ed my usual disassembly a little so as not to break any seals, so apologies if the figures aren't quite as illuminating as usual. Figure 2 shows LED 19, mounted on the main board, immediately surmounted by one end of a square plastic light pipe. These light pipes extend upwards out of the frame of that figure, increasing in size as they go, and are capped with a diffusing or homogenizing film at the circular output end. Figure 3 shows the light pipes from the side inside their protective casings, and Figure 4 shows a view from the top through the lens to the top of the light pipe. The light pipe design, along with the transition from square to round cross-section and the diffuser on the end, serve to homogenize the colors into a single blended beam.

The LEDs are mounted on a metal cored circuit board, which is thermally attached to a large aluminum backing plate and then to a set of cooling fins. This plate also marks where the sealed LED compartment finishes. The LEDs, circuit board, driver circuitry, and motors are all inside the sealed module. The heat sink forms the back wall of this compartment, which transfers heat to the fins on the outside, in an unsealed area. The fins, in turn, are cooled by two, presumably waterproof, fans on the back of the unit. Figure 5 shows the two fans, which are normally covered by a plastic cover. On the left of Figure 5 you can see the fan power wires exiting from the LED compartment module through a sealed tube.

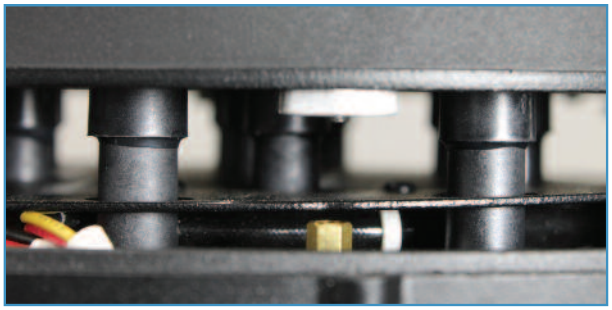

Figure 3: Light pipes.

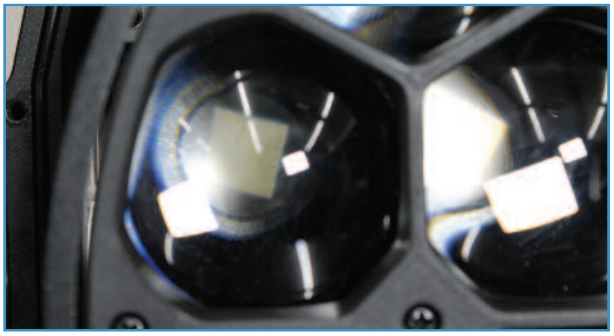

Figure 4: Light pipe and lens.

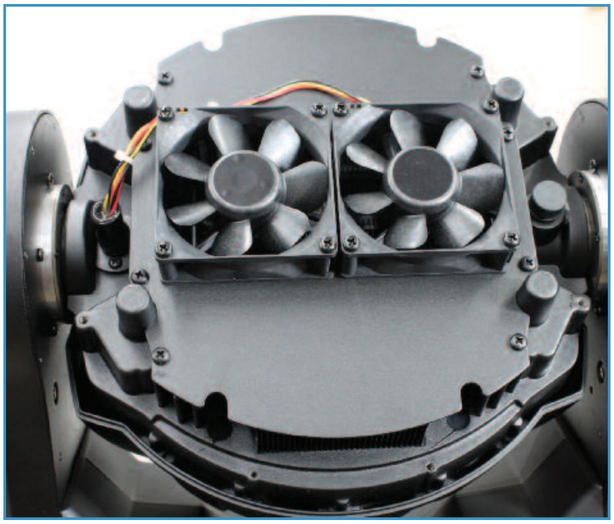

Figure 5: Cooling fans.

