

Competencies

- Basic objectives of lighting
- Light measurement and falloff
- Color temperature
- Incandescent and Tungsten-Halogen lamps
- Differences between spotlights and their general usage
- Floodlights and their usage
- Three point lighting techniques
- Placement and intensity of the key, back and fill lights
- Procedures for mounting and hanging lighting instruments
- Lighting control equipment operation

Objectives of Lighting

1. Provide adequate illumination for the “audience”
2. Enhance a 3-dimensional feeling
3. Set time - day or night
4. Establish a mood
5. Highlight important parts of the scene

Human eyes are very sensitive and are able to adjust quickly to changes in lighting intensity, but there has to be a minimum illumination level to see comfortably. Most television cameras are much less sensitive than the eye.

The TV image is two-dimensional, there is no depth. With placement of lighting instruments, the TV viewer is given clues the depth of the image by casting shadows.

The intensity of the illumination is good indicator of the time of day or night. Angle of the light and placement on the set is a more subtle way of indicating time. Both these variables will also help establish a mood.

Your eyes are drawn to the brightest light. This is an important way of directing your eye to the action.

Light Measurement

Light is measured in foot-candles, the amount of illumination provided to an object that is one foot from the flame of a candle. A light meter is used to measure footcandles.

The digital cameras in the studio require a minimum of 50 footcandles for proper operation.

Falloff

Falloff is the amount of decrease in illumination as an object is moved away from the source. The formula for determining falloff is I/d^2 (d =distance). Falloff at 2 feet is $I/4$ and 3 feet is $I/9$, so you can see there is a rapid falloff as the distance increases. Outdoors, there is no falloff of the sunlight.

Color Temperature

Color temperature is the standard by which we measure the reddishness or bluishness of white light. This is measured in degrees of Kelvin (K). Daylight is in the 5,500-degree range while the home incandescent bulb is 2,800. The normal television studio bulb is 3,200 degrees. It gives a slightly reddish tint but this is corrected in the cameras.

Lamps

For many years, the basic light source has been the incandescent tungsten lamp. There were two major deficiencies with the lamp. As the lamp aged, the light output decreased due to burned off tungsten attaching itself to the glass envelope. The lamp also becomes large and bulky as the wattage increases.

The lamps in most of the lighting instruments you will use are called tungsten-halogen. This lamp maintains a constant light output by recycling the tungsten particles that are burned off the filament as the bulb is used. Tungsten-halogen lamps are rather small even though they have a high wattage. There are 1,000-watt lamps in most of the instruments you will use. As a comparison, the average household lamp is rated at less than 100 watts.

An important point to remember when using tungsten-halogen lamps is **never** to touch them with your bare hands even when they are cool. Your hand will leave an oily deposit on the quartz exterior and will cause an explosion.

Spotlights

A spotlight is an instrument designed to produce a relatively narrow beam of hard, directional light. The intense light produces strong shadows on areas not directly illuminated and permits the lighting director to control light and shadow. Most studio lighting can be accomplished with two basic types of spotlights: the Fresnel spotlight and ellipsoidal spotlight.

Fresnel Spotlight

Named for Augustin Fresnel (Fir-NEL), who invented the lens used in the instrument, the Fresnel spotlight is the most widely used instrument in television studio production. The main advantage of the Fresnel lens is lightweight. The clever use of concentric cuts on one side of the lens, copy the compound curve of a convex lens while reducing the mass of glass needed.

The Fresnel spotlight is relatively light and flexible. It has a high light output, and its light beam can be made narrow or wide by an adjusting device. The spotlight can be adjusted to a “flood” beam position, which gives off a rather wide, spread beam, or it can be “spotted” or “pinned” to a sharp, narrow, clearly defined light beam. This change is made by moving the bulb-reflector unit inside the light instrument toward of or away from the lens.

