too great and critical areas of detail in the transparency may be sacrificed in reproduction.

WHEN TO ADD MULTIPLE HEADS OR USE MULTIPLE FLASHS

There are times when more subject illumination is required than you have available in your electronic flash system. It may be on close-up products where bellows extension add several f-stops of compensation; or when critical focus demands a very small lens aperture; and, the subject itself may be dark and is absorbing a great deal of light.

Our first option is to add more lampheads. That can help to even out the light, but may not increase the power level. Next step is to add power supplies. If they are not on hand, each f-stop needed doubles your costs if you buy or rent additional packs. Therefore, a practical alternative for still life situations has been multiple flashes or "pops".

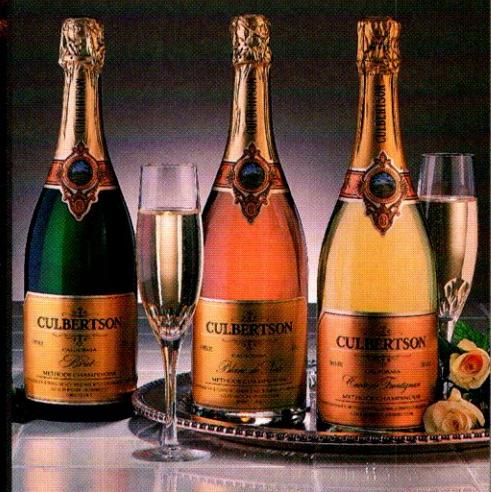
Using an open lens, with studio lights off, gives you the opportunity to gain an extra f-stop of illumination by doubling the number of times the lights are flashed. Other than subject or camera movement and some reciprocity effect as the number of flashes builds, this can be one of the most practical solutions to occasional need for high power levels.

We have these options available in building the light intensity, and with these are a few cautions to consider and plan for, to assure a successful photo without surprises when the film returns.

- **With multiple lampheads on a subject**, especially on a small set, the modeling lamps should be turned down or off to minimize any impact on the exposure or color of the image. Some camera movement could also be detected if a slow shutter speed is used.
- **Reflections in shiny subject surfaces** could be distracting or uneven with multiple heads through a light panel or bounced off a flat.
- **Multiple flash is not perfectly predictable** as it has a tendency to shift to a warmer color balance. Tests should be made to determine the correct filtration and number of flashes for your particular situation.
- **To avoid camera movement** when using multiple flashes, secure the camera firmly, open the shutter, allow the camera to settle before beginning flash series. Do not touch the camera until the exposure is completed.
- **Beware of overheating** when using multiple flashes. Use lampheads with fan cooling. It is important not to exceed the duty cycle of the equipment you are using. Your manufacturer can suggest limits for your application.

From power-hungry big sets to delicate product illustrations and functional commercial assignments, Norman delivers reliable power and versatile control options.

Commercial



Series 900



Series 900 Electronic Flash Systems

Power, Technology and Value for Today's Commercial Photographer

Photographers must master the control of light to meet today's diverse technical and creative photographic demands. And the rigorous, often unpredictable assignments of commercial, catalog, industrial, fashion and advertising photographers require equipment with the power and versatility to adapt to a wide variety of light sources and applications.

The Series 900 electronic flash systems were designed for exactly this purpose. At the heart of the Norman equipment line, the Series 900 consists of several high output, rugged power supply models. Power output, ranging from 800 w-s to 4,000 w-s, offers you the opportunity to grow into the system at your own pace. Complimented by a wide range of reflectors and accessories, Series 900 flash equipment, like all Norman products, are built for years of dependable service.

Using the latest in technology to create optimum efficiency for the photographer, Norman strives to provide the most value-packed equipment on the commercial photographic market.

A careful selection of components and flash tube characteristics combined with a more efficient circuitry and precise voltage specifications deliver true color balance, shorter flash durations at high power and better flash output by optimum conversion of watt-seconds to light.

All Series 900 Flash Systems offer:

Dependability and Consistency. Highest quality U.S. made components, state of the art, transformerless design. Total solid state, voltage stabilized circuitry is accurate to $1/10$ of an f-stop at 100% ready condition.

Versatility. Flash output of one lamp-head from 4,000 w-s to less than 25 w-s. Over **sixty** possible output combinations when using multiple flash heads. Supported by a full line of interchangeable reflectors, barndoors, diffusers and accessories.

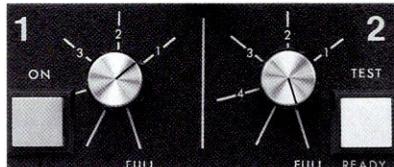
Serviceability. All Norman equipment is protected by a two-year limited warranty. Factory service and other service centers across the United States and selected countries can provide quick turn-around repairs.

Model Lamp Ratio Control - Put the Right Light on the Subject

The quartz model lamp power available with the Series 900 power supplies give you both control and flexibility. Proper adjustment of the modeling lamp dimmers enables you to see actual light ratios, contrast range and shadow detail. Because they are not electronically tied to the strobe output, the model lamps may be adjusted for brightness in f-stop increments, relating to the "real" difference in lamphead power even when using several different power packs.

Independent modeling lamp dimmers are provided for both power output channels. Calibrated in f-stop increments (over a four f-stop range), the dimmers allow you to raise and lower the overall modeling lamp brilliance and match the proper flash level balance. The lamps' brightness relationship is balanced by comparing each lamphead's output in f-stop increments, determined by the amount of energy distributed to that head in watt-seconds.

Double or one-half of the watt-second ratings will change light by one f-stop. The model lamp brightness is adjusted up and down the scale in proportion to the differences in lamphead f-stops. This amount of flexibility and control is a tremendous asset for applications such as controlling uncomfortable brightness levels when photographing people and boosting the proportional light intensity for critical focus or viewing when using large sets or diffused sources.



Norman Gives You Full Lighting Control

A full range of reflectors, barndoors, grids, snoots, diffusers, gels, umbrellas and accessories are available to optimize creativity and solve technical challenges

quickly and easily. Unlimited possibilities of control, all interchangeable throughout your Norman system. (See section on reflectors and light control.)

P4000-PS

Power Up! Trim Down!

The Norman P4000-PS Power Supply is a perfect blend of POWER and SIMPLICITY. It delivers dependable *high flash power* at an *affordable price*. The 4000-PS meets the most complex studio demands yet simplifies traveling — take minimal power packs on location. Powerful enough for large format studio work, slow color films and maximum depth of field control, or lighting through diffusion panels and large soft boxes.

Built for uncompromising quality and dependability, the 4000-PS is an excellent foundation for your Norman studio system. Use the special LH4000 Lamphead for a single source up to 4,000 w-s, or use the Series 900 LH2400 Lamphead for power up to 2,000 w-s.

The Power Trim dial allows you to quickly vary the flash power from 100% to less than 5% in accurate, repeatable increments. Fine tune your light balance, match a critical f-stop, or adjust for different cameras or film. The 32-detent dial enables you to repeat a previous setting without the aid of a flash meter.

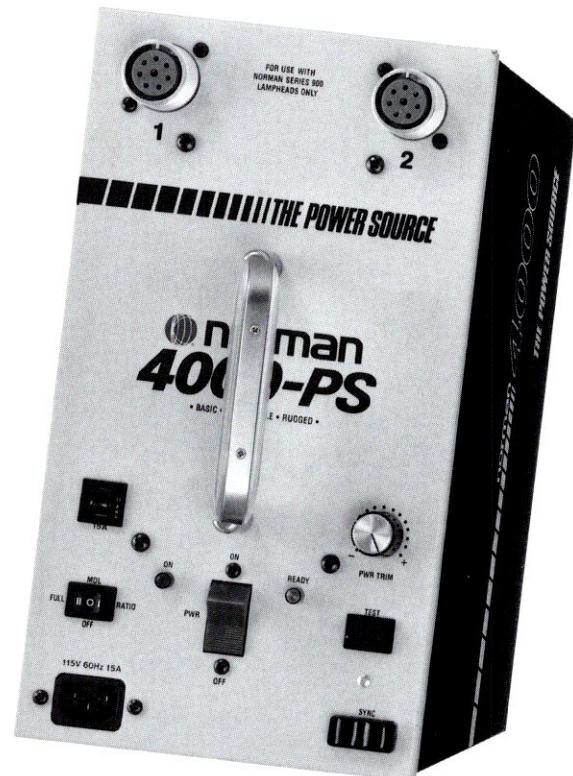
■ **The Power Trim** lets you control the exact f-stop. Offers an infinite sweep adjustment in power output level of 4½ f-stops to provide continuously variable output on one lamphead ranging from 4,000 w-s when using the LH4000 (2,000 w-s on each of two LH2400 Lampheads) to less than 100 w-s on a single lamphead. Even lower with multiple lampheads.

■ **Two lamphead outlets.** The power is divided equally between two lampheads. Use the R9152 Y-Cable to split the output on more than two lampheads.

■ **Model lamp control** selects Full ON, OFF or RATIO — adjusts quartz lamp brightness in direct proportion to selected Power Trim output level. Model lamps will also operate with power switch OFF.

■ **Internal cooling fan** protects components even under the most adverse shooting conditions. Norman uses only the latest technology and components in solid state, transformerless, circuit design.

■ **All Series 900 lampheads** (LH2000, LH2400 and LH4000) can be used with the P4000-PS including the Series 900 TRI-LITE TL-2000 Optical Spotlight and the Norman FS-10 and FS-6 Fresnel Spotlights.



Series 900 Specifications: P4000-PS

Energy Storage (maximum watt-seconds)

4,000 watt-seconds

Power Range on One Lamphead

4000 w-s maximum(LH4000) - 188 w-s minimum

F-stop Range of Output Options

4½ f-stops

Light Output Guide

f 45½ (48,000 BCPS) GN = 560

Using LH4000, 5-E2, 10° satin reflector @ ISO 100

Capacitor Output Channels

1

Lamphead Outlets

2

Flash Duration

1/240 sec (4000 w-s) to 1/4800 sec (100 w-s)

Duration at 100 w-s with LH4000 = 1/4800. With LH2000 = 1/2400.

Recycle Time to 100% Charge

3.5 sec. to 2,000 w-s, 5 sec. to 4000 w-s

Ready Indicator at 100% Charge

Visual ready-light

Down Trim Time

From full power = 20 seconds

Operating Voltage

105-135 volt, 50-60 Hz.

Circuit Breaker

15 amp at 115 volts AC

Actual Weight

23 lbs. 9 oz. (Shipping weight - 27 lbs.)

Dimensions

9½" H x 12 7/16" L x 6 1/2" W

Add 1 1/8" to H for handle.

LH4000 Lamphead — Up to 4,000 w-s from One Lamphead

This versatile lamphead is a "must" for the commercial or advertising studio — even before you buy a 4,000 w-s pack. The dual Helix quartz flash tube design with two lamphead cables can be used for full 4,000 w-s output on the 4000-PS Power Supply. Or, combine the output from any two Series 900 packs to gain more power on one lamphead with faster recycle time and shorter flash duration.

■ Use the full 4,000 w-s from P4000-PS Power Supply — ideal for light boxes or when lighting with diffusion panels.

■ Gain faster recycle time and shorter flash duration when you combine power from two Norman Series 900 w-s packs into a single source.

■ Saves time when used in a fixed lighting setup — controls the power output up to 4,000 w-s, without switching the lamphead.

■ When used with the P4000-PS Power Supply, one light can be adjusted in power to compensate for a change in film speed or when using several camera formats, such as exposures on 8" x 10" and 35mm.

See page 19 for more LH4000 information.



LH4000 Lamphead shown with 5DL reflector.

Flexible and Reliable for Any Assignment



Most photographers are willing, and able, to tackle nearly any type of assignment. But, will you have the equipment that can adapt to the job as well as you can? The Norman P24/24 Power Supply can be the answer for just the right power in the right place, at the right time.

The P24/24 has a power range from 2,400 watt-seconds all the way down to 50 w-s on a single lamphead when using the channel combinations with the Power Trim dial adjustment. You can create numerous lighting ratios, using up to six lampheads.

■ **Extraordinary control of light output.** It is engineered like three packs in one — 400, 800 and 1,200 w-s channels which can be isolated or combined to create power levels suitable for a wide range of applications from low-key portraiture to commercial sets. Each channel has two lamphead outlets.

■ **Fast recycling time.** Recharges to full power (2,400 w-s) in 3½ seconds and to 400 w-s in ½ second.

■ **The Power Trim dial** varies all lights equally. This maintains the lighting ratios you have established on the three channels. The Power Trim dial varies all lights equally over a 3 f-stop range. The 32-detent dial lets you adjust the light output in accurate, repeatable increments.

■ **Two sync outlets;** one for the camera and another for your strobe meter.

■ **Super-sensitive photo cell** for remote triggering is built-in with an on/off switch.

■ **Audible ready indicator** sounds when the unit is at full charge. Switchable.

■ **Unique circuit design** with special phase control charging that is easy on household-rated circuit breakers. Heavy duty, transformerless, all solid-state circuit (less weight, less heat). Fan-cooled power circuit minimizes chance of overheating, even when shooting a rapid-fire motor drive session.

■ **All Series 900 Lampheads** (LH2000, LH2400 and LH4000) can be used with the P24/24 including the TRI-LITE TL-2000 Optical Spotlight and Norman fresnel spots.

Series 900 Specifications: P24/24

Energy Storage (maximum watt-seconds)	2,400 watt-seconds
Power Range on One Lamphead	2,400 w-s maximum - 50 w-s minimum
F-stop Range of Output Options	5½ f-stops, (numerous combinations)
Light Output Guide	f 32¾ (30,000 BCPS) GN = 430 Using 5E-2, 10° satin reflector @ ISO 100
Capacitor Output Channels	3 independent channels
Lamphead Outlets	6
Flash Duration	1/200 sec. (2,400 w-s) to 1/1,200 sec. (400 w-s)
Recycle Time to 100% Charge	3½ seconds to 2,400 w-s
Ready Indicator at 100% Charge	Visual ready-light and audible signal (switchable)
Operating Voltages	90-135 volt, 50-60Hz
Circuit Breaker	15 amp @ 115 volts
Actual Weight	18 lbs. 13 oz. (Shipping weight - 31 lbs.)
Dimensions	9" H x 13" L x 6½" W (dimensions to top of connectors)

SEVERAL POWER OUTPUT EXAMPLES ON THE P24/24

CHANNEL	1+2+3 (Symmetrical)			1↔2↔3 Combine/Isolate Mode (Asymmetrical)			
	Output	Maximum		Channels Used	Maximum		Minimum
		1 Head	2 Heads		1 Head	2 Heads	
1 HEAD	2,400	50		1 Isolated	400	200	50
2 HEADS	1,200	25		2 Isolated	800	400	100
3 HEADS	800	17		3 Isolated	1,200	600	150
4 HEADS	600	12		1+2 Combined	1,200	600	150
NOTE: Range is continuously variable using Power Trim dial. The Minimum rating is with Power Trim at -3 position.				2+3 Combined	2,000	1,000	250
Lampheads can be used in any combination of channels and Power Trim levels for unlimited light ratio combinations. Minimum is with Power Trim dial at -3.							



The $\frac{3}{8}$ " grid from the GR-101S (1" thick) set is shown with the GH-10 Grid Holder on the LH2400-B Lamphead.

New Round Grid Sets Available for 5" and 10" Norman Reflectors

Using a Grid Holder on the rim of the lamphead, you can place a variety of black metal honeycomb grids over your lights to form a soft, vignetted circle of light.

Each grid set contains an assortment of three different honeycomb grid cell sizes

($\frac{1}{8}$ ", $\frac{3}{16}$ ", $\frac{3}{8}$ "). Choose from two grid thicknesses ($\frac{1}{2}$ " or 1") to change coverage area and light fall-off at different working distances. The 1" thick set will give a more precise, circular vignetting pattern, than the thinner $\frac{1}{2}$ " grids. See page 55 for more information on Norman grid accessories.

The Best of Everything in One Pack

The Norman engineers had the vision to make the ideal all-purpose 2,000 w-s commercial power supply. Using the experience gained over 30 years of power supply manufacturing, they created the P20/20, a high quality, dependable product that delivers all the best features in a lighter weight and smaller size pack that is 1/3 shorter than the previous XT series.

Power switching capabilities deliver over **50** output combinations using six lamphead outlets on two independent output channels for either symmetrical or asymmetrical light distribution. Plus a combination plug for single source output of 2,000 w-s.

■ **Improved switching capabilities** with full f-stop increments. Like two packs in one. Channel A switches to 200 or 400 w-s and Channel B from 800 to 1,600 w-s.

■ **Super-sensitive photo cell** for slave triggering is built-in with on-off switch. Two sync plugs—for camera *and* meter.

■ **Audible ready indicator** sounds when flash is at full charge. Switchable.

■ **Fast recycle time** 2 1/2 sec. to 2,000 w-s.

■ **Six outlets** and variable ratio capability give wide flexibility in light output control providing power on one lamphead ranging from 2000 to 200 watt-seconds. Dial down to 100 w-s with the Power Trim and even lower with multiple heads.

■ **Power Trim** lets you adjust the output level by 1 1/8 f-stops and maintain the exact power ratio of the individual lampheads. Use the 32-detent dial to adjust the power level to match an exact f-stop.

■ **Model lamp ratio control** feature permits adjustment of quartz lamp brightness in direct proportion to flash output level.

■ **Unique circuit design** with phase-control charging that is easy on household rated circuit breakers. Transformerless, heavy duty, all solid-state circuit (less weight, less heat). Flash the unit for an extended period without overheating.

■ **All Series 900 lampheads** (LH2000, LH2400 and LH4000) can be used with the P20/20 including the Series 900 TRI-LITE TL-2000 Optical Spotlight and the Norman FS-10 and FS-6 Fresnel Spotlights.

Series 900 Specifications: P20/20

Energy Storage (maximum watt-seconds)	2,000 watt-seconds
Power Range on One Lamphead	2,000 w-s maximum - 100 w-s minimum
F-stop Range of Output Options	4 1/4 f-stops (over 50 combinations)
Light Output Guide	f 32 1/2 (25,000 BCPS) GN = 400 Using 5-E2, 10' satin reflector @ ISO 100
Capacitor Output Channels	2 independent channels
Lamphead Outlets	6
Flash Duration	1/240 sec. (2,000 w-s) to 1/2400 sec. (100 w-s)
Recycle Time to 100% Charge	2.5 seconds to 2,000 w-s
Ready Indicator at 100% Charge	Visual ready-light and audible signal
Operating Voltage	105-135 volt, 50-60 Hz.
Circuit Breaker	15 amp at 115 volts AC
Actual Weight	16 lbs. 7 oz. (Shipping weight - 27 lbs.)
Dimensions	7 1/8" H x 12 1/8" L x 6 1/2" W Add 1 1/16" to H for connectors and handle.

SEVERAL POWER OUTPUT EXAMPLES ON THE P20/20

CHANNEL	A		B		A + B			
Power Settings	200	400	800	1600	Combine / Isolate Options			
1 HEAD	200	400	800	1600	1000	1200	1800	2000
2 HEADS	100	200	400	800	500	600	900	1000
3 HEADS	67	133			333	400	600	666
4 HEADS					250	300	450	500

Note: Additional symmetrical ratios created by adding up to six lampheads. Power Trim Control can reduce the output an additional 1 1/8 f-stops.

Power Trim Control – Fine Tuning Flash Output Levels

The Power Trim dial on Norman Series 900 power supplies allows the power output levels of the packs to be fine adjusted in accurate repeatable increments. The adjustment will maintain the exact lamphead output ratios while you fine tune the exposure level to match a desired f-stop, bracket expo-

sures or compensate for filter factors and bellows extension. The 32-detent control enables you to accurately duplicate or repeat a prior setting without using a flash meter. **Each model pack will vary in the range of control, from 1 1/8 f-stop on the P20/20 to 4 1/2 f-stops on the P4000-PS.**

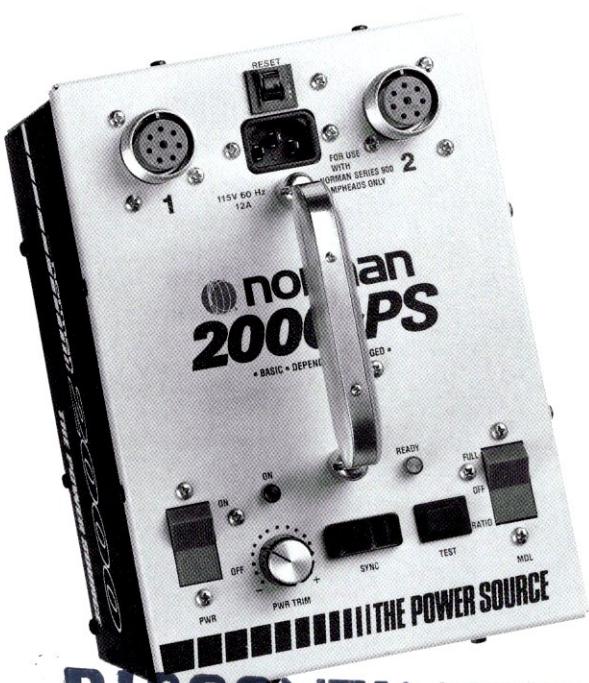


DISCONTINUED



Power Trim control on the P20/20 reduces the overall power output by 1 1/8 f-stops.

P2000-PS



DISCONTINUED

The pure and simple, rugged power source — for multiple-pack light banks, big set or location use.



The Power Source

The P2000-PS is the best value for pure power. It expands Norman's Series 900 high performance line to satisfy the large power needs of the advertising and commercial customers who use multiple power supplies in light boxes, through diffusion panels or in bounce light situations. The extra features that cost hundreds of dollars more on other power supply models are not necessary for this big set type of work, proving once again, Norman engineers are listening to your "real world" needs.

Its size is about equal to the popular P800-D, but the P2000-PS delivers from 2,000 w-s to 125 w-s on one lamphead or may be divided equally between two outlets. The power is infinitely variable over a four f-stop range to easily adapt to different camera format and film speed changes.

The P2000-PS is the perfect blend of power and simplicity. Norman's PS circuitry assures a lightweight, rugged power supply that will continue to provide consistent, reliable flash power for years to come.

If power and cost are more important to you than options and gadgets, the P2000-PS is the choice for you.

■ **Variable power control** over a four f-stop range provides unlimited, incremental adjustment in power output level from 2000 w-s to as low as 125 w-s in one lamphead.

■ **Fast recycle time** 2½ sec. to 2,000 w-s.

■ **Two lamphead outlets** for an additional light angle or better distribution in a large source application. The second lamphead can be added to equally split any selected power level.

■ **Heavy duty transformerless**, all solid-state circuit (less weight, less heat) enables you to flash the unit for an extended period without overheating the power supply.

■ **All Series 900 lampheads** (LH2000, LH2400 and LH4000) can be used with the P2000-PS including the Series 900 TRI-LITE TL-2000 Optical Spotlight and Norman FS-10 and FS-6 Fresnel Spotlights.

Series 900 Power Supplies: P2000-PS

Energy Storage (maximum watt-seconds)	2,000 watt-seconds
Power Range on One Lamphead	2,000 w-s maximum - 125 w-s minimum
F-stop Range of Output Options	4 f-stops, continuously variable
Light Output Guide	f 32½ (25,000 BCPS) GN = 400 Using 5-E2, 10' satin reflector @ ISO 100
Capacitor Output Channels	1
Lamphead Outlets	2
Flash Duration Range	1/240 second for full range (2,000 w-s to 125 w-s)
Recycle Time to 100% Charge	2.5 seconds to 2,000 w-s
Ready Indicator at 100% Charge	Visual ready-light
Operating Voltage	105-135 volt, 50-60 Hz.
Circuit Breaker	12 amp at 115 volts AC
Actual Weight	14 lbs. 12 oz. (Shipping weight - 19 lbs. 8 oz.)
Dimensions	8 7/16" H x 9 1/2" L x 6 3/4" W Add 7/8" to H for connectors and handle.

A Hard Sell on a Soft Light

Often overlooked by the advertising or commercial studio, the 5X Soft Light Reflector is one of the most important accessories that you can own. The 5X produces a very broad, even light like an umbrella, but maintains the directional characteristics of a parabolic reflector plus adds the ability to use barndoors and grids for even better light control. (See page 54 for more details.)

Just a few ways it can be used include:

- Soft, directional light source for food or product photography.
- Main or accent light in fashion and people work.
- Very wide coverage illumination in minimal light to subject distance.
- Broad, even light with minimal flare for under plexiglas sets on backlit product work.
- Wide, even spread of light through light panels within a small space.

A New Dimension in Power and Portability

Here's the one you've been asking for! The P12/12 provides an ideal blend of features for both portrait and commercial applications. Plus, it will travel anywhere in the world with automatic switching for 115 and 230 volt operation.

The Norman P12/12 has a power range from 1,200 watt-seconds all the way down to 20 w-s on a single lamphead. Plus, you can create numerous lighting ratios, using up to four lampheads.

Extraordinary control of light output. Like two packs in one — **A** and **B** are separate channels that can be dialed to any power level between 600 w-s and 150 w-s. Each channel has two lamphead outlets. The POWER TRIM dial varies all lights equally over an additional 3 f-stop range, providing a continuously variable power range of 6 f-stops.

115/230 Volt operation. The P12/12 adjusts automatically for 115 or 230 volt operation. No switches to set. When the voltage specifications are changed, the correct modeling lamp for that voltage must be used.

The Power Trim dial varies all lights equally. This maintains the lighting ratios you have established by the **A** and **B** OUTPUT dials. (See feature below).

Automatic modeling lamp ratioing. When adjusting to various lighting ratios, the modeling lamps adjust automatically in correct proportion to flash outputs.

Super-sensitive photo cell for remote triggering is built-in (switchable).

Audible ready indicator sounds when the unit is at full charge (switchable).

Fast recycling time. Two seconds to full power (1200 w-s) at 115 volts, and 1/2 second to full power at 230 volts.

Unique circuit design with phase control charging that is easy on household-rated circuit breakers. Transformerless, heavy duty, all solid-state circuit (less weight, less heat). Fan-cooled power circuit minimizes chance of overheating, even under a rapid-fire motor drive session.

All Series 900 Lampheads (LH2000, LH2400 and LH4000) can be used with the P12/12 including the TRI-LITE TL-2000 Optical Spotlight and Norman fresnel spots.



Operates on
115 or 230 volts
Automatically!

Series 900 Specifications: P12/12

Energy Storage (maximum watt-seconds)	1,200 watt-seconds
Power Range on One Lamphead	1,200 w-s maximum - 20 w-s minimum
F-stop Range of Output Options	6 f-stops, continuously variable
Light Output Guide	f 22 $\frac{1}{4}$ (15,000 BCPS) GN = 310 Using 5E-2, 10° satin reflector @ ISO 100
Capacitor Output Channels	2 independent channels
Lamphead Outlets	4
Flash Duration	1/400 sec. (1,200 w-s) to 1/800 sec. (600 w-s)
Recycle Time to 100% Charge	2 seconds to 1,200 w-s on 115 volt, 60 Hz
Ready Indicator at 100% Charge	Visual ready-light and audible signal (switchable)
Operating Voltages	90-135 volt or 180-260 volt, 50-60 Hz
Circuit Breaker	15 amp at 115 volts and 10 amp at 230 volts
Actual Weight	12 lbs. (Shipping weight - 15 lbs.)
Dimensions	8" H x 7" L x 7" W

SEVERAL POWER OUTPUT EXAMPLES ON THE P12/12

CHANNEL	A + B (Symmetrical)		A↔B Mode (Asymmetrical)
Output	Maximum	Minimum	
1 HEAD	1200	40	1 HEAD: 600 to 20 w-s range, continuously variable.
2 HEADS	600	20	2 HEADS: 600 to 20 w-s independently variable on each head when using one head on Channel A and one head on Channel B.
3 HEADS	400	13	Or, 300-10 w-s on each head when using both heads on one channel.
4 HEADS	300	10	3 HEADS: 600-20 w-s on the head that is connected on one channel, and 300-10 w-s evenly split between each of the other two lampheads on the other channel.
Note: Range is continuously variable.			4 HEADS: 300-10 w-s independently variable on each group of two lampheads.

