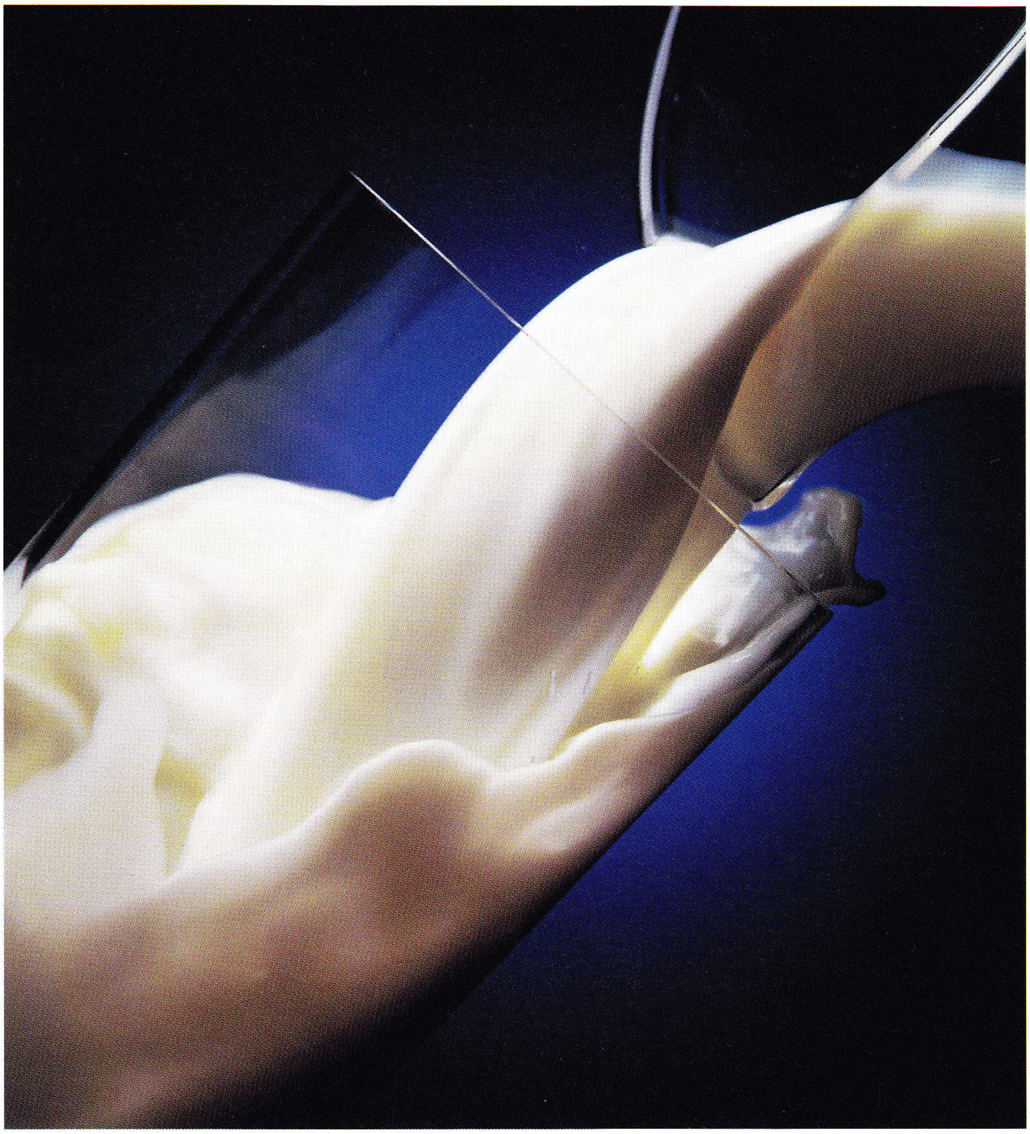
CHAPTER 14

Lighting



Gerald Zanetti.

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Because light is so important in photography, both technically and for visual communication, controlled lighting is a major tool used by photographers wishing to direct and mold the viewer's response to their photographs. The purpose of this chapter is to expand on the techniques for lighting control given in chapter 8. Although the information that follows may seem very technical in nature, it is based entirely on attempts to control the informational and emotive effect of the light. Keep in mind as you work through your early attempts to control light that it is not the technique that is important, it is the end effect. Technique is the stepping stone to control over the endless permutations of the qualities and characteristics of light and is useless without a sensitive understanding of the effect on the viewer of light as represented in a photograph.

The nature of light, its role in photography, and some techniques for controlling light have been discussed in several earlier sections of the book. The boxed section titled "Glossary of Lighting Terms" summarizes this information and adds a few new concepts.

Glossary of Lighting Terms

Ambience The light-reflecting nature of the subject environment. An environment with many light tone reflective surfaces has a high ambience. One with dark light-absorbing surfaces has a low ambience. The amount of environmental light is influenced by the ambience.

Artificial Light Light from manufactured sources, including light bulbs, flash units, and other light sources powered by electricity. Fuel-powered lamps might also be included here.

Available Light To most photographers, usually preexisting light of a low level of intensity.

Continuous Light Light that does not vary greatly in intensity over time. Most normal lighting situations have continuous-light sources.

Controlled Lighting The manipulation of preexisting light or the addition of supplementary light sources or both to achieve a desired result. Manipulation can consist of modifying the quality of the light sources by reflection or transmission of the light they emit, moving the subject for a more desirable relationship with preexisting light, or waiting for different conditions with natural preexisting light.

Diffused Highlight The area of a subject receiving the full effect of the principal illumination and reflecting back diffused light. A diffused highlight shows the true tonality of the subject: gray appears gray, white appears white, and so on.

Diffused-Shadow Contrast The difference in luminance between a diffused highlight and a shadow. When measured on the same tonal surface this is a direct measure of the lighting contrast.

Diffused-Specular Contrast The difference in luminance between the diffused highlight and the specular highlight on a subject surface.

Diffusion Scattering of the rays of light either by reflection from a slightly textured surface or by transmission through translucent materials. The diffusing surface then effectively becomes a new light source of larger area providing nonspecular light, usually called diffuse light. Diffuse light sources produce "soft-edged" shadows with a more gradual transition form lit areas to shadowed areas.

Discontinuous Light Light of very short duration, also called momentary light. Since the only discontinuous light photographers normally use is artificial light supplied by flash units—either flashbulbs or electronically operated flashtubes—this type of light is almost always called "flash" lighting. Artificial discontinuous light can also be produced with some types of electrical arcing or discharge. Examples of momentary sources in nature are lightning and light-emitting explosions.

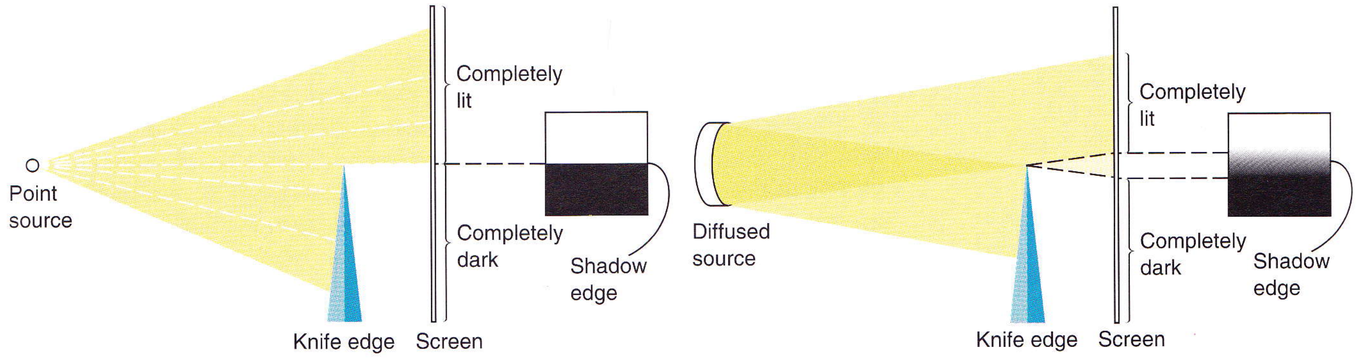
Environmental Light Light that does not reach the subject directly from a light source but is scattered or reflected by the environment surrounding

continued on next page

the subject or the subject itself. Environmental light may result from either preexisting or supplementary sources.
Lighting Contrast The difference between the illumination supplied to the fully lit parts of a subject (the diffused highlight) and the illumination supplied to (incident on) the parts of the subject shaded from the direct effect of the lighting (the shadow areas). This difference can be measured with an incident-light meter and expressed as a ratio. A lighting ratio of 2:1 means that twice as much illumination is being supplied to the fully lit areas as to the shadow areas; in other words, it indicates a one-stop difference in incident-light meter readings. Subject contrast depends partly on lighting contrast but will also depend on the tonal nature of the subject itself. High-contrast lighting is often called "harsh" and low-contrast lighting "flat."
Natural Light Light from sources occurring in nature. The sun is our principal natural-light source, though the moon—acutally reflected sunlight—and stars are sources of light as well. Other natural-light sources include fires, fluorescent materials, and glowing hot objects. The only natural-light source commonly used for illuminating a subject for photographic purposes is the sun, though occasionally open flame or moonlight is used.
Preexisting Light Any light—natural, artificial, or a combination—that illuminates the subject and is not supplied by the photographer. *Existing, prevailing,* and *ambient* are all terms used by photographers to describe preexisting light, although *ambient* is also variously used to describe environmental light or continuous light.
Specular Highlight Reflection of the light source from the surface of a subject. Specular highlight is also called specular reflection.
Specular Light Light in which the rays are traveling as if they emanated from one point or are traveling parallel to each other. A specular light source produces shadows with sharp, distinct edges—"hard-edged" shadows. The apparent size of the light source affects specularity. The smaller a light source appears when viewed from the position of the subject, the more specular it will be. Specularity and intensity are often confused, since many intense sources, like the sun, are also specular. It is possible to have specular light with low intensity, as is the light supplied by a tensor lamp.
Soft Light Light from a diffuse source producing "soft-edged" shadows. Although *soft* is also used by many photographers to indicate low lighting contrast, it is best to use *flat* to describe low contrast to avoid confusion.
Supplementary Light Artificial light supplied by a photographer in addition to the preexisting light.

Point Source

The quality of the light illuminating a subject is determined by the physical behavior of light. Light's straight-line travel and behavior when it strikes a surface—reflection, transmission, absorption, and scattering—are extremely important in controlled lighting. To understand the behavior of light, it is helpful to look at a hypothetical light source called a **point source.** A point source emits light in all directions from a single point. Since a point has no dimension it is impossible to manufacture a true point source. A tungsten filament has definite physical dimensions, but it is small enough that when viewed from some distance it behaves much as a point source.



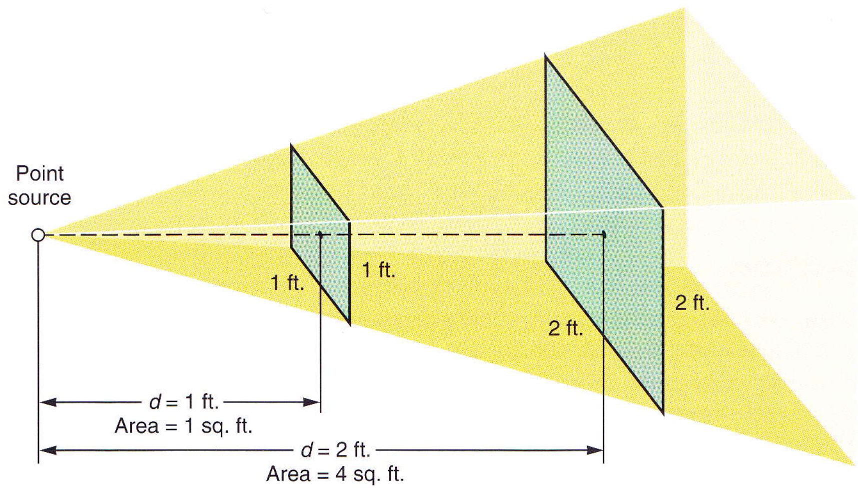
Comparison of the Shadow Cast by a Knife-edge for a Point Source and a Diffuse Source. Left: With the point source, below the dashed line the screen receives no light at all from the source. Above the dashed line the screen receives the full effect of the source, producing a knife-edged shadow. Right: With the diffuse source, below the lower dashed line the screen receives no light from the source. Above the upper dashed line the screen receives the full effect of the source. The amount of illumination gradually increases from the lower dashed line to the upper dashed line, producing the soft shadow edge shown.

A point source produces specular light. The illustrations demonstrate why the appearance of the shadow edge changes as the size of the light source increases. Notice that the lighting contrast in both cases would be the same if the intensity of the diffuse source could be adjusted so that the illumination on the fully lit area of the screen was equal to that from the point source.

Study of a point source also reveals the reason the amount of illumination decreases as the distance from the light increases. The **inverse square law** states that illumination from a light source varies inversely with the square of the distance:

$$\text{Illumination at distance 2} = \text{Illumination at distance 1} \times \left(\frac{\text{Distance 1}}{\text{Distance 2}}\right)^2$$

Doubling the distance from the light source will produce one-fourth the illumination. This reduction of illumination due to distance is commonly called **fall-off.** Remember that this law strictly applies only to a point source. Large-area diffuse lights usually show less fall-off than specular lights.



Inverse Square Law (Point Source). The same amount of light is spread over a greater area as the distance from the light source increases. Since the area covered by the same light quadruples when the distance is doubled, the light must cover four times as much area and provides one-fourth as much illumination.

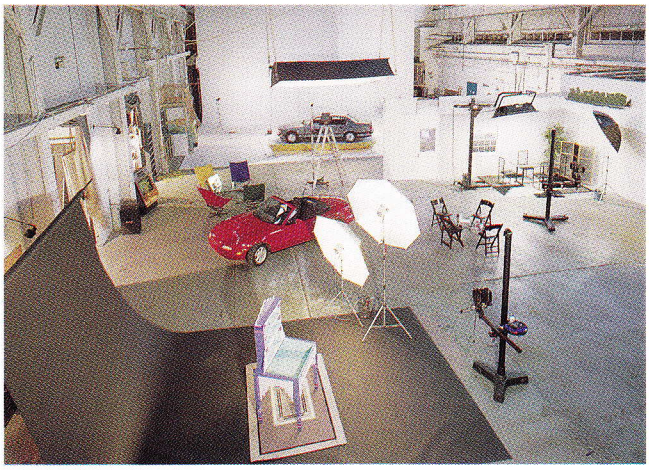
Lighting Tools

The photographer's lighting tools are anything that provides light or a method of altering the light. Lighting tools range from simple to the complex. However, the quality of the result does not always depend on the cost or complexity of the tools but rather on the skill and taste employed in lighting the subject and whether the tools used are appropriate to the job at hand.

The Studio

A photographic studio may be a large space with controllable lighting and expensive lighting equipment, but many studios are small rooms converted from other uses. Basically a studio is an enclosed space that offers the opportunity to block out or control any natural light and the ability to select artificial lights that will give the desired effects.

Studios depending entirely on natural light are rare today, but it is possible to build a studio with windows, skylights, and blinds for reasonable control over the light. Natural-light studios are at the mercy of the weather, so most photographers working on assignment keep a variety of artificial light sources for re-creating the feel of natural lighting or producing unusual lighting, giving them independence from natural conditions.



Left: *Large Commercial Studio.* Several large sets can be operating at once in this converted factory, which is now a studio for Photogroup, Inc. in Bethesda, Maryland.

© Photogroup, Inc.

Right: *Simple Studio in a Home.* Although space is limited, this studio has ample room to handle most still-life or portrait sessions for photographer Merle Tabor Stern.

© Merle Tabor Stern.

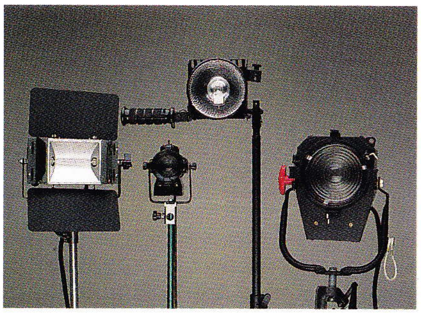
Location

In location photography a controlled photograph is produced not in a studio but in a spot chosen either for its pictorial possibilities as an environment for the subject or because of its convenience. Although location work may offer less complete control over lighting, a surprising number of aids for controlling the lighting can often be found at the location. Light or dark tone surfaces can be used for control over environmental light. Preexisting light sources can be used as part of the lighting scheme, as either a main light or an effects light. An alternative is to completely eliminate or overpower the preexisting light to create what is essentially a studio with completely controlled lighting on location.

Light Sources

The natural light sources most commonly used are the sun and occasionally an open flame. The two basic categories of artificial lights made for photography are incandescent—also called tungsten or hot—lights and electronic flash. Lights that are designed specifically for use in photographic studios or controlled location situations are called **studio lights.** However, the small flash units designed for on-camera use can also be adapted to studio use and are convenient for location work, since they are battery powered.

