Martin by Harman MAC Viper Performance

By: Mike Wood

Figure 1: As tested.

I've been meaning to take a look at one of the members of the Martin Viper family for some time and, of all the models, the Performance appeals to me the most. Once upon a time, framing shutters were a somewhat unusual item to find in an automated light, and, even if available, they were often limited in their functionality. However, as gates have gotten smaller and cooler, most manufacturers offer them as part of their ranges. Clearly, framing shutters are primarily aimed at the theatrical market but, as the systems have gotten faster and more accurate, you see them being used as effects as well. Martin has offered luminaires with automated framing shutters for many years, going back to 1996, when Peter Johansen filed a patent application for a framing shutter system in an early MAC. The patent was never issued, and it isn't the system Martin uses today, but framing systems have long been in the company's repertoire.

The Martin MAC Viper Performance came to me in a road case and I was able to get it out and set it up on my own. It's not the lightest fixture and two people are recommended, but I managed. All the tests you see here are based on that single unit. As always, I've tried to test and measure everything I can, from power input to light output, reporting the raw data so you have information to help you make your own determination as to its potential usefulness to you. The results presented here are based on that testing, with the fixture operating on a nominal 115V 60Hz supply (Figure 1).

Lamp and lamp access

The unit was supplied with an 750-hour, Osram Lok-it! HTI 1000/PS Brilliant lamp. This uses a bayonet lock, so that removal and replacement are simple from outside the fixture without disturbing the lamp focus position. In the case of the Viper Performance, a single captive screw is loosened, a plate slid aside, and the lamp removed by twisting and pulling. There isn't a lot of space to get your fingers around the base, so I had to use a tool to do this; if you have smaller fingers you can probably manage without. Be careful if you do use a tool, so as not to crack the base. Figure 2 shows the lamp change.

The lamp is enclosed in a lamp house that is thermally separated from the remainder of the luminaire. Dedicated fans and vents keep the lamp at its operating point while minimizing the heat dissipated in to the optical system downstream. To aid thermal control, the rear portion of the unit is cast aluminum, while the remainder of the unit uses plastic formed covers over an internal chassis. Figure 3 is a thermal photograph of the unit in operation; you can see the majority of the heat being retained at the rear of the unit. The rear aluminum is running at around 50ºC, with peak temperatures at the air vents of around 100ºC.

Figure 2: Lamp.

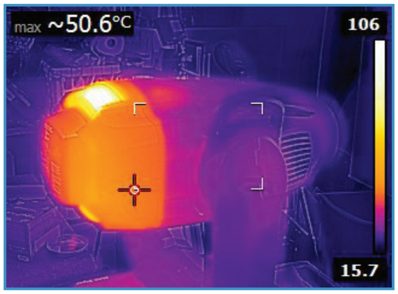

Figure 3: Thermals.

Dimmer and strobe shutters

After the lamp house and hot mirror, the main optical assemblies are mounted on two removable modules. The first contains the dimming and color-mixing assemblies; the second contains color wheels, gobos, framing, and iris.

Figure 4 shows the color mix and dimming module, with a view through the gate of the two toothed dimming flags inserted part way. The dimming from this system was smooth and clean throughout the dimming range, with minimal vignetting, even at the bottom end. It is aided in this by an homogenizing filter mounted on the front of the next module (Figure 4). The Mac Viper Performance offers a choice of dimming curve; Figure 5 shows the actual result obtained when using the default linear response. Strobing comes from the same system; I measured rates variable from 1Hz up to 10Hz.

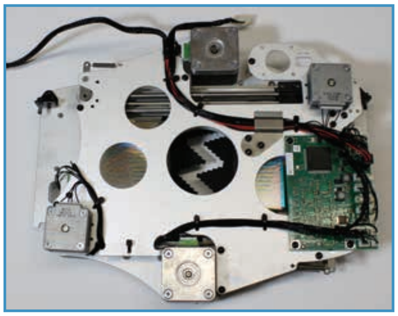

Figure 4: Dimmer and color mix.

