Philips Vari-Lite VLZ Profile

By: Mike Wood

Figure 1: Fixture as tested.

Sometimes you just have to admit that you got it wrong. I was 100% convinced that fixtures that used a mix of technologies, white LEDs plus dichroics for color mixing, were a flash in the pan and would be gone as soon as they arrived. Clearly, I was wrong. Just about every manufacturer of automated lighting now produces such units, and they wouldn't be doing that if there wasn't demand. I admit it's a compelling case—white LEDs are where all the R&D dollars are going—and, accordingly, they are the brightest LEDs around right now. Perhaps it says something about how folks use these products? If they are used primarily in whites or pale colors, a white LED with dichroic color mixing will perform well. It's in the more saturated colors that a full-color LED unit with additive color would shine. Or perhaps it's that units are demonstrated and tested in open white.

Whatever the reason, I was wrong, and this month's review just confirms my error! We are looking at the Philips Vari-Lite VLZ Profile, one of a new range of products from Vari-Lite, all using powerful white LED engines with subtractive dichroic color mixing.

This review is based on my tests of a single VLZ Profile supplied to me by Philips Vari-Lite. All tests were run on a nominal 115V 60Hz supply; however, the VLZ Profile is rated to run on voltages from 100V – 240V 50Hz/60Hz (Figure 1.)

Light source

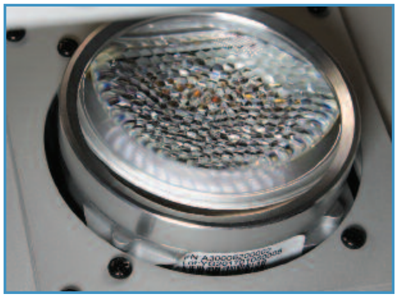

Figure 2: Fly-eye lens.

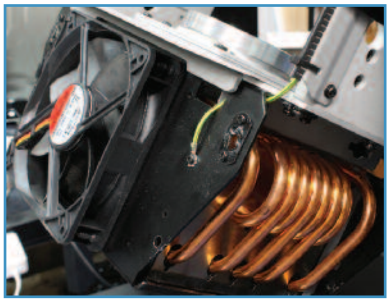

Figure 3: Heat pipes.

The light source in the VLZ Profile is one we've seen before. It's the sealed Atria light engine from Appotronics, containing a sizable 620W array of high-power white LEDs. These are capped with a fly-eye lens, as shown in Figure 2, which homogenizes and collimates the beam into the gate of the luminaire (Figure 2). The best white LEDs at the moment are around 50% absolute efficiency, so that means at least half of that 620W still ends up as heat in the array. (Fifty percent may not sound great for absolute efficiency, but it's hugely better than an incandescent lamp, which might only be 10% efficient). The VLZ Profile deals with this using a bevy of heat pipes, radiators, and thermostatically controlled fans (Figure 3).

Color

The VLZ Profile has its major optical components mounted on two plug-in removable modules. The first module in the optical train, right after the light engine, is for color and imagery, while the second is for framing. Looking at color

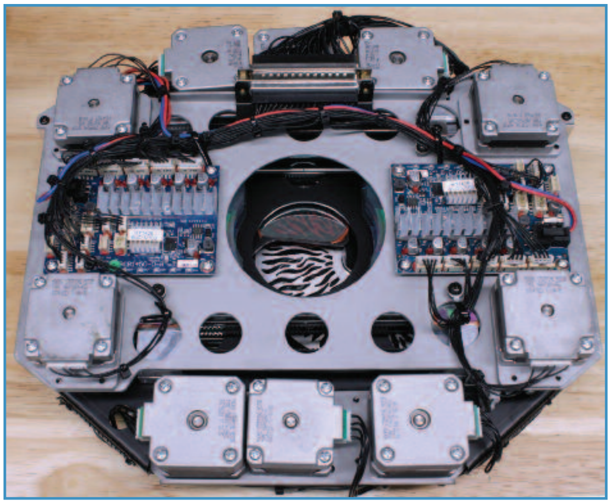

Figure 4: Color and gobo module.

control, first in line are the color mixing flags. Vari-Lite uses the now-ubiquitous pair-of-curtains-style system, in which each of the four sets of graded dichroic colors (cyan, magenta, yellow, and CTO) come in as two linear flags, one from each side of the beam. This two-sided approach, as opposed to a single wheel or flag, produces a much more even color across the beam. Figure 4 shows the overall layout of this module from the color side.