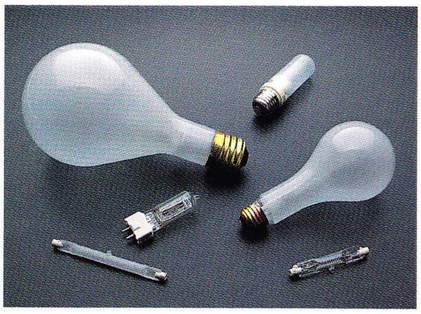
Incandescent Photographic Lights Incandescent lights produce light when an electric current is passed through the filament of the bulb. Since the light produced is continuous, the effects of the lighting can be easily seen and metered, but incandescent lights of high wattage are required for reasonably short exposures. This produces a large amount of heat, which is not appropriate for all situations—photographing food that melts or wilts, for example.



Incandescent Studio Lights. Left to right: quartz-halogen floodlight, minispot, variable-beam quartz-halogen light, spotlight.

Bulbs for photographic incandescent lights come in three general color temperatures: 3200°K, 3400°K, and blue-coated bulbs, which approximate daylight. **Photoflood bulbs** look much like household bulbs but are designed to provide more even light at a consistent color temperature. Although these are the cheapest of photographic incandescent bulbs, the burning life is typically short. The inside of the bulb is coated to provide some diffusion of the light.

Quartz-halogen bulbs produce a more intense light for their size and may have longer burning life than photofloods but are considerably more expensive. Quartz-halogen bulbs may be coated for some diffusion or may be clear, but in any case the direct light from a quartz-halogen bulb is quite specular because of its small size.



Incandescent Bulbs. At top left is a mogul-base 1000 watt photoflood. At right center is a standard-base 500 watt photoflood. The remainder are variously styled quartz-halogen lamps, ranging in wattage from 600 to 1000.

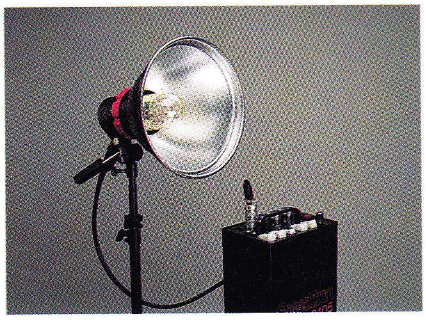
The extreme heat generated by incandescent lights—especially the quartz-halogens—creates some limitations on the methods for modifying light discussed later, since many of the techniques require enclosing the bulb in a housing or placing materials in the beam of the light, which could cause a fire hazard. Exercise extreme care when working with these high-wattage incandescent sources. Not only do the bulbs and lamp housings become very hot but also the beam of light itself is capable of setting flammable materials ablaze. To reiterate some of the safety rules from chapter 8:

- Keep the lights a safe distance from any flammable material, *especially* human hair.
- Do not touch the metal lamp housings or the bulbs. Incandescent bulbs are capable of exploding, so do not look into a lamp when turning it on or ever have it close to a person's face. Touching the glass of a quartz-halogen bulb leaves a deposit that will cause the bulb to blister, with resulting premature failure and increased possibility of explosion.
- Take care to arrange power cords so that they will not be tripped over, which could bring the hot housing down on a person or flammable object. Cords should drop straight to the floor and lie flat with plenty of slack.

Electronic Flash Electronic flash units, in which a high voltage is discharged through a gas-filled glass tube, are the most common source of single short bursts of high-intensity light. The term *strobe* is often inaccurately used to refer to electronic flash. Although similar in construction, a true strobe light is designed to provide repeated flashes of light, often many in 1 second and usually low in intensity.

See pages 206–11 for information on small on-camera flashes.

Electronic flash units are available as small battery-operated flashes for on-camera use and as studio electronic flash units. The brief duration and high intensity of the electronic flash offer some real advantages where fast exposure times and small apertures are needed. However, if expense is a consideration, it is much cheaper to set up a basic studio with incandescent lights.



Studio Electronic Flash with Separate Power Pack.

Power Packs Studio flash units often consist of a power supply, called a power pack, which feeds the electrical current by means of cables to a separate flash head containing the flashtube. A power pack may be capable of powering several heads. Flash units of this type are typically heavy, but newer models employing advanced materials and electronics provide more power for less weight. The power pack contains large capacitors, which store electrical energy at high voltage. When the unit is triggered by means of a synch cord, this energy is dumped to the flashtubes that are plugged into it.

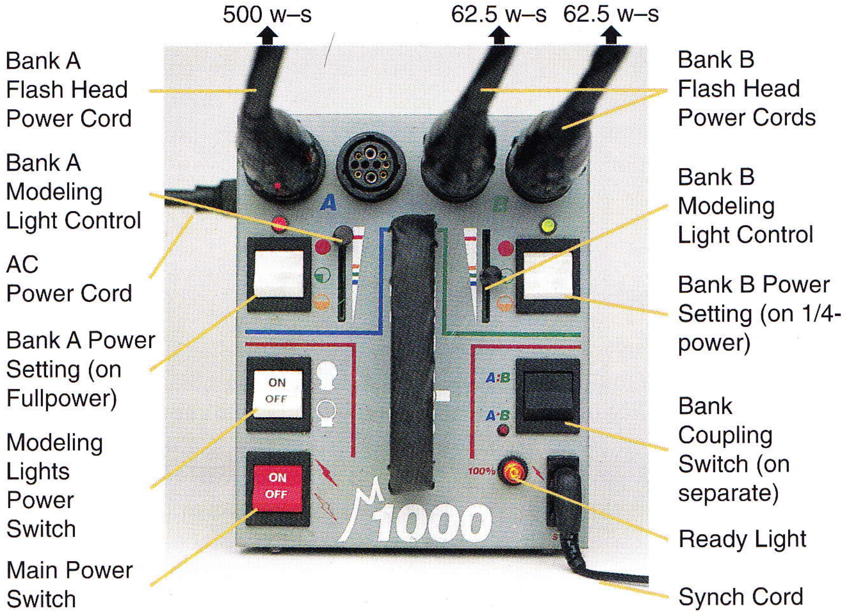
To make variable power available, the packs usually contain two or more sets of capacitors, called **banks,** which can be connected or disconnected by switches. The power of a bank is distributed equally to each of the flash heads plugged into it. Flash power supplies are rated in watt-seconds. Studio flash units vary from as small as 200 watt-seconds to as large as tens of thousands of watt-seconds. The actual illumination supplied to a subject depends on several variables other than the power—such as efficiency and head design—but watt-second rating is a convenient way to compare units or determine the balance of power being supplied to various heads in a lighting setup.

Packs having banks of unequal power, called **asymmetrical packs,** allow different power to be supplied to different heads. In the past it was impossible to continuously vary the power supplied by each bank—it was either all of the charge or nothing—but new electronic advances have made it possible to vary the power supplied to the heads in very small increments by way of dials or slide switches. This technology is still relatively expensive but provides a great convenience in adjusting flash intensity.

CAUTION The cables from the power pack to the flash heads carry large amounts of electrical current at high voltages. Take care in their handling and use. When the capacitors are charged, removing or inserting a cable on the pack may cause arcing between the power pack and the cable with the possibility of electric shock and the destruction of the power pack. Many newer units provide arc-free removal and replacement of cables, but it is best to make no assumptions regarding the presence of this safety feature.

To safely plug or unplug flash cables from a power pack, follow these steps:

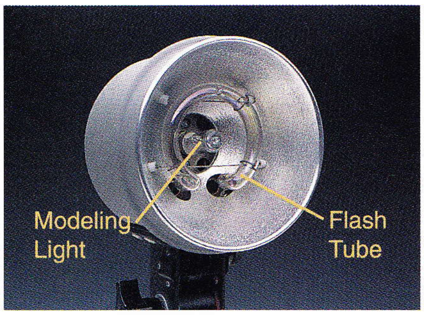
1. Turn the unit off.
2. Discharge the capacitors by pressing the Test button.
3. Grasp the connector itself to remove a cable. Do not pull the cables out by pulling on the cord.



Operation of Studio Flash Power Pack. This 1000 watt-second power pack has two banks of 500 watt-seconds each, for powering up to four flash heads. It is of the symmetrical-asymmetrical type, with bank power switches that can be set so that the power from the two banks can be equal or unequal. The banks can also be linked to act as one bank with the bank coupling switch. When more than one head is plugged into a bank, the power of that bank is divided equally among the heads. The ready light glows to indicate a full charge on the banks.

The power pack pictured has three heads plugged into it. The bank coupling switch is set to separate the banks. Bank A, on the left, is set for full power, or 500 watt-seconds. It has one flash head plugged into it which receives the full 500 watt-seconds. Bank B is set for quarter power, or 125 watt-seconds. Since two flash heads are plugged into bank B, each head receives half of that bank's power, or 62.5 watt-seconds. Note that the modeling lights on this unit are not proportional (see the next section) and must be adjusted using the slide switches to match the power for each bank. This adjustment is for visual effect only and does not affect the flash power.

Modeling Lights The effect of flash illumination cannot be seen. Studio flash units solve this problem by including in the flash head a **modeling light,** which is an incadescent bulb placed as close to the flashtube as possible. Although modeling lights give an approximate idea of the effect of lighting with flash, remember that they are not exactly the same as the flash and may give slightly different quality and evenness. Usually the modeling light can be switched independently of the power to the flashtube. This allows turning off the modeling light in situations where its intensity may affect the exposure. Most studio flash units also allow varying the intensity of the modeling light to match the visual effect of changing the flash power. Some may have a switch that will cause the modeling light intensity to vary automatically as flash power is changed; these are called **proportional modeling lights.**



Modeling Light in Studio Electronic Flash Head.

Monolights A second approach to studio flash construction is to include the power pack and flashtube in one unit, much like an overgrown on-camera flash. Although these units—called **monolights** or **monopacks**—have the convenience of no flash cables, they are considerably heavier than the flash heads powered by separate packs, putting more stress on light stands and accessories. Monolights offer many of the same features as power packs, with variable power to the flashtube—continuously variable on some—and modeling lights. Some monolights also offer battery power for use on location, but the modeling lights usually do not operate on battery because of their high power use.

Monolight Electronic Flash.

Continuous-Discharge Lights Light sources that make use of a continuous discharge of electricity through a gas-filled tube, such as neon and fluorescent lamps, are often found in preexisting light but are seldom used as supplementary light sources in controlled lighting. The color of light produced by gas discharge is not equal in intensity for all the visible colors but has sharp peaks of intensity at specific wavelengths. This property can create abnormal reproduction of colors with color materials.

Tools for Modifying Light

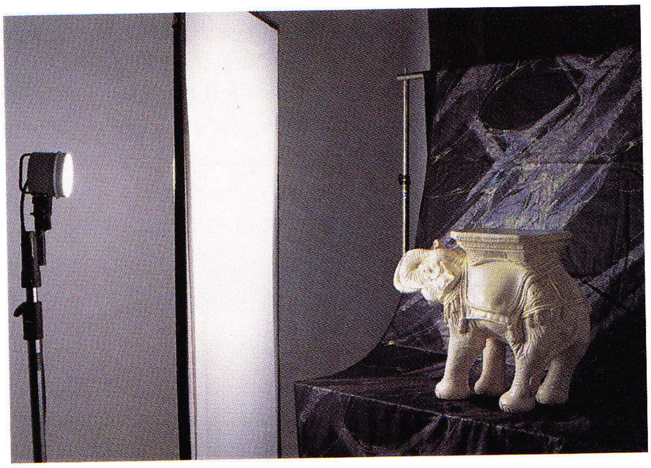
The qualities of a light source can be modified by reflection, transmission, or absorption of the light coming from it, and all of these techniques are used to produce the quality of light that the photographer finds appropriate for the job at hand. Many of these techniques require enclosing the light source or placing materials in front of it and must be applied with caution to incandescent lights, since the heat generated by these lights can ignite many materials. Electronic studio flash is more easily modified, since the flash generates much less heat.

■ **CAUTION** The modeling lights used in professional studio flashes are incandescent lights and do generate heat, so care must be taken not to place materials too close to them or enclose them too tightly. If the modeling light can be controlled separately from the flash, it can be either turned off or reduced in intensity to prevent overheating. Flash heads with built-in blowers can help in cooling.

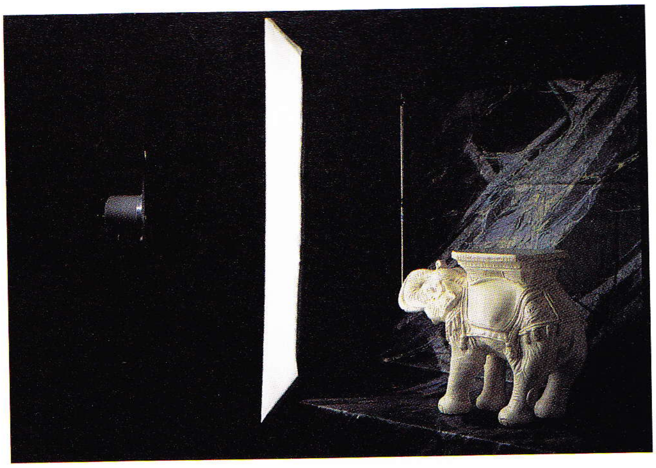
Tools for Diffusion by Reflection. At bottom center and top right are circular cloth reflectors supported by a flexible spring-steel band, which can be coiled for portability. In the middle are a white foamcore board and a white cloth stretched on a plastic pipe frame. At top left is a photographic umbrella.

Diffusion Diffusion means scattering of the light, which can be done by either reflection from a slightly textured surface or transmission through a translucent material. Any light-toned surface can be used to reflect the light. Large white moveable surfaces, called **flats,** are used in the studio. These may be boards painted white, large sheets of foamcore, mat board, or cloth stretched over metal or plastic frames. When photographing with color film, remember that any color in the diffusing material will change the color of the diffused light that will show up in the photograph. This can be used intentionally. A reflector with a gold surface can create the warm-colored light associated with sunset hours. Photographic umbrellas diffuse the light by reflection off the white interior. Because of the shape of the umbrella, the light is more concentrated and slightly more specular than the light reflected from a flat.

Diffusion by transmission is achieved by placing translucent materials, called **scrims,** between the light source and the subject. The effect is to make the light less specular and also reduce the intensity. Materials used for this purpose include translucent Plexiglas, translucent cloth, spun fiberglass (good for hot lights), and translucent plastic sheet materials, such as those made by Roscoe. Many artificial light sources—that is, light bulbs—include a diffusing surface in the glass of the bulb itself. In a softbox the light source is in a black cloth enclosure with a translucent white front. The inside of the softbox is lined with reflective material to increase the intensity of the illumination. The effect is a diffuse source with a large area, with good control of the scattering of light into the environment. The lighting contrast is thus higher with a softbox than it would be with a diffusion screen illuminated with an open lamp from behind.

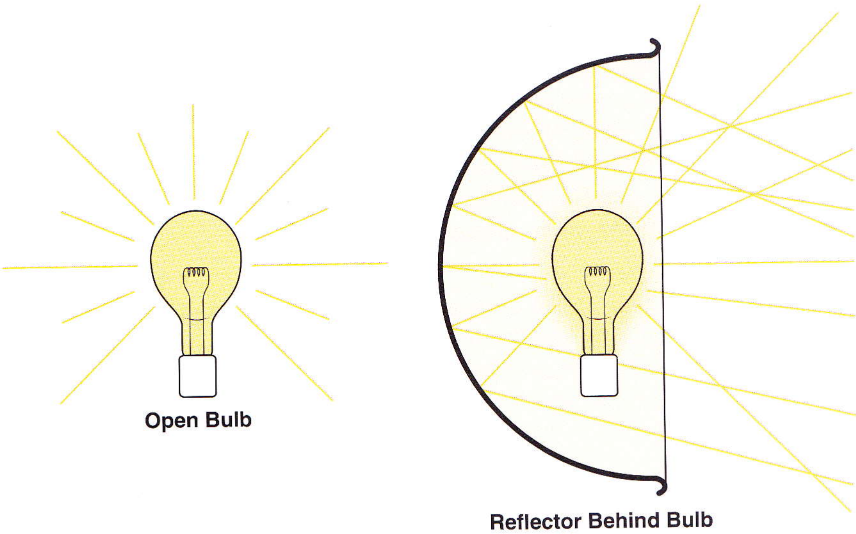


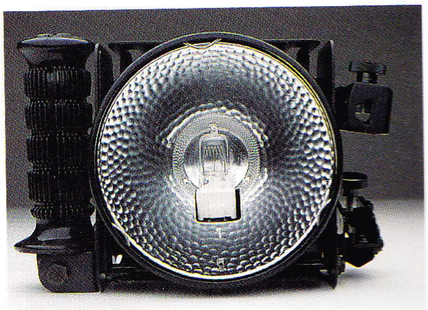
Diffusion by Transmission through a Scrim. An open scrim of translucent nylon cloth stretched on a plastic pipe frame is being used to diffuse the light, producing soft shadow edges. The lighting contrast is fairly low because of the environmental light scattered from the back of the scrim and the studio walls and ceiling.



Diffusion by Transmission Using a Softbox. A softbox has the same type of translucent cloth scrim in the front of it, but the lamp head is enclosed in an opaque housing so that the light reflected from the back of the scrim is not allowed to escape into the studio. The result is the same soft shadow edge as achieved with the open scrim, but much higher lighting contrast.