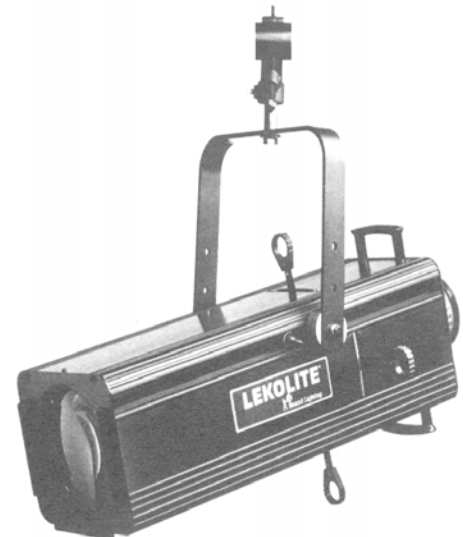
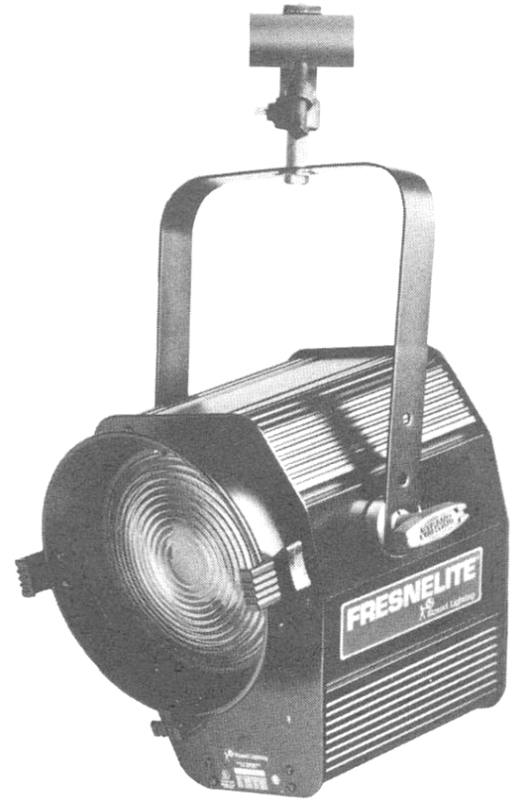
On the back of the instrument, you will find a lever that can be moved horizontally. To narrow the beam, move the lever to the right. This moves the bulb away from the lens. Moving the lever to the left moves the bulb toward the lens and produces a wide beam of light.

Barndoors are metal flaps that can be attached to the front of Fresnel instruments. They are used to control unwanted spill light.

Ellipsoidal Spotlight

The ellipsoidal spotlight (sometimes called a “Leko”) projects a high intensity beam of hard, directional light with a rapid reduction in intensity at the edges of the beam. It is named after the shape of the reflector.

Ellipsoidals are equipped with internal shutters that enable you to “trim” the beam's size and shape. You can focus an ellipsoidal spot by moving the lenses toward or away from the fixed lamp and reflector. This produces a very sharp “spotlight” edge. A modified version of the Leko does provide



for adjusting the beam width. A unique feature of the ellipsoidal spot is the ability of some units to accept patterns for projection. Except for its use as a pattern projector or some special effect, the ellipsoidal is not used in most common television lighting situations.

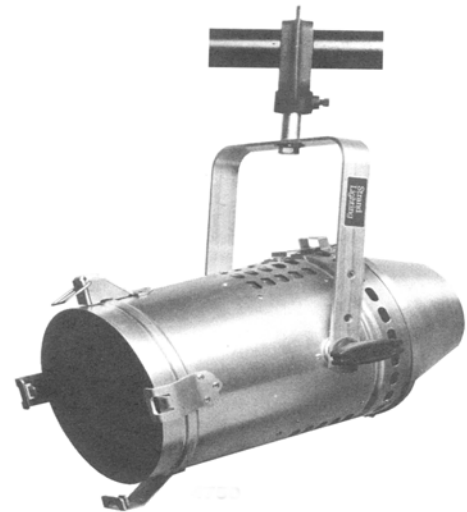
Follow-Spot

The follow-spot is a large, high-intensity spotlight with easy-to-use pan and tilt functions. It is used mainly in theater and concert performances. The follow-spot generally follows action, such as dancers and single performers. It is a quick way of directing the audience's attention toward a particular performer or area on stage. Follow-spots are equipped with controls that enable you to “iris in” or “iris out,” enlarging or shrinking the size of the beam. Follow-spots are also equipped with a color filter selector to change the color of the beam.



PAR Can

The Par Can is a simply made instrument for mounting a PAR lamp. The PAR lamp is a self-contained lamp with a built-in reflector similar to an automobile headlamp. These lamps come in different widths, but the PAR 64 with 1,000 watts is the most commonly used. They are lightweight and provide little in the way of adjustment. The PAR 64 lamp comes in four different models, and provides for a wide to narrow beam width. They are used mostly in live concerts to provide color washes.

