Fig. 1 Unit as tested.

High End Systems' Studio Command 1200 Wash Luminaire

by Mike Wood

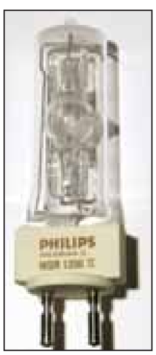

Fig. 2 Lamp.

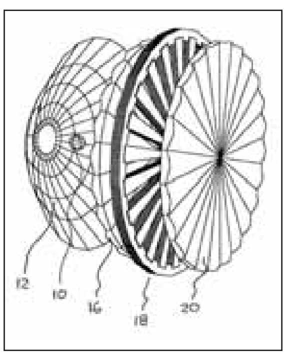

Fig. 4 Optical system.

Fig. 3 Lamp change.

Fig. 5 Color change.

High End Systems has been manufacturing automated wash lights since 1996, when the Studio Color was first introduced. It marked two milestones for the company at the time; not only was Studio Color its first wash light, it was also its first moving yoke fixture. Before then, High End had concentrated on moving-mirror spot units, such as the Intellabeam and Cyberlight. The introduction of the Studio Color was a watershed, as it marked the beginning of the mass usage of moving yoke fixtures.

The fixture we are reviewing in this issue, the Studio Command 1200 wash light, is High End's latest product in a range that traces its lineage back to those Studio Colors. How does it stack up against the competition in today's marketplace?

The Studio Command product line offers the user three choices of lamps: 700W and 1,200W metal halide discharge lamps and a 1,000W incandescent lamp. All three use a new version of the color-mix and optical system originally developed for the Color Command stationary color-mixing fixture. This system is patented and licensed by High End from the original inventor, Brian Richardson, a very well-known name in the moving light industry. Richardson was responsible for the design of all the early Morpheus lighting fixtures in the 1980's. There will be more about the color mixing system later.

As its name implies, the Studio Command 1200 is a 1,200W automated wash light with color mixing and beam size control. The parabolic optical system gives it a short body with a tight beam that leads High End to market it as having a "searchlight" effect. This review will follow our usual format and work through the fixture from lamp to lens, presenting the reader with measurements and details in as complete and objective a manner as possible. The goal is to give you as much information as you need to draw your own conclusions as to how this unit would work for you.

The 1,200W unit used for these tests is rated for 200-230V 50/60Hz operation, and was tested at 230V 60Hz (Fig.1).

Lamp and lamp power supply

The Studio Command 1200 uses a standard Philips MSR 1200 medium arc lamp (Fig. 2). It's almost getting unusual to see the larger, jacketed, medium arc lamps any more, as so many fixtures have gone over to short arc versions. However, if your optics are not helped by the shorter arc, as is apparently the case with this wash unit, then the medium arc lamp is a lot friendlier to use. It is much easier to cool than its short arc cousin, and should offer a longer life.

High End uses a new high-frequency lamp power supply from Power Gems, which both manufacturers claim to be more reliable than standard electronic supplies. It is also supposed to give a more consistent lamp life and performance with reduced lamp devitrification. By necessity, my tests are of relatively short duration, so I was unable to confirm these claims; however, I have seen similar supplies in the past and would accept this as a likely outcome, particularly with the medium arc jacketed lamp.

Note: Devitrification is the process that turns quartz lamp envelopes "milky" white over time. It's caused by the slow growth of cristobalite crystals within the quartz, which build around tiny seed impurities in the material. The crystal growth is very slow and the speed is dependent on a number of factors, such as initial quartz purity, removal of

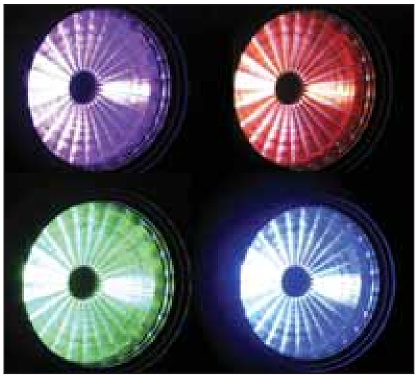
Fig. 6 Color output.

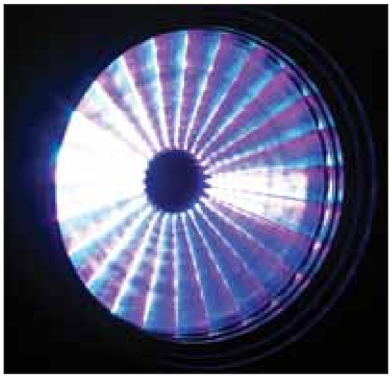
Fig. 7 Mixing colors.

