The Vari*Lite VL880 Spot

By Mike Wood

Fig. 1: Fixture as tested

It's been many years since I've looked at a Vari-Lite spot unit in these pages; in fact, the last one was the VL1000, way back in October 2004. Since then, the world, and our business, has been through a deep recession, and we've seen huge growth in LED-based luminaires, not least from Vari-Lite, with the VLX Wash unit. Although we have seen a few market entries at lower power points, it is more difficult for LED-based units to compete with the high-power discharge lamps in automated focusable spot lights. The small arc of a current HID lamp behaves almost like a perfect point source, and is ideal for compact projection optics. HID lamps are also very efficient, so it will be a little while before an LED-based unit will be able to go head-to-head with the type of high-powered lamp used in the VL880.

Philips Vari-Lite is clearly very aware of the economic pressure its customers have been under recently, and so the company has taken the step—unusual perhaps for Vari-Lite—of developing a new range of luminaires, which it advertises as "compact and economical." The range comprises four luminaire variants, the VL400, VL440, VL770, and VL880, all with spot optics, and all with identical external appearances. The units primarily differ in their light sources; the VL400 and VL440 use a 400W MSR Gold 400 Mini FastFit lamp, the VL770 uses a 700W MSR Gold 400 Mini FastFit lamp, and the top–of-the-range VL880 an 800W MSR Platinum 35 lamp. As I understand it, the feature sets (and much of the internal construction) are identical across the VL440, VL770, and VL880, while the VL400 has a slightly reduced specification, with two fixed color wheels instead of CMY color-mixing, and no separate dim wheel. In this review, I will just look at the VL880, but I think it's reasonable to assume that the other units in the range will perform very similarly, just with different light outputs.

As usual in these reviews, I will start at the lamp and work through the luminaire, taking measurements of everything I can as objectively as possible. The results presented here are based on the testing of one specific VL880 unit supplied to me by Vari-Lite as typical of the product. I should also mention that the unit I tested was a late pre-production prototype, not quite a shipping product, and Vari-Lite warned me that there may be some changes made before it ships. In particular, the software in the unit was Beta code, and, although all functionality was in place, the final tweaks (including things like the dimmer curve) were not yet in place. I've measured, and will report, everything as usual, but I'll add a note where Vari-Lite has warned me that there is a pending change (Figure 1).

All tests were run with the fixture operating on a nominal 115V 60Hz supply. The VL880 uses switched mode power supplies for both lamp power and electronics, and the unit is rated to run on supplies between 100-244VAC, 50/60Hz. In my tests, the unit consumed between 9 and 9.5A, depending on the motor load.

Lamp and lamp access

The VL880 uses the Philips 800W MSR Platinum 35 lamp, the highest-powered lamp in the new Platinum range with a rated output of 55,000lm from a 3mm arc. Access to the lamp is through a removable cover held in place with two twist-lock screws (Figure 2). This cover also provides access to three screws for lamp adjustment. Once the cover is removed, it reveals the now-very-familiar FastFit lamp base. One quick turn, and the lamp is easily removed and replaced. Figure 3 shows the exposed lamp change mechanism. Figure 4 shows the lamp itself, a bare, unjacketed lamp designed for axial mounting in a reflector. In the photograph, you can clearly see the arc gap. When in place, that arc gap is at one focal point of a faceted dichroic ellipsoidal reflector, to capture as much light as possible and send it through the optical system.

As we've discussed before in these reviews, this type of lamp, with no external envelope, requires very careful and precise control of its cool-

