Martin by Harman MAC Allure Profile

By: Mike Wood

Figure 1: Fixture as tested.

It's little more than a year since I looked at a product from Martin by Harman. Over the last couple of years, Martin has moved its production from the original factories in Denmark to a new Harman facility in Hungary. The product I am testing today, the MAC Allure Profile, is marked as being assembled in that factory. I assume that this means the components are manufactured elsewhere but that final assembly and test are in Hungary.

The Mac Allure Profile is the first of its kind that I've tested. It's a profile unit with gobos and imaging components; however, the LED light engine is arranged in seven independently controlled pixels, allowing the image to be dynamically colored or controlled by a video signal. It's a very interesting concept, but what does it look like? As usual, I'll test the fixture from one end to the other, reporting what I can measure to try and help you decide if the Mac Allure Profile is a potential fit for your needs.

Everything I report here is based on the tests on a single Mac Allure Profile unit supplied to me by Martin by Harman for this review. All tests were run on a nominal 115V 60Hz supply (tests run at 114V). The unit is rated to run on voltages from 100-240V 50/60Hz (Figure 1).

Light source and cooling

According to the spec sheet, the Mac Allure Profile uses seven 60W RGBW LEDs. However, access to these is through a virtual RGB control mode, which matrixes all four LED outputs to produce a calibrated mix for the requested RGB color, including the white channel.

Those seven LED arrays are arranged in seven pixels, looking a little like cells in a honeycomb: one hexagonal pixel in the center with six trapezoidal cells around it. Figure 2 shows an example of output possibilities when the optical system is focused back on to the LED array. In this case, I was operating in the extended DMX512 control mode, which gave me independent control of the color of each of the seven pixels.

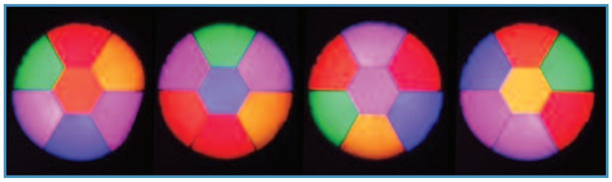

Figure 2: Pixels.

The seven LED arrays are mounted to a large heat plate with a finned heat sink on top of that. Four thermostatically controlled fans, two blowing and two sucking, direct cooling air sideways through those fins from one side of the fixture to the other. Figure 3 shows the heat sink arrangement with the covers and fans removed.

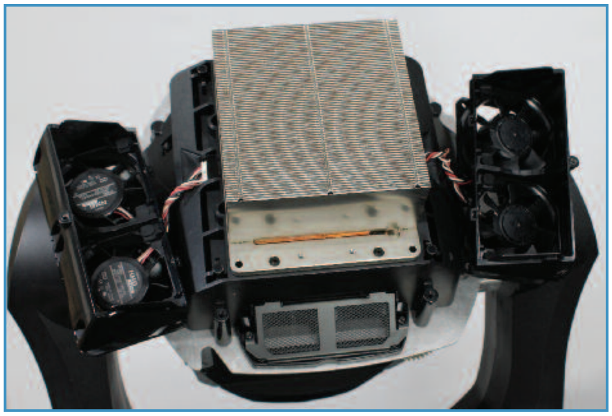

Figure 3: Heat sink and cooling.

Color

As this is a simple RGBW system, the gamut of colors is very much for effects rather than lighting performers. Color rendering is fairly poor at lower color temperatures. I imagine, as this is a product aimed at working with video, that the RGB gamut was chosen to match that of video systems. It also matches the Quantum Wash and other, newer Martin units.

I measured the outputs from the color-mixing system as a percentage of the total output as follows. The colors are well-saturated, and the homogenization within each cell when focus is pulled away from the LEDs is very good. You can, however, see slight differences between each cell in the total image. These disappear when a gobo is used but are visible with an open field.