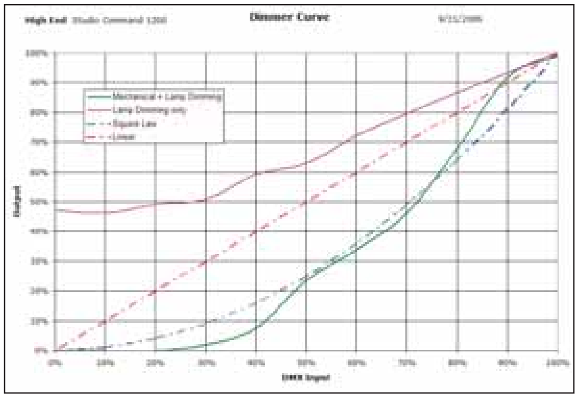

Fig. 8 Dimmer curves.

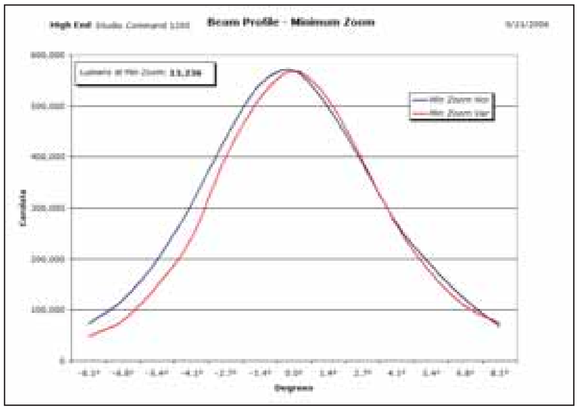

Fig. 9 Output at narrow angle.

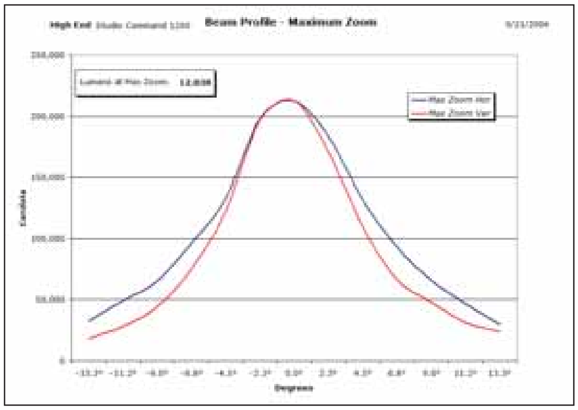

Fig. 10 Output at wide angle.


Fig. 11 Light leak.

water from the lamp, temperature and evenness of cooling, power supply stability, etc. The end result of devitrification is a fully translucent inner lamp envelope which effectively increases the size of the source. It doesn't cut much light out in total, but it diffuses that light so that it is emitted from a much larger area that the optics cannot efficiently capture. Devitrification is very often the cause of lamp failure; or, at least, the reduction in brightness it produces encourages the end-user to replace it. Less devitrification is a good thing!

The lamp change is achieved by slackening two captive screws on the rear lamp plate and removing the lamp plate and lamp cap assembly (Fig. 3). Removing this plate trips an internal safety microswitch, killing lamp power if you hadn't already done so. All parts remain captive during this operation. The lamp assembly can then be eased out of the housing (it's a big lamp!) and the lamp replaced. The Studio Command uses essentially parabolic optics (more about this later) so the aluminum reflector fills the entire width of the luminaire body. The reflector can be glimpsed in Fig. 3. The lamp plate has the usual lamp optimization screws, to allow centering of the arc in the optical system. Accurate alignment is particularly important in this product and its color-change system, to ensure even and consistent color across the field.

Remember, this is a 1,200W unit, so the lamp, lamp plate, and lamp cap get very hot in operation. The large jacketed lamp also retains heat for a long time, much longer than the bare lamp short-arcs you may have gotten used to seeing recently. Take care if you change the lamp while the fixture is up in a truss.

The lamp power supply also provides lamp dimming (down to about 50% output) and the ability to "boost" the lamp above its normal 1,200W during strobes. The system only allows lamp boosting during a strobe cycle, so that the average lamp power is kept at or below the rated 1,200W to avoid any damage to the lamp.

