ON TEST

Altman AP-150 RGBW PAR luminaire

Mike Wood takes a closer look at Altman's new LED PAR luminaire . . .

ABOUT THE EXPERT
MIKE WOOD
A technical, design and intellectual property consultant offering services to the entertainment technology industry.
mike@mikewoodconsulting.com

I've been writing these reviews for 15 years now, very nearly 100 of them so far, and in all that time I've never reviewed a product from Altman Lighting. Altman is one of the oldest manufacturers in entertainment lighting equipment in the US, but I typically stick to automated luminaires, and Altman hasn't been in that arena since the days of the Altstar back in the early 1990s. However, where Altman very definitely do make products, and in an area which is also an interest of mine, is LED-based luminaires. Add in an automated zoom and it's not unreasonable to call it an automated luminaire. It also gives me the opportunity to go into a bit more detail on some of the structure and the science than I normally have the space for.

This month, we are investigating the Altman AP-150 RGBW PAR luminaire (AP-150). As usual, my tests were based on a single sample of the unit supplied to me by the manufacturer. When Altman submitted the AP-150 for review, the team wanted the unit to be considered as a workhorse that was very simple to operate. They also said that it had no superfluous bells and whistles, instead its merit came from being versatile and straightforward. I tried to bear that request in mind as I went through the unit . . .

For the tests, the AP-150 was operated from a nominal 115V 60Hz supply. However, the unit is fitted with an autosensing universal power supply input that is rated from 100V to 240V AC, 50/60Hz.

LIGHT SOURCE AND OPTICS

The AP-150 uses nine RGBW emitters, each of around 15W. Two of these can be seen in *Figure 2*. They are mounted directly onto a single circuit board with a thick aluminium backing plate which, in turn, is thermally connected to the aluminium casing of the unit, forming a large heat sink. There is an internal fan, which keeps air circulating inside and through the enclosure to provide additional heat transfer.

Each of the RGBW LEDs is capped with a light pipe that serves to integrate the four colours into a single beam. You can see detail of both ends of these

AP-150 RGBW PAR luminaire

❷ LEDs

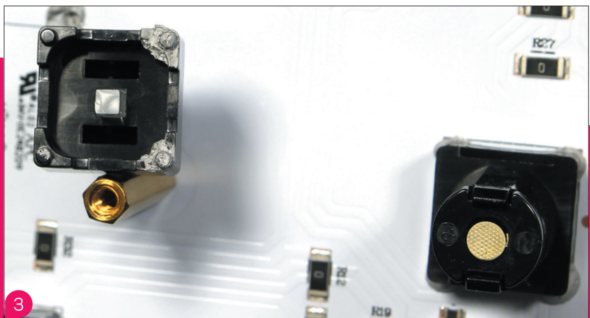
❸ Light pipes

❹ LEDs and zoom motors

light pipes in *Figure 3*. The light itself is a clear solid PMMA rod inside the black supporting enclosure. Each light pipe is square at the bottom end, as shown on the left in *Figure 2* where it contacts the LED so as to maximize light transfer. The opposite end is circular (right side of *Figure 2*), so that you end up with a round beam, not a square one! You can also see that there is a micro lens pattern moulded in the exit end of the pipe; this aids further homogenisation of the colours. You'll see similar light pipes in many entertainment lighting units. Some have one square end and one circular end like this one, others are square and hexagonal, and they have differing types and amounts of micro lenses or diffusion. The goal is always the same, make the multiple LED colours appear as a single beam, with no colour unevenness across the field. The light pipe doesn't do much, if anything, for collimation, it's primarily there for light capture and homogenisation.

Note: You will sometimes also see tapered light pipes where the exit end is larger than the input end. What this does is reduce the cone angle of the light emitting from the pipe. The surface that light is emitted from is larger, but the angle is narrower. Conversely, a pipe with a smaller exit than the input will reduce the size of the light source but increase the angle. In a perfect world, it would be great to have both a small surface and a narrow angle at the same time, but physics gets in the way and the laws of etendue just don't allow it. You may as well try and design a perpetual motion machine!

