Video Production Handbook

Fourth Edition
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Video Production Handbook

Fourth Edition

Gerald Millerson
Jim Owens, Asbury College
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*Contributors of photographs, illustrations and advice:*


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The unwavering support of my wife, Lynn, and daughter, Sarah, has been incredible throughout the writing process.
Since the 1950s, Gerald Millerson’s books on television and video production have been highly regarded for their clarity of explanation and emphasis on techniques to enhance storytelling. While this latest edition of Video Production Handbook is technically a fourth edition, it represents such a tremendous update that we refer to it as a brand-new book. Throughout, Millerson’s clear writing and wealth of technical and procedural information have been retained. However, the book has been completely updated and modernized. Highlights include the following:

- A visual presentation of the material with abundant full-color illustrations throughout
- Up-to-date information on new equipment and techniques
- Valuable material on new distribution outlets (the Web, cell phones)
- Detailed teaching resources for instructors

WHAT IS THIS BOOK ALL ABOUT?

This book was designed to provide you with the basics of video production in an easily digested form. It covers the production process and techniques involved in transforming ideas in your head into an effective presentation on screen.

The knowledge you develop by reading this book will provide a solid foundation for video projects and future studies. We are concentrating on the practical features of video production so that you achieve worthwhile results right from the start, whether you are using a simple consumer camcorder or professional equipment. This book will help you get the best out of your equipment. When the highest level of equipment is shown, adapt the concepts to the level you are working at.

WHO IS THE BOOK WRITTEN FOR?

We designed this book for anyone who wants high-quality videos on a modest budget. The book was developed to help the beginner in video production learn the right way to a video, whether in a class or working on your own. It is especially helpful for entry-level and medium-level television production courses and workshops. This text does not assume that you have any type of technical background or any previous experience—or that you are really interested in the nuts and bolts of equipment.
DO I HAVE THE RIGHT EQUIPMENT?
The equipment available today at the lowest consumer level is good enough. The emphasis is on how to create a quality video program, and that requires a knowledge of how to effectively use the equipment and how to tell a story. The equipment is not an issue.

WHY IS IT IMPORTANT TO LEARN “TECHNIQUES”?
Great ideas do not automatically make great programs. It is not enough to simply show what is going on. The way you present your subject will influence how your audience responds. You need to choose your images and audio carefully, to convey your ideas in an interesting and persuasive way.

TERMINOLOGY
We have tried to apply the most commonly used video production terminology in this book. However, terminology may differ from country to country and company to company. You will notice that some expressions have a term in parentheses next to them. The terms in the parentheses are usually words from the United Kingdom or Europe.

TEACHING WITH THIS BOOK
The book has been designed with numbers that refer to each topic area. This makes assigning reading areas much simpler. Instead of being limited to just page numbers, teachers can assign specific section numbers. While we have written this material in what we consider to be a logical sequence, we understand that every teacher has an order that he or she likes to use when covering the different subjects. The section numbering system allows the teacher to simply assign the material in any order. For more specific suggestions on reordering the sequence of material, please consult the instructor’s manual.

INSTRUCTOR’S MATERIAL
We have created instructor’s material to aid in using this book in a classroom setting. Qualified instructors may access the material by contacting their Focal Press textbook representative or registering at textbooks.elsevier.com.

The instructor’s material includes the following:

- PowerPoint/Keynote slides and images that match the illustrations in the text
- Exam questions for each chapter
- Video demonstrations
- Instruction recommendations
SUMMARY

We are mainly concerned with principles and practices for these are the timeless essentials of persuasive video production. We have updated this edition to cover the latest technology and distribution media in order to help your programs have greater audience appeal and to help you with the problems you may encounter while working in video production. Keep in mind that in the end, what really matters is what you have to say and how effective you are at saying it.

Jim Owens, May 2008
Lighting for Video

High definition television (HDTV) does not require a fewer number of lights. While HD is more sensitive to lighting, the number of lights is still required to create the tone and mood of the scene.

Geoff Dunlap, Director of Photography

Many times the difference between a good show and a great show is the lighting! Good lighting can transform a routine, uninteresting shot into an attractive, appealing image that draws the audience’s attention.

Lighting allows the camera to record a quality image and is usually needed to increase or reduce depth of field. However, lighting is also a great manipulator of the audience. The eye is drawn to the brightest portion of an image. That means that the audience can be subtly directed where to look and what subject is the most important. Lighting is also used to add depth to a scene and allows the director to “color” a scene to create a mood and time period.

TERMS

Barn doors: These metal flaps are usually attached to the top, bottom, and sides of the light in order to shape the beam.

Diffusion material: Can be attached to the front of a light in order to reduce the intensity of the light beam.

Ellipsoidal: The ellipsoidal light is a sharply focused/defined spotlight.

Flood lighting: This light scatters in all directions, providing a broad, nondirectional light.

Fresnel: An unfocused spotlight. It is lightweight and less expensive than an ellipsoidal, and it has an adjustable beam.

Gel: Colored flexible plastic filters used to adjust the color of the lights.
11.1 Lighting for everyone

Many people are apprehensive about lighting because they are afraid of doing the wrong thing and looking foolish. Others think of lighting as an unnecessary luxury when working with a small production crew. They assume it requires a lot of equipment and a lot of power. It can, if a large studio drama is being lit or if you are shooting the inside of a stadium. However, it is worth the time to make sure that the lighting treatment provides a quality image.