Optics

As mentioned above, the Studio Command 1200 uses a parabolic optical system, as opposed to the elliptical system seen in many other units, including High End's own Studio Color, mentioned at the beginning of this article. The large parabolic reflector directs the light from the lamp into a roughly parallel beam, which is the same size as the reflector. Up to this point, the Studio Command behaves like a searchlight fixture; however, it's what happens next that is interesting.

It's difficult to describe how the Richardson optics work in words, so I'm including a drawing (taken from the patent) showing the main features (Fig. 4). Working through Figure 4, the lamp (10) is directed by the parabolic reflector (12) into a parallel light beam. This beam passes through the first radial lenticular lens (16). This lens consists of a series of radial "pie-shaped" wedges, each of which has a conventional convex lens cross section. The result is that the beam is focused down into a star-shaped pattern, with one arm of the star for each pie shaped section of the lens. Next in line is a star-shaped aperture (18) through which the light passes before it is finally reconstituted into a parallel beam again by another, identical but reversed, radial lenticular lens (20).

Why go to all this trouble? Well, between each of the arms of the star-shaped aperture (18) is enough space to hide thin triangular wedges of dichroic glass. These wedges are mounted on three rings; one with cyan glass, one with magenta, and one with yellow. Rotating these rings brings the small triangles of glass across the adjacent "arm" opening in the star-shaped aperture. All the arms of the star aperture get covered by the dichroic glass wedges simultaneously, so the color is very evenly spread across the entire beam. In addition, each color wedge doesn't have to move very far, so the color mixing can be quick. Finally, the resulting module is very compact, particularly front to back, giving the unit its unique appearance.

Color system

The color-change system and the front lenticular lens can be seen in Figure 5, which also shows the stepper motors mounted around the edge of the aperture to drive the three color rings. (There are actually two more motors visible—one for dim and one for zoom which we'll describe later).

In operation, colors are mixed smoothly and the lenticular lenses give the unit an interesting appearance with a "fat" beam when looking back into the fixture.

Color mixing

Color	Cyan	Magenta	Yellow	Red	Green	Blue
Transmission	39%	8%	77%	7%	25%	2%

Color change speed - worst case	0.3 sec

As can be seen above, the short movement range of the color system allows quick moves as predicted, with the color change taking a speedy 0.3 seconds to change from one mixed color to any other. The dichroics chosen and the consequent transmission readings are slightly unusual. Cyan shows about average transmission for current discharge lamp-based units. Yellow has a higher-than-average transmission, while magenta is somewhat lower than the norm throughout. The net result is that the unit is capable of mixing some very good deep blues, but the mixed reds are somewhat pinkish. High End tell me that the dichroics were chosen to visually match other High End products.

Figure 6 shows a few of the mixed colors available and the distinctive "look" of the output aperture.

I was particularly interested to see how the unit performed with pale tints and mid-tones when the colors were only partially inserted. Figure 7 shows a close-up of the lens with 50% Cyan and 50% Magenta. You can clearly see both colors in the lens, one coming in from each side but, once you get a few feet away, the output beam is well homogenized and gave an even mix of hues. Tints and mid-tones worked well. One minor criticism is that the mixing control curve is slightly compressed, with no visible change in the output occurring until your fader gets above 20%.

Dimmer and strobe

The optical system has a couple of other tricks up its sleeve. As well as the CMY rings already mentioned, the Studio Command 1200 has a dimmer/strobe ring and a zoom ring in the middle of the optical system (position 18 in Fig. 4) right next to the color rings. The dimmer works in exactly the same way as the color mixing, but brings a series of solid aluminum triangular wedges across the aperture arms rather than dichroic glass.

Once again, the short travel of the system makes for rapid movement and the mechanical strobe operates up to 10Hz with a slowest speed of 0.2Hz.

You have two choices with dimming; either you can use the mechanical dimmer and electronic lamp dimming combined, or you can just use the electronic dimmer provided by the lamp power supply. Figure 8 shows both dimmer curves. The default mechanical + lamp dimmer curve is smooth in operation and reasonably close to a standard square law. There are no visible beam artifacts or discontinuities at low dim levels.

The lamp power supply is also capable of providing an assisted electronic strobe. The supply boosts the lamp output during the strobe “on” period to around 1,800W and then drops it down to 600W during the “off” phase of the strobe. The top speed of this was too quick for me to measure, but High End tells me it is 20Hz. I can believe it—it’s almost disorientating when it’s going full speed!

Zoom and output

One final disc in the optical path provides a zoom function by moving lens wedges across the same arm apertures we’ve talked about for the other functions. Lens movement time from full wide to full narrow was a sprightly 0.5 sec.