Fig. 2: Lamp adjust

Fig 3: Lamp change

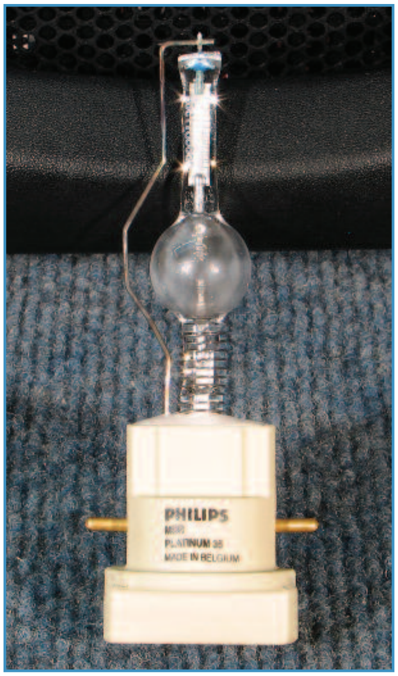

Fig. 4: Lamp

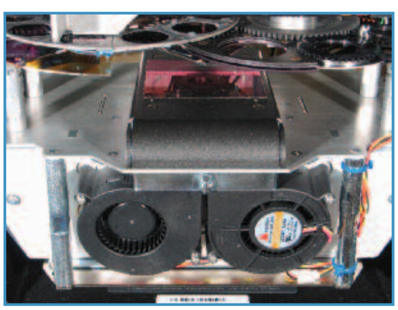

Fig. 5: Hot mirror and lamp house cooling

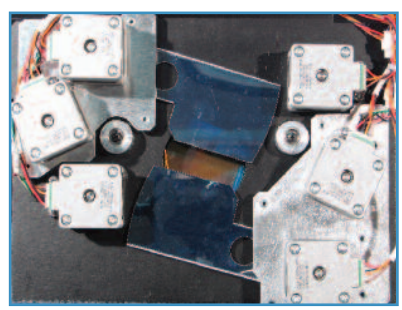

Fig. 6: Shutters

ing to ensure that the arc remains stable and at a constant light output and color. Vari-Lite has gone the tried-and-tested route of enclosing the lamp and reflector in a sealed lamp house with thermostatically controlled cooling fans blowing air though that chamber. Figure 5 shows two fans ducting air into the front of the lamp house and across the lamp; the heated air exits on the other side and out of the rear of the VL880. You can also see the hot mirror, which forms the front face of the lamp house, allowing light to escape but reflecting heat and UV back to keep the light beam as cool as possible. I removed the dim/color module to take the photograph; in the assembled unit, the strobe flags are very close to the hot mirror (Fig. 5). The MSR Platinum 35 is not a hot-restrike lamp; in my tests, it took around 90 seconds to two minutes to cool down enough to restrike.

Strobe and dimmer

The VL880 has a modular construction for its optical assemblies, and the first one after the lamp is a unit containing the strobe flags and dim wheel, along with the color-mixing wheels. Figure 6 shows the two mirror-finish strobe flags, each driven by their own stepper motor, which open and close across the beam. I measured a range of strobe speeds from around 0.4Hz up to 5Hz with the flags closing fully. An extended range up to around 10Hz is also possible with partial closing of the flags. Vari-Lite tells me that the strobe range will improve in the shipping version. The mirror finish on the flags serves to deflect energy and protect them from overheating when closed (Figure 6).

Immediately after the strobe flags comes the dimmer wheel—this is very like the one used in the VL3500 and is a single large glass wheel with a very fine gradient pattern etched in it. It looks similar to the adjacent CMY color-mixing wheels, and, I'm sure, is manufactured in a similar manner. The dimming from this wheel is very smooth; however, at the moment with Beta software, it has a strange dim curve and a rather abrupt wipe-to-black over the bottom 10% of the range. I fully expect this to be improved when the unit has production firmware. Figure 7 shows the dimmer curve measured on this test unit.

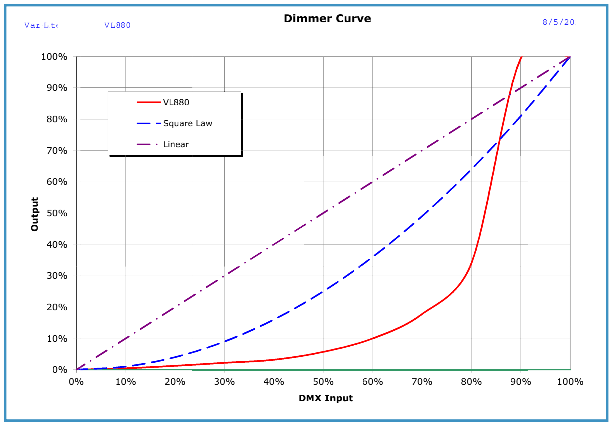

Fig 7: Dimmer curve

Color systems

Next in line are the cyan, magenta, and yellow color-mixing wheels. As with the dimmer wheel, these are finely etched dichroic wheels interleaved over the central aperture. Figure 8 shows the setup with the dimmer wheel and cyan on the left, and yellow and magenta on the right. You cannot see the gradient pattern in the photograph; it's too small (Figure 8).