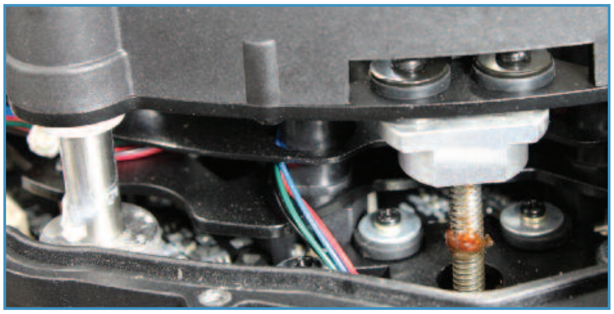

Figure 6: Zoom.

Optics

The light pipes and the diffuser film homogenize the four colors from the LED, directing that output into the objective lens. This is a single large molded lens, with 19 identical circular lenslets molded together, mounted on a carrier plate. In turn, that carrier plate is mounted on four stepper-motor-driven load screws that move the plate back and forth to alter the output angle of the resultant beam. Figure 6 shows one of the lead screws on the right, and one of the linear rod bearings that the lens carrier plate travels along on the left. I measured zoom as taking a minimum of 0.6 seconds to move from narrow to wide.

Gobos and pixel control

Gobos? What gobos? The Maverick Storm 1 Wash has a DMX channel called gobo, but it doesn't have gobos as such, so what does it do? It's really another name for a static macro channel that allows the selection of preprogrammed pattern combinations of the 19 LEDs. Figure 7 shows a few examples of the kind of shapes that are available through the gobo channel. This is a quick way to get animation and dynamic output if these units are used as

Figure 7: Gobos.

Figure 8: Individual pixels.

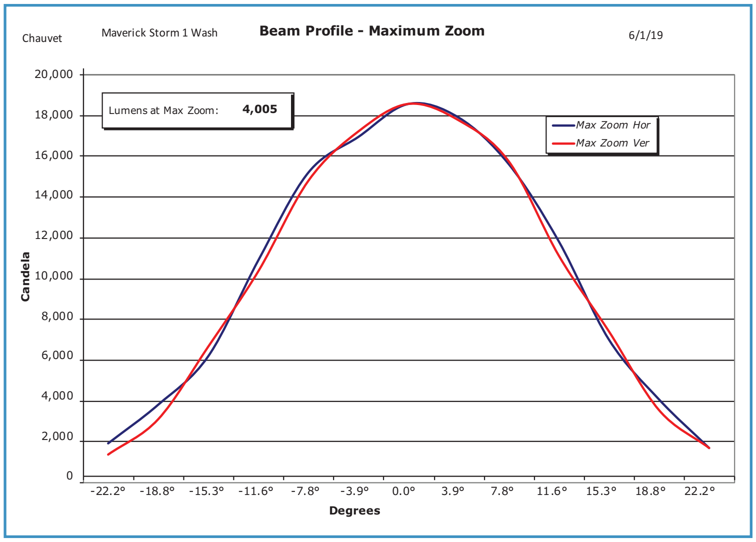

Figure 9: Maximum zoom.

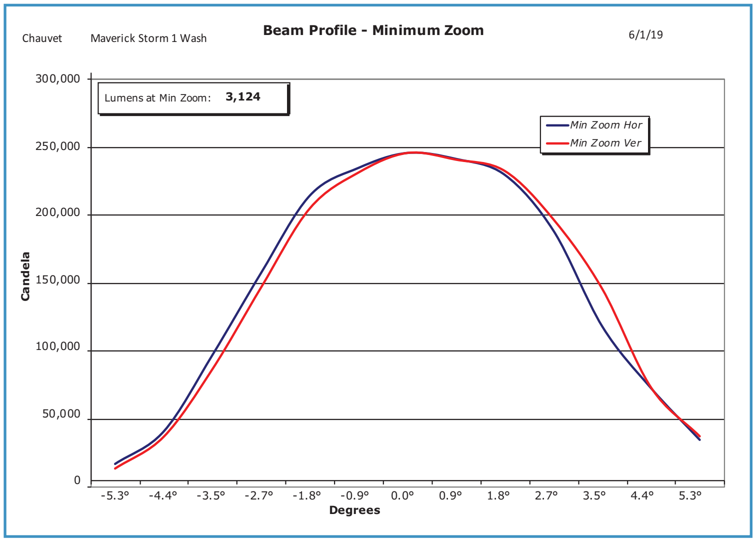

Figure 10: Minimum zoom.

