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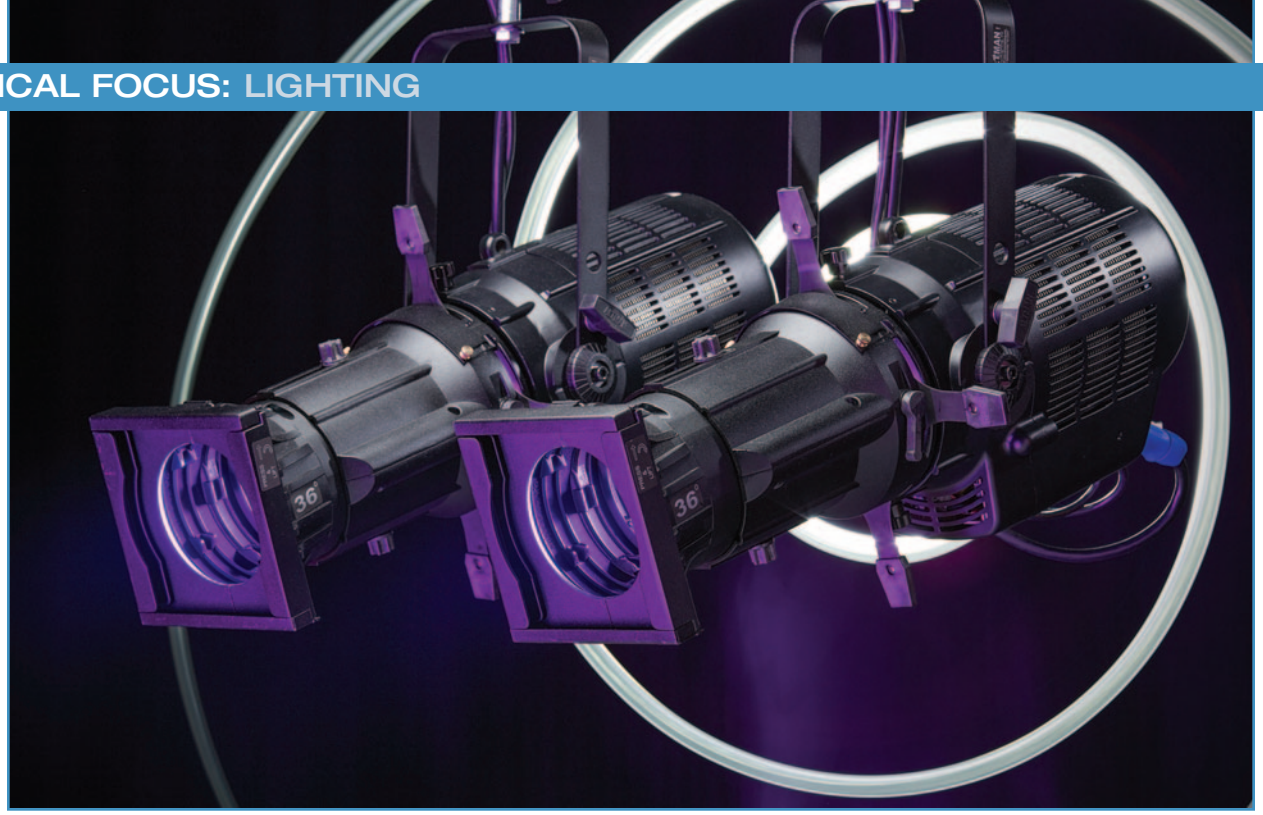

The performance of Altman Lighting's Phoenix LED unit was something of a revelation to the testers.

The Joffrey Ballet LED Shoot-Out

By: Larry Schoeneman

A team of lighting pros takes a hard look at LED units for theatrical applications

Four years ago, Claude Binder, production manager for Joffrey Ballet of Chicago, and I started talking about converting the Joffrey rep lighting plot to incorporate LED fixtures. While the fixtures that we needed weren't available at that moment, we felt sure that, with time, they would be developed and would become roadworthy competitors for the existing incandescent luminaires.

Jump forward four years and we believe that the gear is now available and we can take this transformative step. The question: Which systems of lights should we convert to LEDs first and whose LED fixtures should we use?

Joffrey agreed to invite Chicago-based lighting designer Christine Binder to represent the company's artistic interests in making the equipment selections, and I agreed to assemble representative equipment from several manufacturers for Joffrey's designer to evaluate.

Chris Binder is a USAA lighting designer with a strong background in opera and ballet production. She designs for Lyric Opera of Chicago, Lookingglass Theatre, and other national and international production companies and is head of the lighting design program at The Theatre School at DePaul University.