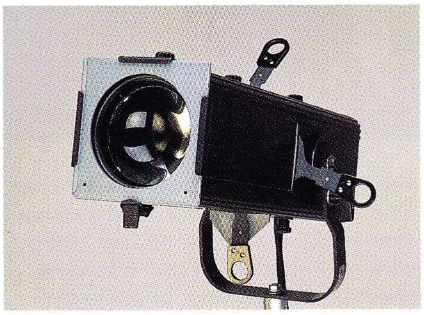
Concentration Light from a source can be concentrated to increase the amount of illumination on the subject or to increase the specularity. Many artificial light sources include a reflective housing for concentration of the light. The reflector gathers the light from the back of the bulb and projects it toward the subject, increasing the effective intensity. If the reflector is polished, the specular nature of the bulb is preserved, but a large matte-surfaced reflector can be used for partial diffusion of the source.

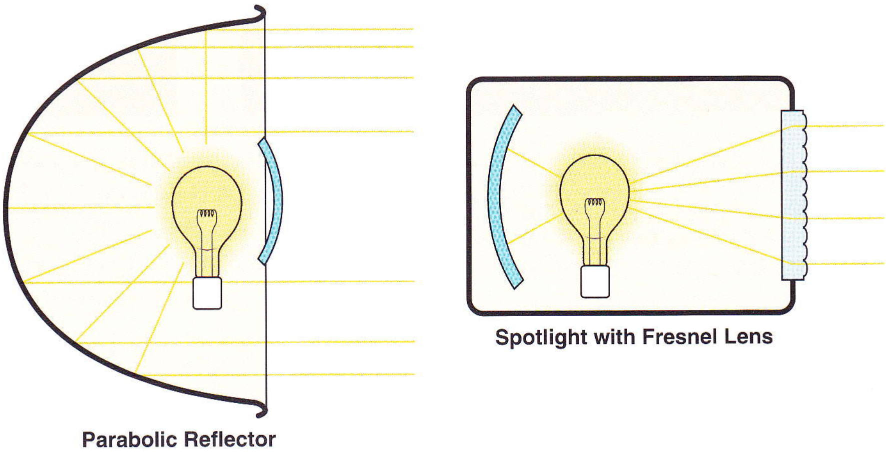




Concentration of Light by a Reflector. The first drawing shows the travel of light from an open bulb. The second shows the concentration in one direction resulting with a reflector housing. The photograph shows a quartz-halogen studio light that uses a reflector for concentration of the light.

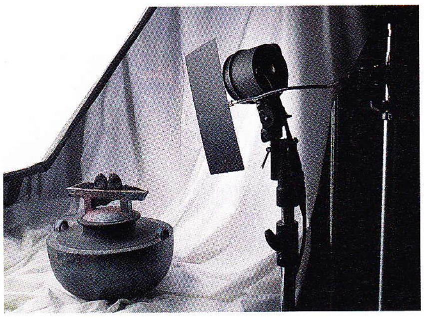
Collimation Proper shaping of a polished reflector can concentrate the light even further to the point where the rays of light are traveling in almost parallel paths. Light in which the rays are parallel is called **collimated light.** This is accomplished even more efficiently by a lens placed in front of the light. Since the light rays are nearly parallel they spread very little over distance, so the beam stays small and loses little intensity. **Spotlights** are of this design. Many spotlights are adjustable, so the amount of collimation and the size of the spot produced are variable.





Collimation of Light. The first drawing shows collimation of light by a parabolic reflector. The second drawing shows a spotlight that collimates the light with a Fresnel lens. The photograph shows a sophisticated studio spotlight that uses lenses and reflectors to collect and collimate the light and that features slide-in filters and apertures.

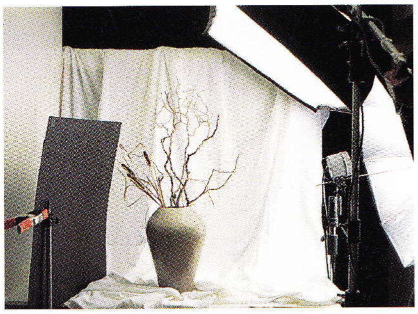
Elimination of Unwanted Light Any opaque object can be used to block unwanted light from a subject, though it is best to use black materials to prevent scattering reflected light into the environment. A **gobo** is any opaque object used in this way. Snoots, cones, barn doors, and grids are accessories for lamp housings that restrict the size of the beam coming from an artificial light. Grids are even effective on diffused sources. Unwanted environmental light can be reduced by placing dark materials around the subject in place of existing lighter surfaces. This lowers the ambience and reduces the amount of light scattered by the environment.



Use of a Gobo to Keep Unwanted Light from a Subject. The flash head on the right is illuminating the background. A small black gobo has been positioned beside it to prevent its light from falling on the subject.

Control of Environmental Light. A. Unwanted fill light reflecting from a nearby studio wall is appearing on the left side of the vase.

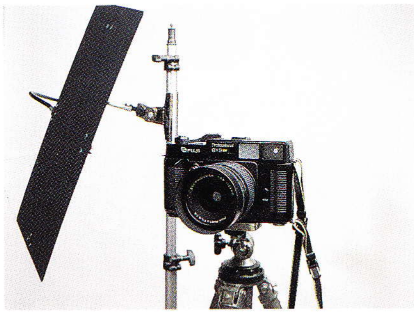
B. A black card was placed between the studio wall and the subject to block the reflected environmental light from the subject.



C. The black card can be seen on the left. The main light is the softbox high on the right. The umbrella at the lower right is supplying fill light to the lower part of the vase and illuminating the background.

Another use for gobos is to prevent direct light from falling on the lens, thus reducing lens flare. To detect flare-producing light, look from the position of the subject for any light falling directly on the lens. A lens shade can also help to reduce flare. Flare can also be caused by brightly lit white areas just outside the view of the lens and can be reduced by covering these areas with black material.

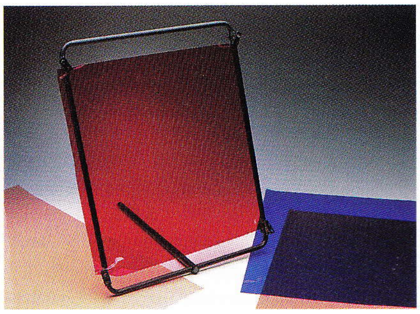
Use of a Gobo to Prevent Lens Flare. A. Without a gobo, light from a studio light falls directly on the lens, as evidenced by the shadow crossing the lens and the specular reflections of the light source seen in the lens surface. Even the use of a lens shade has not prevented flare-producing light from striking the lens.



B. Here, the camera and lights are in the same position, but a gobo has been placed to block the direct light from falling on the lens. When using this type of setup, check carefully through the camera viewfinder to make sure the gobo does not appear in the edge of the frame.

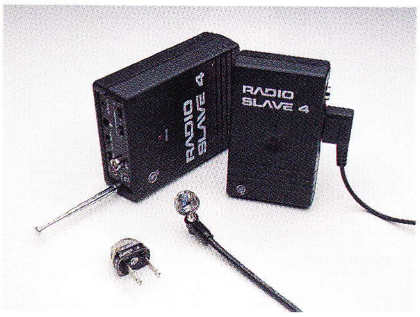
Tools for Restricting Light. All of these tools are designed to be attached to studio lamp housings. From left to right: cylindrical snoot, coarse honeycomb grid in holder, special truncated cone with white interior for lighting backgrounds, fine honeycomb grid, barndoors.

Control of Light Color Colored acetate filters may be used between a light source and a subject to change the color of the light, but take care not to place them too close to hot lights. Colored reflectors will also alter the color of the reflected light. Also see pages 341–43 for methods of controlling the color of the image by filtering on the camera.



Acetate Filters and Frames for Controlling the Color of Light. Filters of this type are often called "gels."

Light Stands and Background System. From left to right: rolling studio stand, folding portable studio stand, folding floor stand, folding portable studio stand in black, expandable pole system with heavy-duty folding legs used as a seamless background support.



Electronic Flash Slaves. At the top is a radio slave unit, with a receiver and a transmitter. The flash is fired remotely by a radio signal. Infrared slaves are similar, but the flash is fired by an infrared beam. At the bottom are dome-style slaves, which fire the flash they are plugged into when they sense the light from another flash. The one on the left plugs into the standard two-prong synch terminal found on many studio flash power packs. The other has a female PC terminal for use with a standard PC synch cord.

Accessories

A large number of accessories are available for photographic lighting and studios, including background holders, seamless backdrops, and stands, clamps, and poles to support all of this equipment. Slave units are available to set off secondary flash sources when the primary flash connected to the camera is fired.

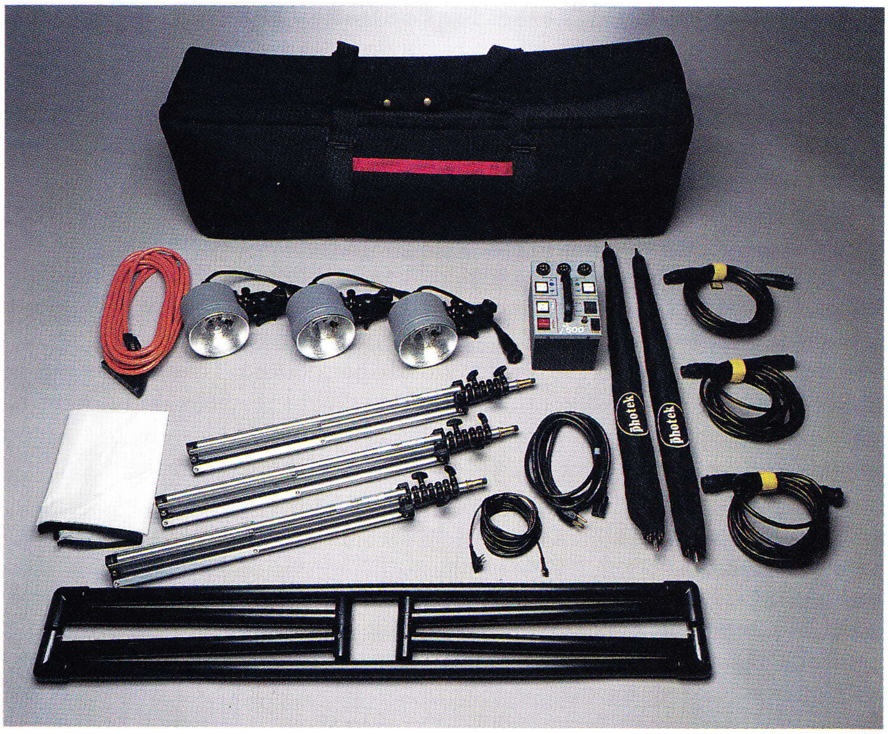
You will need a kit of tools and supplies for general studio usage, known as a **gaffer's kit** (*gaffer* is the movie industry's term for a person who rigs the lights on movie sets). Gaffer's tape is useful in a variety of situations, since it has great strength for temporarily mounting nearly anything but leaves no adhesive residue, as do duct tape and many other available tapes.

Gaffer's Kit. The gaffer's kit contains a number of standard tools, such as hammer, pliers, scissors, extension cord, and so forth, as well as some specialized items for working in a studio or on location, such as an assortment of A-clamps, specialized clamps for studio equipment, and a changing bag for handling film. This kit also includes cleaning and first aid items.

Location Tools

The tools a photographer chooses for location work are basically similar to those already described, but an emphasis is placed on compactness, light weight, and flexibility in ways of supplying electrical power. The presence or absence of electrical power will influence the choice of lights, whether flash or continuous. A number of convenient battery-operated flash units are available. Another solution is to bring along gasoline-powered portable generators or converters that will provide line voltage from a car alternator.

Reflecting and diffusing flats are best for location work if they can be folded or rolled up. The PVC frames with cloth stretched on them are convenient, since they can be disassembled for carrying. Flexible circular steel hoops covered with stretched cloth can be coiled and placed in convenient zippered bags. The illustration shows a useful location lighting kit for applications requiring medium amounts of illumination in locations with line voltage available.



Location Lighting Kit. From front to back, left to right: folding plastic pipe frame for scrims and reflectors, white nylon scrim-reflector, folding light stands, synch cord, AC power cord for power pack, photographic umbrellas, flash head power cords, AC extension cord, flash heads with modeling lights, flash power pack, foam-cushioned case.

Metering and Exposure with Controlled Lighting

The photographic light meter is a useful tool not only for determining camera settings for correct film exposure but also for analyzing lighting.

See chapter 3 for basic information on meter types.

Light Meters

Any type of photographic light meter is useful for analyzing lighting situations, but some specialized meters and meter accessories can make the job easier. An incident-light meter is convenient if you want to measure the illumination on different areas of a subject. If the desire is to control the tonal values of different areas of the subject through controlled lighting, the reflected-light meter is better, since the individual luminances of the subject can be measured for tone control. Both types are useful in controlled lighting situations.

Most light meters are designed for continuous light. If you intend to work with flash, a flash meter is a great convenience. Combining continuous light and flash provides special problems in determining balance of intensities, and a meter capable of incorporating both into one reading is helpful.

The current trend is toward meters that can perform any of these tasks by the use of attachments, accessories, or built-in modes. The more expensive of these convertible meters manage to do all of the jobs well. Typically a professional meter will have an incident dome about 1 inch in diameter. Smaller domes will still provide incident-light readings but may not as successfully integrate the light incident on the subject from different directions.

General techniques for using each of these metering methods follow. The lighting applications section at the end of the chapter shows how these techniques can be applied in real situations.

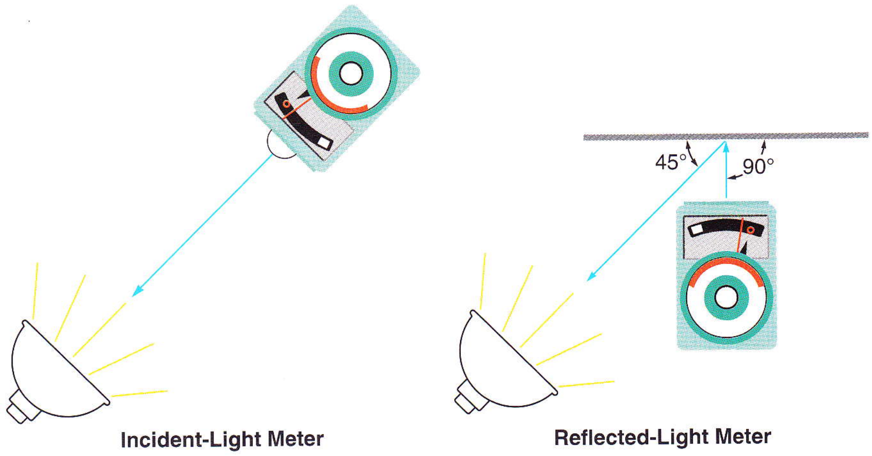
Multi-mode Flash Meter. The multi-mode flash meter has several modes, allowing incident-light, reflected-light, flash, and continuous-light readings. On the left, it is set up for continuous incident-light meter readings. On the right, it is set up for reflected-light flash meter readings, having a 5° reflected-light attachment with viewer in place of the incident dome. This meter can be used for either continuous or flash readings in both incident and reflected modes. In flash metering mode, it will even combine the effect of both flash and continuous light.

Using Reflected-Light Meters for Controlled Lighting Tone control techniques apply quite naturally to controlled lighting. The camera settings can be determined by placement of one tonal area. The expected print values for other tones can then be found by fall. In addition to the controls offered by exposure and development, the lighting can be changed to alter tonal relationships in the subject.

Since the contrast of the lighting can be altered by increasing or decreasing the amount of illumination in the shadows, a common technique is to find the camera settings by placing a highlight area—often the diffused highlight. Once the camera settings are determined, the fall of the shadow is found. If the shadow falls too low, light is added to the shadows; if the shadow falls too high, illumination to the shadows must be reduced. Usually this can be done with little appreciable effect on the highlight readings, but always recheck the placement when lighting has been changed. In this way the subject contrast can be adjusted for normal development. This is especially valuable in color photography where little contrast control is available in processing.

Once the general lighting contrast has been determined, the fall of other areas may be calculated. For example, if the fall of the background is REV +1 a print value of +1 will result for normal development. If a white background is required, the illumination on the background must be increased until the desired white is achieved. For a pure white background, REV +4 or higher is needed; for the last tone before white, REV +3 is needed; and so on. If a modulated background—one that shows a variation of tone—is being achieved on a blank backdrop by use of lighting, the actual variation in tone can be predicted and then controlled by the use of fall. A spot meter or restricted-angle meter of 1°–10° acceptance is useful for this type of control, especially if the subject matter is small, as in many still life subjects.

If the meter is strictly a reflected-light meter, the functions of an incident-light meter may be approximated by use of an 18 percent gray card. Note that great care must be taken to insure that the reflected light measured from the gray card is diffuse light and does not include glare.



Approximating an Incident-Light Meter Reading with a Reflected-Light Meter and an 18 Percent Gray Card. To determine the illumination from a single light source with an incident-light meter, simply point the meter at the light from the subject position. To approximate this incident-light meter reading with a reflected-light meter, place a standard 18 percent gray card at the subject, oriented so that the light strikes it at 45°, then make a close-up reflected-light meter reading of the card with the meter at 90° to the card.