Getting back to the AP-150. The nine LEDs and light pipe assemblies can be seen in *Figure 4*, mounted on the board; each light pipe has an associated output lens as shown in *Figure 5*. These are fine patterned PMMA Fresnel lenses, you can just see the concentric rings stepping out from the centre on each lens. A Fresnel lens behaves optically like a much thicker regular lens. *Figure 6* shows how they might be constructed. Lens A is our original lens; Lens B shows the same lens but with a set of rectangular blocks, shown in blue, superimposed. A rectangular block does nothing optically, so these portions can be safely removed without changing the overall optical characteristics of



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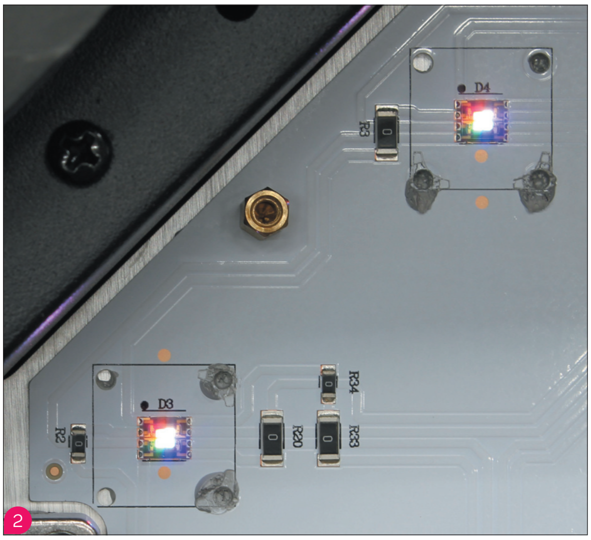
"The output was smooth and well homogenised and should blend well from one fixture to an adjacent unit when creating a stage wash . . ."



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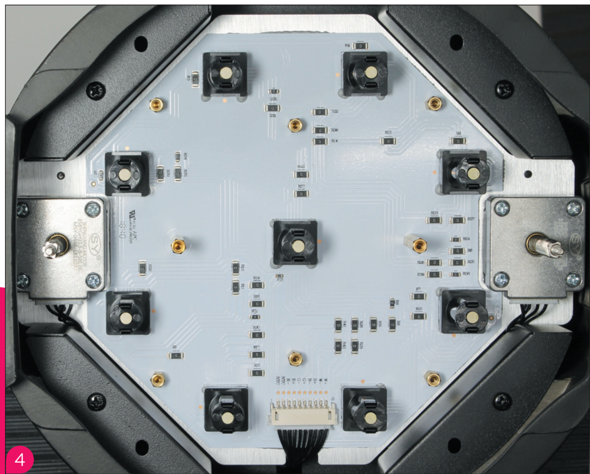
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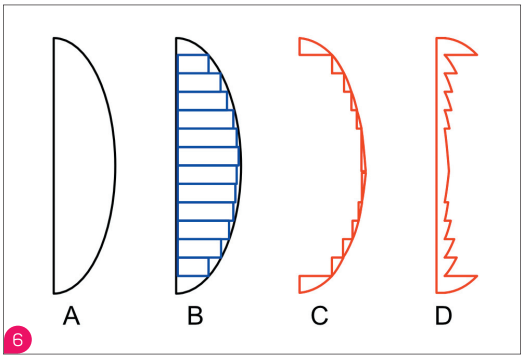
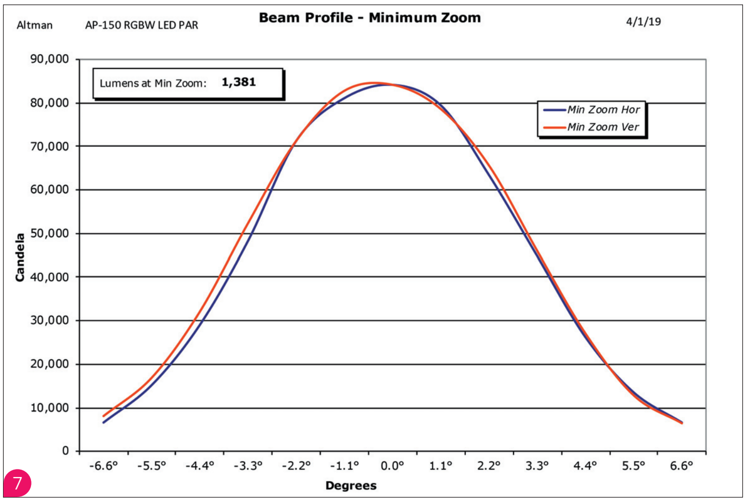
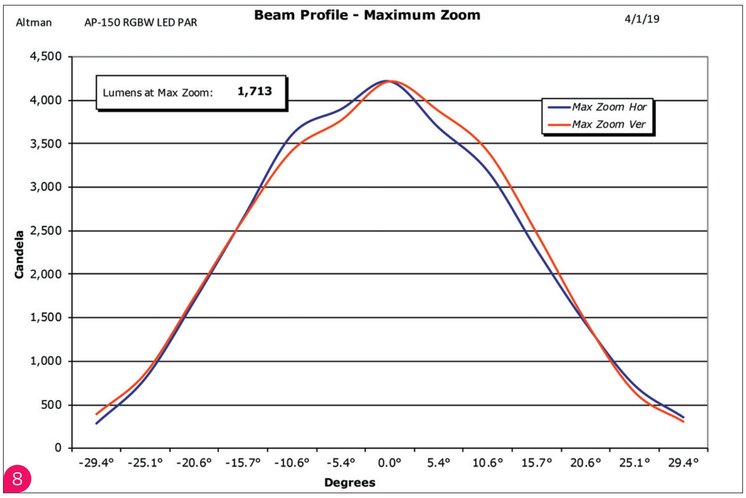






