



**VINCENT**

LIGHTING SYSTEMS

*Entertainment & Architectural Lighting & Rigging*

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# LIGHTING 101

A CRASH COURSE IN HOW TO PROPERLY LIGHT ANY ACTING AREA.

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*This guide is intended to give you an understanding of the general lighting process. It is a learning tool only, and is in no way, meant to be substituted for training in lighting and electronics.*



*Anything Goes, Shaler High School*

Just as no two performances are exactly alike, there is no one proper way to light a stage or performance area. Think about all of the different performances that exist: lectures, concerts, operas, musicals, dramas ... Now think about all of the places where these performances can take place: tents, theatres, churches, arenas, even outdoors. Fortunately, there are simple lighting design techniques that can help even beginners to get proper lighting for their productions. This guide will give you an overview of the jargon, techniques and ideas used to light a performance.

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## UNDERSTANDING THE JARGON

In order to be able to further explain the concept of lighting, it is first important to understand the terms that are used.

**BARNDOORS:** with a similar purpose to that of shutters (but used on Fresnels and PARs), these are attachable metal pieces that have hinged panels that can mask the light out of certain areas.

**COLOR FRAME:** two connected square pieces of metal or cardboard with a hollowed circle in the center; this frame holds the gel in front of the fixture.

**CYCLORAMA:** also known as cyc; a curved piece of cloth or wall that serves as a back drop; may be painted scenery or plain in order to project light and/or images onto it.

**DIFFUSION:** similar to gel, these sheets are used to diffuse, or soften, the beam of light and don't usually change the color of the light (unless it is colored diffusion).

**GEL:** also known as color media, filter; the plastic film placed in front of lights to change the color of the beam of light.

**INTENSITY:** the level of light output coming from the fixture (usually measured in percentages on a control board); the brightness of the light.

**LAMPS:** lightbulbs (the equipment they are used in are referred to as "fixtures").

**OPEN-FACE FIXTURE:** any lighting fixture that has no lens.

**PATTERN HOLDER:** a rectangular, metal frame with a circular hole in the center. This piece holds a pattern and slides into a slot in an ellipsoidal fixture.

**PATTERNS:** also known as gobos; thin, steel, circular pieces with a design cut-out; when placed into a slot in the ellipsoidal, these project patterns of light onto the stage.

**SHUTTERS:** a moveable piece within the ellipsoidal that can shut out part or all of the light coming out of a fixture.

**SNOOT:** also known as top hat; an attachable accessory with a long cylindrical tube used to reduce flare (stray light beams) from lighting fixtures.

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## THE GENERAL PURPOSES OF LIGHTING

So many different types of fixtures exist that it is easy to feel overwhelmed when looking through a lighting catalog (or even your inventory). Fixtures can be classified into two different uses or purposes. Once you understand these purposes, it is much easier to sort through all of the different types of fixtures.

### ACCENTING

This concept entails making certain areas of the stage brighter than others so that the audience will direct their attention to that particular spot. For example, if you have two characters talking on a crowded street, you want the audience to pay attention to those two actors, not the rest of the crowd. By highlighting their area (and/or dimming the rest of the stage), the audience's eye will be drawn to those two people.

### WASHES

A wide area of coverage or "wash" is used to provide color or tone to the performance area. This can be done with one or more fixtures as in a color wash. Where the highlights do not reach, it may be desirable to use wash lights to fill in the shadows with softer light. These fixtures can be used to fill in the dark spaces of the stage. Wash lights are also used to provide additional lighting on actors. Wash lights provide a less directional beam of light than those used to accent.

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## THE DIFFERENCES BETWEEN FIXTURES

### ELLIPSOIDAL



*ETC Source Four*

This is the most common type of fixture used for accenting. Also called an ERS (Ellipsoidal Reflector Spotlight), Leko® (which is a trademarked type of ellipsoidal created by Strand Lighting), or Source 4 (the brand name of a fixture manufactured by ETC), the ellipsoidal can adjust from a sharp-edged, focused beam to a soft, diffused light. Using shutters, the beam can be shaped (for example, if part of the light "spills" off the stage into the orchestra pit, the shutters can be used to crop the beam so the pit is not lit). Ellipsoidals also have features to hold patterns and gel (more on this later).

