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## Martin by Harman Rush MH 8 Mini Profile

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Well, this is a bit different. This month, I'm reviewing a moving light—nothing new there—but it's one I can pick up easily in one hand. It's very considerate of manufacturers to be producing lighter and smaller units as I get older. I don't think I could handle a 12kW magnetic ballast in the same way I did in 1980. Actually, if I'm honest about it, I never could handle a 12kW magnetic ballast...

The product in question is the Martin by Harman Rush MH 8 Mini Profile. I was trying to think of a good way of



the Rush range is. Martin used to call it the company's club or DJ range, but then it expanded and it now includes products, like the MH 8, which have potential uses outside that narrow definition. I suppose it's a reduced feature range, or a simple range. However you describe it, the Rush MH 8 is a small, 12"-high, 10lb, LED moving

describing what

Figure 1: Fixture as tested.

light with gobos and a color wheel. It's very simple, but sometimes simple is what you need. The small size certainly opens up applications hidden within trusses or sets.

The Rush MH 8 I tested was supplied to me from Martin US, and all the tests you see here are based on that single unit. As ever, I've tried to test and measure everything I can, from power input to light output, and report 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).

#### Light source

The Rush MH 8 is fitted with a single 18W Osram Ostar ultra-white LED. This has a 1.5mm x 1.2mm die and is designed for projection optics. The LED is permanently fixed



Figure 2: Dim curve.

to a finned heat sink backed by a fan. The fan can be run either in Auto Mode, where the fan speed increases as needed to keep the LED cool, or in Low Mode, where the light output is reduced instead if things start getting too hot. For all my tests, I ran the unit in Auto Mode and allowed the unit to heat up for 30 minutes before taking any measurements, during which time the output drooped about 3%. However, I did test the unit in Low Fan Mode as well and it



Figure 3: Gobo and heatsink

made very little difference to the light output. It did drop further, but only by a couple of percent, nowhere near enough to be noticeable. The LED is mounted with a primary optic, which collimates the light output from the native 130° down to a tight beam focused through the optical assembly. The rear of the heat sink can be clearly seen in Figure 3.

#### **Dimmer and strobe**

This is an LED unit, so dimming and strobe are handled electronically. The Rush MH 8 offers 16-bit dimming and it performs well. Dimming was smooth all the way up and down, apart from the final 1% or less, where the unit turns off. For most people, this won't matter; you'd only notice it if the MH 8 was the only light on a stage and you were doing a slow fade to blackout. I left the unit in square law dimming mode and the output was as shown in Figure 2: a little steep at the top end perhaps, but a very acceptable curve.

Strobing comes from the same electronic system, and I measured rates variable from 0.66Hz up to just over 13Hz. While dimming, I measured the PWM frequency at 1,100Hz. Although not slow, this is getting to be an average value; higher or having some adjustment might be better, particularly if you were to use the unit with rolling shutter CMOS video cameras.

#### **Gobo wheel**

Next in line is the gobo wheel. The Martin Rush MH 8 Mini Profile has a single fixed gobo wheel. (Note: It's slightly unusual to have the gobo wheel before the color system in the optical train, because the dichroic filters can distort the gobo image a little. However, I suspect Martin did it this way with the MH 8 to get the gobo as close as possible to the light source.) The wheel is manufactured in a single piece with eight permanent patterns, as can be seen in Figure 3.

GOBO	SPEEDS
0.0 0 0	0. 2200

Gobo change speed – adjacent	0.4 sec
Gobo change speed – worst case	1.2 sec
Maximum gobo spin speed	0.8 sec/rev = 75 rpm
Minimum gobo spin speed	130 sec/rev = 0.5 rpm

The wheel is positional in any location, not just on full gobo steps, so intermediate half-gobo positions are possible within the limits of an eight-bit control channel. Figure 4



Figure 4: Gobos.

shows a couple of examples of gobo images and an intermediate position. Gobo change positioning was reasonably snappy and accurate with support for both quick and slow path options available. (Quick path means the gobo wheel always takes the shortest route to the desired gobo, which may or may not include passing over the open hole. Slow path, on the other hand, always avoids the open hole.)

#### **Color wheel**

The color wheel is very similar in concept and operation to the gobo wheel, the MH 8 has eight permanent dichroic filters plus an open hole. Each of these filters is shaped so that they butt up to each other with a minimum of gap, to allow half colors (Figure 5).



Figure 5: Color and gobo wheels.

