

# LIGHTING THE IMAGE

Lighting is one of the most important single elements of cinematography, and yet it is the phase of production that is most often overlooked by the nonprofessional film-maker. The best camera and lenses in the world, combined with the best effort, is wasted and useless when not combined with imaginative lighting. After all, lighting is the medium that is employed by the film-maker to mold each of his compositions and to add psychological impact. Its main purpose is *not* just illumination. How painful it can be to sit through the efforts of the uninformed film-maker, his subjects lost in the shadowed abyss of the scene shot with available light, or lost in what seems to be a violent snow storm because the film has had to be "pushed" to its capacity in processing due to the lack of light during production, or appearing as flat cardboard cut-outs because the lighting that has been employed has been used without a hint of imagination—merely flooded onto the scene to provide enough illumination for exposure. Falling into these traps is not only senseless but unnecessary. The film-maker who thinks he can produce a successful film without lighting does not merit the title of film-maker.

WITH A  
GAMI

We are the first to admit that most of us are continually beset with budgetary problems and that lighting equipment can be an expensive addition to our production plans. But this is not the area where we should try to save. At the same time we do not need all of the elaborate equipment of a major theatrical film. What we do need in large quantities is imagination, for even the simplest of lighting set-ups when carried out with imagination can provide a quality to the final image that has no comparison in dollars and cents. Likewise, the most elaborate equipment can be used without imagination and provide an image that looks cheap when finally viewed on the screen.

Lighting your film should be just as much a creative endeavor as any other phase of your production, but, as with any successful creative effort, your lighting should not scream at your audience from the screen. To be successful it must be unobtrusive. Never let your "technique" show. Your lighting can be invaluable in setting the mood and effectively illuminating the subjects to their best advantage, but it must be carefully thought out and planned *before* the shooting begins. Do not wait until everyone is ready to begin and then discover that you have forgotten to plan and set up the lights. Good lighting must be planned and built up, not just flooded onto the scene. You must know where to throw highlights and where to leave shadows. You must know where to build up important details and where to play down less interesting details. You must know how, where, and when to give objects in the scene dimension with modeled lighting. And finally, you must know how to provide character and emotional key to each scene through the use of lighting. The film-maker uses lighting in the same way that an artist uses color and tone: to express mood and to create an atmosphere, to reveal the character of a person, to unify the structure of his painting, and to create a surface reality through a sense of depth.

1 In Cold Blood, Columbia Pictures







Fig. 3-2 *The Firemen's Ball*, Cinema V

Generally speaking, the film-maker will use dark illumination to set a somber, tragic mood, bright illumination to establish a happy, gay atmosphere, or any variation of these two extremes to fit a variety of moods. Such uses of light will invest the scene with emotional tone that will affect the spectator and evoke in him the proper feelings for appreciation and understanding of the film-maker's purpose. Look, for example, at the somber, tragic emotional tone of the lighting throughout Bergman's *The Seventh Seal* or the sense of tragic foreboding in the lighting of Lumet's *The Pawnbroker* or Brooks' *In Cold Blood* (Fig. 3.1). On the other hand, consider the bright, happy atmosphere provided by the lighting for a comedy like Forman's *The Firemen's Ball* (Fig. 3.2), or the romantic atmosphere created by the lighting in *Elvira Madigan*. Without this valuable production element, the effectiveness of any of these films would have been lost because they would have lacked the realism and vivid drama that was contributed by the lighting.

The lighting of *The Seventh Seal*, *The Pawnbroker*, and *In Cold Blood* was predominantly what is called *low-key lighting* in film parlance. This type of lighting creates a mood by contrasting dark areas with light areas, thus casting a greater depth of shadows and providing the spectator with a harsher illusion of reality. The lighting of *The Firemen's Ball* is what is referred to as *high-key lighting*. In general, when the script calls for lighting that compliments a gay, buoyant mood, a high-level illumination is used with only a few shadowed areas and with brilliant highlights emphasizing various elements within the scene.

We do not mean to say that such formulas are stringently adhered to at all times. What is here presented is only the general rule, and all rules are made to be broken when they do not fit with your purpose.







Fig. 3-3 Light coming from below the subject's face (Mel Wittenstein)



Fig. 3-4 Light coming from the side (Mel Wittenstein)



Fig. 3-5 Light coming from directly in front of the subject's face (Mel Wittenstein)

We said that the painter reveals character with color and tone; the character of a face can be greatly changed or probed in film through the use of lighting. Generally, by aiming the light down onto the face, a quality of youthfulness is given to it. But aim the light from below the face (Fig. 3.3) and that angelic appearance is changed into one that seems wicked and unearthly. Aiming the light from the side will give the face solidity or reveal the depth of character by outlining the lines and crevices of the face (Fig. 3.4). Throw the light on the face from the front and it is beautified by blurring away the faults (Fig. 3.5); however, front lighting takes away its character at the same time. Direct the light from behind, and the face is spiritualized or etherealized by creating a halo around it. Through the imaginative use of light more can be done for the expressive quality of the face than the best work of the make-up artist.

By utilizing lighting to stress what is important and to shade what is unimportant, the film-maker, like the painter with color and tone, unifies the structure of his scene. By illuminating the important and allowing the unimportant to fall into shadows, he controls the concentration and attention of the spectator.

Lastly, the film-maker and his light, unlike the painter, can create an illusion that goes beyond the surface of his "canvas." Although, like the painter's canvas, the film-maker's screen is a two-dimensional surface, he can, with the use of lighting combined with camera angle and lens, create a sense of depth that is far beyond the capabilities of the most proficient and creative painter. Lighting is the third dimension.

The painter deals with a static creation, whereas the film-maker deals with images that are constantly in a state of movement—movement from shot to shot, movement of the subjects within the composition, and movement of the camera. Therefore, the lighting must be adapted to this movement. As the film cuts from shot to shot within a scene, the lighting must provide sufficient illumination and yet generally must match the mood of the preceding shot. As the subjects within the frame of the composition move, they must be seen by the spectator, but at the same time the previously established ambiance must be maintained. And as the camera moves, the lighting, in a sense, must move but still maintain that ever-present atmosphere.

Beyond the physical movement that takes place, there is the dramatic movement of the film. Do not for a moment think that dramatic movement is an element only of the theatrical film. No matter what the subject of the film, if it is to capture and hold the attention of your audience, that film must have dramatic movement. Combine the physical movement and the dramatic movement, and the film-maker and his lighting are faced with yet another problem—tempo. The lighting must suit the tempo as well as the mood and atmosphere of the film. Basically, tempo is the degree of fastness or slowness of a particular scene or sequence, and that fastness or slowness can apply to the physical movement and the dramatic movement, or both. The tempo of the physical movement, then, is the swiftness or slowness with which the actions are



carried out, while the tempo of the dramatic movement—a less tangible element—is the speed with which the dramatic narrative is brought forth to the audience. Generally, in suiting the tempo to the mood, we say that a low-key mood, and thus a low-key lighting, suggests slow physical action, while a high-key mood and its matching illumination suggest a fast tempo of physical movement. In much the same manner, slow dramatic movement will be best suited with low-key lighting, and fast-paced dramatic movement with high-key lighting.

