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Chauvet Professional Legend 230SR Beam

By: Mike Wood

Figure 1: Fixture as tested.

We last examined a product from Chauvet in January of last year. Since then, the company has continued producing amazing numbers of new products across the gamut, from mobile DJ products units available in Guitar Center stores under its Chauvet DJ brand, to more sophisticated gear aimed at the semi-professional and professional markets under the Chauvet Professional brand. The Legend 230SR Beam is part of the latter range and joins other Legend products aimed at the professional user. The star products of the past year in moving lights have been the ultra-narrow beam projectors that have been appearing as aerial effects units in apparently ever-increasing numbers on every kind of show, from TV light entertainment to rock-and-roll tours to Olympic opening ceremonies. The Legend 230SR Beam is the Chauvet Professional entry into that market space. As with all Chauvet products, it's competitively priced and designed to a tight budget. How does it perform, and could it fill a hole in your lighting rig?

The review follows my usual format: We start with the lamp and follow through the optical train, measuring every parameter as we go, ending with the light coming out of the front. I try to take measurements as objectively as possible, so you can evaluate the unit for yourself. With the Chauvet Professional Legend 230SR Beam, the data comes from tests I carried out on a single unit supplied to me as typical by Chauvet. As I've mentioned with other lights of this type, this is primarily a visual unit designed for aerial effects. As such, figures on lumens and lux are not as important. It's the way the output looks to the eye and camera that matters. Beam contrast and separation are as much a part of this product style as beam intensity. Even more than with other product styles, it's important to test these ultra-narrow beam units out for yourself in your own venue to see if they do the job for you. All tests were run on a nominal 115V 60Hz supply; however, the Legend 230SR Beam is rated to run on voltages from 120 – 240V 50/60Hz (Figure 1).

Lamp

Figure 2: Lamp.

The Legend 230SR Beam uses the new Osram Sirius HRI 230 lamp (Figure 2). This has a bare lamp burner capsule, which is supplied prealigned in a dichroic-coated glass ellipsoidal reflector. The lamp has a 1mm arc gap and is rated to produce 10,000 lamp lumens at 8,000K with a relatively low CRI of 75 and a life of 3,000 hours. Remember that this is an effects fixture, so that low CRI is not that important. Clearly, this Osram lamp is designed as direct competition for the Philips MSD Platinum 5 R and, indeed, it shares many characteristics in common. It's a similar efficacy but rated at a higher power and thus a correspondingly higher output. The small arc gap means it has a low etendue and is an ideal lamp to produce a tight beam, as it is used here. As with other lighting fixtures of this type, Chauvet Professional further narrows the beam by using very small gobo apertures and throwing a lot of the peripheral light away; a peaky beam is to the company's advantage.

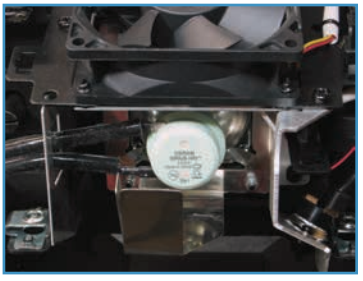

Figure 3: Lamp in place.

Figure 3 shows the lamp in position, surmounted by a fan providing essential cooling. You can also see the associated temperature sensor in the bottom right of the same photo. In my opinion, lamp change is a weak point of the Legend 230SR Beam. To access the lamp, you need to remove both head covers, the rubber light leak seals, and the two screws securing the fan plate above the lamp. The problem is that none of these parts are captive. You end up juggling a lot of parts in your hands, which would be a problem if you were trying to change a lamp in a rig from a ladder. Once all those pieces are removed, the lamp and its reflector snap into spring-loaded clips; that part is simple. I mentioned my concerns to Chauvet, and the company has undertaken to improve it.

Dimmer and strobe

Right in front of the lamp is a hot mirror, immediately followed by the dim/strobe shutters. Figure 4 shows a view into the gate from the lamp side. You can clearly see the hot mirror, held in place with red silicone adhesive, and the serrated teeth of the two strobe/dim flags right behind it. Each flag has its own stepper motor, and they perform both dimming and strobe functions. Because of the extremely peaky (deliberate) light distribution, these don't work that well as a dimmer. The dimming curve is very oddly shaped (Figure 5), with nothing much happening above 80% or below 30%; it all happens between those two figures, and the dimming is uneven and patchy. However, the same is true of other beam projector lights in this class, so perhaps it doesn't matter. It's a light for aerial effects, so nice pattern-free dimming is not that critical. You aren't going to be using it for flat-beam gobo projection on a cyc cloth. Strobing worked well with measured speeds from 0.4Hz to 12Hz. The control channel offers the usual range of different strobe types, ramp-flash, random, and so on.