Using Incident-Light Meters for Controlled Lighting The dome of an incident-light meter integrates all of the light coming from the hemisphere in front of the meter. What is being measured is the illumination incident on the subject from that direction. To measure the illumination from a single source of light, the incident-light meter should be pointed from the part of the subject where the measurement is desired directly toward the light source. If you want to measure the average effect of the general illumination—including all sources and environmental light—on the side of the subject facing the camera, point the incident-light meter at the camera from the subject. An incident-light meter reading does not sense the effect of the subject on the light—due to reflection, absorption, or transmission—and gives no direct indication of the subject luminance, only the amount of light falling on the subject.

The calculator on an incident-light meter is designed to give camera settings for the correct exposure when a reading is taken at the diffused highlight. For normal reproduction of tones, the camera setting would be used as suggested by the meter. With normal processing, the diffused highlight area of each tone will show its true tonality in the photograph: gray will come out gray, black will be black, and white will be white. Any specular highlight on the surface, such as glare, will of course produce a lighter tone in the photograph than the true subject tonality. Any area of the tone shaded from the full effect of the light will be a darker tone than the true tonality.

Since the incident-light meter measures illumination, its strength is in comparing the illumination from different sources. Determination of lighting contrast is simple with an incident-light meter. Incident-light readings are made at the diffused highlight and in the shadow area and compared.

Controlling lighting ratio is discussed in more detail on pages 431–32.

Strictly speaking, incident-light meters cannot be used for tone control, since they do not provide a measurement of the luminance, which is necessary for calculating film exposure for each area of the subject. However, with some knowledge of the reflectance of the area being metered, an incident-light meter reading can give a rough idea of fall and the expected print tone.

Since the camera settings suggested by an incident-light meter will provide the true tonality of a diffuse highlight for a tone, an 18 percent gray subject will be reproduced as 18 percent gray—for normal processing and printing. If the subject tone is white rather than gray, it reflects more of the incident light, producing more film exposure and a lighter tone in the photograph. If we know how much more of the light is reflected, we can predict the film exposure. A typical flat white wall or white paper backdrop will reflect back about two to two-and-one-half stops more light than 18 percent gray (an exact measurement of this difference could easily be made with a reflected-light meter). If the camera settings suggested by the meter for an incident-light reading at the wall or backdrop are used, the fall for that area will be approximately REV +2 to REV +2½.

Remember that any glare from the surface under consideration will raise this film exposure value. Although this procedure provides only estimates of the REV and the resultant print value, for a studio where the photographer is familiar with the reflecting capability of the various materials used, it can be useful in control of background and other tones of the subject.

Determination of Flash Exposure

References to flash in this chapter deal only with electronic flash units. Flashbulbs are rarely used today, but if you find it necessary to do so, follow the instructions packed with the bulbs.

NOTE Large studio flash units may have flash durations of 1/500 second or longer. When these are used with leaf shutters at high speeds, the exposure on the film due to flash may be affected.

The duration of electronic flash is typically much shorter than the shutter speed being used on the camera. Since the entire burst of light occurs during a small part of the time the shutter is open, leaving the shutter open for a longer or shorter time will not affect the exposure on the film due to the flash. Flash exposure is therefore controlled by changing the lens aperture, changing the power of the flash, or changing the subject-to-flash distance. Several methods exist for determining the exposure from flash illumination.

Guide Number Usually the dimensions of a flashtube are fairly small, even for powerful electronic flash units. As a result direct light from the flashtube unmodified by diffusion is quite specular and will fairly closely obey the inverse square law. If the amount of illumination supplied by the flash unit at one distance is found by measurement or testing, the amount of illumination at other distances can easily be calculated. Sometimes these calculations are performed by the manufacturer and presented in the form of charts or calculators providing the aperture needed at each flash distance to provide proper exposure. The ISO of the film must be included in these calculations.

The **guide number** can also be used to calculate the correct f-stop for subject-to-flash distance. To determine the guide number for a flash, test for the f-stop that will give good exposure at a specific flash distance, then multiply that distance by the f-stop number.

EXAMPLE A flash unit is tested at a distance of 10 feet. The best exposure on ISO 100 film is achieved with the aperture set at f/8. The guide number (G.N.) is calculated as follows:

$$\begin{aligned} \text{G.N. (ISO 100)} &= \text{Flash distance} \times \text{F-stop} \\ &= 10 \text{ feet} \times f/8 \\ &= 80 \text{ feet.} \end{aligned}$$

Notice that the unit of measurement—feet in this case—must be specified. If the distance is measured in meters, a different guide number will result. If f/11 gives the best exposure at 3 meters for ISO 100 film, the guide number in meters is determined as follows: **G.N. (ISO 100) = 3 meters × f/11 = 33 meters.**

To calculate aperture settings for other flash distances, simply divide the guide number by the flash-to-subject distance. In this example, if the new flash distance is 6 feet the correct f-stop is calculated as shown here:

$$\text{F-stop} = \text{G.N.} \div \text{Flash distance} = 80 \text{ feet} \div 6 \text{ feet} = f/13.$$

Note that f/13 is a fractional f-stop between f/11 and f/16. Set the aperture control halfway between the two stops. For exact fractional equivalents of f-stop numbers see appendix C. If you change to a film of different ISO, a new guide number must be calculated:

$$\text{New G.N.} = \text{Old G.N.} \times \sqrt{\text{New ISO} \div \text{Old ISO}}.$$

If the flash in the preceding example is now used with ISO 50 film rather than ISO 100, the new G.N. will be as follows:

$$\text{New G.N.} = 80 \text{ feet} \times \sqrt{50 \div 100} = 56 \text{ feet.}$$

Flash Exposure Tables Guide numbers are based on the inverse square law, which means they strictly apply only to specular sources. If a diffuse light source is being used, it is best to do tests at several distances and construct a table of f-stop versus distance rather than using a guide number.

Flash Meter Flash meters provide a much easier and more accurate method of determining flash exposure, since they can easily determine camera settings for complicated lighting situations. The operation of a flash meter is somewhat different from that of a continuous-light meter, but once the measurement is made, calculations of camera settings can be done in a similar way, with the exception that the shutter speed does not affect the flash exposure, but will affect any continuous light being mixed with flash. Flash meters may be either incident- or reflected-light meters and may be used with flash illumination in all the ways previously discussed for continuous-light meters.

Since the burst of light from a flash is brief, flash meters work by electronically capturing the burst and then measuring its effect. Many meters must be "preset" so that they are ready for the flash burst. After the flash meter has been preset—usually by pushing a specific button on the meter—the flash unit must be set off manually by means of the test button for a reading. For incident-light readings where the meter must be held at the position of the subject, this can require the services of an assistant, since one person must hold the meter and a second set off the flash. Some flash meters make this a more convenient procedure by providing a PC receptacle on the meter, into which the synch cord can be temporarily plugged while readings are being made. Alternatively a radio or infrared slave unit for firing flash units remotely can be employed.

Cordless Flash Meter Operation. Pressing and releasing the button on the right side of the meter presets the meter. The flash is then fired manually by depressing its test button or with a radio slave, and the reading is displayed.

Radio Slave Operation. The transmitter is plugged into the camera's synch terminal and can be mounted on the camera or clipped to the photographer's belt. The receiver is plugged into the flash's synch cord receptacle. When the shutter is depressed, the flash is fired remotely by radio signal. The transmitter also has a test button for firing the flash remotely without activating the camera shutter. Infrared slaves operate in a similar fashion.

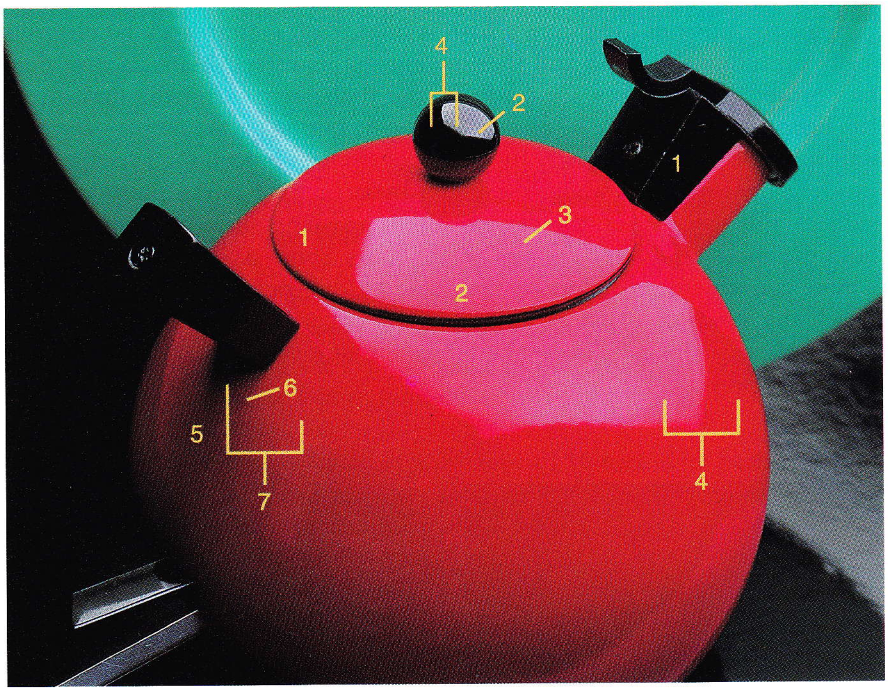
Corded Flash Meter Operation. The synch cord is unplugged from the camera and plugged into the synch cord receptacle on the meter *(arrow)*. When the metering button is pressed, the flash fires and the reading is displayed.

Combined Flash and Continuous-Light Metering Some flash meters will include in the reading the illumination due to continuous sources. These meters will have a setting for the shutter speed, since the exposure due to the continuous light will depend on the shutter speed. The f-stop is calculated by the meter from the combined illumination due to both continuous-light and flash sources at the shutter speed set on the meter and camera. Often the number of shutter speeds that can be selected on the meter is limited, sometimes to only the common synch shutter speed of 1/60 second, but more sophisticated flash meters will give combined flash and continuous-light readings at any shutter speed.

Remember that the shutter speed is only important for the part of the exposure due to the continuous light, but the aperture used will affect both flash and continuous exposure. This fact allows balancing illumination from flash and continuous light by careful manipulation of camera settings and flash power or distance. Techniques for balancing flash and continuous light are covered on pages 438–39.

Lighting Judgment

Judgment of the lighting is the first step in the process of control. When viewing the subject itself, we can look for and usually identify the source or sources of illumination. If the light source is visible we can judge its nature and some of its qualities by experience. The appearance of shadows, diffused highlights, and specular highlights is affected by the lighting. Photographic light meters are a helpful tool in analyzing lighting.



1. Diffused Highlight.
2. Specular Highlight.
3. Specular Highlight Edge.
4. Diffused-Specular Contrast.
5. Shadow.
6. Shadow Edge.
7. Diffused-Shadow Contrast.

Effects of Lighting. **Diffused highlights** show the true tonality of the subject: the medium red appears as medium red and the black appears as black. Diffused highlight luminances depend directly on the reflectance (tone) of the surface and the amount of illumination falling on the surface. **Specular highlights** are direct reflections of the light source, which in this case is a softbox. Note that the specular highlights on the red and the black are much closer in value than the diffused highlights on red and black. The luminance of a specular highlight is much more dependent on the specularity of the surface (its shininess) than on the tone of the surface. **Diffused-specular contrast** is the difference in luminance between the diffused highlight and the specular highlight on the same surface. The diffused-specular contrast is higher on glossy black than it is on glossy red because the diffused highlight on black is much darker. **Shadows** are areas blocked from the direct effect of the main light. Luminance in a shadow depends on the amount of fill light reaching that area and the tonal value of the surface at that point. The **shadow edges** in this case are soft, since the light source used provided diffused light. **Diffused-shadow contrast,** when measured on the same surface, is an indication of the lighting contrast, which in this case is relatively high, since the environmental light has been reduced to a minimum by use of a softbox and a low ambience.

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Shadows

One primary way we sense the quality of light is by its absence—that is, the nature of the shadows formed by the light. A shadow is an area blocked from the direct action of the light by some opaque or partially opaque object—not to be confused with the use of the term *shadows* in printing where it simply means the dark areas of subject or print, whether an actual shadow or not.

Shadows are a primary indicator of the quality of light. Shape, position, deepness, and edge characteristics of shadows are all affected by the quality of the light and the lighting situation. A sense of the three-dimensionality—the volume or modeling—of a subject is largely provided by shadows. Texture of a surface is also shown by shadows.

Diffused Highlight

Another indicator of the quality of the light source is the appearance of the fully lit areas of a subject. If no specular reflection is present, these areas are called **diffused highlights.** These areas show the true tonality of the subject matter. Gray will appear as gray, black as black, and white as white in a diffused highlight area—again not to be confused with a term used in printing, *highlights,* which refers to the lightest areas of a subject or print.

Specular Highlight

Specular reflections—reflections of a light source, also called specular highlights—may appear in fully lit areas of a subject. A specular reflection's edge characteristics, shape, size, and position and the difference in luminance between it and the diffused highlight—called the **diffused-specular contrast**—are all affected by the specularity of the light, the surface nature of the subject (shiny, dull, etc.), the position of the light with respect to the subject, and the aperture and focus of the lens.

Lighting Contrast

Lighting contrast was defined as the difference between the illumination supplied to the shadows and that supplied to the fully lit areas. **Diffused-shadow contrast** is the difference in luminance between a diffused highlight and a shadow and—when measured on the same surface—is an indication of the lighting contrast. The actual contrast seen in a print is the difference in tones between shadows and highlights, and that depends not only on the lighting but also on the tonal value of the subject. Dark-toned surfaces in the shadows or light-toned surfaces in the fully lit areas can increase subject contrast, and light-toned surfaces in the shadows or dark-toned surfaces in the fully lit areas may decrease subject contrast. If a subject has the same tonal value in shadows and fully lit areas, the subject contrast will be due solely to the lighting contrast. Diffused-specular contrast can also contribute to the appearance of contrast in a subject and photograph.

Viewing Position

Viewing position can vastly affect the perception of light, shadows, and reflections. Any visual analysis of lighting should be done from camera position, preferably through the viewing system of the camera itself. Even the effect of aperture and focus on specular highlights can be seen if viewing is done through the lens stopped down to taking aperture.

Color of Light

If you are using color film you should think about the color temperature of the light sources illuminating the subject and any environmental conditions that might change the color of the illumination.

Choice of color balance for the film and filtering techniques for adjusting for the color temperature of the lights are discussed on pages 340–43.

Judgment of Lighting in Photographs

It is a good learning experience to try to judge the lighting in published or exhibited photographs. In a photograph the light source may or may not be included. If it is included, it is easy to judge the nature of the light produced. If it is not, we must judge the quality of the light source or sources by the appearance of shadows, highlights, and reflections.

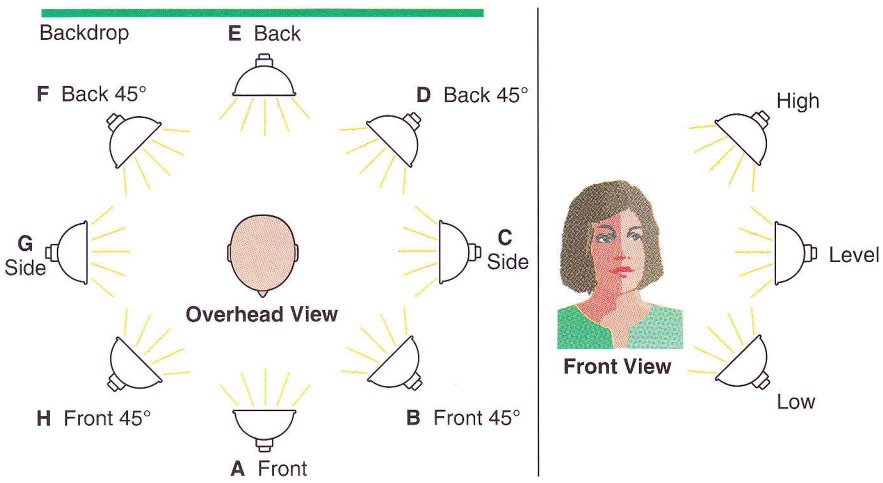
Lighting Control Techniques

Lighting control techniques are summarized in the table "Altering Lighting Quality" on pages 441–42. Any physical change in the lighting usually affects more than one quality. The boxed section "Combined Effects of Physical Changes in Lighting" on page 443 will tell you what to expect for any changes in the lighting situation.

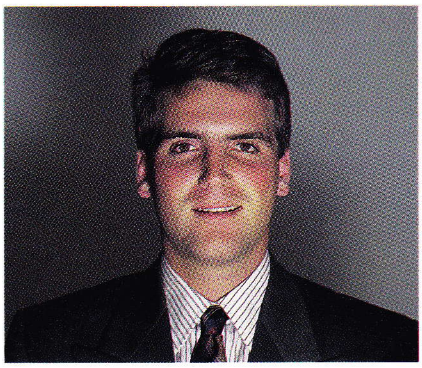
Once you have judged the qualities of the existing lighting situation, you can then make the decision whether to accept the lighting as is or make changes. The following sections will help you decide what physical changes you must make in the lighting situation to get the lighting quality you desire. The principles given here apply to any type of light source, whether natural or artificial. The methods of control and the extent to which the light can be modified will depend on each specific situation. Practical use of the lighting control techniques is demonstrated in the lighting applications beginning on page 443.