There are many situations where just one light, or a well-placed reflector, is all that you will need to make an image spring to life. Even in large-scale production, foresight and imagination can often make a little light go a long way. It is really a matter of knowing what the goal is, what to look out for, and what can be done about the problems that develop.

Why not simply shoot in whatever light is available? Of course, that is possible. On good days, the result will be clear, attractive, and interesting images, where realistic color makes the image jump at the audience. But there will certainly be days when the images will be lifeless, drab, or have a little too much contrast; when the subject is not clear; or when the subject’s texture is lost.

So much depends on where and when the shooting takes place. Is the shoot occurring inside a building (interior) or out in the open (exterior)? Is it day or night? Are the surroundings well illuminated or in shadowy gloom? Are the shots very tight or spacious and long? Finally, a lot will depend on the sort of atmosphere the director is aiming to convey to the audience: a realistic everyday scene or a moody, dramatic situation.

Obviously, it is not smart to introduce any extra lighting into a scene unless it is really going to enhance the images. Often, the crew does not have the time or opportunity to set up lights anyway. For our purposes, we will assume that, for the most part, crews only carry around a few lights. There will be many

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**Grip clamps:** Designed so that a light can easily be attached. The clamp is then used to attach the light to almost anything.

**LED light panel:** A camera or studio light that is made from a series of small LED bulbs.

**Photographic lighting:** See Three-point lighting.

**Scoop:** A simple floodlight. It is inexpensive, usually not adjustable, lightweight, and does not have a sharp outline.

**Soft light:** Provides a large level of diffused light.

**Spotlight:** A highly directional light.

**Three-point lighting:** A lighting technique that utilizes three lights (key, fill, and back lights) to illuminate the subject.

**Triangle lighting:** See Three-point lighting.
situations, particularly when shooting outside, where even these lights will not be needed, provided the subject is correctly arranged in the existing light.

11.2 The camera does not compensate

One of the most important things to bear in mind when lighting is the essential difference between the way the human eye and brain registers a scene and the limited, literal way the camera reproduces it. The eyes and brain compensate (sometimes overcompensate) in many subtle ways as the lighting of the surroundings vary. Our eyes seem to be able to see details in shadows, and variations in color values pass unnoticed. We are able to see a remarkable amount even when the lighting conditions are poor.

However, the camera cannot interpret. It responds to what is there, within its limitations. If a surface reflects too much light for the video system, whether it is a specular reflection from a shiny surface or a very light tone, it blocks off to a blank white in the picture. Darker-toned furniture, clothing, foliage, or shadows often crush out to black on camera. When we are at the same location, looking at the scene with our own eyes, we have none of these problems. That means that directors and camera operators need to watch how the camera is really reproducing what they are seeing.

Loss of detail and modeling in certain parts of the picture may not be important, unless the audience specifically wants to see the features of a white wedding dress or a black velvet costume. Where those tones do matter, the camera operator may need to manipulate the scene a bit. For example, the dark background can be lit to bring it within the range of the camera, or you can change the camera’s position in order to deliberately keep the background out of shot.

11.3 The key factors

Lighting involves a lot more than simply having enough illumination around to let the camera see what is going on. Light influences what the subject looks like, how the viewers feel about what they see, what attracts their attention. That means that we not only need to think about where to place the lights, but also the type of illumination that we are getting from these lights and how all this affects the quality of our images.

To use illumination, or lighting, successfully, we need to take a look at some of its interesting characteristics:

- The light’s intensity (brightness) affects exposure.
- A light’s quality refers to whether it is concentrated “hard” shadow-forming light or diffused “soft” shadowless illumination.
- Lighting impacts contrast, which is the relative brightness of the lightest and darkest areas in the shot.
- The direction of the light has an effect on the appearance of the subject.
- The light’s color temperature refers to its overall color quality.
When using colored light for effect, directors need to be concerned with:

- Its hue (the predominant color; for example, blue, green, and yellow)
- Its saturation (chroma, purity, intensity) referring to its richness or paleness
- Its luminance (brightness, value), or how light or dark it appears

Understanding how to control or compensate for these various features will make the difference in whether you create consistent high-quality images. If you ignore them, the results may be fine; but then again, they will probably be unpredictable.

### 11.4 The light’s intensity

The camera requires a certain amount of light reflected from the scene to produce high-grade pictures. If there is too little light, then the shot will be underexposed (all tones reproduce too dark). If there is too much light, then everything will be overexposed (all tones reproduce too light). You can evaluate the intensity of the lighting by using an external light meter, the camera’s internal exposure indicator, or by reviewing the image in the viewfinder or on a monitor.

The camera will not receive sufficient light in the following conditions:

- The light falling on the subject is too dim (low light levels).
- The lens aperture (f-stop) is too small.
- You are using a filter that is too dense relative to the tones in the scene or its overall brightness.

Clearly, less light is required to achieve good images in a white-walled room than is needed in a dark-paneled one. Remember that extra video gain can only partly compensate for underexposure, for although it boosts the picture strength, the camera’s sensor itself is still getting too little light from the scene (causing picture noise, smearing, and trailing effects).

### 11.5 If there is not enough light

When shooting inside buildings or outdoors at night, there generally is not really enough light to obtain high-quality images. There are several solutions:

- Move the subject to where there is more light.
- Open up the lens aperture. However, this reduces the depth of field.
- Increase the camera’s sensitivity by boosting the video gain. The problem is that this will increase picture noise.
- Increase the available lighting (switch on more room lights or open a curtain).
- Add additional lighting instruments.

