Clay Paky Scenius Profile

By: Mike Wood

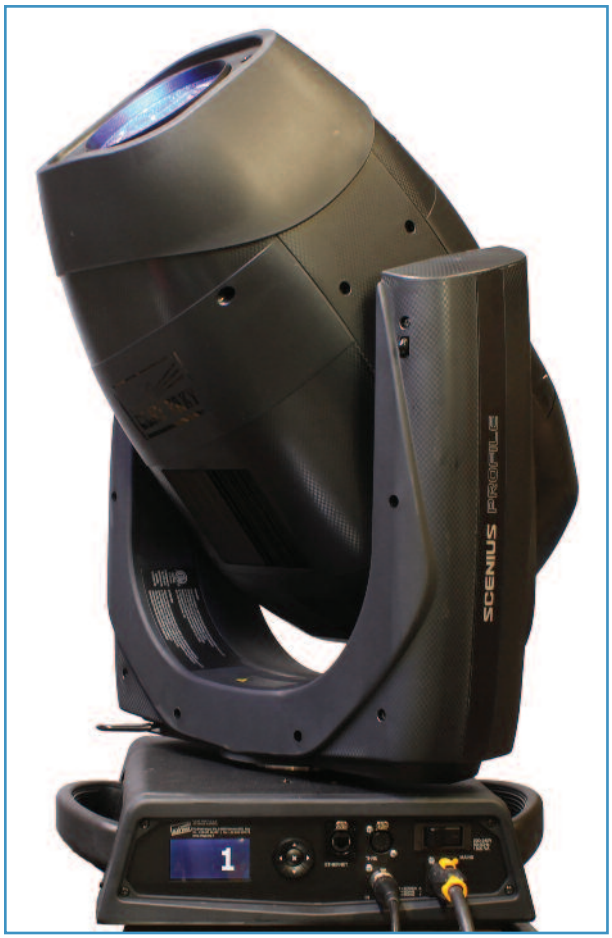

Figure 1: Fixture as tested.

It's funny how cyclically these things go; for a year or so, I received fixtures for review that I could pick up with one hand and that ran off 115V at an amp or so. Now I'm onto the heavyweights, with 230V and lots of power. I wish I could get them in the winter, though; these 1,400W units keep me toasty warm in the heat of a Texas summer!

This month, I'm looking at the Clay Paky Scenius Profile. I found it to be particularly interesting, because it must be one of the first Clay Paky units to have been 100%-developed after Osram purchased the company and following the 2014 death of the eponymous owner Pasquale Quadri, aka Paky. In other words, this is all new-guard. You can definitely see there is a stylistic difference in the construction—not in a bad way, just different—but more of that later.

All the major players now offer a light in this class, between 1,400 and 1,800W, using short-arc lamps. How does the Scenius Profile hold up under scrutiny? As always, I've tried to test and measure everything I can, from power input to light output, and report the raw data to help you make your own determination. The results presented here are based on the testing, with the fixture operating on a nominal 230V 60Hz supply of a single Scenius Profile supplied to me by A.C.T Lighting (Figure 1).

Lamp and lamp access

The Scenius Profile uses the Osram Lok-it! HTI 1400/PS lamp, which has a bayonet-lock version of the PGJ28 base, and is replaced from the rear of the unit through the back of the lamp holder, then twisted slightly to lock in place. Figure 2 shows the lamp change behind a removable panel. I found the hole in the rear panel a little too small for my fingers and had to use a tool to grasp and turn the base. Care is needed if you use a wrench or pliers, as you don't want to crack the ceramic. The Scenius Profile can run this lamp either at full power, 1,400W, or at a reduced 1,200W. I ran it at 1,400W for all tests. The 1400/PS lamp is rated at 120,000 lumens nominal output at 6,000K from a 5.5mm arc. The lamp and its reflector and hot mirror are in a sealed, ventilated lamp house with its own fans and thermal sensors to keep the lamp at its correct operating point. *(Note: It's interesting that nearly every arc-source luminaire these days uses a separate lamp house. Going way back, all luminaires were like this—think of early carbon arcs or Xenon followspots. We moved away from a separate lamp house in the 1990s, when we were using double-jacketed medium arc lamps that had less stringent cooling requirements and no Xenon explosion risk, but we have now*

Figure 2: Lamp change.

