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The Morpheus PanaBeam XR2

by Mike Wood

A new moving light that that moves like no other

First, I have to say thank you for the positive feedback received on the first of these reviews, in the October 2004 issue—-it has encouraged us to continue. Any comments, queries, or recommendations for future reviews would be gratefully received.

This month, we have chosen a fixture that's relatively new on the scene—the Morpheus Lights PanaBeam XR2 washlight. Although it's been shown in early prototype form at trade shows for a year or so performing its trademark spin, it's only recently that the unit went into full production. This unit is a 1,200W automated wash light and thus enters a busy sector of the market with some major competition; however, it has a few tricks up its sleeve that Morpheus clearly believes will distinguish it from its competitors.

Again, this review will attempt to lay out measured parameters and details in as complete and objective a manner as possible, with the intent of leaving readers in a position to judge the conclusions for themselves.

In all tests, the fixture was run at 245V, 60Hz from a two-phase supply; however, the PanaBeamXR2 is fitted with auto-sensing universal lamp and motor power supplies and is rated for 100V-240V 50/60Hz +/- 10% (See Fig.1).

Fig. 1.

The lamp

The lamp used is the Philips MSR1200sa—this is the short-arc version of the well-known MSR1200 lamp and is configured as an unjacketed axial source. The lamp is mounted on a G22 base and, like all of the MSR short-arc unjacketed lamps, needs carefully-controlled cooling. Morpheus mounts the lamp in an easy-to-access drop-down lampholder tray. All parts, including the fixing screws, remain captive, making this a safe truss change. The tray connects through integral connectors (visible at bottom of Fig. 2) which ensure that the supply is disconnected automatically when accessing the lamp.

Cooling is provided through a large-diameter blower and an interesting arrangement of turbine-like blades, which presumably provides a vortex flow around the lamp pinches. The blower speed is dynamically controlled to suit the operating needs (Fig. 3).

(Note: The MSR short arc lamps are particularly awkward to cool—you need to concentrate cool air flow on the heat-sensitive lamp pinches while leaving the central lamp envelope hot to ensure correct operation of the halogen cycle and a constant color temperature output).

Also, note from Figures 2 and 3 that the dichroic coated reflector is a two-part unit with a rear ellipsoidal section and a front spherical section to help capture a wider cone of light and improve efficiency. The whole assembly is topped with the usual hot-mirror reflector to keep heat away from the downstream optics.

This cooling system, although not the quietest, seemed to work extremely well. The fixture remained very cool to the touch throughout the testing, with no external parts exceeding 60° C and the color temperature of the lamp remained visibly constant, with no sign of overheating on the lamp pinches. The system uses ducted air from a single large blower and relies on correctly directed airflow through the whole unit for correct operation so it will not operate correctly without the unit covers in place. I tested this and, indeed, the unit shut down to protect the lamp after a few minutes of running without the covers.

Modular Construction

The optical systems are split across two removable, modules. Each module is self-contained, with its own motors, optics, and drive electronics and only has power and data connections to the rest of the unit. These modules were very easy to replace and I wouldn't be worried about changing them while the unit was still in the rig, if necessary. It's clear that Morpheus has taken some care in designing the unit for easy servicing.

Figure 4 shows the two modules in the head—each one slots into runners and is held in place by two captive screws. Both modules use an identical motor drive circuit board (Fig. 5) with a DIP switch setting on each board distinguishing their function.

Color System

First in line is the color and dimming module (Fig. 6). This uses a fairly conventional CMY dichroic gradient wheel system with the addition of a variable CTO wheel. The CTO system is particularly useful in that it has a very broad range of adjustment—it's probably a double CTO when at its maximum—and allows color-

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Left: Fig. 2: Lamp and connector.
Above: Fig. 3: Reflector and cooling blades.

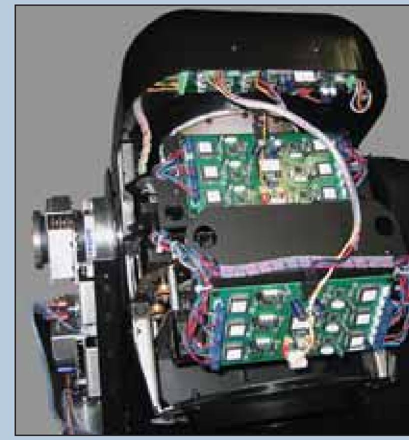

Fig. 4: Head showing removable modules.