## FOLLOWSPOTS



*Lycian Midget*

This type of fixture you see all of the time in concerts, ice skating, lectures and other performances where the main character(s) moves around constantly and unpredictably. It is the type of fixture that is controlled by an operator standing beside it. Although different followspots sport different features, most will let you adjust the beam size, instantly change the color, and many will let you lock pan and tilt adjustment.

## FRESNEL



*Strand Acclaim  
Fresnel*

*(pronounced fre nel'; named after the inventor of the lens)*: This instrument is somewhat similar to the ellipsoidal, but has a softer edge to the light beam. The beam can go from narrow to wide, but shutters are not available on the fixture to shape the beam, nor is it able to utilize patterns.

## PAR CAN



*Altman PAR Can*

Except for a few high-end fixtures, this is a no-frills, lightweight instrument that looks like a headlight at the bottom of a tin can (using a PAR lamp, this is how it got its name). Depending on the brand/model of a PAR can, the beam of the fixture might be able to adjust from a horizontal to a vertical beam. The lens can be part of the lamp, so by changing the lamp type, you can change the beam angle.

## FLOODLIGHT



*Altman Scoop*

*Also known as Scoop*; Pretty much the same as a PAR can, the floodlight is less directional and will provide more of a wash than the PAR can fixture. Floodlights are relatively inexpensive, durable and lightweight. They cannot support patterns, beam adjustment or any other accessories except color and diffusion.

## CYC LIGHTS



*Altman Spectra  
Cyc 100*

Open-faced fixture which gives an even wash of light over a vertical surface (such as a cyclorama or painted scenic drop).

## STRIP LIGHT



*Altman Spectra  
Cyc 400*

Also known as *borderlight*; A wash fixture similar to a cyc light; used to add color or general lighting on stage.

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## CONTROLLING YOUR LIGHTS

Imagine all of the lighting fixtures being at full brightness on your stage: not only would the actors pass out from heat exhaustion, but the colors of the set would be washed out (not to mention how much electricity you'd waste). Also, the audience would not know where to focus their attention. In order to achieve the desired look and intensity of lighting for your production, it is necessary to use dimming and control. Almost all theatres and performance spaces have some sort of dimming and control system. But portable dimming and control also exists for temporary applications, outdoors or alternate area performances.

Most lighting systems consist of four major components: control console, dimmers, distribution and fixtures (see previous discussion on Fixtures).

## CONTROL CONSOLE



*ETC Eos Ti*

Also known as a light board, the control console is the brains of the system. It takes input from an operator, transforms it to signals that the dimmers can read and sends it down a control cable to the dimmers. Obviously, it is important that the console and dimmers are able to speak the same language (although it is possible to convert between some languages with the addition of a convertor box). Some common control languages or "control protocols" are AMX, DMX or a simple analog signal. Control boards can range from small shoe box sized boards to large

microprocessor based consoles, which can drive hundreds of dimmers or moving light attributes. Some have manual control, some automated playback and some combine both.

## DIMMERS



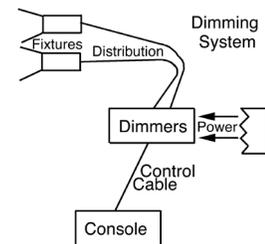
*Lightronics Portable  
Dimmer Pack*

Dimmers plug into the main power at your performance space and send out various amounts of power through the individual dimmers. The control console's signal is what determines how much power goes through which dimmers and when.

Dimmers are available two different ways. Dimmer Racks are mounted dimmers, which are usually for larger systems and permanently mounted in the performance space. Dimmer packs tend to be for portable or semi-portable applications and can generally be carried by one person.