### 11.6 If there is too much light

If the lighting is too intense (high light levels), lighting personnel may compensate by doing the following:

- Move the subject to where there is less light.
- Stop down the lens (selecting a smaller aperture).
Barn doors are used to control and to limit the spread of the light.

- Use a neutral density filter.
- Switch off some of the existing lighting.
- Pull the shades or blinds.

If video lights are being used and the lighting is too intense, the following actions will reduce the intensity:

- Switch off some of your light sources.
- Use lower-power sources.
- Use a dimmer (although dimming a lamp could lower its color temperature).
- Place diffuser material over a light (Figure 11.2).
- Move the light farther away from the subject.
- Flood (spread) or limit the lamp’s beam (Figures 11.1 and 11.3).
- Use “bounce light” instead of direct lighting.

11.7 Hard light quality

Because the sun is so distant, it works like a localized point source of light. Its rays are directional and travel to us in straight lines. They cast distinct sharp shadows, which emphasize the texture and contours of any subject, especially when the light falls at an oblique angle. Because it is directional, the light can be blocked off to prevent it from falling onto any surface.
Many man-made light sources, such as a match, a candle, or a bare light bulb, also behave in this way. Because they are limited in size, they act as point sources and produce hard light, irrespective of how powerful or weak they are.

Rather than allowing the light to spread around in all directions (as with a bare bulb hanging from the ceiling), many lighting instruments include a specially shaped parabolic reflector that directs light rays forward in a narrow beam. They may also be fitted with a Fresnel (“stepped”) lens to concentrate the beam further. This light gathering improves the lamp’s efficiency and helps restrict the light to selected parts of the scene.

By adjusting the position of the reflector or the lens in relation to the bulb, the beam can be spread and, to a certain extent, the intensity can be adjusted. Barn doors, flaps attached to the sides of the light, can be used to cut off parts of the light beam (Figure 11.4).

Here are the good things about hard light:

- It is directional, so it can easily be restricted to illuminate just the desired areas.
- It casts sharp shadows and amplifies texture.
- It can produce vigorous, bold, well-defined effects.
- The intensity of a hard light source does not fall off appreciably with distance. So subjects can be effectively illuminated from some distance away.
Weighing three pounds, the LED light panel projects a bright soft light. It is extremely lightweight and offers low power consumption and accurate color reproduction. It is heat free and can be dimmed. LED light panels are available as flood lights and spot lights. (Photo courtesy of Litepanels.)

Here are the bad things about hard light:

- Distracting or ugly shadows can be difficult to avoid (such as shadows projected onto the set behind the talent).
- Results may look harsh and have a very high contrast.
- Texture may be too emphasized, such as revealing the irregularities in someone’s skin.
- Hard light sources have restricted coverage, so several lights may be required to cover a wide area.
- When more than one hard light source is used, the multishadows can be distracting.

11.8 Soft light quality

Soft light or diffused light, usually known as a floodlight, scatters in all directions (Figures 11.5 and 11.6). It occurs naturally, when the sun is obscured by clouds and whenever sunlight is reflected from rough light toned surfaces. When subjects are illuminated by this soft light, there are no distinct shadows, only slight variations in surface brightness. So texture and surface contours are not pronounced in the picture. In fact, they may not be visible at all (Figure 11.7).

Several techniques can be used to provide soft light. Some rely on diffusion material such as a spun-glass sheet, frosted plastic, or wire mesh to scatter the light. (A diffuser can be placed over a hard light source to reduce its intensity and soften its quality to some extent.) In others, the light from a hidden lamp hits a reflector and then scatters.
Another form of soft light uses a group or bank of open lamps. Their overlapping beams combine to give shadowless illumination. A compact “soft light” can be created by placing two or three layers of diffusion material, such as spun glass, over a hard light source such as a spot.

Here are the good things about soft light:

- It can produce subtle delicate shading.
- It does not generally create unwanted shadows.
- It avoids emphasizing modeling and texture.
- It can lighten the shadows cast by hard light sources so that details are visible.
- It can cover a wide area of the scene.

Here are the bad things about soft light:

- It can flatten out all signs of surface shape and texture in the picture, because it does not emphasize texture.
- It spreads around, flooding all surfaces with light. It can be difficult to restrict the light from selected areas.
- It quickly falls off in intensity as the lamp’s distance from the subject increases. So something fairly near the source may be overlit, while another subject a little distance away is insufficiency lit.

11.9 Lighting contrast

The “contrast” in a scene is simply the difference between the brightness of its lightest and darkest tones. If the range is too great for the camera to handle, as is the case when strong sunlight casts deep shadows, the extreme tones are lost in the image. The tonal contrasts that the camera sees will depend partly on the tones of the subjects, partly on variations in the light’s intensity, and partly on the shadows the light casts.

Excessive lighting contrast produces burned-out highlights and detail-less lower tones. Whether the result looks highly dramatic or difficult to interpret depends on the situation.

When the lighting is high contrast (lots of hard light from one direction and no fill light), picture quality can alter considerably as the camera’s position varies. If you shoot with the light behind the camera, subjects may look bright, flat, and unmodeled. If you shoot toward the light, only the edges of subjects will be illuminated, while the rest remains unlit.
The other extreme is the effect obtained when the scene is lit with soft, shadowless lighting. Now everything is subtly modeled. Even if the camera is moved around over a wide angle, the tonal quality of the picture remains reasonably constant under soft lighting.

