The Clay Paky Alpha Spot QWO 800

By Mike Wood

Figure 1: Fixture as tested

It's becoming a rare occurrence when I get to test something that doesn't use LEDs as the light source. The last one was a year ago! As great as LEDs are, however, they still cannot compete in raw power with HID sources in high-output spotlights. A spot fixture with gobos has some very specific needs. In particular, you have to squeeze a lot of light through a very small hole at the gate, keeping it as well-collimated as you can. Simple optics, and the conservation of etendue, dictate that the smaller the light source, the easier and more efficient that task will be; as yet, LEDs aren't very good at being small sources, A short arc discharge lamp can still do a great job in this role, and very efficiently.

This month, we are looking at the latest product in the Alpha Spot range from Clay Paky, the Alpha Spot QWO 800. Clay Paky has enjoyed success with the Alpha Spot series, and the QWO 800 joins the well-respected stable with a continued drive towards smaller, quieter, and more efficient luminaires. Clay Paky tells me that QWO stands for "quiet wide optics," and that one design criteria with the QWO 800 was to improve its zoom range and optical quality. How well did the company succeed, and is the Alpha Spot QWO 800 a fixture you might want to use? Hopefully, this review will answer a few questions and help you make that decision.

I follow my normal format for this review; in my tests, I started at the lamp and worked through the luminaire, taking measurements of everything I could as objectively as possible. The results presented here are based on the testing, with the fixture operating on a nominal 115V 60Hz supply of one specific Alpha Spot QWO 800 unit supplied to me by Clay Paky (Figure 1).

Lamp and lamp access

The Alpha Spot QWO 800 uses the Philips 800W MSR Platinum 35 lamp, in the company's unjacketed, short-arc, Platinum range, and has a rated output of 55,000lm from its 3mm arc (Figure 2). As with most recent HID-based units, the QWO 800 uses the Mini Fast Fit lamp base, which allows easy lamp change from the rear of the unit through the back of the reflector without having to remove either reflector or main covers. Access to the lamp is through a small rear plastic cover, which has holes in it for lamp adjustment (Figure 3). Once that plate is removed, the lamp base is exposed (Figure 4). One minor quibble: Clay Paky has recessed the lamp inside the surrounding metal plate, and the gap between the lamp and plate is small enough that I couldn't get my fingers in to grip and remove the lamp. I had to use a tool—which isn't really the intent!

Figure 2: Lamp

Figure 3: Lamp change cover

Figure 4: Lamp replacement

These short-arc HID lamps, without an external jacket or secondary envelope, are very efficient, but that efficiency comes at the price of devolving all responsibility for cooling to the luminaire manufacturer. These lamps don't have that insulated gap between the two envelopes to protect them from the external atmosphere, and are therefore very sensitive to the direction and power of cooling air directed at them. It is critically important to get that air pattern and flow correct, so that the various areas of the lamp are at the correct operating point. In particular, the pinches must be kept cool and the envelope hot. This isn't always that easy to do when the lamp is constrained within its reflector. Clay Paky has used two fans and some intricate ductwork to direct air into the right spots. Figure 5 shows the lamp inside the faceted glass dichroic reflector and some of that ductwork. The MSR Platinum 35 is a cold restrike lamp, not a hot-restrike lamp; in my tests, it took around two minutes to cool down enough to restrike.

Immediately in front of the lamp and reflector is the hot mirror. Nothing unusual there, but what is unusual is what appears to be a sensor mounted on that glass. Figure 6 shows the hot mirror; you can see the wires leading to either side of the central split in the glass. This is a temperature sensor, which detects when energy is being reflected back from filters or gobos. The signal from it is fed back to the lamp cooling system, so it can react accordingly. When you use a dark-colored dichroic, such as a deep blue, a lot of light is reflected back toward the lamp, and this sensor allows the QWO to respond quickly to that (Figure 6).