These wheels look to use the same manufacturing technique as those in the VL3500—with slightly different colors and gradients—so it's no surprise that the color mixing looks somewhat similar. As with the VL3500, you see a few artifacts when the wheel transitions from the fully saturated portion to the graded portion, and there are a few times when you can see a difference between one side of the beam and the other, particularly in the saturated red regions. Overall, however, the mixing is very smooth and usable.

Fig. 8: Dim and CMY wheels

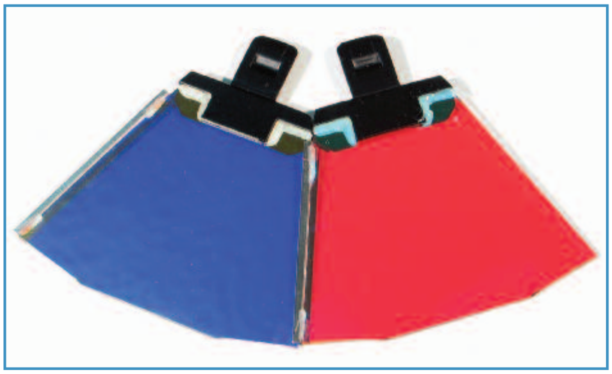

Fig. 9: Color segments

COLOR MIXING

Color	Cyan	Magenta	Yellow	Red	Green	Blue
Transmission	20%	4.1%	73%	3.9%	6.2%	0.4%
Color change speed – worst case			0.4 sec			

Both the cyan and magenta wheels are very saturated colors, which allows good deep color mixes but also makes the system more sensitive to the anomalies mentioned above. As always, there has to be an engineering compromise between depth of colors and smoothness of color-mixing. That having been said, the system produces good mixed pastels as well as saturates, and should prove to be a versatile system.

Immediately after the CMY wheels is the fixed color wheel. This uses eight trapezoidal dichroic color segments, which snap into a central hub through small plastic tabs that are glued on to the inside edge of the glass. As can be seen in Figure 9, a nice feature is that each dichroic segment has a small aluminum mask glued to one edge, which overlaps the adjacent color. This fills in the gap between colors and ensures that there are no visible white streaks when you rotate the wheel or show split colors. Changing the colors by snapping the plastic tab in and out of the hub is very simple, and should be easy to do even with the luminaire in the rig.

FIXED COLOR WHEEL 1

Color	Red	Blue	Green	Magenta	CTO	Pink	Orange	Congo
Transmission	1.2%	1.0%	11%	6.4%	69%	62%	5.4%	0.3%

COLOR WHEEL SPEED

Color change speed – adjacent	0.1 sec
Color change speed – worst case	0.3 sec
Maximum wheel spin speed	1.05 sec/rev = 57 rpm
Minimum wheel spin speed	375 sec/rev = 0.2 rpm

Again, as with the CMY system, the colors are very saturated. It seems like this is a deliberate decision on the part of Vari-Lite, and perhaps reflects the market sector at which these luminaires are aimed. The color-change speed on this wheel is excellent, with very snappy moves.

I measured the color temperature of the uncolored beam at 5,650K and with the CTO filter at 3,600K. However, these readings were taken with a color meter and, if you have read this column before, you will know my opinion of these meters is low, so take them with a pinch of salt!

Gobo wheels

Figure 10 shows the relationship between the color wheel and the two gobo wheels. It also clearly shows the snap-in segment mechanism for the replaceable dichroic colors and static gobos. First in line for patterns is the rotating gobo wheel, which contains seven removable and replaceable

