Clay Paky Sharpy

By Mike Wood

Clay Paky is very well known in the lighting world, both from its distant past as a manufacturer of products for the night club and discotheque industries and, more recently, as a solid manufacturer of automated lights. That legacy has produced some interesting hybrid products over the years, not least the subject of this month's review, the Sharpy. Showing signs of its ancestry from both the effects and automated sides of its heritage, this is a fascinating product that's very hard to pigeonhole. Is it an automated light? Is it an effects unit? Well, it's a bit of both, and, although hybrids aren't always strong products, in this case the mix is a strong one that I suspect will find a home in the tool bags of many a lighting designer. The Sharpy looks like a regular automated light, but its optics are optimized for extremely narrow angle operation so that the output can almost get down to a parallel beam. You could use it for extremely long-throw projection, but I suspect most people will use it for the aerial effects from that tight beam. More on that later...

This review follows the usual format; we start with the lamp and follow through the optical train, measuring everything as we go, ending with the light output. I try to take measurements as objectively as possible, so that you can evaluate the unit for yourself. With the Sharpy, the data comes from tests I carried out on a single unit supplied to me, and represented as typical, by Clay Paky. For once, though, let me add a caveat to this statement—you need to temper any judgments based on my numbers by your desired end use for the product. If you want to judge the Sharpy as an automated light, then use the data as you usually would; however, if you see it primarily as an effect unit, then measurements, such as lumens, are not so useful. What matters with an effects unit is what it looks like to the audience—end of story. All tests were run on a nominal 115V 60Hz supply; however, the Sharpy is rated to run on voltages from 120-240V 50/60Hz (Figure 1).

Fig 1: Fixture as tested

Lamp

The Sharpy uses the Philips MSD Platinum 5R lamp (Figure 2). We've seen this before in other lighting products, where its prefocused reflector aids with accurate alignment. The feature that makes it particularly suitable for the narrow-beamed Sharpy is its extremely small arc gap—only 1mm. That tiny arc means that everything else in the unit can be small as well—in this case, that primarily means the aperture—and still retain good efficiency. Clay Paky has clearly taken an extreme narrow beam as its primary goal with the Sharpy and has used the natural, and normally problematical, peaky distribution of the integrated dichroic-coated reflector as an asset. With most of the beam's power being in the middle, you can

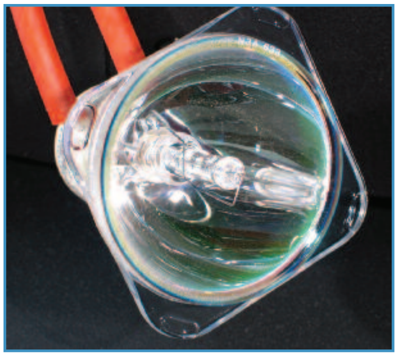

Fig 2: Lamp

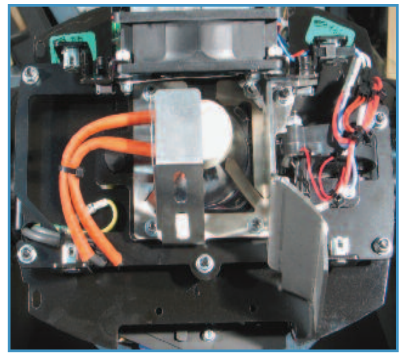

Fig 3: Lamp in position

crop that out with a small gobo without losing too many lumens. The MSD Platinum 5R lamp is rated at 2,000 hours at a nominal 160W. (The actual power draw is 189W.)

Although not as simple as many recent units with FastFit lamps, the lamp change is not too difficult; after removing the covers, you need to slacken two captive screws and lift off a cooling fan to reveal the lamp-retaining clips. The entire lamp and reflector is then easily removed and a replacement snapped back into place. Figure 3 shows the lamp in position, with the cooling fan above it. The focal length of this reflector is very short—betraying its close connection in Philips to existing projector lamps—and thus the dimming flags, hot mirror, and gobo wheel follow hard on to the end of the reflector. Figure 4 shows a top view of the lamp, angled hot mirror, and wheels. You can also see a small blower to the right, which directs air across the hot mirror and gate area. Accurate cooling is critical with unjacketed lamps like the Platinum 5R, and there is a temperature sensor mounted right on the front plate of the lamp assembly so that the unit can regulate it correctly.