Figure 4: Dimmer shutters.

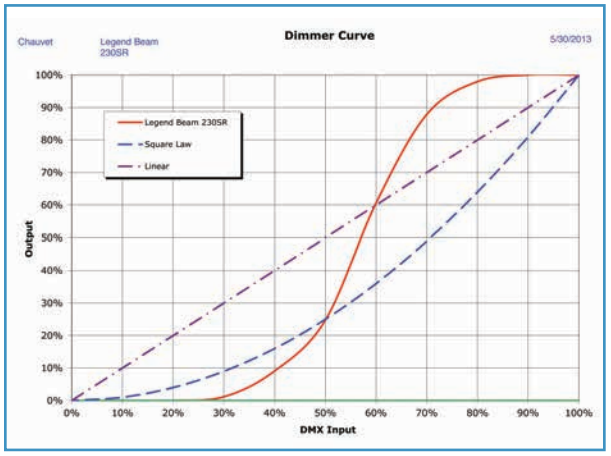

Figure 5: Dimmer curve.

Color wheel

The color wheel is close up to the dimmer flags. This is a fixed wheel with 14 colors plus an open hole. The dichroic filters are glued to the wheel, so they aren't replaceable, nor is the wheel easily changeable. Figure 6 shows the filters as they appear across the aperture and, in this case, the smallest gobo. The filters are trapezoidally cut and are placed close to each other to minimize the black bar between adjacent colors and allow half-color effects.

Figure 6: Color wheel.

Osram specifies the lamp as 8,000K. However, it's quite a way off the black body line, so it was difficult to measure the color temperature with the CTO filter. If the CCT is important to you for video, you should try it yourself with your cameras to see how it looks.

Color change speed is very fast, with the small wheel and colors.

FIXED COLOR WHEEL

Color	Red	Yellow	Cyan	Green	Pea Green	Lavender	Pink	Amber	Magenta	Blue	Straw	CTO	CTB	Congo
Transmission	3.8%	25%	22%	10%	34%	27%	49%	58%	25%	29%	40%	42%	55%	5.2%

COLOR WHEEL

Color change speed – adjacent	< 0.1 sec
Color change speed – worst case	0.6 sec
Maximum wheel spin speed	0.325 sec/rev = 185 rpm
Minimum wheel spin speed	330 sec/rev = 0.2 rpm

Rotational movement of the wheel was smooth, with few steps visible. Half-colors are pretty good, with a narrow black line between the colors.

Gobo wheel

The Legend 230SR Beam has a single gobo wheel. Because the patterns are cut into a single large wheel, they are not changeable, nor is it possible to easily switch out the wheel. The wheel has 17 patterns cut into it, plus an 18th, which is the open hole. I'm calling the open hole an extra gobo, as the Legend 230SR Beam, like the products from its competitors, actually has a much larger beam than the open hole would suggest. The beam is very peaky from the lamp, which is usually a problem with the optical system in lights; however, in this case, it becomes a virtue as you

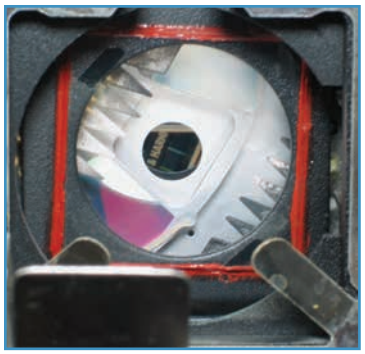

Figure 7: Open hole.

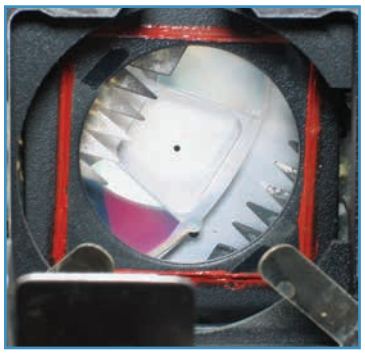

Figure 8: Smallest gobo.

mask off everything but the peak in the center and get a very tight, bright beam. Figure 7 shows the open hole, while Figure 8 shows the smallest gobo. The focus quality is acceptable for an aerial effect projector; this is not a gobo projector. The optical system is so short and fast that the focal plane must be curved quite steeply unless the gobo wheel has domed gobos. Then it can never have sharp focus at both the edge and center at the same time. (The focal plane is always curved to some extent with standard lenses; usually, this curvature is small and can be compensated for with lens design. Very short, fast systems have extreme focal plane curvature, and it is difficult to correct. This is an issue with cell-phone cameras as well. Curved sensors would be a great solution.)