COLOR MIXING

Color	Cyan	Magenta	Yellow	Red	Green	Blue
Transmission	36%	15%	48%	14%	36%	4.4%

There is also a color temperature, or CCT, channel, which allows controlling the mixed white output over a range from 2,000K – 10,000K. The calibration on this channel was extremely good, with the measured CCT never more than 100K or so from the nominal. For example, when the requested CCT was 3,200K, the output was 3,062K, and when set to 5,600K, the output was 5,663K. This is unusually good; I assume Martin must calibrate this on a per-fixture basis to suit its P3 control system.

As examples, Figure 4 shows the spectral distribution at 10,000K, while Figure 5 shows 3,200K. Color rendering and CCT were measured as follows:

CCT Requested	CCT	Duv	TM-30 Rf	TM-30 Rg
10,000K	10,109K	0.0024	81	108
5,600K	5,663K	0.0020	79	115
3,200K	3,062K	-0.0003	61	120
2,000K	1,909K	-0.0023	34	98

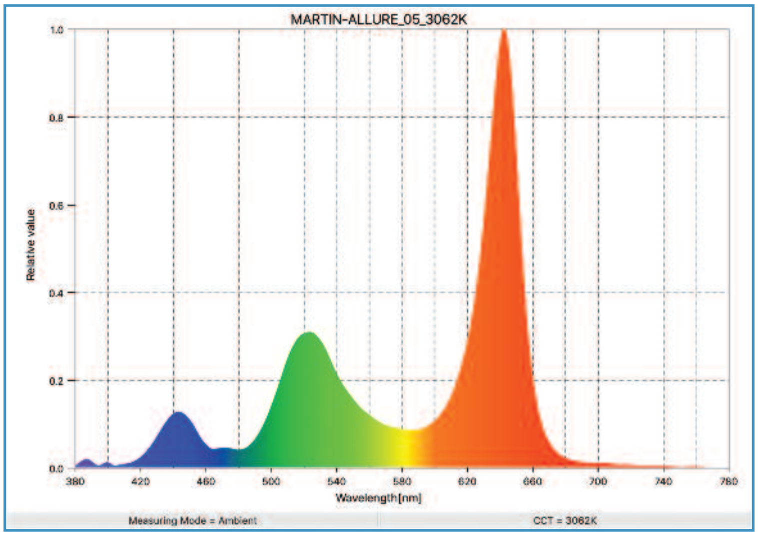

Figure 4: Spectral distribution at 10,000K.

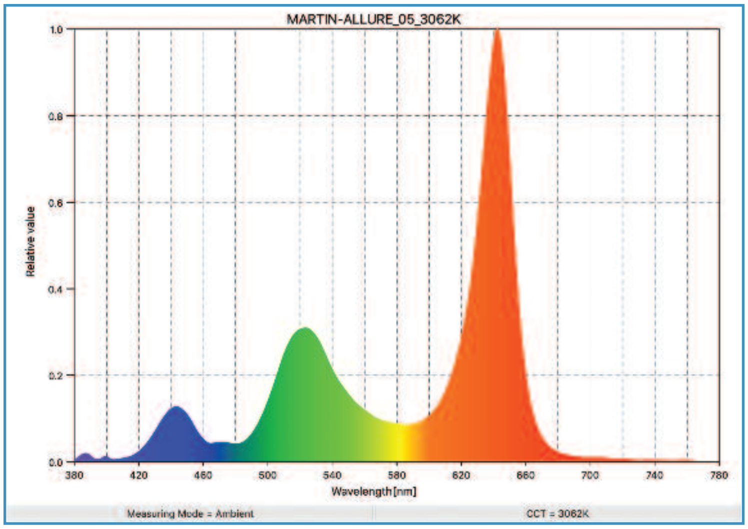

Figure 5: Spectral distribution at 3,200K.

As well as RGB color mixing (which can be controlled either on an overall basis, or pixel-by-pixel), the Mac Allure also provides a virtual color wheel channel, offering a range of premixed standard gel colors. This also takes advantage of the seven pixels by providing virtual half colors where three of the pixels are one color, the center pixel is off, and the three pixels on the other side are a second color. Similarly, you can simulate a color wheel spin.