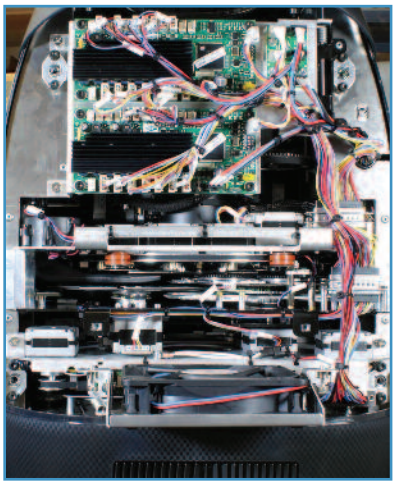

Figure 3: Head.

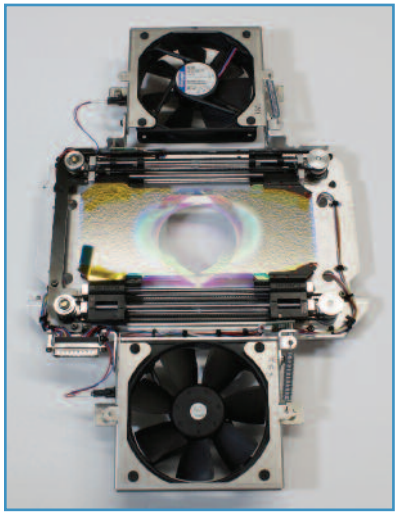

Figure 4: Color module.

gone back to them, with the single-jacketed short arcs, because of their exacting temperature needs.)

The optical systems are arranged in three removable modules (Figure 3). I'll move through these from rear to front.

Dimmer and color module

Figure 4 shows the color module, removed from the unit. The two large fans at top and bottom are on spring-loaded hinges and fold down perpendicular to the module when it is in place. You move them to the parallel position shown to insert or remove the module from the unit. (This emphasis on captive components and modularity is one of the stylistic changes in Clay Paky products that seems to have happened since the change of ownership). The module contains four pairs of sliding dichroic filters, one each for cyan, magenta, yellow, and CTO, running on linear tracks and opening and closing across the beam like a pair of curtains. Color mixing from this system is very smooth. I only saw a small amount of color fringing around the beam edges when trying to mix the tricky pale secondaries, aqua, lavender, and amber.

COLOR MIXING

Color	Cyan	Magenta	Yellow	Red	Green	Blue
Transmission	24%	3.9%	66%	3.1%	7.3%	0.3%
Color change speed – worst case			0.3 sec			

Clay Paky has gone with a deep magenta. This gives strong mixed saturated reds and blues, but makes pastels a little trickier. These short-arc lamps have always had somewhat reduced deep-red output, which makes the color decision harder for the fixture designers. Color choice is always a compromise of some kind. The new Osram HTI lamps help somewhat in that they have a much more consistent spectrum, no big spikes in the green, and an improved red.

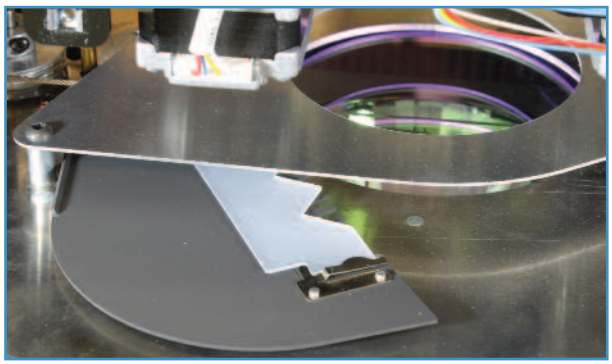

Figure 5: Dimming flag.

The CTO flags reduced the color temperature from the native 6,343K down to 2,744K while reducing light output to 47%. Color rendering was very good at all color temperatures, ranging from 89 CRI at 2,700K to 98 at 6,500K.

On the rear side of the module shown in Figure 4 is a pair of dimming flags. These are metal flags with frosted glass edges cut into a sawtooth shape. Figure 5 shows one of the two dimming flags. Dimming is very smooth and even across the field, aided by the frosted glass teeth and homogenizer further down the optical chain. I saw very little unevenness in the field, perhaps just a small amount of vignetting at the very bottom end of dimming.

