Copyright Lighting&Sound America September 2015 http://www.lightingandsoundamerica.com/LSA.html

The Philips Vari*Lite VL4000 BeamWash

By Mike Wood

After a year or so of small, LED-based lights in small packages arriving at my door for review, the tide seems to have turned back towards large lights in manly road cases. I'd have preferred that to happen when I was younger, but I'll go with the flow. This month, we look at such a product from a manufacturer whose name is still synonymous with the evolution of moving lights, Philips Vari-Lite, and its latest offering in the VL4000 range, the VL4000 BeamWash. At 101lb (46kg) this is a serious luminaire, requiring two people to lift it onto the test bench.

There also seems to have been a trend in the last year or so towards multi-purpose luminaires that can perform the three roles of gobo projection, wash, and tight aerial beam production in a single package. The VL4000 BeamWash enters that arena. How does it perform and how does it compare with its competitors? As ever, I'll do my best to measure and report what I can to help you make up your own mind.

I should start with some explanation of nomenclature. Vari-Lite uses slightly different terms than other manufacturers to describe functionality in the VL4000 BeamWash and I think it bears some explanation, so you understand what I'm talking about. When Vari-Lite describes the VL4000 BeamWash as offering a "beam" mode, they mean a light that can project gobo images. That's a function that I, and many other manufacturers, including Vari-Lite in other fixtures, call "spot." Conversely, what other folks call "beam," i.e. a narrow, almost parallel beam, for aerial effects, the VL4000 calls "shaft" mode. Finally, we all agree what is meant by wash mode, no problem there. In this review, I will use the Vari-Lite term, with the more customary term in parentheses. For example, the VL4000 BeamWash is a multi-purpose luminaire that offers beam (spot), wash, and shaft (beam) functionality. When I asked Vari-Lite about this, I was told, "We called it beam mode rather than spot as the VL4000 BeamWash was not designed to be a refined spot-style fixture (like the VL4000 Spot or VL3000 Spot), but was more intended to be used as an aerial effect fixture (similar to the VL3500 Wash FX). Its imaging and general beam capabilities were purposefully designed to be peaky, with high center beam foot-candles rather than a crisp, flat, even field."

Figure 1: Fixture as tested.

The results presented here are based on the testing, with the fixture operating on a nominal 230V 60Hz supply, of a single VL4000 BeamWash unit supplied to me by Philips (Figure 1).

Lamp and lamp access

The VL4000 BeamWash uses the Philips MSR Gold 1200 FastFit lamp. This is provided with sufficient cooling and control so that it can run at 1,400W when the VL4000 is in its standard operating mode (Philips Lighting rates this lamp for running at 800W to 1,400W). The lamp change is simple, as with all the FastFit lamps. Figure 2 shows both the lamp and the lamp access. The lamp is nominally rated at 95,000 lumens, 6,000K when run at 1,200W. The temperature-controlled lamphouse is capped with the expected hot mirror leading the light into the main optical train.

Figure 2: Lamp change.

MIC MONTH

AMPLIFIED SAVINGS
ON POPULAR BRANDS

CONDENSER VOCAL INSTRUMENT

...AND MANY MORE

FULL COMPASS

Call 800-356-5844
Shop fullcompass.com

Pro Audio • Video • Lighting • Musical Instruments

Fringe-Free Shadows And A Myriad of Hues From Rosco's Miro Cube™

F. Murray Abraham (left) and Michael Park (right) illuminated by Miro Cubes in "The Threepenny Opera." Photo Credit: Kevin Thomas Garcia

Miro Cube™ 4C fixtures were used as footlights in Threepenny Opera at the Atlantic Theater Company. The color-mixing fixtures allowed lighting designer Christopher Akerlind to subtly change the hue of the white light and cast crisp shadows against the set.

"Miro Cubes make good white light, particularly cool white. It's clean without the problematic multi-shadows of RGB(W) that can be tricky with other fixtures."

- Christopher Akerlind

Miro Cubes are available in three models: the color-mixing Miro Cube 4C, the variable color temperature white Miro Cube WNC and the powerful Miro Cube UV black light.

rosco
www.rosco.com

Dimmer and strobe shutters

The VL4000 has dimmer and strobe flags using a finger-cut pattern immediately after the lamphouse. There is a field lens/aperture stop further down the optical train between the two color wheels that helps homogenize the light. This does a good job, as the dimming is very smooth and even across the whole beam, with very few to no beam artifacts