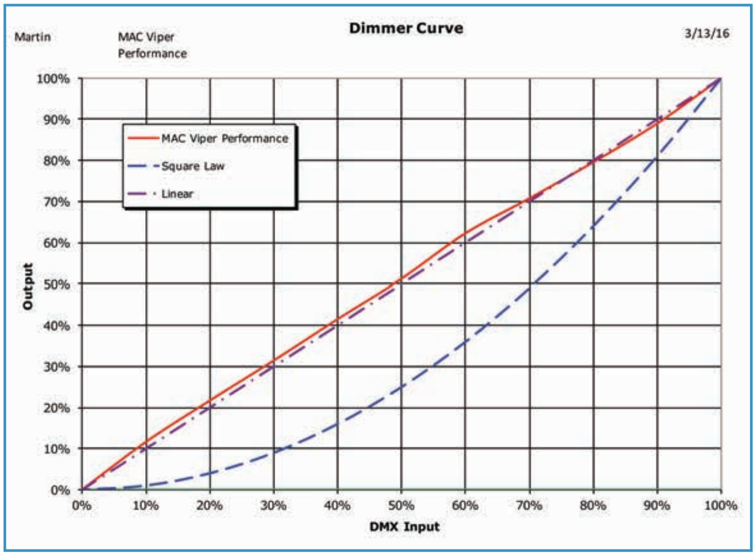

Figure 5: Dimmer curve.

Color systems

The unit has both CMY color mixing (in the rear module, prior to the homogenizing filter) and a color wheel (in the second module, after the homogenizing filter). Color mixing uses four sets of linear flags, (cyan, magenta, yellow, and CTO), etched, as can be seen in Figure 6. The mixing from this, aided again by the homogenizing filter, is very smooth. A small amount of color fringing was visible around the sides of the beam when mixing pastels, but nothing objectionable. The difficult lavenders and ambers were particularly well-mixed.

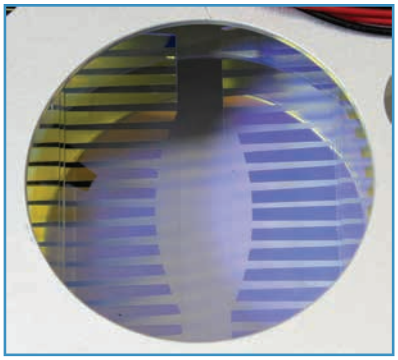

Figure 6: Color flags.

COLOR MIXING

Color	Cyan	Magenta	Yellow	Red	Green	Blue
Transmission	16%	3.1%	79%	2.7%	4.4%	0.3%

Color change speed – worst case	0.2 sec

Martin uses very saturated color-mixing colors in the Viper Performance, particularly with the magenta. This allows mixing a very deep blue, but inevitably reduces the output significantly.

I measured the CTO flags as the color temperature from the native 6,851K down to 3,107K when fully across the beam. As with other short-arc HID lamps, there is very little red in the lamp spectrum (Figure 7) so the CRI is relatively low at 80 and 56, respectively.

We now move to the second removable module where the color wheel is mounted. This has seven replaceable colors, plus an open hole (Figure 8).

COLOR WHEEL

Color	Blue	Green	Amber	-Green	Pink	UV	Red
Transmission	5.5%	29%	22%	84%	16%	0.2%	1.1%

COLOR WHEEL SPEED

Color change speed – adjacent	0.3 sec
Color change speed – worst case	0.9 sec
Maximum wheel spin speed	1.1 sec/rev = 55 rpm
Minimum wheel spin speed	135 sec/rev = 0.44 rpm

Although perhaps a little slow in changes, the system provided good half-colors and smooth continuous rotation.

The remainder of this module is fitted with imaging components, starting with the animation wheel.

Animation wheel

A single animation wheel can be inserted and rotated off-axis. The time to insert the wheel was 1.1 seconds and, once in place, it can be rotated at speeds varying from 0.53 sec/rev (113rpm) down to a very, very slow speed (so slow that I didn't measure it!).

