

A Basic Introduction to Theatre and Entertainment Lighting Equipment



BASICS of THEATRE and ENTERTAINMENT LIGHTING EQUIPMENT

PAR CANS

The most basic and simple of lighting fixtures, the PAR CAN is a staple of rock-n-roll lighting as well as thousands of small stages throughout the world. A PAR lamp is essentially a sealed beam reflector light bulb that's very similar to an old style car headlight. This lamp is installed in a CAN – in the back of a metal cylinder that has no lenses or optics, just a holder for a color gel, a yoke to hang it up, and lamp socket with power plug in the back. These fixtures are very rugged, very reliable, and require no maintenance.

The quality of the light beam is totally contained as part of the PAR lamp. Available in Very Narrow (VNSP), Narrow (NSP), Medium (MFL), and Wide (WFL), the beam shape is determined by the reflector and front glass design, so you buy the lamp in the beam type you need. The pool of light produced has soft focused edges, so it's easy to blend the lights. The beam/spot shape is oval shaped, so you get some shape control by rotating the lamp in the can housing. The brightness is based on the rated wattage. Standard wattages are: 300W, 500W, and 1000W. Very Narrow Spots (also called Pin Spots) for illuminating mirror balls, etc. are typically only 36W. In addition to brightness, beam shape, and wattage, the lamps and cans are available in different sizes, based on diameter. The most common standard sizes are: Par36 (4.5"), Par 46 (5.75"), Par 56 (7"), and Par 64 (8"). Par36 and Par46 are for narrow beam pin spots. Par56 and Par64 are the workhorse lights for rock, small stages, and general illumination. Par56 is most often found in 300W, and Par64 will most often be 500W or 1000W.



Par Can with colored gel

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ELLIPSOIDAL SPOTLIGHT

The most widely used light for stage theatre is the ELLIPSOIDAL SPOTLIGHT. This is a powerful, focused light fixture which can put a very controlled beam light wherever it's needed. Unless deliberately defocused, this light produces a sharply focused, well defined beam of light, not the soft edges found in PAR CANS or FRESNEL fixtures. Sometimes called ERS (ellipsoidal reflector spotlight) or by their brand names, 360Q, Leko, or Source-4, the ELLIPSOIDAL SPOTLIGHT is probably the most versatile light for stage. Available in a number of different sizes, most common are 6" diameter, but 3.5" and 8" diameters are often used too.

Unlike a PAR CAN, an ELLIPSOIDAL SPOTLIGHT uses an ellipsoidal reflector and two heavy condenser lenses built as part of the fixture to focus the light, with a lamp that doesn't have its own reflector. Lamps are commonly used in 500W, 575W, 750W, and 1000W powers, depending on the fixture design, brand, and light power needed on stage. In addition to diameter, they are also most commonly described by length or beam angle. Older, yet still widely used ellipsoidal lights are identified by diameter and length, such as 6x9 and 6x12. The longer the length, the narrower the beam angle and hence the longer the throw distance. More modern designs are described by beam angle, with most common being 30 and 40 degrees, although 20 and 50 are used too. A 6x6 or 20degree fixture will produce a wide spot of light on stage, and are most suitable for short throw distances. 6x9, 6x12, 30degree and 40 degree are for moderate throw distances and produce a medium spot on stage. Going to a very narrow beam angle like a 6x16 or 20 degree is for shooting from the back of the house, or to make a very small spot. In addition to the control of beam focus, ELLIPSOIDAL SPOTLIGHT also have framing shutters – built in sliding metal blades that allow you to clip the beam into a square, narrow shaft, or other shape. Some also have irises for changing the spot diameter (with light loss) and even a place to put patterns for projecting shapes like bars, leaves, or random blobs to simulate light through leaves. Unlike PAR CANS, ELLIPSOIDAL Spots are heavy, require maintenance, and get hotter in operation. With glass lenses and fragile lamps, they are not well suited for touring or truck/bus travel. They are nearly 3x more expensive than PAR CAN fixtures. As with all theatre lights, they also have gel frame holders at the front of the fixture for coloring the light as needed.



Source Four™ Ellipsoidal Spotlight



Ellipsoidal Spotlight

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FRESNEL LIGHT

A Fresnel light is a soft-focused light used for short throw distances. These lights are easy to identify by the circular rings on the front which makes up the fresnel lens from which they derive their name. Similar to a par can in light quality (soft focus), the fresnel has a circular beam, adjustable focus (beam diameter), and usually better light quality. While par cans are more rugged, the fresnel is still a staple of theatre where the instruments won't be subjected to the rough handling of a touring rock show. These lights typically com in 6", 8", and 12" sizes based on the diameter of the lens. Movies also use Fresnel lights extensively, where they can be as large as 24" diameter. There's a modern hybrid light that combines the best of par cans and fresnels, called the Parnel™ from a company called ETC. This is a rugged light that is robust enough for a touring schedule yet produces a high quality of light that can be focused for beam diameter.