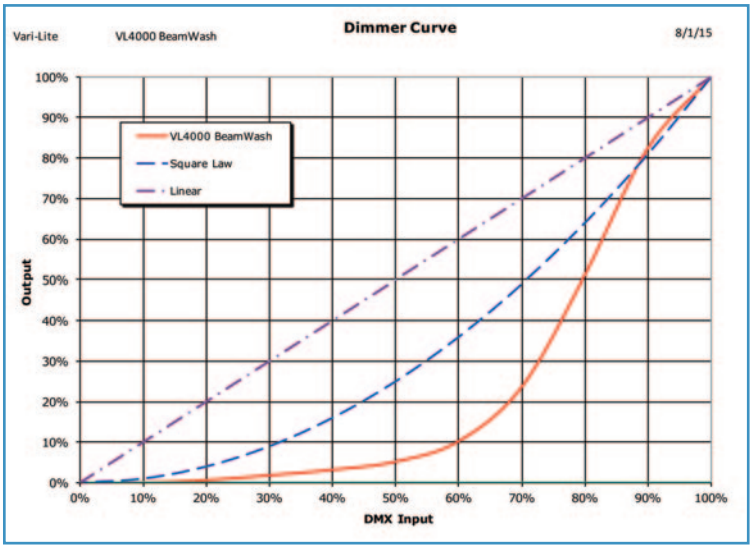


Figure 3: Dimmer curve.

even at the very bottom end of dimming. Figure 3 shows the dimmer curve. It's a square-law type of curve that is a little top-heavy, with most of the dimming happening between 100% and 60%. The strobe function through flags offers a mechanical shutter that I measured providing strobe rates from 0.47Hz — 9.9Hz.

Color systems

The VL4000 BeamWash has both four-color CMY/CTO color mixing and two color wheels. First in the optical train immediately after the dimmer are the color-mixing flags. These are four sets of linear curtain dichroic filter pairs providing control of the usual cyan, magenta, yellow, and CTO. As I've mentioned before, this methodology seems to have pretty much taken over in the industry from the single etched color mixing wheels that we used to see. Color mixing from this system (also situated before the field lens) is smooth, with a small amount of visible edge color fringing when trying to mix pale pastels.

COLOR MIXING

Color	Cyan	Magenta	Yellow	Red	Green	Blue	CTO
Transmission	31%	22%	59%	8.3%	1.9%	12.2%	17%

Color change speed – worst case	0.2 sec

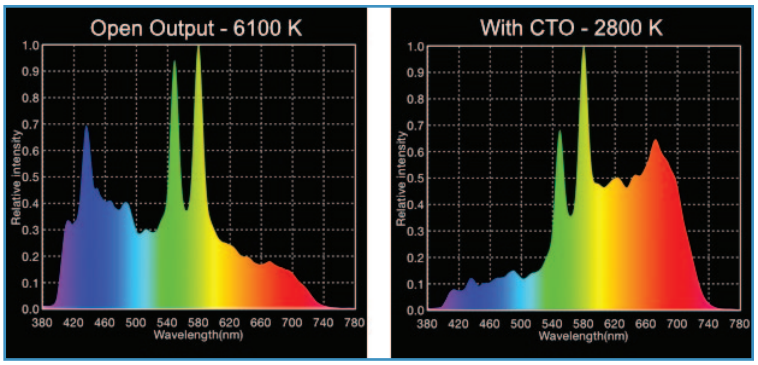


Figure 4: Spectra.

The CTO wheel smoothly adjusted the color temperature from 2,800K up to the native 6,100K when fully out of the beam. Figure 4 shows the normalized output spectra both with and without the CTO in place.

Following on from the color-mix system are the two fixed color wheels with, as already mentioned, a combination field lens and aperture stop mounted between them (Figure 5). My guess is that this is there to help with beam homogenization after the color mixing and dimming. The two color wheels both offer five trapezoidal dichroic filters and an open position. The colors are semi-replaceable in that they are held in place both by a central clip and some silicone around the edge. Replaceable if you need to, but not without removing the wheel.

COLOR WHEEL 1

Color	Red	Fuchsia	Orange	Green	Congo
Transmission	3.7%	16%	8.0%	18%	20%

COLOR WHEEL 2

Color	Blue	Green	Minus Green	Lavender	Amber
Transmission	12%	34%	89%	25%	17%

COLOR WHEEL SPEED

Color change speed – adjacent	0.1 sec
Color change speed – worst case	0.3 sec
Maximum wheel spin speed	0.35 sec/rev = 171 rpm
Minimum wheel spin speed	84 sec/rev = 0.7 rpm

Color wheel movement was quick and smooth.

Figure 5: Color wheel.