Single Light Source

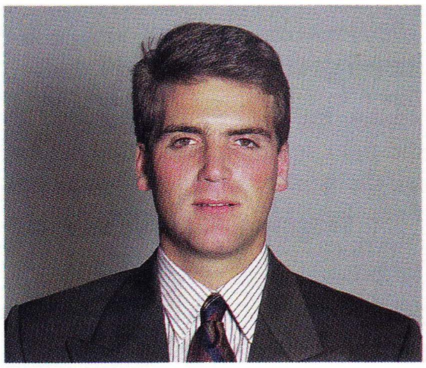
Direction of Light The following photographs show the effects of changing the position of a single specular light for a full-face portrait, a profile portrait, and a still life. In each case the position and shape of the shadows differ and the position of the specular highlights is altered. Each example is labeled with a description of the position of the light, its position as keyed to the diagram below, and some commonly used names for a few of the lighting positions.



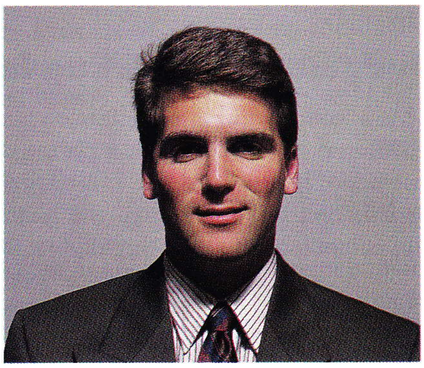
Lighting Position Diagram. Because the camera is located at position A, for level front lighting the light must be positioned just to one side or the other of the camera. For high front lighting, the light would be above the camera, and for low front lighting, it would be below the camera. Demonstrations are shown only for positions at camera right, A through E. Only the level positions were demonstrated for the profile, and the low and level backlighting positions were not demonstrated for the still life because of an opaque background. Depending on the circumstances, any of the remaining positions can be used, at any of the three heights. Because peoples' faces are seldom symmetrical, a lighting position may work better from one side than the other. If a still life has a translucent background, the remaining backlight positions could be used as well.



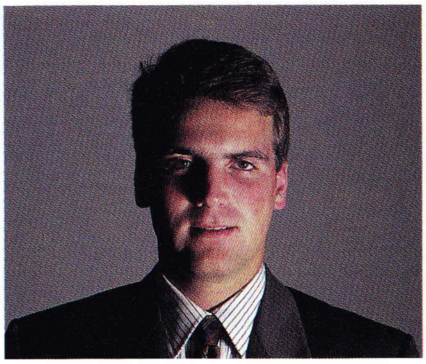
Low Front Lighting, Position A Low.



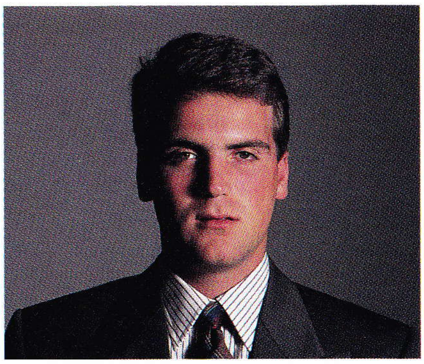
Level Front Lighting, Position A Level (Axis Lighting).



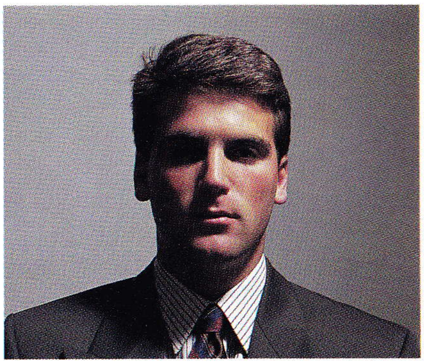
High Front Lighting, Position A High. (Butterfly or Paramount Lighting).



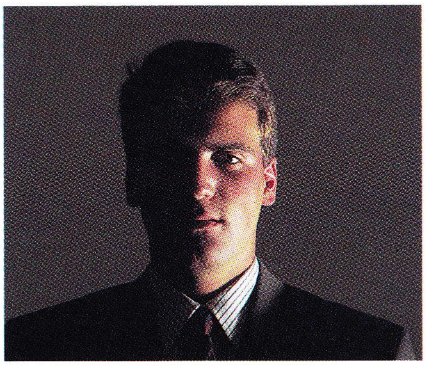
Low 45° Lighting, Position B Low.



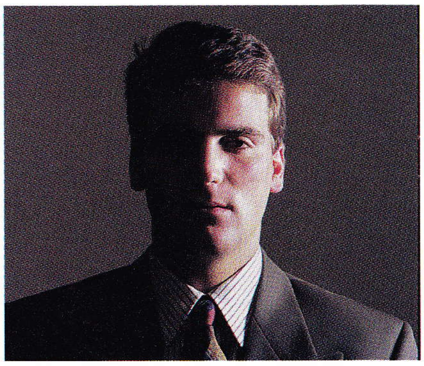
Level 45° Lighting, Position B Level.



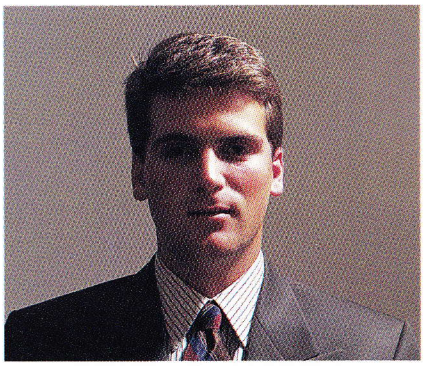
High 45° Lighting, Position B High (Rembrandt Lighting).



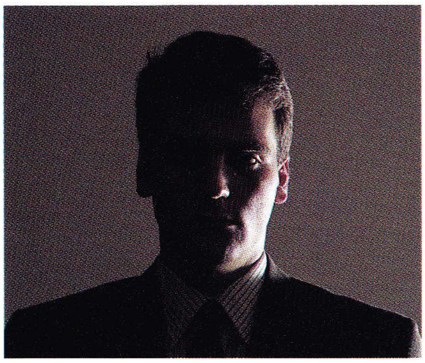
Low Side Lighting, Position C Low.



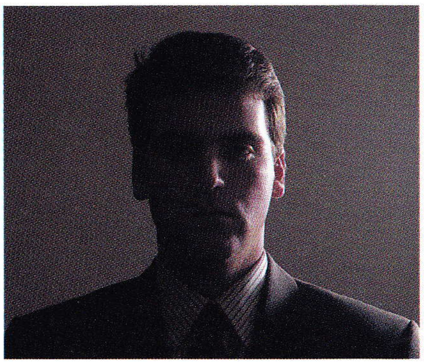
Level Side Lighting, Position C Level (Split or Hatchet Lighting).



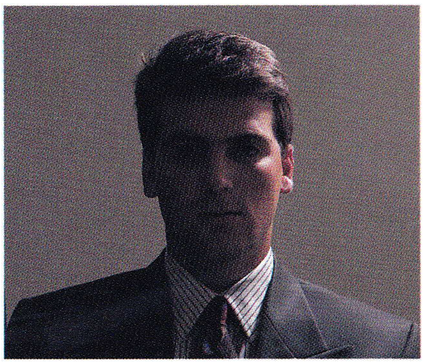
High Side Lighting, Position C High.



Low Back 45° Lighting, Position D Low (Kicker).

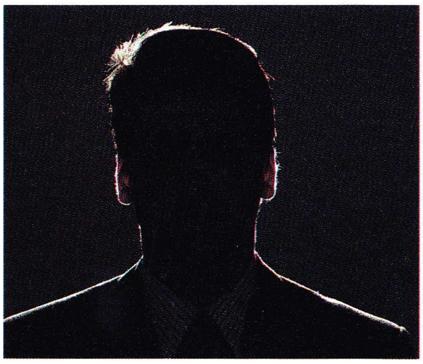


Level Back 45° Lighting, Position D Level.



High Back 45° Lighting, Position D High. This can be used as a hair light if the face is shielded from the light.

Low Backlighting, Position E Low.



Level Backlighting, Position E Level (Rim Lighting).

High Backlighting, Position E High (Hair Light).

continued

Direction of Light—Continued

Profile, Level Front Lighting, Position A Level (Axis Lighting).

Profile, Level 45° Lighting, Position B Level.

Profile, Level Side Lighting, Position C Level.

Profile, Level Back 45° Lighting, Position D Level.

Profile, Level Backlighting.,Position E Level (Rim Lighting).

Low Front Lighting, Position A Low.

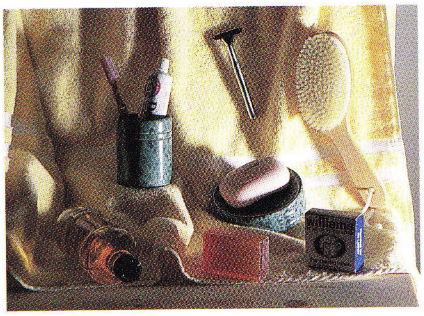
Level Front Lighting, Position A Level (Axis Lighting).

High Front Lighting, Position A High.

Low 45° Lighting, Position B Low.

Level 45° Lighting, Position B Level.

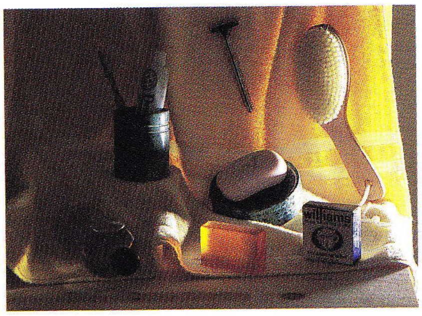
High 45° Lighting, Position B High.



Low Side Lighting, Position C Low.

Level Side Lighting, Position C Level.

High Side Lighting, Position C High.



Low Back 45° Lighting, Position D Low.

Level Back 45° Lighting, Position D Level.

High Back 45° Lighting, Position D High.

High Backlighting, Position E High.

Specularity The following photographs demonstrate the effects of changing the specularity of the light. The tools outlined above for diffusion and concentration of light can be used to alter the specuarlity of the light. Diffusion reduces specularity. Note especially the changes in the look of the specular highlights and the shadow edge.

Specular Light. A single specular studio light is in the high 45° position.

Diffused Light. Again, the light is in the high 45° position, but a large scrim was placed in front of it to provide diffused light. Note the softened shadow edges. Because an open scrim was used, the lighting contrast has also been reduced.

Specular Light. A single specular studio light is in the high 45° (Rembrandt) position.

Diffused Light. Again, the light is in the high 45° position, but a softbox was used in place of the specular light. The shadow edges have been softened, but the high lighting contrast has been retained because the softbox reduces scattered light.

Lighting Contrast Lighting contrast is usually given as a ratio—called the lighting ratio—between the illumination at the diffused highlight and that in the shadows. With a single light source the only light reaching the shadows is environmental light, so the best way to measure lighting ratio is to make incident-light meter readings at the diffused highlight and the shadow.

See the boxed section "Lighting Ratio" on the next page for methods of determining lighting ratio.

If the ratio is too high—that is, too much contrast is present—either the highlight illumination can be decreased or the shadow illumination can be increased. Decrease highlight illumination by reducing the power to the light. Increasing subject-to-light distance or placing a scrim between the light and the subject will also decrease highlight illumination but will change specularity as well. Shadow illumination can be raised by increasing the environmental light by raising the ambience of the subject—placing light tone flats or reflectors near the subject.

Shadow illumination can also be raised by adding a supplementary fill light. See the section on multiple light sources beginning on page 433.

To increase lighting contrast, increase the illumination in the highlights or reduce the illumination in the shadows. Highlight illumination can be increased by increasing the power of the light source or decreasing the subject-to-light distance—which may also change specularity. Shadow illumination can be reduced by lowering the ambience by the use of light-absorbing surfaces around the subject and light source.

The choice of whether to alter the highlight or the shadows for lighting contrast control depends upon whether the specular nature of the light is important in the photograph. Any time the light source is manipulated by moving it or placing scrims in front of it, the specularity of the light changes. Altering the illumination in the shadows, on the other hand, leaves the specular nature of the main lighting unaffected.

Actual subject contrast also depends on the tonal values of the subject in shadow and highlight. When possible, tonal values of the subject as well as lighting contrast could be changed to control final subject contrast. For example, the white shirt of a portrait subject might be replaced by a shirt of lower reflectance to reduce subject contrast.

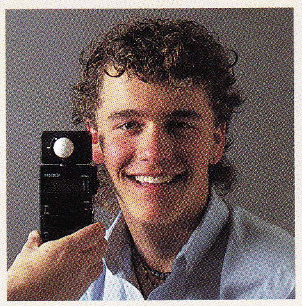
Control Over Intensity of Light Often a specific shutter speed or aperture is needed for control over the appearance of motion or depth of field in a photograph. Changing the film speed may solve the problem, but if the lighting intensity is controllable, some choice of camera settings is possible. The intensity of a source can be changed by altering the power supplied to it. Changing the distance from the light source to the subject or scrimming the light will also change intensity but will affect specularity as well.

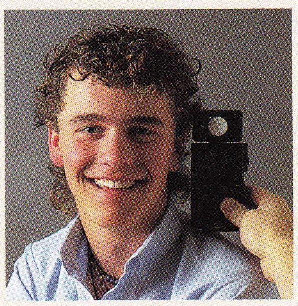
For an example of lighting control using a single light source, see lighting application 1 on page 444.

Lighting Ratio

Measuring Lighting Ratio

A comparison of incident-light meter readings at the diffused highlight and in the shadow is the best way to measure lighting ratio. Gray card readings at the same positions can also be used to determine lighting ratio.





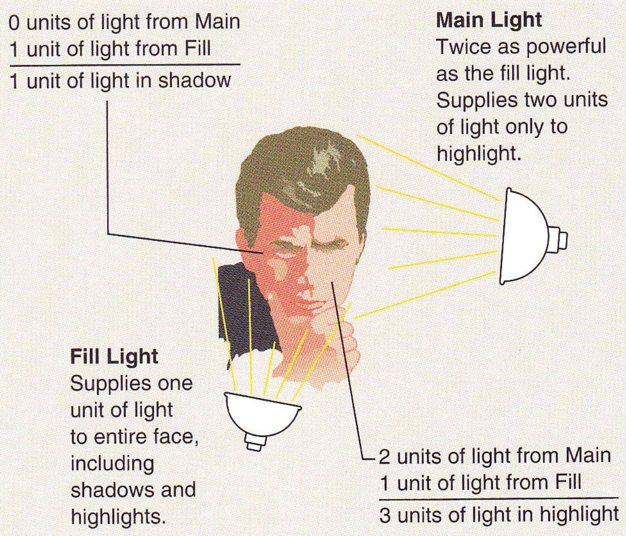
Measuring Lighting Ratio with an Incident-Light Meter. Above left: Take an incident-light meter reading at the diffused highlight, making sure the meter dome receives the full effect of the main light. Point the dome toward the camera to measure the general effect of any light striking the face from the camera direction. Above right: Next, take a meter reading in the shadow area, making sure the dome receives no direct light from the main light but receives the full effect of any environmental or supplementary fill light reaching the shadows. Find the difference in stops and refer to the first table on the facing page for the lighting ratio. Use the diffused-highlight reading for your camera settings. A reflected-light meter can also be used to determine the lighting ratio by finding the difference between reflected-light meter readings from an 18 percent gray card at diffused highlight and shadow.

Calculating Lighting Ratio. Right: If the illumination from the fill light is adjusted to be half that from the main light (one stop less illumination), the ratio is not 2:1, as might be expected, but 3:1, because the fill light is illuminating the highlight as well as the shadow. For low lighting ratios, the illumination added to the diffused highlight by the fill light will require a correction in camera settings. Refer to the second table on the facing page for lighting ratios and exposure corrections for calculated differences between main and fill lights.

Calculating Lighting Ratio

If you do not have an incident-light meter but you know the relative power of the light sources being used for main and fill, you can calculate the lighting ratio. This applies when you are calculating flash exposure manually, either by guide numbers or exposure tables. Two things need to be remembered in calculating lighting ratios:

1. An assumption must be made that the environmental light reaching the shadows indirectly from the main light or any preexisting light is negligible compared with that from the supplementary fill light.
2. If the fill light is a front light, as most are, it is illuminating the diffused highlight as well as the shadows. This will affect the lighting ratio and the exposure for the diffused highlight.



continued

Lighting Ratio by Meter Readings

Stops Difference Between Incident-Light Meter Readings at the Diffused Highlight and in the Shadow	Lighting Ratio
1	2:1
2	4:1
3	8:1
4	16:1

Lighting Ratio by Calculation

Stops Difference Between Calculated Illumination from Main Light and Fill Light	Lighting Ratio	Correction to Calculated Exposure for Main Light. Stop Down:
0	2:1	1 stop
1	3:1	1/2 stop
2	5:1	1/3 stop
3	9:1	No correction

Multiple Light Sources

Since the standard of "normal" light is the sun, many feel that retaining the appearance of a single source of light is the most natural approach to photographic lighting. In fact people are exposed to subjects illuminated by multiple light sources nearly every day in artificially lit situations. Even in cases of a single light source, reflecting surfaces near the subject can create the impression of more than one light source. The following discussion is built around the attempt to capture the feel of natural lighting, but photographic lighting styles vary and many photographers intentionally light so that the presence of multiple sources is obvious.