5. Fresnel lenses
6. Fresnel lens construction
7. Minimum zoom
8. Maximum zoom
9. Spectrum 2700K
10. Spectrum 6500K

the lens. This leaves us with the set of curved prisms shown in red in C. As a final step, slide all those prisms to the left so they line up and you end up with the familiar Fresnel lens, D. Lens D behaves almost the same as Lens A, but is much thinner and lighter. It doesn't behave quite the same because of the steps we've introduced, which lead to stray spill light and loss. The smaller we can make each of these steps the better, and this is how you end up with a very fine Fresnel lens such as the one in the AP-150.

The nine Fresnel lenses are mounted on a single plate which, in turn, is connected via lead screws to two stepper motors, visible one on each side in *Figure 4*. As the two motors turn, the lens plate moves towards and away from the light pipes thus changing the beam angle of the emitted beam. Close to the pipes the beam is wide; far away and close to the focal length of the lenses, we get a narrow beam.

OUTPUT

Figure 7 shows the output of the AP-150 with all emitters at full, and the lens array in the fully narrow position after letting the unit run for 30 minutes to reach thermal equilibrium. In this mode I measured just under 1,400lm with a field angle of 13°. The output was smooth and well homogenised and, as you can see from the profile curve, should blend well from one fixture to an adjacent unit when creating a stage wash. Similarly, *Figure 8* shows the AP-150 in the fully wide position. Here, the output is higher at just over 1,700lm, with a field angle of 59°. The output was again smooth; *Figure 8* makes it look like there were bumps in the distribution, but these are not visible to the eye and likely come from the difficulty of measuring a wide angle like this. The time for the AP-150 to move the lenses from one of the zoom range to the other was five seconds.