In practice, you usually want to avoid the harshness that comes from a high lighting contrast and the flatness that you get with a low lighting contrast. The best solution is to use a careful balance of hard lights (which creates a three-dimensional illusion) and some soft light to illuminate any shadows (i.e., “fill” them) without casting extra ones.

**LIGHT DIRECTION EXERCISE**

The direction of the light has a tremendous influence on what any subject looks like. The best way to demonstrate this for yourself is to grab a flashlight and sit in front of a mirror in a dark room. You will see how the light affects the image as it moves around.

First hold the flashlight beside your head, pointing it straight into the mirror. This is the equivalent of a light just beside the camera. Notice how this direct frontal light seems to flatten out the texture and shape of the front of your face. If there is a smooth or shiny surface behind you, the light bounces straight back into your eye (back into the camera lens) and appears as a hot spot on the background. Even a rough surface, such as stone or concrete, may look smooth under direct frontal lighting. It reminds you too of how unpleasantly dazzling it can be for people if you light them this way.

Move your flashlight to above your head, shining it straight downward. See how the light emphasizes every wrinkle! The top of your head and your nose are now bright (“hot”), and your eyes are hidden in dark sockets. You have instantly aged a number of years! (Always try to avoid top, overhead, downward lighting, particularly when shooting people.)

Hold the flashlight down low, shining upward, and the effect is spooky, because we are not used to seeing people lit in this way—except in horror movies. Now the eyes and the neck are strongly lit. Again, surface details are emphasized with upward shadows.

Take the light around to one side. You will see how only half of your head is lit, and the surface texture and contours of your face are unattractively exaggerated.

If someone takes the flashlight and holds it behind you, shining onto the back of your head, you will see that only the edges of your head will be lit (hair, ears, and shoulders if the lamp is high). This sort of backlit is successful when you are lighting solid subjects, because it helps to make them stand out from the background and creates a three-dimensional illusion. If the subject is made of transparent or translucent material, the backlight will reveal this.

11.10 Three-point lighting

For most situations, the best lighting results come from using some variation of the three basic light directions (Figure 11.8).
Three-point lighting is also known as “triangle lighting” or “photographic lighting.” Three lights are used to create the lighting treatment: the key, fill, and back lights. (Photo by Josh Taber.)

The main light, or key light, is positioned slightly above and to one side of the camera. This is normally a spotlight, and it reveals the shape and surface features of the subject. The key light produces distinct, harsh shadows.

The fill light is a floodlight that is placed on the opposite side of the camera from the key light. It reduces the shadows (made by the key light) but should not eliminate the shadows. The fill light also reduces the lighting contrast. The more the key light is offset, the more important this soft fill light (filler or fill-in) becomes. If the key is nearly frontal, you may not need fill light at all. Note that in the subject’s image in Figure 11.8, the shadows on her face have not been eliminated. This helps give the face texture and shape.
Finally, a *backlight* is angled down onto the subject from behind to separate the subject and the background. The backlight emphasizes the shape of the subject.

The key light and backlight are generally the same intensity. However, the backlight may need to be reduced depending on the subject’s hair color. The fill light is usually one-half or three-quarters the intensity of the key and backlight.

Wherever possible, additional lights can be used to illuminate the background behind the subject. But where space or facilities are limited, spill illumination from the key and fill lights may be used to cover the background areas.

### 11.11 Color temperature compensation

The color quality of light can vary considerably, from the orange-yellow of candlelight or small tungsten lamps to the bluish illumination of daylight, from the warm hues of a sunset to the greenish quality of many fluorescent lights. For good color quality, the camera system’s color response and the color quality of the prevailing light need to match reasonably well. If they do not, the pictures will have a pronounced bluish or orange-yellow color cast. The camera can be matched to the lighting by rotating in the appropriate color-correction filter on the camera or readjusting the camera’s white balance.

Sometimes there will meet a mixture of lighting—for example, daylight coming through the windows and a tungsten light inside a room. When that occurs, you have a number of options:

- Block the window so that the daylight will be obscured. The camera can then balance with the remaining tungsten lighting.
- Place light blue correction filters over the tungsten light to raise its color temperature to match the daylight.
- Attach large sheets of orange-yellow color filter material (gels) over the windows so that the incoming daylight will match the tungsten light.
- Shoot the scene with its mixture of daylight and tungsten and accept the results.

With the camera balanced to “daylight,” the daylight will look right and the tungsten will look over-warm (yellow-orange). When the camera is balanced to “tungsten,” the daylight will look very blue, and the tungsten light will look natural. The color-quality of light (its *color temperature*) is measured in kelvins (K). For most purposes, it is sufficient to switch the camera to its nearest color-correction filter position (e.g., “daylight,” “artificial,” “fluorescent,” or the color temperature filters, 5,600 K, 3,200 K) and white-balance to these conditions.

### 11.12 Using colored light

Because video is usually in color, it seems reasonable to assume that a lot of colored light is used. However, colored lighting is really only needed when creating decorative effects such as for a display, a dance or musical routine, firelight
or moonlight, or to change the appearance of backgrounds (such as to introduce some color on a plain neutral wall).

When colored lighting is needed, a sheet of colored plastic, called gelatin or a “gel,” is clipped onto the front of a lighting instrument, making sure that the gel does not to restrict the ventilation of the lamp (which will overheat and fail) (see Figure 11.9). It is also important not to put gel so close to the lamp that the intense heat destroys the color sheet.