We met to discuss the list of equipment that DesignLab would assemble for the fixture shoot-out and how we would structure the event. Because of their level of development, we all agreed that cyc lights and backlights were the most likely systems in a ballet lighting plot that could be addressed by current LED lighting technology, so we decided to focus on those types of fixtures. The idea was to compare the light that they deliver to the stage. Brand names and fixture costs were not to be taken into consideration; a full rig of LEDs was going to be expensive, and we at DesignLab were ready to amortize the fixture

The ETC Source Four PAR outperformed against LED units for backlight.

cost over the multi-year life of their intended use. Because of DesignLab's relationships with different manufacturers, I proposed to show competing fixtures from ETC, Altman Lighting, and Chauvet Professional. Chris had seen A.C. Lighting Chroma-Q Color Force cyc lights and wanted to include them in the shoot-out, so I agreed to bring in samples from A.C. Lighting, also.

All of the fixtures were to have at least four colors of LED emitters—RGBA, RGBW, or some similar variety. Also, all fixtures were to incorporate DMX-512 and RDM control through five-pin XLR connectors and to use powerCON connectors for AC power in and through. We chose fixtures designed for a range of voltages, usually from 100VAC – 240VAC, and for both 50Hz and 60Hz. For these tests, we used 120VAC, 60Hz exclusively.

DesignLab was the lighting vendor for all three theatres in DePaul's new theatre building and, given Chris' relationship to DePaul, the university seemed to be an obvious location to host the event. I reached out to Chris Hofmann, director for production at The Theatre School at DePaul University, and we arranged the event so that DesignLab would deliver equipment on the morning of August 18, we would run the comparison, and load out by mid-afternoon.

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Lighting equipment

LED lighting fixtures were shipped directly from the manufacturers to DesignLab Chicago; we added an ETC 48 x 2.4 Sensor 3 dimmer rack, ETC Ion controller, and City Theatrical SHoW DMX SHoW Baby wireless DMX-512 transceivers to the rig to speed up the load-in and minimize the amount of cable on the stage floor.

Our LED equipment list then included the following:

Cyc lights:

—A.C. Lighting Color Force 72: a 22kg, 660W, 72" (6') linear RGBA fixture with two fans, a CRI of 92 requiring from 1 – 36 DMX-512 control channels depending on its programming mode.

—Altman 200W Spectra Cyc: an 8kg, 200W, 25" RGBA fixture with integral cooling fan.

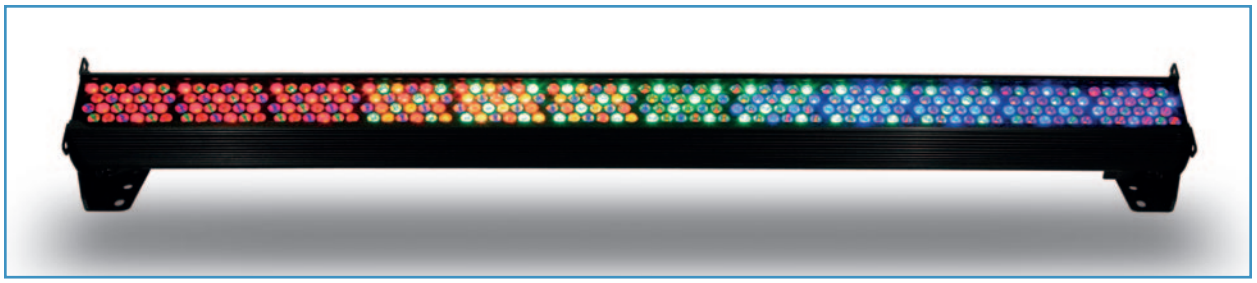
—Chauvet Professional Ovation C-640FC: a 10kg, 175W, "over and under" configured pair of 15" rectangular RGBWA fixtures, requiring 3 – 24 DMX-512 control channels depending on its programming mode.

—ETC Source Four Series 2, 250W LED light engine with cyc adapter: a 7kg profile-type light engine with internal fan and seven-color LED array, requiring 3 – 15 control channels depending on fixture setup. The detachable 3kg cyc adapter connects to the light engine instead of the more common lens tube.

Backlights included:

—A.C. Lighting Chroma-Q Color Force 12: a 4kg, 120W, 48-emitter, 12"-long linear fixture with one internal cooling fan, requiring between 4 - 9 DMX-512 control channels depending on fixture setup. This unit is really a 12" section of the 72" linear fixture that was evaluated for use as a cyc fixture, but we hung it to get some idea of its capabilities in another application.

—Altman Spectra PAR: a 10kg, 100W fixture with changeable lenses and convection cooling. While this fix-



The Chroma-Q Color Force 72 was deemed the best-performing cyc light.

ture was IP65-rated for indoor or outdoor use, the power cord was permanently affixed to the fixture so that power could not be daisy-chained.

—Chauvet Professional COLORado 2-Quad Zoom Tour: an 8kg, 205W, 14-emitter, RGBW fixture requiring 3 – 17 DMX-512 control channels depending on its programming mode. This fixture incorporated an 11° – 43° zoom.