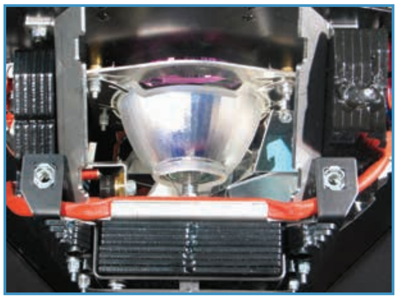

Figure 5: Reflector and cooling

Figure 6: Hot mirror with conductor

Dimmer and strobe

The QWO 800 has a fully modular optical train in which all components are mounted on one of four removable assemblies. The first module contains the dimmer, strobe, color mixing, and color wheel. Figure 7 shows the view of this module from the rear, with the dimmer flags prominent. These are of a design we've seen before on Clay Paky units: large, sawtooth-edged metal flags with overlaid frost glass to soften the edge. The QWO 800 uses a combination of these flags with electronic dimming of the lamp to achieve the full range of dimming. Figure 8 shows the resultant combined dimmer curve, with the electronic dimming primarily handling the top half of the curve and handing over to the mechanical dimmer at the bottom. Dimming was very smooth throughout the range, particularly, as you would expect, in the top electronic portion. Figure 9 shows the detail of the dimmer edge with the combination metal and glass filter. The single strobe flag can be seen in Figure 7, underneath the color-mix flags; it provided a measured range of strobe speeds from 1Hz up to 8.8Hz. The strobe was very crisp and clean.

Figure 7: Dimmer and color flags

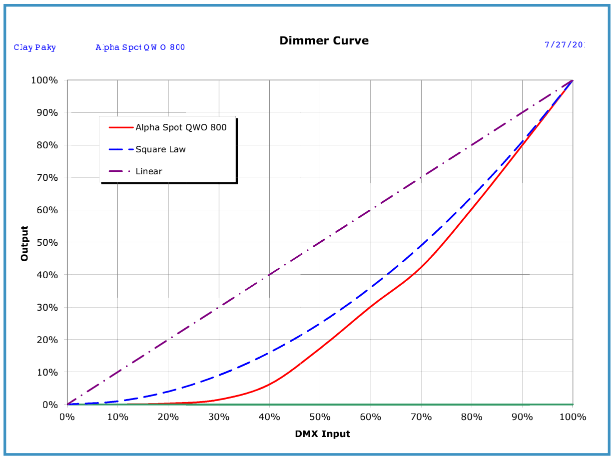

Figure 8: Dimmer curve

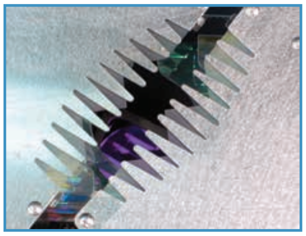

Figure 9: Dimmer flags

Color systems

Also visible in Figure 7 are the color flags. Each of the four colors (cyan, magenta, yellow, and CTO) uses a pair of shaped and etched dichroic flags. These run on tracks and open and close like pairs of curtains. Color mixing from this system was even and smooth. I could see a few residual moiré-type artifacts in some pale pastel colors when focused on a white screen, but I don't expect these to be visible in normal use.

COLOR MIXING

Color	Cyan	Magenta	Yellow	Red	Green	Blue
Transmission	9.3%	4.6%	82%	3.8%	3.5%	0.3%
Color change speed – worst case		0.3 sec				

The mixed colors were strongly saturated good mixing colors, particularly the magenta and cyan. This results in good pinks, blues, and lavenders. The yellow was a bit too "chromey" for my personal taste, which meant that the aquas were the weakest color from the mixing.

The CTO wheel smoothly adjusted the color temperature from 5,800K down to 2,500K, while reducing light output by 50%. (Note: The raw lamp is rated at 7,500K; however, the combination of dichroic reflector, hot mirror, and the lenses reduces the native color temperature of the unit down from there to the 5,800K measured.)

On the opposite side of the same optical module is the fixed color wheel (Figure 10). This contains eight trapezoidal

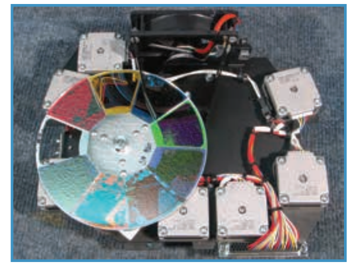
Figure 10: Color wheel

dichroic filters glued to an aluminum wheel. These colors are not, therefore, user-changeable. The gap between colors is very small, and produced very usable half-colors as rotated. Clay Paky has also chosen a range of colors to complement those in the color mixing, and to fill in the weaknesses of that system. In particular, there is a good strong saturated red and a pleasing aqua, along with a deep congo-style blue.

FIXED COLOR WHEEL

Color	Red	CTO	Green	Lt Green	Lavender	Aqua	Orange	Blue
Transmission	0.3%	16%	3%	21%	5.9%	9.3%	14%	0.1%

COLOR WHEEL SPEED

Color change speed – adjacent	0.1 sec
Color change speed – worst case	0.2 sec
Maximum wheel spin speed	0.38 sec/rev = 159 rpm
Minimum wheel spin speed	297 sec/rev = 0.2 rpm

The movement on this wheel was very quick, with a maximum of 0.2 seconds for distant colors. The advantage of having glued fixed colors, which are lightweight, is that you can make the change speed very snappy. Color wheel rotation was also extremely smooth, with a range of speeds from 159rpm (0.4rps) all the way down to 0.2rpm.