## DISTRIBUTION SYSTEM

The distribution system is the wiring that takes the power from the dimmers to the fixtures. This system can consist of wireways, plug-in boxes and connector strips, or can be as simple as a set of extension cords if conditions permit.

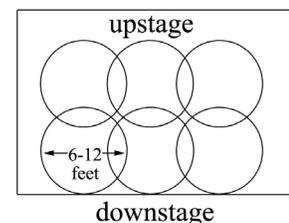


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## PLACING THE FIXTURES

### BREAKING DOWN THE STAGE

There are many schools of thought on the proper way to light a performance space. One of the most popular theories of lighting a stage was developed by Stanley McCandless at Yale. In his theory, the stage is broken up into smaller overlapping circular sections or Acting Areas; between 6 to 12 feet in diameter.



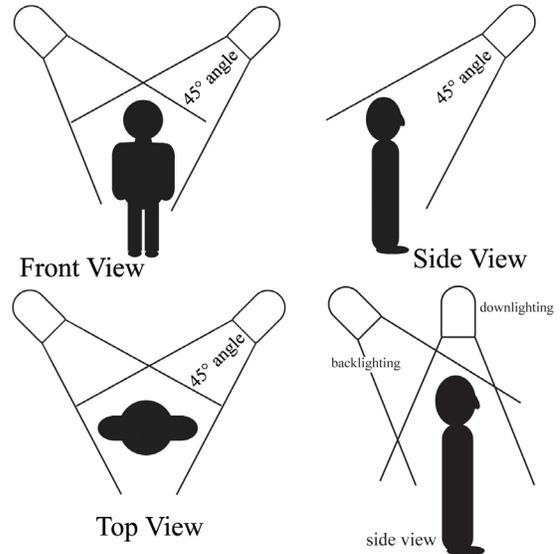
### PLACING THE LIGHTS

In the McCandless theory, each acting area is lit by two lights, each from a position 45 degrees above and to each side of the center of that area (a.k.a. front lights). The reason for angling the lights at 45 degrees is to place feature-enhancing shadows on the actor and to draw the actor away from the background. If a fixture is placed directly in front of the actor, the result will wash out all shadows, and make the actor's face look very flat. Ellipsoidals are ideal for front lighting.

To separate the actor from the background and provide a 3-dimensional appearance, downlighting and backlighting are important. Unless trying to achieve a special effect, this type of lighting is not as bright as the front lighting. Ellipsoidal and Fresnel spotlights or PAR cans are ideal to use for backlighting.

Another angle used to create a three-dimensional appearance is side lighting. Side lighting from both a very low angle and high angle is used to light many dance shows and musicals. Side lighting for dance takes on more importance in some designs than front lighting.

For general illumination, the McCandless theory will provide good lighting in most cases. Different angles, however, will give interesting effects. So, if time allows, try experimenting with alternate placement of fixtures. After you've highlighted each of your acting areas, fill in the rest of the areas with washes so that none of the stage is lost. It is important for the light to be even from side to side and front to back. PAR cans and Fresnels are better to use here than ellipsoidals.



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## ADDING COLOR AND TEXTURE

### CHOOSING COLOR

When discussing color, it is important to understand the difference in color of light versus color of pigment. As taught in school, the primary colors of pigment are red, yellow and blue; mixed together they will make black. However, in light, the primary colors are red, green and blue; when mixed equally together, the end color will be white light.

When we talk about adding color to the lights, what we're really suggesting is adding a specially-made transparent piece of colored plastic in front of the lights. This plastic is known as gel, color media, color filter or just color. The gel is a special transparent or translucent piece which can withstand higher temperatures (although it may fade in color as time passes and should be replaced). This is the most common type of medium used to color lighting. Other methods include a more permanent glass filter or lamp dip (Colorine) for applications where low wattage will be used and gel is inappropriate.



Gel is applied in front of the lights using a color frame. This frame allows a piece of gel to slide in between the two panels. Then the frame fits in the slot located at the front of the fixture.