direct view facing the audience. If you want to get more granular control, you can as use a mode where you are able to control the color and intensity of every LED individually. Figure 8 shows a very simple example where I've chosen six pixels and changed their colors. This kind of pixel mapping is a fairly common feature these days, but it's useful to have it on an outdoor-rated unit. The Maverick Storm 1 Wash also offers a macro channel, providing out-of-the-box dynamic pixel effects.

Interestingly, you also have the ability to split the unit into two separate fixtures for control purposes, with the movement and zoom functions on one set of channels and the pixels themselves on a second. The second set, with the pixels, can then be assigned to a completely separate Art-Net or sACN universe for control from something like a media server or pixel mapper. For my testing, I ran the unit in single fixture mode, with individual eight-bit control of each pixel. This mode consumes 96 DMX-512 channels.

Output and color

I measured the output of the Maverick Storm 1 Wash with all emitters running at full, when it was in wide zoom and the lenses were fully back, at just over 4,000 lumens with a field angle of 44°. At the narrow end I measured 3,124 lumens at a field angle of 10.6°. Figures 9 and 10 show the beam profiles which were very smooth.

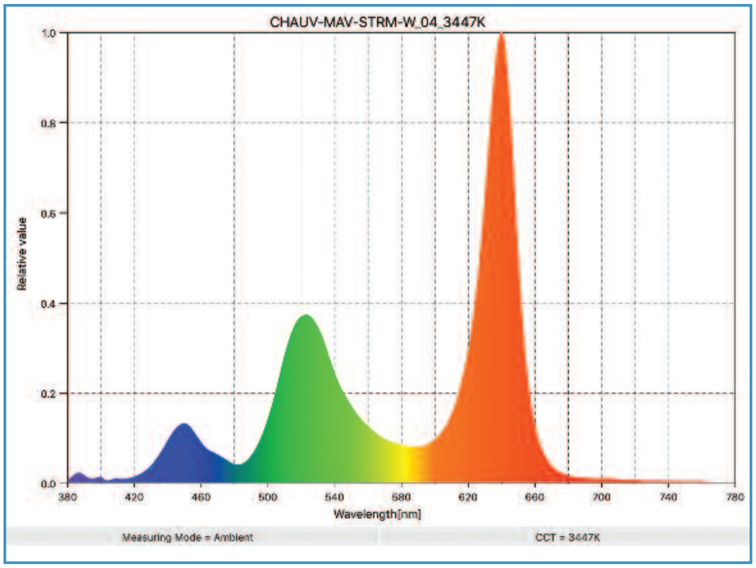

Figure 11: Spectral distribution 3,447K.

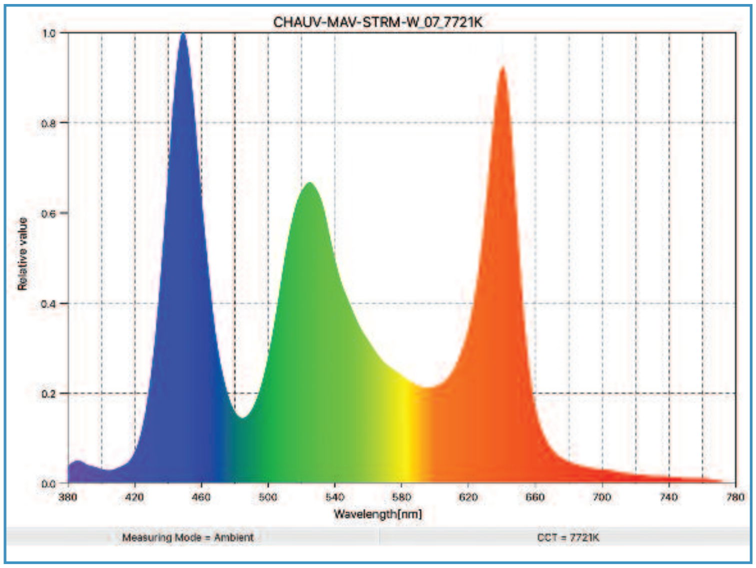

Figure 13: Spectral distribution 7,221K.