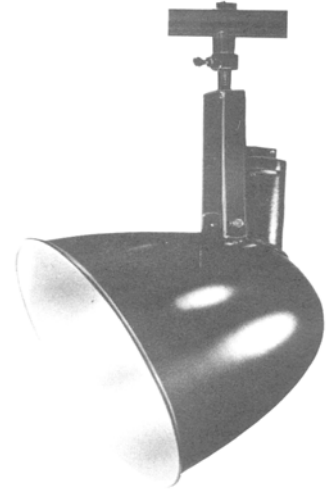


Floodlights

Floodlights emit a beam of soft, highly diffused light that produces few, if any, shadows. They are used to provide general illumination to the set or stage.

Scoop

Just as the Fresnel is the “workhorse” spotlight, the scoop is the most commonly used floodlight. Aptly named for its shape, the scoop consists of a lamp that is mounted inside a semi-ellipsoidal housing and surrounded by a matte-finished surface. The scoop emits a soft light that is highly diffused and which cannot be directed to any one specific area as is possible with the spotlight.



Softlight

The soft light is a large aperture (opening) instrument that produces the most diffused light of any floodlight.

Soft lights are ideal for producing virtually “shadowless” lighting, and they can be used to fill in shadows that are produced by directional instruments such as the Fresnel. The biggest disadvantage of the soft light is that it does not permit the lighting director to isolate the beam toward one specific area.

Cyclorama Light

Most studios are equipped with a cyclorama, a large continuous piece of material surrounding the background edge of the studio. A cyclorama or “cyc” instrument uses a highly efficient reflector to spread a very even beam of illumination across a wide area of the cyclorama.

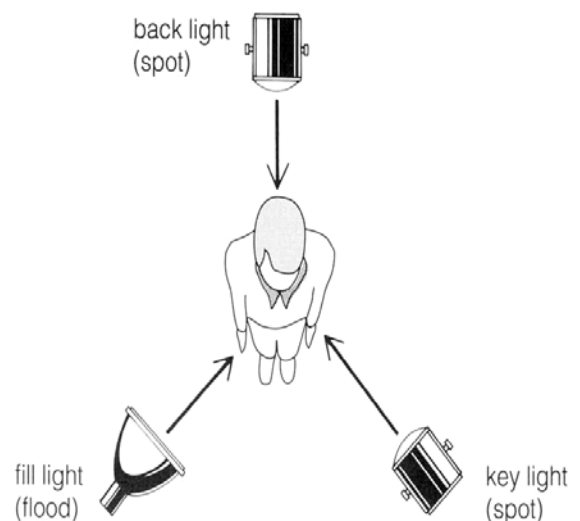
Three-Point Lighting

Three-point lighting was developed for still photography. It is the basic system for Television lighting.

Key Light

The key light is the principal source of illumination for a scene. As such, it provides the primary modeling effect, determines the basic camera operating level and acts as the reference point against which all other instruments are positioned and their light intensities relative to the key.

The key light is positioned in front of the subject, offset to the side and at an elevated angle. It is difficult to provide specific horizontal and vertical angles for the key light since



the positioning of the key will vary depending upon the particular lighting effect you want to achieve. Generally, when we decrease the horizontal angle of the key light and position it more frontally, we tend to flatten out a subject's features and provide less modeling. Increasing the horizontal angle dramatically increases modeling and will produce an aging effect. Dropping the key below the horizon produces an upward shadow on the subject, much like Halloween trick-or-treaters who hold flashlights under their chins.

A good starting point for placing the key light is approximately 30 to 35 degrees to the side of the camera and elevated about the same angle. This is only a starting point; the exact angles can be determined only after you have decided on the lighting effect that you wish to achieve.

The key light will determine the relative intensities of all other instruments, which are balanced in proportion to the key's light level. Since the key will determine the basic camera operating level, you should take a light reading to ensure that the light level is at least 50 footcandles.

Fresnel spotlights are the preferred instruments for key lights. This is because the hard, directional light produced by the Fresnel provides the necessary modeling effect on a subject by creating shadow areas. In addition, the flexibility of the beam control and the evenness of the light provide you the best control than with any other lighting instrument.

Back Light

The back light is used to cast a rim of light around a subject's head and shoulders to separate the foreground subject from the background and to increase the apparent definition by providing contrast.

Ideally, the back light should be positioned directly behind the subject and at a vertical angle that will prevent it from directing light on the front of the subject.