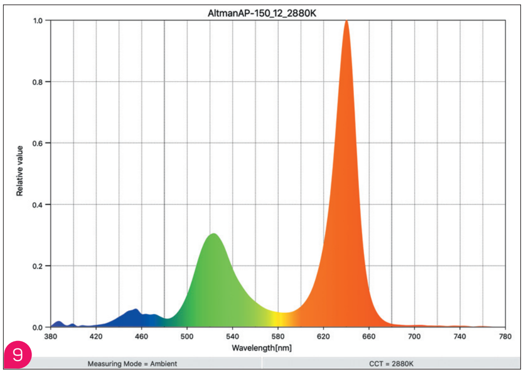
Note: Why are lights very often brighter in wide angle? Often, as is the case with the AP-150, this is because when the lenses are very close to the light sources, as they are when producing a wide-angle beam, there is very good capture by the lenses of all the light emitted. However, when the lenses are further away, such as when we are in the narrow position, some of the light will miss the lenses and end up wasted. There will inevitably be light that falls outside the diameter of the lens. Incidentally, this also helps explain why narrow angles means large lenses, while the larger the lens, the more chance of capturing all the light.

COLOUR

Altman offers a number of ways to adjust the colour from the AP-150. You can control the four channels independently and mix your own colours; you can use RGB or HSIC (Hue, Saturation, Intensity, CCT) control where the white channel is automatically adjusted; or you can use a macro channel where a range of pre-mixed colours matching popular gel colours are provided. There is also a range of whites on that same channel ranging from 2,700K to 10,000K. You can also choose between running these preset colours in calibrated or uncalibrated mode. Fixtures will likely vary unit to unit, but I measured approximately a 10% to 15% drop in output when switching to calibrated mode. This is to be expected, as any calibration can only reduce outputs from maximum, not increase them. I measured each of the provided whites as follows:

WHITE RANGES

Colour Temp	Uncalibrated	Calibrated	TM-30 Rf	TM-30 Rg	CRI Ra
2,700K	2,880K	2,454K	51	110	29
3,000K	3,238K	2,743K	57	112	36
3,200K	3,462K	2,940K	61	113	40
4,000K	4,392K	3,830K	75	115	46
4,500K	4,685K	4,031K	80	113	70
5,000K	5,048K	4,526K	85	110	83
5,600K	5,664K	5,172K	85	109	85
6,500K	7,034K	6,210K	79	105	90
8,000K	15,974K	7,788K	78	95	79
10,000K	n/a	10,164K	78	95	82



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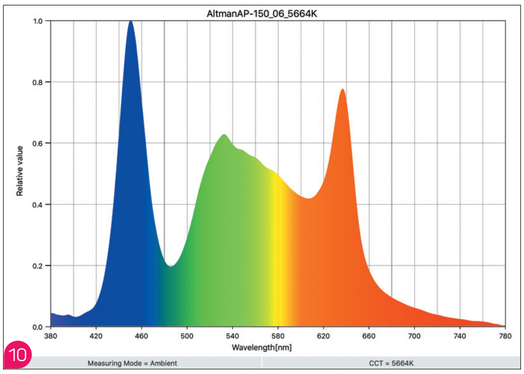

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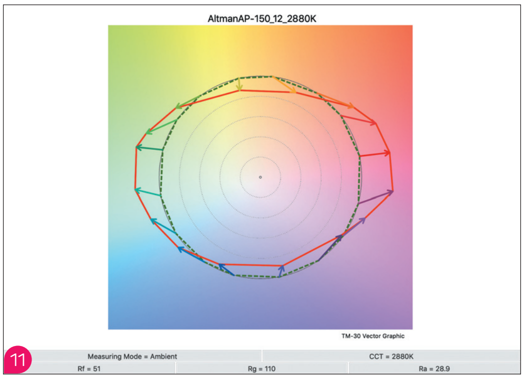
In calibrated mode the colour rendering is pretty good at 4,5000K and above, but drops off at the warmer colour temperatures. As examples, *Figures 9* and *10* show the spectra at the 2,700K (2,880K actual) and 6,500K (5,664K actual) uncalibrated white points respectively and *Figures 11* and *12* show the corresponding TM-30 colour rendering graphics. (These charts come from the new Sekonic C800 meter which now reports TM-30 as well as