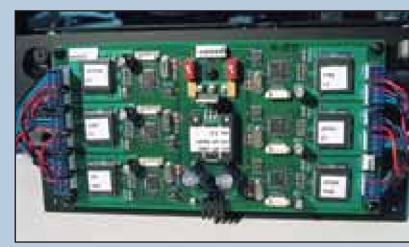

Fig. 5: Motor drive board.

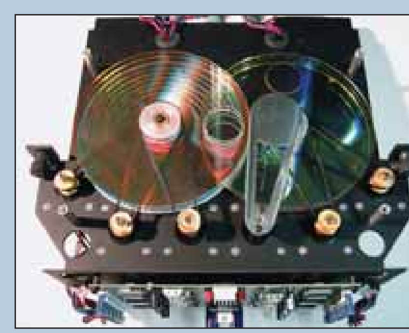

Fig. 6: Color and dimming module.

Fig. 7: Color gradient wheel in two positions.

temperature control to well down below 3,000K from the lamp's native 6,500K. This broad range also allows it to be used as a color-mixing element in its own right. The etched gradient pattern is slightly unusual—with the pattern having the appearance of a brick wall (for any bricklayers reading this, the bricks are laid in running or stretcher bond). Figure 7 shows the Magenta wheel in two different positions.

Mixed colors are smooth, with aberrations only visible when the unit is in its narrowest zoom angle. In that position, very slight color differences could be seen across the beam when mixing pastel and pale mid-tones.

Color mixing

Color	Cyan	Magenta	Yellow	Red	Green	Blue
Transmission	50%	11%	61%	4%	21%	7%

Color change speed - worst case	0.25 sec

The transmission readings show a relatively high efficiency in the cyan and lower efficiencies in magenta and red. This is to be somewhat expected, as the MSR lamps emit primarily in the blue end of the spectrum with relatively little red; however the red produced is very saturated, avoiding the "orange" problem so often seen. The yellow filter was more of an acid yellow than is usual in mixing systems but, overall, the color-mix system was very good and I was able to produce a very acceptable gamut of pastels, mid-tones and primaries; also, the system was able to mix the difficult test colors of lavender and amber without problems.

The speed of color change was excellent, with a very snappy 0.25 sec change from anywhere on the wheel. This makes for impressive color strobe effects.

Dimmer and strobe

The color-mix module also contains the dimmer and strobe systems. The dimmer uses an aluminum wheel with the same "house brick" variable-density pattern as the color-mix wheels and performed very well. Dimming was smooth and even, with very few anomalies even at the very bottom end. The dim curve produced was an acceptable match to a standard square law (Fig. 8) with more feel at the bottom end. Personally, I prefer this dimming curve to a linear one, as it matches the eye response well, giving you the best control where you need it most.

I should also note that there is an electronic dimmer available through the DMX control

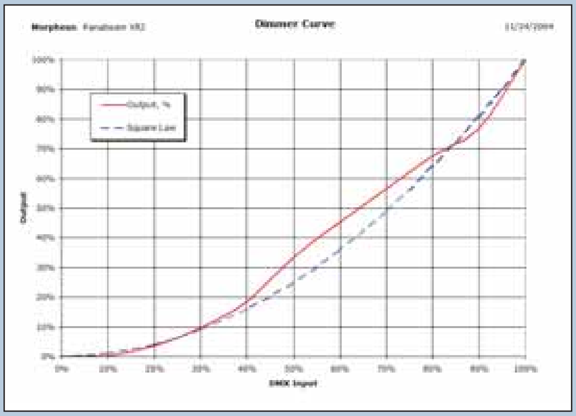

Fig. 8: Dimming Curve.

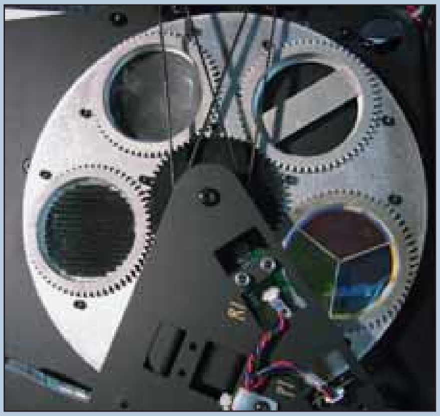

Fig. 9: Effects wheel.

Fig. 13: Semicircle gobo on Effects 2.