P12/12 Power Trim Control – Fine Tuning Flash Output Levels

The Power Trim dial on the Norman P12/12 Power Supply allows the power output levels of the pack to be adjusted in small, accurate increments with this repeatable, 32-step dial. Vary the output level up to 3 f-stops and maintain the exact lamphead output ratios you have established on

Channels **A** and **B**. You can fine tune the exposure level to match a desired f-stop, bracket exposures or compensate for filter factors and bellows extension. With the Power Trim you can duplicate or repeat a prior setting in 1/10th f-stop increments without using a flash meter.



Power Trim control on the P12/12 reduces the overall power output by 3 f-stops.

P2000-D



FS-10
10" Fresnel Lens
2,000 w-s

FS-6
6" Fresnel Lens
2,000 w-s

Practical Blend of Power and Control

The P2000-D is a proven workhorse of the Norman Series 900 power packs that costs less and offers fewer features than the new PS models. A common sense power supply for the commercial photographer, the P2000-D has the versatility and raw power necessary for a studio's varied assignments and lighting accessories.

Power switching capabilities deliver over fifty output combinations using seven lamphead outlets on two independent output channels for asymmetrical light distribution. Plus a combination plug for output of 2,000 w-s or a symmetrical balance for any combination of heads and power settings.

The heavy duty, transformerless design is all solid state circuitry, enabling you to flash the unit for extended periods of time without overheating. Removable circuit modules make service, if ever required, fast and inexpensive.

■ **Fast recycle time** 2 1/4 sec. to 2,000 w-s.

■ **Ratioed light bank** distribution gives wide flexibility in light output control providing power on one flash head ranging from 2,000 w-s to 400 w-s. Even lower with multiple heads.

■ **Switchable, flash ratio** feature gives you two power units in one to vary the light level from multiple lampheads in over fifty combinations.

■ **Seven lamphead outlets** from 2,000 w-s to as low as 400 w-s on standard Series 900 lampheads.

■ **Ratio light distribution** feature permits adjustment of modeling lamp brightness in direct proportion to flash outputs.

■ **Heavy duty transformerless**, all solid-state circuit (less weight, less heat). Like all Norman equipment, protected by a two-year limited warranty.

■ **All Series 900 lampheads** (LH2000, LH2400 and LH4000) can be used with the P2000-D including the Series 900 TRI-LITE TL-2000 Optical Spotlight and Norman FS-10 and FS-6 Fresnel Spotlights.

Series 900 Specifications: P2000-D

Energy Storage (maximum watt-seconds)	2,000 watt-seconds
Power Range on One Lamphead	2,000 w-s maximum - 400 w-s minimum
F-stop Range of Output Options	2 1/4 f-stops (over 50 combinations)
Light Output Guide	f 32 1/2 (25,000 BCPS) GN = 400 Using 5-E2, 10° satin reflector @ ISO 100
Capacitor Output Channels	2 independent channels
Lamphead Outlets	7
Flash Duration	1/240 sec. (2000 w-s) to 1/1200 sec. (400 w-s)
Recycle Time to 100% Charge	2.75 seconds to 2,000 w-s
Ready Indicator at 100% Charge	Visual ready-light
Operating Voltage	105-135 volt, 50-60 Hz.
Circuit Breaker	15 amp at 115 volts AC
Actual Weight	29 lbs. (Shipping weight - 40 lbs.)
Dimensions	10 1/16" H x 15 13/16" L x 6 1/2" W Add 1 1/16" to H and L for connectors and handle.

SEVERAL POWER OUTPUT EXAMPLES ON THE P2000-D

CHANNEL	1	2	1 + 2	Combine / Isolate Options
Power Settings	400	800	800	1200
1 HEAD	400	800	800	1200
2 HEADS	200	400	400	600
3 HEADS	133	266	266	400
4 HEADS	100	200	200	300

Note: Additional symmetrical ratios created by adding up to seven lampheads.

Fresnel Flash Spotlights Added to Norman System

For special lighting problems or creative opportunities, Norman offers two Fresnel Focusing Spotlight Lampheads, 6" or 10" lens diameter, compatible with any of the Norman Series 900 power supplies.

They provide an intense, even light — sharp and hard for heavy contrast or can be easily adjusted to a soft, smooth flood effect. Snoots, barndoors and other accessories are available to increase critical light control. See page 21 for product details.

All-Purpose Power and Portability

For years, the P800-D has been a favorite among commercial and portrait photographers as the power supply that fills the in-between role for low priced power and portability when high power and convenience features are not necessary. As in all of the Series 900 electronic flash equipment, the P800-D is a heavy duty, transformerless design with all solid state circuitry for a long service life.

A total power capability of 800 w-s can be used on one light or divided into two independent 400 w-s output channels. The power level of each channel is selectable to 400 or 200 w-s on one light or distributed either symmetrically or asymmetrically to multiple lampheads.

■ **Switchable, flash ratio** distribution on four lamphead outlets for wide flexibility in light output control. Provides power on one flash head ranging from 200 w-s to 800 w-s. Even lower with multiple heads.

■ **Fast recycle time.** 1 1/4 sec. to 800 w-s.

■ **Ratio light distribution** feature permits adjustment of modeling lamp brightness in direct proportion to flash outputs.

■ **Heavy duty transformerless**, all solid-state circuit (less weight, less heat) enables you to flash the unit for an extended period without overheating the power supply.

■ **All Series 900 lampheads** (LH2000, LH2400 and LH4000) can be used with the P800-D including the Series 900, TRI-LITE TL-2000 Optical Spotlight and Norman FS-10 and FS-6 Fresnel Spotlights.

Series 900 Specifications: P800-D

Energy Storage (maximum watt-seconds)	800 watt-seconds					
Power Range on One Lamphead	800 w-s maximum - 200 w-s minimum					
F-stop Range of Output Options	2 f-stops					
Light Output Guide	f 22 1/4 (10,000 BCPS) GN = 250 Using E-2, 10° satin reflector @ ISO 100					
Capacitor Output Channels	2 independent channels					
Lamphead Outlets	4					
Flash Duration	1/600 sec. (800 w-s) to 1/1200 sec. (200 w-s)					
Recycle Time to 100% Charge	1.25 seconds to 800 w-s					
Ready Indicator at 100% Charge	Visual ready-light					
Operating Voltage	105-135 volt, 50-60 Hz.					
Circuit Breaker	15 amp at 115 volts AC					
Actual Weight	15 lbs. (Shipping weight - 18 lbs.)					
Dimensions	8 5/8" H x 9" L x 7" W Add 1 1/16" to H for connectors and handle.					

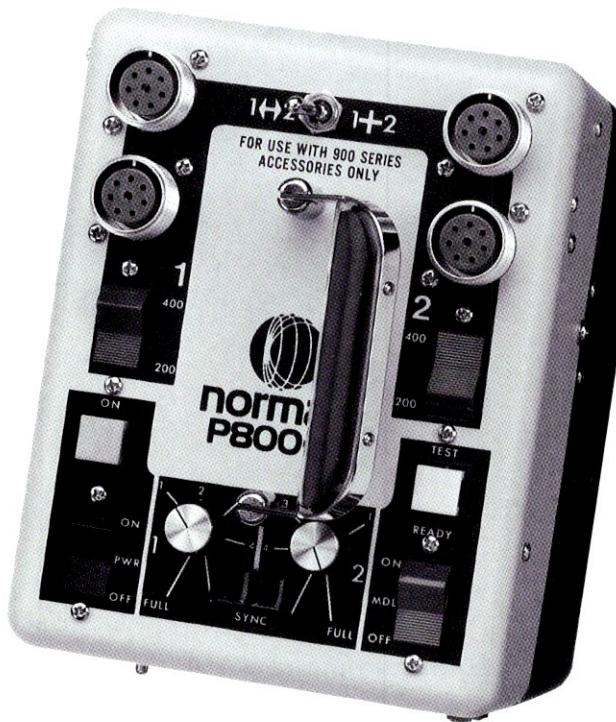
SEVERAL POWER OUTPUT EXAMPLES ON THE P800-D

CHANNEL	1		2		1 + 2		
Power Settings	200	400	200	400	400	600	800
1 HEAD	200	400	200	400	400	600	800
2 HEADS	100	200	100	200	200	300	400
3 HEADS					133	200	266
4 HEADS					100	150	200
Switch Position	Isolate		Isolate		Combine		

LIGHT HOSE ACCESSORY AVAILABLE FOR TRI-LITE TL-2000

It's the creative photographer's tool for the commercial studio, small product photography, creative portrait and fashion work. The TRI-LITE TL-2000 is a 2,000 w-s focusing spotlight with a condenser lens flash system. Adjustable iris control varies size of spot, allowing you to put lighting accents in just the right area. Project patterns, color gels or transparencies for special effects. Uses 5" lens as standard and will accept most Kodak Carousel projector lenses, including the zoom lens.

Light Hose Attachment for the TRI-LITE gives you even more control and creative opportunities. For a minimal additional investment, this accessory makes your TRI-LITE even more valuable as an everyday light source. As a strobe light — it is a localized point source to supplement normal electronic flash setups. Or use as a tungsten source — "painting" with light over larger areas to control highlights, shadows, texture and shape. See page 57 for more information on the DeCapua Light Hose Attachment for the TRI-LITE.



LH2400



**LH2400-B Lamphead
shown with optional
Constant-speed Blower**

The Strong, Lightweight Choice Built for Rugged Commercial Applications

The lamphead is a critical part of every flash system. From its circuitry and flash tubes to its cables, reflectors and accessories, the system must be designed efficiently to conserve precious flash power. Norman has engineered the new LH2400 Lamphead to be the most efficient lamphead possible. And it's loaded with custom features. Designed to operate on Series 900 power supplies, the LH2400 gives shorter action-freezing flash durations at high power. And each lamphead comes complete with a 2,400 w-s (FQ3-UV) plug-in flash tube, 150-watt (Q150CL/DC) quartz modeling lamp, 20-foot cable, R4130 Friction-float Stand Adapter and R4154 Kable Keeper.

■ **High-impact Housing.** Built tough to sustain years of rugged studio use or the abuse of location travel. Constructed of a high impact fiberglass resin, the LH2400 will not dent, bend or scratch and will withstand high temperatures.

■ **Model lamp switch.** A convenient on-off switch at the top of the unit permits individual modeling lamp control at the lamphead.

■ **Two reflector mounting methods.** 1. Twist-lock clips make changing reflectors a breeze – one twist and the reflector is locked in place. 2. Standard Norman mounting holes are used for attaching large accessories, including soft boxes and the 5X Reflector.

■ **Fan-cooled or convection cooled.** Lampheads can be ordered with the blower (LH2400-B) or without the blower assembly (LH2400). The R9124 Constant-speed Blower can be ordered separately and is easily installed at any time.

■ **Ample 20-foot cable length** has an improved design to optimize the electrical current flow and maintain maximum flexibility. The custom made cable is tough, yet coils easily, doesn't kink and won't become excessively stiff in cold weather.

■ **Friction-float Stand Adapter** offers unlimited movement and fine adjustments without loosening and retightening the adapter knob. Comes with $\frac{3}{8}$ " insert. Optional $\frac{1}{2}$ " and $\frac{5}{8}$ " inserts available. Any Norman umbrella, or others with up to $\frac{3}{8}$ " diameter shaft, lock into place with a thumbscrew.

Series 900 Specifications: LH2400

Maximum Energy	2,400 watt-seconds
Modeling Lamp (included)	150-watt clear quartz halogen (Q150CL/DC)
Modeling Lamp (optional)	250-watt clear quartz halogen (Q250CL/DC)
Flash Tube	
Standard UV-Corrected FQ3-UV	5500° K (effective Kelvin temperature)
Weight (including cables)	2 lbs. 4 oz.
Cord Length	20-foot cable with Series 900 connector

Series 900 Lamphead Options

(Complete product information on pages 59 and 62.)

Flash Tube

All Series 900 lampheads now include a UV-coated flash tube — especially important for photographers using transparency film. The ultraviolet-absorbing coating yields a richer and slightly warmer color saturation, cleaner whites and purer highlights without the blue fluorescent effect. (See Page 19 for more information).

Modeling Lamp

A 150-watt quartz modeling lamp, made with a shorter V-shaped filament to last longer, is standard with each lamphead. As an option, a 250-watt lamp is available.

Lamphead Tube Cover

This protective metal cover enables you to store or transport the lamphead without fear of breaking the flash tube or modeling lamp.

Lamphead Extension and Y-Cables

To extend lamphead distance away from the power supply, Norman offers an additional 20-foot lamphead extension cable. The accessory Y-cable allows two lampheads to plug into any one socket, helpful when splitting the flash output evenly between two lampheads.

Removable Diffusion Dome

This dome provides a beautifully diffused light quality. Easily clipped to the reflector base, the textured glass dome is heat resistant and provides a much more accurate model lamp previewing of flash lighting. Also recommended when using grids for best indication of light pattern. Maximum 150-watt modeling lamp. Light reduction is approximately 25% ($\frac{1}{2}$ f-stop).



LH4000

4,000 w-s Lamphead Adds Power and Versatility To Your System

This high power lamphead delivers up to 4,000 w-s per flash. It is excellent for use in light boxes or with diffusion panels on big sets. The dual helix flash tube, powered by two separate cables, brings even more options of power and control to your photographic assignments.

■ **Use any two Series 900 power units** to gain increased output and shorter flash durations from one lamphead or use the full 4,000 w-s of the P4000-PS power supply.

■ **Faster recycle times** when using two power supplies on lower output levels. For example, achieving 800 w-s by using two power supplies on 400 w-s each, will yield the recycle time of one power supply at 400 w-s.

■ **Shorter flash durations** to freeze subject motion. Since the LH4000 uses a dual helix, the flash duration is reduced by 50%.

■ **Protected against overheating.** If the blower is accidentally left off, the thermostats will automatically shut off the modeling lamp and trigger circuit to protect the lamphead from damage. Should this occur, the thermal indicator light on the lamphead will illuminate and remain on until the unit cools and the thermostats automatically reset.

The LH4000 utilizes two 20-foot cables, a "Master" cable and a "Slave" cable. The camera sync is connected to the power supply having the "Master" cable, and the "Slave" power supply automatically operates when the "Master" unit is triggered.

One LH4000 Lamphead includes a constant-speed blower, two cables, FQ4-UV quartz flash tube, 150-watt quartz modeling lamp, R4108 Umbrella Stand Adapter with $\frac{3}{8}$ " insert and two R4154 Kable Keepers.

Series 900 Specifications: LH4000

Maximum Energy	4,000 watt-seconds
Modeling Lamp (included)	150-watt clear quartz halogen (Q150CL/DC)
Modeling Lamp (optional)	250-watt clear quartz halogen (Q250CL/DC)
Flash Tube	
Standard UV-Corrected FQ4-UV	5500° K (effective Kelvin temperature)
Weight (including cables)	5 lbs. 8 oz.
Cord Length	Two 20-foot cables, "Master" and "Slave" with Series 900 connectors



Why UV Coated Flash Tubes?

Most Norman Flash Tubes Are Now UV-Corrected.

Photographic flash tubes are filled with Xenon gas because when ionized it produces a color spectrum that approximates daylight. The total light range of Xenon is from ultraviolet (high end) to infrared (low end).

Some objects, however, become fluorescent when exposed to ultraviolet light. This is especially true of fabrics that contain optical brighteners, such as those used in wedding dresses and white dress shirts. These will generally emit a bluish hue when exposed to UV rays which can cause them to photograph improperly.

In recent years UV-coated flash tubes have become popular. They generally have a coating on the flash tube helix or on the protective cover that filters out most of the unwanted color spectrum.

In addition, these coatings lower the effective color temperature of the light emitted by the flash tube by about 400°K, for a slightly warmer color photographic result.

Great strides have been made in color film emulsions to prevent them from reacting to ultraviolet light. However, the UV effect cannot be filtered out at the camera when the light fluoresces the subject itself. In that case, the best color quality can be obtained by filtering out the UV spectrum with a UV-corrected flash tube.

Most Norman lampheads now include the specially coated UV-corrected Xenon flash tube. Other non-coated tubes are perfectly satisfactory for most photographic situations.



Comparison of photographic results using standard flash tube (left) and Norman UV-corrected flash tube (above).

LH2000



Special Order Lamphead

The LH2000, has been replaced as our standard Series 900 lamphead by the new LH2400 model, which is superior in design and features. To accommodate studio applications where the LH2000 may be required, it will be available for a limited time on special order with or without the constant-speed blower.

Norman's extensive range of reflectors, grids, diffusers, accessories and light stands will continue to adapt to your existing LH2000 Lampheads, as well as new LH2400 Lampheads, as you add to your system. Each LH2000 includes a FQ3-UV (2,400 w-s) plug-in flash tube, 150-watt quartz modeling lamp, 20-foot cable, R4108 Stand Adapter with $\frac{3}{8}$ " insert and R4154 Kable Keeper.

■ **Fan-cooled or Convection Cooling Models.** Standard lamphead can be ordered with or without the constant-speed blower.

■ **20-foot Cable Length.** The ample length cable has an improved design to optimize the electrical current flow and maintain maximum flexibility. A special outside sheath protects the internal wires, doesn't kink, coils easily, and won't stiffen in cold weather.

■ **Umbrella Stand Adapter.** Heavy duty, R4108 tooth-grip stand adapter is included with $\frac{3}{8}$ " insert. Optional inserts for $\frac{1}{2}$ " and $\frac{5}{8}$ " stands available. Adapter allows use of any Norman umbrellas with the lamphead.

■ **All Series 900 power supplies, reflectors and accessories** can be used with the LH2000 Lamphead. And they are readily adaptable to many other manufacturer's light control devices.

Series 900 Specifications: LH2000

Maximum Energy	2,400 watt-seconds
Modeling Lamp (included)	150-watt clear quartz halogen (Q150CL/DC)
Modeling Lamp (optional)	250-watt clear quartz halogen (Q250CL/DC)
Flash Tube	5500° K (effective Kelvin temperature)
Standard UV-Corrected FQ3-UV	2 lbs. 14 oz.
Weight (including cables)	20-foot cable with Series 900 connector
Cord Length	

OUTPUT EXAMPLES for Series 900 Lamphead and Reflector Combinations

These meter readings are made under actual studio conditions to serve as a reference to guide your selection of the proper amount of watt-second power required for your own type of work.

W-S Power	2000	1600	1200	800	600	400
Light Quality						
BARE BULB - 5DL	f 16 $\frac{3}{4}$	f 16 $\frac{1}{2}$	f 16	f 11 $\frac{1}{2}$	f 11	f 8 $\frac{1}{2}$
SPECULAR - 5E	f 32 $\frac{1}{2}$	f 32 $\frac{1}{4}$	f 22 $\frac{3}{4}$	f 22 $\frac{1}{4}$	f 16 $\frac{3}{4}$	f 16 $\frac{1}{4}$
MEDIUM - 5X	f 16 $\frac{1}{4}$	f 16	f 11 $\frac{1}{2}$	f 11	f 8 $\frac{1}{2}$	f 8
SOFT - WB45	f 22 $\frac{1}{2}$	f 22 $\frac{1}{4}$	f 16 $\frac{3}{4}$	f 16 $\frac{1}{4}$	f 11 $\frac{1}{4}$	f 11 $\frac{1}{4}$
Typical Flash Durations						
Hundredths of a Second	1/240	1/300	1/400	1/600	1/1200	1/2400

Specifications for f-stop ratings above are based on actual studio readings with a flash meter, rated at ISO 100 film speed, at a distance of 10 feet from these light sources: **Bare**: Bulb: 5DL, 140° wide angle Reflector. **Specular**: 5E, satin surface Reflector. **Medium**: 5X, 22° Soft Light Reflector. **Soft**: WB45, white 45" diameter umbrella with 5DL Reflector. See pages 6-7 and the *Reflector and Accessories* section of the catalog for further information and photographic comparisons.

Constant-speed Blower

The optional blower fan keeps consistent air circulation throughout the lamphead, quietly cooling the modeling lamp and flash tube. This extends the bulb life and protects your equipment from heat build up during continuous rapid recycle at high power or when the lamphead is being

used in confined enclosures such as snoots, barndoors or light boxes. Order **R9114** for LH2000 Lampheads and **R9124** for LH2400, LH500, LH54 and LH4-A. Each Constant-speed Blower includes easy-to-install mounting hardware.

Norman Adds Electronic Flash To The Drama of Theatrical Lighting Effects

Norman has added two electronic flash lampheads to enhance your creativity. The focusable Fresnel Flash Spotlights are a versatile light source to highlight any assignment. You can control subtle light gradations, enhance the mood or add localized light to emphasize subject detail. You have precise control to add dramatic effects for portraiture, fashion, commercial or illustrative advertising photography.

The spotlights were originally designed for the television and motion picture industry by Bardwell & McAllister, a division of Norman Enterprises, Inc. Engineered to be lightweight with maximum durability, each spotlight is a welded sheet steel housing supported by a tubular steel yoke.

Each Fresnel Flash Spotlight lamphead includes a FQ20-UV quartz flash tube, 250-watt quartz modeling lamp, 20-foot removable lamphead cable with Series 900 connector and yoke assembly.

10" Fresnel Flash Spotlight (FS-10)

Modeled after the popular 2K Junior Spotlight, this exclusive design offers some of the best features available in an electronic flash spotlight for the still photographer. It produces a brilliant, even light with a long throw and controllable beam.

■ **Brilliant 250-watt quartz lamp** for easy preview in critical lighting situations, even under bright ambient light. Also, you can use this efficient source as a continuous tungsten light for focusing or shooting.

■ **Use any Series 900 power unit** up to 2,000 w-s with the Norman Fresnel Spotlights. Each light has a removable 20-foot cable to optimize the electrical current flow and maintain maximum flexibility. The custom-made cable is tough, yet coils easily, doesn't kink and won't become excessively stiff in cold weather.

■ **Variable light beam focus.** When in the "spot" position, these lights deliver an intense, even light beam — sharp and hard-edged for dramatic, high contrast effects or to accent specific areas. Each lamp can easily be adjusted to the "flood" position to create a broad, soft and smooth beam of illumination.

Fresnel Flash Spotlights



FS-10
10" Fresnel Lens
2,400 w-s



FS-6
6" Fresnel Lens
2,400 w-s

Achieve nearly unlimited lighting effects by adjusting the focusable spotlight size and by adding a wide variety of barndoors, snoots, scrims and other accessories available from your Norman dealer.

Series 900 Specifications: FS-10 10" Fresnel Flash Spotlight

Maximum Energy	2,400 watt-seconds
Modeling Lamp (included)	250-watt clear quartz halogen (Q250CL/DC)
Flash Tube – Standard FQ20-UV	5500° K (effective Kelvin temperature)
Guide Number (ISO 100)	"Spot" position: f-45½ at 2,400 w-s. GN = 560
Range of Lighting Angle	Light field focus 15° to 48°
Diameter of Lens	10" Heat Resistant Fresnel Lens
Mounting Assembly	Yoke with 1" diameter socket
Cord Length	20-foot removable cable with Series 900 connector
Dimensions	17½" L x 17¼" W x 18½" H
Weight (including cables)	28 lbs. (Shipping weight – 37 lbs.)

6" Fresnel Flash Spotlight (FS-6)

Versatile, compact and lightweight — this all-purpose lamphead is ideal in any studio for spot modeling, background accents or fill light. With the specially designed accessories, you have complete control of light and shadow placement.

Fingertip focus control with a quick-action lever for changes from spot to flood position, accessible from the front or rear of the lamphead. Easy rear door access to modeling lamp and flash tube. A variety of snoots and barndoors are available.

Series 900 Specifications: FS-6 6" Fresnel Flash Spotlight

Maximum Energy	2,400 watt-seconds
Modeling Lamp (included)	250-watt clear quartz halogen (Q250CL/DC)
Flash Tube – Standard FQ20-UV	5500° K (effective Kelvin temperature)
Guide Number (ISO 100)	"Spot" position: f-32½ at 2,400 w-s. GN = 415
Range of Lighting Angle	Light field focus 12° to 36°
Diameter of Lens	6" Heat Resistant Fresnel Lens
Mounting Assembly	Yoke with 5/8" diameter socket
Cord Length	20-foot removable cable with Series 900 connector
Dimensions	12" L x 10" W x 11½" H
Weight (including cables)	12 lbs. 6 oz. (Shipping weight – 17 lbs.)



Projected patterns with the TRI-LITE add interest to seamless background. A pre-cut pattern was placed in a gel holder of the unit and positioned to the side of the camera as an off-axis projector. This technique can also be used with small product photography to project art patterns or even a company logo into the scene.

Photography by Peters Main Street Photography.

■ **Accurate pre-viewing** with bright 250-watt quartz-halogen modeling lamp. Enables you to see lighting effects even under high ambient light conditions.

■ **Variable output of modeling lamp** to adjust its intensity to be visually balanced with your other studio flash units. Full power modeling button boosts light intensity when needed, while allowing bulb to idle at a lower power, reducing heat and greatly extending bulb life.

■ **Forced air cooling** with built-in blower. Recessed on underside of unit to assure unrestricted air flow.

■ **Internal condensing lens system**, with a speed of f.5, makes the light output of the TRI-LITE extremely efficient.

■ **Built-in, camera-quality, iris diaphragm.** Accurately controls the size of the spot without affecting the light output (film exposure). Adjusts with lever action under body of unit. Using the variable iris and standard 4 inch (100mm) lens, the adjustable range of the spot coverage is shown below at varied distances.

Light-to-Surface Focused Distance	Spot Coverage Diameter Minimum	Maximum
2 feet	1 inch	11½ inches
5 feet	2½ inches	30 inches
10 feet	5 inches	60 inches

Spot size can also be modified by cutting a round hole (or other shape) in an opaque mask and placing it in the gel holder.

■ **Four inch (100 mm) flat field lens** for focusable, sharp spotlight circle edges without aberrations. Yields a 60" diameter spot at 10 feet. Uses most lenses that fit a Kodak Carousel* slide projector.

■ **Gel transparency holder** fits into the side of the unit to project color gels, patterns or transparencies. Holds standard 3" x 3" gels, 35mm transparencies and the larger "superslides."

■ **Yoke assembly with Friction-float Stand Adapter** offers dual movements for full freedom in positioning TRI-LITE. Friction-float action of R4130 Stand Adapter permits easy, accurate positioning of the lamphead. And you don't have to loosen and re-tighten the adapter knob. Comes with ¾" insert. Optional ½" and 5/8" diameter inserts are also available.

■ **Variable power output** controlled by the Norman power supply you select. The TRI-LITE is compatible with low power levels of studio portraiture and is efficient enough to satisfy most commercial view camera assignments.

■ **Two models available.** The TL-2000, Series 900 unit will operate up to a maximum of 2,000 w-s. The TL-500 for Series 500 power supplies has a limit of 400 w-s. Flash modules are interchangeable to allow one unit to be used with both Series 900 and Series 500 power supplies.

*Kodak and Carousel are registered trademarks of the Eastman Kodak Company.

TRI-LITE As A Focusing Optical Spotlight

A precision control light source when an adjustable spotlight is required in electronic flash. The iris diaphragm, internal condenser lens and flat field projector lenses form perfect circles of light without halo or aberrations. Adjust the size and focus of the TRI-LITE for hard or soft-edge spotlight effects.



Special effects for portrait photography using the TRI-LITE to create a circle spot and hard shadow on the background. Effective with color background paper or also with white background paper by adding a color gel to the fill light source. Photography by Ed Matuska

The TRI-LITE As A Background Projector

An unlimited number of opportunities exist when using the TRI-LITE to enhance your background. Use in rear projection with an acetate screen — no more time exposures, uneven density or heavy filtration as with a tungsten slide projector. Effective also as an off-axis projector to reflect transparencies or patterns on to the background, or even upon the subject.



Used in a rear projection application, the TRI-LITE can provide predictable, high quality results, without the complications of time exposures and color shifts experienced with conventional slide projectors. The entire exposure can be from electronic flash, with bright, even illumination. Using the TRI-LITE regularly, makes it easy to be innovative in your photographic images.

Photography by William Eastabrook.