I measured the output from the color-mixing system as shown in the chart below. Interestingly, Vari-Lite has gone for colors that are much less saturated than those you often see in automated lighting. I mentioned earlier that a white LED with dichroics performs at its best in paler colors, so perhaps this is why Vari-Lite made this decision. Or perhaps they are aiming more at the theatrical market with the VLZ Profile, particularly as it is a framing unit. Whatever the reason, the output from this system is good with, as the natural expected consequence, slightly undersaturated primary colors. The mixed red in particular is somewhat orange; however, the fixed red makes up for that and is a deep crimson red.

COLOR MIXING

Color	Cyan	Magenta	Yellow	Red	Green	Blue	CTO
Transmission	33%	16%	56%	11%	2.4%	2.3%	25%

When inserted fully, the CTO flags reduced color temperature from a native 6,855K down to a CCT of 3,015K. I measured all the flags as taking a maximum of 0.7 seconds to move from one end to the other.

Right behind the color mixing flags is the fixed color wheel. This has six fixed frameless trapezoidal dichroic colors plus an open hole.

FIXED COLOR WHEEL

Color	Red	Yellow	Kelly Green	Magenta	Amber	Congo Blue
Transmission	1.7%	82%	14%	13%	25%	0.3%

Look at that red transmission: 1.7%, as opposed to the 11% of the mixed red. This is a much deeper red than the mixed version; I'd even call it crimson. Edgeless colors on the fixed wheel means good half colors. Figure 5 shows an example of one of those positions. Color-change speed was good, with very smooth transitions and slow wheel rotations possible.

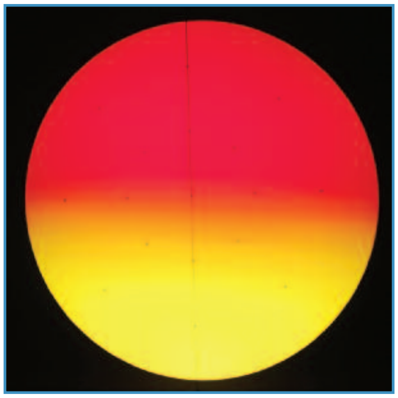

Figure 5: Split color.

COLOR SYSTEMS

Color change speed – adjacent	0.2 sec
Color change speed – worst case	0.5 sec
Maximum wheel spin speed	0.52 sec/rev = 115 rpm
Minimum wheel spin speed	210 sec/rev = 0.3 rpm
Color mix speed – worst case	0.7 sec

Imaging effects

Flip the optical module shown in Figure 4 over and we have the gobo and animation wheels. (Figure 6). On the left of Figure 6 is the rotating gobo wheel, with the fixed wheel

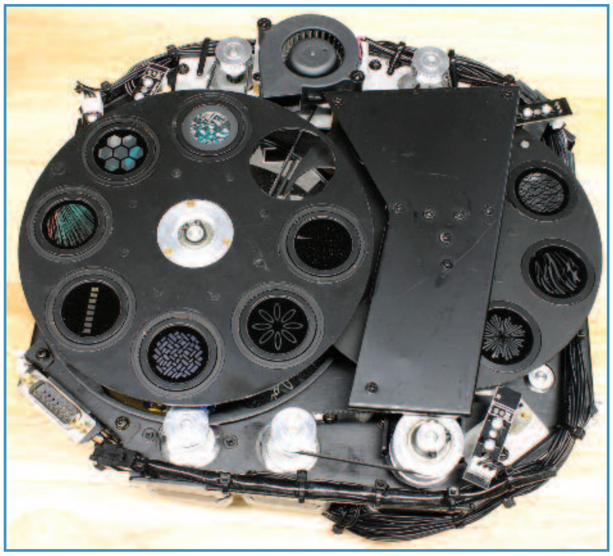

Figure 6: Gobo wheels.