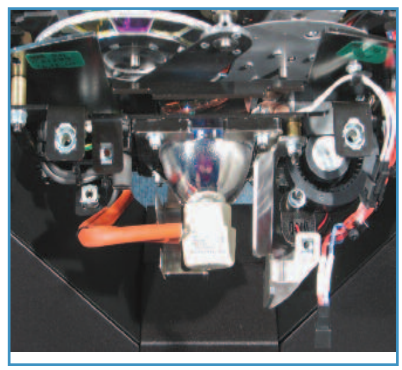

Fig 4: Lamp and wheels

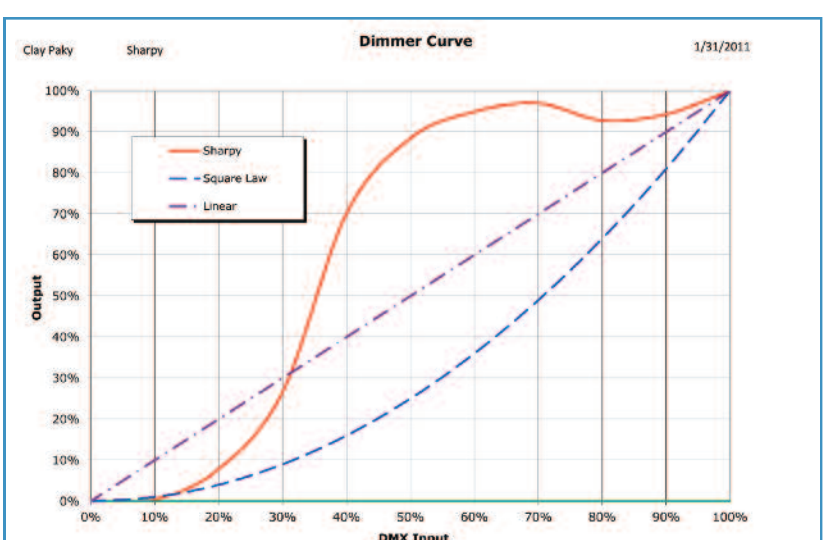

Fig 5: Dimmer curve

Fig 6: Color wheel

Dimmer and strobe

Next in the optical train is the dimmer/strobe assembly. The Sharpy has a typical design using a pair of opposing flags with serrated edges, each with its own motor that closes across the beam. Here's our first case where your desired use of the product may change your opinion of a feature. As an automated light, the dimming was poor, very rough, with highly visible patterning in the beam. It also exhibits the strangest dimmer law I've ever seen (Figure 5), where nothing really happens until you get to 50%, then it plummets. This problem is exacerbated by the peaky beam, as the flags don't reach that portion of the light until they are more than halfway closed. This is not a dimmer for subtle fades. However, as an effects light for aerial beams, does this worry me as much? Probably not. As a strobe shutter in conjunction with the gobo wheel, they work fine. I measured strobe speeds from 1Hz up to 12Hz, with the Sharpy providing pulsed strobe as well as regular and random effects.

FIXED COLOR WHEEL

Color	Red	Orange	Aqua	Green	Light Green	Lavender	Pink	Yellow	Magenta	Cyan	CTO 2600	CTO 1900	CTB 8000	Blue
Transmission	2.5%	51%	31%	14%	63%	21%	50%	76%	7.4%	16%	46%	57%	54%	0.4%

Color wheel

Immediately after the dimming flags comes the color wheel. This has 14 fixed dichroic colors plus an open aperture. The whole wheel is replaceable through a quick-release magnetic coupling, but the colors themselves are not; they are glued to the wheel. The apertures in the wheel are elongated trapezoids with rounded corners, while the dichroics themselves are trapezoidal. The end result has a very narrow solid divider between colors so color change is almost seamless. Figure 6 shows the wheel itself.