A Versatile 2,000 w-s Optical Spotlight

Contemporary photography is returning to the dramatic styles of Hollywood lighting of the 50's. Over the past years, European studios have been using an increasing amount of hard lighting, with a creative use of the distinct shadows. The bold, artistic lighting of spotlights is being used in portrait, commercial, architectural and industrial assignments — and not just in advertising or fashion work.

Norman's TRI-LITE is a very economical investment in exchange for an extremely versatile lighting unit that can help you control, emphasize, accent and enhance your photography.

Use as a focusing spotlight for hard or soft spotlight edges; as a background projector for transparencies or abstract patterns; and, as a precisely controllable light source for any type of local accent needed in your work.

You can see exactly what you get with the efficient condenser lens lamp system. A bright 250 watt modeling lamp can be ratioed to your lighting balance or used at full brightness for positioning the light even under high ambient light levels.

Now even more valuable with the DeCapua Light Hose Attachment — an economical fiber-optic system for "painting with light".

Specifications of TRI-LITE Optical Spotlight

	TL-500 (Series 500)	TL-2000 (Series 900)
Maximum Energy	400 watt-seconds	2,000 watt-seconds
Flash Tube	FT400-UV	FQ20-UV
Guide Number (ISO 100)	135 at 400 w-s	275 at 2,000 w-s
Modeling Lamp (included)	— ENH 250-watt quartz halogen —	
Cord Length	20 feet	20 feet
Lens	— f-2.8 aperture — — 4 inch (100 mm) focal length supplied — — 16 lbs. 12 oz. — — 22 lbs. 4 oz. — — 4" H x 19½" L x 5" W — (excluding yoke assembly)	
Weight		
Shipping Weight		
Dimensions		



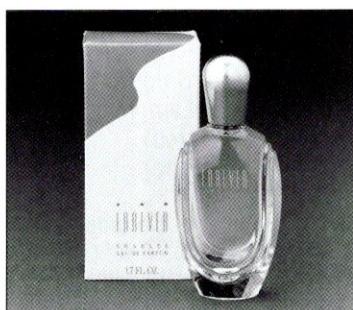
DeCapua Light Hose Attachment for the TRI-LITE

An affordable means to add special fiber-optic light painting techniques to your photographs. Use as a strobe or tungsten light source. See pages 12 and 57 for additional product information.

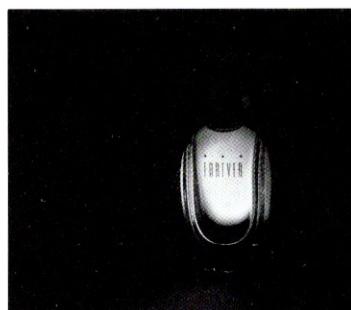
The TRI-LITE As A Local Accent Light

A versatile electronic flash light source, with exacting control of size, shape and intensity, to add light (build density and detail) into shadow pockets, to accent a feature of the product, or to introduce a local color highlight. Cut special shaped masks for the gel holder to project light into very critical, selective areas.

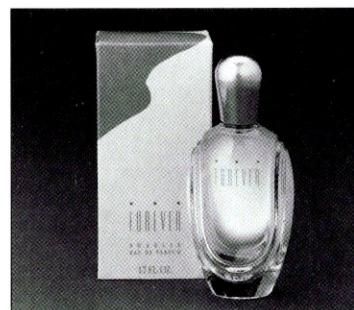
In this example, the TRI-LITE brings the perfume bottle to life. Small product or food photography often has a troublesome pocket of light, or a dark element that needs extra punch. Using the focus control, iris diaphragm and even special shaped masks in the gel holder, you can add light just where you need it.



1) Front lighting leaves the perfume bottle lacking in readability, dimension and shape. Liquid in the bottle is dull and dark from the influence of the background.



2) The TRI-LITE was positioned behind the set and adjusted to a spot size of about 1½". The iris control prevented light from spilling beyond the back of the bottle. A small piece of diffusion acetate was glued to the back of the bottle to spread the illumination evenly over the surface.



3) The final result of the front light and the TRI-LITE shows an added brilliance and detail to the bottle as well as an increased dimension to the entire photo.

Series 900



Variations for your Series 900 Assembly:

B - Includes R9124 Constant-speed Blower on lampheads

ASSEMBLIES WITH BLOWER:

- A800D-B**
- A12/12-B**
- A2000D-B**
- A20/20-B**
- A24/24-B**
- A2000PS-B**
- A4000PS-B**

Commercial Assemblies The Foundation To Your Studio System

The powerful, rugged Series 900 power supplies give you seven different power and feature choices. Paired with our Norman LH2400 Lamphead and the 5E, 10" general purpose reflector, any power supply can be ordered as a complete assembly to make your purchase easier—*plus save you some money!*

All Series 900 assemblies below include the standard convection-cooled LH2400 Lamphead and UV-corrected, FQ3-UV plug-in flash tube. The lamphead can also

be ordered with the optional R9124 Constant-speed Blower.

Any of the assemblies will serve as an economical base to your studio lighting system. And you can build on this base for years to come! Complemented by a complete line of reflectors and accessories, all Series 900 power supplies and lampheads are completely compatible — an essential requirement for the growth and versatility of your commercial photography studio.

Your Choice of Power Supply, Lamphead and Accessory Combinations



LH2400-B shown with blower and 5E-24 Reflector



LH2400 shown with 5U-24 Reflector and WB45 Umbrella

A800-D Assembly

- 1 - P800-D Power Supply
- 1 - LH2400 Lamphead
- 1 - 5E-24 Reflector

A12/12 Assembly

- 1 - P12/12 Power Supply
- 1 - LH2400 Lamphead
- 1 - 5E-24 Reflector

A2000-D Assembly

- 1 - P2000-D Power Supply
- 1 - LH2400 Lamphead
- 1 - 5E-24 Reflector

A20/20 Assembly

- 1 - P20/20 Power Supply
- 1 - LH2400 Lamphead
- 1 - 5E-24 Reflector

A24/24 Assembly

- 1 - P24/24 Power Supply
- 1 - LH2400 Lamphead
- 1 - 5E-24 Reflector

A2000-PS Assembly

- 1 - P2000-PS Power Supply
- 1 - LH2400 Lamphead
- 1 - 5E-24 Reflector

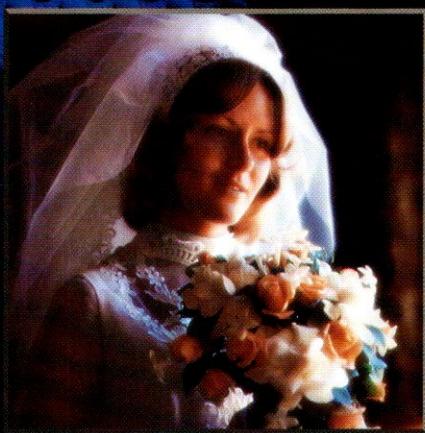
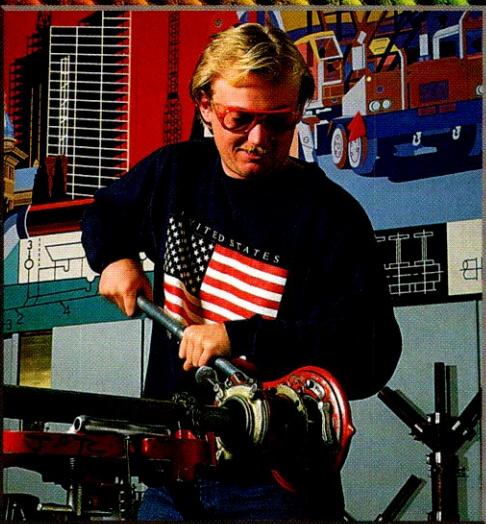
A4000-PS Assembly

- 1 - P4000-PS Power Supply
- 1 - LH4000 Lamphead
(not pictured)
- 1 - 5E2 Reflector

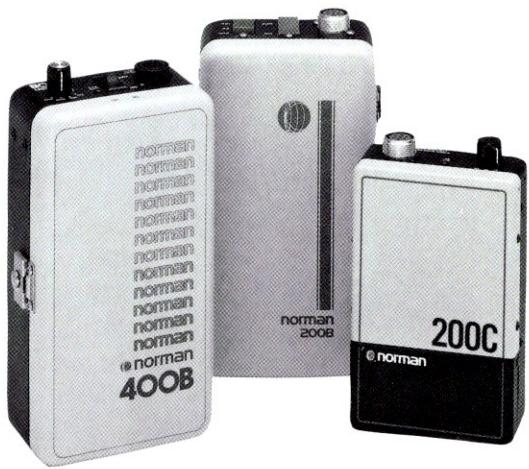
All assemblies can be ordered with the fan-cooled lamphead. A UV color-corrected flash tube is standard with the LH 2400 Lamphead. (See column on left.)

The best professional battery portables in the industry are now lighter in weight and deliver more flash energy. Ideal for the photographer in the field striving to capture the "decisive moment".

Battery Portables



Battery Portables



The Norman Battery Portable Flash Units offers a choice to the photographer.

The 400B (400 w-s) and compact 200C (200 w-s) Battery Packs are shown as size comparison with discontinued 200B model.



400B or 200C – Pick The Size Or Power You Need

Norman now offers two models of battery portable flash units for the professional photographer — both improving on our popular 200B.

The **400B** offers up to 400 w-s of power to the lamphead for the demands of sports, news and fashion work. A full f-stop more power, almost double the number

of flashes and in a pack nearly the same size and weight of the 200B.

The **200C** delivers the same 200 w-s power level of the 200B, in a pack that is 37% lighter and 51% smaller. Ideal for the wedding and candid photographers, as well as editorial and photojournalism assignments.

POWER OUTPUT EXAMPLES FOR 400B AND 200C

BCPS light output rating with standard Norman LH2 and LH52-type Reflectors				
W-S Power	50	100	200	400
2D Standard	1,000	2,000	4,000	8,000
2D-RP Wide Angle	375	750	1,500	3,000
2H Telephoto	7,500	15,000	30,000	60,000
2Q Umbrella	1,500	3,000	6,000	12,000
Recycle Time (Sec.)	1/3	3/4	1 1/2	3
Flash Duration	1/3200	1/1600	1/800	1/400
Flashes per Charge				
400B - 2 batteries	1400	700	350	175
200C or 400B - 1 battery	700	350	175	87

Matched Lampheads For Each Series Power Pack

Several lamphead models are designed for use with the each battery portable flash unit. See pages 30-33 for complete information on lampheads, reflectors and accessories available.

- LH52K (400B – Series 500)**
- LH2K (200C & 200B – Series 450)**
Standard lamphead with 5 ft. coiled cord included in assemblies.
- LH52 (400B – Series 500)**
- LH2 (200C & 200B – Series 450)**
Similar to the LH52K, but has 20-foot straight cable. A 5-foot cable model is also available for each (LH52-5 and LH2-5).

LH52K-ML (400B – Series 500)

Similar design to LH52K and LH2K, with the addition of a 12-volt outlet and timer system to operate the 50-watt quartz lamps in ML-type reflectors.

NOTE:

Flashtubes are **not** interchangeable between Series 450 and Series 500.

The **R5045 Lamphead Adapter Cable** enables you to use Series 500 lampheads on any Series 450 power supply including the 200B and 200C Battery Portables.

Versatility Puts Norman Battery Portables On Top

For portable use, it is difficult to find a rival for the Norman lightweight lampheads (Types LH52 and LH2) that offer such a wide range of control of light quality.

From the 2D-RP wide angle reflector for super-soft close-up work in wedding, news and candids; to the other extreme of the 15° focused reflector for high-output flash with telephoto lenses in sports and event photography — Norman has no equal in the field. And it doesn't stop there. Norman also offers a special line of lampheads and reflectors with a battery powered modeling lamp option. See the following pages for full information on other lampheads, reflectors and accessories available for the 400B and 200C battery flash systems.

- 2D General Purpose Reflector**, 5" diameter, 60° coverage angle.
- 2D-RP Soft, wide angle light source** 5" diameter reflector with matte white surface and diffusion dome. 130° coverage angle.
- 2E-J Portrait Reflector**, 10" diameter, with built-in 100-watt modeling lamp, 60° coverage angle.
- 2Q Umbrella Reflector**, 6" diameter with patterned mirror-type surface. 50° coverage angle.
- 2H Telephoto Reflector**, 8" diameter, mirror-type surface, 15° coverage angle. (Includes R4112 optical spacer. When used without the spacer, the coverage angle increases to 60°.)

Battery Portables

High Performance Portable Flash Using Nickel Cadmium Battery Packs

When on assignment out of the studio; at a wedding, a news or sports event, or school candids, the need for reliable equipment is essential. You want a flash that will be ready when you are to capture the "decisive moment" on film.

Although the initial cost may be a little more, the overall benefit of nickel cadmium batteries far outweighs the alternative gel cell battery. With nickel cadmium batteries, you gain more flashes per charge and the overall life in recharge cycles is longer than with the heavier gel batteries. The voltage remains stable, even at the end of the charge level, so

you can count on consistent light output and the same recycle time for every flash.

Norman's exclusive Thermomatic™ Battery Charger can be used on rapid charge to bring the battery back from dead to full charge in only 70 minutes. It is best to recharge batteries as soon as practical after use, and when the unit is stored, maintain a continuous trickle charge to the batteries. This will insure peak performance from your flash system in the same manner as with the popular battery powered tools and household appliances on the market today.

Thermomatic™ Battery Charger

An important component to keep you on the job is the Norman Thermomatic™ Battery Charger, included with the A400B and A200C Battery Portable Assemblies.

- C5120 Charger**
For 400B only (Series 500)
- C4220 Charger**
For 200C only (Series 450)
- C4120 Charger** (Series 450)
Previously supplied with A200B assemblies. Can be used with 200C by plugging into lamphead connector.

Your nickel cadmium batteries will give you constant recycle times and repeatable output levels throughout the charge cycle. They will not, however, maintain a full charge for a long period of time when left on the shelf. We recommend that the charger be left in the "trickle charge" mode to assure that your system will be always ready to operate at top performance.

To recharge the batteries, the cord of the C5120 Charger is plugged into the lamphead connector on the 400B. The C4220

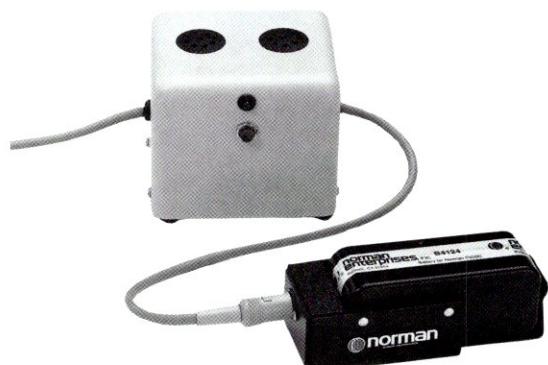
unit plugs into the charge connector on the side of the 200C pack or into the External Charging Tub. All Norman chargers operate on 115-volt AC and can be used in two different charge modes.

Rapid Mode — Push the Rapid Charge button on the front of the charger. The red LED indicator light will illuminate and stay on until the batteries have reached full level, giving you positive proof of a full battery charge. The current draw is only about 3/4 amp on the rapid charge mode. The 400B, with both batteries installed will reach full charge in about two hours (70 minutes if only charging one battery). The 200C recharges in 70 minutes.

Trickle Mode — Do not push the Rapid Charge button and the charger will slowly charge the batteries keeping them in a 100% full charge condition. The battery will not overcharge or undercharge, even if the AC line voltage fluctuates. Trickle charge time to recharge 400B batteries is about 20 hours. The 200C recharges in 12 hours.



Thermomatic™ Battery Charger models have specific connectors to match the Norman Series power supply.



Optional TUB-1 External Charging "Tub" allows a spare battery to be charged while the 200C is in use.

Optional TUB-1 External Battery Charging "Tub"

A new feature of the 200C Battery Portable System allows you to charge a spare battery while the 200C is in use. Simply place a battery into the Tub and connect to

the C4220 Charger in the same manner as you would with the power supply. A spare battery can be conveniently stored in the TUB-1 without being discharged.

Put a Little Light on the Subject

A new ML-type lamphead is available for the 400B (LH52K-ML) and 200C (LH2K-ML), providing a bright modeling lamp within the reflector. It will improve viewing as well as focusing while in dark locations or when outside at night. The 50-watt (12-volt) battery-powered quartz lamp is controlled by a timer and adjustable from

ten seconds to one minute. Push the start button and the lamp stays on through the pre-set timer cycle or until the flash fires. Three reflector options are offered with the model lamp feature: 2D-ML Standard Reflector, 2DRP/ML with Diffuser Dome and 2Q-ML for umbrella use. See page 32 for more information on reflector options.



400B-Series 500 Battery Portable



A400B Battery Portable

Assembly Includes:

- 1 - 400B Power Supply
- 1 - R4127 Contour Shoulder Strap (not shown)
- 1 - C5120 Thermomatic™ Battery Charger
- 2 - B5121 Sub-C Battery Packs
- 1 - LH52K Lamphead with 2D Standard Reflector

Total Performance

Double power OR almost double the flashes of the 200B

We have improved upon the 200B — one of the most successful professional portable electronic flash systems ever manufactured. The new Norman 400B is now twice as powerful as our industry leading 200B Battery Portable flash unit.

■ **Get 400 w-s of power** in a compact case that is nearly the same size and weight as the 200B.

■ **Get almost double the flashes** per battery charge when using both batteries. Up to 350 flashes at 200 w-s from a full charge, or up to 1,400 flashes at 50 w-s.

Technological advances, coupled with consumer demand for battery powered appliances and power tools, have generated a high quality sub-C nickel cadmium

battery — smaller and lower cost than our previous 200B battery (1/2-D cell).

Using the new Series 500 electronic circuitry, Norman engineers have maximized the efficiency of these new batteries to double the power and still deliver 175 full 400 w-s flashes per charge, or 350 flashes at 200 w-s, almost **twice** that of the 200B. You won't find a portable flash system on the market today that can deliver more for your money.

Designed for the professional wedding, sports or news photographer, the 400B is built tough for hard use and years of service. Rugged all-aluminum case, total solid-state electronics and plug-in modular components for easy replacement.

Series 500 Specifications: 400B Battery Portable

Energy Storage (maximum watt-seconds)	400 watt-seconds
Power Range on One Lamphead	400 w-s maximum - 50 w-s minimum
F-stop Range of Output Options	3 f-stops (4 power level options)
Light Output Guide	f 22 (8,000 BCPS) GN = 225 Using 2D standard reflector, 400 w-s @ ISO 100
Capacitor Output	400 / 200 / 100 / 50 w-s
Batteries	Includes 2-B5121 Sub-C Nickel Cadmium Packs (Can also operate on one battery pack)
Flash Duration Range at 100% Charge	1/320 sec. (50 w-s) to 1/400 sec. (400 w-s)
Recycle Time to 100% Charge	1/3 second (50 w-s) to 3 seconds (400 w-s)
Ready Indicator	Visual ready-light on lamphead
Battery Operating Voltage	12 Volts
DC Output Voltage	480 Volts
Power Pack Dimensions	10 1/2" H x 5 1/4" L x 3 1/4" W
Power Pack Weight	5 lbs. 15 oz.
Shipping Weight - A400B Assembly	15 lbs.

■ **More power and four output levels** at your fingertips: 400, 200, 100, or 50 watt-seconds. The power change is instantaneous — no extra flash needed to bleed power. New rotary power switch prevents accidental power switching.

■ **More flashes per charge** to keep you on the job longer; 175 flashes on full 400 w-s power level, 350 flashes at 200 w-s, 700 flashes at 100 w-s and 1,400 flashes at 50 w-s. All 100% voltage stabilized for consistent power output on every flash.

■ **The fastest recycle time** in the industry for battery operated flash enables you to use the 400B with motor drive cameras.

■ **Low battery warning light** helps you determine when battery charge level is low. An automatic voltage cut-off circuit gives extra flashes per battery charge and provides consistent exposures even at low battery charge.

■ **Trigger circuit disables automatically** when power switch is in off position. This eliminates the need to disconnect the sync cord when the flash is not needed.

■ **Automatic circuit protection.** When the lamphead is disconnected from the power supply, the power will automatically be off (regardless of on-off switch position) to prevent accidental battery drain.

■ **Super-rapid battery charging** with Thermomatic™ Charger will recharge the 400B in only 2 hours from dead to a full charge. Cannot be overcharged or accidentally deep charged.

■ **Exceptional versatility.** As part of your Norman system for studio or location work, the 400B is part of the expanding Series 500 equipment line and can be used with other compatible lampheads, power supplies and a full line of reflectors, barn doors, diffusers and accessories.

Smaller Size With All The Features

37% lighter and 51% smaller than the 200B

For years, Norman's 200B had been the "industry standard" in portable battery flash systems. Improved battery technology and compact electronics have contributed to the design of our 200C Battery Power Supply.

With the alternative 400B unit, photographers now have the choice of power supply sizes. Pick the extra f-stop of light output with the higher power 400B; or choose the small and compact 200C that provides greater freedom of movement and an efficient 200 watt-seconds of energy.

The high quality sub-C nickel cadmium battery is manufactured to performance standards that generally exceed those for consumer appliance use. By taking advantage of volume manufacturing to customized specifications, Norman is able to offer a smaller, superior battery that is substantially lower cost than that used in the 200B.

Since the battery is physically smaller, the sub-C battery will not produce quite as

many flashes per charge as the older 1/2-D cell batteries that were used in the 200B. For long assignments, a spare battery can be carried in your camera case. The battery only takes moments to change — open the door of the pack, pull out the low battery and insert the new one — then keep on shooting.

The 200C is ideal for the professional wedding, sports or news photographer, who desires a reliable, powerful and compact portable flash system. As part of the Series 450 equipment line, the 200C Power Supply can be a replacement or addition to your existing 200B equipment. It operates with the LH2-type Lampheads or the LH3B Automatic Lamphead, and the battery can be recharged using the C4120 Charger (supplied with the 200B).

Basic construction includes a rugged all-aluminum case, solid-state electronics and plug-in modular components.

Series 450 Specifications: 200C Battery Portable

Energy Storage (maximum watt-seconds)	200 watt-seconds
Power Range on One Lamphead	200 w-s maximum - 50 w-s minimum
F-stop Range of Output Options	2 f-stops (3 power level options)
Light Output Guide	f-16 (4,000 BCPS) GN = 160
Capacitor Output	Using 2D standard reflector, 200 w-s, @ ISO 100
Batteries	200 / 100 / 50 w-s
Flash Duration Range at 100% Charge	Includes 1-B4124 Sub-C Nickel Cadmium Pack
Recycle Time to 100% Charge	1/1600 sec (50 w-s) to 1/400 sec (200 w-s)
Ready Indicator	1/3 second (50 w-s) to 1 1/2 seconds (200 w-s)
Battery Operating Voltage	Visual ready-light on lamphead
DC Output Voltage	12 Volts
Power Pack Dimensions	480 Volts
Power Pack Weight	8 1/8" H x 4 3/4" L x 2 1/4" W
Shipping Weight - A200C Assembly	3 lbs. 12 oz.
	12 lbs. 13 oz.

■ **The same power as the 200B** — three output levels, 200, 100, or 50 w-s. New rotary switch prevents accidental power switching. The number of flashes per charge are approximately 170 at 200 w-s, 340 flashes at 100 w-s and 680 flashes at 50 w-s. All 100% voltage stabilized for consistent power output on every flash.

■ **The power change is instantaneous.** No need to waste an extra flash to bleed power to desired level.

■ **The fastest recycle time** in the industry for battery operated flash equipment enables you to use the 200C with motor drive cameras.

■ **Low battery warning light** helps you to determine when battery charge level is low. An automatic voltage cut-off circuit gives extra flashes per battery charge and provides consistent exposures even at low battery charge.

■ **Trigger circuit disables automatically** when power switch is in the off position. This eliminates the need to disconnect the sync cord when the flash is not needed.

■ **Automatic circuit protection.** When the lamphead is disconnected from the power supply, the power will automatically be off (regardless of on-off switch position) to prevent accidental battery drain.

■ **Super-rapid battery charging** with Thermomatic™ charger will recharge the 200C in only 70 minutes from dead to a full charge. Cannot be overcharged or accidentally deep charged.

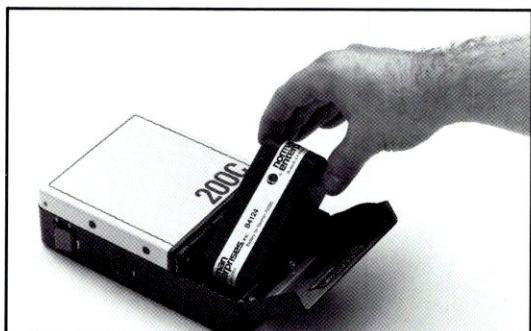
■ **Exceptional versatility.** The battery portable that is truly part of a system. As part of the Series 450 equipment line, the 200C can be used with other compatible lampheads, power supplies and a full line of reflectors, diffusers, and accessories.

200C-Series 450 Battery Portable



A200C Battery Portable Assembly Includes:

- 1 - 200C Power Supply
- 1 - R4127 Contour Shoulder Strap (not shown)
- 1 - C4220 Thermomatic™ Battery Charger
- 1 - B4124 Sub-C Battery Pack
- 1 - LH2K Lamphead with 2D Standard Reflector



Quick, drop-in replacement feature of the 200C makes it convenient to carry a spare battery on assignments that may require a large number of flashes.

LH52



Compact Lamphead With Power And Versatility

The Norman LH52 is a small, compact lamphead, similar to the popular LH2 Lamphead that has been used for years with AC-powered Series 450 power supplies and the 200B Battery Portable Flash Assembly.

Now available for the Series 500 power supplies, (P808, P404, P400SP, P600SP and 400B Battery Portable), the LH52 has been redesigned for higher output levels and uses a 400 watt-second, UV-corrected (FT400-UV) flash tube.

Four models are available:

- **LH52** Standard 20-foot cable with 115-volt AC outlet.
- **LH52-5** Same as LH52 with 5-foot cable.
- **LH52K** 5-foot coiled cord. No AC outlet.
- **LH52K-ML** Similar design to LH52K with addition of a 12-volt outlet and timer system for use with 50-watt quartz lamps in ML-type reflectors.

A very economical lamphead. The LH52 is ideal for use as a hairlight, accent or background light in the studio. Although it is a compact size, the LH52 adapts to a full array of reflectors for portrait, candid or umbrella lighting, for general use, or even for sports photography with the telephoto reflector. See page 32 for full details on the reflectors for the LH52-type Lampheads.

Each basic LH52 Lamphead includes a 20-foot cable with Series 500 connector, removable, 400 w-s, FT400-UV Flash Tube, and a 115-volt AC outlet provision for modeling lamps. A metal $\frac{1}{4}$ " x 20 threaded hole is on the bottom for mounting directly on a camera bracket or adding the optional R4130 Friction-float Stand Adapter. Reflectors can be ordered separately.

Series 500 Specifications: LH52 Type Lampheads

Maximum Energy	400 watt-seconds
Model Lamp	Available with some reflectors (See page 32)
Flash Tube	5500°K (effective Kelvin temperature)
Standard UV-Corrected FT400-UV	Shipping Weight
Weight (including cables)	
LH52 (20 ft. cable)	2 lb. 3 oz.
LH52-5 (5 ft. cable)	15 ounces
LH52K / LH52K-ML (coil cable)	14 ounces
Cord Length	20-foot cable with Series 500 connector



R4109 Snoot shown with LH2 Lamphead.

R4109 Hairlight Snoot

Fits on the 2D Reflector, restricting light to a 25° angle of coverage, to create a spotighting effect for hair light or local accent use. The R4109 includes a 25-watt modeling lamp which connects to the 115-volt AC outlet on LH2 or LH52-type Lampheads (as shown).

■ **Compact size of the LH52 body** (2½" L x 2" W x 4" H) makes it ideal for travel and location work, or as a low-cost unit to backup your regular Series 500 equipment. Use on any Series 500 AC power supply or with the 400B Battery Portable Flash unit.

■ **Ready Light indicator and Open Flash** button on lamphead for easy viewing of ready condition providing the ability to discharge the flash from the lamphead position. (Ready light not visible in photo.)