Trust your Ultratec machines with only premium Ultratec Fluids to ensure **Optimal Performance and Reliability.**

THE BEST MACHINES DEMAND ONLY THE BEST FLUID

THERE ARE NO SUBSTITUTIONS

Safe for use on live stage performances

Our fluid has been included in the "Equipment Based Guidelines for the Use of Theatrical Smoke and Haze" that has been prepared with the support of Equity League Pension and Health Trust Funds et al., and can be used in compliance with ANSI standards for theatrical fog and the PLASA (previously ESTA) Fog Testing Program.

ultratec special effects™

www.ultratecfx.com

Canada - USA - Germany

Phone: 519-659-7972 / Toll Free: 800-388-0617

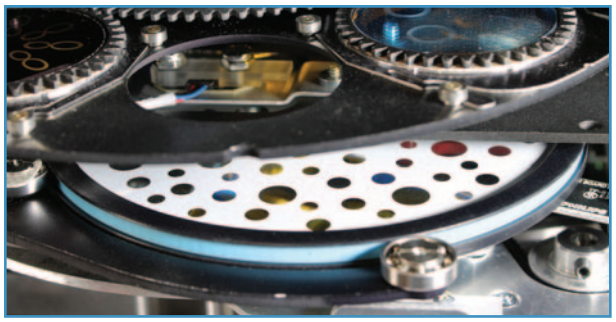


Figure 6: Animation wheel.

Animation wheel

Just after the color systems and before the gobos, the VL4000 BeamWash offers an animation wheel that can be moved across the beam, rotated, and the axis of rotation moved anywhere between a vertical and horizontal movement (Figure 6). The optical system is a little slower than you might expect, so the effect from the animation wheel is a little bit different than from other luminaires—not bad, not wrong, just different. I suggest you take a look at it yourself.

It took approximately one second to insert or remove the wheel. Once in place, it can be rotated at speeds from a maximum of 0.85 sec/rev (71rpm) down to a slow speed of 96 sec/rev (0.63rpm).

Gobo wheels

The VL4000 BeamWash has two rotating gobo wheels, each of which has seven replaceable glass gobos and an open slot. Figure 7 shows one of the two identical wheels and the glass gobos in their holders. A new feature I'm seeing in a number of products these days is the addition of alignment marks on rotating gobo wheels to assist in replacing gobos with the correct rotational alignment. Figure 8 shows both the gobo carrier used in the VL4000 BeamWash as well as the alignment marks on the central and carrier gears. The operator should take care to line these up when replacing a gobo cartridge.

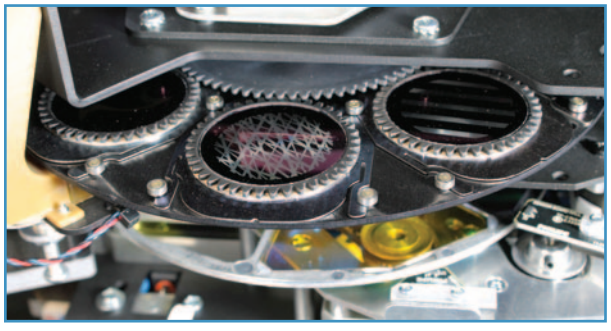


Figure 7: Gobo wheel.

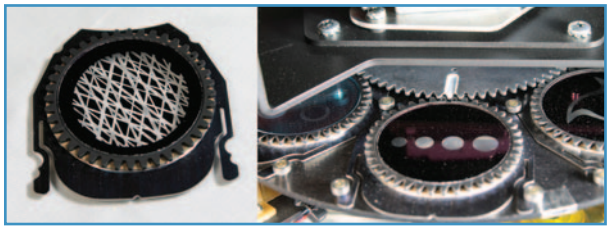


Figure 8: Gobo holder and gobo alignment.

ROTATING GOBO SPEEDS

Gobo change speed – adjacent	0.3 sec
Gobo change speed – worst case	0.9 sec
Maximum gobo spin speed	0.275 sec/rev = 218 rpm
Minimum gobo spin speed	105 sec/rev = 0.57 rpm
Maximum wheel spin speed	1.6 sec/rev = 37 rpm
Minimum wheel spin speed	52 sec/rev = 1.2 rpm

The movement on both wheels was also identical, with smooth rotation and indexing. Movement was slightly jumpy when reversing rotation direction and exhibited some hysteresis. I measured the accuracy at a 0.6° of hysteresis error which equates to 2.5" at a throw of 20' (104mm at 10m). All wheels use a quick-path algorithm to minimize change times.