Colored gelatin is inexpensive, but it burns up, quickly becomes brittle and torn, and pales out in use. Special plastic sheeting (of acetate, polyester, Mylar, or acrylic) is more expensive but will last and can be reused. If you are shooting under tungsten lighting and want to create an overall warmer look to the image, use the “daylight” built-in color correction filter. Conversely, a “tungsten” correction filter can be used when shooting in daylight to give pictures a cold, blue, wintry appearance. To obtain these color changes, the camera operator needs to white-balance under the normal lighting conditions and then add the built-in color correction filter.

11.13 Shooting in daylight

Although daylight provides us with a free, convenient light source, it isn’t a particularly a reliable one. Its intensity and overall quality varies greatly. Clouds pass over the sun, and sharply defined shadows may vanish. Instead we may be left with a much weaker, diffused light. Throughout the day, the color quality and the direction of the light will alter, and the sun that was frontal in the morning will gradually change to side light by the afternoon. All of this may make it difficult to cut together shots that have been taken at different times of the day, where the variations in lighting show in the edited version of the action.

Remember that the effect of light depends on the position of the camera. Strong sunlight that offers more than enough illumination from one viewpoint may only give rim lighting to the subject from another angle, leaving the subject in deep shadow. You have a number of options:

- Move round the subject until the sun is roughly behind the camera (but then it may not be the background you want).
- Turn the subject into the light.
- Wait for the sun to move around to a better angle (this is time consuming).
- Add (or reflect) lighting to compensate.
FIGURE 11.10
Reflectors can be used in many situations with a variety of techniques. A. The sun provides the key light, and the reflector is the fill light. B. A reflector is being used to reflect additional light into a building through its window. C. Two reflectors are being used to increase the illumination. One of the reflectors is silver (the key light), and the other is white (fill light). How effective a reflector is depends on its surface and on its angle to the sun or other light sources. If a reflector is used beside the camera and reflects a source directly ahead of the camera, the intensity and coverage of the reflected light is at its maximum. As the reflector is angled to the source, its output and its coverage fall. (Photos by Josh Taber (A) and Nathan Waggoner (B).)
11.14 Using reflectors

The easiest and least expensive way to improve a subject’s lighting when shooting in sunlight is to use a reflector. This is simply a surface, such as a board, screen, cloth, or even a wall, that reflects existing light onto the subject from another angle. The quality of the reflected light depends on the surface you use.

Many commercial reflectors are available such as the one shown in Figures 11.10 and 11.11. These lightweight cloth reflectors, sewn onto a spring-metal frame, can be easily folded and transported. Available surfaces include silver, gold, white, and combination reflectors. A mirror surface, such as metal foil, will reflect a distinct beam of light from a hard light source, creating sharp, well-defined shadows. This light travels well, even when the subject is some distance away. (A mirror surface will even reflect soft light to some extent, if placed fairly near the subject.) The angle of a mirror-finish reflector can be critical. When the light shines directly at its surface, the maximum effect is obtained. However, as the surface is angled toward the light, the reflected beam, which only covers a restricted angle anyway, narrows and becomes less effective. In a long shot, its limited coverage appears as a localized patch of light.

If the reflector has a matte-white surface, it will produce a soft, diffused light, which spreads over a wide angle. But this soft, reflected light is much weaker and will only travel a relatively short distance, depending on the intensity and distance of the original light source.

Reflectors can be easily made from a board covered with aluminum foil (smooth or crumpled and flattened) or matte-white painted, according to the type of light reflection required. (A board with a different surface on each side can be useful.) These “boards” can be made of wood, foam core (which is extremely lightweight), or cardboard. The bigger the reflector, the more light that will be reflected over a broad area. Even a large cloth can be used. However, cloth reflectors of this size can be cumbersome to hang and are likely to blow in the wind. Because the only alternative is to use powerful lamps or lights close in to the subject, when desperate, it is certainly worth trying when the sun’s direction is appropriate and the tonal contrast is high (Figure 11.12).

Indoors, reflectors can be used to redirect light from windows into shadowy corners or to reflect sunlight as a filler. And when using backlight, a low reflector near the camera will reduce the shadows under people’s chins and eyebrows.
Finally, while on the subject of reflection, when shooting in bright sunlight, look out for *accidental colored reflections* from nearby surfaces. Even a bright green shirt may reflect, giving the wearer a green complexion!

### 11.15 Bounce light

It is a common trick in photography to point the flash at the ceiling or a wall when photographing interiors to give the scene an overall wash of diffused *bounce light*. However, don’t use a colored surface, or the reflected light will have a similar hue.

The same idea can be used when shooting video. Just point the light(s) at the nearby surfaces to get a soft “base light” (the amount of light required to obtain a quality video image). However, only a fraction of the light’s output will be reflected.

### 11.16 Do we really need to light it?

It is interesting to note that when people look around, their eyes will often pass, without a second glance, over incidental features that seem to stand out in a photograph, film, or video. They overlook the reflections in a shop window and concentrate on the items for sale inside the window. People accept a bright blob of light on a tiled surface without a thought. When they talk to others, they may note their expressions and how they are dressed, but that is usually the end of it.

However, when people look at a video of the same scene, they are likely to react quite differently. The reflections in the window seem to stop them from seeing into the shop. The blob of light on the tiles becomes an annoying distraction. They will tend to look at the people in the picture in a much more detached, critical way than they would if they were viewing them in everyday life. People may be struck by the talent’s shadowed eye sockets, how haggard the person looks under the steep lighting, the hot spots on the person’s head; they may become aware of ugly neck shadows, bright noses or ears, strongly lit shoulders, and maybe even the long nose shadow that looks like a mustache. What were previously trivial aspects of the everyday scene have a different impact on the screen.