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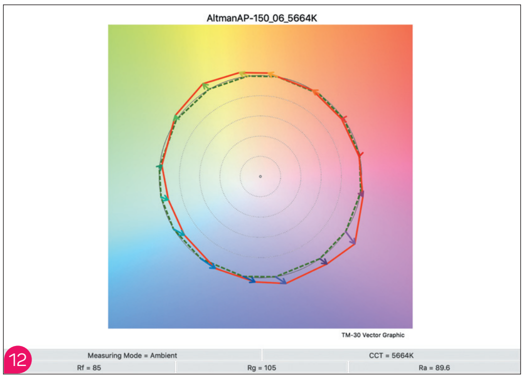
1. TM30 2700K
2. TM30 6500K
3. Dimmer curve
4. Rear panel
5. Electronics
6. RDM1
7. RDM2



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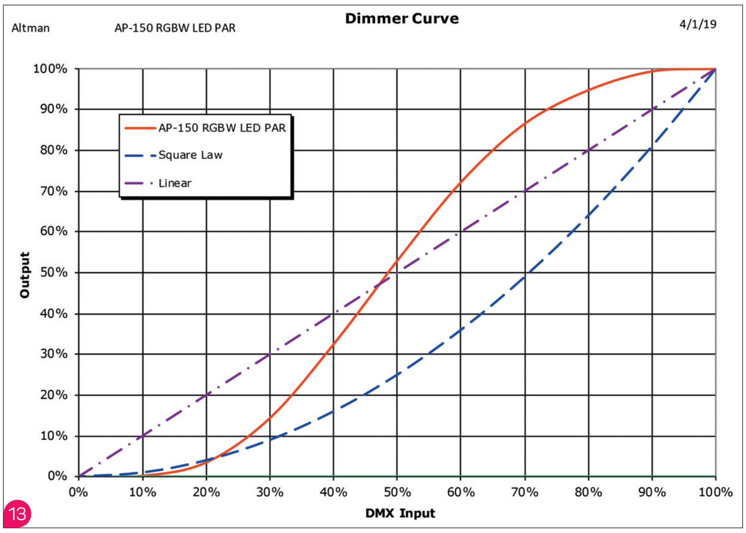

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CRI.) Of the four colours, red represents 13.5% of the lumen output, green 42%, blue 5%, and white 47.5%. This adds up to a little more than 100%, which shows some thermal budgeting is going on.

DIMMING AND STROBE

Figure 13 shows one of the available dimmer curves of the AP-150. This is the one Altman calls 'incandescent'. It's reminiscent of the old S curves you used to see on some dimmer racks. There are also linear and square laws available through menu selection. Dimming performance was very good, smooth and no visible stepping or inconsistencies. This is partly due, I'm sure, to the incandescent emulation modes available in the AP-150, which allow you to simulate the thermal lag of incandescent filaments, and smooth out any fades.

I measured the thermal droop of the AP-150 by running it at full power from a cold start and measuring light output over a period of 30 minutes. Over the first five minutes output dropped to 88% and finally settled out at 83% of the original level after 20 minutes. PWM rate is approximately 8kHz, which shouldn't have any problems with any cameras. Strobe rates through a dedicated strobe channel were measured ranging all the way up to 30Hz.

NOISE

The Altman AP-150 has an internal fan which, when the unit was running at full power with the fans set to Auto mode, measured at 41.8dBA at 1m. Running zoom, the only other noise producing motors, increased this to 43.7bBA at 1m. There are many options for the fans, including direct DMX512 control. I tested this by putting the fans in manual mode and turning them down to their lowest setting.