The native white of the Sharpy was too far off the black body line for me to be able to measure the correlated color temperature, although that could be the specific lamp/hot-mirror combination. I've measured other examples at around 6,700K—7,500K. With the CTO 2600 filter in, I measured it at 2,950K, and with the CTO 1900 as 4,200K. It was again too far off the line to measure the CTB 8000 filter. The Sharpy has a good range of colors; the reds are a little weak because of the lack of red in the lamp, but other colors were strong. I particularly liked the aqua. Because of the narrow dividers, half-colors worked well even though the color wheel is fairly close to the focal plane.

The small wheel size means that the color transitions are very quick, with the change between adjacent colors being almost imperceptible. Spin speeds were also very quick, giving an interesting pulsing rainbow effect.

COLOR WHEEL

Color change speed – adjacent	< 0.1 sec
Color change speed – worst case	0.2 sec
Maximum wheel spin speed	0.375 sec/rev = 160 rpm
Minimum wheel spin speed	300 sec/rev = 0.2 rpm

The movement in both wheel rotation, and color selection was very smooth, with no visible steps or jumps.

Gobo wheel

The Sharpy has a single fixed gobo wheel. It is somewhat reminiscent of the gobo wheels on some of Clay Paky earliest products, as it is really a single large etched stainless-steel gobo with 17 patterns. As with the color wheel, you can easily change the entire wheel, but not the patterns within it. This construction keeps the wheel thin, small, and lightweight, all concessions to the effects orientation of the product. Figure 7 shows the wheel and, to give you an idea of scale, I've included some coins in the photo. To try and maintain the international nature of PLASA and this magazine, those three coins are, from top to bottom, one Euro cent, one US cent, and one UK penny. Whichever coin you are most familiar with, I'm sure you will agree that this wheel is pretty small! The smallest aperture gobo is around 1mm in diameter (Figure 7). This wheel moves quickly, with change times similar to the color wheel. Slow rotations were smooth and step-free, with accurate repositioning.

GOBO WHEEL

Gobo change time – adjacent apertures	< 0.1 sec
Gobo change time – max (Gobo 0 - 7)	0.2 sec
Maximum wheel spin speed	0.6 sec/rev = 100 rpm
Minimum wheel spin speed	12 sec/rev = 5 rpm

Focus quality on the larger gobos was average, with quite a big difference from center to edge. As mentioned previously, the Sharpy optics are clearly optimized for the small, tight beams and anything inside the center third of the image. Small images within that center portion are sharp. The lenses are configured as an achromatic combination, so there is minimal colored fringing.

Figure 8 gives you a view through the system from the point of view of the lamp. You can see the dimming flags, color wheel, and, in the center, the smallest gobo pattern right at the focus of that reflector.

Prism and frost

Next in line is the frost filter. It's variable in that the entire filter can be moved in and out of the beam; however, the effect isn't fully homogenized across the entire beam until it is fully in place. It does provide a frost effect, though, as opposed to a focus softener.

Mounted with the frost system, on the same carriage, is the rotating prism. A prism is a key component in a beam effects light, so Clay Paky has added some extra bells and whistles here. The prism itself is an eight-facet design, with symmetrical facets that provides good image separation, particularly of the smaller patterns. I measured the prism insertion/removal time at one second, and, once in place, it provides a good range of rotation speeds from 42rpm all the way down to an almost imperceptible 0.04rpm, which is 24 minutes for a full rotation.