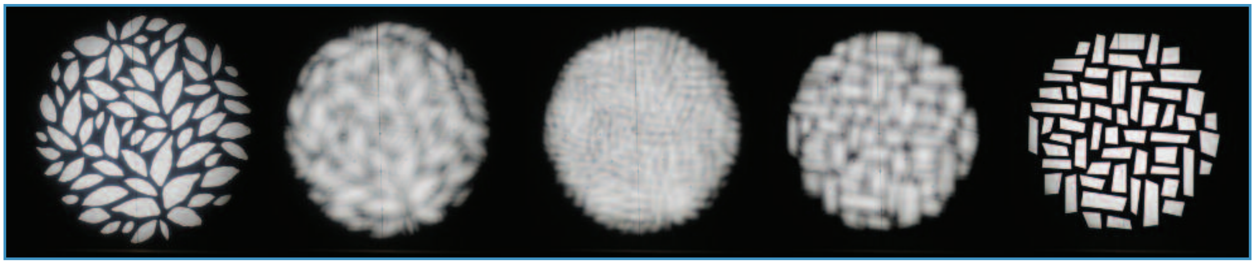

Figure 7: Gobo morph.

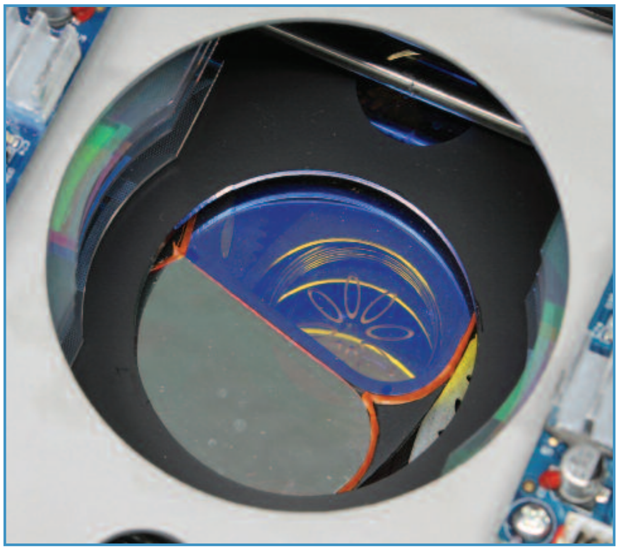

Figure 8: Gate.

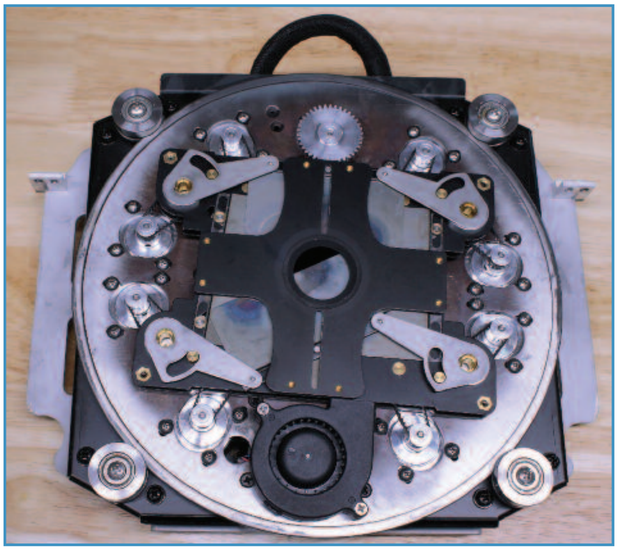

Figure 9: Framing shutters.

behind it, and the animation wheel behind that.