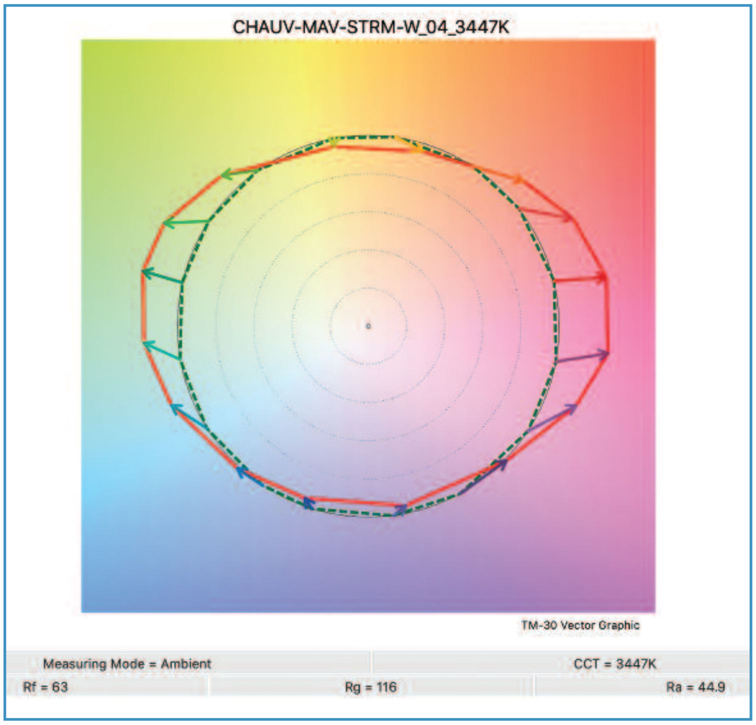

Figure 12: TM-30 3,447K.

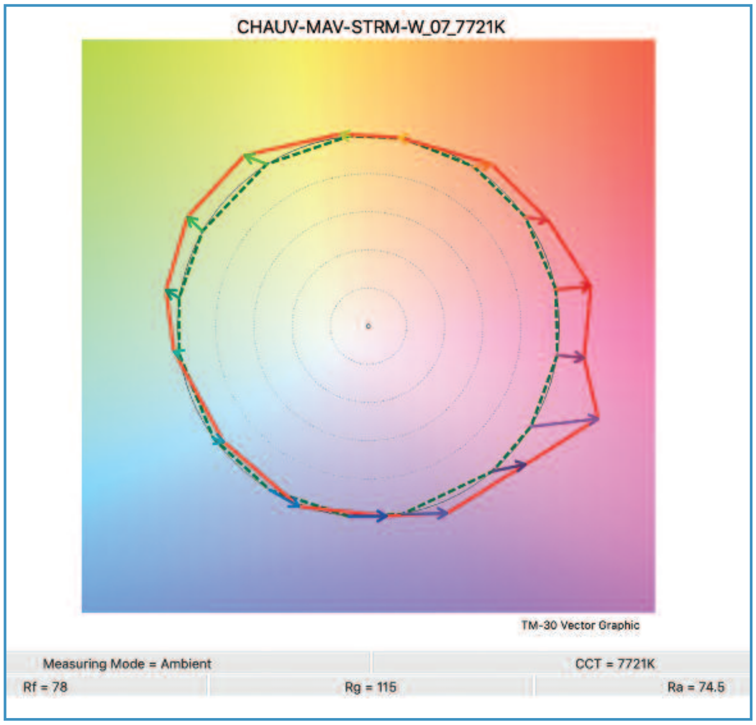

Figure 14: TM-30 7,221K.