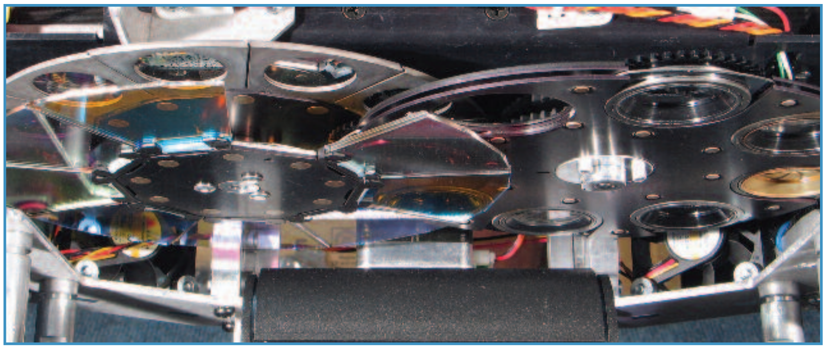

Fig. 10: Color and gobo wheels

rotating glass patterns, plus an open hole. The standard set includes geometric patterns, break-ups, and art glass. Each glass gobo is mounted in a snap-in cartridge, as shown in Figure 11. Snapping these in and out is very straightforward. Note that Vari-Lite only supports using glass gobos—not metal—in the VL880 and the VL770.

ROTATING GOBO SPEEDS

Gobo change speed – adjacent	0.2 sec
Gobo change speed – worst case	0.8 sec
Maximum gobo spin speed	0.55 sec/rev = 109 rpm
Minimum gobo spin speed	Very slow!
Maximum wheel spin speed	6.5 sec/rev = 9.2 rpm
Minimum wheel spin speed	60 sec/rev = 1 rpm

The VL880 has a good range of rotate speeds for both the individual gobos and the wheel itself. In fact, the minimum gobo rotate speed was so slow that it would take hours to perform a complete revolution, and I didn't have the patience to measure it! Seriously, that could be a useful function for an imperceptibly changing background. I was a little disappointed in the hysteresis and movement of the rotating gobos when changing rotation direction. They are somewhat jerky and showed bounce and 0.7° of hysteresis error, which is equivalent to 2.8" at a throw of 20'. The rotating wheel does not use the quick-path algorithm, and therefore reverses direction to go from Gobo 7 to Gobo 1 rather than going through the open hole. I contacted the developers at Philips Vari-Lite to ask about these issues and they assured me that they are making changes to address them before going into production.

Fig. 11: Rotating gobo

Fig. 12: Static gobos

The static gobo wheel contains ten patterns, plus open hole. They use a similar mechanism to the color segments, although the carrier is die-cast aluminum rather than plastic. The small casting contains the same overlapping edge as the colors, so there is no visible gap between gobos. Figure 12 shows two gobos in their carriers when removed from the wheel.

GOBO WHEEL SPEED	
Gobo change speed – adjacent	0.1 sec
Gobo change speed – worst case	0.4 sec
Maximum wheel spin speed	1.05 sec/rev = 57 rpm
Minimum wheel spin speed	435 sec/rev = 0.1 rpm

As with the color wheel, the changes from pattern to pattern were very quick, and this wheel does use the quick-path algorithm. Focus quality on all gobos was excellent at all beam angles, with very little edge-to-center difference and almost no color-fringing.

Iris and effects

The VL880 has a conventional multi-blade iris, which was able to open and close in around 0.1 seconds. The fully closed iris reduces the aperture size to 47.5% of its full size, which gives equivalent field angles of 7.5° at minimum zoom and 17.8° at maximum zoom.

Just after the iris is the rear lens assembly of the multi-group zoom lens (of which more later). After the first lens group, and before the second, are mounted the prism and frost systems. These share the same physical location on the optical path, so one or the other can be used, not both simultaneously. Figure 13 shows the system.

The frost is a single round diffusing filter which can be moved across the field. Although you can position it freely, it performs best when fully inserted across the aperture. The time to insert or remove the frost flag was 0.2 seconds.

The VL880 is supplied with a single, rotatable, five-facet prism, which pro-

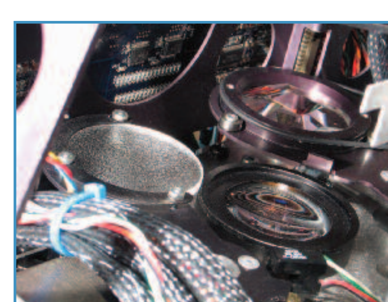

Fig. 13: Frost and prism

duced clear, well-separated, images. The prism can be inserted or removed in 0.5 seconds, and, once inserted, can be rotated at speeds ranging from 86 sec/rev (0.7rpm) up to 0.675 sec/rev (89rpm). I understand that both the frost and prism glass are changeable.