Figure 6 shows the default dimming curve. In general, it follows the square law well, except for a little hiccup around 80%. My guess is this is the transition point between the

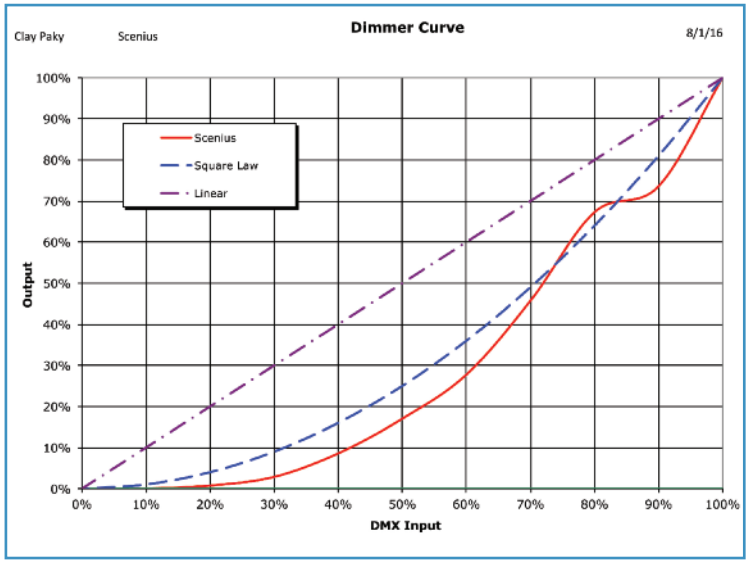

Figure 6: Dimmer curve.

glass and metal on the flags. The final fade to black is clean. (These flags aren't used for strobing—that comes from a separate mechanism on the beam module further downstream—so we'll come to that later.)

Beam module

Figures 7 and 8 show both sides of the beam module. There's a lot going on in here! Again, this module is easy to remove or replace from the unit. From rear to front, this module contains a homogenizer, strobe flags, color wheel, fixed gobo wheel, rotating gobo wheel, framing shutters, and iris—17 motors in all. Let's work through them.

The homogenizer is visible at the top of Figure 7. It's motorized on a geared quadrant, so it can be inserted or

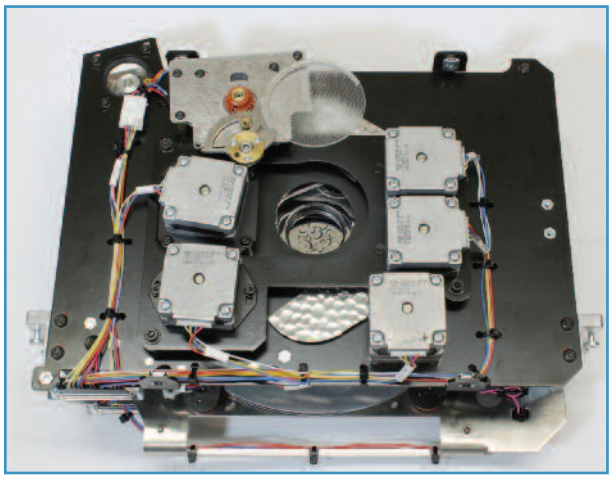

Figure 7: Beam module rear.

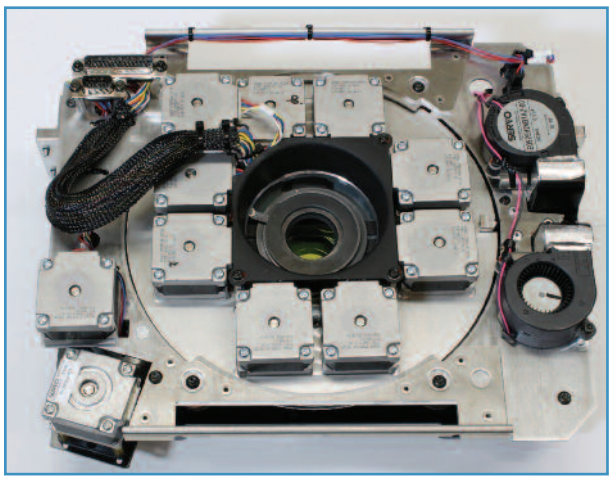

Figure 8: Beam module front.

removed from the beam. It's not under direct user control; the Scenius Profile decides when it is needed. I think it comes in when the gobos are being used, to protect them from any hot spots, and is removed when using an open beam to maximize light output. Next are the two strobe flags, one of which is visible peeking out below the aperture in Figure 7. I measured possible strobe speeds up to just under 12Hz.