Gobos

The Mac Allure Profile has a single rotating gobo wheel with six rotating, indexing gobos plus an open hole. The gobos are mounted in snap-in carriers so they can be changed. Two gobos have a permanent fixed gobo mounted adjacent to them, allowing for morphing and moiré effects with those two patterns. Figure 6 shows a close-up of the first three gobos on the wheel. The first, on the left, is a single rotating gobo; the next two have a fixed gobo pattern etched into the plate nearest to us, as well with the gobo behind. The center pattern in Figure 6 is a patterned gobo; the third (on the right) has textured glass in the rotating gobo wheel with a fixed slot pattern on top. If you wanted to use custom gobos in the Mac Allure Profile, you would either need to remove or replace this fixed wheel plate or take care which

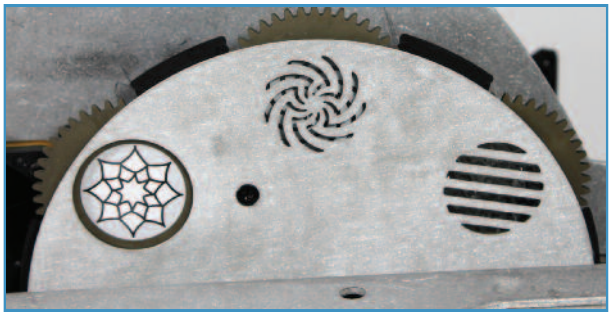

Figure 6: Gobo wheel.

Figure 7: Gobo.

slots you use. Figure 7 shows one of the rotating gobos in its carrier.

ROTATING GOBO

Gobo change speed – adjacent	0.4 sec
Gobo change speed – worst case	1.0 sec
Maximum gobo spin speed	0.3 sec/rev = 200rpm
Minimum gobo spin speed	340 sec/rev = 0.176rpm
Maximum wheel spin speed	0.68 sec/rev = 88rpm
Minimum wheel spin speed	7.2 sec/rev = 8.3rpm

Indexing and rotation of the gobo wheel was quick and smooth, with a good range of rotation speeds and minimal bounce when changing direction. Hysteresis on the gobo indexing was approximately 0.03°, this equates to an error of 0.1" at 20' (5.4mm at 10m).

It is worth looking at how the pixelated LED illumination

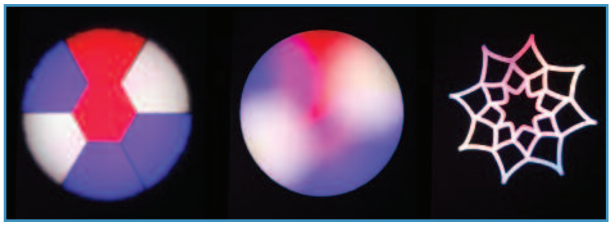

Figure 08: Pixel focus.

system behaves when use with gobos. Figure 8 shows the beam in three different configurations. The first, on the left, is the projected beam when the optical system is focused on the LEDs and no gobo is inserted. The center image shows the same LED pattern, but this time with the optical system focused on the open aperture at the gobo plane. Finally, the right image shows the output with a gobo in place. (The colors behind the gobo were brighter in real life; this was difficult to photograph).

Iris

The Mac Allure Profile has a standard iris, offering the usual range of ramp and snap macros as well as positional control. At its smallest, the iris reduced the output beam to 17% of its full size. This equates to field angles of 1.9ª and 5.2° at narrow- and wide-angle zoom respectively. It took 0.2 seconds to open or close.

Prism

The Mac Allure Profile has a single removable indexable and rotatable four-facet prism. This is mounted between the zoom and focus lens groups. The prism can be inserted or removed in approximately 0.8 seconds. (It varies, as the lenses may have to move out of the way at some zoom positions). Once in place, it can be rotated at speeds varying from 0.47 sec/rev (128 rpm) down to 1,760 sec/rev (0.03 rpm) (Figure 9).

