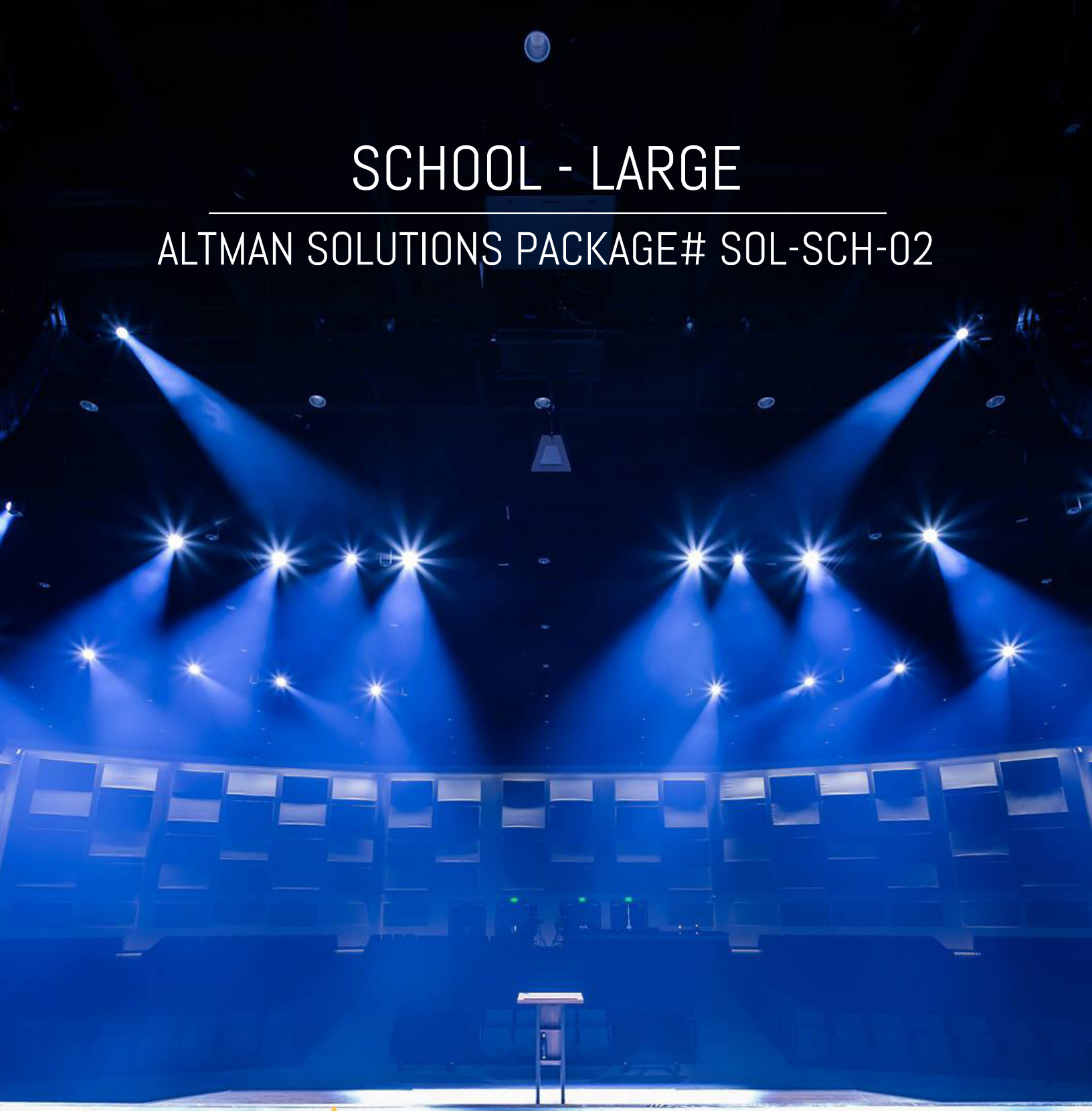
SCHOOL - LARGE

ALTMAN SOLUTIONS PACKAGE# SOL-SCH-02



ALTMAN

LIGHTING

1 (303) 500-7072 1400 E. 66th Avenue, Denver, CO 80229 www.altmanlighting.com

CONTENTS

EQUIPMENT SUMMARY

Profile Fixtures | PHX3 Zoom

PHX3 is a 340 Watt (RGBL) Red, Green, Blue, and Lime Profile Zoom. The 30°-55° zoom PHX3 LED is the brightest RGBL LED profile specifically made for the production lighting and theatrical market. This makes P
HX3 ideal for use in schools, theaters, and sany special event where extra intensity is needed.