As with the color wheel, moves and rotations were smooth and fast.

GOBO WHEEL

Gobo change time – adjacent apertures	< 0.1 sec
Gobo change time – max (Gobo 0 – 7)	0.6 sec
Maximum wheel spin speed	0.55 sec/rev = 109 rpm
Minimum wheel spin speed	41 sec/rev = 1.5 rpm

Prism and frost

The frost and rotating prism are next in line, both mounted to the same movable carriage. The frost is variable. However, this doesn't provide a variation in frost effect; it does allow you to move the frost flag across the beam from one side to the other. As you do so, the visible frost effect also moves across the beam, with the beam becoming fully frosted when the flag is totally covering the aperture. The frost doesn't affect the beam size much, so it behaves as a frost, not as a diffuser or focus softener. It took 0.3 seconds to insert or remove the frost flag.

The prism has eight facets and may be rotated. Insertion time was 0.4 seconds, with a range of rotation speeds from 45rpm down to 0.16rpm. Image separation was good and is adjustable by moving the carriage containing the frost and prism back and forth along the optical axis. This gave a range of about 1.33: 1 in the spread of the eight images from the prism. Figure 9 shows a view of the optical system and the frost flag.

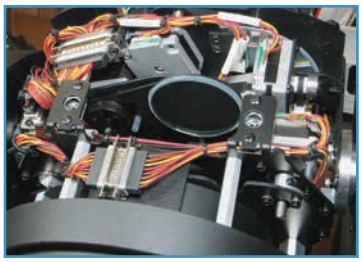

Figure 9: Optical module and frost.

Lenses and output

The main optics of the Legend 230SR Beam are two large-diameter lens groups at the front of the unit. The rear of these two groups moves to provide focus control, while the front group is fixed. Time for full movement of the focus lens from end to end was 1.4 seconds.

Measurement of these tight beam units is tricky. The beam distribution is extremely peaky, and it is not symmetrical, which means that my normal technique of using numerical integration to get a total lumen figure isn't very accurate. I now have a mirror in my workshop that I've calibrated for light loss so I can get a good long throw, but I still wasn't happy with trying to measure total lumens on such an asymmetrical beam. Instead, I'm reporting the beam profile and the candela values in Figure 10. As I stated earlier, lumens is not that useful a measurement for a narrow angle beam unit anyway. It is relative intensity and contrast that matter.

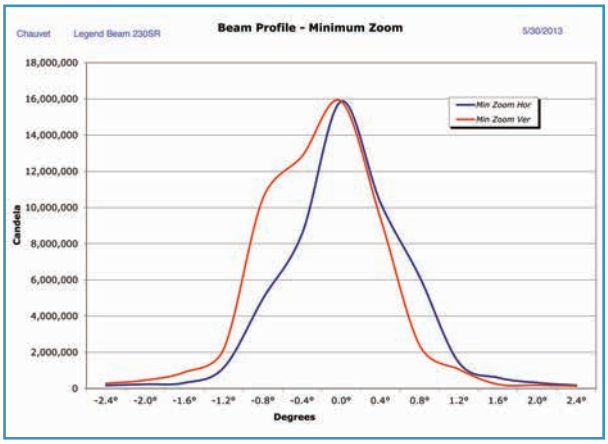

Figure 10: Beam profile.

I measured the cut-off angle with the open aperture as 4.8°, field angle of 2.4°, beam angle of approximately 1.6°. With the smallest gobo in place, the cutoff angle dropped to 0.6°. At that point, it's just the central bright spike that is getting through the system.

Of course, what you really want to know is how bright it

is compared to the competitive units. It's hard to say. The center illuminance of the Legend 230SR Beam is a little lower than another, very similar, unit I've measured. However, the total light output is a little higher. You'd have to compare them side-by-side to make a judgment. It's very subjective, as issues such as beam contrast, edge definition, and fog/haze density play an equally important role.

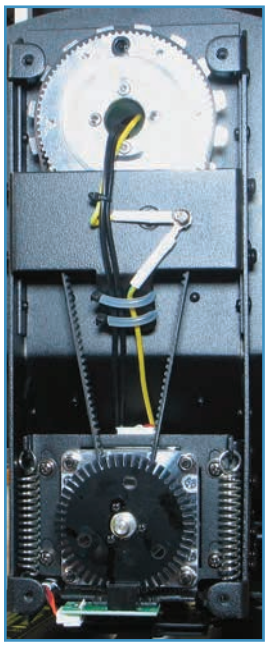

Figure 11: Tilt motor and drive.