■ **Battery powered modeling lamp** option of the LH52K-ML Lamphead is used and the 400B Battery Portable Power Pack. This lamphead feature includes a timer-controlled 12-volt outlet to operate the 50-watt quartz modeling lamp in 2D-ML, 2DRP-ML and 2Q-ML Reflectors.

■ **AC power for modeling lamp** provided through the convenience outlet on the standard LH52 Lamphead. 115-volt AC powers the model lamp available on the 2E-J, 2Q and R4109 Snoot. When using these attachments with the 400B Battery

Portable, the optional R4153 Cable is used to connect the modeling lamp to a standard 115-volt wall outlet.

■ **Optional Friction-float Stand Adapter** connects to $\frac{1}{4}$ " x 20 threaded hole in base of lamphead. Provides unlimited movement and fine adjustments plus easy, accurate positioning of lamphead without loosening or re-tightening the adapter knob. Comes with a standard $\frac{3}{8}$ " insert. Inserts for $\frac{1}{2}$ " and $\frac{5}{8}$ " light stands are also available.

■ **Sync Outlet** for standard 2-blade sync cord is located on side of the lamphead.

■ **Adapts to Series 450 power supplies** with R5045 Lamphead Adapter Cable. This short cable correctly matches the pin configuration of any Series 500 lamphead to match with the Series 450 power supply connector.

■ **A Full range of reflectors** and accessories are available for the control of light quality when using Norman's LH52-type lightweight lampheads. See page 32 for more complete information.

Our Most Economical Series 450 Lamphead

For Battery Portables and AC Power Supplies

A long-time mate to the popular 200B Battery Portable Power Supply and the variety of Series 450 AC power supplies, the LH2 Lamphead model continues to be one of the most rugged and versatile lampheads on the market.

Four models are available:

- **LH2** Standard 20-foot cable with 115-volt AC outlet for accessories.
- **LH2-5** Same as LH2, with 5-foot cable.
- **LH2K** 5-foot coiled cord. No AC outlet.
- **LH2K-ML** Similar design to LH2K, with addition of a 12-volt outlet and timer system for use with 50-watt quartz lamps in the ML-type reflectors.

For the studio, the LH2 is an ideal hairlight, accent or background light source. Being small in size and inexpensive, it is also popular for general use and for backup lampheads for your regular Series 450

equipment. Although it is very compact, the LH2 adapts to a full array of reflectors for portrait, candid or umbrella lighting.

For portable use, it is difficult to find a rival for a low-cost lamphead that provides such control of light. From the 2D-RP wide angle reflector for super soft close-up work in news, weddings and candids . . . to a 15° mirror-type reflector for high output flash with telephoto lenses which is ideal for sports and event photography.

Each LH2 basic lamphead includes a 20-foot cable with Series 450 connector, removable FT120-UV (250 w-s) flash tube, and a 115-volt AC outlet provision for modeling lamps. A metal $\frac{1}{4}$ " x 20 threaded hole is located on the base for mounting directly on a camera bracket or for adding the optional Friction-float Stand Adapter. Reflectors can be ordered separately, see pages 32-33.



Series 450 Specifications: LH2 Lamphead

	LH2	LH2-5	LH2K	LH2K-ML
Maximum Energy	250 watt-seconds for all lampheads			
Modeling Lamp Outlet	Optional modeling lamp capabilities in some reflectors (See page 32)			
115-volt	115-volt	None*	12-volt	
* For modeling light operation use R4153 Cable from reflector to wall outlet.				
Flash Tube				
Standard FT120-UV	UV-Corrected to 5500°K (effective Kelvin temperature)			
Cord Length	20-foot cable	5-foot cable	5-foot coiled	5-foot coiled
All cables and cords with Series 450 connectors				
Weight (including cables)	2 lb. 3 oz.	15 ounces	14 ounces	14 ounces
Shipping Weight	3 lb. 3 oz.	1 lb. 14 oz.	1 lb. 13 oz.	1 lb. 13 oz.

■ **Compact size of the LH2 body** ($2\frac{1}{2}$ "L x $2\frac{1}{2}$ "W x $4\frac{1}{2}$ "H) makes it ideal for travel and location work, or as a low-cost spare to backup your regular Series 450 equipment. Use on any Series 450 AC power supply or with the 200B and 200C Battery Portable flash units.

■ **AC power for modeling lamp feature** provided through the convenience outlet on the standard LH2 Lamphead. 115-volt AC powers the modeling lamp available on the 2E-J, 2Q and R4109 Snoot. When using these attachments with a battery portable pack, the optional R4153 Cable is used to connect the modeling lamp to a standard 115-volt outlet.

■ **Sync Outlet** for standard 2-blade sync cord is located on the side of the lamphead.

■ **Ready Light indicator and Open Flash button** on lamphead for easy viewing of ready condition and ability to discharge the flash at the lamphead.

■ **Battery powered modeling lamp** option with LH2K-ML Lamphead. (Used with the 200B or 200C Battery Portable Power Supplies.) This lamphead includes a timer-controlled 12-volt outlet to operate the 50-watt quartz modeling lamp in the 2D-ML, 2DRP-ML and 2Q-ML Reflectors.

■ **Optional Friction-float Stand Adapter** connects to $\frac{1}{4}$ " x 20 threaded hole in base of lamphead. Provides unlimited movement and fine adjustments plus easy, accurate positioning of lamphead without loosening or re-tightening the adapter knob. Comes standard with $\frac{3}{8}$ " insert. Inserts for $\frac{1}{2}$ " and $\frac{5}{8}$ " diameter light stands are also available.

■ **Full range of reflectors** and accessories for the control of your light output and quality are available. See pages 32-33 for more complete information.



LH2K-ML Lamphead

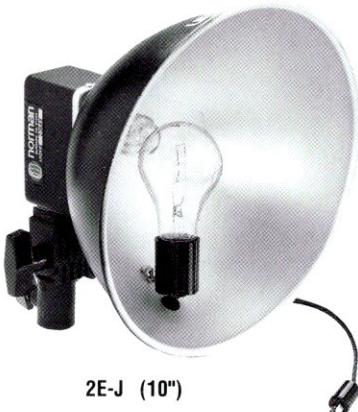


A full range of reflectors and accessories for the control of your light output and quality are available.

Reflectors



2D-RP (5")
2DRP-ML (not shown)
Includes 12-volt / 50-watt
modeling lamp.



2Q (6")
2Q-ML (not shown)
Includes 12-volt / 50-watt
modeling lamp.

Reflectors For Compact Lampheds

Fits LH2 and LH52 models

2D **60° General Purpose Reflector** **5" Diameter**

Textured semi-gloss surface reflector. Best all-around reflector for weddings, candids, sports, editorial and studio use. Accepts accessories for 5" diameter reflectors.

2D-RP **130° Wide Angle Reflector** **5" Diameter**

Textured white surface with frosted Pyrex dome to provide a super-soft and even lighting, not normally experienced with portable lamphead reflectors. Light compensation of 1 1/2 f-stops is required over the standard 2D Reflector.

2D-ML and 2DRP-ML **Modeling lamp for battery units**

For use with LH2K-ML and LH52K-ML Portable Lampheds. Adds a 50-watt (12-volt) quartz modeling lamp to the interior of the standard 2D or 2D-RP Reflectors. Provides light for viewing and focusing in dark locations. Plugs into outlet on the front of LH2K-ML and LH52K-ML Lampheds. Timer controlled lamp can be adjusted to stay on from about ten seconds to one minute. Modeling lamp automatically switches off when flash fires, to conserve battery power.

2E-J **60° Portrait Reflector** **10" Diameter**

Matte (satin) surface 2E-J Reflector provides light quality comparable to the Norman 5E Reflector, to convert LH2 or LH52 type lampheds for studio use. Includes a 100-watt modeling lamp which connects to the 115-volt AC outlet on the side of LH2 and LH52 Lampheds, or to a standard wall outlet with the use of the optional R4153 Cable. Accepts all standard Norman 10" diameter reflector accessories.

2H **15° Telephoto Reflector** **8" Diameter**

Mirror-type surface used with the R4112 Optical Spacer (included) to direct light to a narrow beam of highly efficient light. Ideal for sports, magazine and news photography when you are required to use telephoto lenses. The 1200 Guide Number (at 400 w-s) at ISO 400, allows you to use f-12 at a distance of 100 feet. When the 2H is used without the spacer, coverage angle is increased to 60° and the light output is decreased to the same output as the standard 2D Reflector.

2Q **50° Umbrella/Modeling Reflector** **6" Diameter**

Patterned mirror-type surface is excellent for highly efficient umbrella lighting. Includes a 150-watt (Q150CL/DC) quartz modeling lamp which connects to the 115-volt AC outlet on the LH2 and LH52 Lampheds, or directly to standard a wall outlet with the use of the optional R4153 Cable.

2Q-ML **50° Umbrella/Modeling Reflector for battery units**

For use with LH2K-ML and LH52K-ML Portable Lampheds. Same construction as 2Q Reflector with the addition of a built-in 12-volt, 50-watt quartz modeling lamp.

POWER OUTPUT EXAMPLES FOR LH2 AND LH52 TYPE REFLECTORS

BCPS light output rating for reflectors used with Norman LH2 and LH52 Lamphed types

Watt-seconds Power	400	200	125	100	62	50
Reflector Type	<i>Coverage</i>					
2D Standard	60°	8,000	4,000	2,500	2,000	1,250
2D-RP Wide Angle	130°	3,000	1,500	940	750	470
2Q Umbrella	50°	12,000	6,000	3,750	3,000	1,875
2E-J Portrait	60°	7,200	3,600	2,250	1,800	1,125
2H Telephoto	15°	60,000	30,000	18,750	15,000	9,375
R4109 Snoot	25°	1,100	550	280	225	140
						112

Accessories

Battery Portable Accessories For Use With LH2 and LH52 Type Lampheads

R4109 Hairlight Snoot

Fits on 2D or 5DL Reflectors, restricting light to a 25° angle of coverage, to create a spotlighting effect for hair light or local accent use. The R4109 includes a 25-watt modeling lamp which connects to the 115-volt AC outlet on the LH2 or LH52 type lampheads. With the battery portable lampheads (LH2K or LH52K type) the R4153 AC Modeling Lamp Cable must be used to connect to a standard 115-volt outlet. The **R4109-B** Hairlight Snoot is also available without the modeling lamp feature. See page 51 for additional use of R4109-B Snoot with studio lampheads.



R4109 Snoot shown with LH2-K Lamphead. Use the R4153 Cable for AC power.

R4161B Quick Release Mount and Plate

Mounts many of the smaller Norman power supplies to any Norman light stand. Metal mounting plate attaches to holes on back of power supply. Bracket assembly clamps to light stand and slides into mounting plate. Power supply locks into place with spring-loaded pin. Hardware included. Adapts to Norman P125-H, P202, P200B, P200C, P400B or V200 Power Supplies.



R4161B Quick Release Mount and Plate

R4101 Adjustable Camera Bracket

Positions lamphead directly above the camera lens at a distance that prevents "red eye". It also tilts to bounce light off of the ceiling. Has a comfortable moulded hand grip and ribbed rubber cushion for a solid, anti-slip grip to the camera base. Mounts to camera body with the $\frac{1}{4}$ " x 20 standard screw (included) and can be used with most hand-held cameras.



R4101 Adjustable Camera Bracket shown with LH2 Lamphead and 2D Reflector.

R4130 Friction-float Umbrella Stand Adapter

Connects to $\frac{1}{4}$ " x 20 threaded hole in the base of the lamphead to mount to $\frac{3}{8}$ " diameter light stands. (Optional inserts for $\frac{1}{2}$ " and $\frac{5}{8}$ " light stands are available). Provides unlimited movement and fine adjustments plus easy, accurate positioning of lamphead without loosening and re-tightening the adapter knob. Also, holds any Norman umbrella.



R4130 Friction-float Umbrella Stand Adapter

R4153 AC Modeling Lamp Cable

Optional 12-foot long cable, connects the 2Q, 2E-J and R4109 to a standard 115-volt AC outlet to operate the 115-volt modeling lamp when using the light on a battery portable.



Extension Cable

Y-Cable

R4153

R5045

Y-CABLE SPLITTERS

R4152 Series 450

R5152 Series 500

Allows two lampheads to operate from a single outlet on a Norman power supply. Will divide the energy available from that outlet equally on two heads. Order by Series Code.

EXTENSION CABLES

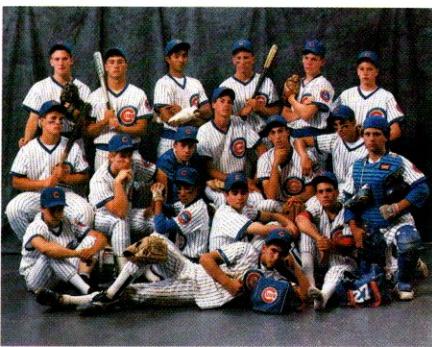
R450-20 Series 450

R500-20 Series 500

Enables you to place the lamphead an additional 20 feet from the power supply. Plugs into any matching Norman Series lamphead cable and power supply.

MEETING THE CHALLENGE OF GROUP PHOTOGRAPHY

When we think of group photography, we know there will be problems in arranging the people and a probable compromise in getting the best expressions on the majority of the faces. At the same time there exists a series of interrelated problems in the technical accomplishment of group photographs; controlling depth of light, depth of focus and head size with the limitations of camera-to-subject distance and available illumination.



The restrictions of space may begin the problem, limiting our selection of camera lens focal length to maintain depth of focus sharpness and keep consistent head sizes front to rear.

This also puts pressure on the lighting where a conflict can exist in amount of power available versus what is required for the desired f-stop and where the lights should be positioned to evenly illuminate the group.

By applying the principals of the Inverse Square Law (see page 4) and Angle of Coverage (page 48), we can be better prepared to solve the inherent problems of our next group photo assignment. When the light-to-subject distance is doubled, the camera exposure must be increased by 2 f-stops, and this can create a depth of focus problem. To maintain the same f-stop, the alternatives are to increase the flash output 4 times by increasing the power in w-s by adding more lights, changing to a more efficient reflector combination, or a combination of all three.

Several things can be done in lighting to use the available power to your best advantage. For small groups, the light can be feathered to direct the major strength of the light to the farthest point of the group, the natural fall-off of the light source will help balance the differences in light-to-subject distance. For larger groups, a number of rows deep, the same principal can be applied by raising the light source so the lamphead is level with the highest back row of the group. Depending on the characteristics of the particular reflector or

umbrella used, the front-to-back exposure will be better balanced from the fall-off typical of the normal coverage angle which offsets the light-to-subject differences of the inverse square law.

Noting that the angle of coverage of a reflector is determined by a point that measures approximately 1 f-stop less than light measured at the center of the source, we can add additional lights to balance a wide horizontal group. The scene can be more evenly illuminated over a wider, side-to-side area by adding additional lights and allowing the lighting patterns to overlap. Meter the illumination level across the group area and continue to add as many units as required for the desired lighting ratio and balance.

In all situations, whenever the location and available flash power permit, you will have more control of the lighting balance when the lights are at longer distances from the group. The principals of the Inverse Square Law at greater distances create minimal differences in effective exposure across the depth and width of the group.

For more information request the Norman publication *The Battle Between Depth of Light and Depth of Field — The Inverse Square Law* from your dealer or Norman Enterprises.

THE TECHNICAL AND AESTHETIC IMPACT OF LIGHTING RATIOS

A lighting ratio is the measurement of the difference between light and shade in a photograph, created by the main source and fill illumination. The relationship is the choice of the photographer, governed by the film used, method of reproduction and the desired mood of the final image.

For color portraiture, many photographers have found a 3 to 1 ratio to yield the most pleasing results. In this case, the exposure created by the fill light is adjusted to be 50% (1 f-stop) less in intensity than the light output of the main (key) light. Since the fill lighting is adding illumination to the highlights as well as the shadows, two units of main light are added to the one unit of fill light for a total of three units of illumination on the highlight side of the face, with one unit of light on the shadow side; hence a 3:1 ratio. A flash meter and film test is recommended to determine the exact relationship desired for your work.

The wide variety of sources that we have available to us will vary the techniques required to balance and control your desired lighting ratio



setup. If two lights of equal power and equivalent reflectors are used, a conversion from the f-stop scale can be used to easily position the lights for the desired ratio. If the fill light is placed at 8 feet from the subject, a main light that is 1 f-stop brighter (3:1 ratio) would be positioned at 5 1/2 feet. (See pages 2-3 for more information.)

On the other hand, if a mixed combination of reflector sources are used in your lighting, a flash meter test from each light (with the other lights off) can help you determine the proper power and distance for the ratio you want. For example, when using a broad source for fill lighting (such as bounce light or umbrellas) that generally adds more light to the shadow area, a main light with more intensity may be required to maintain the desired ratio.

The sensitivity characteristics of the film emulsion and print materials will also have an impact on the ideal lighting ratio. These materials and the color printing process do not have the same response to light as our eyes, nor do the characteristics of Polaroid films, color negative film, transparencies or print materials correspond with each other. Understanding the capabilities of your materials can help you select the lighting ratio that will yield the desired results in the final reproduced image.

Characteristic curves are generally available from the film and paper manufacturers and can be helpful. In most cases, photographic print materials will provide a linear response to exposure density over about a 5 f-stop range. For commercial four-color process printing, a 4 f-stop range is recommended (see page 8, *Shooting for Reproduction*).

If you desire more information on the subject of lighting ratios, request the Norman publication *Syncro Sunlight*.

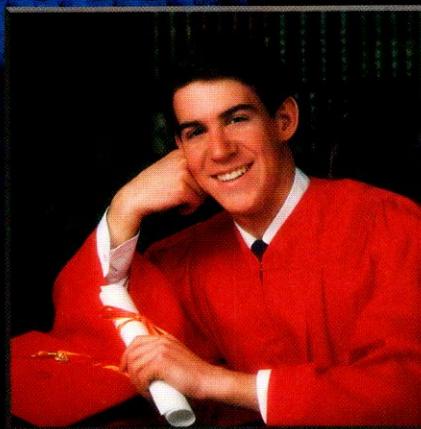
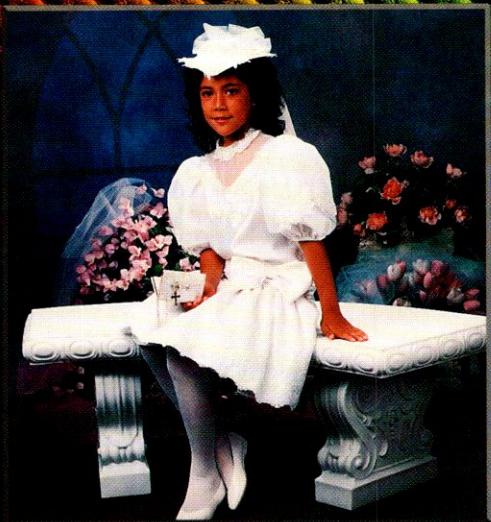
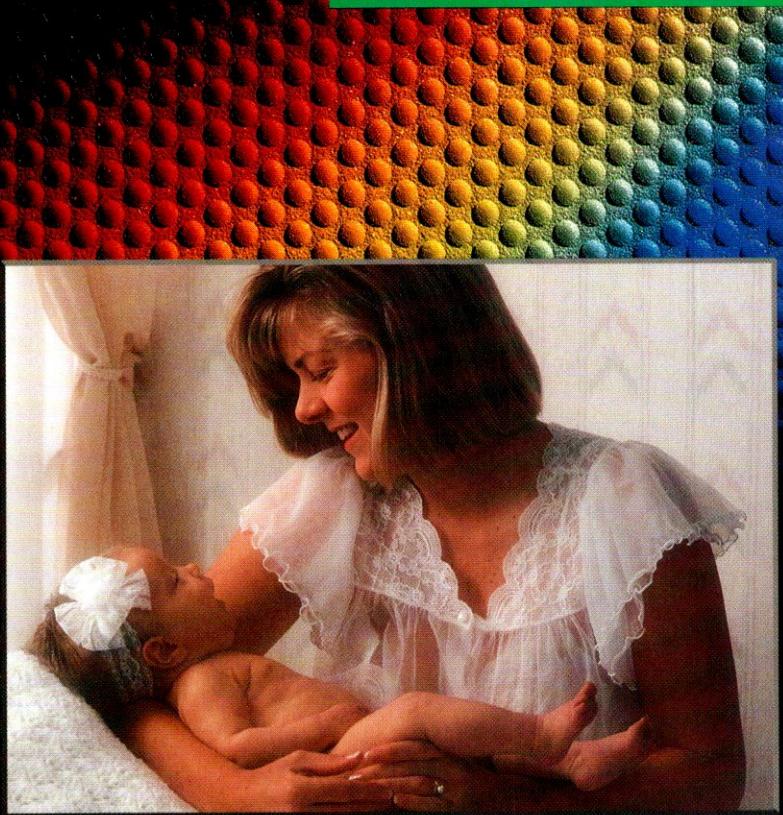
Light-to-Subject Distance vs. F-stop Gain / Loss

Light-to-Subject Distance in Feet

1	1.4	2	2.8	4	5.6	8	11	16	22	32	45	64
+6	+5	+4	+3	+2	+1	X	-1	-2	-3	-4	-5	-6

The wide power range and versatile ratio control of Norman equipment makes your portrait lighting an opportunity instead of an obstacle.

Portrait



Photography by Tom Dawdy,
Dawdy Photography, Millbrae, CA

P808



The Series 500 Portrait Pac — Our Most Versatile Portrait Unit

The idea for the P808 Portrait Pac originated with a group of portrait photographers whose goal was to obtain a flash unit of maximum versatility and dependability at an affordable price.

School photographers can now use the same power supply for undergrads and seniors as well as for class groups. Studio photographers can use the P808 in the studio for general portraiture and use the same equipment on location for family groups or prom couples.

Within its small frame is a heavy duty 800 w-s circuit with numerous switching combinations, making the P808 Portrait Pac ideal for single subject and group por-

trait photography. From two lampheads at 400 w-s each to four lights at 50 w-s, or nearly any combination in between, to match the demands of your job. Whether you prefer to use umbrella bounce or direct light, the proper amount of output can be achieved with ease.

The Norman P808 delivers fully voltage stabilized power with rapid recycle times, giving you consistent exposures on every flash. Short flash durations of $\frac{1}{800}$ second ($\frac{1}{400}$ at 400 w-s), freeze movement and yields sharp, clear photographs. Combined with its versatility in power and reliability, the P808 appeals to the large school photography organizations as well as the independent studio photographer.

Series 500 Specifications: P808

Energy Storage (maximum watt-seconds)	800 watt-seconds
Power Range on One Lamphead	400 w-s maximum – 50 w-s minimum
F-stop Range of Output Options	3 f-stops
Light Output Guide	f-16 $\frac{1}{4}$ (5,000 BCPS) GN = 175 Using 5-E2, 10' satin reflector, 400 w-s @ ISO 100
Capacitor Output Channels	4
Lamphead Outlets	4
Flash Duration Range	$\frac{1}{400}$ sec. (400 w-s), $\frac{1}{800}$ sec. all other settings
Recycle Time to 100% Charge	$\frac{4}{10}$ second (50 w-s) to 2 seconds (800 w-s)
Ready Indicator at 100% Charge	Visual ready lights at 100% output
Operating Voltage	105 -135 volts, 50 - 60 Hz
Circuit Protection	15 amp at 115 volt AC
Actual Weight	9 lb. 14 oz. Shipping Weight 13 lb. 5 oz.
Dimensions	7" H x 8 $\frac{5}{8}$ " L x 6 $\frac{7}{16}$ " W (add 1 $\frac{1}{2}$ " for handle height)

■ **Independent output control switches** for each of the four lamphead outlets. Each lamphead can therefore be switched at 200 w-s, 100 w-s, 50 w-s or OFF, or other numerous light output combinations. You can disable unneeded lights without having to disconnect them from the power supply and view the effects of each light independently from the other lights.

■ **400 w-s on each of two lampheads** is obtained by switching the two COMBINE/ISOLATE switches to the COMBINE positions. Or, one lamphead can be set to 400 w-s while the other lamphead(s) are set at lower outputs.

■ **Three position modeling lamp switch.** RATIO: Allows you to preview your lighting

balance as related to the flash outputs. FULL: Modeling lamps remain at full output, regardless of the flash output settings of the lampheads. OFF: Turns off modeling lamps when not needed. The modeling lamps can be operated even when the main power switch is off.

■ **Test/Open Flash button** triggers the flash for testing and for multiple flash.

■ **Ready/On lights for each channel** indicate that the AC power is on and the respective channel is ON.

■ **A fail-to-flash alarm system** provides an audible signal in the event of a lamphead misfire to alert the photographer of the problem immediately, during the sitting.

SEVERAL POWER OUTPUT EXAMPLES ON THE P808

1 Light	50, 100, 150, 200, 250, 300, 400 watt-seconds
2 Lights	Both lights can be independently set to any of the above outputs.
3 Lights	One light can be set to any of the individual outputs listed above. The other two lights can be independently set to 50, 100 or 200 w-s. For example; one light could be at 400 w-s, one at 200 w-s and one at 50 w-s.
4 Lights	Each light can be independently set to 50, 100 or 200 w-s. For example; one light could be at 200 w-s, two at 100 w-s each and one at 50 w-s.
The modeling lamps automatically ratio to the flash outputs if desired.	



A full range of reflectors, barndoors, grids, snoots, diffusers, gels, umbrellas and accessories are available to optimize creativity and solve technical challenges quickly and easily.

Two Economical Packs Designed for School and Portrait Photographers

The P600-SP and the P400-SP Power Supplies were designed as a result of meetings of The School Photographers of California (SPCA) Advisory Board with the engineers of Norman Enterprises.

The packs are ideal for any photographer who needs an economical, highly portable, and dependable power supply that can perform consistently on every exposure of every sitting...every day.

No fancy switches or dials, just a tough, hard-working, fool-proof flash unit. Made easy to setup, simple to use and strong enough to take the beating of travel between locations.

Following the same basic design, the Norman P600-SP and P400-SP provide two choices in power level and switching capability, plus an optional misfire alarm.

Two choices in power and switching

The **P400-SP** provides a simple symmetrical (equal) split of 400 w-s of light on 1, 2, or 3 lampheads. The **P600-SP** is a 600 w-s power supply than can split the power equally among 1 to 3 lampheads, or provide several ratio options on main, fill and hair lights.

Symmetrical Split: P400-SP	P600-SP
1 light =	400 w-s
2 lights (each) =	200 w-s
3 lights (each) =	133 w-s

Combine/Isolate switch. (P600-SP only)

An assymetrical (unequal) split provides the flexibility of adding a hair or background light without draining potential power from the main and fill lights.

"ISOLATE 3" mode: P600-SP unit only

- 1 light = 550 w-s or 50 w-s
- 2 lights = 550 w-s and 50 w-s
- OR 275 w-s and 275 w-s
- 3 lights = 275 w-s, 275 w-s, 50 w-s

A guard placed over the switch prevents accidental movement.

Optional misfire alarm circuit warns the photographer in the event of a lamphead misfire. An audible "beep" sounds for one second and the corresponding LED indicator illuminates to show which lamphead did not flash. The alarm circuit is set automatically, requiring no switch setting. (Patent pending).

Ready/On lights. Red lamp indicates that the AC power is on and green lamp illuminates when unit is at 100% charge.

Use Series 500 lampheads with these portrait units. The LH500 Lampheads can be used with either pack. The LH54 and the LH52-type Lampheads can only be used with the P400-SP unit, since the maximum rating on the flash tube is 400 w-s.



Models Available:

P600-SP	600 w-s	Without Misfire Alarm
P600-SP _A	600 w-s	With Lamphead Misfire Alarm
P400-SP	400 w-s	Without Misfire Alarm
P400-SP _A	400 w-s	With Lamphead Misfire Alarm

The P400-SP unit is not pictured. It is identical to the P600-SP appearance and dimensions.

The Alarm Circuit (ALM-1) may be added to a P600-SP or P400-SP Power Supply at any time by Norman Enterprises or by one of its authorized repair stations.



C600 Kit Case: Assembly comes packed in a sturdy, lightweight carrying case with 3-LH54 Studio Lampheads, 3-5DL Reflectors and your choice of P600-SP or P400-SP Power Supplies. Optional Stand and Umbrella Package includes: 1-LS-220 Back Light Stand, 2-LS-222 Mini-Compact Light Stands and 2-WB45 Umbrellas.

