
Fig. 1

The Chauvet Legend 3000

by Mike Wood


Fig. 2. Voltage-select switch


Fig. 3. Lamp, condenser, and reflector


Fig. 4. Gobo and color wheels

This month, we're looking at a fixture from one of the newer suppliers to the moving-light market—Chauvet—and its Legend 3000 automated spot fixture. There used to be a clear demarcation line between fixtures designed for the professional or touring market and those designed for installations in less rigorous environments. That line isn't there any more—the technology needed to make a solid, reliable moving light has matured to the point where you can reasonably hold up lower-priced units to the standards that, five years argo, you would only expect from top-of-the range products. The Legend 3000 falls right into that category; it's a well-priced 250W workhorse product that deserves a proper evaluation.

The Legend 3000 is one of a new range of DMX-512 controlled moving-head products from Chauvet. The 3000 is the middle of the range and includes both static and rotating gobo wheels. As a 250W unit, it should be suitable for smaller venues and for small tours, as well as an accent unit on larger installations. Styling follows the current industry norm, with plastic injection-molded covers over a metal chassis (Figure 1: Unit as tested).

As always, this review follows our established format—working forward in the fixture from lamp to output lens, presenting the measured results in as objective a manner as possible. All results are based on averaging multiple readings, but they are all from one specific unit, so you may get slightly different results in your tests.

The Legend 3000 is fitted with a conventional magnetic ballast and linear power supplies driven from a transformer; thus, it is important to check the voltage tappings are correct before powering up. The fixture has a simple voltage-select switch, which allows running on 115V, 220V, 230V, or 240—all at 50 or 60Hz, so there's no excuse for getting this wrong! In all tests below, the fixture was run set at 115V, 60Hz (Figure 2: Voltage-select switch).

Lamp

The Legend 300 uses the Philips MSD 250/2 or Osram HSD250 lamp. The MSD250/2 and HSD250 are well-established, long-life lamps (2,000-3,000 hours) used in many moving lights. The unit was supplied and tested with the Osram HSD 250. It's a very forgiving lamp, easy to cool, and provides good service—the price you pay for that long life and ruggedness is a fairly wide arc gap, which means that you can't get the highest optical efficiencies.

Installing the lamp into the Legend 3000 is slightly tricky--it plugs into a deeply recessed lampholder in front of the reflector. Installation in this spot necessitates holding onto the lamp's outer envelope, so make sure to either wear gloves or use a clean, dry cloth to protect the lamp envelope from the grease and oils in your fingers. Once installed, there is no lamp-adjustment system (Figure 3: Lamp, condenser, and reflector).

As I said earlier, cooling is pretty easy with this lamp—its needs are simple. The Legend 3000 uses a single radial fan to cool the whole unit. The fan always runs at full speed and I saw no signs of overheating.

As you can see in Figure 3, the lamp is mounted radially, between a spherical reflector and a single condensing lens. This condenser optic arrangement is getting rarer in automated lights—we used to see it a lot—and now is seen mainly in units from Italian manufacturers, but it has largely been replaced by elliptical reflector systems. The spherical reflector/condenser lens system has its pluses and minuses—typically, the system has excellent focus, low spherical aberration, and good flat field, due to the effective point source that the arrangement produces. However, it captures much less light than an elliptical reflector and thus provides a less efficient system. Indeed, the Legend 3000 had a lower output than some other 250W units.