Figure 9 shows the typical focus quality achievable from the two wheels when running the unit in beam (spot) mode. Some spherical and chromatic distortion is visible. As mentioned above, when talking about the animation wheel the optical system at the gate is slower than you might expect. The good news is it means a greater depth of focus, so you can overlay gobos. However, it also means that gobo morphing looks a little different, as both gobos are more in focus at the same time. We get so used to fast optical systems with narrow depth of focus in automated luminaires that it's become slightly unusual to see a unit with a slower system. They each have their own advantages; do you want to overlay gobos or morph? Figure 10 shows the effect

Figure 9: Gobo focus.

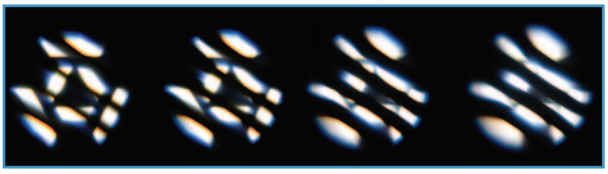


Figure 10: Gobo morph.

BMFL™

GAME CHANGER

BRIGHT MULTI FUNCTIONAL LIGHT

ROBE®

www.robelighting.com

Moonlight

MOOD Boards

From madness to moonlight, passion to piety, rapture to royalty, the LEE Filters Mood Boards have been created to help you take your lighting ideas and turn them into reality. So, whether you're working on a new project or simply need some inspiration to nudge you in the right direction, visit our website and see where the mood takes you.

LEE Filters

www.leefilters.com

of pulling focus (or "edge," as Vari-Lite calls it) from one gobo wheel to the other.

Iris

As is often the case, the last imaging component in the optical train is the iris. The fully closed iris reduces the aperture to 20% of its full size; I measured the opening/closing time at around 0.2 seconds.

Beam shaper and prism

The VL4000 BeamWash offers both beam shaping (mostly used in wash mode but available in any mode to create effects) and prism (primarily in beam [spot] or shaft [beam] mode). They are mounted next to each other in the middle of the three-group-lens system. Depending on the zoom angle you are using, they are either positioned between lens 1 (focus lens) and lens 2 (zoom lens), or between lens 2 and the final output lens. To facilitate this, the VL4000 BeamWash has some fancy collision-prevention routines in its firmware, which automatically deal with retracting the prism or beam shaper, allowing lens 2 to pass, and then replacing them in the optical path again on the other side of the lens. This is hard to describe in words but easy to understand when you take the covers off and look at the unit in operation. It's important to get your head around this, as it's an integral part of how the optical system operates. If you aren't using either the beam shaper or prism, then you get a single uninterrupted zoom range, from narrow to wide. However, if you have either or both of the beam shaper or prism in use, then you effectively get two separate zoom ranges, one with lens 2 on one side, and one with it on the other side of the effect in use. Total zoom range is the same; there's just a discontinuity in the middle somewhere where the lens has to flip from one side of the effect to the other. Figure 11 shows a view of the five-facet linear prism with the lenticular glass beam shaper behind it.

Figure 11: Prism and beam shaper.

Figure 12 shows a typical result of using the beam shaping with the unit in wash mode. It produces an elliptical beam which can be rotated or indexed.

The prism is nominally five-facet, although this gets down to three visible facets at the wide end of the zoom.

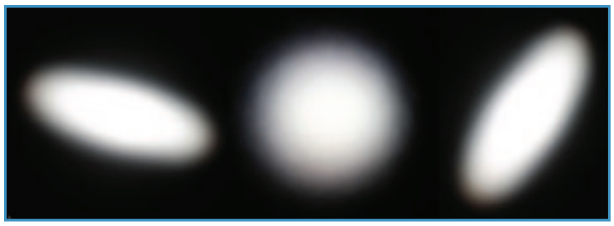


Figure 12: Beam shaping.

Image separation is about 50%. The time to insert or remove with the prism or beam shaping varies depending on the current positioning of lens 2 as it may have to move out of the way. The average is about 1.5 seconds. Once in place, effects can be rotated at speeds varying from 0.8 sec/rev (75 rpm) down to 48 sec/rev (1.25 rpm).

Lens options and output

As might be gleaned from the name of the unit, the options possible with the final lenses of the VL4000 BeamWash are many and varied. Essentially, it is a familiar three-group-lens system with first two groups moving and final group fixed. However, Vari-Lite has attempted to provide a very wide range of beam angle in the beam (spot) and wash modes while also providing an ultra-narrow shaft (beam) mode to produce parallel aerial effects. They do this by moving the two lens groups to positions they wouldn't normally occupy when projecting gobos, thus the need for a separate shaft (beam) mode. There's also wash mode, where a separate diffusing filter (Figure 13) is brought into the train after the second lens. This filter moves back and forth with that lens as the beam angle is altered. An interesting extra effect you get with the wash mode is by moving the edge (focus) lens. It doesn't alter the focus of the wash beam, but instead it adjusts the beam distribution making the beam more or less peaky.