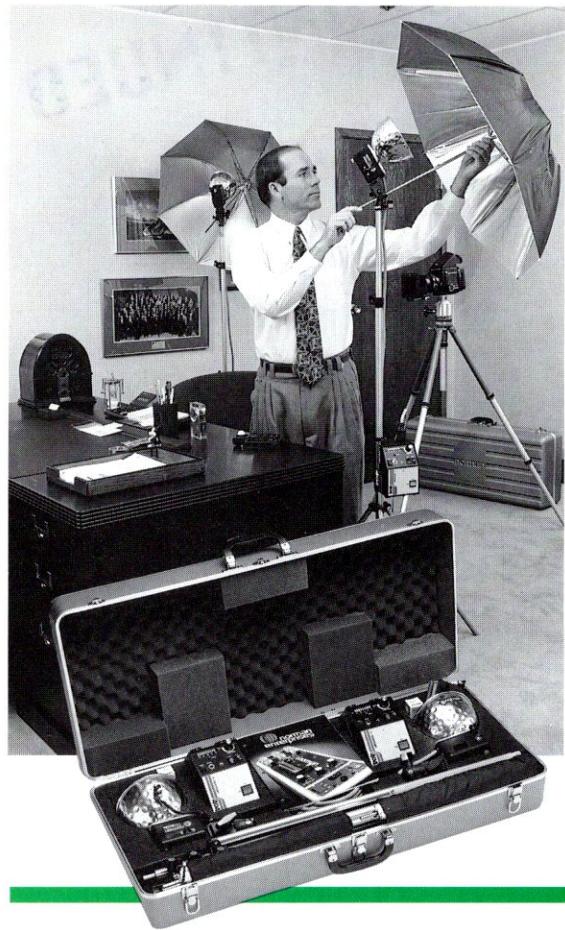
Series 500 Specifications: P600-SP

Energy Storage (maximum watt-seconds)	600 watt-seconds
Power Range on One Lamphead	600 w-s (Combine) 550 w-s or 50 w-s (Isolate)
Light Output Guide	f-22 (7,500 BCPS) GN = 210 Using 5-E2, 10° satin reflector, 600 w-s @ ISO 100
Capacitor Output Channels	2 (Outlet 3 can be isolated from 1+2)
Lamphead Outlets	3
Flash Duration Range	1/300 sec. (600 w-s), 1/600 sec. (300 w-s)
Recycle Time to 100% Charge	4 seconds to full, 100% power (600 w-s)
Ready Indicator at 100% Charge	Visual ready light at 100% output
Operating Voltage	90 - 135 volts, 50 - 60 Hz
Circuit Protection	7 amp at 115 volt AC
Actual Weight	8 lb. 5 oz. Shipping Weight 10 lb.
Dimensions	5" H x 9" L x 7" W (add 1 1/2" for handle height)

Series 500 Specifications: P400-SP

Energy Storage (maximum watt-seconds)	400 watt-seconds
Power Range on One Lamphead	400 w-s (no power level adjustment)
Light Output Guide	f-16 1/4 (5,000 BCPS) GN = 175 Using 5-E2, 10° satin reflector, 400 w-s @ ISO 100
Capacitor Output Channels	1
Lamphead Outlets	3
Flash Duration Range	1/400 sec. (400 w-s), 1/1,200 sec. (133 w-s)
Recycle Time to 100% Charge	2 seconds to full, 100% power (400 w-s)
Ready Indicator at 100% Charge	Visual ready light at 100% output
Operating Voltage	90 - 135 volts, 50 - 60 Hz
Circuit Protection	7 amp at 115 volt AC
Actual Weight	6 lb. 8 oz. Shipping Weight 9 lb.
Dimensions	5" H x 9" L x 7" W (add 1 1/2" for handle height)

P404 Kits & Power Rack



Build A Versatile Lighting System For Any On-Location or Studio Situation

Studio Kit Is Always Ready To Go

The compact size, 400 w-s flash output and control features make the P404 one of the most versatile electronic flash systems you can buy. When you buy a P404 Studio Kit, you get added convenience and lower cost.

Organized and Portable

Everything you need for your location lighting is always ready in the attractive high impact plastic case — each piece is neatly stored in compartments custom cut into the solid foam inserts.

Convenience for Any Assignment

The P404 Studio Kits are ideal for wedding formals, prom couples, executive portraits, family groups, etc. You'll be prepared for anything.

Choose the Best Kit for You

Complete two-light Studio Kits are available with your choice of one or two P404 Power Supplies.

The A404K Kit includes:

- 1 P404 Power Supply (2 units optional) with R4155 Sync Extension Cable and R4161 Quick Release Mount
- 2 LH52 Lampheads
- 2 2Q Reflectors
- 2 S45 Umbrellas
- 2 LS224 Light Stands
- 2 R4130 Umbrella Stand Adapters
- 1 Carrying Case (9" x 16" x 36")

1,600 w-s Modular Rack Assembly

An optional **RK-1 Power Rack** is available to create a 1,600 watt-second system that powers all of your portrait lights. Used as a wall mounted assembly or carried by the recessed handle for convenient use on location. The RK-1 Power Rack creates a whole new dimension of versatility for the P404. Add units as you need them.

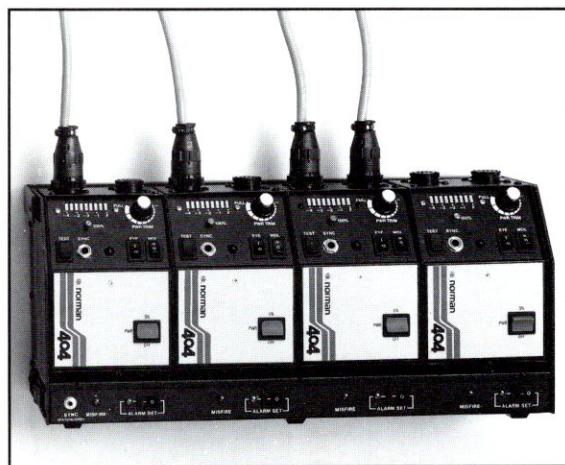
Up to four P404's slide into the base connectors to become one unit, requiring only one power cable and one sync cord. This provides a single power unit that gives independent control of each light unit, over a 4 f-stop range.

Audible and Visual Alarms

Built into the RK-1 is an automatic audible and visual lamphead misfire alarm system. Should a lamphead misfire, the alarm will momentarily beep and the misfire light will illuminate.

Common Power Connections and Individual Pack On/Off Controls

Connectors on the platform of the Power Rack provide 115-VAC to each P404 unit to eliminate individual AC power cords. Four individual switches on the front of the Power Rack give you the ability to turn off one or more lights without affecting the operation of the remaining lighting units.



Wall Mounting For Studio Rail Lighting Systems

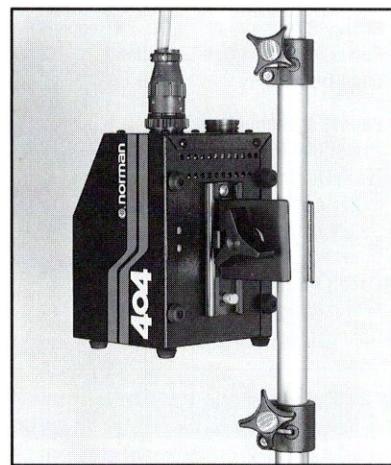
Usual wall-mount installations require that separate power packs be bolted to the wall which causes them, for convenience sake, to become single-purpose units.

Wish you could take your studio flash on location? The Power Rack slips over two #10 wall screws in a manner that enables you to lift it off the wall in a matter of seconds.



Recessed Handle For Portability

This convenient carry handle tucks out of view when not in use. Its bold construction enables the unit to be easily and comfortably carried on location. The studio features offered by the P404 units and the rack itself, can be used anywhere and anytime.



R4161 Quick Release Mount

Quickly and conveniently attaches a P404 Power Supply to any light stand. Simply slide the P404 onto the stand mount and snap the locking pin into place. To remove the P404, pull the pin and slide the pack off the mount. It's just that easy!

The New Standard For Portrait Studios

If you're tired of splitters, plugs, diffusers and mathematical formulas to get the lighting ratios and power levels that suit your style — the new Norman P404 could be the perfect fit for all types of school, studio, and location portraiture.

The Norman P404 Power Supply is one of the most significant products introduced for the portrait photographer in years. A very economical solution to a variety of lighting requirements — the P404 costs much less than popular portrait packs and has more practical features for portraiture.

Although small in stature, the P404 can deliver a powerful 400 watt-seconds on a single lamphead and is infinitely variable over a four f-stop range to as low as 25 watt-seconds, for total control of every

light. A second lamphead can be added to equally split any selected power setting.

The P404 is powerful enough for group and prom photography and adjustable to meet any specific ratio combinations desired in school, senior or studio portraiture. Its power, control features and, in particular, its very small size has made the P404 an excellent portable power supply for commercial, fashion, industrial and other photographic specialties. Perfect for a compact two-light copy setup, too.

Start small — Grow BIG! If your budget is limited, or if your shooting style does not yet require the versatile 1,600 w-s Power Rack system, you can grow into it one step at a time. The RK-1 Power Rack operates with two, three, or four P404 units.

Series 500 Specifications: P404

Energy Storage (maximum watt-seconds)

400 watt-seconds

Power Range on One Lamphead

400 w-s maximum — 25 w-s minimum

F-stop Range of Output Options

4 f-stops (infinitely variable)

Light Output Guide

f-16 1/4 (5,000 BCPS) GN = 175

Using 5-E2, 10" satin reflector, 400 w-s @ ISO 100

Capacitor Output Channels

1

Lamphead Outlets

2

Flash Duration Range

1/400 second consistent across range

Recycle Time to 100% Charge

1/3 second (25 w-s) to 2 3/4 seconds (400 w-s)

Ready Indicator at 100% Charge

Visual ready light

Operating Voltage

105 -135 volts, 50 - 60 Hz

Circuit Protection

3.5 amps / 250 volt fuse (2 AG)

Actual Weight

4 lbs. 8 oz.

Dimensions

6 3/4" H x 4 1/4" L x 4 1/8" W

(includes connector height)

■ **A full four f-stop power output range**, from 400 to as low as 25 watt-seconds on one light source or equally divide any selected level with a second lamphead.

■ **Infinitely variable power control** using the Power Trim adjustment to have total control of every light to achieve the perfect balance of lighting ratios. Accurate, repeatable increments, over a four f-stop range, can be used to adjust light levels without the need to reposition your lights.

■ **Two lamphead outlets** for symmetrical distribution of the power selected with the Power Trim control.

■ **Ratioed modeling lamp** to visualize your lighting or confirm ratios with your tungsten light meter. Switchable to full brightness, regardless of power level, to aid in focusing in low ambient light situations. Also, can turn off lamp when not needed.

■ **Test/Open Flash button** to trigger the lamphead(s) from the power supply during setup or test procedures.

■ **Power level shown on LED bar display**. A separate ready lamp will illuminate when

at full charge, making the power setting and ready condition of your lights easily identifiable, even from across the studio.

■ **Built-in, switchable photo eye**. An ultra-sensitive photo eye will flash the pack, without cord connection, when the master pack discharges. It can be switched off when not needed. Individual packs can also be triggered by direct connection with the camera using the R4155 Sync Cable.

■ **A fail-to-flash alarm system** (as part of the optional Power Rack) activates an audible signal and visual LED lamp in the event of a lamphead misfire.

■ **Plug-in transformerless circuitry** makes the P404 rugged, lightweight and easy to service. As with all Norman electronic flash equipment, the P404 is protected with a full two-year limited warranty on parts and labor.

■ **Interchangeable within the Norman Series 500** equipment line using the LH500, LH54 and LH52 Lampheads as well as a complete array of reflectors and accessory items.



A404-U Umbrella Assembly

Includes:

P404	Power Supply
LH52-5	Lamphead
2Q	Reflector
LS-224	Light Stand
S45	Umbrella
R4130	Umbrella Stand Adapter
R4155	Sync Extension Cable
R4161	Quick Release Mount



LH500

The Series 500 Studio Lamphead



LH500-B with
5X Reflector

Following the design of the Series 900 LH2400 Lamphead, the LH500 brings high efficiency flash output and strong light-weight construction to portraiture.

Made of high impact fiberglass resin, the LH500 Lamphead will not dent, crack or scratch. It includes a bright 150-watt quartz modeling lamp and a high quality 600 w-s flashtube that meets the same design standards as the Series 900 tubes. Many other custom features compliment the exciting advances in the Series 500 power supplies; a product line tailored to the specific applications of school, senior and studio portrait photographers.

Each basic LH500 Lamphead includes the heavy duty, UV-corrected, FT6-UV (600 w-s) plug-in flash tube, 150-watt quartz modeling lamp, 20-foot cable, one R4130 Friction-float Stand Adapter (with insert to fit $\frac{3}{8}$ " diameter light stands), and R4154 Kable Keeper.

■ **Two reflector mounting methods.**

1. Twist-lock clips make changing reflectors a breeze — one twist and the reflector is locked in place. 2. Standard Norman mounting holes are used for attaching large accessories, including the 5X Reflector and soft boxes.

■ **Friction-float Stand Adapter** offers

unlimited movement and fine adjustments, plus easy and accurate positioning of the lamphead without loosening and retightening the adapter knob. Comes with $\frac{3}{8}$ " insert. Inserts for $\frac{1}{2}$ " and $\frac{5}{8}$ " light stands are also available.

■ **Ample 20-foot cable length** has an improved design to optimize the electrical current flow and maintain maximum flexibility. The custom made cable is tough, yet coils easily, doesn't kink and won't become excessively stiff in cold weather.

■ **Umbrella mounting** is easily accomplished with the Friction-float Stand Adapter. Any Norman umbrella or others with up to $\frac{3}{8}$ " diameter shafts slide into the stand adapter and locks into place with a thumbscrew.

■ **Model lamp switch.** A convenient on-off switch at the top of the unit permits individual modeling lamp control at the lamphead. Ideal for previewing the effects that each lamphead has on the subject when using multiple lights.

■ **Fan-cooled or convection cooled.** Lampheads can be ordered with the blower (LH500-B) or without the blower assembly (LH500). The R9124 Constant-speed Blower can be ordered separately and easily installed at any time in the future.

■ **Adapts to Series 450 power supplies** with R5045 Lamphead Adapter Cable. This short cable correctly matches the pin configuration of any Series 500 lamphead to match with the Series 450 power supply connector.

■ **All Series 500 power supplies**, reflectors and accessories can be used with the LH500 Lamphead. And, they are readily adaptable to many other manufacturer's soft boxes.

Series 500 Specifications: LH500

Maximum Energy	600 watt-seconds
Modeling Lamp (included)	150-watt clear quartz halogen (Q150CL/DC)
Modeling Lamp (optional)	250-watt clear quartz halogen (Q250CL/DC)
Flash Tube	
Standard UV-Corrected FT6-UV	5500° K (effective Kelvin temperature)
Weight (including cables)	2 lbs. 4 oz.
Cord Length	20-foot cable with Series 500 connector

A Broad Coverage Softlight, Ideal For The Portrait Studio

The Norman LH500-B Lamphead, as well as any of the Norman studio lampheads, when used with the 5X Reflector become a high quality portrait light, producing flattering skin tones with beautiful diffused highlights. The 5X provides outstanding definition of shape and texture — a light quality that is hard to match with bounce umbrellas or soft boxes.

The exceptionally wide coverage of the 5X Reflector (130°) is also valuable for full length portraits or groups in the studio or on location when space limitation makes umbrella use impractical. See page 54 for more information.

General Purpose Series 500 Lamphead

Blending Technology and Economy

Norman has created the LH54 to offer a mid-range lamphead that combines the economies of the LH4-A (Series 450 lamphead) with the improved technology of the LH500 (Series 500) and the LH2400 (Series 900) Lampheads.

The LH54 has tungsten modeling lamps for previewing your lighting, an improved flashtube for use at 400 watt-seconds maximum (nearly double the watt-seconds of the Series 450 lampheads.) It also offers the two mounting methods to attach the full line of Norman reflectors and accessories.

Made in the same rugged body style as the LH2400 and LH500, the high impact fiberglass resin, prevents the LH54 Lamphead from dents, cracks or scratches. Each basic LH54 Lamphead includes a UV-corrected, 400 w-s (FT400-UV) plug-in flash tube, four 25-watt (25T8/DC) modeling lamps, 20-foot cable, R4130 Friction-float Stand Adapter and R4154 Kable Keeper.

The R5045 Lamphead Adapter Cable allows the LH54 and other Series 500 Lampheads to be used on any Norman Series 450 power supply.

Series 500 Specifications: LH54

Maximum Energy	400 watt-seconds
Modeling Lamp (included)	Four - 25 watt (25T8/DC)
Flash Tube	
Standard UV-Corrected FT400-UV	5500° K (effective Kelvin temperature)
Weight (including cables)	2 lbs. 4 oz.
Cord Length	20-foot cable with Series 500 connector

■ Two reflector mounting methods.

1. Twist-lock clips make changing reflectors a breeze — one twist and the reflector is locked in place. 2. Standard Norman mounting holes are used for attaching large accessories, including the 5X Reflector and soft boxes.

■ Model lamp switch. A convenient on-off switch at the top of the unit permits individual modeling lamp control at the lamphead.

■ Four 25-watt modeling lamps. (25T8/DC) Provide long life illumination to preview your subject lighting. The optional RP-1 Diffusion Dome is recommended for the best match of modeling lamp to flash exposure coverage.

■ Friction-float Stand Adapter offers unlimited movement and fine adjustments without loosening and retightening the adapter knob. Comes with $\frac{3}{8}$ " insert. Any Norman umbrella or others with up to $\frac{3}{8}$ " diameter shafts lock into place with a thumbscrew.

■ Ample 20-foot cable length has an improved design to optimize the electrical current flow and maintain maximum flexibility. The custom made cable is tough, yet coils easily, doesn't kink and won't become excessively stiff in cold weather.



OUTPUT EXAMPLES for Series 500 Lamphead and Reflector Combinations

These meter readings are made under actual studio conditions to serve as a reference to guide your selection of the proper amount of watt-second power required for your own type of work.

W-S Power	400	300	200	150	100	50
Light Quality						
BARE BULB - 5DL	f 8½	f 8	f 5.6½	f 5.6	f 4½	f 2.8½
SPECULAR - 5E	f 16¼	f 11¾	f 11¼	f 8¾	f 8¼	f 5.6¼
MEDIUM - 5X	f 8	f 5.6½	f 5.6	f 4½	f 4	f 2.8
SOFT - WB45	f 11¼	f 8¾	f 8¼	f 5.6¾	f 5.6¼	f 4¼

Specifications for f-stop ratings above are based on actual studio readings with a flash meter, rated at ISO 100 film speed, at a distance of 10 feet from these light sources: **Bare** Bulb: 5DL, 140° wide angle reflector. **Specular**: 5E, satin surface reflector. **Medium**: 5X, 22° Soft Light reflector. **Soft**: WB45, white 45" diameter umbrella with 5DL reflector. See pages 6-7 and the *Reflector and Accessories* section of the catalog for further information and photographic comparisons.

Looking For More Information?

Norman offers four booklets summarizing practical concepts of photography with electronic flash. See your local dealer or order directly from Norman Enterprises.

Series 500

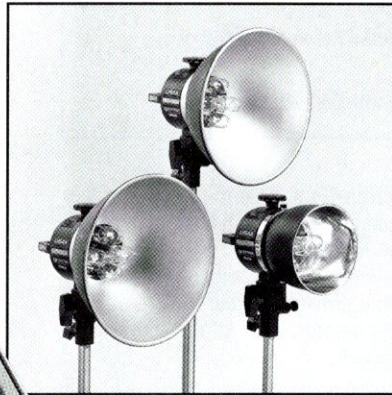
P808 Portrait Assemblies for Single Subject or Group Photography

Two versatile package options have been built around the features of the P808 Portrait Pac. Designed specifically for the needs of school photographers, the P808, combined with your choice of lamphead package, provides the right equipment for undergrad or senior portraits, as well as class groups.

Either assembly serves as the solid foundation for a system you can grow with. Compatible with Norman's complete line of reflectors and accessories, the P808 Assembly of your choice can be expanded with any Series 500 lampheads or power supplies.

The AA808 Assembly includes three basic LH54 Lampheads, and the Group A-50 Reflector Set which includes: two 5E, 10" general purpose 60° reflectors, for main and fill light and a 5DL Reflector for use as a background light.

An upgraded lighting package, the AQ808 Assembly, includes the Group Q-50 Set of reflectors. It has three improved LH500 Lampheads, all with R9124 Constant-speed Blowers. Two 5E, 10" general purpose 60° reflectors, for main and fill light and a 5DL Reflector for a background light are included. The RP-1 Diffusion Domes are in all three lights for improved accuracy of the modeling light positioning.



GROUP A-50



GROUP Q-50

AA808 Assembly Low-cost Portrait Package

- 1 - P808 Power Supply**
- 3 - LH54 Lampheads**
- 2 - 5E Reflectors**
- 1 - 5DL Reflector**

AQ808 Assembly Quartz Modeling/Blower Cooled

- 1 - P808 Power Supply**
- 3 - LH500-B Lampheads with Constant-speed Blowers (R9124)**
- 2 - 5E-RP Reflectors**
- 1 - 5DL-RP Reflector**

Series 450 2-Light Portrait System *Quality; Low Cost and Dependable*

The versatile Norlite V200 is an inexpensive and uncomplicated AC-operated lighting unit. Quick to set up and easy to carry—the V200 is a speedy solution to add lighting to almost any situation! Ideal for the professional with limited studio space or commercial photographers who need a compact flash unit for supplementary light on location with up to 200 w-s output on one lamphead.

Designed with a special ratio capability, the V200 Power Supply is extraordinarily efficient for umbrella lighting or home portraiture. When using two lights, the Output/Ratio switch splits the main light at 150 w-s and an additional accent light can be used at 50 w-s with a reflector. Or both lights can be used at 100 w-s each. This exclusive feature enables you to maintain excellent lighting balance while operating at the full power guide number.

A product of Normark Industries, a division of Norman Enterprises, Inc., the Norlite V200, is compatible with all Norman Series 450 equipment and accessories.

Safety Interlock. A special electronic design feature prevents the AC power circuit from turning on if a lamphead is not connected to the power supply. Voltage stabilized for consistent output from flash to flash. Engineered and manufactured with

the latest of solid-state circuitry to assure years of dependable operation.

■ **Ratioed or equal power** on two lights. When using ratioed (asymmetrical) power, one lamphead can be set to 1½ f-stops greater than the second. Change a switch and both lights receive equal (symmetrical) power of 100 w-s into each lamphead.

■ **Output/Ratio switch** controls the power to each lamphead connector. **UP position (150/50)** splits output so the lamphead in outlet #1 will receive 150 w-s and the lamphead on outlet #2 will receive 50 w-s. This power distribution is the same when either one or two lampheads are used. In **DOWN position (100/100)** both outlets are connected in parallel and the total pack output of 200 w-s will be divided equally between them. (One lamphead = 200 w-s; two lampheads = 100 w-s each.)

■ **Optional second light.** Two lamphead outlets! Main and fill light or two-light copy setup—the economy of purchasing only one power supply makes the V200 shine.

Use the V200 Power Supply with any of the Norman Series 450 lampheads. Choose from the studio-style LH4-A (page 45) or the smaller LH-2 type lampheads including those with modeling lamps. See pages 31–33 for LH-2 Lampheads and compatible accessories.

Normark Specifications: NORLITE V200

Energy Storage (maximum watt-seconds)	200 watt-seconds
Power Range on One Lamphead	200 w-s maximum - 50 w-s minimum
F-stop Range of Output Options	2 f-stops
Light Output Guide	f 16 (4,000 BCPS) GN = 160 LH4-A Lamphead with E-52, 10" satin reflector, @ ISO 100
Capacitor Output Channels	1 channel
Lamphead Outlets	2
Flash Duration	1/400 sec. (200 w-s) 1/1600 sec. (50 w-s)
Recycle Time to 100% Charge	1 second to 200 w-s
Ready Indicator at 100% Charge	Visual ready-light
Operating Voltage	95-135 volt, 50-60 HZ
Circuit Protection	3 amp, 3 AG, SLO-BLO fuse
Actual Weight	5 lbs. 11 oz. (Shipping weight - 8 lbs.)
Dimensions	3 1/2" H x 9 3/4" L x 3 1/2" W

V200-U Umbrella Bounce Assembly

Includes:

- V200 Power Supply
- LH2-5 Lamphead (5 ft. cable)
- 2Q Reflector (150-watt quartz modeling lamp)
- LS224 Stand
- S45 Silver Umbrella
- R4130 Umbrella Stand Adapter
- R4151 Sync Extension Cable
- R4161B Bracket Set (mounts power supply to light stand)

An economical, compact solution for many lighting situations. Folds to a small unit easily stored in a case or in the trunk of your car. Keep it with you for a second light for location work, weddings, etc. or use it as a full time portable or studio unit.

The V200-U Umbrella Bounce Assembly is comparable in price to a monolight assembly. However, you can add a second light for a fraction of the cost, making the V200 the perfect answer for the budget-minded photographer.

Norlite V200



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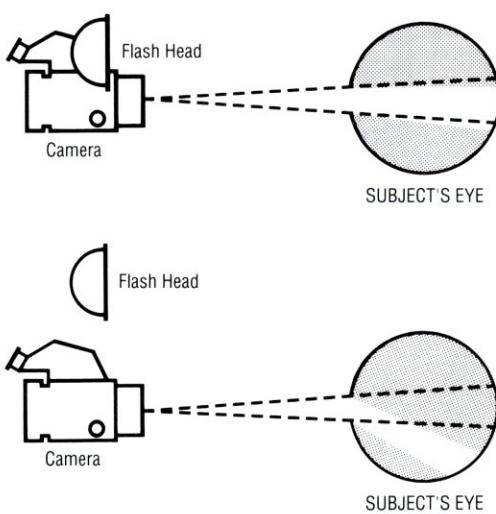


P500-M



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Dotted lines indicate what camera sees through pupil of the eyeball.
White area in subject's eye indicates path of light.



The Series 450 Portrait System Four Light Pack for Studio or Location

The economical choice for the photographer who needs a versatile 500 w-s studio portrait power supply with enough power for umbrella lighting or group photos on location. Use up to four lampheads, each individually controlled, or combine two banks of a channel for a 250 w-s umbrella fill source and use the other channel for main and background lights.

■ **Fail to flash alarm** sounds if one of the lampheads misfires.

■ **Full/Half/Off control** for each of four lampheads up to 125 w-s each. Using the "combine" switch, increases each of two banks to 250 w-s output. When a lamphead is switched off, the modeling lamp and alarm circuit are automatically disabled.

■ **Modeling lamp switch** has three positions. Full: Modeling lamps at full brightness regardless of power setting. Ratio: Lamps automatically ratio to full or half with change of lamphead power switch. Off: Turns modeling lamps off.

Series 450 Specifications: P500-M

Energy Storage (maximum watt-seconds)

500 watt-seconds

Power Range on One Lamphead

250 w-s maximum - 62 w-s minimum

F-stop Range of Output Options

2 f-stops

Light Output Guide

f-16 (3,750 BCPS) GN = 155

Capacitor Output Channels

LH4-A Lamphead with 5E-2, 10" satin reflector, @ ISO 100

Lamphead Outlets

4 independent channels

Flash Duration

4

Recycle Time

1/500 sec. (Constant at all power settings)

Ready Indicator

1.5 seconds to 500 w-s

Operating Voltage

Visual ready-light

Circuit Protection

105-135 volt, 50-60 Hz

Actual Weight

15 amps @ 115 volts AC

Dimensions

15 lbs. 8 oz. (Shipping weight - 21 lbs.)

6 1/4" H x 9" L x 7" W

Add 1/8" to H for connectors and handle.

"Red Eye" and How To Avoid It

In the photography of people, the eyes have it — the eyes are the key to capturing the expression and personality of the subject. Proper attention to the brilliance of the eyes is necessary in successful portrait lighting.