This is why professionals go to so much trouble to readjust and light many scenes when the illumination was obviously insufficient to produce acceptable images. It is not enough, for example, to be able to get shots of an audience at a concert; one wants the images to be attractive too. The available light is often in the wrong
direction, or is too flat or too contrasty, or only illuminates part of the scene clearly. By adding lighting, the professional seeks to correct these shortcomings.

11.17 Lighting options
Whatever the type of program being shot, there are basically four choices as far as lighting is concerned:

- Shoot the scene with existing light.
- Increase the intensity of the lighting that is already present. For example, replace the bulbs with others of higher power (check the lamp holder to make sure it can handle a higher-rated bulb).
- Add some lights to the present lighting.
- Remove the existing lighting and bring in television lights.

Then comes the decision as to whether to light the whole action area or restrict the lighting to fit limited action in one small section of the area at a time.

11.18 Existing light
Whenever one shoots in existing light, whether it is daylight or artificial lighting, there is always an element of uncertainty about the quality of the images he or she will obtain.

By lighting the scene or supplementing the existing lighting, the director has some control over the situation and a far better chance of achieving consistently high-quality pictures. Existing light shooting is a matter of taking advantage of whatever lighting is available to enhance the image (Figure 11.13). Production personnel begin by asking the following questions:

- Can the scene be shot from the chosen camera position, with the present lighting?
Is it possible to expose the picture properly?
Is there good detail and tonal gradation in the subject?
If part of the subject is in the shadow, does that matter?
Would some fill light from a reflector or an additional small light beside the camera help to show details in the shadows?
Are there any distractions in the shot, such as a bright sky?

Perhaps the overall effect would look better if the subject was turned slightly toward the light. Then a fill light may not be needed for the shadows. Would it be better to wait for the sun to come out, or return another day when the light is right?

When shooting an interior and there is daylight around, can the sunlight be used to provide a key light, backlight, or reflected as a fill light additional light to illuminate the background.

A technique that has been used for years when there is virtually no light or when it’s impossible to get good pictures with the video camera is to use a still photographic camera (with a time exposure) to photograph the scene. The image can then be imported into the computer editing system and panned, so that it looks as though it is a video shot of the real scene.

LIGHTWEIGHT LIGHT SUPPORTS

11.19 Grip clamps

A number of different clamps or grips are available on the market in order to hold lights on location or in the studio. All of them include “mounting spuds,” where lights can be attached. These clamps clip a light to any firmly based object, such as a door, table, chair, rail, post, window, or ladder. In the studio, they can also be clamped to a light stand and set flat. A clamp can be a useful compact device to secure lamps in out-of-the-way places, especially when space is restricted (Figure 11.14).

11.20 Light stands

Light stands come in different sizes and shapes. They can be collapsed, folded, or dismantled into sections for transport. The size of

![FIGURE 11.14](image)
“Furniture clamps” and “gator” clamps are used to attach a light to anything around the shooting location. (Photos courtesy of Mole-Richardson.)

![FIGURE 11.15](image)
Light stands can be collapsed and folded into a compact size for storage and transport. (Photo by Josh Taber.)
the light will determine how sturdy the light stand needs to be. If the stand is too flimsy, it will be top heavy and easily upset, even by the weight of the light’s cable. With more robust types of stands, two or more lights can be attached to a stand when necessary (Figure 11.15).

**LIGHTING SAFETY**

When working on the lighting, it is easy to become preoccupied with the effects being created and to overlook some of the practical hazards that can negatively impact the production. A number of issues need to be considered:

**Equipment Condition**

Check all of the lighting equipment to make sure that it is all in good condition. Lamps should be fitted firmly in sockets (never handle lamps with the bare hands). Check that nothing is coming loose, cables are not frayed or cut, and that the plug and its connections are okay.

**Grounding**

All electrical equipment should be properly grounded, otherwise there is more of a chance of receiving a severe electric shock under certain conditions.

**Electrical Overload**

Do not connect too many lamps to one outlet or overload the power supply. There may already be other equipment using the same electrical circuit, making it easy to exceed its capacity. Before connecting to the electrical circuit, find out where the breaker box is located and who is responsible for accessing it.

**Hot Lamps**

Some types of lamps can get extremely hot, especially quartz lights. Fluorescent and LED lights burn cool. Be careful when working near hot lamps that are lit or were recently switched off. Not only can they burn whatever touches them, but the lamp’s filament is fragile when hot and can be destroyed by even a slight hit.

If a hot lamp is within a couple of feet of a surface, there is a chance of scorching or burning that surface. Wood, drapes, paper, and plastic are particularly vulnerable. Cables should not rest against a hot lamp either, because they can melt. Gels attached to the light usually reduce the amount of air ventilation, causing more heat within the lamp. If gels or diffusion material attached to the lighting instrument get too close, they can smell, melt, or even burn when overheated.

**Falling Equipment**

Light and light supports can fall down all too easily. Safety wires/chains should always be used when hanging lamps from a ceiling grid. This backup is invaluable if a light falls
for some reason. A light on a stand can be hazardous if it is tripped over and knocked down. Whenever using a lighting stand, it is best to place a weight on its base (perhaps a canvas sandbag, a bag of stones, or even a rock) to prevent it from moving or toppling over. Very high lighting stands (taller than six feet) are extremely unstable.