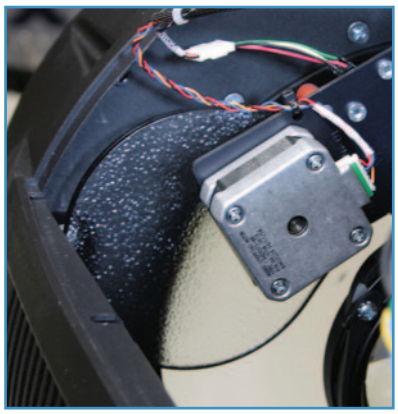


Figure 13: Diffusion.

If you are a regular reader of this column, then you would know that I'm always a little skeptical of multi-purpose lens systems. They do the job—actually, many jobs—but do they do them as well as dedicated luminaires would do? I'll let you be the final judge of that. To my mind, the gobo projection beam (spot) mode is a little soft and it may be why Vari-Lite called it a beam effect rather than a spot.

take the lead
AND FOLLOW

Get leading LED technology with the Drama FS-LED 700 from Mega-Lite.

This follow spot is equipped with a powerful single-source 350-watt LED, producing outputs comparable to a 700-watt lamp or brighter. Faders and buttons are located directly on the back of the fixture to control the unit's features. This fixture has a color wheel that produces a red, green, yellow, blue, orange and white spot light. The Drama FS-LED 700 also features a CTO wheel, used both for adjusting color temperature and the color hue of each primary and secondary color. Learn more about this fixture at mega-lite.com.

MEGA LITE
MEGA SYSTEMS INC.

www.mega-lite.com | SALES@MEGASYSTEMSINC.COM
866-460-MEGA (6342) | SAN ANTONIO, TX

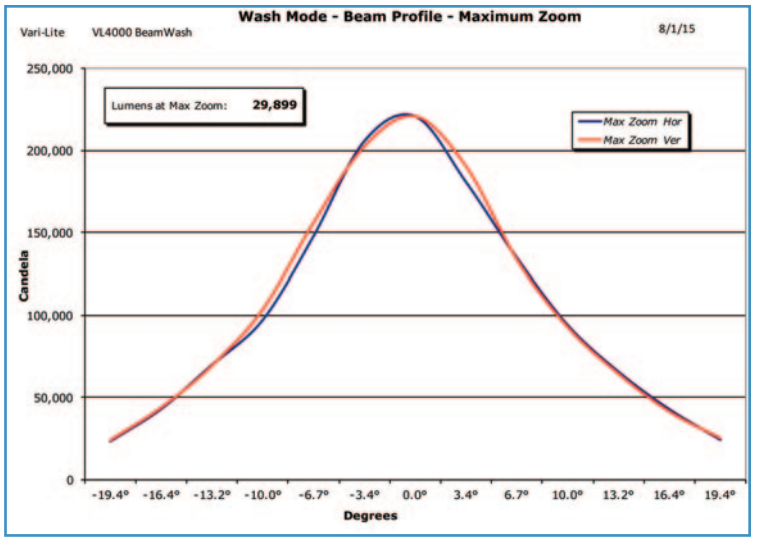


Figure 14: Maximum zoom output.

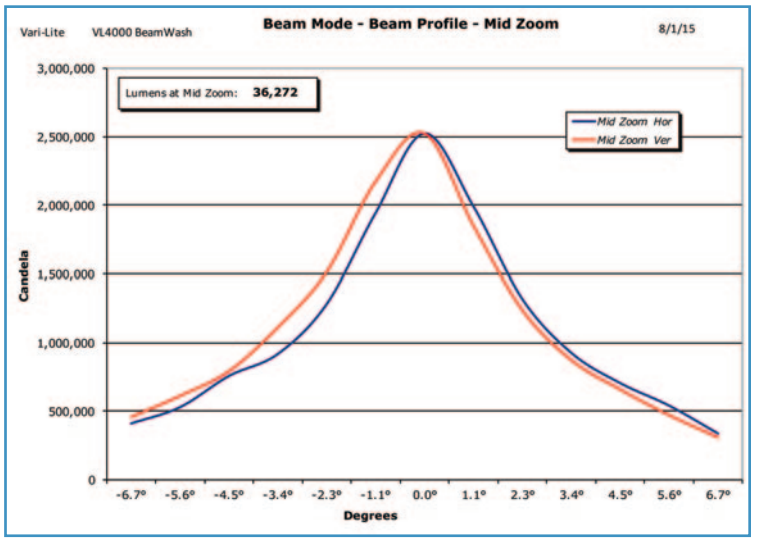


Figure 15: Mid-zoom output.