The ambient light level of the room and modeling lights must provide sufficient illumination to constrict the pupil of the eye for proper eye coloration. Also, the eye must receive sufficient light to record that color and to reflect a catchlight that brings a sparkle and life into the eyes.

When the modeling lamps of a particular studio flash system are too low, the room's ambient light must be lowered in order to visually compose your portrait lighting. This low light level causes the pupil of the eye to dilate or "open up" to see properly, minimizing the iris size and color, making the eyes appear lifeless and stagnant.

This condition also increases the opportunity for the effect we call "Red Eye" to be seen in the subject's eyes. What appears in the color photograph as a red pupil is actually an image of the retina of the eye, which is a maze of blood vessels, being illuminated by the flash. Some people are

more apt to be photographed with this "red eye" result than others, since individual physical characteristics vary how the eyes respond to light.

In order to reflect light off the retina sufficiently to influence the photograph in this way, the light source would need to be very close to the axis of the camera lens. A bright, concentrated light, with characteristics of a point source, is more likely to create "red eye". As a light is moved farther from the camera axis, the chance of "red eye" decreases.

With these circumstances in mind, the probability of "red eye" increases in low ambient light situations. Flash-on-camera, ring lights and front projection background units bring a lighting condition that warrants caution to avoid unwanted results.

To minimize the opportunity of "red eye" these precautions can be taken.

- Using the flash one foot off camera axis is usually sufficient.
- Modeling lamp level can be increased to cause the pupil diameter to reduce.
- Subject's head can be turned or eyes directed to look slightly off camera axis.

Series 450 Studio Lamphead

The heavy duty LH4-A Lamphead is rugged enough for daily applications in studio portraiture and the demands of location and product work. Adaptable to a wide range of reflectors and accessories, this unit will accommodate a variety of photographic applications.

The LH4-A Lamphead, made of high impact fiberglass resin, will not dent, crack or scratch. It replaces the discontinued LH4 and operates on all Series 450 power supplies. Each LH4-A unit includes a 20-foot cable, plug-in FT120-UV flash tube, four 25-watt modeling lamps, one R4130 Friction-float Stand Adapter (with insert to fit $\frac{3}{8}$ " diameter light stands) and R4154 Kable Keeper.

Two reflector mounting methods. 1. Twist-lock clips make changing reflectors a breeze — one twist and the reflector is locked in place. 2. Standard Norman mounting holes are used for attaching large accessories, including the 5X Reflector and soft boxes.

Friction-float Stand Adapter offers unlimited movement and fine adjustments without loosening and retightening the

adapter knob. Comes with $\frac{3}{8}$ " insert. Any Norman umbrella or others with up to $\frac{3}{8}$ " diameter shaft locks into place with a thumbscrew.

Ample 20-foot cable length has an improved design to optimize the electrical current flow and maintain maximum flexibility. The custom made cable is tough, yet coils easily, doesn't kink and won't become excessively stiff in cold weather.

Model lamp switch. A convenient on-off switch at the top of the unit permits individual modeling lamp control at the lamphead.

Four 25-watt modeling lamps (25T8/DC) provide long life illumination to preview your subject lighting. The optional RP-1 Diffusion Dome is recommended for the best match of modeling lamp to flash exposure coverage.

All Series 450 power supplies can be used with the LH4-A, including the P500M, Norlite V200 and P200C battery portable. Use the standard Norman mounts to attach Norman reflectors and accessories as well as other manufacturer's light box units.



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Series 450 Specifications: LH4-A

Maximum Energy	250 watt-seconds
Model Lamp (included)	Four 25 watt (25T8/DC)
Flash Tube	
Standard UV-Corrected FT120-UV	5500° K (effective Kelvin temperature)
Weight (including cables)	2 lbs. 4 oz.
Cord Length	20-foot cable with Series 450 connector

OUTPUT EXAMPLES for Series 450 Lamphead and Reflector Combinations

These meter readings are made under actual studio conditions to serve as a reference to guide your selection of the proper amount of watt-second power required for your own type of work.

W-S Power	250	200	125	100	62	50
Light Quality						
BARE BULB - 5DL	f 5.6 $\frac{3}{4}$	f 5.6 $\frac{1}{2}$	f 4 $\frac{3}{4}$	f 4 $\frac{1}{2}$	f 2.8 $\frac{3}{4}$	f 2.8 $\frac{1}{2}$
SPECULAR - 5E	f 11 $\frac{1}{2}$	f 11 $\frac{1}{4}$	f 8 $\frac{1}{2}$	f 8 $\frac{1}{4}$	f 5.6 $\frac{1}{2}$	f 5.6 $\frac{1}{4}$
MEDIUM - 5X	f 5.6 $\frac{1}{4}$	f 5.6	f 4 $\frac{1}{4}$	f 4	f 2.8 $\frac{1}{4}$	f 2.8
SOFT - WB45	f 8 $\frac{1}{2}$	f 8 $\frac{1}{4}$	f 5.6 $\frac{1}{2}$	f 5.6 $\frac{1}{4}$	f 4 $\frac{1}{2}$	f 4 $\frac{1}{4}$
Typical Flash Durations	P500-M: $\frac{1}{500}$ second consistent at all power settings.					
Hundredths of a Second	P400-D and P202: $\frac{1}{400}$ second constant. Shorter with multiple lampheads.					

Specifications for f-stop ratings above are based on actual studio readings with a flash meter, rated at ISO 100 film speed, at a distance of 10 feet from these light sources: **Bare**: Bulb: 5DL, 140° wide angle Reflector. **Specular**: 5E, satin surface Reflector. **Medium**: 5X, 22° Soft Light Reflector. **Soft**: WB45, white 45° diameter umbrella with 5DL Reflector. See pages 6-7 and the *Reflector and Accessories* section of the catalog for further information and photographic comparisons.

Boom Arm Keeps Lights in Place and Stands Off of the Floor

The Norman LS-232 Wall Boom is a convenient way to put your lights exactly where you want them without light stands and cables taking up floor space. It's the perfect answer for a small camera room — main and fill lights mounted to the side walls with a hairlight on the back wall.

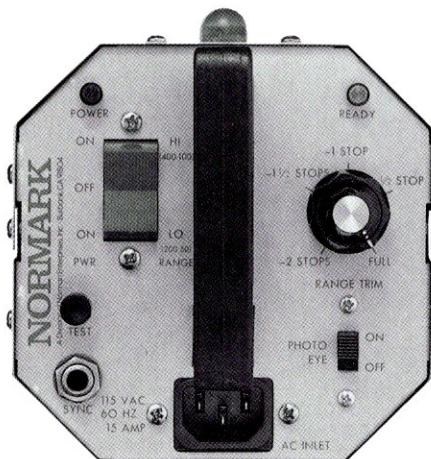
Telescopes from 4 to 7 feet, and swings vertically and horizontally for maximum flexibility of lighting without fighting with light stand legs. Also, ideal for copy light setups, adjustable backlighting, or other semi-permanent lighting situations. See page 61 for complete specifications.



LS-232 Wall Boom

Mounts directly to walls. Shown with LH2000-B Lamphead, 5DL Reflector and R4109-B Snoot.

Norlite 400



Self-contained Electronic Flash Units Powerful, Portable and Packed with Features

The Norlite 400 was designed for today's on-the-go photographers. Weighing in at just over 6 pounds, it is a reliable compact flash unit that can be used in the studio or when you travel on location. A convenient two-light kit is available complete with stands, umbrellas and sturdy carrying case.

The flash output and modeling light levels are infinitely variable from 50 to 400 watt-seconds. It is one of the most economical self-contained flash units on the market, offering superior performance as well as important light control features.

Norlites are manufactured in the U.S. by the Normark division of Norman Enterprises, Inc. The solid state, transformerless circuit design is voltage stabilized and built for years of dependable use. Like all Norman equipment, the Norlite 400 is protected by a two-year limited warranty with over 80 service centers in the U.S. and Canada.

Each Norlite 400 unit includes a heavy duty FT6-UV (600 w-s) plug-in flash tube, a 100-watt Krypton modeling lamp, one R4130 Friction-float Stand Adapter (3/8" diameter light stand insert) and 5DL Reflector. Most Norman Enterprises 900 Series reflectors, barndoors, grids, diffusers and other accessories can be used.

■ **Variable output range of 3 f-stops.** The RANGE TRIM (dual dimmer) dial controls the light output of both the flash and the modeling lamp. Both dials are "interlocked" to maintain both output levels in direct ratio. You also have the flexibility to raise or lower the overall modeling lamp brilliance without changing the flash output.

■ **Power/Range switch** controls both the AC power and light output range of the flash and modeling lamp. In the HI position the Range Trim adjusts from 400-100 w-s. In LO, the 2 f-stop range is 200-50 w-s, and the modeling lamp output is half as bright.

■ **Twist-lock reflector mounting** make changing reflectors a breeze — one twist and the reflector is locked in place.

■ **Friction-float Stand Adapter** offers unlimited movement and fine adjustments without loosening and retightening the adapter knob. Fits any umbrella with up to 3/8" diameter shaft. Thumbscrew locking.

■ **Built-in photo eye.** Ultra-sensitive photo-eye mounted to top of unit for full 180° coverage. A number of Norlights can be triggered in perfect synchronization with only one unit connected to the camera. Can easily be switched on or off.

Studio In A Kit — For the Photographer on the Go

The NL400K Studio Kit offers a versatile two light assembly at a tempting price. Everything for basic location lighting neatly packed in a sturdy, lightweight carrying case. Keep a Studio Kit packed and you will be ready to go on a moment's notice.

The NL400K Studio Kit includes:

- 2 – Norlite 400 Light Units
- 2 – 5DL Wide Angle Reflectors
- 2 – LS224 Light Stands
- 2 – NCW44 Translucent White Umbrellas
- 1 – Carrying Case (9" x 16" x 36")

Normark Specifications: NORLITE 400

Power Range (watt-seconds)	400 w-s maximum – 50 w-s minimum
F-stop Range of Output Options	3 f-stops, continuously variable
Light Output Guide	f 8½ (1,500 BCPS) GN = 95 <i>See chart below</i>
Recycle Time to 100% Charge	2 seconds to 400 w-s
Model Lamp (included)	100 watt tungsten lamp
Flash Tube – FT6-UV (UV-Corrected)	5500° K (effective Kelvin temperature)
Operating Voltage / Circuit Breaker	95-135 volt, 60 Hz / 7 amp at 115 volts AC
Weight (including cables)	6 lbs. 2 oz. (Shipping weight – 9 lbs.)
Dimensions	5" H x 8½" L x 5" W (Add 5½" for handle and 5DLReflector)

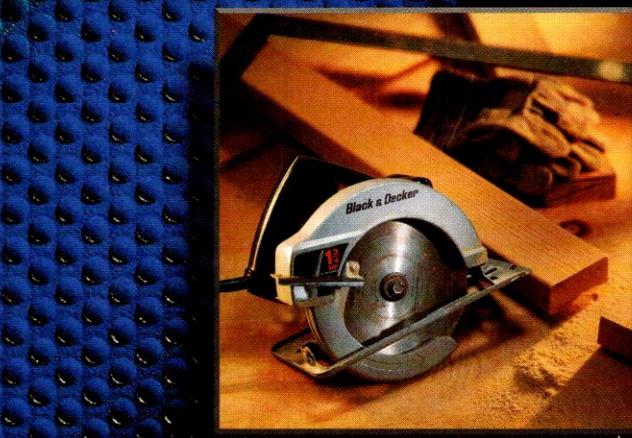
OUTPUT EXAMPLES for NORLITE 400 and Reflector Combinations

These meter readings are made under actual studio conditions, rated at ISO 100 film speed, at a distance of 10 feet from these light sources. Use as a guide to select a watt-second rating to begin your own tests.

W-S Power	400	300	200	150	100	50
Light Quality						
BARE BULB – 5DL	f 8½	f 8	f 5.6½	f 5.6	f 4½	f 2.8½
SPECULAR – 5E	f 16¼	f 11¾	f 11¼	f 8¾	f 8¼	f 5.6¼
MEDIUM – 5X	f 8	f 5.6½	f 5.6	f 4½	f 4	f 2.8
SOFT – WB45	f 11¼	f 8¾	f 8¼	f 5.6¾	f 5.6¼	f 4¼
Typical Flash Durations	HIGH Setting (400 - 100 w-s): 1/250 second.					
Hundredths of a Second	LOW Setting (200 - 50 w-s): 1/500 second.					

With Norman reflectors and accessories you can shape and direct light, change color, contrast and intensity to fit your style of photography.

Reflectors & Accessories



SIZE IS THE SECRET BUT NOT THE RULE

Regardless of the type of light source, size is the single most influential factor determining the specular or diffused quality of your lighting. This varies in application by the relationship of the light source size in comparison to the subject and light-to-subject distance.

When the light is closer to the subject or larger than the subject, the lighting will be softer. The shadows are open with softer edges, less texture is recorded and the color saturation is decreased by the large, diffused highlights. A relatively small, direct light source could produce a very effective lighting quality when used very close to the subject.

The opposite can apply when using a large light source. For example, a metallic silver umbrella, when placed at a greater distance from the subject begins to take on the characteristics of a specular, parabolic reflector. As a light is moved farther away, becoming smaller to the subject, the wrap-around illumination decreases and texture, color saturation and highlight intensity increases.

The closer a light is to the subject, the more local control you gain in separation of the subject from the background. This enables you to feather the light to adjust the contrast and select the brightest subject areas.

A generally accepted rule of thumb states that the best working distance for a large, soft light source is up to 1½ times the size of the source. For example, a starting point for use of a 3-foot soft box would be from 3 feet to 4½ feet from the subject. Many other factors in highlight reflections, texture, shadows and contrast must be considered to determine the optimum position of the light source for each photographic situation.

COLOR SATURATION

Exposure on film, or the density of a photographic print, will vary the overall image color saturation and detail. Considerable variation is caused by the size of the light source itself, its relative distance from the subject, and by the angle of the light-to-camera axis.

If the selected light source is a small and shiny parabolic reflector, the light level will produce a relatively high contrast result with distinct, dark shadows and small, specular highlights. As the light source gets larger in relation to the subject, the illumination becomes softer, with more gentle shadows, and the reflection of the source (highlight) is also larger. The highlights from a large source are less specular, and leave a transparent reflection on the subject that can dilute the intensity of the color as seen by the camera.

A white background, reflectors and even the environment of the shooting area can increase the bounce of light onto the subject, reducing contrast and adding reflections that will weaken the saturation of the color. Shielding

the subject from excess light, by controlling or reducing the size of the source and surrounding the subject in black, can significantly increase the contrast and color intensity of your photograph.

A simple experiment of photographing a dark colored product on a white background and comparing the results with the same product on a dark background can be dramatic. If a lighter surrounding edge is required for defining the product shape, black can be added just outside the camera format area and still improve the final image quality considerably.

ANGLE OF COVERAGE

This term is commonly used to communicate the spread of light as it radiates from a given lamphead and parabolic reflector combination. Norman offers a wide variety of reflectors with angle of coverage from 15° to 140° and a variety of surfaces to satisfy specific photographic applications.

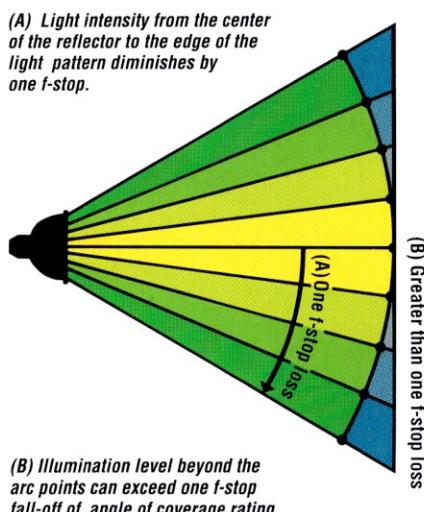
The various published standards (ISO, ASA, and ANSI) used by manufacturers to measure angle of coverage provide a reasonable basis for comparison, but the resultant ratings can be misleading to the photographer.

Generally speaking, the angle of coverage of a reflector is the angle at which the light falls to half of the BCPS rating (direct on-axis reading) of the reflector. This means the light output will be one f-stop less, at the extreme sides of the illumination pattern (coverage angle), than in the center of the beam.

For situations where even illumination to the edges of the frame is required, you may wish to select a reflector with a coverage angle that is greater than you would normally require or add additional lampheads to assure even lighting across the image area.

Since angle of coverage measurements are made by pivoting the lamphead, the light output readings pertain to a circular surface rather than a flat plane. You can experience an even greater loss at the edges when the subjects are positioned in a straight line. When practical, subjects can be positioned in a curved line to reduce this effect.

(A) Light intensity from the center of the reflector to the edge of the light pattern diminishes by one f-stop.



(B) Illumination level beyond the arc points can exceed one f-stop fall-off of angle of coverage rating.

CHOOSING THE RIGHT SOURCE

The lighting is right when *you* are satisfied with the results of the finished product. There are as many ways to reach this level of satisfaction as there are photographers. Each type of assignment and individual creative style will dictate the approach to lighting. Still, regardless of brand names or lighting equipment investment, there are common considerations for subject illumination that each photograph shares.

In this article, the concentration will be on one primary light source. Its size, shape, position and angle will be the dominant influence in rendering the subject on film and maintaining the accuracy of the intended visual message.

The objective of any lighting selection is to reach the desired relationship of highlights to shadows. Building highlights and filling shadows can be accomplished by varying the specular/diffused quality and position of the light, increasing the exposure or adding reflector panels to redirect and bounce stray light back to the subject. Any additional light units should be added only for a particular reason or effect.

The size and shape of parabolic reflectors for electronic flash systems all have common purposes – to vary the quality of light, change coverage angle and/or boost light output. The two extremes are:

Point Source – Small, direct, source of light that when striking the subject, causes sharp, harsh outlines, little shadow detail and small intense highlight reflections. Placing any light at a great enough distance from the subject can cause it to react like a point source light. The Norman TRI-LITE has characteristics of a focusable, point-source light.

Floodlight – A source with a reflector or diffuser that scatters light over a wider angle creating softer outlines and lower contrast. The Norman 5X Soft Light Reflector is this type of broad coverage parabolic reflector.

Beyond these two specific descriptions, there are infinite variables in ultimate light quality. Included are light-to-subject distance, size of source, diffusers, light-to-camera axis, the environment and in particular, the subject itself. The reflective nature of the subject, shiny or mirrored surfaces, textures and skin all have different needs to effectively maintain their natural characteristics on film.

Our photographic light sources vary from the hard-edged, specular direct sunlight to the non-directional, low contrast, diffused properties of overcast daylight. The following five groups of light source options include the major alternatives for photography with electronic flash lighting systems.

Direct Light

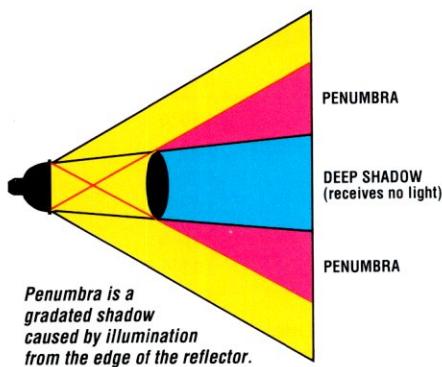
This type of light is especially beneficial when color saturation or subject texture is important. Often used as an accent light from the side so depth of shade and light can emphasize shape and surface characteristics.

—Continued on page 49—

Direct light yields optimum color saturation, creates a harsh contrast between highlights and shadows, may record little or no shadow detail and reflects small, bright specular highlights. As the source gets smaller or the distance to the subject becomes greater, the contrast effect increases. The sharp-edged shadows can become important parts of the photograph and they can enhance, distract, or interfere with the intended emphasis.

Direct lighting is controlled by a variety of parabolic reflectors with a multitude of interior surfaces to alter this concentration of light and the amount of specularity from the "hot spot" of the illumination. Norman offers a full range of parabolic reflectors, from specular to floodlight, to compliment your individual photographic style.

As a reflector is added to increase the size of the source, the sharp-edged deep shadow of the subject is softened by a graduated zone of partly lit shadow called the **penumbra**.



If the light is larger than the subject and sufficiently close to create a wrap-around effect, the light from the edges of the reflector will overlap behind the subject creating the penumbra area. This extra illumination lightens part of the deep shadow created by the direct light from the center of the reflector.

As a light is moved closer to the subject, more light wraps around the subject for a softer shadow. As the light moves away, the penumbra shadow has less effect on the deep shadow and the light provides less wrap-around effect on the subject shape.

Diffused Direct Light

The light from a specular, parabolic reflector can be softened considerably. Shine the lamphead through a flat or scrim made of a frame covered with diffusion material such as sailcloth, plexiglas, artists vellum, sheer curtain fabric or even bed sheets. It is best to use nonflammable materials and those that will not affect color balance such as the materials used in Norman diffusers.

Adding a diffuser to a parabolic reflector scatters light in all directions creating an effectively larger source of illumination that bounces around the subject as ambient light. The larger highlights are more transparent and more detail is shown in shadows. A certain directional quality can be controlled, so the shape and texture of the subject is maintained.

The apparent contrast level is reduced because the diffuser reduces the natural "hot spot" in a reflector, improving the edge-to-edge evenness without increasing the size of the light source. The specular/diffused nature of the lighting does not change unless the light is very close to the subject where the relative change in "hot spot" size would be noticed in the reflected highlights.

Indirect Diffused Light

Popular light modifiers today come the form of soft boxes and light banks (large light boxes). They are manufactured in various sizes, shapes and price ranges. All basically function the same way, to direct light to the subject through a diffused surface.

Their advantage is that the light is scrambled internally before reaching the front diffusion surface producing a very even, broad illumination that can be controlled as a large, directional source. Since the light radiating from the box light is more directional than bounce lighting, the color saturation and texture qualities of the subject are also improved.

Bounce Flats Versus Umbrella Lighting

A lamphead and parabolic reflector, when used as a bounce lighting source, results in illumination of lower contrast than with a diffusion panel of comparable size. Bounce lighting can generate a large amount of

ambient light with less directional characteristics, depending on how the light is positioned. It is often used as an overall illumination to bring up shadow detail or balance light levels across a large area. An umbrella light is a good mid-ground between the effects of direct and bounce lighting.

Non-directional Lighting

A level of ambient lighting, similar to that which occurs with the open sky outdoors, can be obtained with the proper use of a "bare bulb" lamphead. (No reflector is used and light will emanate from all sides of the flash tube.) When positioned to bounce off walls and ceilings of the studio environment bare bulb illumination can create the most diffused light quality. A certain amount of ambient light is generated from any lighting method and can influence the photograph. Using this uncontrolled illumination, all reflecting surfaces in the subject area or the room can reduce the overall effects of your primary lighting.

Raising the ambient light level with bare bulb or bounce lighting is one of the best ways to reduce the overall contrast in a scene without adding multiple direct lights. The Norman 5DL Reflector preserves the quality of bare bulb light, but protects the camera lens or subject from the raw light of the flash tube.

NORMAN REFLECTORS

Light Output Efficiency Comparison

REFLECTOR TYPE	W-S @ f-16/10 ft.	Change in Light Level	Light Quality	Coverage Angle
Bare Bulb (None) Standard for Comparison	1200	0	Bare	270°+
5DL 5" Reflector	1200	0	Bare	140°
5DL + RP-1 Diffusion Dome	1600	-½	Bare	140°
5E 10" Reflector	350	+1¼	Specular	60°
5E + RP-1 Diffusion Dome	500	+1¼	Specular	70°
5E + Fine Grid	700	+¾	Specular	1' Spot @ 5 ft.
5E + Course Grid	500	+1¼	Specular	2' Spot @ 5 ft.
5W 16" Reflector	400	+1½	Specular	70°
5W + RP-1 Diffusion Dome	600	+1	Specular	80°
5X 22" Reflector	1600	-½	Medium	130°
5X + Grid	4000	-1¾	Medium	3' Spot @ 5 ft.
5U-2 9" Reflector	100	+3½	Specular	50°
45" White Umbrella + 5DL	700	+¾	Soft	130°
45" Silver Umbrella + 5DL	600	+1	Soft	120°
30" Soft Box	1200	0	Soft	130°

Comparisons made under studio conditions. All lights remained 10 feet from center of set to edge of reflector. Use these numbers as a guideline to judge needs of reflectors, accessories and power supply capacity as well as approximating changes in f-stop or watt-seconds required when changing to a different reflector combination.



USES:

Portraiture

- Portable or studio lighting.
- Rim light for texture or accent.

Commercial Lighting

- Direct light for texture or accent.
- With diffusion and bounce panels.
- Illumination of background area.

Architectural or Industrial

- Interior and general lighting applications.

Direct Illumination for Large Groups

Umbrella Lighting with Less Spill



10" General Purpose Reflector

The 5E is our most popular and versatile reflector, widely used throughout all phases of the industry. It provides a medium-hard light with specular highlights and well defined shadows. Found in applications from a school photographer's efficient portrait light to an easy-to-control reflector source with diffusion panels for advertising studio product illustration. That's why you should make this 10", 60° reflector standard equipment in your Norman system!

5E Specifications

Type	General Purpose
Diameter	10 inches
Coverage Angle	60°
Interior Surface	Matte (Satin) Surface
Quality of Light	Specular
Efficiency	+ 1 1/4 f-stop gain (over bare bulb/5DL Reflector)
	F-16 @ 350 w-s
	10 feet, ISO 100

Model Options

5E: No umbrella hole
5E-2: For LH2000 Lamphead with umbrella
5E-24: For LH2400 Lamphead with umbrella

OUTPUT EXAMPLES WITH 5E REFLECTOR

WATT-SECONDS	BCPS	GUIDE NUMBER (ISO 100)	F-STOP (@ 10 FT.)
*4,000	48,000	560	f 45 1/2
2,000	25,000	400	f 32 1/2
1,200	15,000	310	f 22 3/4
800	10,000	250	f 22 1/4
400	5,000	175	f 16 1/4
200	2,500	123	f 11 1/4
100	1,250	87	f 8 1/4

Note: Accessories will change the light output. *4,000 w-s requires use of LH4000 Lamphead.

Compatible Accessories (See pages 55-62)

- Norman Umbrellas:** Angle of coverage is extended to about 130°. The 5E Reflector is not recommended for use with 30° or smaller umbrellas.
- G-10 Grids:** Choice of coverage of 1 ft. (G-10F) or 2 ft. (G-10C) diameter circle at 5 ft. distance to subject, 1/2 f-stop light loss. Will also hold 10" filters and gels. (RP-1 Diffusion Dome recommended for best results with all grids.)
- Grid Sets:** GH-10 Grid Holder clips to 5E Reflector rim. Selected grid quickly snaps into holder. Each set includes 3 grid patterns (1/8", 1/16", 1/32") to control the spread of light. Available in two grid thicknesses: GR-101S (1") or GR-105S (1/2").
- BD-410 Barndoors:** 4-wing design. Rotates 360° on rim. Holds 10" filters & gels.
- RP-1 Diffusion Dome:** Improves accuracy of modeling lamp and softens light, 70° coverage angle, 1/2 f-stop light loss.
- FF-10 Filter Frame:** Holds diffusers and gels flat. Fits into 10" Filter Frame Holder, barndoors or grids.
- FFH-10 Filter Frame Holder:** Holds Filter Frames directly on reflectors when not using barndoors or a G-10 Grid.
- DF-410 Diffusion Pack:** Package of four assorted 10" square diffusion filters, designed to withstand high temperatures.
- ND-10 Neutral Density Pack:** 10" high-temp 1, 2 or 3 f-stop neutral density filters.
- CG-10 Colored Gel Pack:** Variety of seven 10" square high-temp colored gels.

RP-1 Diffusion Dome

Use with the 5E, 5DL, and 5W Reflectors to improve the modeling lamp accuracy of your lamphead and soften the light quality. Creates a beautifully diffused source, especially when used at close working distances. The frosted glass dome causes the flash tube and modeling lamp to radiate light

from the same optical axis. Recommended when using grids to more accurately visualize the light pattern. Will increase angle of coverage by 10° with 5E and 5W. Light reduction is approximately 1/2 f-stop. Use of 150-watt modeling lamp is required.