#### COLOR WHEEL

Color	Red	Orange	Yellow	Lt Green	Dk Blue	Magenta	Lt Blue	Pink
Trans-								
mission	5.9%	31%	76%	57%	9.1%	4.8%	54%	20%

COLOR WHEEL SPEED				
Color change speed – adjacent	0.2 sec			
Color change speed – worst case	0.6 sec			
Maximum wheel spin speed	0.8 sec/rev = 75 rpm			
Minimum wheel spin speed	130 sec/rev = 0.46 rpm			

Color changes were a little quicker than gobo changes and share the same positioning system. Figure 6 shows a few examples of colors and half colors.)



Figure 6: Colors.



Figure 7: Lens.

#### Lenses and output

The Rush MH 8 has a very simple optical system. In addition to the LED primary optic already mentioned, there are just two more lens elements: a fixed single plano-convex element immediately after the color wheel, and a manually operated focus lens as the output lens, —again, a single element. Figure 7 shows the output lens within its knurled housing, which you twist to focus the output at your desired throw. Also visible in Figure 7 is an aperture, mounted immediately behind this lens, which will get rid of stray light and spill. There's no zoom, of course, just a single set of output figures. I measured the Rush MH 8 as producing 554 lumens with a field angle of 12.8°. As you can see from the images, focus quality was good, with just a little chromatic aberration showing up as blue/yellow edges to gobos, par-



Figure 8: Output.



Figure 9: Spectrum.

ticularly near the edge of the field. It's very good for such a small and simple optical system. Figure 8 shows the output profile, the beam is extremely flat, about 1.5:1 center to edge. This looks totally flat to the human eye.

Color temperature in open white was 9,090K, with a CRI of 76.5. Figure 9 shows the measured spectrum from the unit. This is a fairly high color temperature LED, so the large dip around cyan is not unexpected.

#### Pan and tilt

I measured the pan and tilt range of the Rush MH 8 at 545° and 230° respectively. A full range 545° pan move took a mere 2.2 seconds to complete, while a more typical 180° move finished in 1.4 seconds. Tilt took 1.2 seconds for a full 230° move and 0.9 seconds for 180°. The small size of the unit really helps with these very quick times. All movements were acceptably smooth, with very little bounce and no visible steppiness. I measured hysteresis on both pan and tilt at an excellent 0.05°, equivalent to 0.1" at 20' (8.3mm at 10m). There are no positional



Figure 10: Pan-and-tilt motors.



Figure 11: Tilt system and microswitch.

encoders to reset pan and tilt if the unit is knocked out of position. Figure 10 shows the unit with the yoke covers removed, exposing the pan-and-tilt motors and associated pulleys and belts. It's a very straightforward system using micro switches for homing. More detail of the pan system in the yoke arm is in Figure 11.

#### Noise

There's not much to say about noise. In Fan Auto Mode, the lamp cooling fan provides the noise floor of around 47dBA at 1m with none of the other motors really getting above it. In Low Fan Mode, the noise drops considerably, down to 38.3dBA. As I mentioned earlier, output only dropped by 2% in Low Fan Mode, so I would recommend using it. It drops the noise from objectionable to hardly noticeable.

#### Homing/initialization time

Full initialization took between 15 and 20 seconds from either a cold start or a DMX512 reset command, depending on where the head is positioned when the reset command is issued. Homing is partly badly behaved. The fixture fades out smoothly before moving pan and tilt for reset; however, it fades up again before reset movement is finished.

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Figure 12: Menu.

#### **Control and connections**

Finally, the control panel and connections: The Rush MH 8 has a 16-character alphanumeric display with a standard four-button control. This gives you access to the usual setup and configuration options, along with the ability to run the unit in stand-alone, master/slave, or sound operated modes (Figure 12).

On the connector side, the unit has an IEC power input,



Figure 13: Connectors.

along with five-pin DMX 512 connectors and three-pin  $\ensuremath{\mathsf{XLRs}}$  .

The Rush MH 8 is rated for operation on 100V — 240V, 50/60Hz. I measured power consumption running at 115V, 60Hz at 0.65A, 47W, 77VA, with a power factor of 0.61. Quiescent load with the LED extinguished was 0.36A, 24W, 42VA, power factor of 0.57.

So, there it is: a simple review for a simple product, the Martin by Harman Rush MH 8 Mini Profile, from mains input to light output. Simple it may be, but its small size perhaps gives it unique options. I hope I provided you with useful data that could help you determine if it's a unit you should be testing. The bottom line, as always, is that it's you who gets to decide.

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