I mentioned that the frost and prism are mounted on a carriage. This is motorized and can be moved backwards and forwards along the optical

Fig 7: Gobo wheel

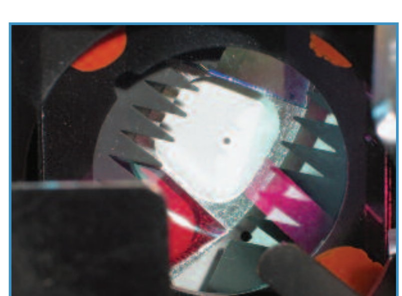

Fig 8: View through gate

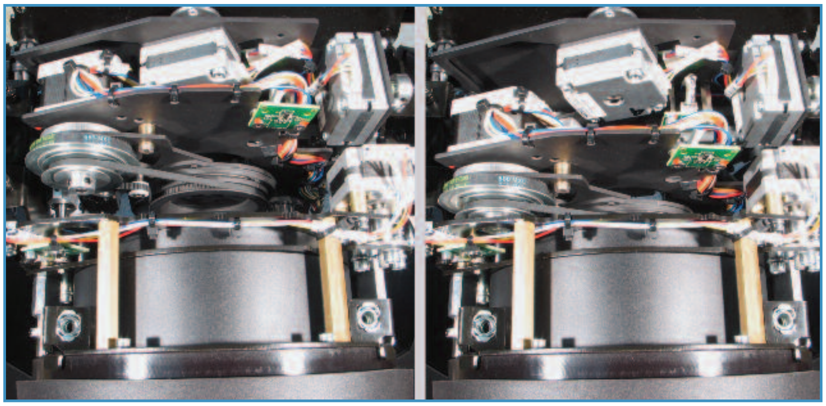

Fig 9: Moving prism

axis. The result with the prism is to provide a zoom effect where the eight individual beams from the prism facets open and close like the petals of a flower. Figure 9 shows the system in operation; the left half of it shows the prism carriage in its rear position, next to the gobo wheel, while the image in the right half of the photograph shows it moved fully forward, towards the output lens.

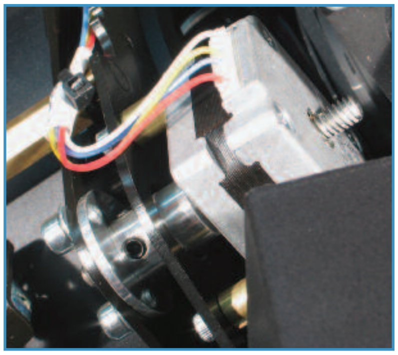

Fig 10: Linear actuator

Lenses and output

The Sharpy has three coated lenses in two groups at the front of the unit. One moving group provides focus, followed by a fixed group as the output lens. All these lenses are large in diameter compared to the aperture size, and are well suited for extreme narrow angle effects. The movement of these large lenses is provided by two linear actuators, as shown in Figure 10. These provide accurate linear movement at reasonable speed—in this case, 1.5 seconds for full travel.

Now we come to the output measurement. This was tricky, primarily because of the extremely narrow angle of the optical system. The measurement system I uses requires filling a 3'