Moving through the system in the direction of the light, first in line is the animation wheel. This wheel has a breakup pattern that can be overlaid over either of two gobo wheels. It can be moved across the beam in 0.3 seconds and then rotated at varying speeds. Unlike some other animation wheels setups, the angle of the pattern across the beam is fixed.

Next come the gobo wheels, which are very similar, apart from the rotation function. Each has seven gobos plus an open hole, and all are fitted with glass patterns. All gobos, both rotating and fixed, are mounted in snap-in cartridges making for a quick, easy change.

ROTATING GOBO SPEEDS

Gobo change speed – adjacent	0.3 sec
Gobo change speed – worst case	0.7 sec
Maximum gobo spin speed	0.26 sec/rev = 235 rpm
Minimum gobo spin speed	648 sec/rev = 0.09 rpm
Maximum wheel spin speed	0.92 sec/rev = 65 rpm
Minimum wheel spin speed	1,496 sec/rev = 0.04 rpm

Positioning and rotation of both wheels was quick and smooth, with a good range of rotation speeds. There was an occasional step in the slowest wheel rotations. The rotating wheel showed very little bounce when changing direction but had a little overshoot on indexing. I measured the accuracy as 0.34° of hysteresis error, which equates to 1.4" at a throw of 20' (60mm at 10m). Both wheels use a quick-path algorithm to minimize change times.

Focus quality on all gobos was extremely good, with very acceptable edge-to-center difference and almost no color fringing. Figure 7 shows an example of the gobo morph effect from the fixed wheel (left) to rotating wheel (right). As can be seen, the multiple LED sources give some interesting effects in mid-morph and when images are out of focus, but it all cleans up when in focus. Figure 8 shows the view into the gate of the module with all the various wheels and flags visible.

Framing

Now we move to the second optical module, which has the framing and iris. Figure 9 shows the front of the module with a clear view of the four independent framing blades. Each

Figure 10: Framing range.

blade can be tilted approximately 22° in each direction at the center of the beam (45° in total), and is capable of traveling fully across the beam. Figure 10 shows the framing tilt range for a single blade. The possible tilt angle varies at different insertions and is greater for higher insertion amounts. The entire four-blade assembly can then be rotated by +/- 45° (90° in total). This system, like just about all automated framing systems, has its pluses and minuses. A plus of the VLZ Profile system is that each blade can travel all the way across the beam, while a minus is the somewhat limited tilt angle. You need to play with it (as I encourage everyone to do with every light I review) to check it does what you need.

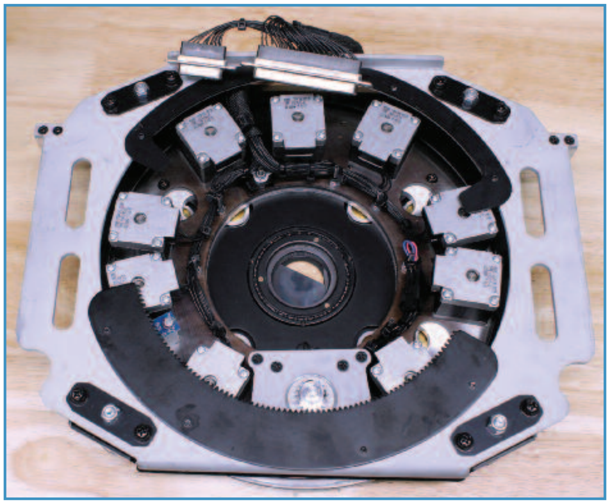

Figure 11: Framing shutters rear.

Iris

Turn the module over, as shown in Figure 11, and you find the iris. Also visible in Figure 11 are the motors needed for framing (eight small motors for framing blades, one large motor to rotate the entire module, and another small motor at the top for the iris). I measured the opening/closing time of the iris at around 0.3 seconds. The fully closed iris reduces the aperture size to 14% of its full size which gives equivalent field angles of 0.85° at minimum zoom and 6.3° at maximum zoom.