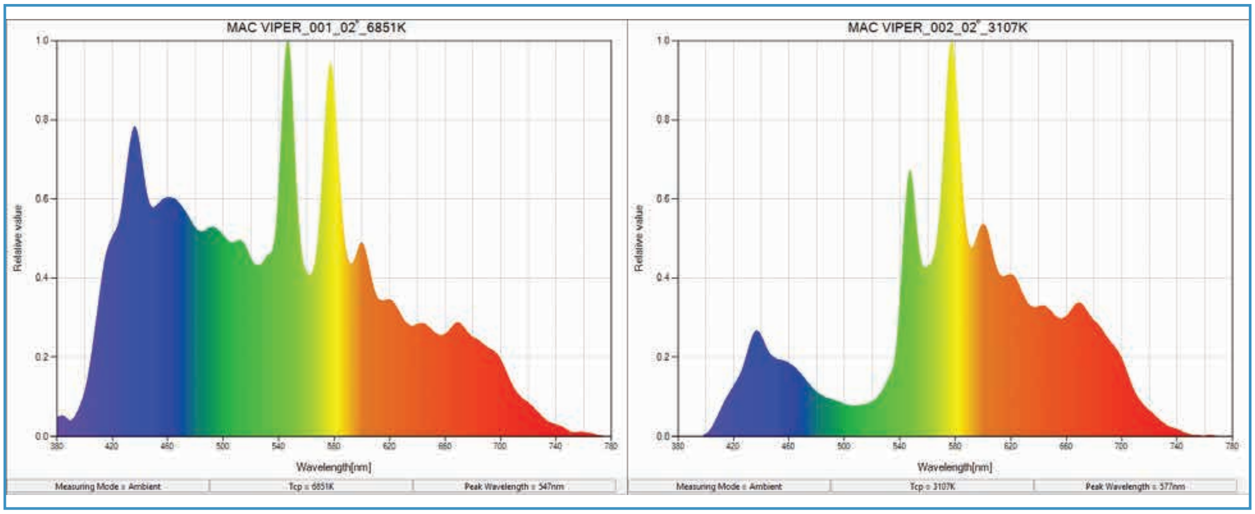

Figure 7: Spectra.

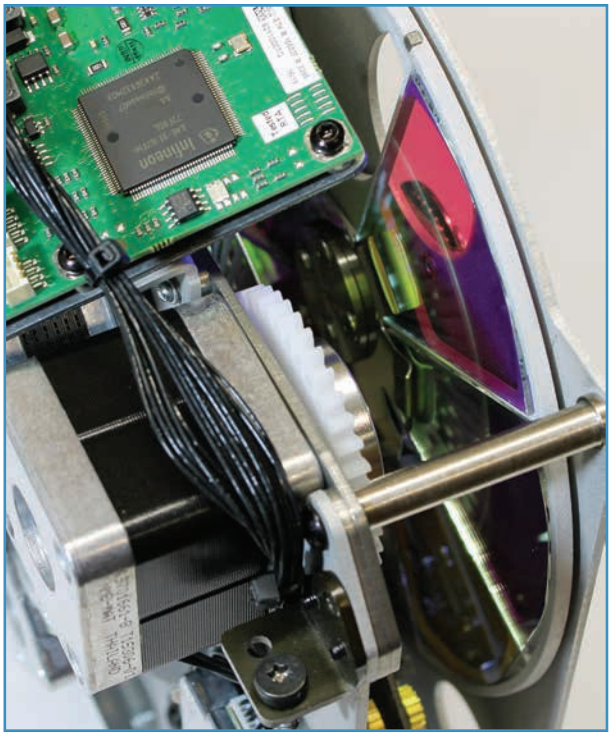
Figure 8: Color wheel.