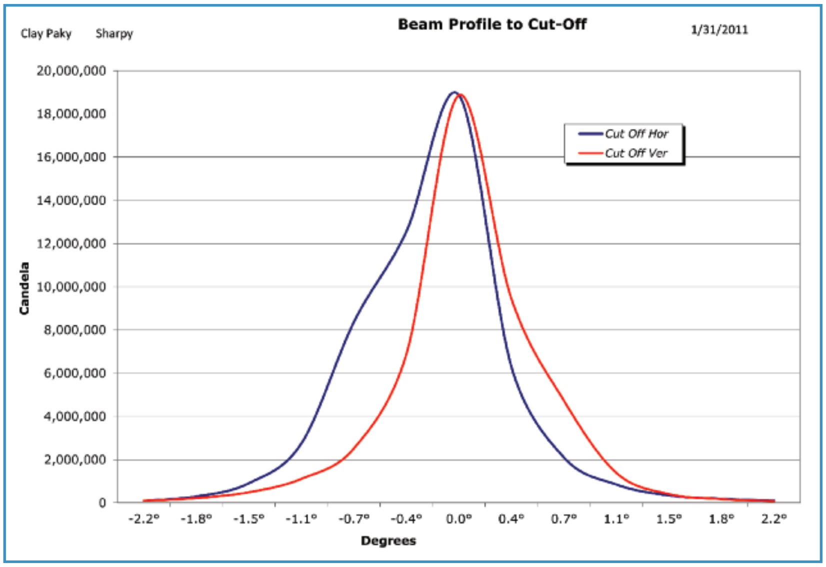

Fig 11: Beam profile to cut-off

diameter circle with the field angle of the beam. With the Sharpy, I had to get to 40' before even the cut-off angle filled the 3' circle. With most spot fixtures, the field angle (10% output point) and cut-off angle (3% output point) are close to being the same, but, with the Sharpy, the beam is so peaky that they are very different. I took measurements at the cut-off angle and then calculated the distance and output for field angle, which was around 91‘. As an aside, I don't have 40' throw in my workshop, let alone 91', so I had to do these measurements outside at night, shooting the light along the street, siting my test target and taking measurements on my neighbor's front lawn.

Figure 11 shows the beam profile to cut-off at the 40' throw at full aperture. The native cut-off angle was around 4.4°, but you can see that the large spike in the middle means that the field angle is less than half that, or 1.8°, while the beam angle is around 0.8°. Figure 12 shows the same data expanded so that we are measuring the true field angle. In this case, we can now take the field output measurement that came in at just over 4,000lm. The beam profiles are a slightly odd shape because the hot spot was off-center, but that doesn't significantly affect the output measurement. That having been said, I'm sure the output of this optical system is very sensitive to accurate lamp alignment.

Now comes the question I posed at the beginning whose answer depends on your use: Is that a good output or not? For a moving light of this class, it's somewhat average, but, for a narrow beam effect light. I think it's excellent. It's tough to get a lot of power into such a narrow beam.

These measurements were all taken with the open aperture. Once you start bringing in the smaller gobos, things get really narrow. With the smallest gobo, the beam was reduced to 10% of its full size, or approximately 0.4° cut-off angle. I measured it as 3.5" in diameter at the 40' throw—almost parallel.

It's interesting using the focus control at these narrow angles. The beam has an external crossover point where it necks in and spreads out again. By carefully adjusting the focus control, you can visibly move that crossover back and forth along the beam; it's a neat trick and looks good with some haze in the air. Clay Paky is publicizing the fact that it has filed for patents on these optical systems in the Sharpy.

Pan and tilt

The Sharpy has full pan-and-tilt ranges of 540° and 250°, respectively. I measured pan speed over the full 540° at 2.5 seconds and 1.25 seconds for