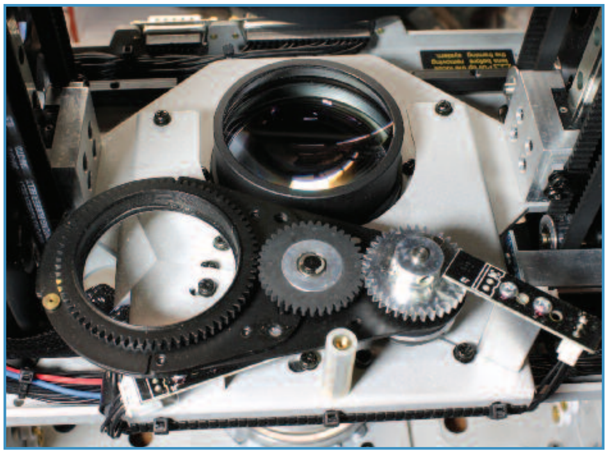

Figure 12: Prism.

Prism and frost systems

The VLZ Profile has a single three-facet prism mounted on the rear of, and traveling with, the focus lens (lens group 1). It can be inserted across the beam in around 0.2 seconds and rotated at speeds varying from 0.5 sec/rev (120rpm) down to 156 sec/rev (0.38rpm). Figure 12 shows the prism, while Figure 13 shows the image separation.

Figure 13: Prism separation.

Finally, mounted on the rear side of the zoom lens (lens group 2) are the frost flags. There are two flags, which can be inserted independently or together, providing three fixed levels of frost. It's not variable between these levels. Figure 14 shows the frost flags, while Figure 15

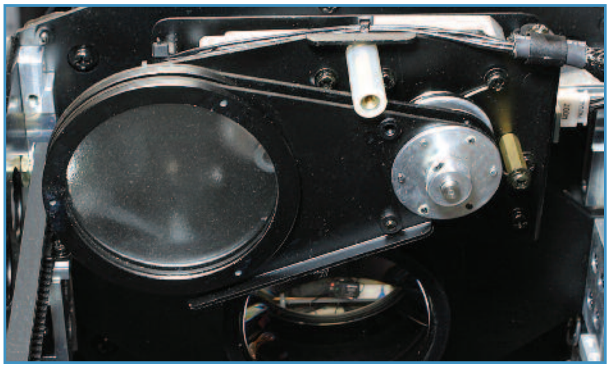

Figure 14: Frost flags.

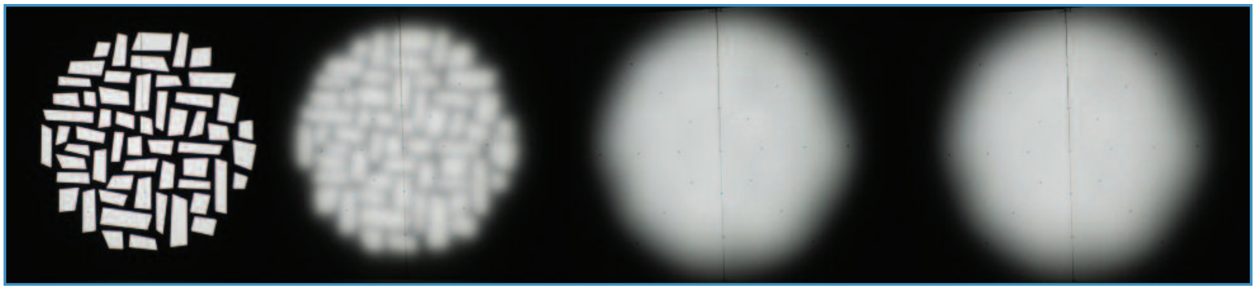

Figure 15: Frost effect.

shows the frost levels achievable on a gobo. The filter acts as a true frost, not just a contrast reducer.