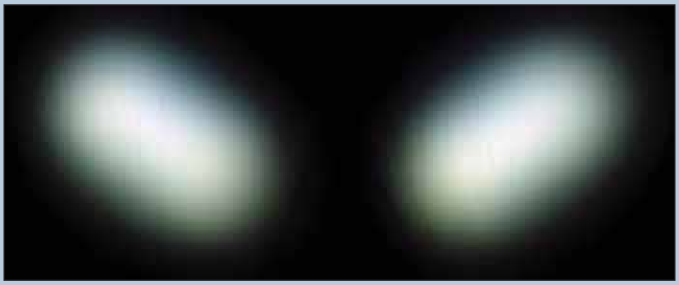

Fig. 10: Beam-shaping, narrow.

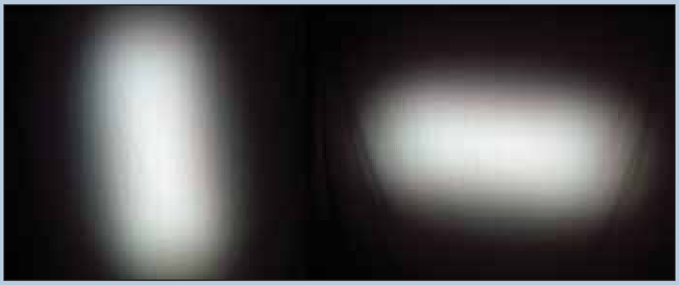

Fig. 11: Beam-shaping, wide.

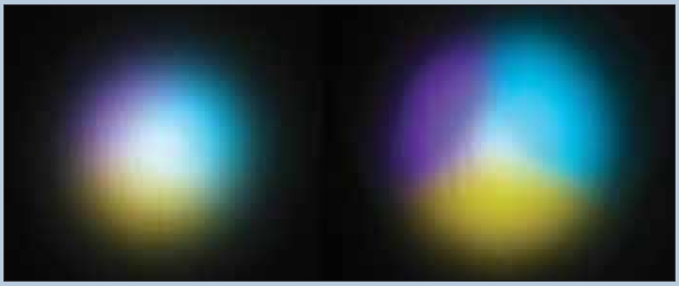

Fig. 12: Color effects, narrow and wide.

Fig.14: Beam size mechanism.

channel where you can switch the lamp from its usual 1,200W operation down to 600W. I measured the output when in 600W mode to be 43% of the full 1,200W output. The color temperature does change when this switch is made and it takes a few minutes for the lamp to settle down, so this is probably not designed as a regular operational feature.

Strobing by the separate flag (clearly visible in Figure 6) was positive and quick with a measured range from 0.71Hz to 12Hz. As it is a separate assembly, clean dimming while strobing is possible.

Effects System

The second module contains the effects and beam-size systems. The two effects wheels are conventional, belt-driven, four slot + open, rotating assemblies (Fig. 9). Each wheel contains a similar assortment of effects—a ribbed, lenticular beam-shaping lens, a single cylindrical lens, a multi-colored dichroic filter, and what can only be described as a gobo. The lenses on each wheel can be overlapped so that the user has access to both narrow and wide beam-shaping. Figures 10 and 11 show the beam-shaping effects from the two wheels, each at two different angles. The user has full control over the rotation of the beam shaping through 360°.

The multi-color dichroics are interesting. The effect varies as the beam size is changed—for comparison, Figure 12 shows the color filter on Wheel 1 when the beam size is in the narrow and wide positions.

Rotating Effects

Effect change time, adjacent apertures	1.0 sec
Effect change time, max (Effect 0 to 2)	2.0 sec
Maximum effect rotate speed	1 sec/rev = 60 rpm
Minimum effect rotate speed	60 sec/rev = 1 rpm
Maximum wheel rotate speed	1 sec/rev = 60 rpm
Minimum wheel rotate speed	12 sec/rev = 5 rpm

I have to say I found the two metal gobos (center bar and semicircle) on the effects wheel to be of limited application. The semicircle on Effects 2 gave the clearest result of the two and was most effective when rotating. You could use them in combination as animation effects (Fig. 13).

The module also has a variable frost mechanism—not a huge effect being a wash light, but useful as it does reduce the center hotspot; it also pushes the widest field angle out to around 40°. The same wheel as the frost also has some fixed effects—including a deep, saturated red dichroic.