As to the numbers, I measured zoom as taking 0.8 seconds to move end to end, while focus took 0.5 seconds. In wash mode, I measured just under 30,000 lumens at a full zoom field angle of 39°. In beam (spot) mode, which will be the most efficient mode, output was about 10,000 lumens higher. I also measured the unit in a mid-zoom position in beam (spot) mode of 13.5°, where it had an output of just over 36,000 lumens. The narrow end is more difficult to quantify, but I measured around 5°. These measurements are with the unit in standard mode, where the lamp is run at 1,400W (Figures 14 and 15). Wash mode is somewhat wider and has less light output, because of the diffusion filter.

Programming solved.

Best in class. A true competitor for many consoles twice its size.

Simple.

Affordable.

Expandable.

Powerful.

Compact.

Silent.

Pathway® Connectivity Solutions

tel +1 403 243 8110 • pathwayconnect.com

Pan and tilt

I measured the pan-and-tilt range of the VL4000 BeamWash at 540° and 270°, respectively. This is a large unit with big lenses and a full-range 540° pan move took 7.5 seconds to complete, while a more typical 180° move finished in 4.5 seconds. Tilt took 5.4 seconds for a full 270° move and 4.3 seconds for 180°. All movements were very smooth, with very little bounce and no visible steppiness. I measured hysteresis on both pan and tilt at 0.08°, equivalent to 0.3" at 20' (13mm at 10m).

Noise

With 1,400W of heat to remove, it should come as no surprise that the cooling fans provide the bulk of the noise floor from the VL4000 BeamWash. As is nearly always the case, full-range zoom and focus movements were really the only systems to get above the noise floor of the fans.

SOUND LEVELS

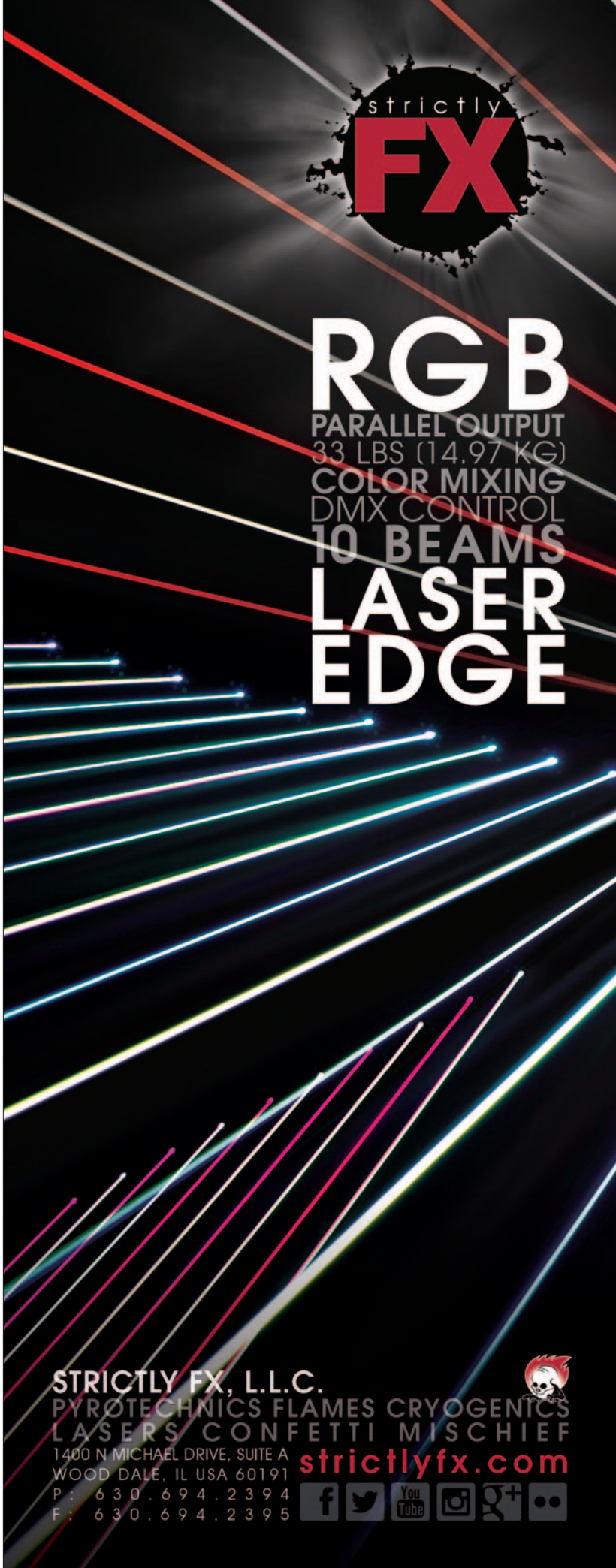
	Normal Mode
Ambient	<35 dBA at 1m
Stationary	58.2 dBA at 1m
Homing/Initialization	58.9 dBA at 1m
Pan	58.5 dBA at 1m
Tilt	58.6 dBA at 1m
Color	58.2 dBA at 1m
Gobo	58.2 dBA at 1m
Gobo rotate	58.2 dBA at 1m
Zoom	62.5 dBA at 1m
Focus	58.9 dBA at 1m
Strobe	58.2 dBA at 1m
Animation wheel	58.2 dBA at 1m
Iris	58.2 dBA at 1m
Diffusion	58.2 dBA at 1m
Prism	58.2 dBA at 1m

