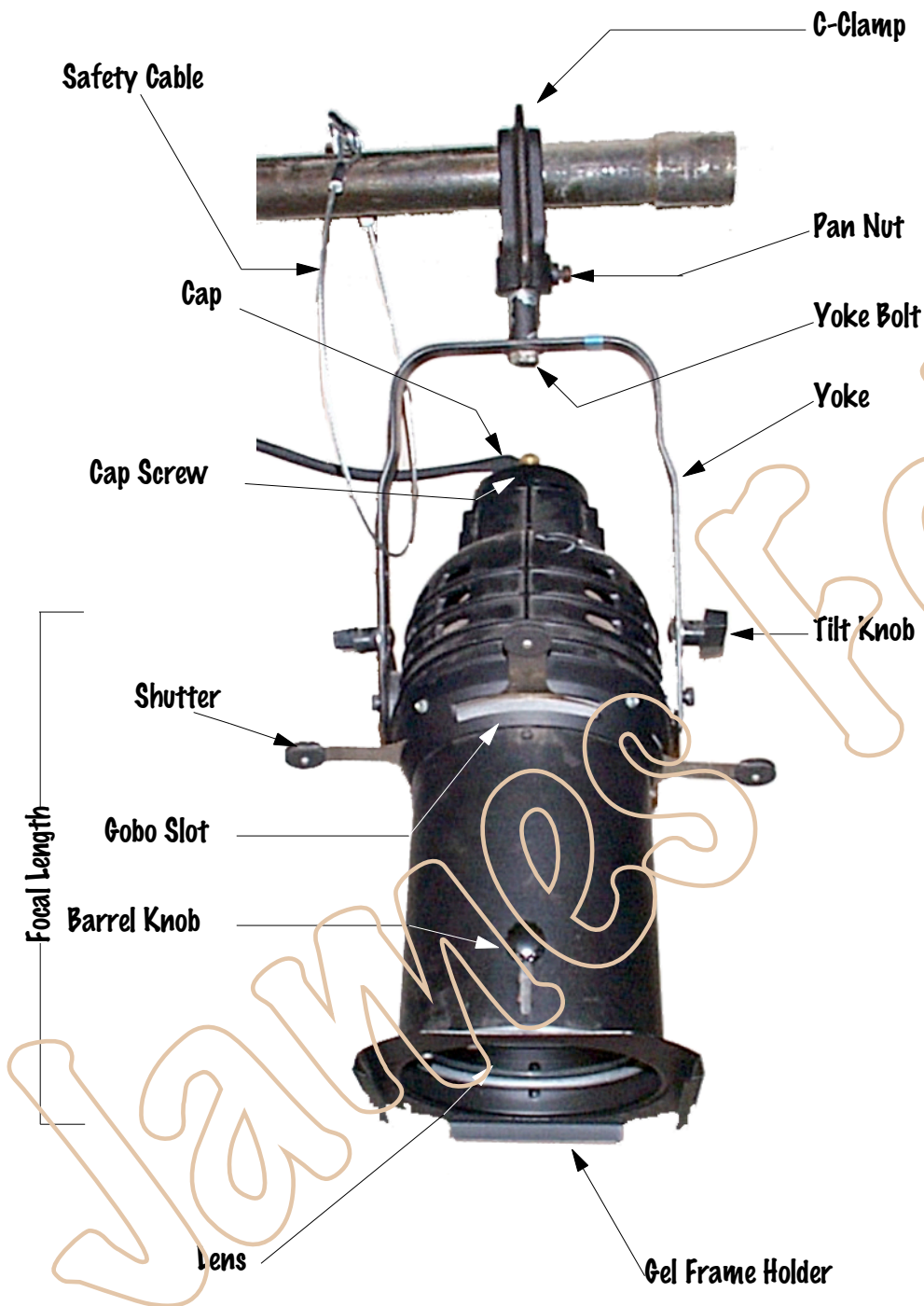


ERS/LEKO



The **Ellipsoidal Reflector Spotlight** is the most controllable of conventional theatrical lights, and is typically the most common instrument in use. It is often referred to as a **Leko**, which is actually a brand name from the mid-20th century, so **ERS** is the preferred term for this type of unit. Most of our ERS are Altman 360Q's. The Source Four from ETC, introduced in the 1990's, is considered to be the next generation of ERS. We don't have any, but if you work in any other theatres you'll probably run into them. The concepts are all the same, regardless of the manufacturer.