As started earlier, lamp power comes from a

Fig. 5. Focus quality

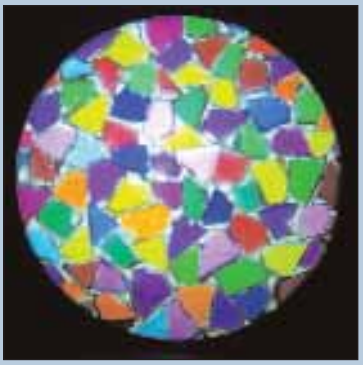

Fig. 6. Rotating gobo

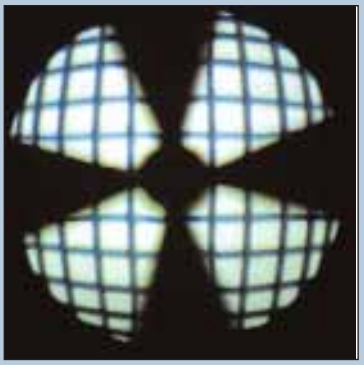

Fig. 7. Morphing.

Fig. 8. Half-colors

conventional magnetic ballast with power factor correction.

Gobos

The overall layout of the unit can be seen in Figure 4 (Gobo and color wheels). The lamp house is below the fan at the top of the picture, followed by the gobo wheels and the color wheel.

The Legend 3000 has two gobo wheels—the first contains nine static gobos and the second six rotating gobos. All gobos are changeable through the use of spring clips. I found the procedure slightly tricky—I suggest you carry this out on the bench before rigging, rather than trying to do it from the top of a ladder when the fixture is hanging in a rig. Access to both the wheels is achieved by removing the five screws that secure the top injection-molded head cover. None of the screws are captive, which is another reason for making this a bench operation.

The gobos are small, but focus quality was excellent, as you would expect from the condenser optic system (Figure 5: Focus quality). You can see some slight blue fringing (chromatic aberration) but very little difference in the focus between center and edge of the beam (spherical aberration). The rotating gobo image quality is also good (Figure 6: Rotating gobo). However, we now see one of the minor issues with a condenser system—try and morph between the static and rotating gobos and you really can't do it. The focus is so good that you can't actually get them out of focus enough. Figure 7 (Morphing) shows that both the overlaid static and rotating gobos are in reasonable focus at the same time—of course, from another perspective, if you want to overlay gobos rather than morph then this is a positive rather than a negative attribute!

Static Gobo Wheel

Gobo change time, adjacent apertures	0.3 sec
Gobo change time, max (Gobo 0 to 4)	1.3 sec
Maximum wheel spin speed	1 sec/rev = 60 rpm
Minimum wheel spin speed	143 sec/rev = 0.4 rpm

Rotating Gobo Wheel

Gobo change time, adjacent apertures	0.5 sec
Gobo change time, max (Gobo 0 to 3)	1.2 sec
Maximum gobo rotate speed	0.7 sec/rev = 86 rpm
Minimum gobo rotate speed	55 sec/rev = 1.1 rpm
Maximum wheel spin speed	1 sec/rev = 60 rpm
Minimum wheel spin speed	97 sec/rev = 0.6 rpm

Indexing and wheel-positioning accuracy on the rotating gobo wheels were fine. Measured hysteresis error was around 0.2° which is just less than 1" at a 20' throw.

A couple of points worth making about the above data: Neither wheel had "quick-path" ability—that is, the software always turned the wheel in the same direction rather than taking any shortcuts. In this case, that meant, when changing from Gobo 9 to Gobo 1 on the static gobo wheel, the wheel turned back through all the gobos in between; 8, 7, 6, etc., rather than rotating in the other direction and taking the short cut from Gobo 9 to 1. This is reflected in the slow maximum gobo change times reported above. (Note: One good thing about not having quick path is that you never go through the open hole.) Quick path is a simple feature that Chauvet might want to look at adding into their software, as it would reduce the worst-case gobo change time to less than a second. Secondly, wheel spins are possible in one direction only—clockwise.

Color wheel

The Legend 3000 has a single color wheel fitted with 11 fixed dichroic colors. The colors are close enough together so that, with the cooperation of the condenser system, you are able to achieve some good half-color effects (Figure 8: Half Colors).

As is usual with discharge lamps, which have a relatively high color temperature (particularly with the MSD250/2, which has almost no red at all), reds are the weakest colors in terms of output.