Lenses and output

The VL880 uses a three-group zoom lens system. The rear group, behind the frost and prism, is fixed, while the front two groups move together on a carriage to provide focus, and towards and away from each other to provide zoom. The zoom function uses an elegant cam-and-arm mechanism to provide the correct relative motion of the two groups driven from a single stepper motor. Because all the output lenses move, there is a final fixed glass window to protect and seal the unit. With the VL880 provided I measured the optical system as providing 19,208 field lumens at its wide angle position of 37.5°, grading to around 18,078 lumens at the narrow angle position of 15.8°. This is excellent output from a relatively small unit. The field in all cases was very smooth, and provided a good blending distribution (Figures 14 and 15).

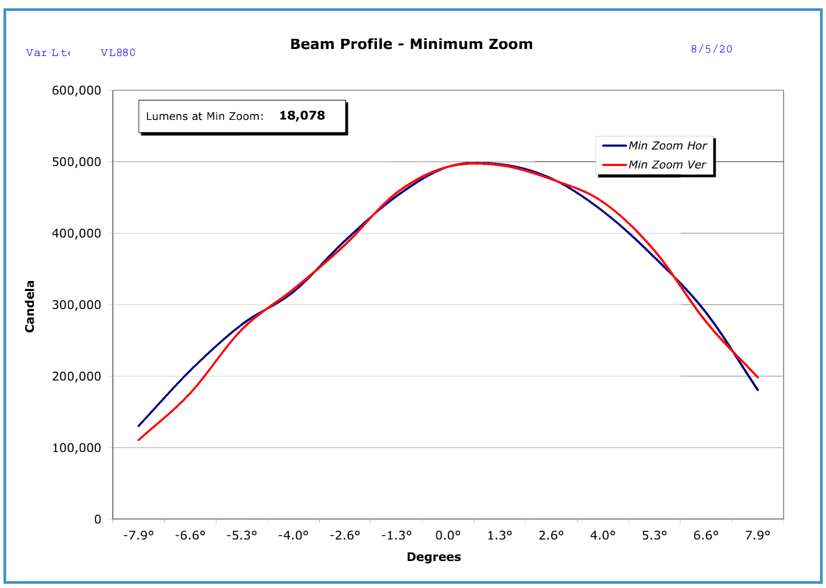

Fig. 14: Minimum zoom

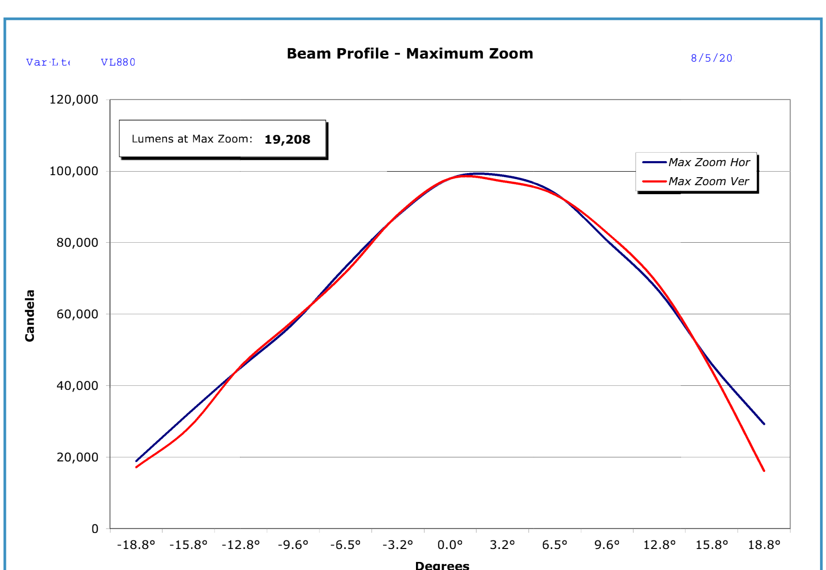

Fig. 15: Maximum zoom

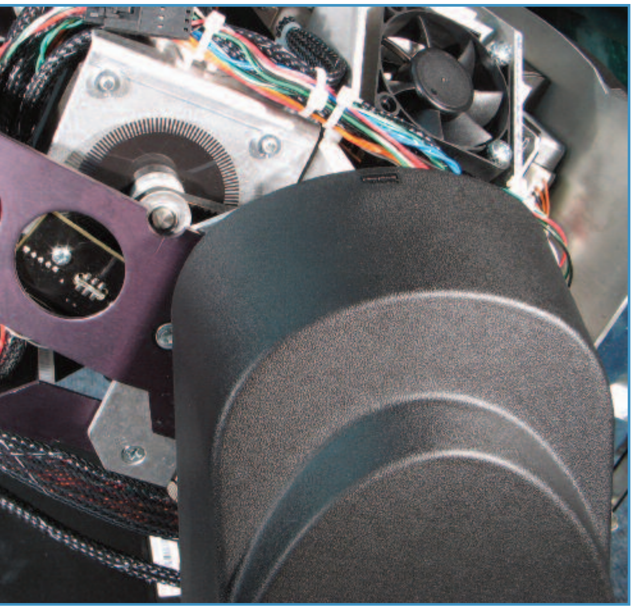

Fig. 16: Tilt motor and encoder

Pan and tilt

The pan and tilt ranges of the VL880 are 540° and 260°, respectively. A full-range 540° pan move took 4.2 seconds to complete, while a more typical 180° move finished in 2.3 seconds. Tilt took 3.1 seconds for a full 260° move and 2.4 seconds for the 180°.

The quality of the movement was excellent, with no jerkiness even at slow speeds. The accuracy of positioning was good, with a measured hysteresis of 0.3° on pan and 0.18° on tilt. That's equivalent to 1.3" at 20' on pan, and 0.8" at 20' on tilt. Both axes have encoders, and will correct position errors if blocked or knocked.

Slightly unusually, the tilt motor is mounted inside the lamp head rather than the yoke; Figure 16 shows the tilt motor along with its encoder

.

Noise