As well as the two sets of individual channels, the Alpha Spot QWO 800 provides a macro color channel where a preselected range of gel colors can be chosen. These use a combination of the color wheel and the color mixing to provide a reasonable match to the chosen gels.

Gobo wheels

The second optical module contains all the imaging components, gobo wheels, iris, and animation wheel. The first system, as shown in Figure 11, is the rotating gobo wheel. This contains seven replaceable patterns, all of which are glass. They snap in and out in a cartridge and were easy to change. Also visible in Figure 11 is the friction dampening arm, providing hysteresis control to the wheel in rotation and positioning.


Figure 11: Gobo module

ROTATING GOBO SPEEDS	
Gobo change speed – adjacent	0.2 sec
Gobo change speed – worst case	0.6 sec
Maximum gobo spin speed	0.34 sec/rev = 179 rpm
Minimum gobo spin speed	840 sec/rev = 0.07 rpm

Positioning and rotation are quick and smooth, with a good range of rotation speeds. Movement was clean when changing direction, with very little bounce or hysteresis. I measured the accuracy at 0.1° of hysteresis error, which equates to 0.4" at a throw of 20'. All wheels use a quick-path algorithm to minimize change times.

The static gobo wheel contains eight replaceable patterns plus open hole. These again were all glass patterns, and they slide in and out retained by two sprung fingers.

GOBO WHEEL SPEED	
Gobo change speed – adjacent	0.1 sec
Gobo change speed – worst case	0.2 sec
Maximum wheel spin speed	0.64 sec/rev = 94 rpm
Minimum wheel spin speed	12 sec/rev = 5 rpm

Changes were very snappy for a glass gobo wheel, particularly on the long-distance changes. Focus quality on all gobos was good, with very acceptable edge-to-center difference and color fringing. It is also possible to get a good gobo morph effect from one wheel to the other.

Iris and animation wheel

The iris and animation wheel are also mounted on the second module, a rear view of which can be seen in Figure 12. The iris is mounted underneath the two gobo wheels, against the aperture in the module support plate, and can be glimpsed through the central aperture in Figure 12. It's a 16-blade iris, with an opening/closing time of around 0.2 seconds. The fully closed iris reduces the aperture size to 19.5% of its full size, which gives equivalent field angles of 1.6° at minimum zoom and 10.6° at maximum zoom.

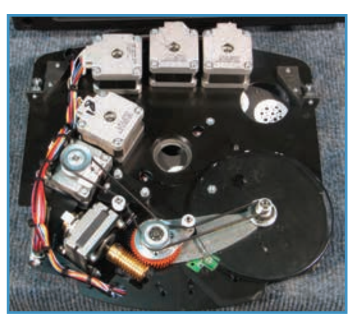

Figure 12: Animation wheel

The animation wheel is a single-piece wheel with a patterned or rippled glass. It is swung across the beam, when needed, by the worm drive shown at the bottom of Figure 12. Once in place, it can be rotated at varying speeds. The effect is to add a ripple or water like effect to gobos. With multiple layers of two gobos and the animation wheel, some quite complex, almost 3D, effects can be created. It took 1.5 seconds to insert or remove the wheel.

Frost and prism

The third and final optical module contains the zoom and focus lenses and the two final effects, prism, and frost (Figure 13). The prism is a single six-facet unit that can be swung across the beam on an arm, as shown in Figure 14. It's mounted immediately after the first of the output lens groups, and moves back and forwards with it. The prism can be inserted or removed in 0.5 seconds and, once inserted, can be rotated at speeds ranging from 570sec/rev (0.11rpm) up to 1.2sec/rev (50pm). Image separation is excellent; the images retain their focus quality well.

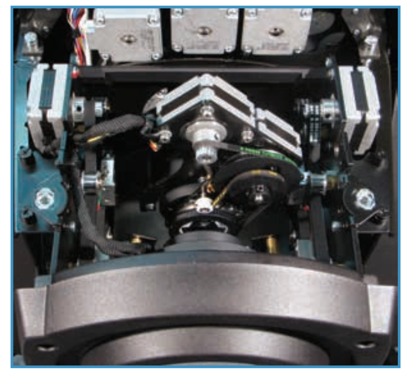

Figure 13: Lens modules

Figure 14: Prism

Mounted in a similar manner, the frost is a flag on the rear of the second lens group, facing the prism, and also moves with that group. This is very much a "wash" frost, similar to that on the Alpha Spot HPE 700, which, to my mind, is not as versatile as that used in the Alpha Spot 1200 HPE, which was one of the best frost