ERS come in different **sizes**, described either by beam spread (in degrees, for Source Fours) or by focal length and lens diameter (in inches, for Altman's). For instance, many of our ERS are 6x9's and 6x12's. This means that the diameter of the lens is 6", and the **focal length** (the distance from the lens to the lamp) is either 9" or 12". The larger the focal length, the longer the unit. So it's easy to tell a 9 from a 12 from a 16 from a 22 when they're next to each other. It's harder when they're far apart. When in doubt, measure the focal length (I use my handsread).

An ERS will generally hang on the pipe using a C-clamp (a lighting C-clamp is very different from the carpentry clamp with the same name, so don't get confused). The clamp bolt should be tightened with a crescent wrench one-quarter to one-half turn past finger tight. Don't go crazy tightening it down; you'll just gouge the pipe. **Make sure you hang the instrument right-side up.** An easy way to check is to look at the gel frame holder. If the open side is down, such that the gel would fall out, then it's upside down.

Hanging an ERS

Once the light is on the pipe, **attach the safety cable** through the yoke and over the pipe. Make sure the safety runs under any cable, so there's nothing between the safety and the pipe. **Rough focus** (aim) the light in the correct direction, and gently tighten all of the nuts, bolts, and knobs so nothing slips before focus.

As the last step before you plug in the unit, **OPEN THE SHUTTERS.** This is crucial, as if the shutters are completely closed when the lamp is turned on, the heat from the light will burn through the shutters. Once they're open, **circuit** the unit, which means to plug the light into the appropriate circuit. A circuit is basically an outlet, but instead of being powered directly, it runs through a dimmer so it can be controlled by the light board.

When it's time to strike a light, the first thing you should do is close the shutters. This will help protect them as the light gets moved around, and hopefully keep the shutters from being bent and damaged. Then drop it so it hang straight down and lock it in place. Remove the safety from the pipe and leave it hooked through the yoke, so every unit always has a safety attached. Finally, loosen the C-clamp bolt and lift the light off the pipe. In Shiley, we'll generally store unused lights on an upstage lineset, you you'll probably hang it there. Those units should be just past finger tight, with safeties attached to the pipe.

Focusing an ERS

First, make sure the shutters are open, the unit is safetied, and it's plugged in. Then **loosen** the pan and tilt bolts or nuts just enough so that you can move the light, but not so much that it wiggles. **Panning** is to move the light sideways, to the left and right. To pan, loosen the pan nut on the C-clamp, or if that's broken or the light is over-hung, loosen the yoke bolt. **Tilting** is to move the light up or down. To tilt, loosen the handle where the yoke attaches to the light. Some designers will ask you to pull color and templates before focusing.

The designer will ask you to pan and tilt the light until it's focused where she wants it. She may ask you to put the **hot spot** somewhere, which generally means the center of the light. Each pool of light will have one spot where it is brightest, and the light diminishes farther away. If the light is properly maintained, the hot spot will be in the center, but on some of our units it may be off to one side. You may also be asked to **flag** the light, which means to wave a hand or foot in front of the unit to indicate which pool of light is being adjusted.

Once the light is focused, you should tighten the pan and tilt adjustments so it stays in focus. This is known as **locking it** in position.

The **shutters** can be used to shape the beam of light. There are four shutters, one for each side. Because they're before the lens, they are reversed by the optics. This means that the top shutter controls the bottom cut, the left controls the right, and so on. Likewise, **gobos**, which go into a frame and then into the slot by the top shutter, should be upside down and backwards.

When you're finished with the focus and shutters, drop in the color (the gel in a frame in the front holder) and the template (or pattern or gobo, in a frame in the slot by the shutters), and move on to the next unit.

Changing an ERS Lamp

The **lamp** is the light bulb. Theatrical lamps run very hot, to the point where anything on the surface of the lamp, including finger oils, will cause the quartz glass to bubble and eventually shatter. So it's very important to **NEVER TOUCH THE GLASS** with your bare hands when handling a lamp. Use a glove, or the plastic sleeve that comes with most lamps in the box.

To change a lamp on an ERS, first **unplug** the unit. You'll need to remove the **cap** on the back of the unit. Unscrew the brass thumbscrew, which will come free of the body but stay in the cap. Then lift the cap straight off the unit, so that the lamp does not scrape against the reflector. Be very careful, as if the lamp has just blown it will be far too hot to touch for several minutes.

ERS will generally use EHD (500W, for 6x9's) or EHG (750W, for 6x12's and up) lamps.