Fresnel Light



Parnel™ Light

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MOVING HEAD LIGHT

A moving head lighting fixture is a modern, computer controlled light in the category of “intelligent lighting”. This class of lighting fixture is most often used in music and rock shows, but is also being used more and more for classical theatre. Popular names for these lights include “MAC”, “Studio Spot”, “VariLite”, and moving yokes. These lights do it all – they move in pan (horizontal) and tilt (up/down), they change colors, and they can change patterns. The most complex versions of these lights also have motorized focus, multi-pattern prisms, strobes, and built-in complex programming effects. These lights are generally fragile and should not be handled roughly. They are expensive to buy and expensive to fix. These lights need computerized consoles to operate, and they are NEVER to be plugged into a conventional theatre dimmer, even if it’s set on 10 all the time. Extensive training is needed to understand how to handle, program, and properly use these lights, but the razzle-dazzle effects are well worth the added care required!



MAC 2000 Moving Head

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MOVING MIRROR LIGHT

Also called scanners, moving mirror lighting fixtures are modern, computer controlled lights in the category of “intelligent lighting. Popular names for these lights include “Roboscan”, “CyberLight”, scanner, and mirror. Very similar to moving head lights, moving mirror lights were the first style of moving light. These lights move the light beam around in pan (horizontal) and tilt (up/down), as well as change colors and change patterns. Patterns can also rotate on some models, as well as strobe and multi-pattern prism effects. These lights are generally fragile especially the mirrors which are exposed. Like all other automated intelligent lighting, they are not to be handled roughly. They are moderately expensive to buy and expensive to fix. These lights need computerized consoles to operate, and they are NEVER to be plugged into a conventional theatre dimmer, even if it’s set on 10 all the time. Extensive training is needed to understand how to handle, program, and properly use these lights, but the razzle-dazzle effects are well worth the added care required!



Roboscan 512

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PIN SPOT

A Pin spot (pinspot) is a very, very narrow beam version of a par can (see above). The pin spot is usually used to illuminate a mirror ball (disco ball). Due to the very narrow beam, the pin spot diameter is seldom any bigger than 8". Pin spots can also be used for very specific illumination in theatre, such as lighting just a small set piece or the head of a carefully positioned actor. Pinspots can be dimmed with conventional theatre lighting dimmers.



Pin Spot

COLOR SCROLLER

This is a lighting accessory that has 12 or more different colored “gels” taped together into a single scroll, also called a “gel string”. Using the DMX lighting computer commands, the scroller has motors that move the gel string to the desired color. Color scrollers are often mounted to ellipsoidal lights, fresnels, and par cans.



Color Scroller mounted on an ellipsoidal spotlight

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LIGHTING CONSOLE

The lighting console is the operations control center of any lighting rig. Consoles vary in how many different dimmers they can control, whether they are manual or computer controlled (automated), and how well they control intelligent lighting. There are generally three types: manual 2-scene preset, moving light console, and fully automated computerized console.



Modern Computerized Lighting Console

Manual 2-Scene Preset: this most basic and useful lighting console consists of two identical rows of dimming sliders, plus a crossfader and master control. The identical rows of sliders are typically arranged so each slider controls one dimmer, and thus one or two lights. The top row of sliders is usually set for the first scene in a play, and the bottom row of sliders is set for the second scene. The crossfader control is arranged to allow switching between the two rows, and hence the two scenes. These consoles are very easy for beginners to operate, even though there seems to be so many different sliders. Despite the inclusion of the term “manual” in this description, many are computer controlled and can remember complex settings in a step-by-step way.



Manual 2-Scene Preset Control Console

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LIGHTING CONSOLE (continued)

Moving Light Console: This is a computer controlled console specifically designed to control automate, intelligent lights such as moving heads and moving mirror lights. They have large libraries of different brands and model number lights pre-programmed in, and have joysticks, sliders, rotary knobs, and buttons to facilitate setting pan/tilt position, color, pattern (gobo), and other effects, then remember those settings in a string of memories called a sequence. These consoles are complex and require a significant learning curve for beginners. Popular brand names are “MLC-16”, HOG, “Light Jockey”, and the generic term DMX controller.