Fig. 9. Focus lenses

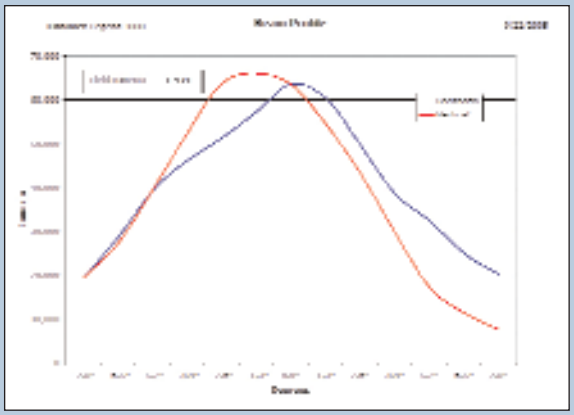

Fig. 10. Output

Fig. 11. Full upen beam

Color Wheel

Color	Steel Blue	Orange	Green Blue	Bright Blue	Bright Pink	Red	Deep Blue	Yellow	Dark Pink	Moss Green	Light Blue
Transmission	74%	18%	34%	32%	14%	3%	11%	53%	42%	17%	41%

Color change speed was good—however, as with the gobo wheels, the software doesn't support "quick path" and wheel spin is only available in one direction.

Color Wheel

Color change speed - adjacent	0.15 sec
Color change speed - worst case	1.2 sec
Maximum wheel spin speed	0.73 sec/rev = 83 rpm
Minimum wheel spin speed	113 sec/rev = .5 rpm

Lenses and output

The Legend 3000 uses a straightforward, three-element, air-spaced system for its output lens system: Elements One and Two move together, providing focus (Figure 9: Focus lenses) while the third element is the static front lens. Focus time from end to end was a quick 0.75 sec. The output field angle is fixed and was measured at 15.5°, with total field lumens of 1,971 lumens. This output figure is somewhat on the low side for a 250W unit and is undoubtedly a consequence of the spherical reflector and condenser optics coupled with a large arc and small apertures (Figure 10: Output). Figure 11 shows the full open beam.

Dimmer and strobe

Next in the optical train, and falling between the focus lens elements and the final output lens, is the dimmer and strobe mechanism—this uses a fairly standard pair of shaped aluminum flags driven from a single stepper motor (Figure 12: Dimmer and prism). These flags close like jaws over the exit aperture to provide both dimming and strobing functions. Figure 13 (Dimmer curve) shows the measured output dim curve compared with hypothetical linear and square laws. The actual curve from the Legend 3000 is more like an 'S' law and was actually fairly smooth and easy to use. It introduced very few artifacts in the beam while dimming and was really only noticeable at the lowest dim values.

The strobe system was very quick indeed. I measured a speed range of 0.5Hz - 7Hz. All the usual pulse and random strobe modes are available.

Prism

The last element before the final output lens is the three-facet prism. This can be seen on the left of Figure 12. A straightforward arm brings the prism into the beam when needed. The prism is well-sited in the optical train and gave good image separation.

Prism

Prism in/out time	0.4 sec
Maximum prism spin speed	0.4 sec/rev = 150 rpm
Minimum prism spin speed	9 sec/rev = 6.7 rpm

Pan and tilt

The fixture has a large pan-and-tilt range of 570x270°, with very good speed. A pan move of the entire 570° took 4.2 seconds, while a more typical move of 180° took two seconds. For tilt, the full 270° took 2.4 seconds while 180° took 1.8 seconds. The software allows the option of running the pan and tilt in eight-bit or 16-bit resolution—all tests were carried out in the 16-bit resolution mode. (Note: Unfortunately, the high-byte and low-byte channels are separated in the DMX-512 protocol, which means many desks cannot take advantage of the 16-bit mode.)