Let us return first to the problems inherent in the tempo of physical movement. Quite obviously the swifter the physical movement of a scene, the less the time that will be devoted to that movement on the screen. Conversely, the slower the movement, the greater the amount of screen time that will be devoted to it. As a result, in a fast-paced scene the audience must perceive and understand the action at a comparable swift rate. Therefore, the main task of the lighting is to assist in this quick perception, while maintaining the ambiance of the scene whether it be low-key or high-key. This means that the scene or shot cannot be brilliantly lit when the emotional atmosphere is low-key, but rather the scene must be rendered in highlights and shadows that will simplify the action and make it readily perceivable by the spectator. In Stanley Kubrick's *Paths of Glory* there is a short scene in which three men are sent out on a night patrol to scout the enemy stronghold. As the three men make their way across no man's land, its barbed-wire fences and shell holes, the audience can easily perceive the action because of the highlights and shadows falling across the terrain. At the point where the spectator's keen perception is paramount—when the leader turns coward, throws a grenade that kills one of his own men, and runs away deserting the third—Kubrick adds brilliant light to the scene by having a flare explode overhead. Thus the ambiance of the scene is maintained and sufficient light is provided for the audience to witness and grasp the action.

On the other hand, the problem of immediate audience perception is not so acute in the slow-paced and somber scene. What we might call the lighting "tempo" can likewise be slowed down and thus become more complex. A scene in F. W. Murnau's *The Last Laugh* is an excellent example of this lighting concept. An old man returns late at night to the lavish hotel where he is employed to return the doorman's great-coat which he has stolen. He makes his way to the long darkened hallway leading to the offices and storeroom of the hotel. The lighting of this hallway is extremely low-key and the movements of the old man are in silhouette. The old man hears a noise and flattens himself against the wall. A slowly swinging beam of light comes into view at one end of the hallway. Back and forth the light swings as it comes nearer and nearer to where the old man is hiding in fear of discovery. Finally, the swinging light comes to rest on the face of the old man, and we see that the beam of light is from the flashlight of his friend, the night-watchman. Murnau has not only preserved but heightened the atmosphere, movement, and composition while using a more complex pattern



of lighting that is compatible to the physical tempo of the scene. The swinging light beam punctuates that tempo.

But what if the film-maker must maintain a low-key atmosphere while at the same time creating a sense of rapid and precise movement? The low-key would seem to cancel out any projection of precision in the movement and would tend to make rapidity impossible. If the film-maker employs parallel planes of light and shadow across the scene, he will not only maintain the low-key but also accentuate the movement and thus heighten the tempo. Examples of this solution abound in war films, adventure films, and Westerns. The hero and his band are making a night attack on the enemy. As they move through the forest or the jungle, the beams of light from the moon pass through the branches of the trees, creating those necessary planes of light and shadow so that the audience can perceive their maneuvers as they approach the enemy. When the attack begins, the moonlight is then aided and abetted by the light from fires and bomb blasts of the attack to again create the planes of shadow and light. Thus the film-maker has created the mood and enhanced the tempo, as well as provided enough illumination for the witnessing of the action. Scenes with an atmosphere that require high-key lighting create few perception problems for the audience. The bright illumination can only contribute to the physical tempo, unless it is static. When this is the case, the dramatic tempo is usually of prime importance.

Fig. 3-6 *Paths of Glory*, released by United Artists, © Harris-Kubrick Pictures Corp., 1957





Fig. 3-7 *In Cold Blood*, Columbia Pictures

Let us look at the problems inherent in lighting for dramatic tempo. Since, as we have indicated, dramatic tempo does not necessarily correspond to physical tempo, it would not be inconceivable to have a scene overflowing with dramatic movement and have only a minimum of physical movement taking place, or vice versa. In such cases the filmmaker would generally design his lighting to heighten the dramatic tempo.

To exemplify our case of rapid-paced dramatic action and a minimum of physical action, let us return to Kubrick's *Paths of Glory* (Fig. 3.6). The court-martial scene has a swiftly-paced dramatic tempo. Following the general rule cited earlier, the lighting should be bright, high-key. What does Kubrick do? He bathes the entire scene with sunlight flooding through the great glass windows lining the walls of the enormous room of the castle. Yet the movement of the scene is nearly static; the officers defending and prosecuting the three soldiers being unjustly tried for cowardice in battle carry out what movement there is. High-key lighting has also provided a heavy, dramatic mood when necessary. An identical procedure is used in the courtroom scene of *In Cold Blood* (Fig. 3.7).

In conclusion, we can best suit the physical tempo of a scene by manipulating the brilliance of parts of the predominant visual key, and we can suit the dramatic tempo by manipulating the overall tone of the visual key.

However, we hasten to point out that none of the effects lighting of which we have been speaking should be incorporated into a film if it might destroy the visual unity and coherence of the production. Any type of lighting must be chosen for its place within the scope of the whole film. The truth of the matter is, some scenes do lend themselves to effect lighting, and it can be tempting; we repeat, however, you cannot think only of the individual scene but of how that scene will fit with what comes before and after it.



**LIGHTING TERMINOLOGY**

Have you ever found yourself in a situation where you had to buy or rent technical equipment without knowing the technical terminology? Too many film-makers have not the slightest acquaintance with lighting terminology. The President of the Berkey-ColorTran Corporation has told us that one of the most difficult problems he has to contend with is the lack of understanding by clients of simple lighting terms.

**LAMP** This is the element placed inside a lighting instrument to create the light rays. It is *not* a "bulb." The bulb is the glass casing that surrounds the filament.

**CANDLE** The candle is the fundamental unit of light intensity. It is used as the measure of the ability of a source to radiate light. A source that can cast illumination on an object at a given distance to the same degree as would a standard candle is said to have an intensity of one candle. A standard candle is a  $\frac{7}{8}$  inch sperm candle.

**FOOTCANDLE** This term is applied to an arbitrary standard measure of light intensity. It measures the amount of light that falls on a surface that is one foot from a source of one candlepower.

**CANDLEPOWER** Candlepower is also a term used in the measurement of light intensity. It is that intensity expressed in candles. A certain instrument, for example, may have a candlepower of 60,000 candles. Essentially, it is the light-emitting power of a source.

**LUMEN** The lumen is the measure of an amount of light. It measures the rate at which light is emitted or received. One lumen is equal to one footcandle of light covering an area of one square foot. Therefore, the lumen measures the flow of light from the source of one candlepower to the area of one square foot. To find the total lumens covering a certain area, take the measure of the illumination in footcandles (given by your light meter) and multiply it by the area measured in square feet.

**BRIGHTNESS** When determining the light-emitting power per unit of area, we are measuring the brightness of a source. Two different sources can have the same candlepower yet differ in size. The smaller of the two sources is then said to be brighter. The brightness of a source is expressed in "candles per unit area." When we measure both the candlepower and the brightness of a source in all directions, together they will provide us with the complete specifications of a particular light source.

**FOOT-LAMBERT** The foot-lambert is very important for it is the measure of reflected light seen by the camera lens. The foot-lambert is a unit of photometric brightness which is usually used to render the amount of light per area reflected from an object, or, in the case of projection, the light per area that is reflected from the screen. A perfectly reflecting surface that reflects light at the rate of one lumen per square foot is said to have a brightness of one foot-lambert in every direction.

**LUX** Lux is the photometric term that is used internationally in place of footcandle. It represents a meter-candle. 10.764 lux equal one foot-



candle, but the number is usually expressed in round numbers, so one footcandle equals 10.8 lux.