Thermal droop was reasonable, I saw a drop to 91% of initial cold output over 15 minutes of running at full power, output then stabilized. (Lumen measurements are taken after this initial droop, after the unit has reached thermal equilibrium)

I measured the wavelengths of the emitters at blue 450nm, green 525nm, and red 645nm, the standard Osram colors.

COLOR MIXING

Color	Red	Green	Blue	White	All
Transmission	14%	40%	4.5%	46%	100%

As well as individual control of each pixel's color, you can also set a background overall color and brightness, which the gobos or patterns will be superimposed on top of. Both this background color and gobo colors can be

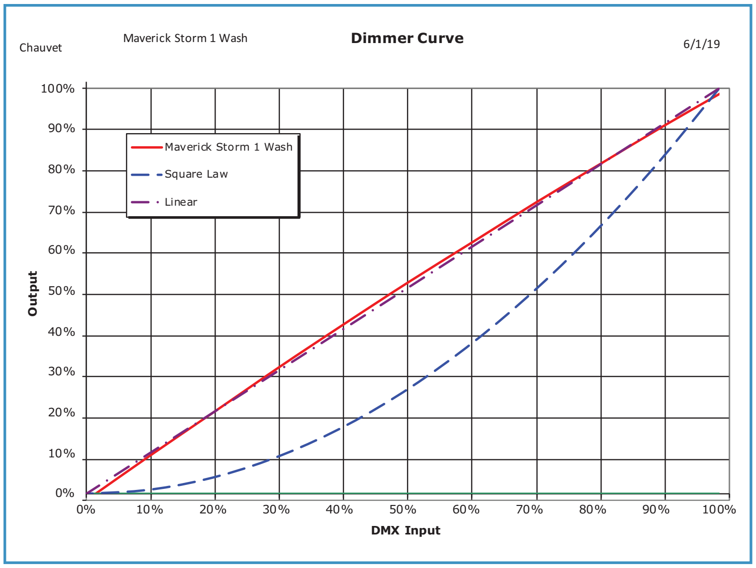

Figure 15: Dimmer curve.

controlled through additive RGBW, subtractive CMY, or through a set of preprogrammed colors on a color channel. This channel also offers a range of premixed whites which I measured as follows:

Setting	Measured CCT	TM-30 Rf	TM-30 Rg	CRI Ra
2,700K	3,447K	63	116	45
3,200K	4,102K	69	117	55
4,200K	5,350K	80	115	74
5,600K	7,721K	78	115	75
8,000K	12,747K	79	110	79

Figures 11, 12, 13, and 14 show the TM-30 graphics and spectra for the 2,700K setting and the 8,000K setting as examples. They were all quite similar, with some over saturation in the red/magenta and green areas. Not bad for a simple RGBW system.

Finally, in color control, there is a color temperature control channel which imposes a color temperature on top of any mixed colors, effectively treating them as if they were gels in front of lamps of different color temperatures. I measured this channel as ranging from 3,350K at the low end, up to a level in excess of 30,000K at the high end.

Dimming

Figure 15 shows the dimming curve of the Maverick Storm 1 Wash when set to its default linear setting. The fixture also offers a number of other dimmer curves, such as square law and S-curve, as well as two options for dimmer speed. I found that 16-bit dimming was smooth and clean over the entire range. Strobe speeds are selectable up to a measured 26Hz. Finally, I measured the PWM frequency as the unit was supplied to me at 2kHz; however, the Maverick Storm 1 Wash offers a range of selectable PWM rates from 600Hz —15,000Hz.