The field angle range was measured at 16-28° (beam angle 8-11°) with the corresponding total field lumens ranging from 13,250 at narrow angle to 12,050 at wide. That output is on the low end of the range for 1,200W wash units (Fig. 9, Fig 10).

The optical system has one minor problem; it is not possible to get a complete blackout. There is always some light leakage at about 45° around the dimming blades (Fig. 11). The light level is not high and doesn’t really project, but might be annoying if you need a very dark stage with the fixtures in view to the audience. Concerts might not mind, but a theatre may have a problem with it. Take a look at this in your venue to see if it matters to you. Other than this, the fixture has almost no light leaks.

Pan and tilt

Movement uses familiar and well-established High End Systems mechanisms as seen in many of the company’s products utilizing three-phase motors fitted with encoders for both axes (Fig. 12). The Studio Command 1200 has pan and tilt ranges of 540° and 240°, respectively (these figures seem to be becoming unofficial industry standards). A full-range pan move took 4.9 seconds; a more typical 180° move took 2.8 seconds. Tilt took 3.4 seconds for a full 240° move and the same 2.8 seconds for 180°. These

Fig. 12 Tilt.

Fig. 13 Tilt Motor brake.

Fig. 14 Ignitor.

are typical figures for current luminaires, comparable with competitive units.

Positional repeatability/hysteresis on both pan and tilt was 0.14°—that's around 0.6" of error with a 20' throw. Fixture bounce when coming to a stop was minimal, assisted by the large motor brakes High End uses as dampeners on both pan and tilt shafts (Fig. 13).

I found a minor bug in the encoder system which resets the position if the fixture head is knocked. Occasionally, the system would reset to a slightly incorrect position, 0.9° off, but would then recover correctly on the next move. This error is small and would probably not be noticed on a wash light; High End tells me it is working to fix this bug.

Noise

The Studio Command produced average results for noise—no annoying whines or whistles, but an audible "clunk" when running high-speed color or shutter changes. All figures are worst case.

Noise

Ambient	<35 dBA at 1m
Stationary	51 dBA at 1m
Homing/Initialization	53 dBA at 1m
Pan	56 dBA at 1m
Tilt	54 dBA at 1m
Color	59 dBA at 1m
Zoom	54 dBA at 1m
Strobe	57 dBA at 1m

Electrical parameters

The Studio Command 1200 runs at 200-230V only, not at 115V. Current consumption was 6.1A when running at 230V, 60Hz. Homing/initialization time was 49 seconds from issuing a DMX "reset" command. Homing was very orderly and controlled, with all parameters correctly closing down before pan and tilt initialization started, and not opening up again until the final position was reached.

Electronics and control

The Studio Command 1200 has a conventional head/top box construction with the main electronics and power supplies in the top box and the lamp ignitor in the yoke arm (Fig. 14). Access to the electronics in the top box is very simple; undo the two screws in each of the two large plastic covers, and they slide off. Two more screws, and both sides of the unit, hinge down, exposing the power supplies and the main control board (Fig. 15, Fig. 16). Replacing any of these should be a simple field operation. The power supplies slide out from the unit, while the main control board just unplugs from the main harness and is retained to the front panel by a few screws. I would have no hesitation changing these on a job site.

There are no electronics in the head—in fact, there is very little you can maintain in the optical system other than keeping it clean. The color-change system is very compact, and doesn't look to me as if it should be a user serviceable component.

The menuing system is familiar and comprehensive, offering all the features you would expect from a current unit (Fig. 17) with straightforward navigation through a standard four-button system with a numeric display.

Conclusions

I don't have any! If you've read these reviews before, you know that. Potential applications for these kinds of products are so varied that a conclusion from me is not likely to reflect your application. However, I hope I've provided you with enough measurements and information to allow you to make up your own mind.

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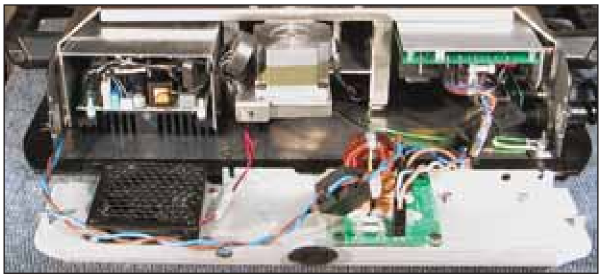

Fig. 15 Power supplies.

Fig. 16 Control board.

Fig. 17 Menu system.