**Light Cables**

Remember that people trip over cables strewn around the floor, so place the cables as much out of the way as possible. They should be placed near a wall and out of the walking/driving path. Stationary cables in walking locations should be secured with gabby tape/duct tape to keep the cables from moving. People should be not stepping on the cables, so they need to be covered in some way. This could include placing them in a cable tray or covering them with a mat or some type of board (Figure 11.16). Cables can also be hung on wall hooks or taped to undecorated walls.

**Water**

Working with lighting in rain or near water can be very dangerous. If rain falls on a lamp, it is liable to explode or short out the supply, unless the equipment is specifically designed to avoid this. Water on the ground can cause short circuits or electrocute the personnel if it gets in the wrong places.

![Cable trays or “yellow jackets” are used to protect cables and people when in walking paths. These trays can also be driven over by a car, protecting the cables from damage.](image)

**LIGHTING INSTRUMENTS**

**11.21 Camera light**

A small portable light can be attached to the top of a video camera (Figures 11.17 and 11.18). These camera lights are generally powered by an AC adapter, exterior battery pack, or the camera’s battery. Its main advantage is that it always lights whatever the camera is shooting and does not require another pair of hands. Portable lighting of this sort can provide a convenient key light when
you are shooting under difficult conditions, especially if you are following someone around. The light can also provide modeling light for close exterior shots on a dull day or fill light for hard shadows when you are shooting someone in sunlight.

The disadvantages are that this type of light adds to the camera’s overall weight. Also, the light is extremely frontal and so tends to flatten out the subject. The light will reflect in glasses and shiny surfaces near the subject as an intense white blob. People facing the camera may also find the light dazzling.

Some camera lights have fixed coverage, whereas others are adjustable. The illumination is invariably localized, and when using a wide-angle camera lens you may find that your subjects move out of its light beam. Another problem is that the illumination may not really be appropriate for the scene. Whereas anything near the camera is easily overlit, anything farther away remains virtually unlit. This can be obvious in long shots. Some camera light systems even have an auto-sensor intensity control, which nominally adjusts their intensity to match exposure to the prevailing lighting conditions. Like all automatic systems, its performance is variable.

11.22 Scoop

The scoop is an inexpensive and simple light instrument that requires little maintenance and works well when a floodlight (fill) is required (Figure 11.19).
However, it can be inefficient and bulky. Unfortunately, the light from the scoop spreads uncontrollably, spilling over nearby scenery.

11.23 Broad

The lightweight broad (broadside) has a short trough containing a reflector and a tubular quartz light of usually 500 to 1,000 W (Figure 11.20). The bulb may have a frontal shield to internally reflect the light. Although the broad is widely referred to as a soft light source because of its small area, it produces discernible shadows. Nevertheless, it is an extremely useful wide-angle broad light source that can be hung conveniently in various ways, supported on stands, or laid on the floor. Two-leaf or four-leaf barn-door shutters, that can be closed to reduce the spread of the light, are often fitted to broads.

11.24 The portable soft light

The portable soft light is designed to easily be carried into the field. It provides a large amount of soft light (Figure 11.21). The portable soft light is available in different models. Some of these diffusion attachments fit on a standard Fresnel light while others can be purchased with special lighting instruments.
Light from a central lamp is reflected off of the back of the lighting instrument. Although this device spreads its illumination uncontrollably, its portability makes it a handy lighting tool.

11.25 Multilamp sources

Several soft-light sources use groups of lamps, which combine so that the shadows cast by each are “lit out” by its neighbor’s light.

A *strip light* or *cyc light* consists of a row of light units joined in a long trough (Figure 11.22). Each unit has a bulb with a curved metal reflector. The strip light can be used to illuminate backgrounds or translucent screens from the floor. In a studio, strip or eye lights are often suspended to light backgrounds from above.

Multilamp *banks* are excellent soft-light sources. A typical design has multiple panels of grouped PAR internal reflector lamps (Figure 11.23). Each panel can usually be independently switched and turned to adjust the brightness and spread of the unit. The *floodlight bank* is mainly used as a booster light for exteriors and for large-area illumination. Large side-flaps may be fitted to restrict the light spread. Soft-light sources that rely on internal reflection to produce light scatter generate quite diffused light, but they are relatively inefficient.

Some people favor large units fitted with a bank of fluorescent tubes as an inexpensive soft-light source (Figure 11.24). Although these lights can be
A bank of lamps provides a highly diffused light source and can easily work as a daylight booster. This lighting instrument acts like a series of scoops and houses a series of switchable PAR lamps. Users have little control over the beam coverage. (Photo courtesy of Mole-Richardson.)

fragile, one of their main advantages is that they produce little to no heat, use much less energy than a normal television light, and put out a large amount of light.

11.26 Open face adjustable light
This type of lighting instrument is widely used in the field. It has a variety of names, including lensless spotlight, open-bulb spot, external reflector spot, and reflector spotlight (Figure 11.25). Some brands of this light have uneven beams. However, this light has many advantages. It is extremely portable, compact, and efficient, all of which is useful when ventilation and power are limited. Diffuser or corrective color gels are easily clipped to its barn doors.

11.27 Fresnel spotlights
In television studios, where the lights have to be positioned a fair distance from the subjects, the large heavy-duty Fresnel spotlight is universal, suspended from ceiling bars or battens (Figure 11.26). It is lighter than the other studio spotlight (the ellipsoidal), sometimes has an adjustable beam, and provides an
unfocused spotlight beam. The Fresnel is probably used more in studios than any other light.