Pan and tilt

The Maverick Storm 1 Wash has full pan-and-tilt ranges of 540° and 270°, respectively. I measured pan speed over the full 540° at 2.5 seconds and 1.7 seconds for 180°. In tilt, the figures were 1.6 seconds for 270° and 1.5 seconds for 180°. Both pan and tilt have optical encoders to reposition the fixture if it is knocked out of place. I measured hysteresis or repeatability at a low 0.05° for both pan and for tilt, which is about 0.25" at a 20' throw. All movement was steady and smooth, with no objectionable bounce or overshoot.

Noise

As usual with LED fixtures, the cooling fan provides the main constant noise source from the Maverick Storm 1 Wash. Noise from the zoom motors was barely above the noise floor, but pan and tilt were noticeable at some speeds.

SOUND LEVELS

Ambient	<35 dBA at 1m
Stationary	40.4 dBA at 1m
Homing/Initialization	48.7 dBA at 1m
Pan	47.5 dBA at 1m
Tilt	47.7 dBA at 1m
Zoom	40.7 dBA at 1m

Homing/initialization time

The Maverick Storm 1 Wash took 21 seconds to complete a full initialization from first powering up, and 18 seconds to perform a system reset while running. The unit was badly behaved on reset, with the LEDs powering up before homing movement had finished.

Power, electronics, and control

In operation on a nominal 115V 60Hz supply, the unit consumed 3.3A when stationary at full output with all emitters on. This equates to a power consumption of 397W with a power factor of 0.99. Quiescent current draw, with no LEDs running, was 0.34A, 48W, with unity power factor.

As you can see from the connector panel in Figure 16, the Maverick Storm 1 Wash offers numerous means of control. From left to right in this figure, we have DMX-512 in and out, RJ-45 in and out, W-DMX wireless DMX antenna, pressure release valve, and power in and out. The RJ-45 networking supports the three major protocols: sACN, Art-Net, and Kling-Net. In addition, the unit provides basic RDM functionality.

Note: A pressure release valve is needed on sealed

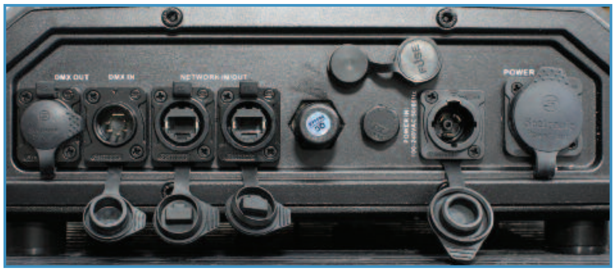

Figure 16: Connectors.

Figure 17: Menu.

units such as this top box. A completely air-tight sealed unit would have to be much thicker and stronger than you need for IP65 protection and just isn't necessary. What you are looking for is protection against water, not an air-tight enclosure. That means you need a controlled way to let air in and out as the unit heats up and cools down and the internal air pressure increases and decreases, without also providing an unintended route for water. A pressure relief valve, often containing a Gore-Tex membrane, provides this.

The menuing system is also comprehensive and is provided through a color display and six buttons. Figure 17 shows the layout with DMX address, wireless signal level, and IP addresses all visible.

Construction and serviceability

This is an IP65 rated unit so, as you might expect, there is a lot of sturdy die-cast aluminum and many, many stainless-steel screws. Getting access to clean lenses is quite possible, however: there are only about 16 screws to remove and it was simple to do. Digging deeper would mean breaking seals. For example, Figure 18 shows the inside of one of the yoke arms where the major power and data feeds lead up to the head from the top box. They are sealed inside a flexible plastic tube, which I didn't want to open. You end up with a unit which is, inevitably, quite chunky and heavy for its output, but well in line with similar competitive products. I can't speak to the IP65 rating, as I have no way to test that.

Figure 18: Yoke arm.

That's about it for the Chauvet Professional Maverick Storm 1 Wash. Does it have the right combination of wash and pixel mapped features to be useful to you? The choices in IP65 rated units are relatively limited, but it seems to be a market that is growing. If the data I've presented here sounds interesting, then try it out for yourself.

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