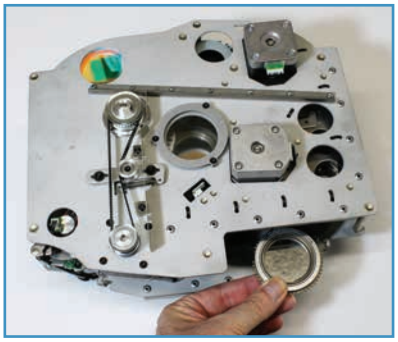
Figure 9: Gobo change.

Gobo wheel

The Mac Viper Performance has a single, rotating and indexing gobo wheel containing five gobos plus open hole. Figure 9 shows the rear of this optical module with one of the gobos removed.

ROTATING GOBO SPEEDS	
Gobo change speed – adjacent	0.3 sec
Gobo change speed – worst case	0.8 sec
Maximum gobo spin speed	0.52 sec/rev = 115 rpm
Minimum gobo spin speed	Very slow…
Maximum wheel spin speed	0.8 sec/rev = 75 rpm
Minimum wheel spin speed	4.6 sec/rev = 13 rpm

Rotation and indexing were smooth, with a good range of rotation speeds; as with the animation wheel gobo rotation; slow speed was too slow to measure. A slight oddity in gobo indexing is that the gobo always overshot slightly when rotated, then moved back into the correct position more slowly. After this correction, the hysteresis error was very small, with a measured accuracy of 0.07° which equates to 0.3" at a throw of 20'.

Framing

Immediately after the gobo, and as close to it as possible, is the four blade framing system. Figure 10 shows the nine motors needed to operate this system, two motors for each blade plus a ninth to rotate the entire assembly. Construction of this assembly was neat using the dedicated circuit board seen in the figure. Figure 11 shows the appearance of the blades when inserted across the gate. Each blade is capable of being inserted and adjusted in angle by +/- 30°, and then the entire assembly has +/- 55° of rotation adjustment available. Movement was clean; it took about

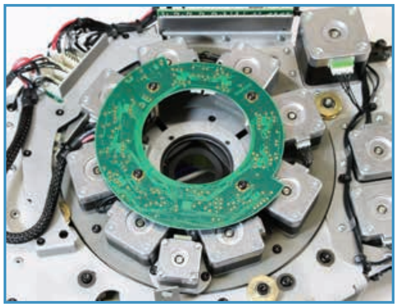
Figure 10: Framing module.

Figure 11: Framing shutters.

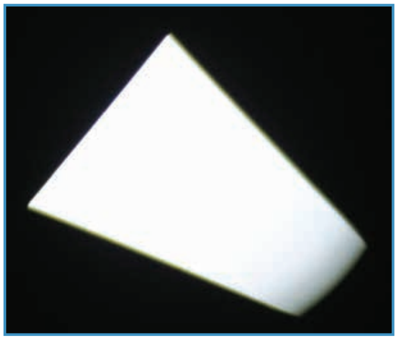

Figure 12: Shutter focus.

0.6 seconds for a blade to move from outside the beam to its maximum position. The blades don't meet in the middle—each covers less than 50% of the beam—so you can't black out with the shutters. Figure 12 shows an example of the shutter edge focusing. There is some focal difference between blades; the usual very fast optics are responsible for that. I also noticed some spherical distortion, resulting in slightly curved blades at wider zoom angles.

Iris

The last imaging component in this module is the iris. The fully closed iris reduces the aperture size to 16% of its full size, which gives equivalent field angles of 1.5° at minimum zoom and 6.5° at maximum zoom. I measured the opening/closing time at around 0.6 seconds.

Frost and prism

As is common in most automated spot luminaires, the zoom optical system comprises three lens groups: two moving groups and the final, output group, fixed. The frost and prism systems are mounted between the first two groups and travel. The system has to do some lens juggling to be able to insert these when they are needed. The prism has four facets and takes 0.3 seconds to remove or insert. Once in place, it provides approximately 50% image separation and can be rotated from 0.8 sec/rev (75rpm) down to a very slow speed. The prism is also indexable for accurate positioning (Figure 13).

Figure 13: Prism and frost.