**PRACTICAL LIGHTING**

11.28 The general approach to lighting

As discussed earlier, if a light is moved from near the camera’s position over to the right, any prominent feature on the subject’s surface, such as someone’s nose, will cast a shadow to the left. As the lighting angle increases, such shadows spread across the surface, emphasizing its shape and texture. The greater the light’s angle, the greater the effect. At the same time, the shadow of the subject itself also moves across the background, growing broader. As the light is moved further around the subject, less and less of the subject is illuminated, until eventually, by the time the lamp has been moved entirely to the right side, only half of the subject is lit. The surface details that are caught by the light stand out prominently, which is a useful technique when lighting low-relief subjects such as coins. As the lamp is raised, shadows grow downward. Similarly, when a lamp is moved upward diagonally, shadows develop downward diagonally in the opposite direction. From these basics, we can see some obvious principles to follow:

- The lamp should not be too close to the lens. This flattens out surface modeling and causes light reflections.
- The angle should not be too steep. It creates crude, gaunt, unattractive top light.
- The lamp should not be too far around to one side, unless the subject is facing that way. This can result in harsh surface modeling and a half-lit effect.

Other lighting times include the following:

- Choose the light direction that is most appropriate for the subject and its surroundings best. Don’t forget to look out for any reflections or shadows that might be distracting.
- The final light position is often a compromise. It depends on what is being lit and what the director wants it to look like. As a general guide, when lighting a person, do not have the lamp flat on but position it at an angle: a little to one side of the subject’s nose direction and a little above the eyes. Clearly, the best position for the light depends on which direction the person is facing. If the subject is going to turn his or her head around between full face and profile, place the key roughly halfway between those two positions.
- When lighting an object, there is a far greater freedom of choice as to where the lights are placed, for its appearance is usually less critical than a person’s appearance is. If, for instance, you are shooting a vase inside a glass case, you may need to heighten the lighting angle to avoid reflections.
of the light and camera. You make this adjustment not because it shows
the vase best but because it avoids the problem of reflection. You can use
an upward reflector to reduce the shadows.
- A prominent shadow on a light surface behind a subject can seem per-
fectly natural, or it may cause the picture to look crudely unbalanced.
Lightening the shadows with another lamp may cause the background to
be overexposed. Instead, either move the subject farther away from the
background or raise the lamp a little to push the shadow downward.
- As the light is moved farther away from a subject, the light spreads over a
greater area, but its intensity falls.
- If a lamp is placed close to a subject, the light output will be higher.
However, its light beam will cover less of the scene.
- Avoid lighting arrangements in which people move in and out of light,
unless you are seeking a dramatic effect. Lighting should generally cover
the action area, plus a safety region, in case people move beyond their
expected positions.
- Find out as much as possible beforehand about what is going to happen.
Then set up the lights to specifically cover the action.
- Use the rehearsal as an opportunity to check your lighting treatment on
camera. Do not just watch the rehearsal and then light the scene. There
will probably not be enough time to sufficiently light the scene properly,
and you will miss the opportunity to check for lighting defects.
- During rehearsal, look out for hot spots and dark areas, both on people
as they move around and on the background. To adjust the lighting balance (i.e., the relative intensities of the various lamps), add a scrim to a
light to dim it a little or you may need to increase another light.

11.29 Using one light

Keep in mind that the priorities in lights are as follows: the subject’s key light,
then a fill-light to illuminate its shadows, then a backlight if needed, and finally
lighting for the background. However, if you are using a single light and this is
the only illumination there is, it will need to be placed relatively frontally.

A single soft light, such as a “V-light,” will provide a more attractive effect than
a hard light source, particularly if you use a diffuser. This will cut down its
light level but improve the pictorial effect. Although this soft light will scatter
around, at least it prevents nearby areas from falling into a deep shadow.

If you are using a single hard-light source, results can be over-contrasty, leaving
the subject unattractively isolated in a pool of light, within dark surroundings,
or casting a strong obtrusive shadow.

Depending on how satisfactory the existing lighting is, a single lamp can be
used as a key light, fill light, backlight, or background light. It can strengthen
the weakest lit area of the image. A reflector can be used to reflect sunlight or
lamplight to reduce shadows.
11.30 Using multiple lights

Several lights are usually needed to light the scene in the following situations:

- When lighting has to be provided for a very wide shot, which must be lit evenly.
- When lamps are of low power or have a restricted spread.
- When people and the background need to be lit throughout.
- When a series of subjects are spread around and cannot be lit by one light (each may need its own individual lighting).
- When you want to show detail or modeling in dark background tones.
- When the camera moves around and shows a series of background areas.
- When the subject is to be shot from several different directions.
- When you are attempting to create lighting effects, such as patches of dappled light, light patterns, colored lighting, lighting changes (such as morning to night), or a series of lamps each lighting a small selected area.
- When you need a considerable depth of field in the shot (i.e., the lens stopped well down).
FIGURE 11.28
Waiting for the right light. Sunlight from the side casts attractive shadows and gives dimension and depth. (Photo by Josh Taber.)

FIGURE 11.29
Rim lighting can reveal outline and texture. (Photo by Josh Taber.)
By keeping the light localized, the attention is concentrated. (Photo by Josh Taber.)

Where contrast is high, you may not be able to expose the lighter areas and the shadows successfully.