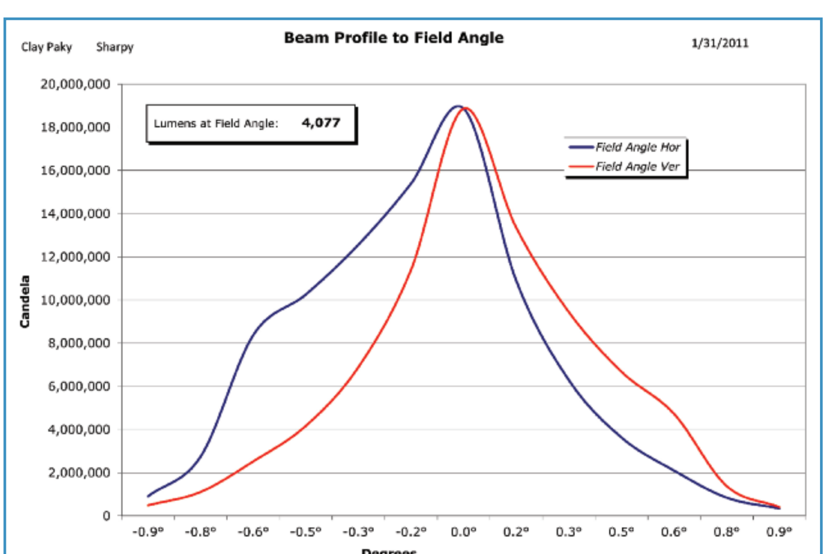

Fig 12: Beam profile to field angle

Fig 13: Tilt drive

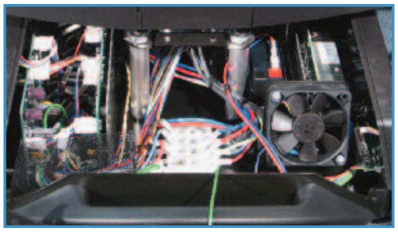

Fig 14: Top box

180°. In tilt, the figures were 1.5 seconds for the 250° and 1.25 seconds for 180°. Both pan and tilt have optical encoders to reposition the fixture if it is knocked out of place. Hysteresis, or repeatability, was measured at 0.32° for both pan and tilt, which is about 1.3" at a 20' throw. Movement on pan and tilt, and indeed all motors, was very smooth. Clay Paky has improved the quality of its motor drive systems significantly over the years. Figure 13 shows the tilt system, along with the encoder wheel and sensors.

Noise

As seems to often be the case recently, the fans provided the most noticeable noise from the Sharpy. Only the pan, at an intermediate speed and focus, was slightly louder than the fans.

SOUND LEVELS

Ambient	<35 dBA at 1m
Stationary	45.0 dBA at 1m
Homing/Initialization	54.0 dBA at 1m
Pan	47.5 dBA at 1m
Tilt	46.5 dBA at 1m
Color	45.0 dBA at 1m
Prism	45.0 dBA at 1m
Gobo select	45.0 dBA at 1m
Focus	47.5 dBA at 1m
Strobe	45.0 dBA at 1m
Frost	45.0 dBA at 1m

Homing/initialization time

The Sharpy took 55 seconds to complete a full initialization from first powering up and 42 seconds to perform a system reset while running. The unit was very well-behaved on reset; it gently faded the output to black, performed the reset, then gently faded it back in again. These times are fairly slow, but, on the plus side, are long enough that the lamp can cool down and restrike during initialization when recovering from a power outage.

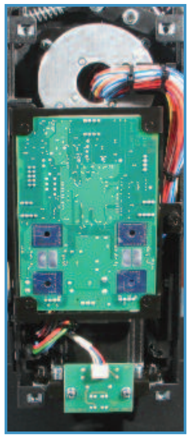

Fig 15: Drivers

Fig 16: Display

Fig 17: Connections

Power, electronics, and control

In operation on a nominal 115V 60Hz supply, the Sharpy consumed 2.59A when stationary, a power consumption of 301W at a power factor of 0.98. The power peaked to 320W when all motors were running.

As we are now seeing from almost all manufacturers, the control and motor electronics are distributed throughout the unit, connected together by a data bus. Figure 14 shows the top box, where you can see one of the power supplies and main electronics board as well as the battery used to power the menu system, allowing the setting of system parameters when the unit is unplugged. Figure 15 shows the main motor drive board mounted in one of the yoke arms—a favorite spot, as it keeps cool. Covers came off easily and access was good.

Clay Paky provides a graphic LCD screen and control pad for parameter setting with the menu, providing all the usual functionality. As already mentioned, these can be run under battery power when the unit is being prepared for use (Figure 16).

On the opposite side of the topbox, the connector panel (Figure 17) provides both five-pin DMX512 XLR and three-pin XLR connectors, as well as power via Powercon and Ethernet via an Ethercon. There is a full set of six Neutrik connectors.

Construction and serviceability

Head construction is very familiar. A backbone chassis with removable modules is enclosed by injection-molded covers. Servicing and cleaning should not be a problem. The gobo and color wheels are held in place by magnets on the hubs, and can both be easily replaced with the unit in situ. Getting them back in was slightly tricky, but a little practice soon resolved that. One feature I must mention is the label warning about the minimum distance from lighted objects the Sharpy should be used. On most units, this distance is usually set at a few meters; however, the Sharpy is rated as needing to be 12m (39') away from any illuminated object: Clay Paky tells me it is making a safety neutral density filter available for use in smaller venues.

There it is, the Clay Paky Sharpy. It's an interesting unit that, to my mind, is primarily an effects unit with its powerful narrow beams. The Philips Platinum 5R lamp is perfect for this application and should help it to do well. Clay Paky has done a good job of optical design to provide as narrow a beam as I've seen for some time. Is the Sharpy for you? You have all the facts and figures, so now you get to decide.

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