As both the prism and frost systems move with their associated lenses and can thus overlap in some zoom/focus positions, some juggling goes on within the unit to ensure there are no collisions.

Lenses and output

The VLZ Profile lens system is a typical three-group zoom, with the front group fixed as the output lens and the other two groups moving to provide zoom and focus control. (I write that last sentence a lot in these reviews. I ought to create a copy-and-paste snippet for it, as I can't remember a current spot luminaire that doesn't use this kind of three-group system!) Zoom took 1.2 seconds to run from maximum to minimum, while focus took one second from end to end.

I measured the field output of the VLZ Profile at 17,000 lumens across a field angle of 44.5° at the wide-angle end of zoom, ramping down to 11,000 lumens at a narrow angle of 6.1°. The field is extremely flat at all positions as can be seen in the beam profile (Figure 16). These measurements are field lumens (output within the 10% field angle), taken after running the unit at full power for at least 30 minutes. As is often the case with LED-based units, the VLZ Profilei shows some output droop as it warms up. Over the first ten minutes after turning on at full power, the output dropped by about 10%.

Dimming was extremely smooth and followed both linear and square laws well. No steppiness or artifacts were visible (Figure 17). The PWM rate is adjustable over a wide range, all the way up to 25kHz, so the user can tune it to avoid strobing or banding with video cameras if need be. For these tests, I ran at the default 1,200Hz. The LEDs can be strobed as well, of course; I measured the maximum strobe rate as 23Hz.

Pan and tilt

The VLZ Profile has 540° of pan and 270° of tilt movement. I measured pan speed over the full travel at 5.2 seconds and 2.8 seconds for 180°. In tilt, the figures were 3.2 seconds for the full 265° and 2.6 seconds for 180°. Movement on both axes was very smooth, with minimal hysteresis and just a little overshoot/return at the end of a move. Pan showed

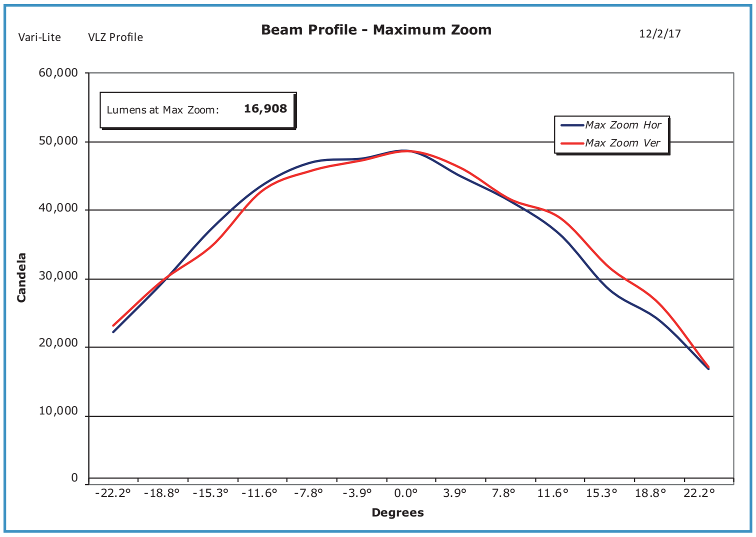

Figure 16: Beam profile maximum zoom.