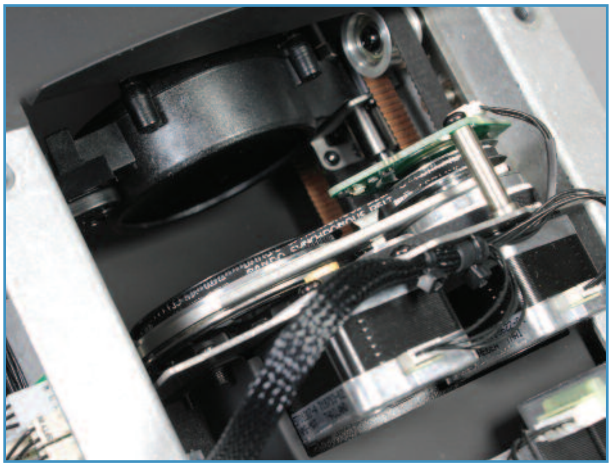

Figure 9: Prism.

Lenses and output

The Mac Allure Profile uses a typical three-lens group zoom, with the front group fixed as the output lens and the other two groups moving to provide zoom and focus control. Zoom took 0.65 seconds to run from maximum to minimum while focus took 0.85 seconds from end to end.

I measured the output of the Mac Allure Profile with all channels set to their defaults at 4,500 lumens, with a field angle of 31° at the wide-angle end of zoom, ramping down to 3,560 lumens at a narrow angle of 11°. Figures 10 and 11 show the beam profiles at these two extremes. Both profiles have good flat tops. This, again, speaks to the design as a video-enabled device.

These measurements were taken after running the unit at full power for at least 30 minutes to account for any warm-up droop. Over the first ten minutes, after turning on at full

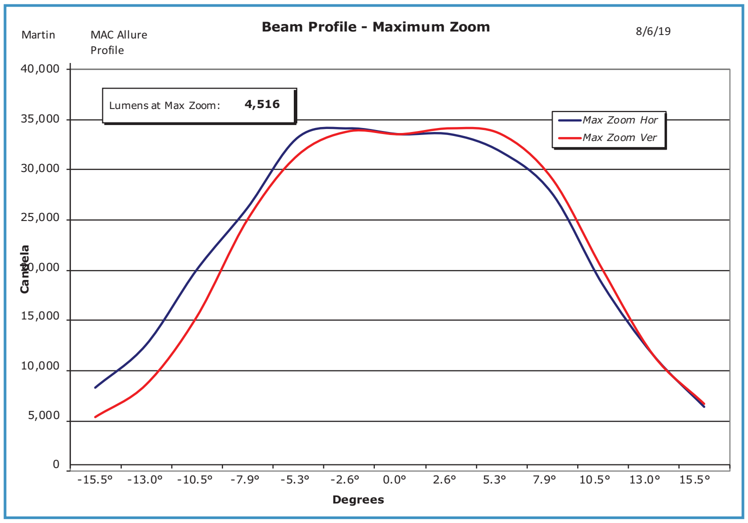

Figure 10: Maximum angle.

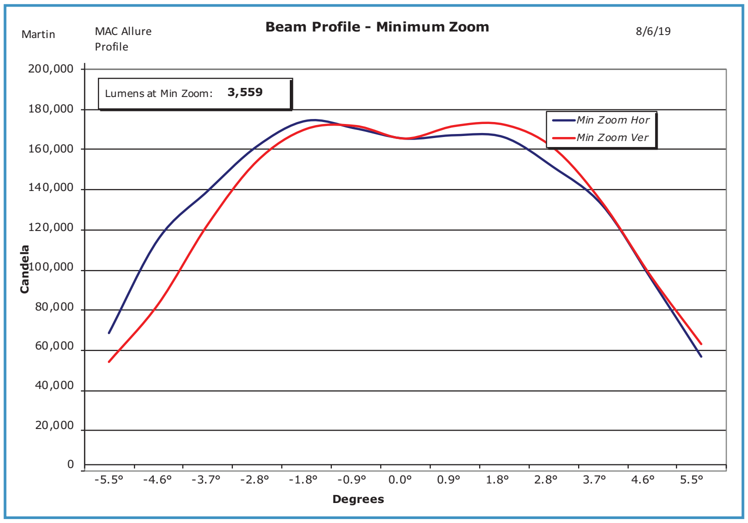

Figure 11: Minimum angle.