**TUNGSTEN-HALOGEN** This is a new term slowly coming into general use as the name for the recently developed type of light source (Fig. 3.8) that is commonly called quartz-iodine or tungsten-iodine. When this new source was placed on the market it employed a quartz envelope with a small amount of iodine gas inside—hence, quartz-iodine lamp. However, today tungsten-halogen is a better term because elements other than quartz and halogen gases other than iodine are now being used. These new sources are more compact and a great deal more efficient throughout their life because of the new tungsten-halogen cycle. A halogen gas—chlorine, bromine, fluorine, or iodine—is sealed inside of an envelope made of a substance that has a high melting point and a low coefficient of expansion, such as quartz, so that the heat does not cause it to crack. The filament, because of the qualities of the envelope can be positioned closer to this bulb wall and, therefore, can permit a hotter filament in a more compact envelope. The lamp is more efficient because it is self-cleaning through a regenerative process which eliminates the blackening of the bulb wall which reduces the efficiency. The tungsten particles which evaporate from the filament, and would be deposited on the glass wall and cause blackening, are combined with the halogen gas. The particles are then redeposited back on the filament and the halogen gas is then released. As a result of this regenerative process, the lamp has good lumen and color temperature maintenance throughout its life.

To say that on the following pages we can provide you with a foolproof process to follow consistently in setting your lights would not only be an error, it would be most presumptuous on our part. The first thing you must learn is that there are no hard and fast rules for setting lights. What you do will not only be different for each film, it will be different for each shot. The only true rule, if it can be called that, is to know what you want to express visually and utilize the lights to enhance and contribute to that visual expression.

There are basic elements that the film-maker should master and utilize, just as there are specific tools—the lighting instruments—that you should experiment with and learn to use properly. We can provide you with the basic elements, but the experimentation and proper usage will come only from the experience of doing.

Generally, the lighting you will be involved with need not be highly elaborate or complex; however, this does not mean that it can be passed over. People have become conditioned to the technical excellence of the theatrical film and they expect to see the same excellence in any film they view. You cannot achieve any semblance of this excellence without the use of first-rate lighting.

The equipment you need is readily available from any equipment rental service, but how you use it is dependent upon your grasp of cer-

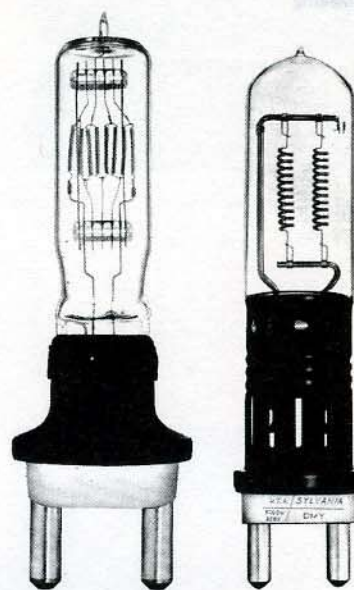


Fig. 3-8 Bardwell and McAlister's 2000w and 500w tungsten-halogen lamps

## LIGHTING THE SCENE





### Lighting "Rules"

tain basics and your creative ability. If you choose your equipment carefully, utilize your imagination, and take care to balance the lighting, you should end up with results that will satisfy the expectations of your audience.

Until a few years ago, the problems of lighting for the nontheatrical film were sizable, mainly because of the bulky, complicated equipment necessary. Since the development of the tungsten-halogen light source, lighting units are more convenient to handle, more compact, mobile, and simplified, but high in output. At the same time, better light controls and accessories are also available. These developments are of particular importance to the nontheatrical film-maker for they allow him to be more flexible and effective. The nontheatrical producer tends to utilize real places in making his films. These new light sources are most compatible with this practice. In fact, the trend of making films in real places seems to be growing rapidly in the area of theatrical films also, a development made possible by the invention of the tungsten-halogen lamp.

The first "rule" that any film-maker should learn, remember, and put into practice is never state what you can imply. This applies to lighting just as it applies to every other aspect of production. James Wong Howe, the noted cinematographer, has said, "I think that sometimes we should merely suggest things, rather than to say directly. Then you make the audience work a little harder—try to see a little more—and I think they appreciate it."<sup>1</sup> Mr. Howe further provides us an example of this philosophy in what he calls "lost and found lighting." In lighting an object such as the head, Mr. Howe does not always light it fully, providing a complete view of the face and the outline of the head. Instead, he lights enough to partially illuminate the object and provide clues as to its total shape, and lets the audience fill in the remainder of the shape in their imaginations. (An example of this technique can be seen in Conrad Hall's lighting in Fig. 3.1.)

A second "rule" to put into practice when lighting for realism is that the lighting for every shot should look natural to the situation and be in key with the subject. The lighting should be set so that the illumination of the scene is coming from the apparent light source in the setting—sunlight or moonlight through the window if the scene is an interior, a chandelier from overhead, a table lamp sitting nearby, a streetlamp. This "rule" is based upon good old-fashioned common sense. The lighting source of the scene should be the first consideration of the film-maker in planning his lights.

The best source of knowledge in determining the lighting of a scene is nature itself. Observe is the key word in learning to light. Observe how light falls from the chandelier, the table lamp, the sun, the streetlamp. Then attempt to duplicate these patterns, while at the same time providing enough illumination for a proper exposure and for the perception of the action by the audience. The sun provides the key, for most of our artificial illumination in life is patterned after the sun. Are



not our lamps, chandeliers, streetlamps, etc., placed above us so that their rays fall in a pattern similar to that of the sun? If we observe the light from the sun, we will see that as the rays of light reach the earth's atmosphere, part of the rays are diffused and part of them will continue on and strike the object we are viewing. The diffused rays will provide the light that surrounds the object and fills in many of the shadows. When we utilize manmade light, that illumination should simulate the light of nature. If the sun's rays are strong enough, they may be sufficient for our purposes. When they are not, we provide additional direct sun rays and additional fill light in the way we set our lighting units. In doing this, we must then consider the angle and the elevation of the main source—the sun in this case—and duplicate this angle and elevation in the positioning of our instruments. The same procedure follows with any light source other than the sun.

Since no light source in the world emits its rays in a constant, never-changing pattern, by following nature and duplicating its lighting, we have an endless variety of lighting patterns from which to choose. We must consider the object to be lighted, the general mood of the scene, the psychological implications of the scene, and then turn to nature for the patterns to employ as the basis of our lighting plan.

The third "rule" to follow is to plan the lighting of the film well in advance of production. The need to plan fully in advance cannot be overstressed. Such planning facilitates the speed and efficiency of filming by bringing up aesthetic and technical problems at a time when they can be efficiently overcome.

Each scene of a film will have a prevailing mood and tempo. As we have already discovered, the light can provide invaluable assistance in the capturing of this mood and tempo, but this assistance is more certainly achieved if the lighting is planned in advance. Even more important, the mood and tempo of the lighting of each scene must be compatible with the overall production style of the film. The lighting of each scene must fit with that of the scenes that come before and those that follow. In short, the film must have visual and dramatic unity. Hence the plan of the lighting must be compatible with that unity. Again, only lighting planned in advance can assure the film-maker of such unity.

Since film is predominantly a visual medium, the ability of our audience to perceive the action is of paramount importance. When the film-maker can compare his plan of the actions of the film with the plan of the lighting, he will be able to adjust one to fit the other for the best possible visual expression for the purpose of his film.