Frost is provided by a single flag (visible in Figure 13) and can be positioned in about 0.3 seconds. Figure 14 shows the effect of the frost on a gobo as it moves across the beam. If you've read this column before, you'll know I have a regular complaint about what is called "frost." The Mac Viper Performance offers the type of frost that doesn't really soften the edges of the image; instead, it reduces overall image contrast while leaving the edges quite sharp. The other type of "frost" (which, I think, is the original meaning of the word, as it's what a piece of frost gel does to an ellipsoidal) would instead produce a result similar to defocusing the image. They both have value as effects, but they ought to have different names to distinguish them (Figure 14).

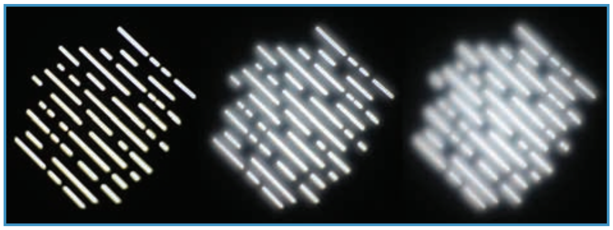

Figure 14: Frost effect.

Lenses and output

So how did the Mac Viper Performance perform? I measured the zoom range having field angles ranging from 9º to 39º, or nearly 5:1. The output at wide angle was 24,700lm, while in narrow angle it produced 21,100lm. The beam profile is very smooth and flat, roughly 2.5 : 1, edge to center (Figures 15 and 16). Focus quality is also good, with a little visible chromatic aberration and, as mentioned with the shutters, spherical aberration. Zoom and focus both took about 0.6 seconds to move end to end.

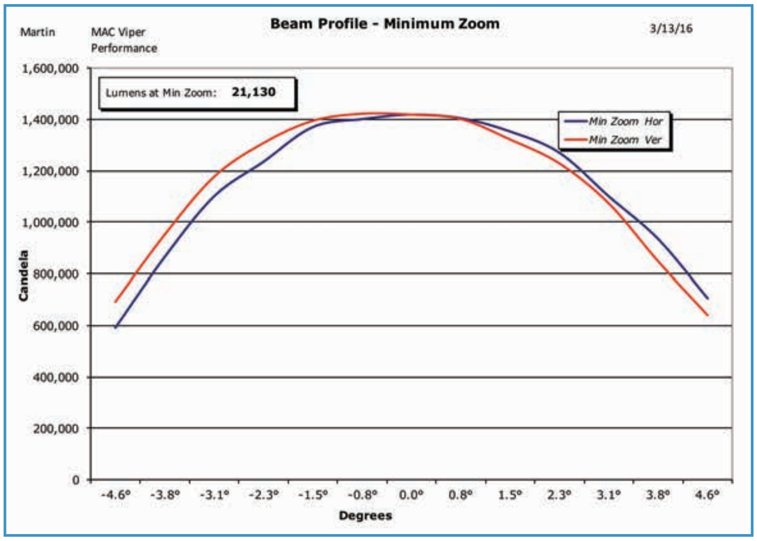

Figure 15: Beam profile minimum zoom.

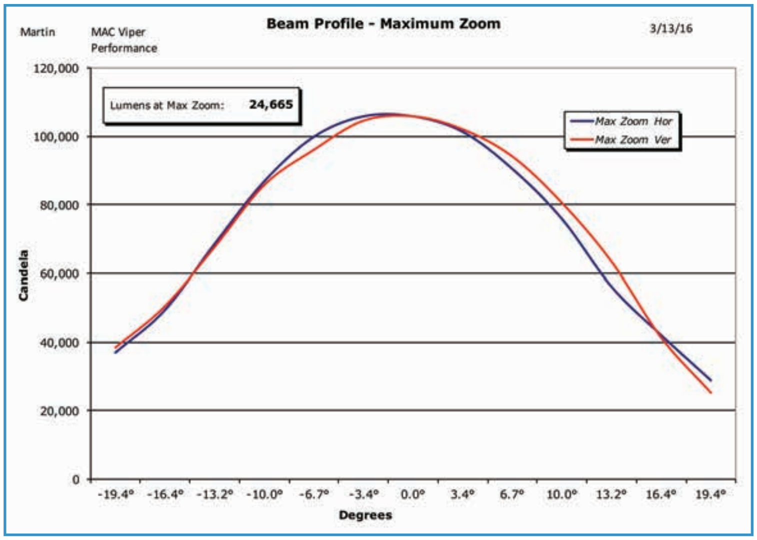

Figure 16: Beam profile maximum zoom.