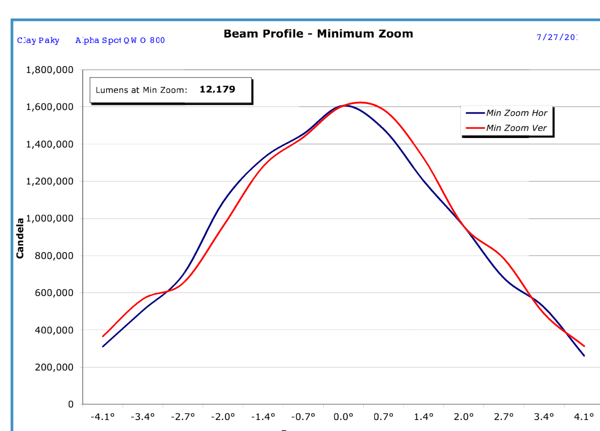

Figure 15: Minimum zoom

effects I've seen. A "wash"-type frost only really allows for full insertion to wash out the entire beam. It isn't possible to use the frost to soften the edges of gobos. The frost flag came in and out in a snappy 0.1 seconds.

(Note: I've discussed this "frost" difference before in this column. There are really two completely different effects, both called frost by manufacturers, likely because they both use frosted glass. The end result from the two techniques—which is as dependent on the position in the optical train as it is on the material—is very different. One type—the wash frost—has little effect on edge sharpness as it comes in, and the end result is somewhat like a wash light. The other—which is what I call a true frost—progressively softens the edges on gobos, and you end up with a slightly harder result. Both are useful, but are so different in their use that I wish they had different names!)

Lenses and output

The Alpha Spot QWO 800 uses a three-group zoom lens system. I've already mentioned the first two groups, which both move; the final fixed group is the large front output lens. To live up to its QWO name, the QWO 800 provides a very wide range of zoom, with field angles ranging from 8.2° to 54.4° in my tests at full aperture; that's a 6.6:1 ratio. The output at wide angle was 14,600 lumens, which ramped down slightly to 12,179 lumens at narrow. Figures 15 and 16 show the output curves. The output field was smooth, with a good blending distribution. The hot spot from the lamp was visible, but not objectionable, for a unit of this type. Clay Paky offers some interesting control options, with a couple of autofocus channels where you can set the throw distance so that the focus will automatically compensate for zoom changes. I was only able to test this at relatively short throws, but it seemed to work well. You set the throw distance on one channel, then adjust the focus on another. Once that's done, the system will track focus as zoom is altered—assuming you don't change the throw, of course!

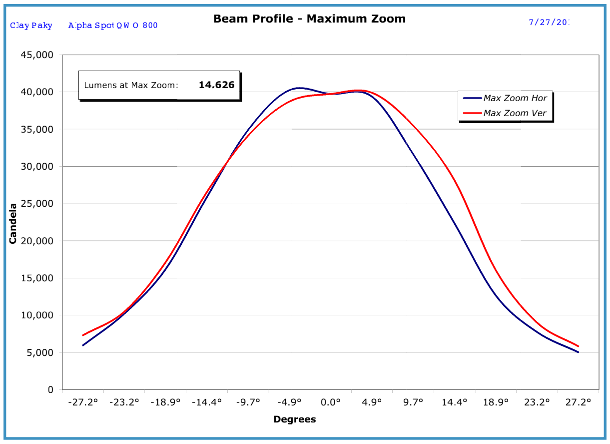

Figure 16: Maximum zoom

Clay Paky uses this wide zoom range and auto-focus to good effect in the macro system, which combines zoom, iris, and dimming in some interesting pre-canned effect sequences. I measured zoom as taking 1.2 seconds to move end to end, while focus took 0.8 seconds.

Pan and tilt

The pan and tilt ranges of the Alpha Spot QWO 800 are 540° and 240°, respectively. A full-range 540° pan move took 4.9 seconds to complete, while a more typical 180° move finished in 2.7 seconds. Tilt took 2.6 seconds for a full 240° move and 2.4 seconds for 180°. All movements were good and smooth, with no visible steppiness. I measured hysteresis on pan at 0.26°, equivalent to 1.1" at 20' while tilt hysteresis was 0.13°, equivalent to 0.25" at 20'. Both axes have encoders to reset position if the unit is knocked.

Noise

Even with all the cooling fans, the Alpha Spot QWO 800 is an impressively quiet unit. The iris was the noisiest function, but even that was quieter than the ambient from many other units I've tested.