The best of creative ideas can be ruined because the film-maker has neglected to plan out the technical aspects involved in bringing the ideas to fruition. Since the lighting is one very important factor in accomplishing this, it must be pre-planned. Too many technical considerations are involved to leave it until the last minute.

Since the film-maker will more than likely be renting most, if not all, of the equipment he will need, he must have a light plan revealing just what his needs will be. Do not wait until you are on your way to

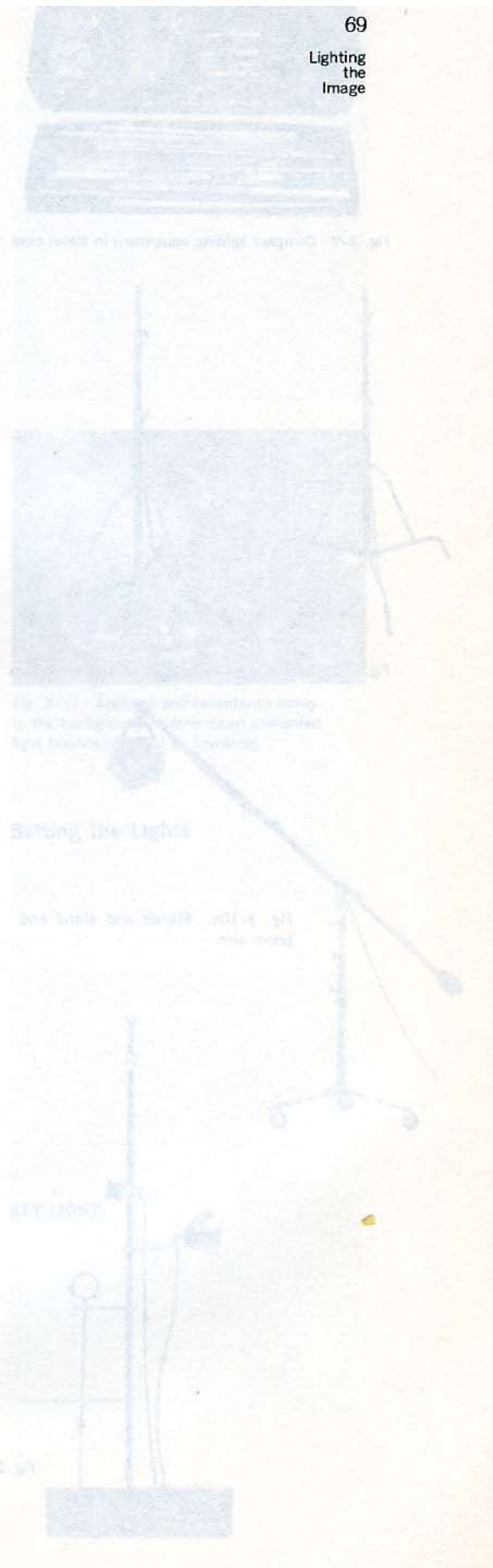






Fig. 3-9 Compact lighting equipment in travel case



Fig. 3-10 Stands and (below) stand and boom arm



Fig. 3-10a. Stands and stand and boom arm



Fig. 3-11 ColorTran's Pole King

the filming location to stop and rent your lighting equipment. Reserve this equipment in advance so that you will not be disappointed at the last moment because it is not available. To be involved in shooting and discover that you do not have the piece of equipment that you need to light the scene can be frustrating. Only with thorough pre-planning will you know in advance the type and quantity of equipment that is needed to achieve the visualization of your script and expose the type of film you have selected.

Most professional cameramen prefer to work at a certain  $f$ /stop, particularly when filming indoors. They select the most effective diaphragm opening of the particular lenses they will be using, and the diaphragm opening that will provide the depth of field required. This necessitates sufficient equipment to maintain the proper light level for that opening. For the best exposure results and the best matching of takes, we recommend you follow this lead of the professionals and adopt this practice also. Therefore, this is another aspect to keep in mind in drawing up your light plans.

Pre-planning the lights will also indicate to the film-maker the size of the crew that will be necessary. Select too many people and you have wasted valuable money in wages and cluttered the set with unnecessary personnel. Hire too few, and you will have to hold up filming to set the lights. This can be far costlier in time and money than the wages of one more lighting assistant. Many professionals do not appreciate it when they must do the work of two. Thus the effectiveness of this person is greatly reduced because he is mentally upset and because he is physically tired from having to do too much.

Knowing the filming location and the lighting requirements, the film-maker can determine the amount of floor space needed for his lighting equipment and whether he will have that floor space available. Do not wait until you are at the location to discover that if you set up the necessary equipment, you will have no room for the camera or the action that is to be photographed. Your lighting plan should take these factors into consideration. If the floor space is inadequate, different arrangements may be possible, but they may require additional equipment that must be planned for. Can you imagine the frustration of planning to place your instruments on floor stands and finding that there is no room for them? Other means of support—such as a Pole King (Fig. 3.11)—are available, but they must be included in your equipment needs.

All lighting equipment requires some type of power supply in order to operate. The film-maker must know if there is a power source available to him, what type of source, and the location of that source. If none is available, he must supply his own. I know of a film-maker who was to shoot a sequence on a street corner in New York City. He scouted the location and discovered that there was a shop on that corner from which he could run a power cable that would provide him with A.C. power. He then selected lighting equipment, sound equipment, and a camera motor that would run off of A.C. power. He arrived at the site with equipment, crew, and cast to find that the shop was closed for



vacation. That wasted day was quite costly. This was a foolish mistake that could have been avoided had he thought to talk to the shop owner while scouting the location. This foolish film-maker would have avoided his mistake also had he brought along an A.C. generator, or had he selected battery-powered equipment. At the same time the film-maker discovers what power supply he has available to him, he should discover the location of that source so that he can determine his cable requirements. What good is the power supply if it is too far away to reach?

Lastly, by knowing the location and its requirements, the equipment and its requirements, the script and its requirements, the film-maker will be able to determine what lighting controls he will need. Will the aesthetic and technical requirements necessitate the use of a dimmer board? If so, he will need the board, the power to run it, the cable to connect it, and a crew member to operate it. Knowing what he will require of his instruments will tell him what accessories he will need to control their light, such as scrims, barn doors, cookies, dots, flags, etc. Knowing the location and the instruments to be used in lighting the site will tell the film-maker what he will need to control the light of that environment—overhead scrims to control sunlight, sheets of filter to control color temperature when filming color, antireflectance spray to tone down light bounce from objects within the environment (Fig. 3.12), Windex to clean a dirty window, etc. Without pre-planning, the film-maker will be prepared for none of this.

When at the filming site, the lighting plan will serve as the basic guide as to the aesthetic requirements of the scene—whether the lighting should be basically low-key or high-key. Generally, whoever is setting the lights (in professional production this falls into the bailiwick of the camera-man) will familiarize himself with the lighting plan, the action that has been blocked out by the director, and the camera angle. The proper atmosphere must be created and the action must be properly recorded by the camera—very important considerations in how to set the lights. A run-through of the action of the scene should be carried out so that the lighting man will have a full picture of the demands to be made of the lighting. Now the lights can be set. Their setting-up should be directed from the viewpoint of the camera.