Finally, we come to the beam size mechanism—I call it "beam size" rather than "zoom," as it is very unusual and the effect it gives is not the same as conventional zoom lens systems. Morpheus acknowledges this and instead describes it as a "dissolve" effect between narrow and wide.

What Morpheus has done is to take a Fresnel lens and slice it up, pizza style, into eight wedges. Each wedge can move radially in and out of the beam. Figure 14 shows the mechanism in three different positions—from left to right: narrow, intermediate, and wide. As you bring in the lens segments, the edges of the beam are spread out, while, in the intermediate positions, the center of the beam is unaffected. The effect of this to the eye is of a softening and spreading of the beam edge while the center hot spot remains unaltered. It's not a displeasing transition and one I can see application for. The user will need to spend a little time getting accustomed to the system, though, and learning how it differs from a regular zoom system—the effect is very different and probably unique—so much so that Morpheus recently had a patent issued on this mechanism. Take a look at US patent 6,817,737 if you are interested to learn more.

Very often, the output from the optical system used in wash lights gives you maximum total lumen output at wide angle, with output reducing as the beam is constrained to narrow angles. The PanaBeamXR2 system behaves in the reverse manner—maximum output is achieved when the Fresnel lens is completely out of the beam, i.e., the system is at its narrowest angle; see Figure 15. You can see the pronounced hotspot, with very little reduction in center output at 50% spread in Figure 16. and, finally, the output when the Fresnel lens is fully closed up in Figure 17. Maximum output at around 23,000 lumens is not the highest you'll see from a 1,200W wash light but is in the right ballpark for the class.

Pan, tilt—and spin!

One of the unit's main claims to fame is the pan-and-tilt system. Morpheus has engineered this to allow continuous rotation of the unit in both pan and tilt, with no end stops. This means that power and data has to be supplied to the head through commutator systems on both axes. Figure 18 shows a general side view of the unit with the yoke arm cover removed and Figure 19 shows one of the tilt axis slip ring systems. (There are similar systems on both sides of the fixture around the tilt bearings and a single larger system in the top box around the main pan bearing.

The DMX control protocol allows the user to make the system emulate either a standard 540° pan and 270° tilt (or 360° and 360°) system with virtual end stops or to have the fixture completely free to rotate. When in this free mode, it is possible to tell the unit to take the shortest or longest path from any position to any other. It takes some getting your head around but it's a very powerful and flexible system.

Pan & Tilt - virtual endstop mode

	Range	Min time, full range	Min time, 180°	Hysteresis error
Pan	540°	3.5 sec	2.2 sec	0.67°
Tilt	270°	2.5 sec	2.1 sec	0.67°

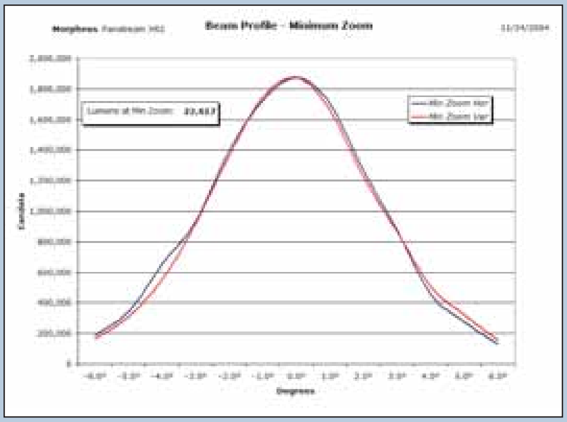

Fig. 15: Output at narrow angle, 12° field angle.

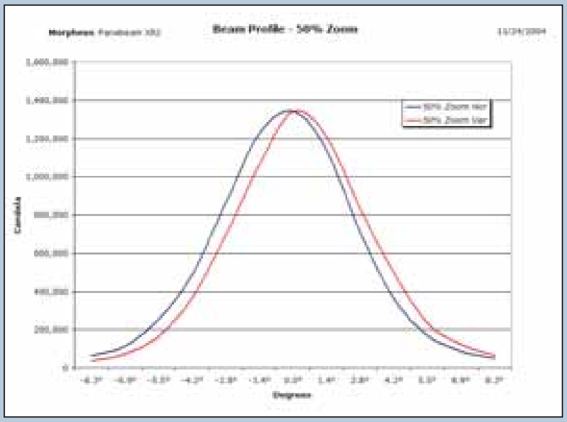

Fig. 16: Output at 50% beam size, 17° field angle.