The light level of the back light, as with all lights, must be set relative to the intensity of the key. A good rule of thumb is to start with the back light level, set at about half the key light's intensity and then adjust the level up or down depending upon the effect produced on the camera. Different subject and background combinations will require different back-to-key ratios. For example, a blonde foreground subject placed against a dark background will usually require less back light than a brunette against the same set.

Since backlighting requires a hard, directional light source, the best instrument choice is usually a Fresnel spotlight. To avoid any hot spots that could ruin the effect of a back light, it is best to flood out the Fresnel and trim off any spill light by using barndoors.

Fill Light

Fill light is used to reduce or completely eliminate the shadows produced by hard light sources. Of course, completely washing out shadows with a fill light would destroy the modeling effect that was created by the key light.

The fill light is positioned on the side of the camera opposite the key light. For best effect, the quality of the fill light should be diffused, soft light with no apparent direction. This will permit you to blend in the soft light smoothly with the key light's illumination.

The intensity at which the fill light is set depends on the lighting effect you are trying to create. However, the fill light should never be more intense than the key light, or it will have the effect of replacing the key as the primary source of illumination.

When we light a scene with heavy fill light and attempt to reduce or eliminate many shadow areas, we are lighting for low key. Low key lighting in television is usually associated with most nondramatic programs such as news, interviews, or on musical variety programs.

A scene in which there is little, if any, fill light and many dark shadow areas is said to be lit for high key. High key lighting produces a very moody, dramatic look.

Mounting and Hanging

Lighting instruments are hung from the grid with a C-clamp. The clamp itself is attached to the yoke of the individual instrument.

When you are moving an instrument from one location to another, use the following procedure:

1. Before raising the lift, make sure you have a clear area for the outriggers to open.
2. Use the safety chain to close the opening to the lift.
3. Clear the area below of people and equipment.
4. The instrument should be cool enough to touch.
5. Be sure the instrument is hanging over the lift, so if you drop it will fall only a few feet...not to the floor.
6. Unplug the instrument
7. Remove the barndoors and gel frame.
8. Adjust the lamp to a horizontal position.
9. Remove the safety wire.
10. Grasp the yoke with one hand and loosen the C-clamp with a wrench. Loosen the clamp so the opening will clear the pipe.
11. Place the instrument on the floor of the lift.

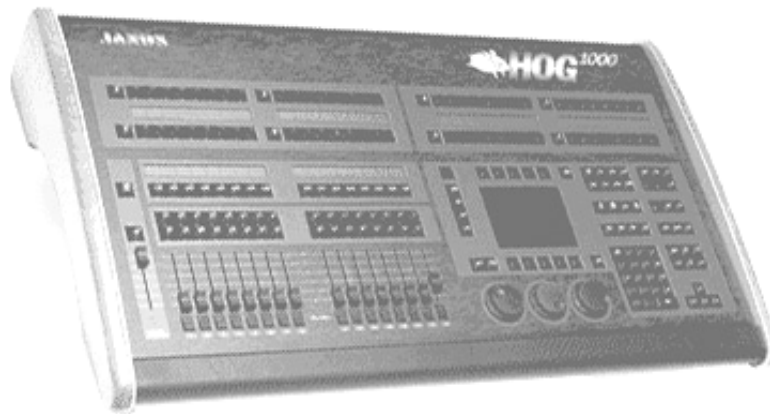
To re-hang the instrument, reverse this procedure and then re-aim.

Lighting Control

Hog 1000

The Hog 1000 system includes the Console, keyboard, mouse and monitor. The system is designed to run individual fixtures such as spot and flood lights; it is also used for moving lights. It also is capable of storing cues, times and order of playback. This information can also be recorded on removable 3 1/2" disks.

Physically, the console is comprised of four main units: the Programmer, the Playback Masters, the Menu Banks and the Displays.



Articulated Lighting System

The articulated lighting system is manufactured by High End Systems. They manufacture several types of articulated instruments.

The Intellabeam is a 700-watt unit that allows one to direct the light both horizontally and vertically. Twelve different colors can be selected as well as twelve different gobo patterns. The light can also be strobed, irised, and dimmed.

The Trackspot has the same capabilities except for the iris function. It is a less expensive instrument and produces less light output.

The articulated fixtures are also controlled with the Hog 1000. Each of the parameters can be adjusted and "Pages" of these settings can be stored in memory. The pages can then be played back to create a lighting sequence.