As we mentioned in the beginning of this chapter, the light must be built up for a scene. The key light is the first to be set for it is the *key* to our plan. This key light provides the illumination that is supposedly coming from the principle source in the environment. The basic exposure setting will be determined from the key light, no matter how much other light is thrown on the setting. As the names suggest, high-key and low-key determine the effect strived for; therefore, the key determines the *f/stop*. Once the intensity of this light is determined, it remains the same



Fig. 3-12 Applying anti-reflectance spray to the background to tone down unwanted light bounce (Richard C. Tomkins)

## Setting the Lights

### KEY LIGHT



throughout the sequence within that setting. This intensity is usually determined by the mood of the scene, the size of the setting, and the ability of the subject or the cast to work under lights for an extended period of time.

The position and angle of the key light is important. The most favorable angle of light for facial features is from three-quarters front, one side or the other. Normally the key light is placed at that angle unless the main source or some other factor dictates another angle. The key can be positioned, if so dictated, from straight in front to directly behind the subject. It is not uncommon to place the key light directly in front of the subject's face on close-ups—especially when the subject is female—in order to smooth out and beautify the face. However, the shape of the face should be considered before this approach is used.

The next step is to measure the footcandles by placing an incident light meter in front of the subject's face, pointing toward the key light. If the lamp is too bright, it is flooded the necessary amount (if the unit has a flood control), or the lamp is backed away the necessary distance, or a scrim is placed in front of the light until the desired reading is achieved. If the light is not bright enough, any of the above procedures is reversed.

When shooting outdoors during daylight, the key light will come from the direct sun rays. On overcast days, it may be necessary to supplement the sunlight with artificial light. In such a case the lighting unit is placed at the same angle as the sun, and its intensity is controlled in the same way as outlined above. Another technique that may be used is to position reflectors which will bounce additional sunlight into the places desired.

How large an instrument to be used as the key light will be determined by the mood of the scene, the brightness indicated by the source, the working aperture favored by the cameraman, and whether the production is being shot in black-and-white or color. Various types of key lights are available in a variety of sizes. They are a form of spotlight and produce a strong highlight that creates well-defined shadows. For small-scale production, close-ups, small settings, or low-key scenes, the smaller units are sufficient. The greater the intensity or the larger the area to cover, the larger the instrument needed. Never try to increase the intensity by using two smaller lights. The main source of illumination in any normal locale comes from only one source. Use two spots and you cast double shadows, a very unnatural phenomenon.

#### FILL LIGHT

The fill light is the next to be set. The fill light is the illumination that sets the mood of the scene and controls contrast by filling in the shadowed areas created by the key light. The intensity of the fill light is determined by the dramatic effect desired and is in direct proportion to that of the key light. The fill light is a diffused light that is placed at the subject's eye level. This placement will allow the light to fill in any harsh shadows that might exist about the eyes, nose, and throat.

The lighting ratio is the relationship of the key light plus the fill



light to the fill light alone. The lighting ratio must be computed in this manner because the brightest area will be where the key and the fill overlap. The film-maker establishes his lighting mood and controls the contrasts of light and shadow by adjusting the lighting ratio. If the key light and the fill light are equal in intensity, this is a ratio of two to one ( $2 = \text{key} + \text{fill}$   $1 = \text{fill alone}$ ). Such a lighting ratio is very bright and is what we have classified earlier as high-key lighting. The scene is nearly devoid of shadow. High-key does not, of course, necessitate this low a ratio. It merely requires less contrast between key and fill. Filming with color film also requires a low lighting ratio. Generally, color film is not exposed with a lighting ratio exceeding three to one, unless special effects are required or the filming takes place under unusual circumstances.

Obviously low-key lighting requires a much greater contrast ratio. An eight to one ratio, for example, creates a very dark, nightlike atmosphere. Naturally, the higher the ratio the more contrast there will be in the scene due to the lack of fill light to illuminate the shadowed areas. This ratio also determines the brightness range that the film will reproduce—one other reason why higher ratios are impossible when shooting color. Color film has less latitude than black-and-white, and, therefore, in high ratio scenes the highlights are burned out and the shadows are black.

In order to be accurate in determining the overall contrast of a scene, the reflectance ratio of the subject as well as the lighting contrast ratio must be considered. The reflectance ratio is dependent upon the physical nature of the subject or subjects being photographed. A woman in a white blouse and a dark skirt can reflect as much as six times the amount of light off the blouse as off the skirt. Therefore, the reflectance ratio is six to one. The lighting contrast, therefore, must be governed by the subject contrast. Generally, if the subject contrast is low, a higher lighting ratio can be used. If the subject contrast is high, the reverse is in order.

The lighting ratio may be measured in footcandles, when artificial light is used, or in f/stops. Place an incident light meter where the key and fill overlap, and take a reading. Then adjust the fill light until the desired ratio is reached. If, in achieving the desired ratio, the fill lights are greatly changed, it may be wise to recheck the key-plus-fill reading since it may differ from the first reading.

Obviously indoors it is a relatively easy matter to arrive at a lighting ratio because of the control over the intensity of the lights. In exterior shooting such contrast lighting is frequently ignored. It can be achieved through the use of reflectors or booster lights. The key reflector or booster is positioned in the same angle and direction as the source light, and the fill reflector or booster is placed in the same position that it would be placed on an interior set—at eye level. It is wise *not* to ignore the lighting ratio for exterior shooting if you are to obtain consistent results throughout the production of a film.

Special lighting units are available for use as fill lights, such as ColorTran's Mini-Lite. Such units should project a broad, diffused beam



Fig. 3-13a Key light only



Fig. 3-13b Fill light only



Fig. 3-13c Key and Fill light



**BACKLIGHT AND KICKER LIGHT**

Fig. 3-13d Kicker light only

**BACKGROUND LIGHT**

Fig. 3-13e Background light only

of light. "Softlights," scoop lights or pan lights fitted with diffusers generally work best as fill lights. Size again depends upon the intensity that will be required of the instrument.

If your lighting is going to aid in providing a three-dimensional image on the screen, you will need to place instruments that will provide depth to the lighting. The backlight and kicker are used to highlight the subject and to provide the necessary depth. These lights and their modeling effect will also serve to separate the subject from the background.

The backlight is positioned opposite the camera and above and behind the subject. The kicker is placed directly opposite the subject from the key light. Spotlights are mostly used because their beam can be controlled.

These sources require considerable control because of their position, and because without control they interfere with the key and fill lights due to the shadows they throw. Their position places them—especially the backlight—in direct line with the lens, so care must be exercised to shadow the beam out of the lens. Therefore, careful barndooring and goboing is essential. With these control devices the lens can be shielded from the light and the shadows thrown by these units can be shaded off by limiting the light to the subject, allowing none of it to spill onto the floor. The only shadows that can be allowed are those from the key light because it represents the natural illumination in the environment. At the same time, allowing the backlight and kicker light to spill onto the floor might illuminate the floor brighter than the subjects in the frame. This, of course, would be most distracting and must be avoided.

Special illumination of the background is generally necessary, although there are times when the lighting for the subject will provide most of the illumination of the background also. Background lights are separate instruments set up for the express purpose of lighting only the background. The advantage of using separate background light is that careful control of the contrast ratio between the subject and the background is possible. If the key and fill lights serve this function, it is difficult to control the value of the background. The use of such instruments also allows for visually interesting treatments of the elements that make up the background. These instruments are set in their patterns and then usually remain in these positions throughout the shooting in that environment.