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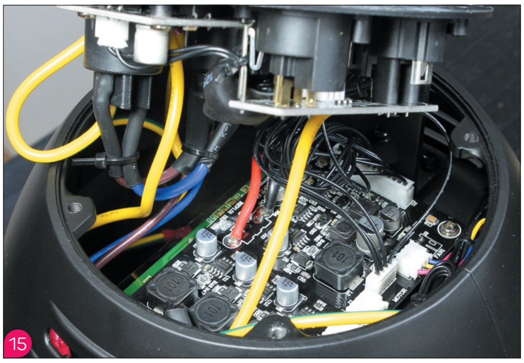
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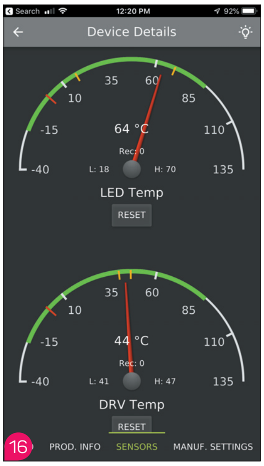

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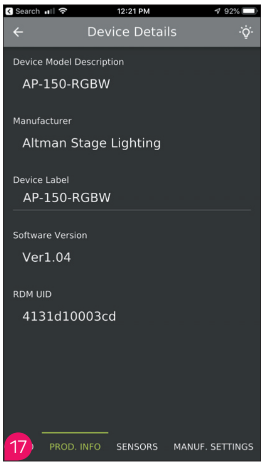

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The unit then effectively became silent. However, this silence comes with a price - at full power, the unit ran at full output for about 100 seconds, then the light level dropped rapidly over about five seconds to about a third of the full output as the unit ramped down to keep the LED temperatures under safe limits. Recovery from this situation took a long time. After turning the fans back to Auto, it took over 10 minutes for the unit to recover to its original output. Altman recommends that you use the option to set a reduced power level if you know you are going to want to run with very low or no fan noise. That way you avoid any of these surprises with throttling.

ELECTRICAL PARAMETERS

POWER CONSUMPTION AS TESTED AT 120V

	Current, Power	Power Factor
Quiescent Load	0.058A, 5.8W	1.0
All LEDs illuminated	1.09A, 132W	1.0

Initialisation time from power up or reset command to finishing homing of the zoom was around 12 seconds. The unit is badly behaved in reset as the LEDs power up almost immediately as the zoom slowly travels to maximum and back over the full 12 seconds.

ELECTRONICS AND CONTROL

Power in and out is through daisy-chained Neutrik PowerCon connectors. Control is through DMX512 on standard 5-pin XLRs. The AP-150 RGBW offers a control menu through a colour LCD display and button array, which allows the set-up of control parameters and standalone mode (Altman tells me it has tried to minimise the button pushes to get to any function). All these are visible in *Figure 14*. Behind this panel is the main control board containing the LED and motor drivers, and the power supply (*Figure 15*).

I also tested the RDM capabilities of the AP-150 RGBW using the City Theatrical DMXCat - see *Figures 16* and *17* to get an idea of the data available through RDM. This is in addition, of course, to the ability to set menu parameters and control the unit.

CONSTRUCTION

It's a simple aluminium die-cast clamshell design with all components stacked inside. Removal of the lenses to access the LEDs was simple, but I didn't disassemble it much more than that. I don't anticipate it being a difficult unit to work on.

CONCLUSION

That's about it, my first review of an Altman luminaire. The AP-150 RGBW is a straightforward RGBW LED colour mixing PAR unit with motorized zoom. Would it work for you in your venue? I hope I've provided enough data to help you make that decision.

ALTMAN AP-150 RGBW
TECH SPEC

FEATURES

- Dimensions (HxWxD): 343mm x 286mm x 233mm
- Weight: 5.08kg
- RGBW LED colour configuration
- Light engine: 135W RGBW (W=6500K)
- LED life: > 50,000 hours
- Input Voltage: 100-240V AC 50/60Hz
- Power Factor: ≥ 0.95
- Control: DMX/RDM
- Motorized zoom: 12° to 65°
- Up to 30Hz strobe rate
- On-board user interface
- Four control settings: 16 Bit, 8 Bit, RGB, HSIC
- Built-in floor stand
- Multiple dimming profiles