5" Wide Angle/Umbrella Reflector

5DL Specifications

Type	Wide Angle/Umbrella
Diameter	5 inches
Coverage Angle	140°
Interior Surface	Mirror-type Surface
Quality of Light	Bare Bulb
Efficiency	+ 0 f-stop gain (Bare bulb/5DL Reflector used as reference standard) F-16 @ 1200 w-s 10 feet, ISO 100 (Same as bare bulb/no reflector)

We call it the "bare bulb" reflector since the mirror-surfaced 5DL, with a wide 140° coverage, does not alter the light characteristics of the raw flash tube. Maximum light spread is achieved, yet the reflector prevents the loss of stray side light, offering more control of your light ratios and eliminating raw light flare in the camera lens. The 5DL depth is enough to prevent the modeling lamp from protruding beyond the reflector rim.

This is our best umbrella reflector yielding a GAIN of light with umbrellas—it blocks less light than other reflectors and its wide spread fills the umbrella at a closer distance from the lamphead. Also excellent for background lighting and special applications with a wide variety of special accessories.



OUTPUT EXAMPLES WITH 5DL REFLECTOR

WATT-SECONDS	BCPS	GUIDE NUMBER (ISO 100)	F-STOP (@ 10 FT.)
*4,000	14,000	300	f 22 3/4
2,000	7,500	210	f 16 3/4
1,200	4,500	160	f 16
800	3,000	135	f 11 1/2
400	1,500	95	f 8 1/2
200	750	68	f 5 1/2
100	375	48	f 4 1/2

Note: Accessories will change the light output. *4,000 w-s requires use of LH4000 Lamphead.

Compatible Accessories (See pages 55-62)

Norman Umbrellas: GAIN of 1/2 f-stop with all Norman white umbrellas. Full 1 f-stop GAIN with all Norman silver umbrellas. Angle of coverage remains the same at about 140°.

G-45 Grid: Coverage is 1 ft. diameter circle at 5 ft. distance to subject, 1/2 f-stop light loss. Will also hold gels or diffusion sheets. (RP-1 Diffusion Dome is recommended for best results with all grids).

Grid Sets: GH-5 Grid Holder clips to reflector rim. Selected grid quickly snaps into holder. Each set includes 3 grid patterns (1/8", 3/16", 1/4") to control the throw of light. Available in two grid thicknesses: GR-51S (1") or GR-55S (1/2"). See page 55 for details.

BD-45 Barndoors: 4-wing design. Rotates 360° on rim. Holds 5" filters and gels.

RP-1 Diffusion Dome: Improves accuracy of modeling lamp and softens light, wider coverage angle, 1/2 f-stop light loss.

FF-5 Filter Frame: Holds diffusers and gels flat. Fits into 5" Filter Frame Holder, barndoors or grids.

FFH-5 Filter Frame Holder: Holds 5" Filter Frames directly on reflectors when not using barndoors or G-45 Grid.

DF-45 Diffusion Pack: Package of four assorted 5" square high-temp diffusion filters, designed to withstand high temperatures.

ND-5 Neutral Density Pack: 5" high-temp 1, 2 and 3 f-stop neutral density filters.

CG-5 Colored Gel Pack: Variety of seven 5" square high-temp colored gels.

R4109-B Snoot

An excellent hair or accent lighting source when added to the 5DL Reflector. Less coverage angle than the 5C Snoot for better control of illuminated area. Light reduction is 2 1/2 stops from normal 5DL efficiency. BCPS rating of 360 at 200 w-s.

RP-1 Diffusion Dome recommended for best results. Use 150-watt modeling lamp and R9124 Blower with Series 500 or 900 lampheads. R4109 model available with built-in 25-watt modeling lamp for LH2 Lampheads.



5U-2



USES:

Portraiture

- Highly specular light for high key work.

Commercial Lighting

- Direct light for texture or accent.
- Concentrated, specular light with diffusion panels.
- Bounce lighting with less side spill.
- Increased output with large diffusion boxes.

Architectural or Industrial

- Interior and general lighting applications.
- High output reflector for ceiling or wall bounce.

Umbrella Lighting

- General purpose applications.



9" Specular Reflector

With its 9" diameter and 50° coverage, this reflector was designed specifically for use as a general purpose reflector where maximum light output is required. It has a textured, polished interior for a highly concentrated, specular light source. Though not as even a light as the smooth, satin surfaced reflectors, the higher output efficiency of the 5U-2 makes it a good reflector to use for high key work, indirect lighting, bounce lighting or when using large diameter umbrellas.

5U-2 Specifications

Type	Specular Reflector
Diameter	9 inches
Coverage Angle	50°
Interior Surface	Textured Mirror-type
Quality of Light	Specular
Efficiency	+ 3 1/2 f-stop gain (over bare bulb/5DL Reflector)
	F-16 @ 100 w-s 10 feet, ISO 100
Model Options	5U-2 for LH2000 Lamphead with umbrella 5U-24 for LH2400 Lamphead with umbrella

OUTPUT EXAMPLES WITH 5U-2 REFLECTOR

WATT-SECONDS	BCPS	GUIDE NUMBER (ISO 100)	F-STOP (@ 10 FT.)
*4,000	140,000	950	f 90
2,000	75,000	690	f 64 1/4
1,200	45,000	530	f 45 1/2
800	30,000	430	f 45
400	15,000	310	f 32
200	7,500	210	f 22
100	3,750	155	f 16

Note: Accessories will change the light output. *4,000 w-s requires use of LH4000 Lamphead.

Compatible Accessories (See pages 55-62)

Norman Umbrellas: Light reduction of 2 f-stops with all Norman white umbrellas. Loss of 1 f-stop with all Norman silver umbrellas. Angle of coverage is extended to about 130°. The 5U-2 is not recommended for use with umbrellas under 30" in diameter.

RP-1 Diffusion Dome: Will improve accuracy of modeling lamp and softens light. Increases coverage angle to 60°. Allow for 1/2 stop light loss in exposure.

5C Snoot

The 5C adapts to the Norman lampheads with the standard reflector pins and uses an economical method of tunneling the light to form a 30° spot illumination. An excellent hairlight control for portraiture or accent light for people or products. Requires the use of the 150-watt modeling lamp and the R9124 Blower. BCPS rating of 480 at 200 w-s.



16" Portrait Reflector

5W Specifications

Type	Portrait Reflector
Diameter	16 inches
Coverage Angle	70°
Interior Surface	Matte (Satin) Surface
Quality of Light	Specular
Efficiency	+ 1 1/2 f-stop gain (over bare bulb/SDL Reflector)
	F-16 @ 250 w-s 10 feet, ISO 100

The broad parabolic shape of the 5W Reflector is a flattering light for portraiture. And, this specially designed reflector is equally efficient as a flood light for groups and fill-in light.

The wide diameter and medium 70° angle yields a medium-hard light with good specular highlight quality and well defined shadows for excellent facial portrait lighting. The slightly hotter center source and natural light fall-off of this parabolic reflector make it excellent to use as a feathered source.

Feathering the light gives the photographer additional control for facial sculpturing and manipulation of scene brightness. The 5W is used extensively as main and fill light in individual portraiture and for even illumination of broad areas for full length and group photography.



OUTPUT EXAMPLES WITH 5W REFLECTOR

WATT-SECONDS	BCPS	GUIDE NUMBER (ISO 100)	F-STOP (@ 10 FT.)
*4,000	44,000	530	f 45 1/4
2,000	22,500	365	f 32 1/4
1,200	13,500	280	f 22 1/2
800	9,000	235	f 22
400	4,500	170	f 16
200	2,250	116	f 11
100	1,125	84	f 8

Note: Accessories will change the light output. *4,000 w-s requires use of LH4000 Lamphead.

Compatible Accessories (See pages 55-62)

- RP-1 Diffusion Dome:** Improves accuracy of modeling lamp and softens light, 80° coverage angle, 1/2 stop light loss.
- BD-416 Barndoors:** 4-wing design. Rotates 360° on rim. Holds 16" filters & gels.
- FF-16 Filter Frame:** Holds 16" gels and diffusers flat. Fits into FFH-16 Filter Frame Holder or BD-416 Barndoors.
- FFH-16 Filter Frame Holder:** Holds 16" Filter Frames directly on reflectors when not using barndoors.

DF-416 Diffusion Pack: Package of four assorted 16" square diffusion filters designed to withstand high temperatures.

ND-16 Neutral Density Pack: 16" high-temp 1, 2 and 3 f-stop neutral density filters.

CG-16 Colored Gel Pack: Variety of seven 16" square high-temp colored gels.

USES:

Portraiture

- All purpose studio light for main, fill or accent lights.
- Excellent light for soft focus lenses.
- Direct illumination for large groups and full length.

Commercial Lighting

- Broad direct, specular light source.
- Use with diffusion and bounce panels.
- Overall fill illumination of larger sets.

Architectural or Industrial

- Interior lighting.

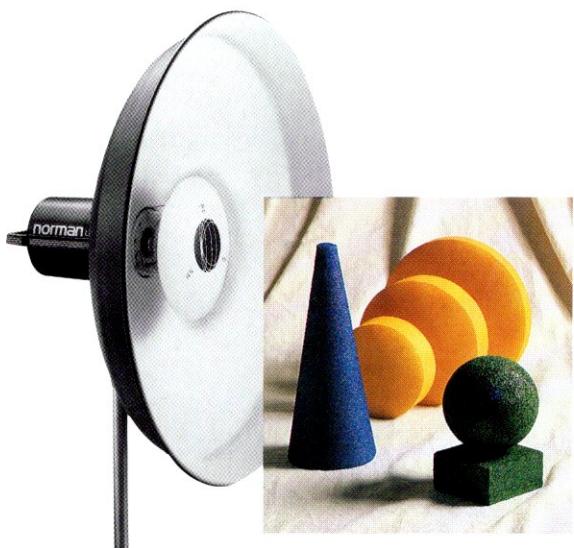


5BP Barndoors

Special accessory for background lighting, accent "kicker" light or backlighting the subject. Produces a 180° diffused "bare bulb" quality of light from standard lamphead. Hinged, curved barndoors allow for

control of coverage and angle of light. BCPS rating of 400 at 200 w-s. Mounts with standard reflector pins on LH4000, LH2400, LH2000, LH500, LH54 or LH4-A Norman Lampheads.

5X



22" Soft Light Reflector

This is a soft light that deserves a hard sell! The 5X Reflector produces a broad and even quality light—flatters skin tones for portraiture and accentuates the form and texture of food and product photography. The deflector cover over the flash tube and the flat white interior minimize the specularity and give a light quality similar to an umbrella or softbox.

The 5X provides a hard to achieve combination of a soft, yet direct light that can enhance your photography. This wrap-around light quality creates a unique blend of smooth, broad highlights with open shadows. Optimum results are achieved when used close to the subject.

As the light is moved back, the 5X becomes a smooth broad source for full figure or group photography. Its wide coverage also helps in interior and commercial work where hiding umbrellas from the field of view is a problem. If you have never used this type of reflector, think again!

5X Reflector Specifications

Type	Soft Light
Diameter	22 inches
Coverage Angle	130°
Interior Surface	Flat White Surface
Quality of Light	Medium
Efficiency	- 1/2 f-stop loss (under bare bulb/5DL Reflector) F-16 @ 1600 w-s 10 feet, ISO 100

USES:

Portraiture

- Excellent main or fill lighting.

Commercial Lighting

- Soft, specular direct light for food and product photography.
- Versatile, broad fill lighting.
- Natural illumination of background or large set areas.

Fashion Illustration

- Texture and accent lighting for clothing.
- Soft, directional light for full figure photography.
- Compliments skin texture for close-ups.

Architectural or Industrial

- Broad interior lighting in confined areas.
- Even coverage and specularity for furniture photography.

OUTPUT EXAMPLES WITH 5X REFLECTOR

WATT-SECONDS	BCPS	GUIDE NUMBER (ISO 100)	F-STOP (@ 10 FT.)
*4,000	9,000	235	f 22 1/4
2,000	4,800	170	f 16 1/4
1,200	3,000	135	f 11 1/2
800	2,000	110	f 11
400	1,000	80	f 8
200	500	56	f 5.6
100	250	40	f 4

Note: Accessories will change the light output. *4,000 w-s requires use of LH4000 Lamphead.

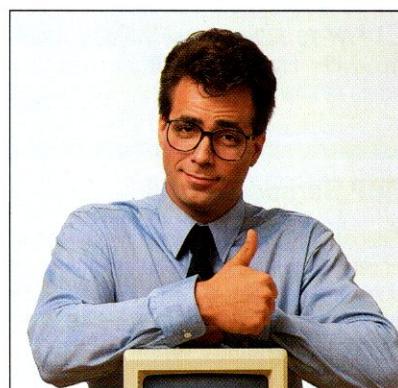
Compatible Accessories (See pages 55-62)

G-22 Grid: Coverage of 3 ft. diameter circle at 5 ft. distance to subject, maintains soft and diffused quality. 1/2 f-stop light loss. Clips directly to reflector rim.

BD-422 Barn Doors: 4-wing design. Rotates 360° on rim.



As an underlighting source—used directly beneath the translucent base of the set, the 5X Reflector spreads a broad, even illumination within a short floor to table distance.



An exceptional light for people—for portraits, fashion or advertising. The 5X is a broad, soft and controllable floodlight. It provides better skin texture and more highlight definition and color saturation than diffused sources.

Grids

Spot Control with Parabolic Reflectors

The Norman black metal honeycomb grids provide a convenient method to modify the light fall-off of a standard reflector. The grid pattern tunnels the light to form a soft vignetted circle of light.

The characteristics of the light source (shadows and highlights) remain the same as the normal reflector. The size of the light source does not change, only the angle of coverage is restricted by the honeycomb.

Subject contrast may increase slightly, since the spread of light is decreased and there is less stray light filling the shadows. The impact of the grid on the subject contrast will depend on the reflecting surfaces surrounding the subject.

Square Grids

Grids mount directly to the rim of the reflectors. A slot at the top of the housing allows the use of gels, filters and diffusers mounted in the appropriate size Norman Filter Frame. Diffusers used behind the grid spot will not alter the size of the spot.

<input type="checkbox"/> G-45	FINE $\frac{1}{8}$ " Grid Cell	For 5" diameter reflectors
<input type="checkbox"/> G-10F	FINE $\frac{1}{8}$ " Grid Cell	For 10" diameter reflectors
<input type="checkbox"/> G-10C	MEDIUM $\frac{3}{16}$ " Grid Cell	For 10" diameter reflectors

G-22 Round 22" Grid for 5X Softlight

Custom manufactured grid for the Norman 5X Softlight provides a beautiful vignetting to portrait lighting. Sturdy, lightweight frame clips directly to 5X rim. Can be quickly added or removed during sitting to vary lighting styles.

Grid Holders for Round Grids

The Grid Holder clips directly to the rim of the reflector and allows the round grids of either thickness ($\frac{1}{2}$ " or 1") to be quickly snapped into position.

<input type="checkbox"/> GH-5	Fits all 5" diameter reflectors
<input type="checkbox"/> GH-10	Fits all 10" diameter reflectors

Round Grid Sets

Assortment of three different honeycomb grid cell sizes ($\frac{1}{8}$ ", $\frac{3}{16}$ ", $\frac{3}{8}$ ") to provide a choice of coverage area and light fall-off for different working distances. Quickly snaps into the grid holder to cover the reflector. The pull-tab can be used to easily remove the grid from the holder. An RP-1 Diffusion Dome is recommended for the most accurate visualization of the flash pattern.

Available in two thicknesses ($\frac{1}{2}$ " or 1"), each will produce a different coverage angle and different characteristics to the feathering of light at the edge of the circle. The thinner $\frac{1}{2}$ " grids have a softer (less defined) edge than the 1" thick material. Although not as effective, the $\frac{1}{2}$ " grids are less bulky for travel and location work. Using the 1" thick set will give a more precise, circular vignetting pattern.

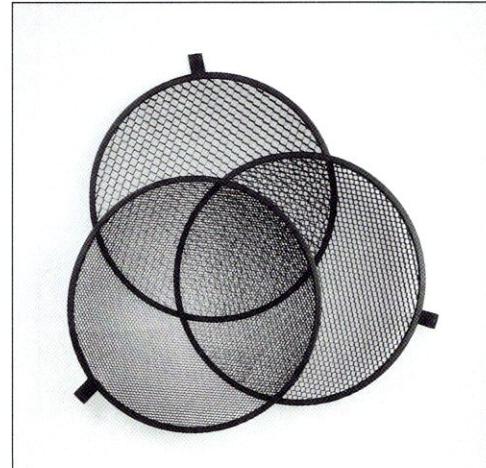
<input type="checkbox"/> GR-51S	Set of three 1" thick grids for 5" diameter reflectors.
<input type="checkbox"/> GR-55S	Set of three $\frac{1}{2}$ " thick grids for 5" diameter reflectors.
<input type="checkbox"/> GR-101S	Set of three 1" thick grids for 5" diameter reflectors.
<input type="checkbox"/> GR-105S	Set of three $\frac{1}{2}$ " thick grids for 5" diameter reflectors.

Light Coverage for Norman Grids

Chart shows grid dimensions and cell size with approximate vignetted circle of light at 5ft. light-to-subject distance.

<input type="checkbox"/> G-45	5" sq. ($\frac{1}{8}$ " cell)	16 inches
<input type="checkbox"/> G-10F	10" sq. ($\frac{1}{8}$ " cell)	18 inches
<input type="checkbox"/> G-10C	10" sq. ($\frac{3}{16}$ " cell)	24 inches
<input type="checkbox"/> G-22	22" rd. ($\frac{3}{16}$ " cell)	30 inches
<input type="checkbox"/> GR-55S	5" rd. ($\frac{1}{8}$ " cell)	24 inches
$\frac{1}{2}$ " set	5" rd. ($\frac{3}{16}$ " cell)	48 inches
	5" rd. ($\frac{3}{8}$ " cell)	60 inches

<input type="checkbox"/> GR-51S	5" rd. ($\frac{1}{8}$ " cell)	12 inches
1" set	5" rd. ($\frac{3}{16}$ " cell)	24 inches
	5" rd. ($\frac{3}{8}$ " cell)	36 inches
<input type="checkbox"/> GR-105S	10" rd. ($\frac{1}{8}$ " cell)	24 inches
$\frac{1}{2}$ " set	10" rd. ($\frac{3}{16}$ " cell)	48 inches
	10" rd. ($\frac{3}{8}$ " cell)	60 inches
<input type="checkbox"/> GR-101S	10" rd. ($\frac{1}{8}$ " cell)	12 inches
1" set	10" rd. ($\frac{3}{16}$ " cell)	24 inches
	10" rd. ($\frac{3}{8}$ " cell)	36 inches



Bounce Umbrellas



The black backing on the WB45 and WB60 can be easily removed to use only the white fabric umbrella.



The translucent white umbrellas make an excellent portable, soft portrait light when used as a direct diffused source. Adjust exposure for $1\frac{1}{2}$ f-stop light loss when lighting through the white fabric surface.

The Popular, Portable Light Source

Umbrella lighting has provided a simple, inexpensive and portable solution to the need for controlled, diffused bounce lighting. It is used in virtually all types of lighting situations; including group photography, flood lighting of large areas, fashion, portrait and commercial assignments.

All Norman bounce umbrellas feature neutral color UV absorbing fabrics that prevent color shift due to fluorescing of

the material. Our white umbrellas provide a softer light than do the silver models. For those applications where maximum light output is required, silver umbrellas will yield about $\frac{1}{2}$ f-stop more light than the white fabric lined umbrellas.

Each umbrella comes in a nylon sheath which protects the umbrella from the elements during transit.

WB30 Translucent White with Removable Black Backing

You can either shoot through the WB30 or bounce the light into it in the traditional manner. The compact 30-inch diameter is ample for a good light coverage, and is ideal for small studios or storage in equipment cases. $\frac{5}{16}$ " shaft.

WB45 Translucent White with Removable Black Backing

Our most popular umbrella, 45-inches in diameter. The black backing eliminates stray light from filtering through the fabric. Plus, the backing can be removed for situations where more ambient light is desired or if you wish to shoot through the umbrella as a diffuser. $\frac{5}{16}$ " shaft.

WB 60 Translucent White with Removable Black Backing

Our softest umbrella light. The 60-inch diameter becomes a very large source of wrap-around lighting providing broad, smooth highlights and open shadows. This umbrella is also good for groups or full length photography. $\frac{5}{16}$ " shaft.

S30 High-output Textured Silver with Opaque Backing

A very efficient 30-inch diameter umbrella that effectively becomes a large, portable reflector. The shiny, slightly textured, interior surface creates a little more contrast in the light quality which can improve color saturation, specular highlights and texture. $\frac{5}{16}$ " shaft.

S45 High-output Textured Silver with Opaque Backing

An all-purpose, 45-inch diameter umbrella for studio or location, providing a wide coverage, specular light source for all types of portrait, interior or product work. $\frac{5}{16}$ " shaft.

S56 Soft Silver

Our most popular large umbrella. The light quality and large size gives this umbrella the versatility that every studio can use as "standard" equipment. The 56-inch diameter is big enough for a good wrap-around lighting. The textured silver surface is better for light dispersion, creating a highly efficient bounce reflector and moderate specular light quality. $\frac{3}{8}$ " shaft.

Lamphead Reflectors Make A Difference

The efficiency of an umbrella can be helped or hurt by the choice of the lamphead reflector — the coverage angle, distance of lamphead to umbrella surface and the blockage of subject light by the physical reflector itself.

Our best reflectors for umbrella use are the 5DL for the LH4-A, LH54, LH500, LH2000 and LH2400 Lampheads, and the 2Q for the LH2 and LH52 Lampheads.

The 5DL Reflector produces about a $\frac{1}{2}$ f-stop gain with Norman's white umbrellas and about a 1 f-stop gain with our silver umbrellas (compared to direct light use of the 5DL Reflector.)

The 2Q Reflector provides about $1\frac{1}{2}$ f-stop loss with Norman's white umbrellas and

about a 2 f-stop loss with our silver umbrellas (again compared to the direct light use of the 2Q Reflector).

The differences in these reflectors are by design. The 5DL Reflector was primarily made to act as a shield to the bulb, creating a near "bare bulb" lighting situation, while protecting the lens from stray light and preventing lens flare. With an umbrella, the 5DL allows the light to be focused by the umbrella surface and its small 5" diameter blocks minimal subject light; both factors increase light efficiency.

The 2Q, on the other hand, was specifically designed to focus the light from the flash tube to maximize the watt-second conversion into light efficiency when used with umbrella bounce lighting.

Localized Control For Reflector Sources

Standard 4-wing Barn Doors for Norman Reflectors

Barn doors make it easy to feather the light to control ratio and gradation; to shield light from the background; and, to protect stray light from creating lens flare.

Each Norman barn door unit has four fully adjustable metal barn door wings, mounted on a sturdy frame assembly that snaps over the lip of reflector. The design allows a full 360° rotation of the barn door assembly on reflector rim. Top and bottom wings are trapezoid shaped to allow a tighter positioning of the wings for maximum light control.

The barn doors serve as a multi-purpose device — to modify the light coverage and conveniently mount color gels, diffusers, and neutral density filters. Norman Filter Frames fit easily into the framework of the barn doors to hold filters and gels flat.

- BD-45** 4-wing
Fits all 5" diameter reflectors
- BD-410** 4-wing
Fits all 10" diameter reflectors
- BD-416** 4-wing
Fits all 16" diameter reflectors

For 5X - 22" Soft Light Reflector

Sturdy, lightweight corrugated wings mounted on metal framework gives you 4-wing control to the broad coverage of the versatile 5X light source.

- BD-422** 4-wing
Fits 5X (22") reflector

Barn Doors and Snoots for Norman Fresnel Spotlights

FS-6 6" Fresnel Spotlight

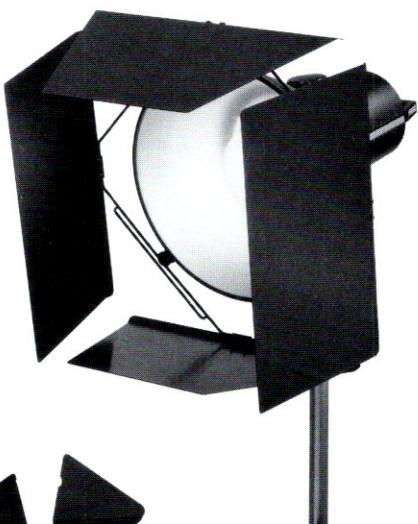
- 58005** 4-wing Barn Door
- 10004** Snoot - 2" opening
- 10005** Snoot - 3" opening
- 10006** Snoot - 4" opening
- 49143** Diffuser and Gel Frame

FS-10 10" Fresnel Spotlight

- 58014** 4-wing Barn Door
- 10012** Snoot - 6" opening
- 10013** Snoot - 8" opening
- 49369** Diffuser and Gel Frame

NOTE: A variety of wire screen scrims for each spotlight size are also available.

Barn Doors



FS-6 Barn Doors and Snoots.
A full line of accessories are offered for both Series 900 fresnel flash spotlights.

“Paint with Light” with TRI-LITE Accessory

The DeCapua Light Hose Attachment makes your TRI-LITE even more valuable as an everyday studio light source. It is a very economical way to accomplish some of the special fiber-optic light painting techniques that are so popular today.

“Painting with Light” removes the limitations of single or multiple flash exposures which are restricted by the elements of time and physics — you are now free to create any effect you wish.

With the DeCapua Light Hose by Norman, you can have much more control over subject shape and texture, as well as the location of highlights and shadows.

USE AS A STROBE LIGHT SOURCE:

A localized point source of light used to supplement normal electronic flash setups.

Illuminate critical shadow pockets or emphasize specific detail of the photo. Add light to local areas that require more intensity or aim the fiber-optic hose from a different angle to brighten an area that may be blocked from the main light source.

USE AS A TUNGSTEN LIGHT SOURCE:

“Painting” with light over larger areas with a moving light for extended exposure times.

The Norman TRI-LITE can be used as a movable, hand-held tungsten light source

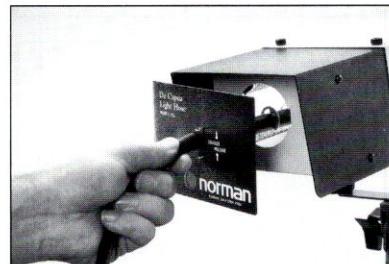
with the fiber-optic light hose. The High-Low feature of the TRI-LITE is ideal for working with the DeCapua Light Hose.

DCF01 DeCapua Light Hose

Includes a 10-foot fiber-optic cable in a durable black sheath, a special light-collector adapter plate to mount on front of TRI-LITE, and four black light cones with varied openings to control the shape and size of light pattern.

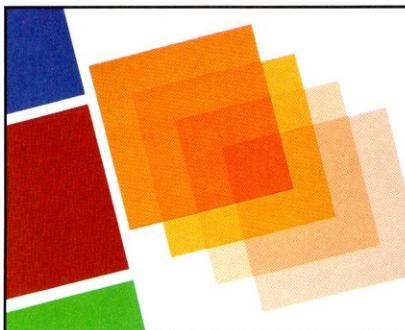
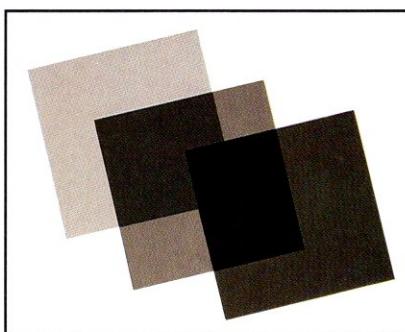
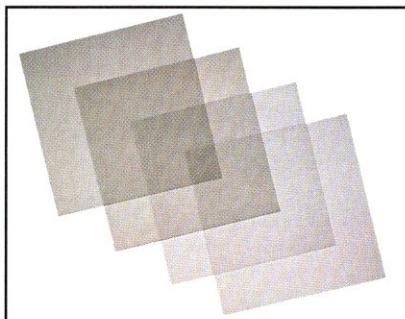
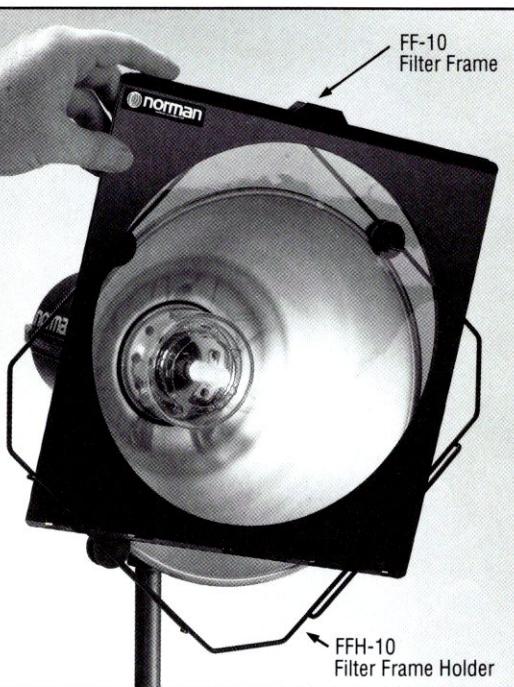
MANY VARIED AND CREATIVE USES:

- Add colored gels and diffusion filters for dramatic special effects.
- Enhance backgrounds with splashes of light to add texture and depth.
- Place a highlight as a localized accent.
- Fill troublesome shadows or small, hard-to-light areas.
- Balance extreme contrast areas to the range of the film.
- Add detail or highlights on products with complicated surface texture.
- Achieve rich color saturation — without casting shadows or producing reflections on high gloss or chrome objects.