The fan and lamp system are the main noise producers in the VL880; that's probably inevitable with an 800W lamp in a relatively small housing. Most other functions rarely came above the fan noise, even at high motor speeds. Of the motors, pan was the noisiest when run at top speed. Note that the smaller lamps in the other units in the range may have different levels of fan noise.

SOUND LEVELS

	Normal Mode
Ambient	<35 dBA at 1m
Stationary	49.9 dBA at 1m
Homing/Initialization	52.4 dBA at 1m
Pan	53.5 dBA at 1m
Tilt	50.7 dBA at 1m
Color	51.7 dBA at 1m
Gobo	51.1 dBA at 1m
Gobo rotate	50.5 dBA at 1m
Zoom	50.2 dBA at 1m
Focus	50.3 dBA at 1m
Strobe	50.7 dBA at 1m

Electrical parameters and homing/ initialization time

POWER CONSUMPTION AT 115V, 60HZ

	Current, RMS	Power, W	VAR, VA	Power Factor
Normal running	9.1A	1013W	1023VA	0.99
All motors running	9.3A	1055W	1030VA	0.98

All power supplies seem well regulated and properly power-factor-corrected. Initialization took around 65 seconds, either from a cold start or from a DMX512 reset command. Homing is badly behaved, in that the fixture starts to pan and tilt before it closes the shutter.

Construction

This is a solidly built unit with a simple, modular construction. The head covers split around the line of the yoke and pull off easily, forwards and backwards, giving full access to all components. I would expect the head to be

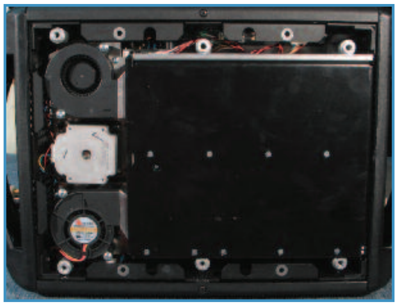

Fig 17: Top box

straightforward to maintain and keep clean. I had more problems with the top box, which seems relatively complex to disassemble—perhaps I missed the easy route. Figure 17 shows the view inside the top box after removing the bottom plate of the unit. Hidden under the panel on the right are the CCI lamp power supply and electronics supplies. Both pan and tilt are fitted with manual locks for transport and maintenance.