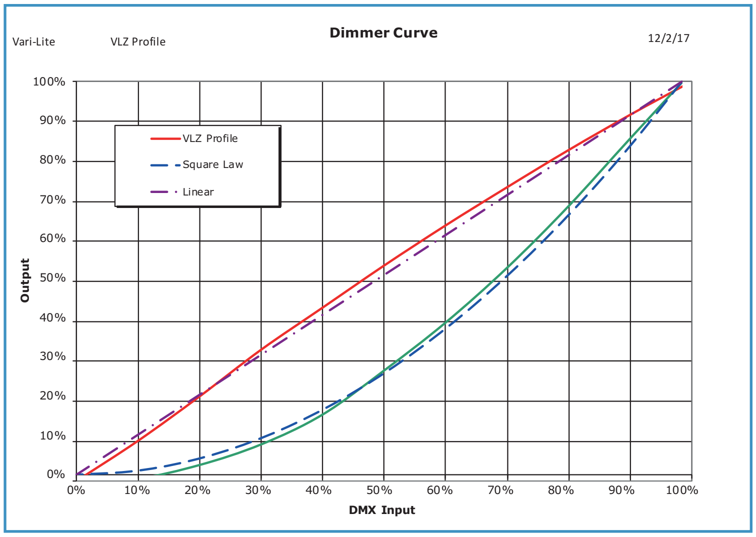

Figure 17: Dimmer curve.

Figure 18: Yoke arm.

0.06° of hysteresis which is 0.3" at a throw of 20' (10mm at 10m). Tilt had 0.12°, 0.5" at 20' (21mm at 10m). Figure 18 shows the tilt system in one of the yoke arms.

Noise

Long rails with heavy lenses are often the noisiest part of automated fixtures. Indeed, that is the case with the VLZ Profile: Zoom and focus were the worst offenders. The VLZ Profile also has a studio mode, which reduces fan noise from these figures.

SOUND LEVELS

Ambient	<35 dBA at 1m
Stationary	49.7 dBA at 1m
Homing/Initialization	62.9 dBA at 1m
Pan	51.5 dBA at 1m
Tilt	51.8 dBA at 1m
Color	51.9 dBA at 1m
Zoom	54.1 dBA at 1m
Focus	53.7 dBA at 1m
Frost	49.7 dBA at 1m
Gobo	50.9 dBA at 1m
Gobo Rotate	49.8 dBA at 1m
Prism	49.8 dBA at 1m
Animation Wheel	49.7 dBA at 1m

Figure 20: Display.

Figure 21: Connectors.

Homing/initialization time

I measured the VLZ Profile as taking 82 seconds to complete a full initialization from power up, and 65 seconds from a DMX reset command. The reset is well-behaved in that the LEDs are properly dimmed out before reset starts, and don't fade up again until after final positioning.

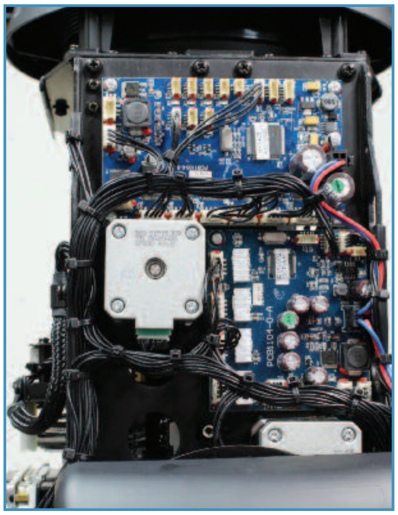

Figure 19: Head circuit board.

Power, electronics, control, and construction

In my setup, the power consumption of the VLZ Profile was 7.21A with the LEDs at full and no motor movement. In detail, this was 843W, 849VA with a power factor of 0.99. Quiescent load with LEDS extinguished was 1.0A, 120W, 120 VA, power factor of one.

Motor drive electronics are distributed throughout the head close to each module. Figure 19 shows two of these boards mounted on the side of the lens module. The two modules I described earlier are easy to remove and replace for maintenance or gobo change.

The top box in the VLZ Profile contains the main input electronics and power supplies for the electronics and LEDs. It also houses the display (Figure 20) and connectors (Figure 21).

Figures 17 and 18 show the color LCD display and menu system and the set of connectors, including DMX512 and network connections for Art-Net.

Conclusion

That's the Philips Vari-Lite VLZ Profile, from one end to the other. It's a workhorse LED spot unit with full framing. It enters a busy sector of the marketplace with many other vendors having competing product. How did the VLZ compare? Hopefully I've given you some data that will help but, as always, it's your decision that counts.

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