Above: Pete McArthur, Still Life. The lighting recreates a natural feel of late-afternoon direct sunlight, accentuated by the warm colors.

© Pete McArthur.

Left: Charles Purvis, Russian Cigarettes. The lighting is complex and stylized, with mirrors used to create a multidirectional feel for the light.

© Charles Purvis, Courtesy of Art and Commerce.

Multiple lighting situations may consist completely of lights supplied by the photographer or may include some light from preexisting sources. In either case the suggestion in chapter 8 that lighting be built in stages is valid:

1. *Main light.*
   a. The position of the main light determines the shape and placement of shadows and the position of specular highlights in the subject. If the main light is a preexisting source that you cannot move, you will have to move the subject or the camera for the desired effect.
   b. The specularity of the main light may be modified to control shadow edges and the appearance of specular highlights.

2. *Fill light.* The fill light supplies illumination to the shadows. The amount of fill light determines the lighting contrast. Measure the lighting ratio. Usually diffused light is used for fill to prevent the formation of multiple shadows. If you are using supplementary lights for fill, you can change the power or distance to the subject of the fill light to control lighting contrast.

3. *Effects lights.* Effects lights, such as a hair light, are often brighter than the main light to draw attention to a specific area.

Lighting applications 2, 3, and 4 beginning on page 446 demonstrate lighting control using multiple light sources.

Multiple Lighting with Flash In a multiple lighting setup using only flash, visual evaluation of shadows and highlights is aided by modeling lights. Evaluation of exposure and lighting contrast is most easily done with a flash meter.

Some electrical connection between all the flash units is necessary to make sure that they fire together when the shutter is fully open. This can be done by wiring the synch cords of all the flashes in parallel to the synch cord attached to the camera, but it is better to have only one flash unit fired by the camera and the others fired by slave units that sense the light from the first flash. When using studio flash units of the power pack type, any flash heads plugged into the same power pack will fire simultaneously, but additional power packs will require a slave for each. Other than this problem of synchronizing all the flash units, lighting with multiple flash is approached in the same way as lighting with multiple continuous lights.

If only the effect of the flash lighting is desired, the exposure due to flash must be well above that of any continuous light illuminating the subject, such as modeling lights or preexisting light. To see if the continuous light is adding appreciable exposure, take a continuous-light meter reading at the diffused highlight. It should be four or more stops lower than the camera settings determined for the flash exposure. If the continuous-light level is too high you have three choices:

1. Reduce the intensity of the continuous light if possible.
2. Raise the intensity of the flash lighting.
3. Use a faster shutter speed at the same f-stop. This will reduce the exposure from the continuous light without affecting the exposure from flash. Do not exceed the maximum shutter speed for synchronizing with flash.

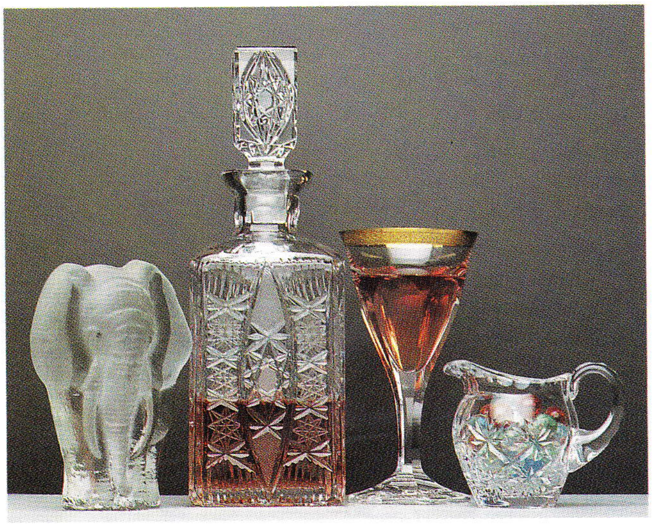
Lighting applications 2 and 3 beginning on page 446 demonstrate multiple flash lighting in the studio.

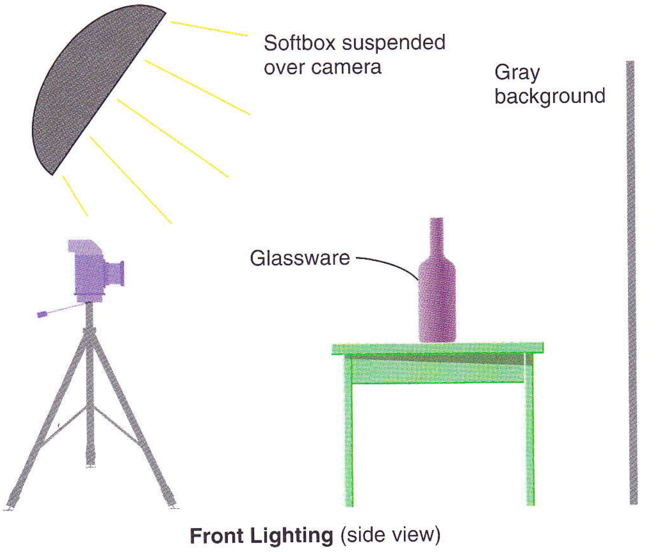
Combination of Preexisting and Supplementary Sources
With black-and-white film, sources of any type—natural or artificial, flash or continuous—can be combined for lighting the subject. If color film is being used, remember to consider the match between the color balance of the film and that of the various light sources. Flash and daylight work well together, since both are daylight balance. If the preexisting lights are tungsten, supplementary incandescent lights with tungsten balance film will give good results. Lighting application 4 on page 450 demonstrates mixing flash and daylight on location.

First evaluate the effect of any preexisting light on the subject. Decide which source will serve as your main light, what is providing fill, and what produces effects lighting. If necessary, and possible, manipulate the subject and the preexisting light for the best effect. Add supplementary lights one at a time, evaluating the results at each step visually and by metering.

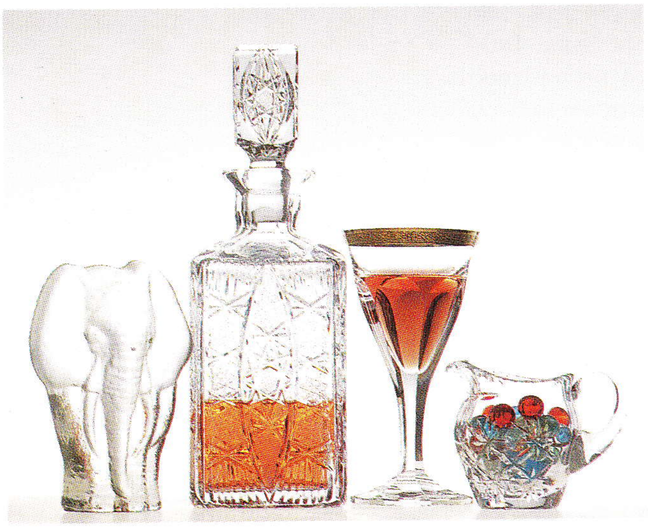
The methods outlined on page 432 for measuring lighting ratio can be used to determine the desired lighting contrast. When the preexisting light is not controllable, the intensity of the supplementary light must be adjusted for contrast control regardless of whether it is used as fill or main. The methods for changing intensity include changing the distance to the subject, changing the power of the source, or reducing the intensity with scrims. If you are mixing flash and continuous-light sources, the balance of exposure between the two can be manipulated by careful choice of camera settings (see the boxed section "Balancing Flash and Continuous Light" on pages 438–39).

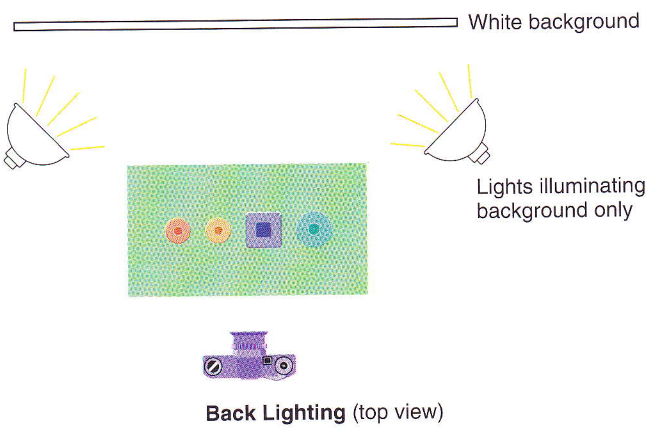
Lighting Transparent Objects Transparent materials offer a special challenge in lighting. In general, if you wish to show that a subject is transparent or translucent you must have some light coming through it, as in backlighting or top or bottom lighting. These positions are used alone or in combination with each other or with front lighting. With front lighting, the harshness of





High Front Diffused Lighting. A softbox over the camera gives relatively large and gentle specular reflections, but the lack of light coming through the transparent and translucent objects makes them appear dark and somewhat opaque. Cut glass responds well to this lighting because the facets pick up and refract the light.

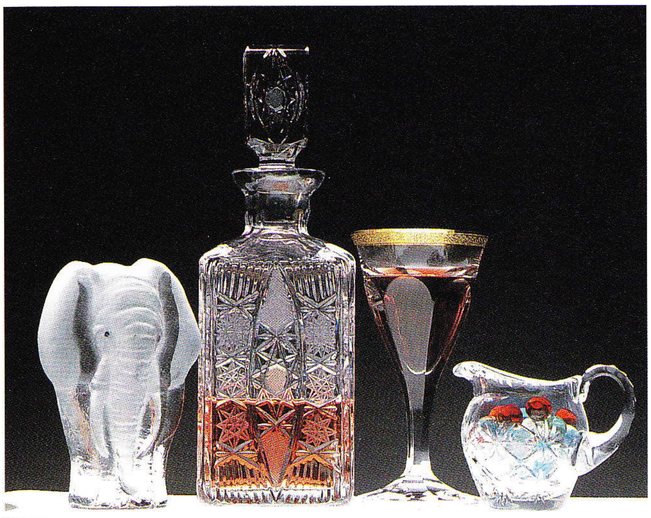


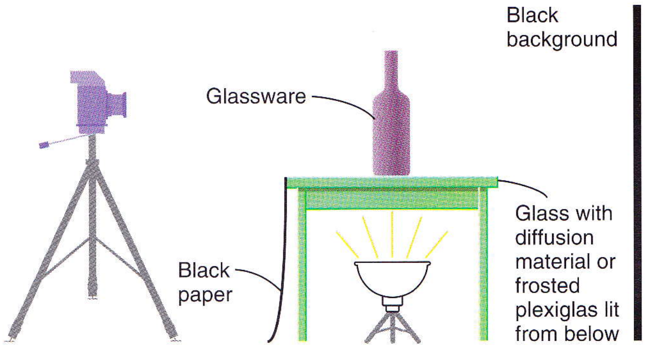


Diffused Backlighting. Backlighting is set up exactly like silhouette lighting, but the light is transmitted through transparent or translucent objects, giving a true sense of their transparency. Specular reflections are almost nonexistent. All of these objects respond well to backlighting, especially the transparent liquids, but some of the sparkle is lost from the cut glass, since the facets tend to go black.

Photos © Bognovitz.

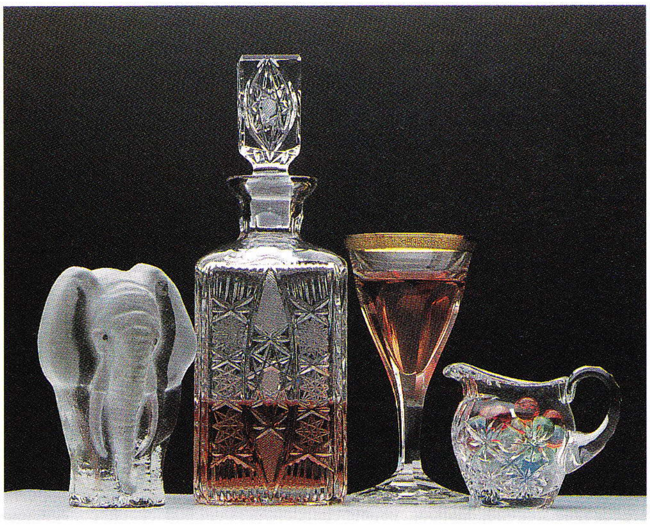
specular reflections from the shiny surfaces of many transparent objects can be softened by the use of diffused lighting. Additional specular reflections help to define the shape of the object and may be added by placing white cards near the object, just out of camera view.

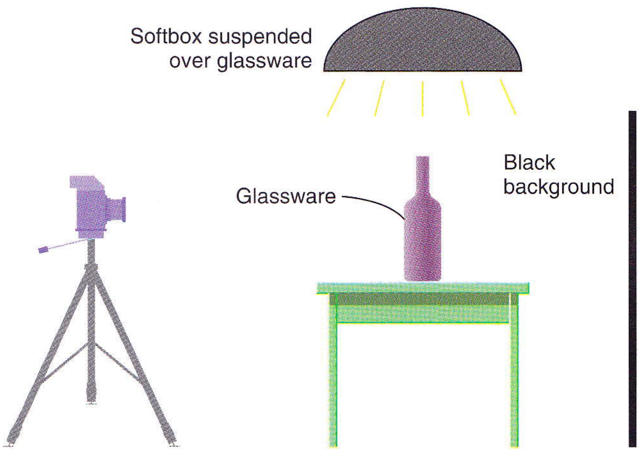




Bottom Lighting (side view)

Diffused Bottom Lighting. Bottom lighting gives a kind of inner glow to objects made of thick curved or faceted transparent materials. A few specular reflections appear, but objects that flare out, such as the wine glass, will reflect the lighted table surface. Cut glass responds well to this lighting, but with tall objects such as the decanter, the effect may be lost at the top. Liquids tend to go dark. To avoid seeing the white tabletop, place a piece of black paper over the light table with holes cut the exact size of the bases of the objects.





Top Lighting (side view)

Diffused Top Lighting. Top lighting gives less of an inner glow than bottom lighting but also gives specular reflections, which are very effective at highlighting the tops of the objects—especially rounded tops—and at separating them from the background.

Photos © Bognovitz.

Balancing Flash and Continuous Light

Exposure due to electronic flash is normally independent of the shutter speed set on the camera, being affected only by the aperture, subject to flash distance and the power of the flash. Exposure from continuous light, on the other hand, depends on both the aperture and the shutter speed. A careful choice of camera settings, flash distance, and flash power can therefore be used to balance the exposure due to flash and continuous sources in a mixed lighting situation.

Using Camera Settings to Control Flash and Continuous-Light Balance

If you wish to change the exposure due to the continuous light without affecting the exposure from the flash, keep the aperture the same and change the shutter speed.

EXAMPLE You are using the flash as a main light and preexisting continuous light as fill. Your maximum synch speed is 1/60 second. The continuous light meters M.R. f/2.8 at 1/60 second. The calculated f-stop for the flash—by its distance from the subject—is f/11. If you set your camera to C.S. f/11 at 1/60 second, the exposure due to flash is correct but the exposure due to continuous light is four stops less than the metered value—f/2.8 versus f/11. Four stops difference between main and fill results in a lighting ratio of 9:1 (see the table on page 433).

If you wish to have a lower lighting ratio, change your camera settings to C.S. f/11 at 1/15 second. The exposure due to the flash is unaffected, since the f-stop is the same, but the exposure due to the continuous light is now only two stops less than metered: metered M.R. f/2.8 at 1/60 second equals M.R. f/5.6 at 1/15 second compared with the camera setting of C.S. f/11 at 1/15 second. A two-stop difference between main and fill results in a lighting ratio of 5:1.

If you wish to change the exposure due to the flash without affecting the exposure from the continuous light, use a different equivalent exposure setting on the camera.

EXAMPLE You are using daylight as a main light and electronic flash on the camera as fill. The daylight—continuous light—is giving an incident-light meter reading of I.M.R. f/11 at 1/60 second at the diffused highlight. For the distance the flash is from the subject, the f-stop from the flash calculator is f/8, giving a lighting ratio of 3:1—one stop difference in illumination supplied to shadows and the diffused highlight, with fill illuminating the highlight. You would like a higher lighting ratio, so you need to reduce the exposure due to the flash. Choose an equivalent camera setting with a higher f-stop: C.S. f/16 at 1/30 second. This will provide the same exposure due to the continuous light but reduce the exposure from the flash one stop, resulting in a 5:1 lighting ratio.

Shutter speed choices for balancing flash and continuous light are limited by the correct synch speed for the shutter. Leaf shutters, which synch with electronic flash at any speed, offer more control, especially when the continuous light is bright compared with the flash illumination. The newer focal-plane shutters with higher synch speeds also offer the convenience of reducing the effect of the continuous light by raising the shutter speed. Remember that some large studio strobes have shutter speeds of 1/500 second or longer and that exposure due to flash may be affected by the use of higher shutter speeds.