Electronics and control

Figure 18 shows the main control panel with a normal Vari-Lite LCD menu system, which gives quick access to fixture configuration and maintenance features. Figure 19 shows the straightforward electrical connections—five-pin XLRs in and out for DMX512, and a PowerCon for

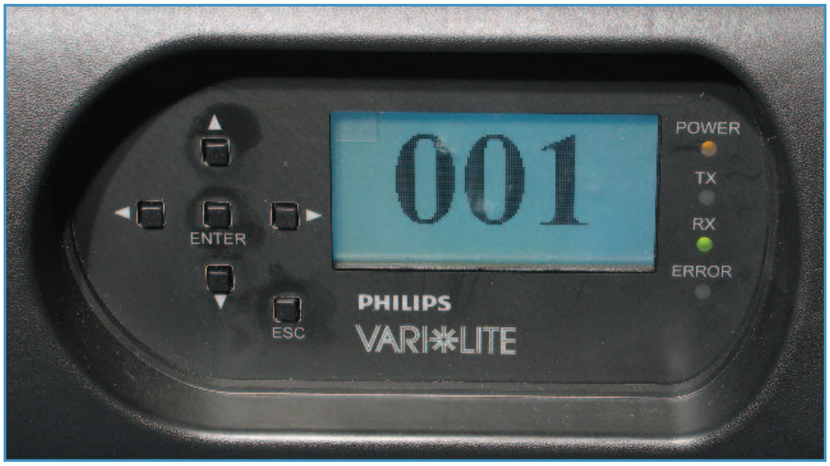

Fig. 18: Menu system

Fig. 19: Connections

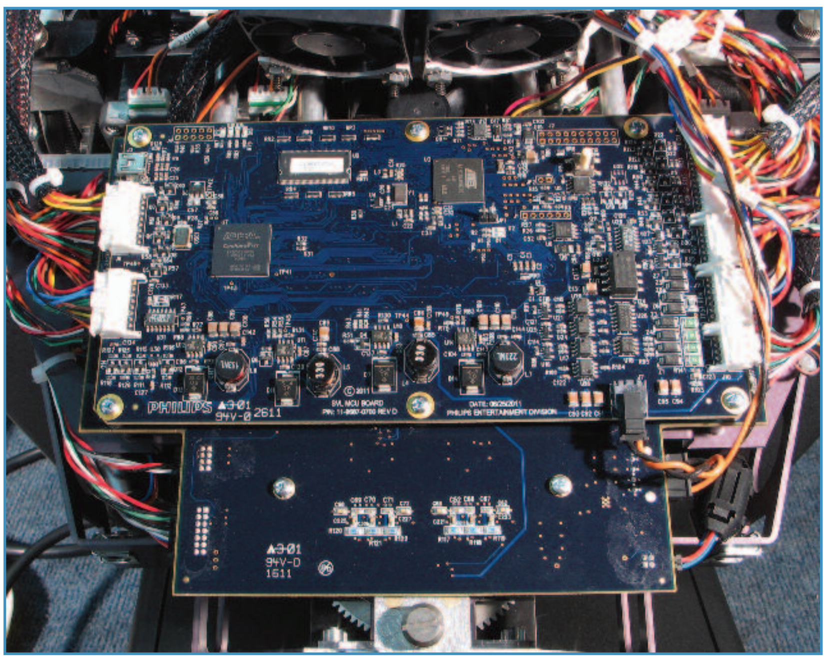

Fig. 20: Main driver board

power. The main electronics of the VL880 are in the head, with two large circuit boards sandwiched together over the top of the zoom lens system. This is likely the coolest part of the unit and a good spot for electronics. Figure 20 shows the boards in place.

With the tilt motor and driver electronics in the head, the only major component in the yoke arm is the lamp ignitor from CCI, shown in Figure 21.

Fig. 21: Ignitor in yoke

So there you have it, the new Vari-Lite VL880 Spot. As I understand it, the features of the VL440 and VL770 are pretty much identical, apart from the lamp power, so my measurements of everything but output and noise levels should be valid for those models as well. Do they meet Vari-Lite's stated goals of being "compact and economical" while retaining the well-known Vari-Lite quality? I've tried to give you some facts and figures to help but, ultimately as always, it's you who gets to decide.

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