Color wheel

Just after the strobe is the color wheel, the other half of the color-mixing system. I suspect Clay Paky mounted it here in the beam module, rather than next to the CMY, so as to get it closer to the focal point and thus improve the edge on half-colors. It likely also benefits from being after the homogenizing filter. The wheel has seven trapezoidal colors with, as already mentioned, very clean half-color transitions between colors.

COLOR WHEEL

Color	Dark Red	Blue	Green	Minus Green	Amber	Dark Red	Blue
Transmission	1.9%	2.2%	28%	72%	55%	20%	0.2%

COLOR WHEEL SPEED

Color change speed – adjacent	0.2 sec
Color change speed – worst case	0.6 sec
Maximum wheel spin speed	0.92 sec/rev = 66 rpm
Minimum wheel spin speed	760 sec/rev = 0.08 rpm

One slight negative of the color wheel positioning and large colors with clean edges is that the color change is a little slow. Nothing ever comes for free in engineering!

Gobo wheels

The Scenius Profile has two gobo wheels, the first of which is a fixed wheel with eight replaceable gobos and an open slot; the second is a rotating/indexable wheel with six replaceable glass gobos and an open slot. Gobos are easy to change on either wheel. Those on the fixed wheel are bare gobos, while those on the rotating wheel are changed by removing the gobo carrier complete with its gear.

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	1,600 sec/rev = 0.04 rpm

FIXED GOBO SPEEDS

Gobo change speed – adjacent	0.2 sec
Gobo change speed – worst case	0.5 sec
Maximum wheel spin speed	0.8 sec/rev = 75 rpm
Minimum wheel spin speed	16 sec/rev = 3.8 rpm

Rotation and indexing were smooth on the rotating wheel, with a good range of rotation speeds, including a very slow, almost imperceptible, gobo rotate. Movement was clean when changing rotation direction, with no gobo bounce. I

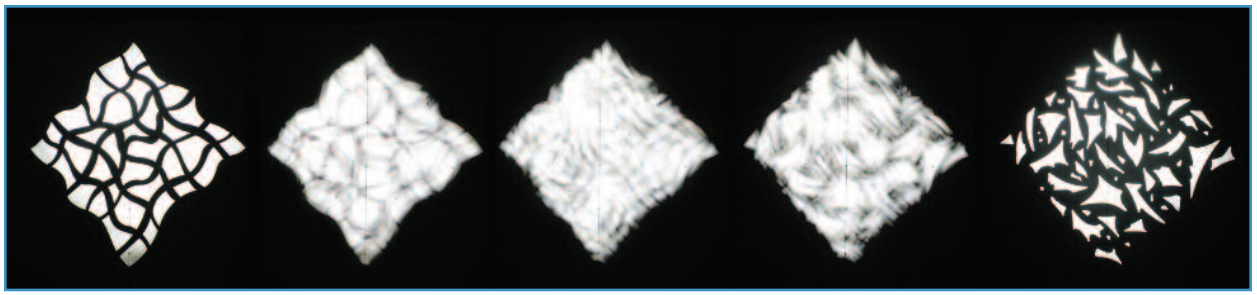

Figure 9: Gobo morph.

measured the accuracy at an excellent 0.08° of hysteresis error, which equates to 0.3" at a throw of 20'. Interestingly, the fixed gobo wheel uses a quick-path algorithm to minimize change times, but the rotating wheel doesn't.

Figure 9 shows the effect of pulling focus to morph from one gobo wheel to the other.

Framing

Full beam framing has been Clay Paky's signature effect for many years, going way back to its moving mirror products. In those days, the company used condenser optics, which made life much simpler, as the depth of field was so great that the individual shutter blades could be widely spaced and still be in simultaneous sharp focus. Condenser optics aren't that efficient, though; to compete in light output, Clay Paky has long since moved to ellipsoidal optics. The problem is that the depth of field is tiny; to get them in focus, all four blades have to be as close together as you can possibly squeeze them. Different manufacturers solve this in different ways but, in the end, it all boils down to cramming in four metal blades and eight motors (nine, if you include the overall rotate) into a small spot in as ingenious a manner as you can. In the Scenius Profile, Clay Paky has a double-bar four-link mechanism on each blade to give them the long travel needed to cover the whole beam. The consequence of this long travel—Didn't I just say that all engineering decisions have consequences?—is that the range of rotation of each blade is somewhat limited at +/- 22.5º. You can't have your cake and eat it, I'm afraid. I measured the time for insertion (across the whole beam, remember) at one second. The entire framing mechanism can also be rotated as a group by +/- 45º; it takes 1.5 seconds to move the full 90º. Focus on all four blades is good—not perfectly sharp on all at once, but very acceptable. As with other fixtures on the market, it isn't possible to hard-shutter on a focused gobo; you have to choose which is in focus. Only the old Clay Paky condenser optics had that ability!