Repeatability on both pan and tilt was 0.11°, which equates to about 0.5" at a 20' throw. As we've seen on the last few reviews, this tightness leads to a bit of bounce when stopping from high speed-however, the Legend 3000 isn't a very heavy unit, so it still managed to perform very well in this respect.

Both pan-and-tilt axes are fitted with encoder wheels and so provide automatic position reset if the fixture is knocked out of position (Figure 14: Yoke arm).

Fig. 12. Dimmer and prism

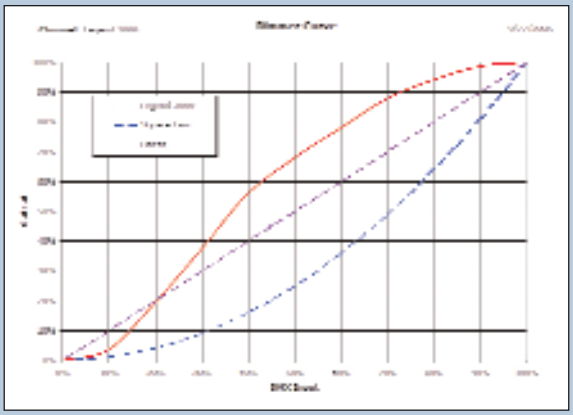

Fig. 13. Dimmer curve

Fig. 14.Yoke arm

Noise

Sound levels were fairly constant throughout the tests, as the single head fan provided most of the noise. Apart from the fan, the noisiest system was the focus motor.

Sound Levels

Ambient	35 dBA at 1m
Stationary	52 dBA at 1m
Homing/Initialization	56 dBA at 1m
Pan	54 dBA at 1m
Tilt	55 dBA at 1m
Color	52 dBA at 1m
Prism	55 dBA at 1m
Gobo rotate	54 dBA at 1m
Focus	58 dBA at 1m
Strobe	55 dBA at 1m

Because the noise is mainly from the head fan, there were noticeable differences in noise level as the unit moved around and the fan pointed towards or away from the listener. These changes can sometimes be more noticeable than a constant level noise.

Electrical parameters

Power consumption at 115V, 60Hz

	Max Current, RMS	Power Factor
Initializing - lamp already ON	3.3A	0.95
Initializing - lamp OFF	6.7A	n/a
Normal running	3.3A	0.95

The Legend 3000 offers two options for start-up—the default mode will first strike the lamp and then wait before powering up the electronics. This reduces the maximum surge current but increases the time for a "cold" start. The second option is more normal and strikes the lamp at the same time as powering up and initializing the electronics. Both modes have their problems—in the default mode, the lamp strikes up and runs for 70 seconds before the motors power up. So, depending on where the fixture was left when powered down, you get uncontrollable light out of the fixture for those 70 seconds. The second mode gives a problem with the electronics—there is insufficient protection in the fixture against interference from lamp strike voltages and the unit jerks about randomly until the lamp is fully struck. Overall, I would recommend using the default mode and making sure you power up the units before the audience is present.

Once the fixture is powered up you can issue Initialization commands to the motor control system through a DMX-512 control channel. This initialization is well behaved.

Homing/initialization time

In default mode, for the lamp to strike and then for the motors to initialize: 137 seconds.

For a warm start when the fixture is already powered up and the "reset" command is sent: 67 seconds.

Electronics and control

The menuing system offers a good range of normal options, as you would expect from a modern fixture. All the usual functions are easily available. I admit to being slightly frustrated by the unit only providing non-standard three-pin XLR connectors for DMX-512, as all my cabling uses five-pin. However, once we got over that, everything worked fine with the DMX-512 implementation.

In conclusion, I had a few quibbles about the operation of the Legend 3000, but, overall, it performed very well. The 250W sector of the market is a busy one, and highly competitive, but the Legend 3000 is priced right for that competition.

Is the Chauvet Legend 3000 right for you? As usual I leave you to draw your own conclusions.

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