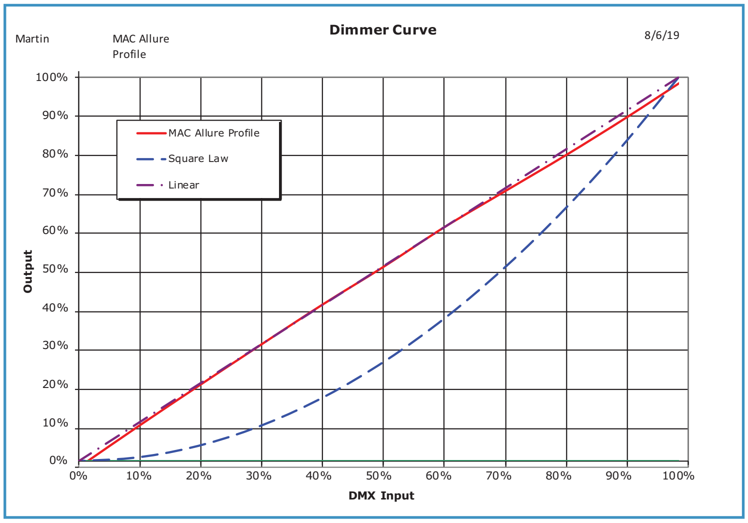

Figure 12: Dimmer curve.

power, the MAC Allure Profile output dropped by 15%.

Dimming was smooth and followed a default linear law well, with no jerkiness and no artifacts at low dim levels (Figure 12). I measured the standard PWM rate at 1,200Hz. Electronic strobe of the LEDs is variable up to a measured 21Hz.

Pan and tilt

The Mac Allure Profile has 540° of pan and 270° of tilt movement. I measured pan speed over the full travel at 3.8 seconds and 2.2 seconds for 180°. In tilt, the figures were 2.9 seconds for the full 270° and 2.4 seconds for 180°. Movement on both axes was very smooth, with minimal hysteresis. Pan exhibited 0.05° of hysteresis, which is 0.2" at a throw of 20' (8.1mm at 10m). Tilt was a little more, at 0.06°, 0.3" at 20' (11mm at 10m).

Martin uses an interesting homing system for pan and tilt that I've seen before in the Mac Encore. It's a two-stage system: Firstly, there are four magnets on the pan and tilt pulleys that provide four potential homing positions. Figure 13 shows the main tilt gear with the four

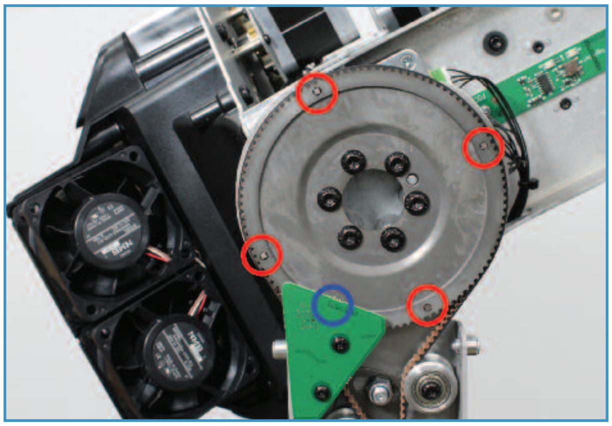

Figure 13: Tilt homing.

magnets mounted at 90° intervals circled in red. There is a single Hall-effect sensor on the circuit board at the bottom, circled in blue. The Mac Allure Profile can home to any one of the four magnets but to do so it must be able to distinguish which is which. To do that, it uses a second sensor, a rotary sensor mounted to the rear of the motor. A small magnet is mounted on the end of the motor shaft, aligned with a sensor on an adjacent board. Figure 14 shows this sensor board, mounted at the rear of the tilt motor. The sensor detects the angular orientation of the magnet and, using this information, the system can determine which of the four magnets is causing the homing sensor to trip. This allows much quicker homing, as pan and tilt don't need to move all the way to their end stops, just to whichever of the four magnets they hit first. The rotary sensor also provides the same functionality as an encoder wheel to detect if the unit has been knocked out