The process of balancing flash and continuous exposure is made easier by a flash meter that will combine continuous light and flash into one single reading. Determine the lighting ratio by making two incident-light readings, one in the shadows and one at the diffused highlight, and compare them for the lighting ratio (see the table on page 433). The diffused highlight reading includes both continuous–light and flash illumination, so the camera setting suggested by the meter can be used without correction.

Using Flash Intensity to Control Flash and Continuous-Light Balance

Situations may arise where the camera controls cannot be used for control of flash and continuous-light balance. For example, if the maximum synch speed is 1/60 second, setting the camera controls for the continuous light may result in high f-stop numbers that give insufficient flash exposure. A reverse case is if the continuous light is low in intensity and the flash is powerful, resulting in undesirably high f-stop numbers and long shutter speeds to get the correct continuous exposure. In both cases the intensity of the flash can be changed to get the desired result. Flash intensity can be controlled in two ways:

1. Change the flash-to-subject distance. Moving the flash closer increases the flash exposure. Use the flash calculator or the inverse square law to figure out the exposure change.

2. Alter the power of the flash itself. Some flash units have power settings. Setting the flash on half power will provide one stop less flash exposure, setting it on one-quarter power gives two stops less exposure, and so on. If your flash does not have power settings, its intensity can be reduced by placing diffusing material in front of it. Translucent plastics or even a handkerchief can be used for this purpose.

Combining Flash with Sunlight. These photographs demonstrate the use of sunlight with a small electronic flash added as a supplementary light, known as **synchro-sun** or **sun-synch** photography. On the left, direct sunlight provided the illumination. The lighting contrast was high because little environmental light was reflected into the shadows. An incident-light meter reading at the diffused highlight was I. M. R. f/8 at 1/125 second for ISO 25, and camera settings of C. S. f/8 at 1/125 second were used. The camera was 5 feet from the subject.

For the photograph on the right, a lower lighting ratio was desired, so a small electronic flash was added, placed in a front lighting position to add fill light to the shadows. The lighting contrast has been reduced and catchlights added to the eyes by the flash. The maximum synch speed for the camera used was 1/60 second, so the camera settings were first adjusted to C.S. f/11 at 1/60 second, which is an equivalent exposure setting to C.S. f/8 at 1/125. A lighting ratio of about 3:1 was desired, so the exposure from the flash had to be adjusted to be one stop less than that from the sun. If the flash, which had a guide number of G.N. 56 at ISO 25, were placed on the camera at 5 feet, the recommended f-stop for the flash would be G.N. ÷ distance = 56 feet ÷ 5 feet, or about f/11. This is the same as the sunlight illumination for C.S. f11 at 1/60 second and needs to be reduced one stop.

Any of the methods discussed in this section of the text for reducing the flash exposure without affecting the daylight exposure could have been used: (1) *Change the flash power to half-power.* This was not an option in this case, since the flash had only one manual setting. (2) *Change the camera settings to C.S. f/16 at 1/30 second.* The daylight would still get correct exposure, but the flash would be reduced one stop for the 3:1 ratio. The camera should then be set between f/16 and f/22 for the required half-stop exposure correction for a calculated 3:1 lighting ratio. However, with the camera used here, the minimum aperture was f/16, so the exposure correction could not be made. (3) *Increase the flash-to-subject distance.* This was the method chosen. Since the camera is set at f/11, we need a calculated f-stop of f/8 for the flash. To find the flash-to-subject distance, divide the guide number by the desired f-stop: G.N. ÷ f-stop = 56 feet ÷ f/8 = 7 feet. The flash was taken off the camera, attached by an extension synch cord, and held at 7 feet from the subject. The aperture on the camera was set between f/11 and f/16 to provide the half-stop exposure correction needed.

Painting with Light

Trying to light large subject areas can present a problem if only a limited number of lights are available. One solution is painting with light, which is also useful for complex lighting on small subject matter. This technique requires that the subject be in almost total darkness so that the shutter can be locked open as for a time exposure. One light source is moved throughout the subject to selectively light different areas in sequence. This can be done with either flash or continuous-light sources.

With flash, the distance from the flash to the area of the subject being illuminated must be calculated from the f-stop being used on the camera. Repeated flashes are then performed to illuminate the parts of the subject that are to show in the photograph.

When a continuous-light source is used for painting with light, the distance from the light to the subject and the time the light is allowed to fall on the area can be altered to control exposure, taking into account the f-stop set on the lens.

Painting with Light. Aaron Jones. A number of devices for painting with light are available. They use fiber optics to provide a movable beam of light and feature controllable intensity and accessories to alter the pattern of light.

© Aaron Jones.

Summary of Lighting Control Techniques

Look for the change you wish to make in the quality of the lighting in the following table titled "Altering Lighting Quality." The table will tell you what physical change to make in the lighting to get the new quality. Note that the desired change in a particular quality of the light can usually be achieved in several ways. Each change in the lighting also usually affects qualities other than the one you are interested in changing. The boxed section "Combined Effects of Physical Changes in Lighting" on page 443 tells you all of the effects you get from making a physical change in the lighting. Refer to it to tell if the physical change in lighting you plan on making will have other possibly undesirable effects on the lighting quality.

Altering Lighting Quality

QUALITY CHANGE DESIRED	PHYSICAL CHANGE IN LIGHTING
Shadow shape and position	The shape and position of shadows depends on the relative positions of the light source and the subject and the three-dimensional form of the subject and the environment. The representation of the shadows in the photograph also depends on the point of view of the camera. See pages 426–29 for lighting positions.
Shadow edge	
A harder edge	Hard-edged shadows result from specular light. Increase specularity: a. Use a light source of smaller physical size. b. Increase the subject-to-light-source distance. c. Focus the light by reflectors or lenses so that its rays are parallel when they reach the subject.
A softer edge	Soft-edged shadows result from diffuse light. Increase the apparent size of the light source to reduce specularity: a. Place translucent material between the light source and the subject. b. Diffuse the light by reflecting it off a matte surface (bounce the lighting). c. Reduce the subject-to-light-source distance (if the light source is nearly a point source this may not have much effect on specularity, but with large-area sources the difference will be marked).
Lighting Contrast	
Increased contrast	1. Increase the illumination in the diffused highlight area: a. Increase the intensity of the light source. b. Decrease the subject-to-light-source distance. c. Add supplementary lights illuminating the diffused highlight. 2. Decrease the amount of illumination in the shadows to darken them: a. Reduce the amount of environmental light by lowering the ambience (use black flats, etc., around the subject). b. Reduce the amount of environmental light by controlling the amount of light scattered into the environment by the main light source (use barn doors or black flats or material around the light). c. Reduce the intensity of any supplementary lights illuminating the shadows.
Decreased contrast	1. Decrease the illumination of the diffused highlight a. Decrease the intensity of the light source. b. Increase the subject-to-light-source distance. c. Introduce translucent material between the light source and the subject. 2. Increase the illumination of the shadow: a. Raise the ambience (place white flats or materials near the subject). b. Allow more light to spill into the environment from the main light source. c. Add supplementary lights illuminating the shadows (fill light). d. Increase the intensity of any supplementary lights already illuminating the shadows. e. Decrease the distance of the supplementary fill light from the shadow area.

continued on next page

Altering Lighting Quality—Continued

QUALITY CHANGE DESIRED	PHYSICAL CHANGE IN LIGHTING
Specular highlight contrast and size	
Increased diffused-specular contrast and reduced size of specular highlights	a. Reduce the physical size of the light source. b. Increase the subject-to-light-source distance.
Reduced diffused-specular contrast and increased size of specular highlights	a. Increase the physical size of the light source. b. Reduce the subject-to-light-source distance. c. Place a translucent screen between the light and the subject. NOTE: The tonal value of a subject also affects diffused-specular contrast. A shiny black object will show more diffused-specular contrast than a shiny white object, since the tone in the diffused highlight area of the black object is darker than that of the white object.
Specular highlight position	The position of the specular highlights on the surface of the subject depends upon the relative positions of subject, light sources, and camera. Refer to pages 426–29 for some of the effects of lighting positions on specular reflections.
Specular highlight edge sharpness	The sharpness of the edge of a specular highlight depends on the degree to which the specular reflection is in focus and does not depend directly on the nature of the light source.
A sharper edge	a. Stop down the lens aperture to bring the specular reflection into better focus. b. Bring the light source closer to the plane of focus by moving it closer to the subject.
A softer edge	a. Open up the lens aperture to throw the specular reflection out of focus. b. Move the light source farther from the subject to get it farther from the plane of focus.
Surface specularity	The appearance of the specular highlight depends greatly on the ability of the subject's surface to reflect an image; this is called the specular nature of the reflecting surface. Polished, shiny, or mirror surfaces reflect a sharper, brighter, more distinct image, resulting in higher diffused-specular contrast and a harder specular highlight edge.
Increased specularity	The specularity of a surface can be increased by polishing, spraying with a transparent glossy finish, or coating with oil or another reflective liquid.
Decreased specularity	The specularity of a surface can be reduced by roughening or spraying with a matte spray that produces a dull, less reflective surface, giving lower diffused-specular contrast and softer specular highlight edges.

Combined Effects of Physical Changes in Lighting

A physical change in the lighting can affect more than one of the visual evidences of lighting. Refer to this listing to find out all of the changes in quality to expect.

Size of Light Source

The larger the area of the light source supplying light to the subject, the more diffuse and less specular the light. (Size here does not refer to the strength or power of the light source.)

1. *Increasing* the area of the light source gives these results:
   a. Softer shadow edges
   b. Lower diffused-specular contrast
   c. Larger specular reflections
   d. If the increased size of the light source is achieved by diffusing the light with a translucent screen or reflecting surface, a lowering of diffuse highlight illumination and a scattering of more light into the environment may result, both of which will reduce lighting contrast
2. *Decreasing* the area of the light source gives these results:
   a. Harder shadow edges
   b. Higher diffused-specular contrast
   c. Smaller specular reflections
   d. If the amount of environmental light is reduced by the change in light size, possibly increased lighting contrast

Main Light Intensity

The main light is the principal illumination on the diffused highlight. If the intensity of the light source can be changed electrically—for example, by supplying less current to the light—without changing its position or physical nature, then the lighting contrast can be selectively controlled:

1. *Increasing* the intensity results in higher lighting contrast.
2. *Decreasing* the intensity results in lower lighting contrast.

NOTE: The amount the lighting contrast changes with intensity will depend on the ambience, since that will determine how much of the change in illumination reaches the shadows.

Main-Light-to-Subject Distance

The main-light-to-subject distance directly affects the amount of diffused highlight illumination and the apparent size of the light source.

1. *Decreasing* the light-to-subject distance gives these results:
   a. Softer shadow edges
   b. Higher lighting contrast
   c. Harder specular highlight edges
   d. Lower diffused-specular contrast
   f. Larger specular highlights
2. *Increasing* the light-to-subject distance gives these results:
   a. Harder shadow edges
   b. Lower lighting contrast
   c. Softer specular highlight edges
   d. Higher diffused-specular contrast
   e. Smaller specular highlights

Lighting Applications

The lighting applications beginning on the next page outline four uses of controlled lighting: portrait photography, still life photography, illustration photography, and fashion photography. Each application gives some general information about the specialty, some information on lighting for that application, and a step-by-step account of an actual shoot by a working photographer. These are only a few of the areas of photography in which controlled lighting techniques are widely used, but the variety of subject matter, methods, and equipment covered gives information that should be useful in nearly any controlled lighting situation.

Lighting Application 1: Portrait Photography

Portraits of people are probably the single largest application of controlled lighting. Successful portraits convey a sense of the person who is the subject, and the major tool for that is expression, which includes facial expression and body gesture (the position of the body, hands, and so on). Appropriate posing of the subject helps to achieve the desired body gesture. Posing can be accomplished by using specific directions on how to sit, position hands, turn the head, and the like but is often more successfully achieved by providing an appropriate choice of seating, placing a table or other object nearby on which to rest the arms or legs, and allowing the subject to settle into natural poses. Professional models or actors can assume poses and expressions at will with a natural effect, but most people must be helped along by unintrusive direction and a personal interaction that occurs between the photographer and the subject that will call up the desired expressions. Expressions are fleeting, and the photographer must be sensitive to the subject's mood and anticipate them.

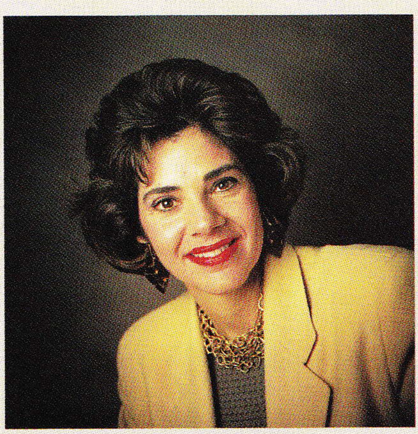
Well-controlled portrait lighting is needed to support and enhance the impression given by expression. The character of the sitter may influence the quality of light used. A person of strong personality and features may look best with a specular light of high contrast, whereas the use of softer, less contrasty light can give an entirely different feel for the subject. Props, surroundings, and clothing also contribute to the impression given of the subject. ■

Edward Steichen, *George Gershwin*, 1927. The high backlighting emphasizes the strong profile, the cigar and smoke, and the musical score. Front lighting gives detail in the face and jacket and highlights the hair. The specular light provides a theatrical feeling appropriate for Gershwin's personality and occupation.

© Edward Steichen, Courtesy of the International Museum of Photography at George Eastman House. Reprinted by permission of Joanna T. Steichen.

Paul Strand, *Young Boy, Gondeville, Charente, France, 1951*. The natural diffuse lighting provides a luminous open effect, which emphasizes the sculptural quality of the face and intensifies the direct, almost confrontational expression of the young man.

© 1971 Aperture Foundation, Inc., Paul Strand Archive.



Portrait with One Light Source. Left: The sitting began with a moderately high 45° diffused light source. This gave a somewhat dramatic look, with noticeable but soft-edged shadows. Right: A different look was tried, with a high front (butterfly) diffused lighting and a base fill added below the face to add light to the shadows under the chin and nose. This is a widely used glamour-lighting setup and produces an open, luminous look. Bottom left: It was decided, however, to return to the relative drama of the high 45° lighting but to use a fill reflector to the right of the subject to lower the lighting contrast, giving a softer feeling to the portrait. The final version was cropped to a vertical and retouched slightly.

© Philip Birmingham

Photographer:	Philip Bermingham
Studio:	Philip Bermingham Photography
Camera:	Hassleblad 500CM
Lens:	120mm
Lighting:	Balcar Mini-Z flash, Balcar medium softbox, Photogenic reflector
Film:	Fuji Reala
Camera Settings:	f/8 at 1/125 second

Lighting Application 2: Still Life Photography

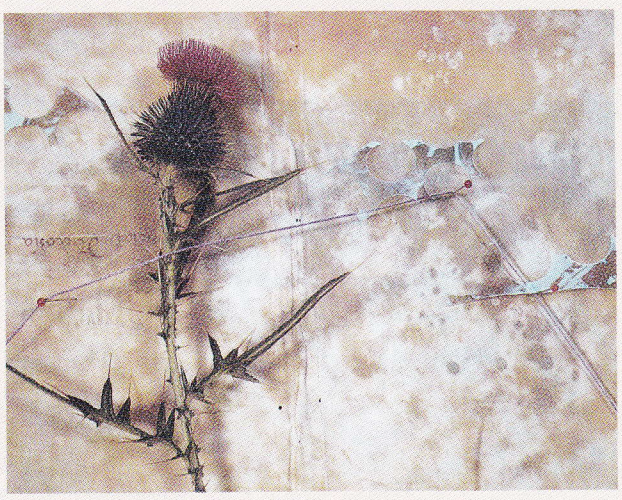
The still life has been a popular subject since the beginnings of photography, both for art and for commerce. The challenge in lighting a still life is to show the form, volume, and surface nature of the objects in a convincing way, at the same time using the quality of light and the arrangement of the objects to convey the concept behind the photograph. Many still life subjects are a mixture of objects with greatly different surfaces and shapes. Trying to light these diverse objects in one photograph can present interesting problems.

The nature of the surface will affect the choice of quality of light. Mirror surfaces, such as polished silver, will show reflected images of any surrounding objects, requiring a totally controlled environment. A **light tent,** which surrounds the subject with translucent materials, is one solution to the problems of mirror reflections.

Shiny and glossy surfaces present some of the same problems, since they will reflect clear, distinct images of light sources and vague images of surrounding objects. If specular sources are used to illuminate a subject with this type of surface, the result is small, high-intensity specular reflections. Photographers often use diffused sources to produce larger, less intense specular highlights. The trend for many years has been to light still life subjects with diffuse light, but styles change, and specular lighting is becoming more popular.