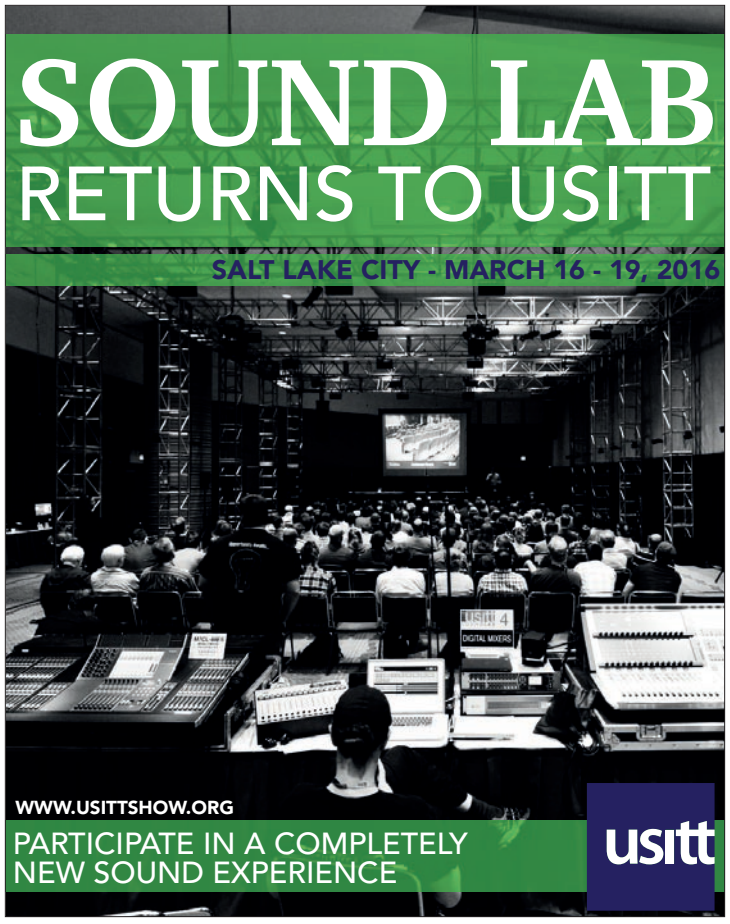
Homing/initialization time

Full initialization took 85 seconds from either a cold start or a DMX512 reset command. Homing is well behaved in that the fixture fades out smoothly, resets, and keeps its shutter closed before fading up again after all reset movement is finished. The lamp is cold-restrike, but, with all the cooling available and with a new lamp installed, it cooled down sufficiently in 35 seconds to be able to restrike.

Construction

The VL4000 BeamWash uses a distributed electronics system, with two main boards in the head providing all the motor drives. Figure 16 shows one of these boards, which takes in master data at the top and processes and distributes this out to 12 motors, including the lens systems. A second board near the rear of the head handles color, dim-





ming, and gobos. All systems are reasonably accessible for maintenance.

Figure 17 shows one of the yoke arms with associated tilt motor, belt, and gears.

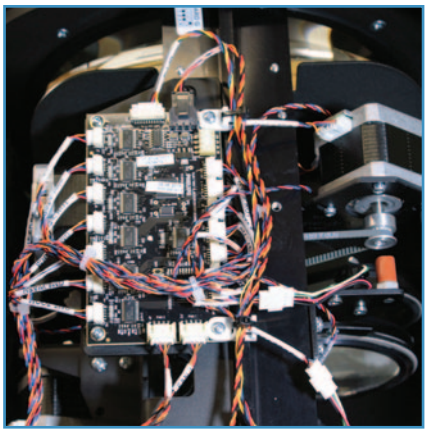


Figure 16: Motor control board.