—ETC Selador Desire D-60 Lustr+: a 9kg,161W, 60-emitter fixture with changeable secondary lenses and a variable-speed cooling fan.

Fixture evaluation

In agreement with Joffrey Ballet and Theatre School at DePaul University faculty and staff, we invited representatives from a variety of area schools. These included John Culbert, dean of the Theatre School at DePaul University and a USAA lighting and scenic designer, and representatives from Columbia College, Northern Illinois University, Northwestern University, and Lookingglass Theatre. We were also joined by representatives from each of the manufacturers whose equipment was shown so that any technical questions could be answered on the spot.

All cyc fixtures were placed on the ground upstage of the cyc and focused using a muslin bounce. We evaluated color intensity and evenness of distribution from positions in the audience. Standing onstage and looking directly at the emitters also allowed us a far more critical comparison of low-end dimming curves.

This was the first chance any of us had to directly compare brands of cyc fixtures in a theatrical environment. Chris Binder was impressed with the marked improvement with dimming at the low-end of each fixture's curve. Just a couple of years ago, low-end dimming was frequently marked by "steppiness," but that was not apparent in any of these fixtures. Obviously, a great deal of attention has been spent by all manufacturers in addressing this concern.

> "No one was surprised when the LED fixtures delivered good, clean light in the deep, saturated colors. However, everyone was surprised that when we started mixing colors into paler pastels, the LED fixtures started to deliver a less crisp light and the quartz PARs consistently produced a more satisfactory light."

As a direct-view fixture, the Altman Spectra cyc didn't come on until a level of approximately eight was reached (based on a scale of 0 – 100), although this was not really apparent when viewed from the audience. Both John Culbert and Chris Binder felt that the Source Four Series 2 cyc fixture had slightly more critical control of color but failed to deliver any "punch" on the cyc. The real winner, though, was the Color Force 72. This fixture's light was bright and crisp and clean. We were also able to get an even color wash moving from one Color Force fixture to another without scalloping, and the light was far even up onto the cyc even while only lighting the cyc from the floor. Chris Binder felt that, for dance, in which bright, clean color cast evenly across a cyc was required, the Color Force 72 units met their requirement better than any of the competing cyc lights. That part of the comparison was a clear-cut decision.

For the comparison of backlight, we hung four different manufacturers' LED fixtures along with a number of 750W Source Four PARS with scrollers so that we could compare color intensity and punch between LEDs and traditional quartz light sources.

No one was surprised when the LED fixtures delivered good, clean light in the deep, saturated colors. However, everyone was surprised that, when we started mixing colors into paler pastels, the LED fixtures started to deliver a less crisp light and the quartz PARs consistently produced a more satisfactory light. We tried each LED fixture individually and also ran the Chauvet Professional COLORado fixture through its zoom function, but we all agreed that the quartz units delivered a superior look; none of us were comfortable in

selecting an LED fixture to use instead of the Source Four PARs that Joffrey has in its rig for backlight.

In addition, DesignLab recently added Altman Phoenix "ellipsoidal" LED units into our rental inventory and, just to play with them, we had hung three RGBA units in an 8' section of 12" x 18" single-drop truss, setting it up as an example of color-changing sidelight without scrollers. Chris Binder and I decided early on that we didn't intend to evaluate shuttered fixtures for sidelight, because we didn't think it likely that they could hold their own against LED cyc and backlight fixtures, so we hadn't solicited fixtures from other manufacturers—these were just from our rental inventory.

We were evaluating the backlights when Casey Diers, our board operator, brought up the Phoenix units and one of the electricians walked through the light. We were all shocked at how bright and crisp the light was. Chris called the electrician back onstage and had him stand in the light while we looked at different colors and realized that the Altman unit could deliver the punch, color control, and effective shutter cuts that Joffrey needed for its sidelight, and high sidelight, and other applications. We had thought that these requirements were beyond the capabilities of current technology in theatrical LED fixture optics and control and had been shown to be wrong. We were all shocked.

> "We were evaluating the backlights when our board operator brought up the Phoenix units and an electrician walked through the light. We were all shocked at how bright and crisp the light was."

We spent some time reviewing what we had seen and learned about LED cyc-light, backlight, and sidelight fixtures for use by a major ballet company: Cyc and shuttered LED fixtures could hold their own in a large-theatre dance rig, and backlight (wash light) fixtures (based on what we had seen) could not. Then we broke the rig down and packed it up, thanked Chris Hofmann and John Culbert for their hospitality and the use of their new and well-appointed theatre, loaded our gear out, and drove back to DesignLab to end a very productive and educational day.

Larry Schoeneman is a USAA Lighting Designer, is President of DesignLab Chicago, DesignLab Charlotte and Interesting Products, and is active on several PLASA Technical Standards Working Groups.