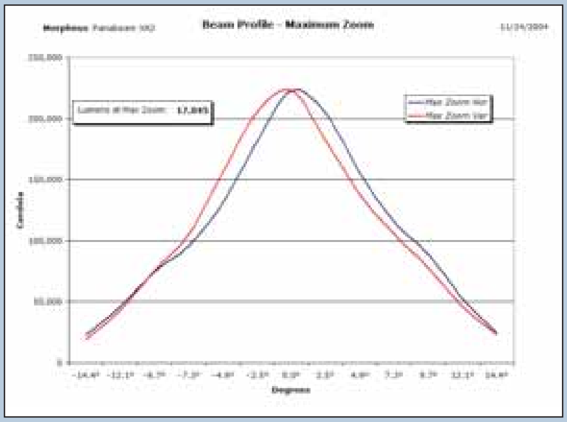

Fig. 17: Output at wide angle, 29° field angle.

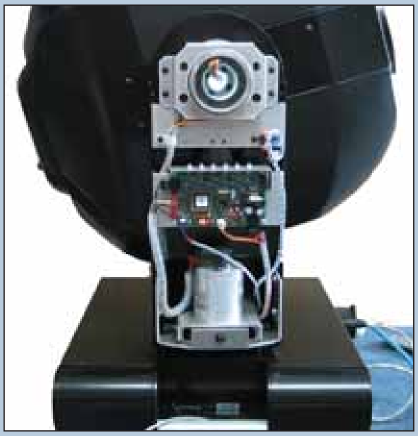

Fig. 18: Side view, showing servo motor and slip ring assembly.

Fig. 19: Close-up of tilt slip ring assembly.

Fig. 20: Servo motor and encoder.

All this freedom means that spinning the head is not only possible but positively encouraged—I measured a range of speeds on both pan and tilt of 1.2 rpm minimum up to a scary 48 rpm at full speed. The gyroscopic forces on the system at those speeds must be quite high but I never lost the home position in my testing.

As you can also see from the data above, the system is very quick in positioning mode and a closer look at Figure 18 reveals why—the large silver cylinder at the bottom of the yoke is a DC servo motor, in this case the pan motor (Note: The pan motor is mounted in the yoke rather than in the top box, as is more common—it makes no difference to the operation of the unit) and Figure 20 shows a close-up view of the same motor and its attached optical encoder. These motors produce a lot of torque, significantly more than the more usual stepper motors, and I was hard-pressed to hold the unit stationary when trying to test how well the unit coped with hitting obstructions. The twin belt 30:1 reduction drive system helps as well, although is probably partly responsible for the fairly high hysteresis figures. Although this error was slightly higher than normal, it is still within acceptable limits, particularly for a wash light where small position errors are not noticeable. This seemed to me to be an error that was correctable in firmware so may well be fixed by the time you read this.

Noise

The noise levels from the system were fairly constant; the cooling necessary for the MSR1200sa means a lot of air movement from the fan which, even though it is thermostatically controlled, is essentially running at all times.

Peak levels of 60 dBA at 1m were produced by the strobe system, 3dB above the noise floor of around 57dB. Pan-and-tilt moves did not measurably increase this. Movements of the effect system, although not that loud, did produce an obvious whistle at some speeds.

Many thanks to Morpheus Lights for providing the fixture and agreeing to participate in this review.

Homing/Initialization	69 dBA at 1m
Pan	59 dBA at 1m
Tilt	57 dBA at 1m
Color	57 dBA at 1m
FX change	58 dBA at 1m
FX rotate	58 dBA at 1m
Strobe	60 dBA at 1m
Stationary	57 dBA at 1m

Electrical Parameters

Power consumption as tested at 245V

	Max current	Power Factor
Electronics, initializing	6.6A	n/a - spike
Electronics, stationary	5.4A	0.7
Electronics, all motors	5.8A	0.65

Homing/Initialization Time	20 sec

Electronics and Control

The unit has a conventional layout with main electronics and control in its top box. The menu system with its vacuum fluorescent display is clear, flicker-free, and easy to navigate with a standard four-button system. There's nothing unusual about the DMX channel allocation, either. The lamp is driven from a square-wave switching power supply. Thanks to this and the efficient cooling system the lamp cool down time was minimal and I had no problems quickly restriking the lamp even while it was still warm.

Conclusions

As will continue to be the custom in this series, there are no conclusions; those are for you to determine. I hope the information in this review helps you determine if the Morpheus PanaBeamXR2 wash light will work for you.