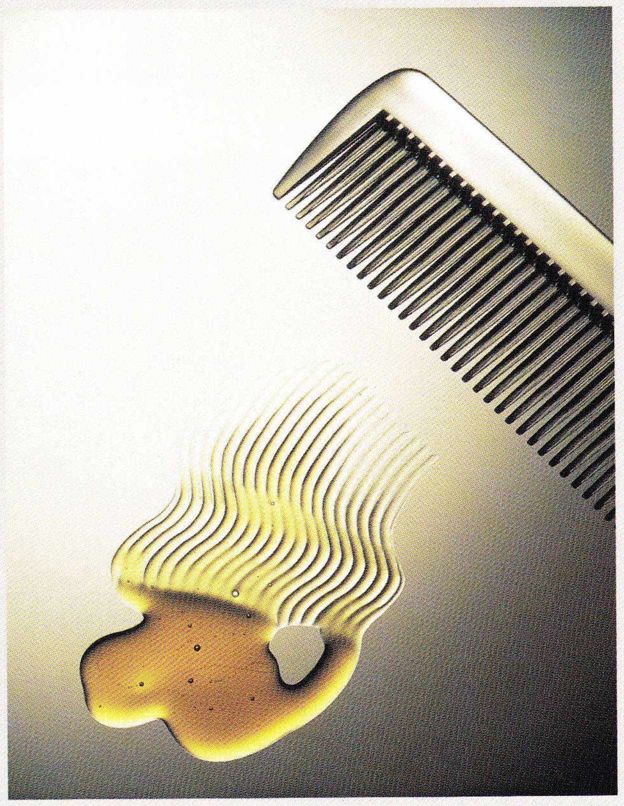
Matte surfaces are relatively easy to light, since they do not produce any extreme reflections or surface images. Nevertheless, they can reflect light in the form of glare, so care must be taken with the relative angles of lights, subject surface, and camera to avoid or make use of glare.

The texture in a surface can be emphasized by cross lighting or deemphasized by lighting directly into the surface. The impression of texture is increased with a more specular light source. Rough and broken surfaces respond in a similar way to cross-lighting. ■



Olivia Parker, *Thistle.* The diffused lighting brings out the gentle colors and gives a subtle sense of depth to the subject.

© 1982 Olivia Parker.

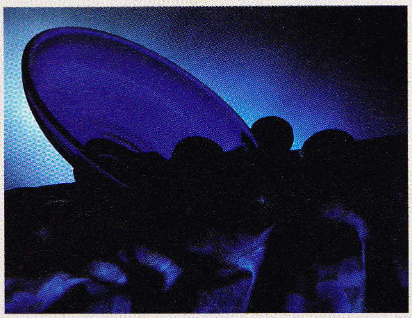


Roger Turqueti. Backlighting the transparent materials makes them glow, and the refractive quality of the viscous liquid adds sparkling highlights.

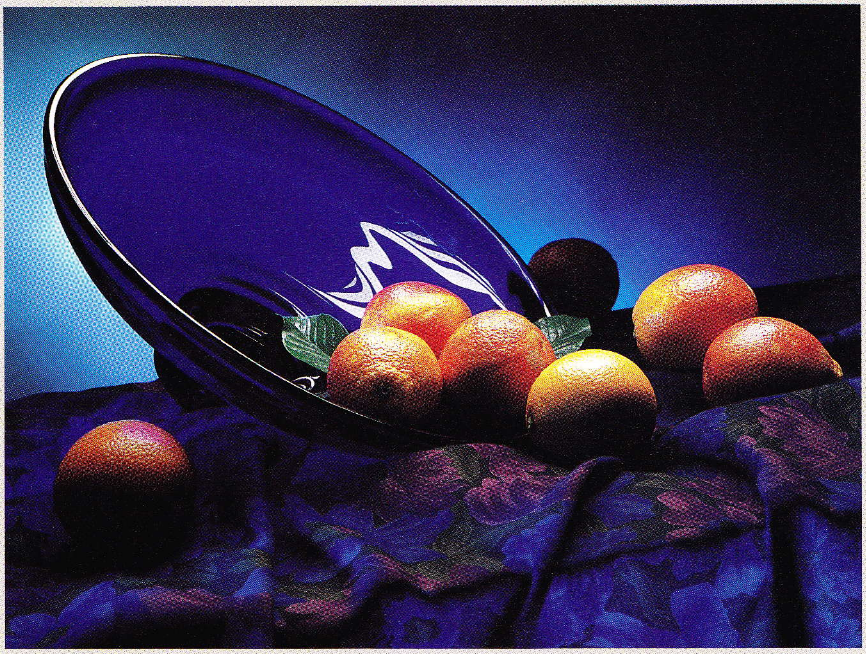
© Roger Turqueti.

A.

B.



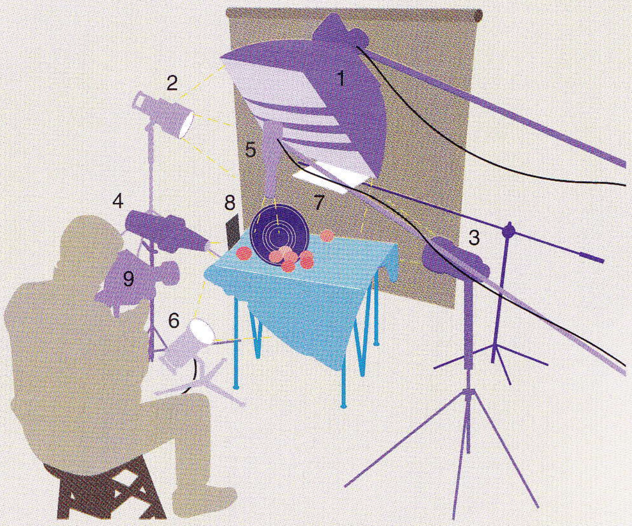
C.



D.

Still Life with Multiple Flash. **A.** A medium softbox acts as main light (1 in the drawing). A blue-filtered spotlight (4) accents the foreground tablecloth. A small gobo (8) blocks the blue light from the orange on the left. **B.** Black strips over the softbox modulate the specular highlight in the bowl. A spotlight (5) accents the oranges and leaves and filters through the blue bowl onto the tablecloth behind. A gobo (7) blocks the main light from the background and the back of the table. **C.** Two blue-filtered lights (2 and 3) illuminate the background, and a third (6) accents the front of the tablecloth. The main light has been turned off here to show the effects of the accent and background lights. **D.** The final result. A lens shade on the camera (9) prevents flare. **Photographer:** John Burwell. **Stylist:** Claudia Burwell. **Camera:** Mamiya RZ67. **Lens:** 127mm. **Lights:** Speedotron. **Film:** Fujichrome. **Camera settings:** f/22 at 1/60 second.

Photos © John Burwell.



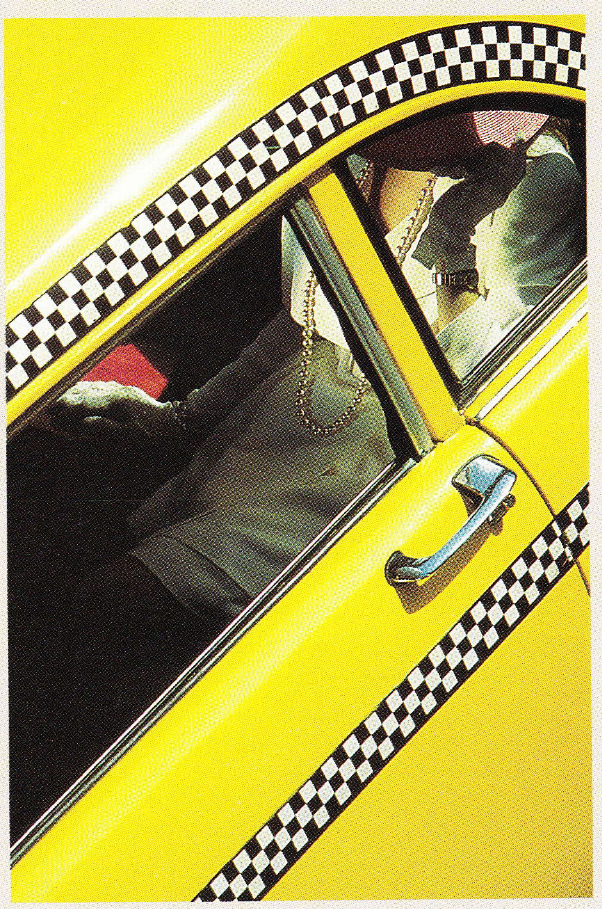
Lighting Application 3: Illustration Photography

Illustration photographs are used to convey to a viewer a specific idea or concept. One frequent use of illustration photography is for advertising a product or service, or to win the public over to a way of thought. In all cases, the messages conveyed by the photograph must provoke the right response in the viewer, which usually means careful control over subject matter, sets, props, and lighting. As a result, illustration photography is a painstakingly planned process and may involve not only the photographer but the services of art directors, models, set and prop stylists, hair stylists, makeup artists, and assistants. The client is usually heavily involved in both planning and shooting the photograph.

When illustration photographs include people, the techniques are similar to those for portrait photography, with the difference that the models are acting out a scenario for the purposes of the illustration. Lighting can range from simple to complex. Natural light, natural light with supplementary artificial lights (most often electronic flash), and completely controlled studio situations with artificial light (again normally electronic flash) are all employed. Since some kind of story is usually being told, lighting is used to emphasize or suppress different parts of the subject to promote the visual narrative. Lighting also plays a major role in establishing the mood in the photograph. ■

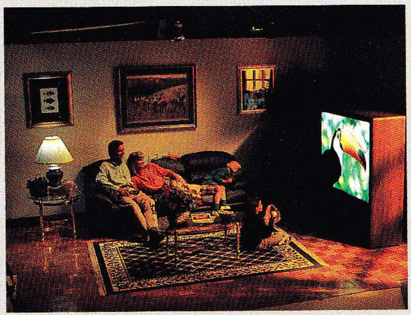
Jack Reznicki, *Mr. and Mrs. Claus*. Lighting control, set construction, propping, and the perfect models combine with Jack Reznicki's great sense of humor to produce a completely fabricated illustration of a sterling fantasy moment. Lighting for a slightly lower exposure on Mr. Claus and the background emphasizes Mrs. Claus and her gift.

© 1987 Jack Reznicki.



Stephen Wilkes, Woman in a Yellow Taxi. Part of a continuing ad campaign featuring a sophisticated woman-about-town, this photograph gives the feel of a spontaneous moment, glimpsed in passing. More careful inspection shows that everything is carefully controlled: the lighting, which highlights the important details, the styling of clothing and accessories; and the point of view.

© Stephen Wilkes.



A.

B.

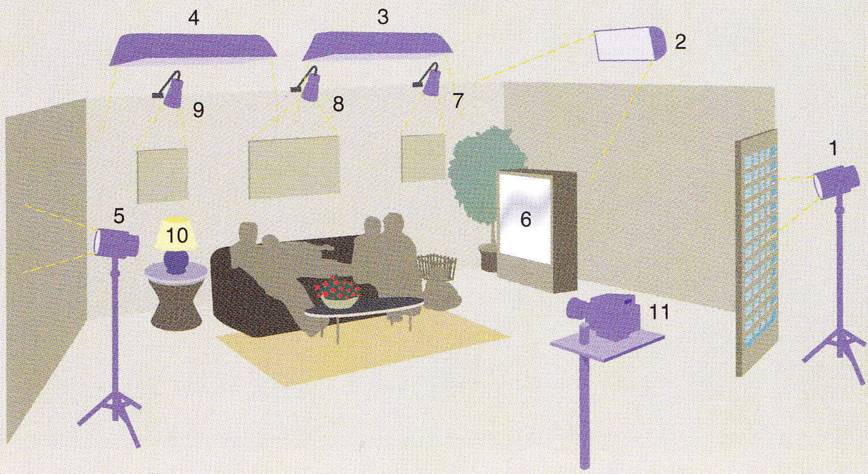
C.

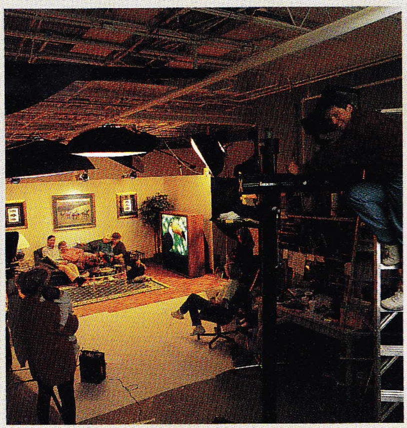
D.

Photos © 1992 Philips Consumer Electronics Company.

Illustration with Multiple Flash. From top left: **A.** A yellow-filtered light (1) through a simulated french door acts as the main light. It is supplemented by a yellow-filtered softbox (not shown). A Morris Mini-light slave strobe (10) lights the lamp. The TV cabinet (6) is gutted and equipped with an enlarged transparency backlit by a softbox. **B.** Three large softboxes (2, 3, and 4) and a light (5) bounced from a flat, all with yellow-orange filters, provide general fill light. The main light has been turned off to show the effect of the fill lights. **C.** Three lights accent the wall hangings. The main and fill lights have been turned off to show the accent lighting. **D.** The final result. This photograph was shot for a Magnavox brochure. The set was completely fabricated in the studio. Lighting included five softboxes, eleven flash heads, and nine power packs, totalling 21,600 watt-seconds.

Philips Consumer Electronics Company Staff: Walter C. Kirk III (Senior Photographer), Scott Denison (Creative Director), Joey Heath (Art Director), Bill Collins (Assistant Photographer). **Modeling agency:** 18 Karat. **Make-up:** Charlene Saucier. **Camera:** 8 × 10 Horseman. **Lens:** 300mm Schneider. **Flash:** Pro Photo. **Camera settings:** f/32 at 1/60 second.





Lighting Application 4: Fashion Photography

Fashion is a specialty in illustration photography. Since fashion is being sold, more attention is often paid to the clothing, showing the characteristics of the outfit clearly or alternatively providing a feeling of its style. Sometimes the clothing may not be clearly shown at all, since the emphasis is on the style or cachet the clothing is supposed to give the wearer.

As with other types of illustration photography, lighting in fashion involves a wide range of techniques. The specularity of the light, the lighting contrast, the direction—all the qualities defined earlier in this text—are used to convey the mood or style required. A complex set may call for complicated lighting setups, but some of the most effective fashion has been done with natural or relatively simple studio lighting.

Many other concerns also must be addressed in fashion photography. The clothing, models, sets or locations, props, and accessories must all be carefully controlled for the desired effect. Good fashion models must not only have the required physical appearance but must be able to pose and act as well. A full-fledged fashion shoot can be a complicated affair, with many people on the set—models, stylists, art directors or other ad agency representatives, client representatives, assistants, and so on—and a fashion photographer must be capable of controlling this situation with all of these people involved.

When learning fashion photography, you will probably not have all of these resources, so you may be acting as your own art director and stylist. Models, makeup artists, and stylists who are at the same learning or career stage will often be willing to work with you for the experience and may provide valuable future contacts for your growing career. ■

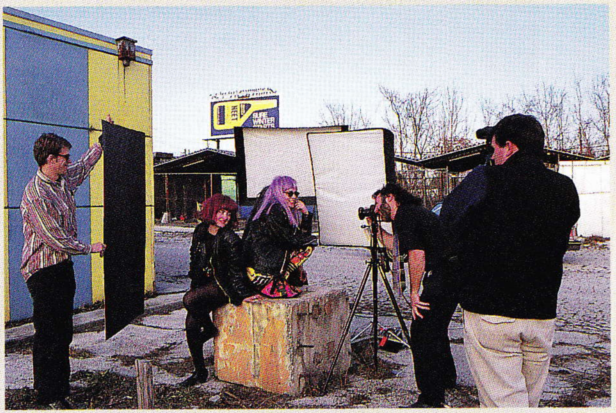
Helmut Newton, "Heart Attack," Fashion Photograph. The feeling of institutional lighting has been retained in this startling depiction of high fashion in a crisis situation.

© Helmut Newton/Sygma.

A.

Fashion with Combined Daylight and Flash. From top: **A.** A test shot was made to see the effect of daylight alone. The sun was behind clouds at this time. Incident meter readings for the daylight were I.M.R. f/5.6 at 1/30 second at the left side of the faces and I.M.R. f/8 at 1/30 second at the background. **B.** The cloud layer over the sun began to thin, and some slightly diffused sun was beginning to light the models from the left. New continuous incident-light meter readings gave I.M.R. f/8 at 1/30 on the left side of the faces, I.M.R. f/5.6 at 1/30 on the right side of the faces, and f/8 on the background, which was shaded from the sunlight. Two medium 30×40 inch softboxes with light amber (1/8 tungsten) filters for a warming effect were placed to the right of the subjects to balance the daylight. Flash power was adjusted to 125 watt-seconds per head, for a combined flash and continuous incident-light meter reading of f/8 at the faces. The camera was set for C.S. f/8 at 1/30 second, providing the correct exposure in all areas. **C.** The final result. A black flat was placed behind the model on the left to accentuate her profile, and the models were rearranged for a more dynamic pose.

B.



C.

Photographer: Murray Bognovitz.
Camera: Contax 167MT.
Lens: Zeiss 25mm.
Film: Fujichrome.
Flash: Dyna-lite.
Location Power: Portable 120VAC Gasoline Generator.
Camera settings: C.S. f/8 at 1/30 second.

© Murray Bognovitz.

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