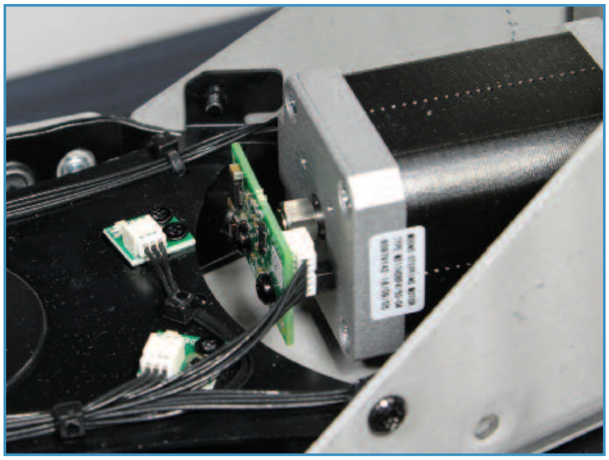

Figure 14: Magnetic position sensor.

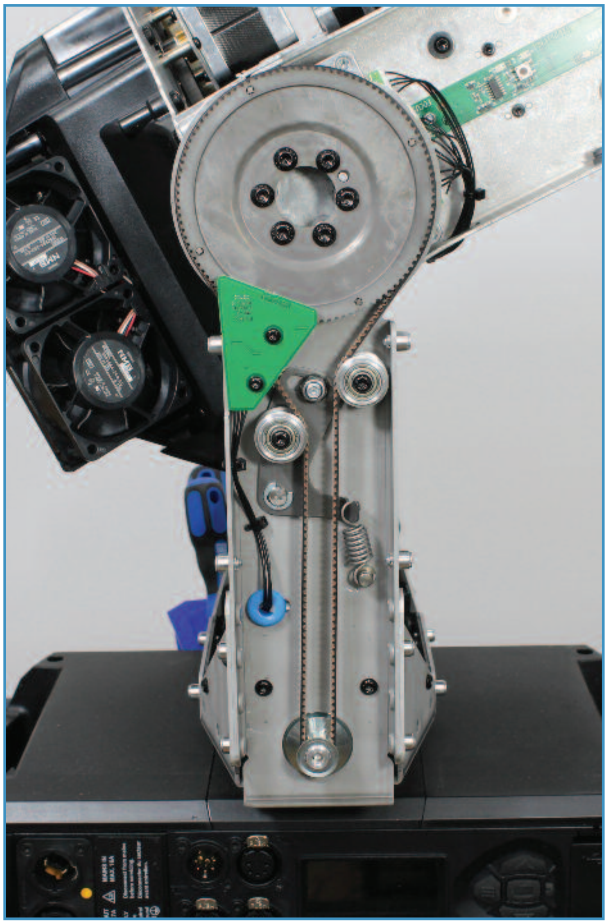

Figure 15: Tilt.

of position. Figure 15 shows the full yoke arm with tilt motor, belt, and belt tensioning system.

Noise

The Martin Mac Allure Profile is not a quiet fixture. Zoom and the gobo wheel were both noisy, with the zoom producing a loud whine at high speeds. (Martin tells me it has reduced this noise in current software revisions.) Of course, you can always slow these down. All readings were taken in the default mode where the fixture controls fan speed to maintain maximum output.

SOUND LEVELS

Ambient	<35dBA at 1m
Stationary	43.1dBA at 1m
Homing/Initialization	53.6dBA at 1m
Pan	53.9dBA at 1m
Tilt	45.7dBA at 1m
Iris	46.2dBA at 1m
Zoom	61.0dBA at 1m
Focus	50.2dBA at 1m
Gobo	45.7dBA at 1m
Gobo Wheel Rotate	61.5dBA at 1m
Prism	48.2 dBA at 1m

Homing/initialization time

I measured the time for a full initialization of the Mac Allure Profile from power up to be 39 seconds. From a DMX reset command, it was slightly quicker, at 36 seconds. Reset is very well-behaved in that the LEDs are dimmed out before reset starts and do nice, slow fade-ups after final positioning.