Use with any model Norman TRI-LITE by removing the projector lens and placing the Light Hose mounting plate into front of housing. Locks into place with spring clips.

Filters and Gels



Filter Frames

Holds the diffusion, neutral density and color gels flat. The "frame" slips into the Filter Frame Holders, Barn Doors or Grids.

- FF-5** For 5" holders or barn doors
- FF-10** For 10" holders or barn doors
- FF-16** For 16" holders or barn doors

Filter Frame Holders

Allows the filter frames to be mounted directly on reflectors without using barn doors.

- FFH-5** Fits all 5" diameter reflectors
- FFH-10** Fits all 10" diameter reflectors
- FFH-16** Fits all 16" diameter reflectors

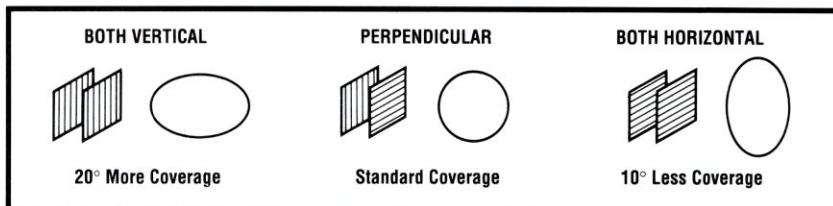
Diffusion Packs

Assortment of four diffusion sheets designed to withstand high temperature conditions. The pack includes a lightly frosted, medium frosted for normal diffusion needs and two striated diffusers that enable you to also increase or decrease the angle of coverage by the way they are inserted in the filter frame. All diffusers can be used in various combinations to create softer, more even lighting and reduce the harshness of shadows. Available in three sizes.

- DF-45** 5"x 5"
- DF-410** 10"x10"
- DF-416** 16"x16"

DIFFUSER	DESCRIPTION / APPLICATION	APPROXIMATE LIGHT LOSS IN F-STOPS			
		Reflector diameter	5"	10"	16"
A	Frosted / LIGHT DIFFUSION		1/4	1/2	1/2
B	Frosted / MEDIUM DIFFUSION		1/4	1	1
A + B	Both Together / HEAVY DIFFUSION		1/2	1 1/2	1 1/2
C	Striated / LIGHT DIFFUSION		1/4	1/2	1/2
C + C	2 Striated / MEDIUM DIFFUSION *		1/2 **	1	1
A + B + C + C	All Together / MAXIMUM DIFFUSION		1	2 1/2	2 1/2

* See diagram below for use of striated diffusers to increase or decrease the angle of coverage of your reflector. ** Striated patterns have very little affect with 5DL reflectors.



Neutral Density Packs

Three high temperature neutral density filters that can be added to the front of a reflector to cut the light output without adjusting the power supply setting. One filter in each density to reduce the light by 1 f-stop, 2 f-stops or 3 f-stops. The filters can be stacked to extend range to 4, 5 or 6 f-stop reduction. Available in three sizes.

- ND-5** 5"x 5"
- ND-10** 10"x 10"
- ND-16** 16"x16"

Color Gel Packs

A variety of seven color filters, for slight warming of skin tones, background colors or other special lighting effects. Made of a durable material that will withstand high temperature conditions. Package includes: #02 bastard amber (provides a healthy suntan look), #08 pale gold (for slight warming effect), #12 straw yellow, #20 medium amber (simulates light from a fire or sunset), #26 light red, #80 primary blue and #89 moss green gels. Other colors can be achieved by combining the filters or used in conjunction with the diffusion or neutral density filters. Available in three sizes.

- CG-5** 5"x 5"
- CG-10** 10"x 10"
- CG-16** 16"x16"

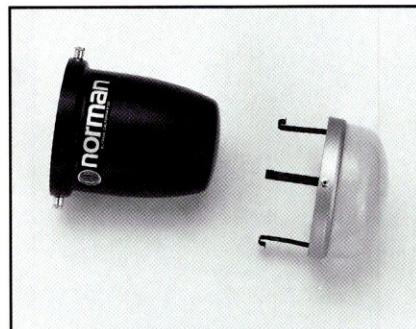
Accessories

RP-1 Removable Diffusion Dome

Use with the 5DL, 5E and 5W Reflectors to improve the modeling lamp accuracy of your lamphead and soften the light quality. The frosted glass dome causes the flash tube and modeling lamp to radiate light from the same optical axis. Recommended when using grids to more accurately visualize the light pattern. Will increase angle of coverage by 10° with 5E and 5W. Light reduction is approximately 1/2 f-stop. Use 150-watt modeling lamp and lamphead with a blower fan.

R9109 Flash Tube Cover

A protective metal cover that enables you to transport or store the lamphead without fear of breaking the tubes. Clips to reflector mounting holes on lampheads or to spring clips on LH2400 Lamphead.



Constant-speed Blower Fans

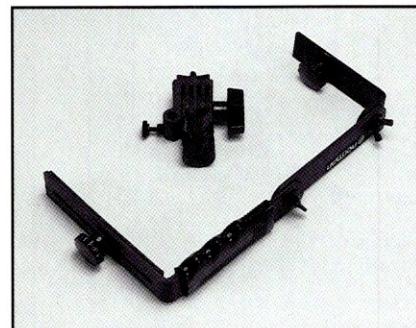
Optional attachment can extend flash tube life during long sessions of rapid flashing. Also helpful when lamphead is confined in an enclosure that inhibits air circulation, to disperse the quartz modeling lamp's heat. Required when using RP-1 Diffusion Dome, snoot, grids or filter frames with diffusers, gels or filters.

- R9114 Constant-speed Blower** with hardware. For discontinued LH2000.
- R9124 Constant-speed Blower** for other lampheads. Hardware included. New fan for LH4-A, LH54, LH500 and LH2400 Lamphead models.
- R9805 Blower Mounting Ring for LH2000** Allows quick change of blower unit to other lampheads as needed. Attaches to the back of the discontinued LH2000 Lamphead, for mounting a Norman R9114 Constant-speed Blower.



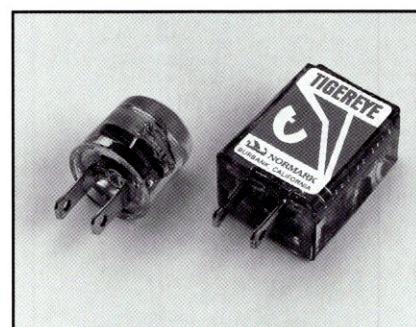
R4101 Camera Bracket

Places any of our battery portable lampheads directly over the camera lens. For use with most hand-held cameras. Has a standard 1/4" x 20 tripod screw.



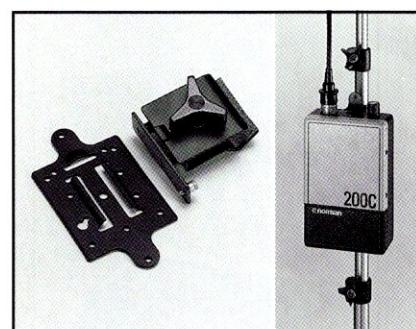
R4130 Friction-float Umbrella Stand Adapter

Mounts any of our lampheads to a standard 3/8 inch light stand and to any Norman umbrella. Additional inserts are available for 1/2 and 5/8 inch diameter posts. Connects to 1/4" x 20 threaded hole in the base of the lamphead. Provides unlimited movement and fine adjustments plus easy, accurate positioning of lamphead without loosening and re-tightening the adapter knob.



PE-4 Photo Eye

A twin-blade slave unit that triggers any Norman power supply from another electronic flash. Non-polarized for convenient use. Connects to a twin-blade sync outlet or sync extension cord.



NTE-1 "Tiger Eye" Photo Eye

Our best photo-eye. Triggers any Norman power supply from another electronic flash (even in direct sunlight) up to 300 feet or more. No batteries required.

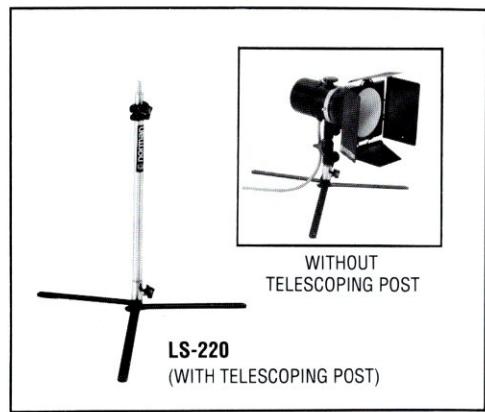
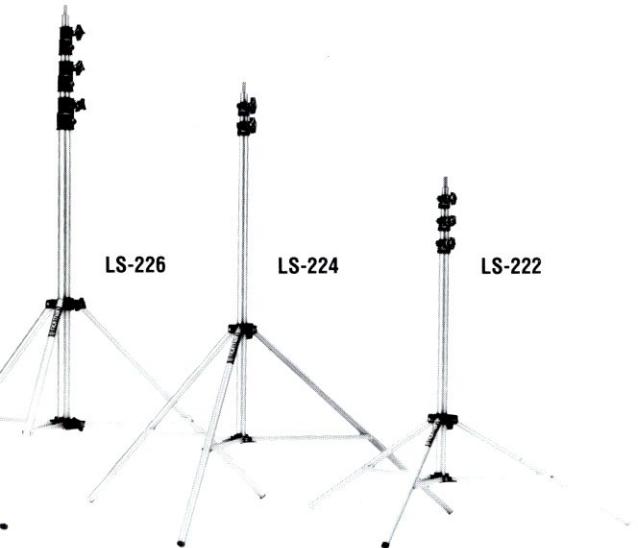
R4161B Quick Release Mount and Plate

Mounts many of the smaller Norman power supplies to any Norman light stand. Metal mounting plate attaches to threaded holes on the back of power supply. The bracket assembly clamps to light stand and slides into mounting plate. Power supply locks into place with spring-loaded pin. Hardware included. Mounts to Norman P125-H, P202, P200B, P200C, P400B, V200 or P404 Power Supplies.

R4161 Quick Release Stand Mount

Quickly attaches a P404 Power Supply to light stands or tripods. Mounting plate not required. Bracket assembly mounts to back of P404 housing.

Light Stands



Series 200 Aluminum Stands

Lightweight stands built sturdy for the professional photographer in the studio or on location. All stands have high-strength anodized aluminum shafts with durable die-cast parts to last for years. Available in a variety of sizes, so you can mix and match a set ideal for your lighting system.

LS-222 Mini-Compact Light Stand

Fits in Norman carrying cases. Four-section stand extends to 90 inches and is ideal for location work.

Mounting Stud:	3/8 inch
Minimum Height:	2 1/2 feet
Maximum Extension:	7 1/2 feet
Folded Length:	26 1/2 inches
Weight:	2 lb. 4 oz.
Shipping Weight:	3 lb.

LS-224 General Purpose Compact Light Stand

Our most popular stand for studio or location work. Three-sections extend to 96 inches, on wide stance tubular legs for greater stability.

Mounting Stud:	3/8 inch
Minimum Height:	2 3/4 feet
Maximum Extension:	8 feet
Folded Length:	34 1/4 inches
Weight:	2 lb. 10 oz.
Shipping Weight:	4 lb.

LS-226 Large Master Light Stand

A four-section stand reaches to 13 feet. Ideal for the commercial studio, heavier lampheads with accessories or for use with boom arm assemblies.

Mounting Stud:	3/8 inch
Minimum Height:	3 3/4 feet
Maximum Extension:	13 feet
Folded Length:	41 1/2 inches
Weight:	4 lb. 12 oz.
Shipping Weight:	6 lb.

LS-220 Back Light Stand

Ideal support for background light or kicker. Low, stable and sturdy with versatile light placement. Short 1/4-20 tripod stud or telescoping post from 21 inches to 30 inches can be used in folding stand base.

Mounting Stud:	3/8 inch
Minimum Height:	4 inches with stud. 2 1/2 feet with post.
Maximum Extension:	2 1/2 feet
Folded Length:	18 inches (2 pieces)
Weight:	2 lb. 10 oz.
Shipping Weight:	3 lb.

Dollies:

R9101 Dolly

Four-wheel dolly platform designed for P1250-D, P2000-D or P4000-D Power Supplies. New wheel design rolls easily on carpeted or hard floor surfaces.

LS205 10-foot Telescoping Post Assembly

Attaches with R205-B Bracket Set (included) to P1250-D, P2000-D, P4000-D and P4000-XT Power Supplies.

R205-B Bracket Set for Post Assembly

Bracket Set only. Allows use of LS205 Post Assembly on other power supplies. Attaches to P1250-D, P2000-D, P20/20, P24/24, P4000-D and P4000-XT packs.

Boom Arms

Aluminum Boom Arms

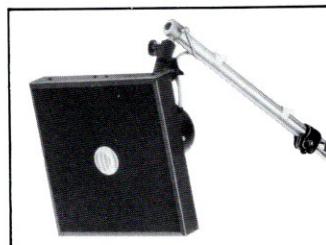
LS-230 Boom Arm

Our most popular boom. Ideal for portrait, commercial and industrial assignments where strength and portability is required. Strong enough to support umbrella lighting, barndoors, grids or small light box accessories. Assembly includes 3-section 79-inch arm, adjustable stand mount and 9 3/4 pound, clamp-on counter balance weight. Disassembles to 3-24 1/2 inch sections for easy portability.

Mounting Stud: 5/8 inch
 Total Arm Length: 79 inches
 Light Stand Required: LS-226 or larger
 Weight: 14 lb. 12 oz. Shipping Weight: 16 lb.



DISASSEMBLED



HANGING THE LIGHT



LS-230



LS-232
(CONVENTIONAL
LAMPHEAD
MOUNT)



LS-232 Wall Boom

A convenient way to put lights where you want them without light stands and cables taking up floor space. For permanent studio or institutional use, the Wall Boom can mount to studs or masonry walls. Telescopes in two sections 4 feet to 7 feet from the wall. It swings through an arc of about 160° vertically and 180° horizontally. Fully extended, it can support weight up to 8 pounds.

Mounting Stud: 5/8 inch
 Total Arm Length: 83 inches
 Light Stand Required: Wall Mounted
 Weight: 3 lb. 12 oz. Shipping Weight: 7 lb.

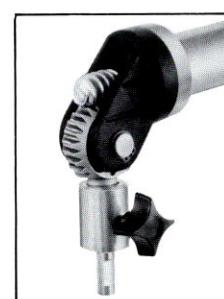
LS-234 Super Boom / Stand Assembly

Our finest boom assembly for the studio. A high quality, steel Cine stand (wheels included) that extends up to 92 inches. Lateral and vertical tilts of the lamphead are crank-controlled from the end of the boom shaft to provide critical light adjustments in all directions. The Super Boom arm is 8 1/2 feet long and strong enough to support most light box units up to 15 pounds with counter-balance weight included.

Mounting Stud: 5/8 inch
 Total Arm Length: 102 inches
 Light Stand Required: Included
 Minimum Height: 4 feet 3 inches
 Maximum Extension: 7 feet 8 inches
 Leg Spread Diameter: 46 inches
 Weight: 49 lb.
 Shipping Weight: 56 lb.



DUAL CRANK CONTROLS



SWIVEL HEAD

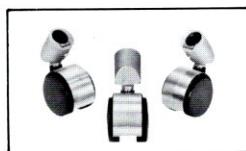
LS-234
(INCLUDES BOOM
AND STAND)



Wheel Sets for Light Stands

A set of three high-quality wheels attach to the "Mini-Compact", "Compact" or "Master" stands. Screw-tighten to stand legs. Roll smoothly on carpeted or hard surface floor.

- WH-1 Wheel Set for LS-222 and LS-224
- WH-2 Wheel Set for LS-226



Lamps & Cables



POWER & SYNC CABLES

R4150 AC Power Cable

Replacement AC power cable for all Series 450 Power Supplies. Also used with older P800-D, P1250-D, P2000-D, P2000-X, P4000-D and P4000-X.

R4156 AC Power Cable

Replacement AC power cable for P404, P808, P800-SL, P12/12, P2000-XT, P4000-XT, P4000-PS, P2000-PS, P20/20 and P24/24 Power Supplies. Also used on newer P800-D and P2000-D packs and the Normark V200 and 400 units.

R4151 Sync Extension Cable

Replacement 2-prong sync extension cord for all Series 450 Power Supplies. Also used with the P800-D, P1250-D, P2000-D, P2000-X, P2000-XT, P2000-PS, P20/20, P24/24, P4000D, P4000X, P4000-XT and P4000-PS Power Supplies.

R4155 Phono Sync Cable

Replacement phono plug-style sync extension cord for P404, P808, P800-SL and P12/12 Power Supplies. Also used with Normark V200 and 400.

Y-CABLE SPLITTERS

Allows two lampheads to operate from a single outlet on a Norman power supply. Will divide the energy available from that outlet equally on two heads. Order by Series Code:

R4152 Series 450

R5152 Series 500

R9152 Series 900

EXTENSION & ADAPTER CABLES

Enables you to place the lamphead an additional 20 feet farther away from the pack. Plugs into the end of the lamphead cable and outlet on the power supply of that Series.

20-foot Lamphead Extension Cable - Order by Series Code:

R450-20 Series 450 R500-20 Series 500 R2000-20 Series 900

R5045 Series 500 Lamphead Adapter Cable Special cable connector adapts any Series 500 lamphead to any Norman Series 450 power supply.

FLASH TUBES

Most Norman lampheads now include as standard a UV-corrected flash tube. These tubes have been specially coated to absorb ultraviolet light to remove the blue cast often noticeable in transparency films. The UV-corrected flash tube also slightly "warms-up" the color temperature rating from 5900° to 5500°K (effective Kelvin temperature).

FQ3-UV UV-Corrected Flash Tube

For LH2000 and LH2400 Lampheads. Rated at 2,400 w-s maximum.

FQ4-UV UV-Corrected Flash Tube

For LH4000 Lamphead. Rated at 4,000 w-s maximum.

FQ6-UV UV-Corrected Flash Tube

For LH500 Lamphead and Norlite 400. Rated at 600 w-s maximum.

FQ10 Standard Flash Tube

For TL-900 TRI-LITE. Rated at 1,200 w-s maximum. Tube is not UV-corrected.

FQ20-UV UV-Corrected Flash Tube

For TL-2000 (2,000 w-s) TRI-LITE and FS-6 and FS-10 Fresnel Spotlights. Rated at 2,000 w-s maximum.

FT120-UV UV-Corrected Flash Tube

For LH2, LH2-K, LH3B, LH4, LH4-A Lampheads and TL-450 TRI-LITE. Rated at 250 w-s maximum.

FT400-UV UV-Corrected Flash Tube

For LH52, LH52-K and LH54 Lampheads and TL-500 TRI-LITE. Rated at 400 w-s maximum.

MODELING LAMPS

Q150CL/DC

150-watt Clear Quartz Lamp For LH500, LH2000, LH2400 and LH4000 Lampheads.

Q250CL/DC

250-watt Clear Quartz Lamp

Brighter modeling lamp option for LH500, LH2000, LH2400 and LH4000 Lampheads. Standard for use in FS-6 and FS-10 Fresnel Flash Spotlights.

BRL

50-watt, 12-volt Clear Quartz Lamp For ML-type reflectors.

100/CL

100-watt Clear Lamp For 2E-J Reflector.

25T8/DC

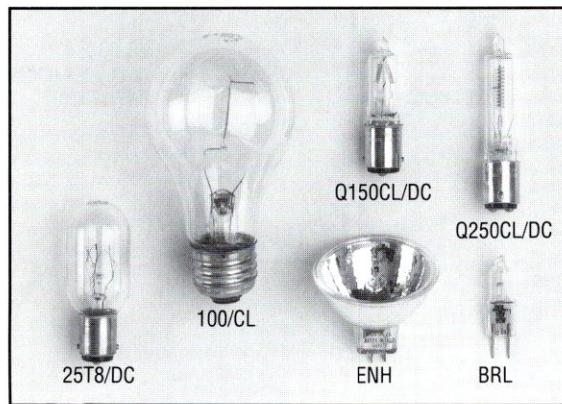
25-watt Clear Lamp

For LH4, LH4-A, and LH54 Lampheads and for the R4109 Snoot.

ENH

250-watt Tungsten Halogen Lamp

For all TRI-LITE models. Bulb life is extended beyond ratings by operating modeling lamp at lower wattage.



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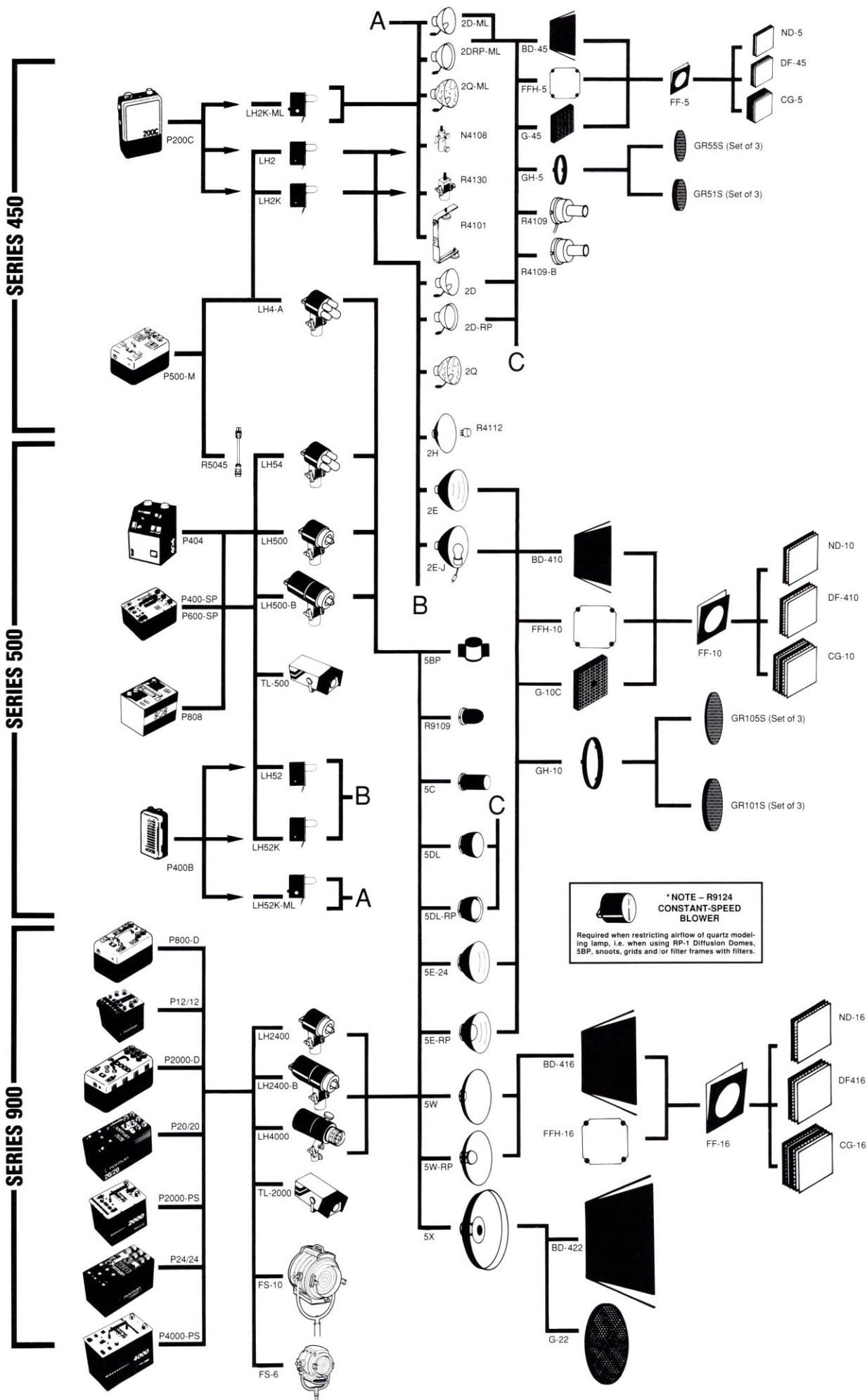
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Norman Makes The Right Equipment For You

Norman Enterprises manufactures one of the most extensive lines of electronic flash equipment in the industry. We have compiled the chart below as a guide to the individual pieces of equipment designed to fulfill the requirements for a variety of photographic assignments. Select your work specialties and note the equipment recommendations that apply.

	200C & 400B Portable	Normlight V200	Normlight 400	P500-M	P404 (Pack or Kit)	P808	LH500 Lamphead	P2/12	P20/20 & P24/24	P2000-PS & P2000-D	P4000-PS	LH2400 Lamphead	LH4000 Lamphead	TRI-LITE Optical Spot	5X Soft Reflector	Fresnel Spotlights
Advertising - Big Sets								★	★	★	★	★	★	✓	★	★
Advertising - Location	✓	✓	✓		✓		✓	★	★	★	★	★	★	✓	★	✓
Advertising - People	✓	✓	✓		✓		✓	★	★	★	★	★	★	★	★	★
Advertising - Tabletop/Food								✓	★	★	★	★	★	★	★	★
Commercial Product								✓	★	★	★	★	★	★	★	★
Catalog								✓	★	★	★	★	★	★	★	★
Fashion	✓	✓	★		★		★	★	★	★	✓	★	★	★	★	★
PR/Editorial	★	★	★		★		★	★				★				
Industrial	★	✓	★		✓		✓	✓	★	★	★	★	★	★	★	✓
Architectural	★	✓	★		✓		✓	✓	★	★	★	★	★	✓	★	✓
Business Groups	★	★	★		★	★	★	✓	★	★	✓	★	★	✓		★
Sports/Events	★	✓	★		✓		✓	✓	✓	✓	✓	★	★	★		
Legal	★	★	★		★		★	✓	✓	✓	✓		★			
Weddings	★	★	★		★		★	★	✓	✓	✓		★		✓	
Portrait - Location	★	★	★	★	★	★	★	★	★			★			✓	
Portrait - General Studio	✓	★	★	★	★	★	★	★	★			★		✓	★	✓
Portrait - Seniors	✓	✓	✓	✓	★	★	★	★	★			★		★	★	✓
School - Students	✓	★	★	★	★	★	★	★	★			★		✓	★	✓
School - Class/Team Groups	★	★	★	✓	✓	★	★	★	★	★	★	★		★		
School - Activities	★	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓			

★ Indicates Widely Used in Industry and ✓ Indicates Often Used.

Norman Technology...Where Your Image Counts.

Though all photographers share a great deal in common, each photographer works in a specialty area that presents different challenges in lighting. Each assignment, from advertising illustration through fashion, editorial, weddings and school portraits, requires equipment designed with the convenience features, accessories and power levels that make the job easier.

For over thirty years, our only business has been designing and building electronic flash lighting equipment for the professional photographer. We value the input from you, our customer. With an understanding of the current needs of the working photographer, we can continue to provide a complete line of contemporary lighting equipment — a line that is versatile, reliable and delivers the best value for your equipment investment.



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