SOUND LEVELS

	Normal Mode
Ambient	<35 dBA at 1m
Stationary	43 dBA at 1m
Homing/Initialization	48 dBA at 1m
Pan	43 dBA at 1m
Tilt	44 dBA at 1m
Color	43 dBA at 1m
Gobo	44 dBA at 1m
Gobo rotate	44.5 dBA at 1m
Zoom	45 dBA at 1m
Focus	46 dBA at 1m
Strobe	44 dBA at 1m
Animation wheel	44 dBA at 1m
Iris	48 dBA at 1m
Frost	43 dBA at 1m
Prism	45 dBA at 1m

Electrical parameters and homing/initialization time

POWER CONSUMPTION AT 115V, 60HZ

	Current, RMS	Power, W	VAR, VA	Power Factor
Normal running	9.2A	1031W	1067VA	0.99

The unit's power supplies are well-regulated and power-factor-corrected. Initialization took around 60 seconds from a cold start and 35 seconds from a DMX512 reset command. Homing is well-behaved in that the fixture keeps its shutter closed until all reset movement is finished.

Construction

As mentioned earlier, the Alpha Spot QWO 800 is a modular unit. Removing the main optical modules was a simple process once the four quarter-turn locking screws have been removed and the head covers lifted off. The same applies to the top box and yoke arms where, again, simple removal of the covers reveals easily accessible components. It should be an easy unit to service and maintain. The yoke mechanics are solid, with both pan and tilt fitted with manual locking systems for transportation.

Electronics and control

Electronics are distributed throughout the luminaire. Motor drive boards are in both the head and one of the yoke arms, while power supply and main control electronics are in the top box. Figure 17 shows a view inside the top box with control electronics towards the front and power supplies for

Figure 17: Top box

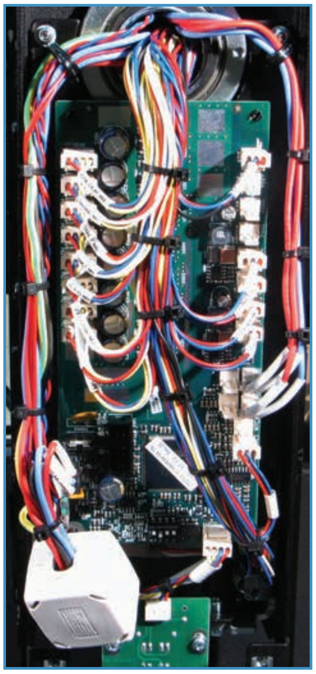

Figure 18: Yoke arm 1

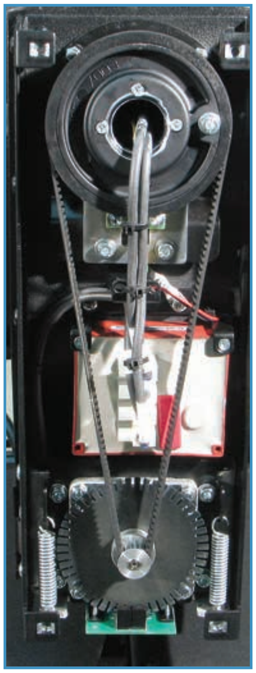

Figure 19: Yoke arm 2

the lamp and electronics mounted on either side. I believe that Philips supplies the lamp power supply and high-voltage ignition system.

Figure 18 shows the inside of one yoke arm, with drive control electronics; Figure 19 shows the other yoke arm, containing the tilt motor drive system and HV lamp ignitor.

The Alpha Spot QWO 800 has a comprehensive menu and set-up system, accessed through a rocker wheel switch array and a large LCD panel. All this can be run from an internal battery when the unit is powered down, so you can set the fixture address and other start-up options while it is still in the road case. As for control options, the luminaire comes with five-pin XLR DMX512 connectors as well as the non-standard three-pin. It is also fitted with an Ethercon connector for Art-Net protocol, which can be configured to re-transmit the Art-Net data as DMX512 over the XLR connectors. You can provide Art-Net to the first fixture in a chain as a gateway, and then connect others to this via DMX512 (Figures 20 and 21). Power is through the ubiquitous powerCon, with the unit rated for operation on supplies from 115 – 230V, 50/60Hz.

Figure 20 - Menu and control

Figure 21: Connectors

That about covers it; from lamp to output, that's the Clay Paky Alpha Spot QWO 800. There are a number of units out there using the MSR Platinum 35 lamp; it's really an ideal lamp for the job of an automated spot light. Does the Alpha Spot QWO 800 meet your needs? I've tried to give you some facts and figures to help you make a decision, but ultimately, as always, it's you who gets to decide.

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