Pan and tilt

I measured the pan-and-tilt range of the Mac Viper Performance at 540° and 270°, respectively. A full-range 540° pan move took 4.4 seconds to complete, while a more typical 180° move finished in 2.3 seconds. Tilt took 2.9 seconds for a full 270° move and 2.2 seconds for 180°. All movements were smooth, with little bounce and no visible steppiness. I measured hysteresis on pan and tilt at an excellent 0.04°, equivalent to 0.1" at 20'. Both axes use the Martin absolute position monitoring system.

Noise

Lamp cooling provides the background noise level. Pan, tilt, and focus were pretty much equally loud, as all three exhibited some resonance points

SOUND LEVELS

	Normal Mode
Ambient	<35 dBA at 1m
Stationary	48.3 dBA at 1m
Homing/Initialization	55.7 dBA at 1m
Pan	64.0 dBA at 1m
Tilt	64.2 dBA at 1m
Color	48.3 dBA at 1m
Gobo	50.2 dBA at 1m
Gobo rotate	48.3 dBA at 1m
Zoom	59.4 dBA at 1m
Focus	64.0 dBA at 1m
Strobe	48.3 dBA at 1m
Animation wheel	49.1 dBA at 1m
Iris	48.3 dBA at 1m
Frost / Prism	48.3 dBA at 1m
Framing Shutters	52.9 dBA at 1m

Homing/initialization time

Full initialization took 45 seconds from either a cold start or a DMX512 reset command. Homing is very 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

Construction

Figure 17 shows the overall construction within the fixture head. As already mentioned, the main systems are all mounted on two modules, which were simple to remove. (Note: Make sure you have some good-quality Torx drivers before attempting to work on this product. All fasteners are Torx, and I discovered that my cheap Torx drivers weren't up to the task. The sockets were a loose fit and I would have damaged the heads if I'd persevered. Instead, I purchased a good-quality set and had no problems. Throw away the Husky tools, and get the Wiha, is

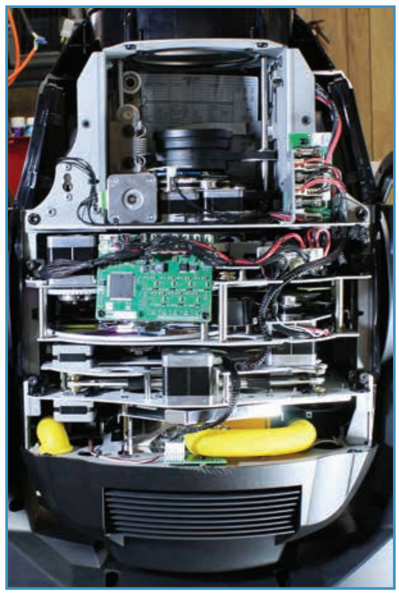

Figure 17: Head.