Figure 18 shows one side of the top box with safety covers removed, exposing the lamp electronic switching power supply. The other side contains the motor power supplies.

Electronics and control

The VL4000 BeamWash provides a comprehensive menu and control system though a color LCD panel and control buttons (Figure 19). Power and data connections include a Neutrik powerCON power input and standard five-pin DMX512 connections as well as a service USB socket (Figure 20). The unit offers a comprehensive RDM functionality, which is well-explained in the manual.

The VL4000 BeamWash is a bit of a departure for Vari-Lite. I don't recall that the company has produced a multi-purpose luminaire before. Has it succeeded and will the unit find a place on your lighting rig? As always, I try and provide some data but it's you who gets to decide.

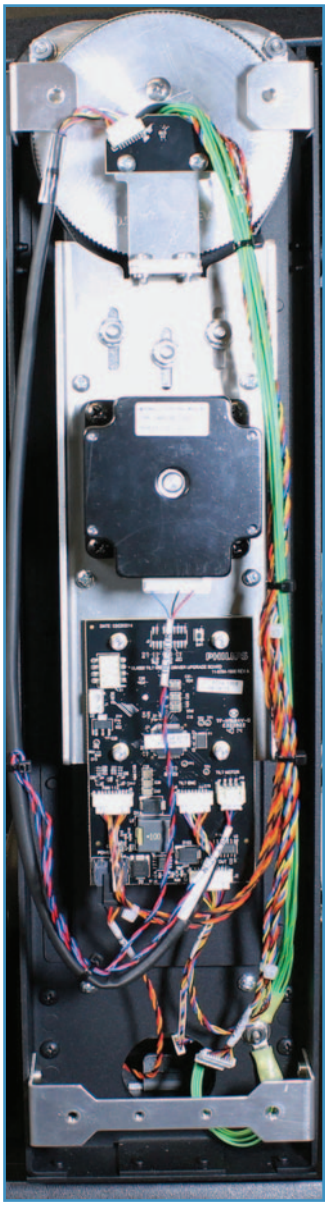


Figure 17: Yoke arm.

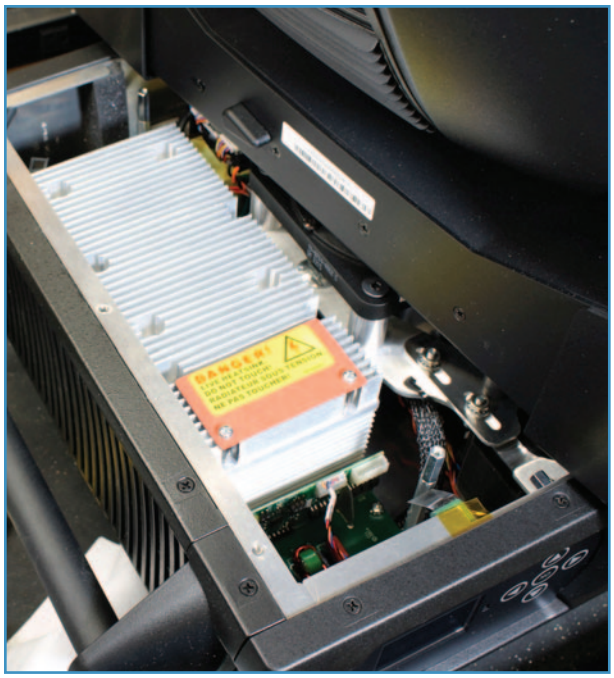


Figure 18: Power supplies.

Figure 19: Menu.

Figure 20: Connections.

Mike Wood provides design, research and development, technical, and intellectual property consulting services to the entertainment technology industry. He can be contacted at mike@mikewoodconsulting.com

ETCP WOULD LIKE TO THANK THE INDUSTRY FOR ITS ONGOING SUPPORT TO THE PROGRAM!

SETTING THE STAGE FOR SAFETY

etcp

Entertainment Technician Certification Program

10 YEARS

OVER 2000 CERTIFICATIONS = A SAFER INDUSTRY

www.etcp.plasa.org

etcp@plasa.org

SPECIAL THANKS TO OUR TOP CONTRIBUTORS AND MEDIA PARTNERS:
Top contributors: IATSE, InfoComm, Live Nation, Production Resource Group, PSAV, and USITT

Media partners: Church Production, Facility Manager, IATSE, Lighting&Sound America, Live Design, Pollstar, Protocol, Systems Contractor News, Technologies for Worship, and Theatre Design & Technology

PLASA • ACTSAFE • AMPTP • CITT • IATSE • IAVM
INFOCOMM • THE LEAGUE • TEA • USITT