Pan and tilt

The Legend 230SR Beam has measured pan and tilt ranges of 540° and 246° respectively. Pan took 2.7 seconds to traverse the full 540° and 1.3 seconds for 180°. For tilt, the unit took 1.4 seconds for 246° and 1.2 seconds for 180°. Movement was slightly bouncy on pan, less so on tilt. I also heard a couple of missteps on high-speed pan moves, which the optical encoders then corrected. The bounce on pan shows that it is a tight system, and the hysteresis figures reflect this at 0.16° on pan and 0.04° on tilt. These are equivalent to 0.7" and 0.2" at a 20' throw respectively. Figure 11 shows the tilt system in one of the yoke arms.

Noise

The fans in the Legend 230SR Beam, which are necessary for the unjacketed lamp, also produced a steady noise level. The noise levels from other motors and effects were very little louder than the fans, the exception being pan and tilt at some speeds where motor whine was noticeable.

SOUND LEVELS

Ambient	<35dBA at 1m
Stationary	46dBA at 1m
Homing/Initialization	55dBA at 1m
Pan	55dBA at 1m
Tilt	51dBA at 1m
Color	46dBA at 1m
Prism	47dBA at 1m
Gobo select	46dBA at 1m
Focus	47dBA at 1m
Prism separation	47dBA at 1m
Strobe	48dBA at 1m
Frost	46dBA at 1m

Homing/initialization time

It took the Legend 230SR Beam 40 seconds to complete a full initialization from power up and 19 seconds to rest the motors when the lamp was running. The unit was badly behaved on motor reset, with the shutter reopening before the unit had moved to its final position. The lamp is not hot restrike, but, with the fans running, only took about 30 seconds to cool down enough to be able to restrike.

Power, electronics, and control

In operation on a nominal 115V 60Hz supply, the Legend 230SR Beam drew 2.92A when stationary. I measured this as a power consumption of 345W and a power factor of 0.99. The consumption peaked at 3.61A, or 426W, when all motors were running.

Figure 12: Menu and display.

Chauvet provides its standard menu and display system on the Legend 230SR Beam, as can be seen in Figure 12. This provides the usual expected functionality to adjust parameters and DMX512 settings as well as maintenance and setup features.

Electronics are distributed throughout the unit, with the bulk of the motor drivers in a yoke arm and all power supplies and DMX512 input and control in the top box. Figure 13 shows the two motor driver boards in the yoke, while Figure 14 shows a view into the top box and power supplies.

The connector panel (Figure 15) provides five-pin DMX512 XLRs and three-pin XLR data connectors, as well as power input through a Powercon connector.

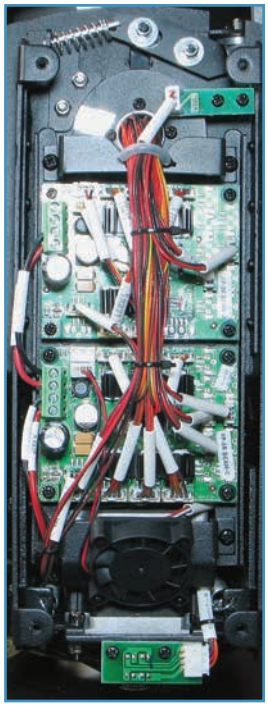
Figure 13: Driver electronics.

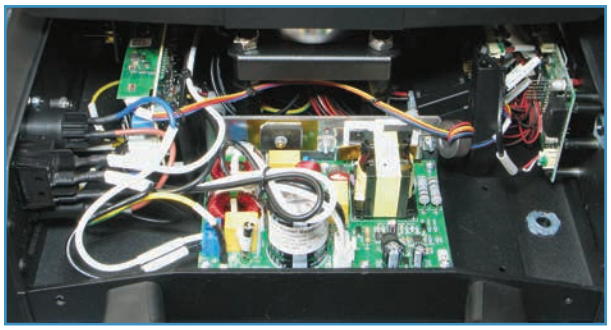

Figure 14: Power supplies.

Figure 15: Connections.

Construction and serviceability

As I mentioned earlier, many of the components of the Legend 230SR Beam aren't captive, and this makes any kind of work while the unit is in the rig tricky. I'd want to work on the unit on the bench at all times. Construction utilizes the typical chassis with removable plastic covers that is ubiquitous among moving lights. There's not much modularity. However, once on a bench, disassembly is straightforward and obvious.

That's about it for this review of the Chauvet Professional Legend 230SR Beam. It enters a very specific niche product market that, so far at least, has been dominated by a single manufacturer. Can the Legend 230SR Beam threaten that domination with the new Osram Sirius lamp? Even more than usual, that's up to you, as this is a very subjective type of lighting effect. I've presented the raw data, so now you get to decide.

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