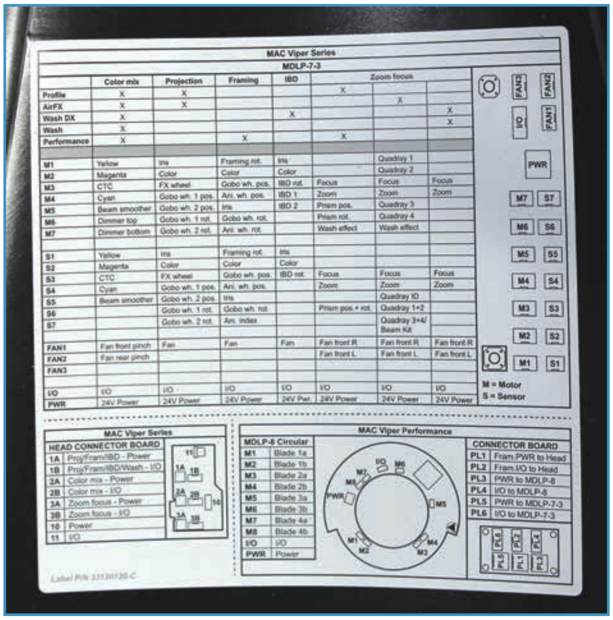

Figure 18: Wiring connections.

never bad advice.) All motor-control electronics are distributed throughout the system with a data bus connecting everything together. I liked that Martin has put a connection diagram for the electrical connections inside each head cover. This could be very useful when maintaining the unit (Figure 18).

Figure 19 shows the yoke arms with the covers off (many screws to remove the yoke arm covers), one side with the tilt belt and power wiring, and the other with the pan.

Figure 20 shows one side of the top box with cover removed revealing one of the Schiederwerk supplies. The top box is pretty well-filled with lamp and power supplies, but access is pretty straightforward.

Electronics and control

Finally, the control panel and connections: The Mac Viper Performance has the standard Martin menuing system for configuration and service using a scroll wheel and buttons. For connectors there is a powerCON for power in, and a pair of five-pin DMX512. The unit offers full RDM capability. I ran the Open Lighting Project RDM test suite (www.openlighting.org) through the unit and it performed well, giving me access to all the expected functionality.

So, there you have it: the Martin by Harman Mac Viper Performance, from mains input to light output. I hope I provided you with some useful data that could help you determine if it's a unit you should be testing. As I always say, it's you who gets to decide.

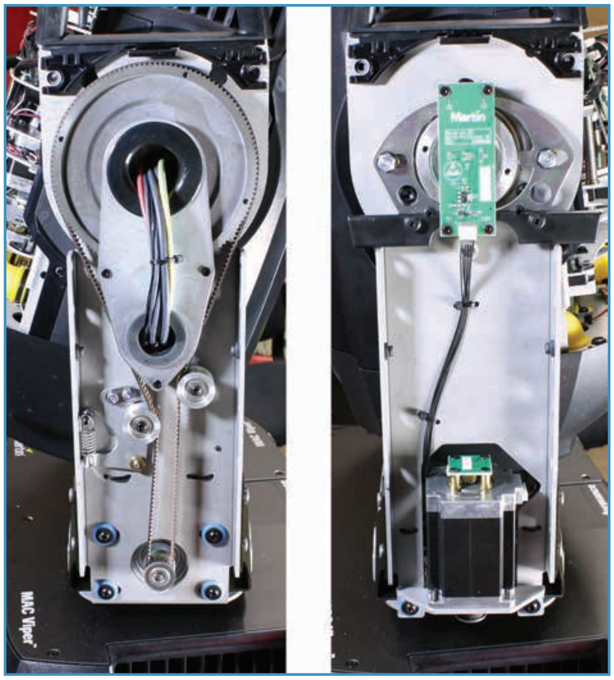

Figure 19: Yoke arms.

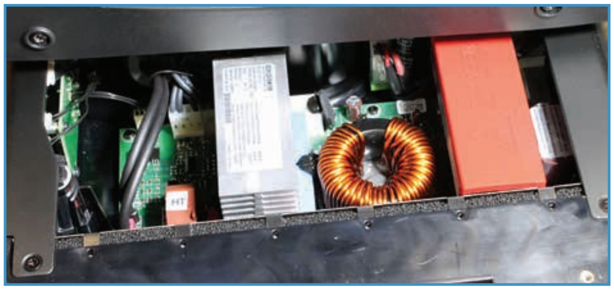
Figure 20: Topbox.

Figure 21: Display and connectors.

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