The brightness of the background will depend upon the mood and the general key light that is already established for the scene. In high-key scenes the background is often brighter than the key light falling on the subjects, while in low-key scenes it may be barely discernible, limited to lighting which accents only certain elements of the background, letting the rest go dark. The basic purpose of any type of background light is, of course, to make the set look realistic and to provide an interesting pattern behind the subject of the scene.



Background light is usually provided by instruments set up out of the camera's range. However, with the development of the tungsten-halogen lamps, it is possible—because of the compactness of these units and their high intensity—to secrete these instruments within the setting that is within the range of the camera's view. They can easily be hidden behind furniture and such elements when the scene is located within very close quarters. In the studio the background lighting is generally mounted above and aimed down at the set. Such an arrangement is naturally beneficial since it eliminates instruments within the set that can clutter needed floor space and, because the light is aimed down from above, unnecessary shadows are eliminated. Wherever the background lighting is positioned, it should appear to originate from a natural source, such as light through a window, or any normal illumination visible to the camera's view, like a lamp. For example, if an illuminated table lamp is in view of the camera, the background behind the lamp should be lighted with a spot light to simulate the effect on the wall of the burning lamp. Care should be taken after the background lights are set to tone down any reflectance from objects within the background that might be distracting to the viewer. A special aerosol spray is available which works most efficiently and is unharmed to the finish of any object.

The key, fill, back, kicker, and background lights, when properly placed and adjusted, provide the illumination necessary for the scene, help in establishing the mood, provide a sense of depth to the scene, and allow for the movement that is so vital to film. Such a lighting arrangement should not only affect the appearance of the subjects but keep them lit throughout the movements they will carry out. When a character, for example, turns his face away from the key light, the kicker will take over the illumination of the face and the key will serve as a modeling light. Thus the mood, etc., is maintained as is the necessary illumination of the subject. Great care must be taken to achieve the proper balance of the various instruments. By losing the preconceived balance of the lighting plan through over-lighting in one area, you can change the emotional effect of the lighting. Remember, each light used must have a value and a function in the scene being shot. Never turn on a light and leave it on without justifying its function in each scene in which it is used.

Even in the most routine film assignment, the need to control the light that is projected from the instruments is vital. As we have mentioned earlier, this control is of particular importance in the setting of the back-light and the kicker light, but it can also be most important in the handling of the fill, background, and key lights.

With the older fresnel lens-type of spotlights, barndooring was an effective means of controlling the edges of the light beam emitted from the instrument. Barndoors are still useful with the new tungsten-halogen



Fig. 3-13f All lights (Mel Wittenstein)



Fig. 3-14 ColorTran Quartz King spotlights—650w, 1000w, 500w

## Control Devices and their Use

### BARNDOORS



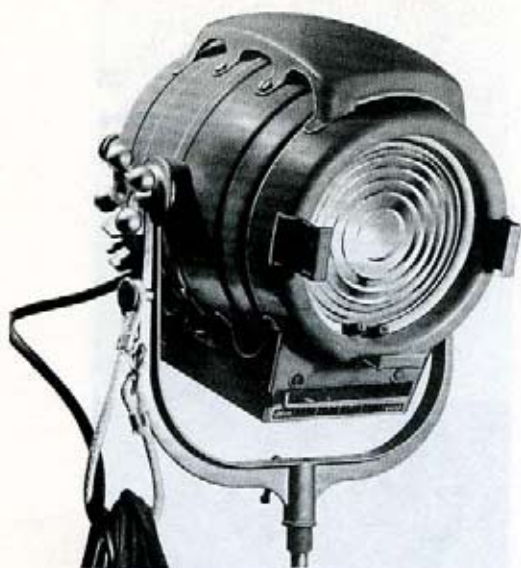


Fig. 3-15 Bardwell and McAlister's Baby Keg spotlight



Fig. 3-16 Bardwell and McAlister's Tiny Mac spotlight

#### SNOOTS

#### FLAGS, DOTS, GOBOS

#### DIFFUSERS

units but are not quite as effective. Barndoors are hinged wings mounted onto a frame thin enough to slip into the gel-holder flanges which are a part of the front assembly of lighting instruments. They are available with two and four doors. When slipped into the gel-holders, they control the edge of the beam of light by the opening or closing of the hinged doors. The edges of the light beam will, of course, strike these doors and thereby cast a shadow, since these doors serve as an obstruction for the light beam. When these barndoors are used with the old fresnel spots, they control the beam by casting a definite, soft-edged shadow. In actuality, there is no sharp change from one light level to shadowed light level; instead, there is a relatively narrow area in which the light level changes from one level to the other. Of course, the narrower the flood setting of the spot, the more precise this region becomes. Therefore, by widening the flood setting so that the beam is more diffused, the more effective the barndoors will be because the shadow edge will be softer, more diffused. As a result of this effect, barndoors have little or no use when an instrument is focused at "spot."

The main purpose of the barndoor is to control the extraneous, unneeded light. This is a needed control, since in the lighting of a scene the act of not lighting is just as important as the act of lighting. Generally then, barndoors are used to achieve the following effects: (1) to limit the area illuminated by a specific instrument or, to be more specific, not lighting part of the area; (2) to prevent the light beam from a unit from passing into the lens—the problem mentioned earlier in regard to the backlight; (3) to eliminate a microphone boom shadow by shading out the boom shadow through the elimination of the light causing the shadow; and (4) to control the light beam by forming a light-shadow line that will blend with scenery or some other architectural element.

Snoots are another device which can be mounted on the front of a spotlight in order to concentrate the light and eliminate spillage. They resemble a top hat with a square brim and with a hole in the top. It is a tubelike shape that allows for the control of the light beam. Snoots are made in a variety of sizes from about a one-inch diameter to an eight-inch diameter or more.

These are devices of varying sizes and shapes which are employed to control the beam of light. Generally these devices provide sharp light-to-shadow transitions and should be used when this is the effect desired. The type and degree of control they provide is very limited.

A variety of diffusers are available which are mounted in the flanges on the front of spotlights. Spots, as we have said, project a focused beam of light that casts a sharply defined shadow. Diffusers are used to modify



the beam and thus break up the sharp shadows. They are available in a variety of materials. Some are made of silk, others of celloglass or frosted gelatin. This type of diffuser breaks up the beam from the filament radiating over the surface of the material of the diffuser, and it is projected as a diffused light that casts a much softer shadow line. Other diffusers are made of scrims or nets and have no altering effect on the beam from the source but merely reduce the amount of light from the lighting units.

The cukaloris is more commonly referred to as the "cookie" and is a shadow device that is used to break up the flat light that can fall across large masses of wall area, etc., making it a valuable device for controlling background and set lighting.

The cookie is a panel that usually measures approximately sixteen by twenty inches. It can be made from any rigid or semirigid material that is opaque or at least semiopaque. Such materials as cardboard and hardboard have been used but cast very definite shadows. Panels of celloglass or fiberglass create a much softer pattern of light and shadow.

When you have decided upon the type of shadow pattern, definite or diffused, the proper material is selected and then perforations or cut-outs are made in the material irregularly. Above all, refrain from any established pattern. If you do not wish to make your own cookie, commercially-made die-cut units are available.