Iris

The last component in the beam module is the iris. The fully closed iris reduces the aperture to 23% of its full size which gives equivalent field angles of 1.4° at minimum zoom and 9.3° at maximum zoom. I measured the opening/closing time at around 0.2 seconds.

Lens module

The final removable optical module contains the zoom projection optics, along with frost and prism. Scenius Profile has the typical three-lens group system: The first two groups move and provide zoom and focus, while the third group is fixed as the large output lens. Prism and frost are between the first and second groups; the prism system is attached to, and travels with, the rear of the first group, while the frost system is attached to, and travels with, the second group. There is a single four-facet pyramidical prism that can be inserted or removed across the beam in one second and rotated in either direction at speeds varying from 0.77 sec/rev (78rpm) down to a speed so slow I didn't measure it. Figure 10 shows the image separation from this prism, using the same gobo as I used to show morph in Figure 9.

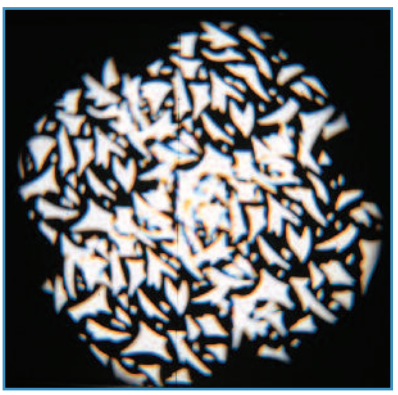

Figure 10: Prism separation.

The frost mechanism on the second lens group has two separate, staggered frost filters. As the frost channel is increased, one, then the other, is moved across the beam. It's variable in that there are two stages of

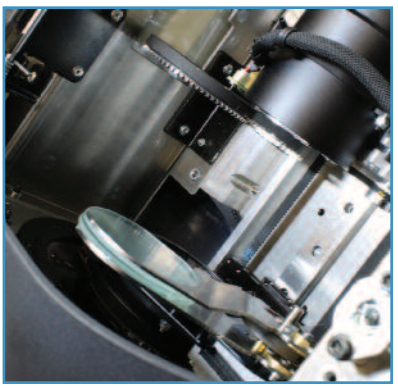

Figure 11: Frost and lenses.

zoom, not really continuous. The first filter is a light frost that reduces image contrast (it doesn't really soften image edges that much) while the second is a heavy frost that soft-floods the entire field. Also visible in Figure 11 is the prism mechanism across the end of the first lens group.

Lenses and output

Focus quality from the system is good across the entire zoom range. Three-group zoom lenses of this type, using aspheric surfaces, always, no matter the manufacturer, exhibit some barrel distortion at one end of the zoom (in the case of Scenius Profile, the narrow end) and some pincushion at the other. Clay Paky has kept this inevitable distortion to a minimum in the Scenius Profile.

Finally, we get to the important part: the output. I measured the Scenius Profile as providing a zoom range with field angles ranging from 6° — 41°, or roughly 7:1. When run at 1,400W, the output in wide angle was 23,500lm; in

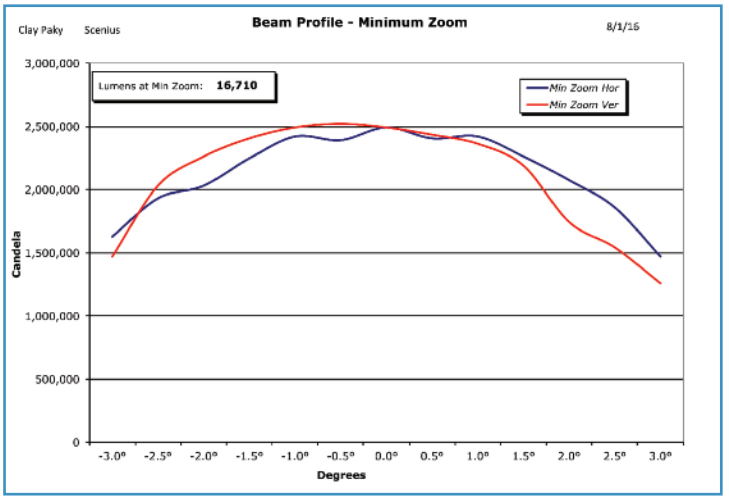

Figure 12: Minimum zoom.