To remove the lamp, pull it straight out from the socket. It's best to grasp only the metal or ceramic base, and you may need to wiggle slightly. The new lamp will go straight in until it locks. If you see too much of the base, then the lamp is not in all the way. You will need to push firmly to get it completely seated in the socket.

Then put the cap back on the unit and tighten the thumbscrew. Plug it back in, and you're done.

Other Ellipsoidal Spotlights

The **Source Four**, from Electronic Theatre Controls (ETC), was introduced in the 1990's as a major redesign of the Ellipsoidal Reflector Spotlight. It has a removable, interchangeable lens tube, making it possible to change the beam angle of the instrument just by swapping barrels. It has an improved mirror design which allows the use of smaller wattage lamps to achieve the same light output. In addition to saving electricity, and allowing more instruments per dimmer, the lower-wattage lamps are much cooler, allowing the use of many more accessories in the gobo slot.

Source Four ERS's are identified by their **beam angle** in degrees.

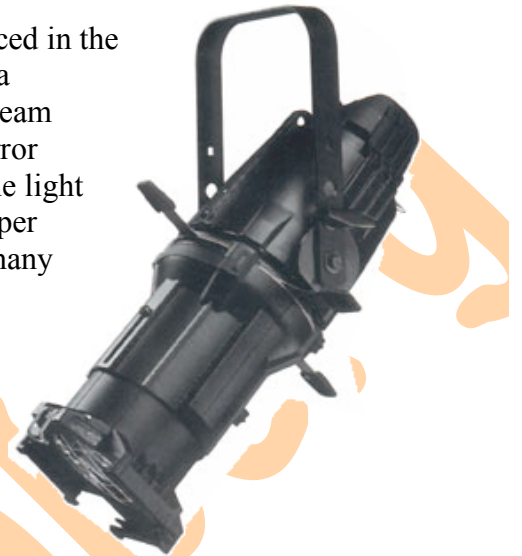
A 50° is roughly equivalent to a 4.5x6, a 36° to a 6x9, a 26° to a 6x12, a 19° to a 6x16, and a 10° to a 6x22. A 5° lens tube, which does not have a 6x equivalent, is also available. The 5° and 10° lenses are much larger than the other tubes.

The Source Four ERS hangs and focuses just like an Altman ERS, including the C-clamp, pan nut, yoke bolt, tilt knob, and shutters, and it has a right-side-up. Unlike an Altman, it is possible to **rotate the barrel** independently of moving the unit, which makes it much easier to arrange gobos and shutter cuts. This is accomplished by loosening a knob on the bottom of the unit behind the shutters (towards the cap), and then grasping the barrel to rotate it. Once it's in position, tighten the rotation knob. The focus can be **sharpened** (or fuzzed) by loosening the barrel knob and moving the lens tube in and out, just like on an Altman. But if you remove the barrel knob (or both the top and bottom barrel knob if it has them), you can pull the lens tube out the front and **swap the lens tube** for one with a different beam spread. Be sure to keep the knobs with the lens tubes. Source Fours use a smaller **6.25" gel frame**, and have a spring-loaded **gel frame clip** to hold the gel frame in place. To open the clip, push it to one side and then flip it up. There is also an **accessory slot** in front of the gobo slot, which fits things like irises and gobo rotators. To open the slot, loosen the two Phillips-head screws and slide the cover forward. You may also need to slide the lens tube forward to fit the accessories into the unit.

The **Source Four Junior** has the same improved optics and reflector as the Source Four, in a smaller and less expensive package. The biggest differences are that the lenses are not interchangeable and the barrels do not rotate. It uses the same 6.25" gel frame as the Source Four ERS, but the tiny M size gobo, which greatly reduces the available gobo slot accessories.

A note on gobo sizes:

There are three sizes of gobo in our inventory. "A," the largest, "B," the most common, and "M," the smallest. Altman 6-by's use B size. Source Fours can use A or B. Source Four Juniors and the "baby" Altmans use M. This means we have 5 sizes of gobo holders: to put a B size gobo in an Altman, to put a B size gobo in a Source Four, to put an A size gobo in a Source Four, to put an M size gobo in a baby Altman, and to put an M size gobo in a Source Four Junior. For now, you just need to remember that not all gobo holders are equal so that you know to find the right size holder before installing a gobo.



The **Fresnel** light is named for the Frenchman who invented the stepped lens used in this type of unit. It gives a more diffuse light that can cover a large area and is less controllable than the ERS.

The fresnel uses the same type of C-clamp and yoke as an ERS, so it works in much the same way.