Power, electronics, control, and construction

Running on a 115V 60Hz supply, the Mac Allure Profile consumed 3.3A at full output and allowed to warm up. This equates to 373W with a power factor of 0.99. The quiescent load, with the unit powered up but no LEDs on, was 0.64A, 73W, power factor 0.98.

The Mac Allure Profile drive electronics are distributed throughout the unit, with neat daughter boards in the head connected via CAN bus. The same CAN bus also drives the LED array. Figure 16 shows one of these motor boards mounted to the side of the lenses and the head power distribution board.

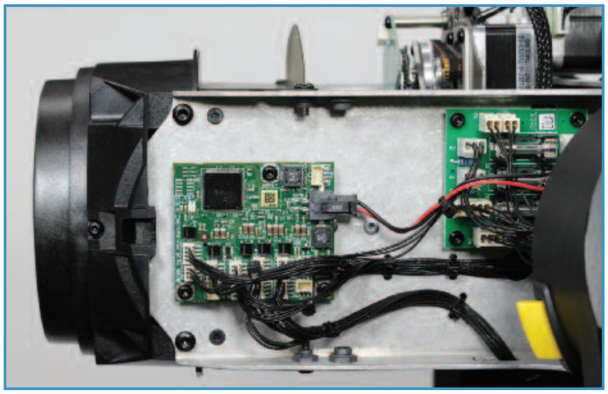

Figure 16: Motor board.

A nice feature of the construction is the inclusion of a number of schematics inside the covers of the unit and on the rear of the LED module, detailing how modules are connected. Figure 17 shows the labels on the rear of the LED housing molded air ducts. Quite a lot of the construction uses plastic moldings. For example, the iris linkage is a plastic molding rather than the usual aluminum or steel arm. The move to LEDs and the consequent lower internal operating temperatures has allowed this.

One aspect of the molded construction I didn't like was the removable head covers. I found these extremely difficult to replace (and I've struggled with a lot of head covers over the years) without trapping motor wires. As it stands, I wouldn't recommend trying to replace gobos on this light when it's in the rig. The head cover needs to be replaced on a bench with good lighting. This is a minor quibble, however.

Figure 17: Molded air duct.

Figure 18: Display and connectors.

Figure 18 shows the monochrome graphical display and four-button control menu system next to the connectors. The door on the far right reveals a USB connector and the battery for off-line configuration. The menu system is familiar and provides access to the usual fixture setup and maintenance functions. The Mac Allure Profile uses True1 connectors for power in and out, and provides five-pin XLR connectors for DMX512 data along with RJ45s for sACN, Art-Net, or Martin P3 video data. The Ethernet connections are bridged by a relay when power is off, so as not to break a daisy-chained installation. I tested and confirmed RDM functionality using a City Theatrical DMXcat and was able to change system parameters, control the unit, and access temperature data and other parameters.

The addition of optional control via the Martin P3 video control system is perhaps significant. Martin may see the Mac Allure Profile as a video product as much as a lighting product. Clearly, it's designed to straddle that divide. When operated via P3, you can control multiple Allures in sync with video displays and LED video walls and, Martin claims, achieve color matching between the products. With only one product to test, I can't speak to this. If you don't use P3 but stick to DMX512 control, the Mac Allure Profile offers macro channels and controls to provide quick access to the seven pixels while still keeping multiple units in sync.

Conclusion

That just about does it for the Martin MAC Allure Profile, a unit with some interesting features that point to its intended use as a video/lighting crossover product. This isn't a fixture you would likely use as a key light on performers, but it's not intended to be. It's an effect product that can be used in arrays and banks along with video systems, but its small size and weight may give it use elsewhere as well. I hope I've given you some information that helps you decide if you want to test out the Martin MAC Allure Profile for yourself. That decision is yours, and yours alone.

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