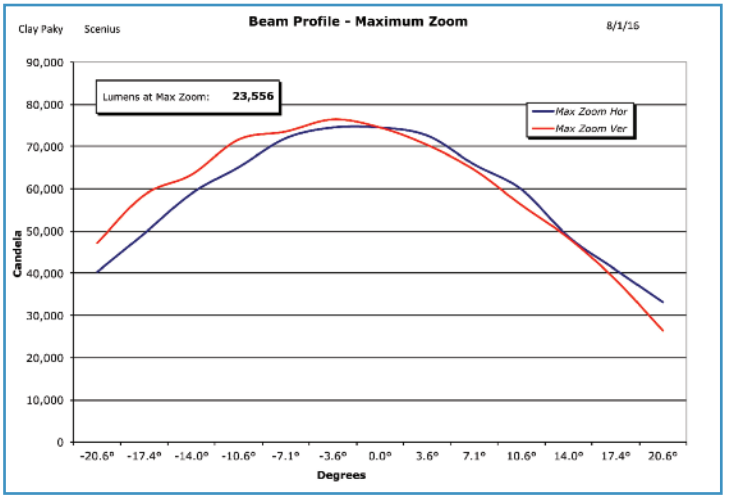

Figure 13: Maximum zoom.

narrow angle, it produced 16,700lm (Figures 12 and 13). I measured zoom as taking 0.7 seconds to move end to end; focus took 0.5 seconds, both quick for a fixture of this size.

Pan and tilt

I measured the pan and tilt range of the Scenius Profile at 540° and 265°, respectively. A full-range 540° pan move took 5.3 seconds to complete, while a more typical 180° move finished in 2.7 seconds. Tilt took 2.9 seconds for a full 270° move and 2.3 seconds for 180°. All movements were very smooth, with very little bounce and no visible steppiness, just a very small amount of overshoot. I measured hysteresis on pan at 0.16°, equivalent to 0.7" at 20' (28mm at 10m) while tilt hysteresis was 0.06°, equivalent to 0.3" at 20' (10mm at 10m).

Noise

The lamp-cooling fan provides the bulk of the background noise level, with most motor functions being quieter than the fan noise. Unusually, it was the overall framing rotate motor that was the noisiest. (It's usually zoom and focus.) These measurements were taken with the unit running at full output 1,400W, and allowed to thermally equilibrate for 30 minutes.

SOUND LEVELS

	Normal Mode
Ambient	<35 dBA at 1m
Stationary	50.5 dBA at 1m
Homing/Initialization	54.9 dBA at 1m
Pan	50.7 dBA at 1m
Tilt	50.7 dBA at 1m
Color	50.9 dBA at 1m
Gobo	52.0 dBA at 1m
Gobo rotate	52.0 dBA at 1m
Zoom	53.8 dBA at 1m
Focus	54.7 dBA at 1m
Strobe	50.7 dBA at 1m
Framing Rotate	62.6 dBA at 1m
Iris	51.5 dBA at 1m
Frost	50.5 dBA at 1m
Prism	50.5 dBA at 1m

Homing/initialization time

The lamp is cold-restrike and took about two minutes to cool down after being doused before it could be restruck. It then took about a minute to come up to full brightness. These figures will likely lengthen as the lamp gets older. Full initialization took 64 seconds from a DMX-512 reset command. Homing is well-behaved in that the fixture fades out smoothly, resets, and keeps its shutter closed before fading up again after all movement is finished.

Construction

We've already talked about the modular construction. This is primarily where I saw the subtle changes in engineering that distinguish the Scenius Profile from prior Clay Paky products. There's nothing in any way bad, just evidence of a different hand at the wheel. Every engineering team has its signature, and you can usually spot fixtures from the same team. It is very easy to remove and replace all the modules, with extensive use of captive fasteners and parts that flip up and down on hinges and springs to provide access. The fans on the color module do this, as does the main circuit board at the front of the unit over the lenses, as shown in Figure 14. One small difference between manufacturers is whether they have a single circuit board with all the drivers (as the Scenius Profile does) or separate daughter boards on each module. There's nothing wrong with either technique, just a difference you'll notice.