Hanging a fresnel is just like hanging an ERS. Put it on the pipe, tighten the C-clamp bolt, attach the safety, rough in the focus, and circuit the unit. Again, check the gel frame holder to make sure you're right-side up.

Focusing a fresnel is also similar to an ERS. Loosen the pan nut (or yoke bolt) and tilt knob, get the hot spot into position, and lock it down.

One thing that a fresnel can do that a traditional ERS can't is adjust the size of the beam of light. By moving the position of the lamp and reflector relative to the lens, you can change the unit from **spot to flood**. This is accomplished by loosening the wing nut on the bottom of the unit and sliding it forwards and backwards.

Because the optics of the fresnel are less complicated than the ERS, there are no shutters and it cannot take a gobo. If a designer needs to control the edges of the beam of light, he or she can use **barn doors**, which are basically four flaps on a framework that slips into the gel frame holder. By moving the flaps, you can block part of the light. But since it's after the lens, it's much less precise than shutters.

Changing a Fresnel Lamp

As with the ERS, it is important to **NEVER TOUCH THE GLASS** with your bare hands. Use gloves. If you do touch the glass, use an alcohol swab to clean off your finger oils.

To gain access to the lamp on a fresnel, lift up on the **lens release** pin on the top of the unit. This will allow the lens assembly to hinge forward and swing down, revealing the interior of the unit. Our fresnels use a bayonet base, which works sort of like a child-safety cap. Push down on the lamp, spin it approximately a quarter turn, and it should release. The lamp has two differently-sized flanges or tabs on the base. When installing the new lamp, make sure you line up the correct flange with the correct opening in the socket. Push down and turn until it locks. Lift up the lens release, flip up the lens and pop it into place, and then release the release. Make sure the pin has dropped in correctly, so you can't pull the lens open.

FRESNEL

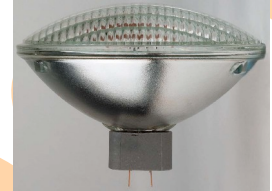


PARs

PAR stands for Parabolic Aluminized Reflector. PARs are used to project a big, bright beam of light that can really punch through the lighting and make an object stand out.



The traditional PAR instrument is often called a **PAR Can**, because the instrument itself is really just a metal shell that holds the PAR lamp. Unlike in most other theatrical lighting instruments, the PAR lamp contains the light source, the reflector, and the lens. The beam spread of the instrument can be changed by **swapping the lamp**. Because the reflector is a parabola, the beam of light has a long axis and a short axis.



Like all of our instruments, it hangs with a C-clamp from the yoke, so it has a pan nut, a tilt knob, a yoke bolt, a safety cable, etc. It uses a 10" gel frame, and often has a spring-loaded clip on the top of the unit to hold the frame in place. It has no shutters, but it can take **barn doors** in the gel frame holder, just like a fresnel. On the back of the lamp is a porcelain rectangle that holds the electrical connections. This is known as the **bottle**. By reaching in to the back of the unit and spinning the bottle, you can change the axis of the reflector, which will rotate the beam of light.

PAR lamps come in different diameters and are identified by their size. We use mostly 1000W **PAR-64**'s, but we also have some smaller 500W PAR-56's in our inventory. PAR lamps are available in a variety of beam spreads, including wide flood (WLF, pronounced wiffle), medium flood (MFL or miffle), narrow spot (NSP) and very narrow spot (VNSP). Aside from looking for markings on the back of the lamp, you can tell the beam spreads apart by looking at the lens. VNSP will be practically clear and NSP will be frosted. MFL will have 8 ridges in one direction (and a whole bunch in the other direction), and WFL will have 16 ridges in one direction (and the same whole bunch in the other).



The alternative to the PAR can is the **Source Four PAR**. Like the other instruments in the Source Four line, but unlike the PAR can, the lens, lamp, and reflector are all separate parts. S4 Pars use the same 575W lamp as the Source Four ERS and Source Four Jr. and a similarly re-designed reflector, allowing them to run cooler and more efficiently. Like a PAR can, you can choose between WFL, MFL, NSP, and VNSP, but on an S4 Par you simply pop out the lens and pop in a new one. Lenses are held in place by a spring clip inside the front of the unit. To spin the bottle, you simply turn the **lens rotation ring**, behind the gel frame holder. It hangs with the same C-clamp from the yoke as the other stage lights, giving it the same pan and tilt options. The S4 Par uses a 7.5" gel frame with a slightly larger opening than in the Altman 7.5" frames, and has the same gel frame clip as the other Source Four units.