The cookie is used by placing it some distance between the light unit and the object being illuminated. The light and shadow pattern can be regulated by moving it nearer to or farther from the lighting unit. The type of instrument with which it is used will also have some effect upon the pattern of the cookie. A spotlight and its sharply focused beam will cast a much more sharply defined light and shadow pattern than will a flood lamp. The cookie is a more aesthetically pleasing way to tone down large expanses of wall, for example, with its mottled effect than merely giving the wall an overall dark tone.

Scrims of various sizes are generally carried when shooting on exterior location; they are used to subdue light. Black scrim is sometimes placed over objects which reflect too much light into the lens. Still other scrims—blue scrims—can be stretched behind the foreground of a scene to create an atmospheric haze in the distance. This practice will diminish the background and create a sense of greater distance. White scrims are used in the same manner to create fog or mist effects. Some sort of backlighting is used in either of the above cases to control the desired effect.

Large overhead scrims can be used to subdue the intensity of sunlight hitting the subjects of the scene. These scrims soften the effect of the harsh light on the faces of the subjects. The scrim is stretched onto a frame that can be placed onto a large stand or, in the case of the smaller ones, can be attached to a pole that is held by some member of the crew.



Fig. 3-17 Bardwell and McAlister's Big 10kw spotlight

#### CUKALORIS



Fig. 3-18 Bardwell and McAlister's Foco spot

#### SCRIMS

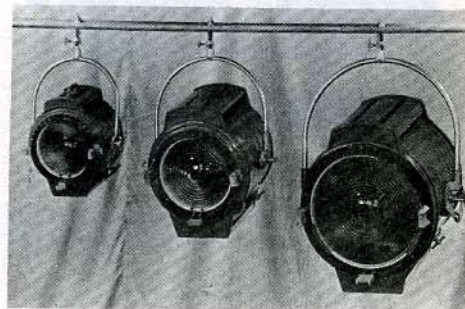


Fig. 3-19 Bardwell and McAlister's 2kw, 5kw, 10kw spotlights



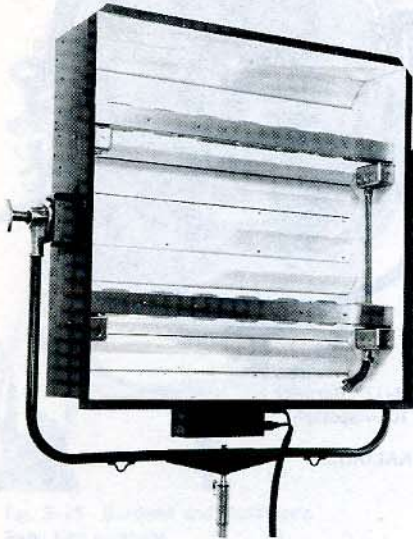


Fig. 3-20 ColorTran's softlight

#### GEL

Colored gelatin is used to alter the color quality of a beam of light from an instrument. It is available in sheets and can be cut to fit into special gel frames that slide into the flanges found on the front of lighting units.

#### UMBRELLA LIGHT

This is an arrangement made up of an actual umbrella and a tungsten-halogen light. The umbrella is made of a white mylar base material and is stretched over an aluminum frame. It is the same weight and construction of a normal umbrella, except its handle is adjustable and is constructed so that it can be mounted on some type of support. A tungsten-halogen lamp is mounted on the handle with the lamp pointing up at the inside of the umbrella.

The major use of this arrangement is to provide a soft light, a north sky quality, or a shadowless light source. It is frequently used to simulate a window light source because the light projected from the umbrella has a "wrap-around" quality.

#### CAMERA-MOUNTED FILL LIGHT

By attaching a metal bar to the top of a camera, a fill light can be mounted onto the camera and moved with that camera. This is a practice that has been followed in Hollywood for many years and is slowly finding its way into other areas of film production. Its use is similar to that of the camera-mounted flash bulb in still photography. The light emitted serves the same purpose as any fill light, namely to wash out shadowed areas, but this camera-mounted fill can be especially useful with close-in shots or with moving camera shots. To set up floor lamps that provide satisfactory illumination is virtually impossible when the camera must move; the camera-mounted fill solves the problem because the light travels with the camera. Care must be exercised in the use of this type of fill light also. When fill light is overdone, the contrast be-



tween the highlights (key light) and the shadows (fill light) becomes so negligible that the result is a flat picture.

The dimmer board came to film with the advent of sound. After sound became a part of film production, the use of multiple cameras on the set to cover the action from different angles became widespread. As a result of this practice, takes were longer and the subjects moved much more freely within the setting. At the same time, sound brought stage-trained actors to film, and they were accustomed to more freedom of movement. Therefore, because of these new factors, dimmer boards were incorporated for a more precise and flexible control of lights.

By attaching the instruments lighting a scene to a dimmer board, the light intensity of each instrument can be individually controlled by an operator manipulating the controls of the dimmer board. Take for example a scene in which a subject at the back of a room slowly walks toward the camera. It is essential that the key light falling on this character remain approximately at the same level of intensity on the subject. However, without dimmer control, as the subject walks toward the camera, the closer he comes to the key light the more intense the light on the subject will become. When a dimmer is attached to the lamp, the intensity can be decreased accordingly, keeping the intensity on the subject the same. However, dimmers can be a problem when shooting color film for the dimmer affects the color temperature of the lamp. When the dimmer setting is lowered the light gets redder.

Reflectors are used not only to control light, but also to provide light in exterior shooting. Many cameramen dislike the look of obviously artificial light when filming in natural locations so they resort to the use of reflectors. When reflectors are used as the source of lighting, they are placed in approximately the same positions as are artificial lights. Elevated reflectors are used for key and backlights and reflectors positioned at a lower angle are used as fill light.

The normal use of reflectors is to fill in unwanted shadow area with light reflected from the surface of the reflector. However, never place these reflectors on the ground since light seldom originates from the ground.

Reflectors can be purchased or constructed by the film-maker. The simplest form of reflector can be made of a frame with oilcloth or white paper tacked to the frame. A reflector can be constructed by cutting a piece of quarter-inch plywood and painting it white or by covering it with a special reflector paper that is available. The most useful reflectors can be constructed using metal foil to cover the reflecting surface. One side can be covered with silver foil, and the other side with gold foil, since there are situations—because of color temperature—when the yellow light from the gold foil is needed.

## DIMMERS

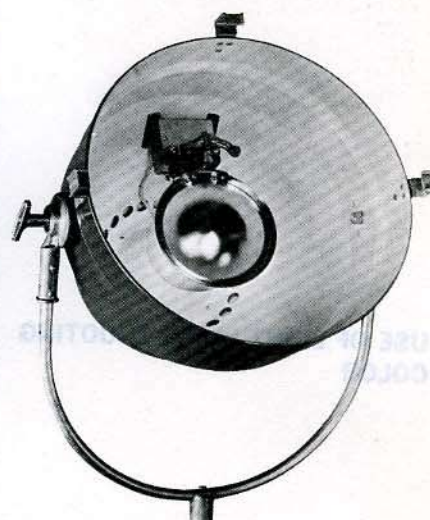


Fig. 3-21 Bardwell and McAlister's Indirect Light

## REFLECTORS



Fig. 3-22 Colortran's Mini-Lite "6" with integral four leaf barndoor



**SUN GUNS**

Frequently the cameraman must use more than reflectors when shooting on location. He may find the use of artificial light necessary to accentuate or reduce the contrast of light and shade, or he may wish to highlight an important detail that might otherwise be unobserved by the audience. Perhaps one of the most useful lighting instruments for these purposes is the battery-powered Sun Gun. These units operate off of a nickel cadmium battery, are relatively lightweight and small in size, and are very versatile. They contain a beam control that permits adjustment of the beam from flood to spot or any position in between.