MLC-16 Moving Light Control Console

Fully Automated Computerized Console: This console is the current state-of-the-art. It combines the best of both the 2-scene preset with control of automated lights. These consoles often have the familiar two-rows of control sliders for dimmer operation, as well as joysticks or touch pads and dials for programming of automated lights. These consoles are the most complex to learn and run, but when approached in a section-by-section basis can be learned in manageable chunks of operations. Popular brands include: ETC Expression, Acclaim, Obsession, HOG2, HOG3, Maxxyz.



Maxxyz Computerized Console

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FOLLOW SPOT

A follow spot is a bright, moveable light on a stand that can be easily moved by a person standing beside it to follow actors around on stage. These lights can be adjusted for hard edge beam or soft focus. They also have beam diameter control with an iris, horizontal shutters, and colors on manually operated levers called the “boomerang”. These can vary from 300 watts to 1200 watts.



Follow Spotlight

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FOGGER and HAZER

A fogger, and it's nearly identical twin called the hazer produce a very fine mist of fog for various effects. Foggers are most often used to produce clearly visible clouds to simulate smoke, nightmare scenes, vanishing effects, and magical scenes. Hazers use a similar fine mist technology, but include blower fans to rapidly disperse the haze so it's not seen as a cloud. Hazers are designed to produce a very thin veil of haze in the air mostly so the audience can see the beams of light. Care must be used in many theatres to ensure foggers and hazers do not accidentally set off smoke detectors. Check your venue before using.



Fogger



Hazer

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COLOR GEL MEDIA

The most commonly used accessory with theatre lights is the color gel media. Gels are colored thin sheets of heat resistant plastic that is placed in a gel frame at the front of a light such as an ellipsoidal (leko), fresnel, or par can. The gel materials come in hundreds of colors from several popular companies. Roscolux is the most popular colored gel material, but you can buy gels from Lee and GAM. To select colors, most companies give away samples in the form of a swatchbook. A swatch book provides small samples of each color, and the representative number for that color. Some swatch books also provide detailed technical information on color transmission.



Gel Swatchbook



Gel in gelframe on a Par Can

GOBO PATTERNS

Patterns can be projected from ellipsoidal spotlights using gobo patterns. These are cutout metal patterns that project a shadow in the light beam. They can also be made from glass and other materials, but etched metal shadow patterns are the most popular. There are thousands of pre-made gobo patterns available from companies like Apollo and Rosco. You pick these from catalogs. Custom gobo patterns are also available to create patterns for company logos, school names, and other images.



Gobo Patterns from a catalog page

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SCOOP LIGHT

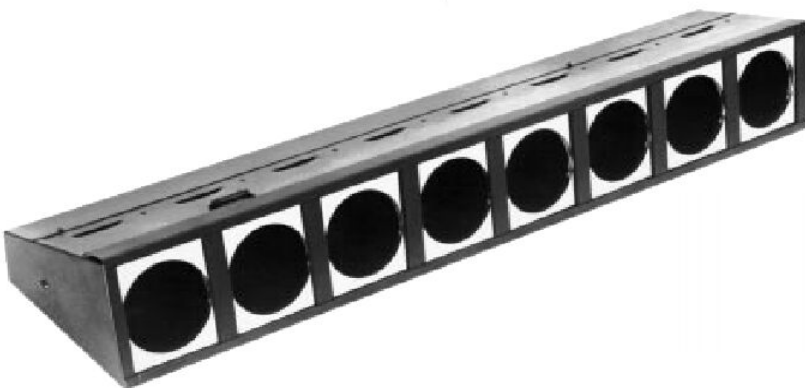
The scoop is one of the oldest style lights in the theatre. It's just a lamp held in a large metal bowl of metal. The spherical white painted inside of the "scoop" provides a very soft edged, broad beam of light that is perfect for lighting backdrops and very large areas. One scoop can easily light half the stage, and four can often smoothly light a large cyclorama backdrop at the back of the stage.



Scoop Light

STRIP LIGHT

A strip light is a long series of lamps designed to spread light out evenly across the stage, most often used for coloring a backdrop or cyclorama. Most striplights are actually wired in groups of three or 4 circuits. Most often, strip lights are gelled with red, green, and blue gels. These colors would correspond to the three electric circuits of lamp wiring in the light, providing simple color control for a stage or cyclorama backdrop. Strip lights are not only hung overhead, but are also put on the floor shining up at a cyclorama to provide even illumination at the bottom to match the top. Music DJs sometimes use 4 color strips for dazzle.



Strip Light



DJ Color Strip Light