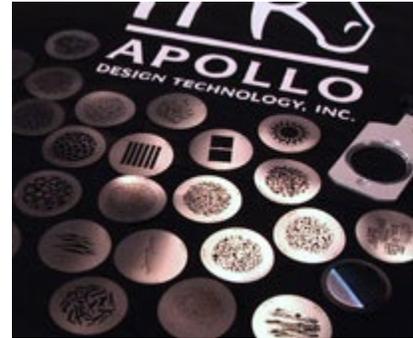
Cool colors include those in the blue-green-violet range. Warm colors include the red-yellow-orange range. Generally, it is ideal to add a cool color to one of the 45° angled front lights, and a warm color to the other. This will provide a good color of light on the actors' faces or set, and give the illusion of depth. Together they should mix to white light (unless a specific effect is desired).

Color in the rest of the instruments depends on what feeling or mood you want your area to convey. For example, if you have a cheerful, fun musical, you'd most likely want to use warm, vibrant reds, pinks, ambers, etc. but you are the designer, so the choice is up to you.

## ADDING TEXTURE

Textures of light add an interesting effect to any stage. If your setting is in a park, adding leafy patterns to the ellipsoidals will project a look of sunlight shining through trees. This can also work for windows, clouds, or more abstract effects.

Patterns can also be used to project images onto cycloramas; images such as clouds, stars, snowflakes and city skylines can be added rather easily (much more easily than painting a drop) and can change from scene to scene with less effort than flying drops in and out.



*There are thousands of different colors of gel and patterns from which to choose. E-mail us at [info@vls.com](mailto:info@vls.com) if you'd like to receive some gel swatchbooks and/or pattern catalogs.*

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## ADDITIONAL READING

Following are some books that we recommend for further learning. Many of these books are used in college or university classes.

McCandless, Stanley. *A Method of Lighting the Stage*. 4th ed. Theatre Arts Books, 1958.

Mumm, Robert C. *Photometrics Handbook*. 2nd ed. Louisville, KY: Broadway Press, 1997. ISBN 0-911747-37-0

Pilbrow, Richard. *Stage Lighting Design*. London: Nick Hern Books, 1997. ISBN 185459 273 4.

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## HELPFUL SOFTWARE

### LIGHTWRIGHT

by John McKernon. For both Windows and Macintosh operating systems, Lightwright is used to generate lighting design paperwork.

*You can purchase this and other software and lighting products through Vincent Lighting Systems. Shop online at <https://shop.vls.com> or contact us for more information at [info@vls.com](mailto:info@vls.com).*

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## NEED HELP?

Vincent Lighting Systems employs degreed and certified team members. We pride ourselves in creating customers for life, so we want to help you understand your lighting system, so you can love lighting as much as we do.

Whether you need advice on which fixtures or control board to purchase, to create a special effect, or a site survey to diagnose, troubleshoot or upgrade your system, we can provide you with advice on purchasing, renting or supply you with a quote. Our services include Production, Rental House, Repair & Training, Rigging & Safety Inspections, Stocking Distributor of Supplies and Expendables and Systems Integration & Programming. Contact us at [info@vls.com](mailto:info@vls.com).

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### **RELIABLE**

Vincent Lighting Systems provides reliable entertainment and architectural lighting and rigging products that are inspected, maintained and tested for compliance with industry standards prior to delivery. Our reputation for reliability is backed with a commitment to providing on-time delivery, a personal equipment operation guarantee and after-hours project, rental and production support.

### **PROFESSIONAL**

Every customer of Vincent Lighting Systems can count on a dedicated team of certified and degreed lighting professionals with an accumulated 500+ years of industry expertise, all fully focused on delivering an outstanding customer experience.

### **CREDIBLE**

Since 1978, the award-winning professionals at Vincent Lighting Systems have met the needs of entertainment and architectural lighting customers with the broadest range of equipment and products from more than 100 industry manufacturers. We have managed more than 10,000 projects and productions, including specialty architecture, bridges, theatres, schools, houses of worship, weddings and corporate events.

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