When shooting with available light, the use of either reflectors or artificial light or both is advised. Available light varies constantly, and the film-maker must take care to avoid an impossible problem when it comes time to match the various takes in the editing room.

**USE OF LIGHT WHEN SHOOTING  
COLOR**

Lighting for color film can be a highly complex process. When the light is flooded all over the scene, the results frequently resemble the pictures of a picture postcard—devoid of any style. This is generally not the impression the film-maker wishes to create. The pictorialist era in film-making is over. The matter of prime importance is to provide pictures which visually express the dramatic elements of the film, no matter whether the film be theatrical or nontheatrical.

One of the major contributing factors to the complexity of lighting for color is the low sensitivity of its emulsion to light. As a result, a greater amount of light is required to expose the film. The more light that is used, therefore, the less contrast that is possible. As mentioned earlier in this chapter, color film also has a narrow latitude between light and dark. Because of the narrow brightness range, care must be taken in lighting the scene to see that highlights are not burned out and shadows allowed to go to black in the final image recorded on the film. As a result, more fill light is generally used in color filming.

Fortunately, color itself is a contrast factor. The film-maker is concerned with contrast because it provides the modeling of objects in the picture, but color can serve the same purpose as light and shadow. Whenever the film-maker has a choice as to color, the right choices can help greatly in producing the necessary contrast. Michelangelo Antonioni, the noted Italian director, has been known to exercise his choice of color to the point of painting grass a different shade of green and altering the natural colors of other elements within a certain environment, and many "industrial" film directors paint walls and floors of subject factories.

Nature itself can cause problems that add to the complexity of shooting in color. The light that comes from the sky has a bluish tint, light reflected from the ground can have a brownish cast, and light reflected from leaves and foliage can have a greenish quality, and so on ad infinitum. The film-maker must control these problems caused by nature. James Wong Howe has told of the problem he faced when shooting the white-washing-the-fence sequence in *Tom Sawyer*. The white fence



looked blue at the top and brown at the bottom when shot outdoors because it was reflecting the earth and sky. He felt that the whiteness of the fence was so important that the set was constructed in a studio, and the scene was shot where the color could be controlled.

Generally, however, the film-maker need not be so accurate in his color rendition. Faithful reproduction of the colors of a scene is not necessary. The audience need not see the colors as the film-maker sees them during filming, unless those colors are vital to the believability of the scene. The only things that must be reproduced faithfully are the colors of readily recognizable objects, such as the American flag, and flesh tones. Great care must be taken to shield these objects and the skin surface of the human body from unwanted color reflections.

Separating the main subject from the background is one of the major functions of lighting for black-and-white film. Many film-makers carry over this concept when shooting in color. This separation is not so vital in color filming, for as color can provide contrast, it can also provide this separation which is, to a degree, a form of contrast. As a result, less backlighting is actually necessary when shooting in color. Instead, the proper selection of colors is more important. Contrast the color of the background with the color of the object that is to be photographed in front of it, or the object will blend into that background. The value-reflectance or brightness of the background should be kept darker than the subject's skin tone.

Perhaps the most complex matter to deal with in color filming is the problem of color temperature. As we have said before, the only time color film will provide a reproduction of the scene as the eye sees it is when there is a balance in the color temperature of the film and the light source. The proper use of filters can bring about this balance.

The problem of color temperature is not so severe when shooting exteriors. Colors outdoors are constantly changing because of weather, the seasons of the year, the time of the day, and we do not expect them to constantly have the same appearance. As a result, faulty color renderings on the screen, unless too extreme, will generally go unnoticed by the audience, with the exception of the aforementioned flesh tones and recognizable objects. Reflectors are constantly used to provide or control light. If the bluish tint of skylight is needed to maintain color temperature, a reflector with a silver surface should be used. However, if it is necessary to warm the color of the light, then a reflector with a gold surface must be employed to add a yellowish tint.

The major area where color temperature control is more difficult is when shooting actual interiors. Most actual interiors contain windows which admit sunlight. Generally, however, that sunlight is not sufficient to provide the film-maker with necessary illumination for a proper exposure of the less sensitive color emulsion. Therefore artificial light must be used to provide a high enough degree of illumination. The color temperatures of sunlight and incandescent light do not match. The easiest solution to the problem is to shut out the sunlight from the windows. Notice the next commercial you see on television that is staged inside an



airplane. The standard practice is to shut off the light from the windows of the aircraft by closing the sliding blinds of those windows. These small windows will normally go unnoticed by the viewer.

But how does one solve the problem when it is necessary to the believability of the scene or the action of the scene to have these windows open to the sunlight? One procedure is to use a painted flat outside the window that shuts off the light. The flat has a view of the outdoors painted on it, and lighting units are set up to simulate light coming through the window. A more satisfactory procedure is to use tungsten film and to place over these windows large sheets of 85 filter, available in thin gelatin sheets and lately in rigid plastic sheets. When the thin sheets are used, a wise procedure is to place the gel between two sheets of glass, which eliminates the crinkling of the gel. A colored dye is also available that can be sprayed onto the glass of the windows, but reports are that it is not very satisfactory because of its tendency to streak and go on uneven.\* To reduce the light volume when following this procedure of covering the windows with gel, it may also be necessary to use neutral density filters with the 85 filters.

Another procedure to use to correct this color temperature problem is to use either daylight film or tungsten film with an 85 filter on the lens. Do nothing to the light coming through the windows, but instead place blue filters (MacBeth filters), or the new dichroic filters which are more efficient, over the lighting sources. The blue filters absorb a great deal of light (64 per cent), and this can cause a great deal of difficulty because of the low sensitivity of the color film. Instead of incandescent units, one could carefully use the blue (daylight) corrected photofloods that are available and thus do away with the need for filters.

Shooting inside of an automobile can cause the same problems as the previously mentioned interiors. Sunlight is flooding through the windows, yet it may not be sufficient to illuminate the action. The same choices are available. Cover the windows with 85 filter and utilize a Sun Gun or Mini-Lite inside for the extra illumination. Of course, if this procedure is followed, all of the windows of the auto must be closed. Burnett Guffey, in filming *Bonnie and Clyde*, solved the problem by ignoring the windows and using a Sun Gun with 26-Blue gelatin filter attached. This filter—though flimsy and with a tendency to fade rapidly—produces much less of a light loss than glass filters.

Another color temperature problem is faced if it is necessary to use dimmer control when shooting color. Altering the voltage of an incandescent lamp will affect the color temperature. A change of ten volts will result in a change of 100 degrees K. in the color temperature. Therefore, dimmers could be used to control color temperature, but cannot be used for effect lighting.

When a mismatch in color temperature is suspected but is not as certain as the above examples, the film-maker may find it necessary to use a color temperature meter to measure the color temperature of his light source. Such situations can develop when the accuracy of the voltage is uncertain. These meters measure the proportion of red and blue radia-

\*Berkey-ColorTran is working on some new products that may soon be on the market.