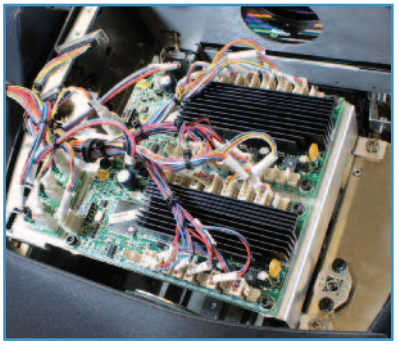

Figure 14: Main motor drivers.

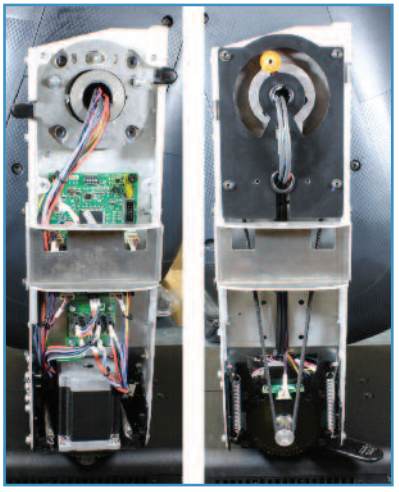

Figure 15: Yoke arms.

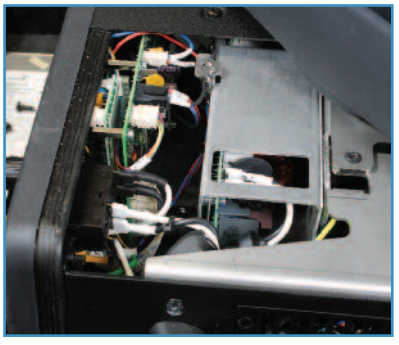

Figure 16: Top box.

Figure 15 shows the two yoke arms. The first has the pan motor and drivers for both pan and tilt, while the other has the tilt motor and belt drive.

Figure 16 shows one side of the top box after removing a cover, showing the menu and DMX electronics along with one of the power supplies. The lamp ignitor is mounted in the head, at the side of the lenses.

Electronics and control

Figure 17 shows the Scenius Profile control panel, which also contains the control and power connectors. It has the standard Clay Paky battery-backed LCD panel with five-button control pad, along with standard DMX-512 five-pin connectors as well as RDM and an Ethernet port offering Art-Net. Power input is through a Neutrik powerCON True1.

Figure 17: Control panel.

Note: This has always been the case with powerCON and Socapex connectors, but I have to admit it hasn't occurred to me before, as it wasn't common to see the original powerCON used at 230V in the US. The powerCON is not rated for a specific voltage; instead, it's rated for any voltage up to 250V. Thus it is perfectly fine to use it for both 115V and 230V. It's classified as an appliance inlet connector, not a general-purpose connector, and its UL approval is driven by the approval of the fixture it's used and tested in as a whole. In the case of the Scenius Profile, that rating is for operation on 200V – 240V. However, there's nothing to stop you accidentally plugging in a 115V feed by mistake, using a True1 cable you just happen to have on your test bench. (Your author may or may not have done this during his testing.) This way round with 115V to a 230V unit, it's likely fine—you just blow the breaker. However, you could also plug a 115V fixture into 230V, which might not be as benign. I called Steve Terry, the oracle on all things electrical, and he confirmed this is the case. There's nothing wrong with using the same appliance connector for different voltages, but it's up to you, as the user, to make sure they don't get confused! A single truss or lighting bar with True1 connectors, or any other appliance inlet connectors that are interpluggable but at different voltages, could mean that the installation (not the fixtures themselves) is, technically, out of compliance with the NEC. This is in no way a comment on Clay Paky's use of the connector in Scenius. Every manufacturer is doing the same, they are 100% legal, and, personally, I like the True1. It's just something to be aware of.

That's about it from end to end with the Clay Paky Scenius Profile. It's a strong contender in the top-of-the-line market. I've tried to give you the raw facts and figures to help you make a decision as to whether the Scenius is for you but, ultimately, as always, it's you who gets to decide.

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