Wash Fixtures | AP150

The AP-150-RGBW is a compact, lightweight 135 Watt RGBW LED par wash light that is packed with a high feature set at an affordable price. Featuring a motorized zoom producing a beam spread between 12° and 65° with built-in stops at five different set points ensuring precise beam spread repeatability.

Followspot | AFS-500

The AFS-700 LED follow spot is a lightweight, 780 Watt white LED follow spot that is packed with a powerful feature set at an affordable price.
This compact, purpose built LED followspot weighs under 40 pounds (17 kg.) and is quiet enough to place inside a performance venue.

Control | Genesis

The Genesis lighting control console combines the ease of use of a fader based lighting controller with the power of a touch screen. From simple fader control to advanced functionality supported with
features such as shape FX, chases, fan, and individual cue timing, Genesis is an ideal entry level console for tomorrow's lighting rigs.

EQUIPMENT SUMMARY cont.

Network | Ethernet to DMX Gateway

The Pathport 6824 4-Port DMX/RDM gateway is a compact gateway for encoding, routing and decoding DMX512 data over a standard Ethernet network. In addition to DMX, the Pathport 4-Port supports RDM discovery and configuration data transport.

Network | Ethernet Switch

The VIA8 is a Gigabit Ethernet switch with eight copper ports and two gigabit mini-GBIC ports for SFP/SFP+ modules. Designed to mount to 35mm DIN rail, this compact switch is engineered specifically for sACN data distribution. Management features, such as VLANs, DHCP and IGMP multicast, filtering, are all featured.

Power | SNAP Panel

SNAP lighting control panels provide unified DMX512 control of 0-10V analog outputs and relay switching, all within a single enclosure. Intended for use with fully isolated LED fixture drivers requiring mains switching and 0-10V dimming. Eight or sixteen normally-closed (NC) single-pole latching relays

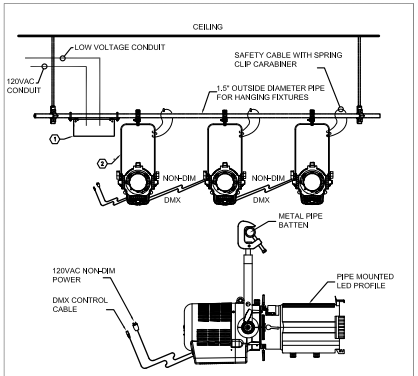
Distribution | 450 Series

Distribution enclosures are connector strips, plug-in boxes, recessed floor boxes, and recessed wall boxes. Altman manufactures a complete line of distribution enclosures shipped from stock or made to order. All distribution enclosures offer a wide range of connector options.

BILL OF MATERIALS

PART NUMBER	Part Name / Description	QTY.	UNITS
PHX3-RGBL-30Z-B	PHX3 Zoom 30-55 Degree lens	8	Fixtures
AP-150-RGBW-B-PCED	AP150 RGBW Par with Powercon	2	Fixtures
AP-150-RGBW-B	AP150 RGBW Par without Cable	6	Fixtures
450-PBU-4-520DUP-HW-1-XLR5F-SDR	450 Series Under-hung Distribution Box	4	Boxes
450-PBS-4-520DUP-HW-1-XLR5F-SDR	450 Series Surface Mount Wall Distribution Box	2	Boxes
450-PBS-4-520DUP-HW-1-RJ45-SDR	450 Series Surface Mount Control Position Distribution Box	1	Boxes
510	Pipe Clamp	8	Clamps
SC-36-BK	Black Safety Cable with Spring Clip	8	Cables
PCTJ-12-10	Powercon cable 10’	12	Cables
XLR-5-10	DMX Cable 10’	20	Cables
AFS-700-B-PCED	AFS-700	1	Followspots
GEN-24	Altman Genesis Control Console	1	Console
4850-8	Pathway SNAP Control Panel—8 relay/16 Analog outputs	1	Panel
1107	eDIN System Enclosure, c/w Three 9” Horizontal DIN Rail	1	Enclosure
1001-100-48-DIN	100 Watt, 48VDC Power Supply, DIN-Mountable	1	Power Supplies
6708	VIA8 Gigabit Ethernet Switch, 8 Port, eDIN (supports PoE)	1	Switch
6824	Pathport 4-Port Gateway, eDIN (8”)	2	Gateways

Note: All needed accessories are included. Some fixtures are provided with accessories in the part number and some are not.

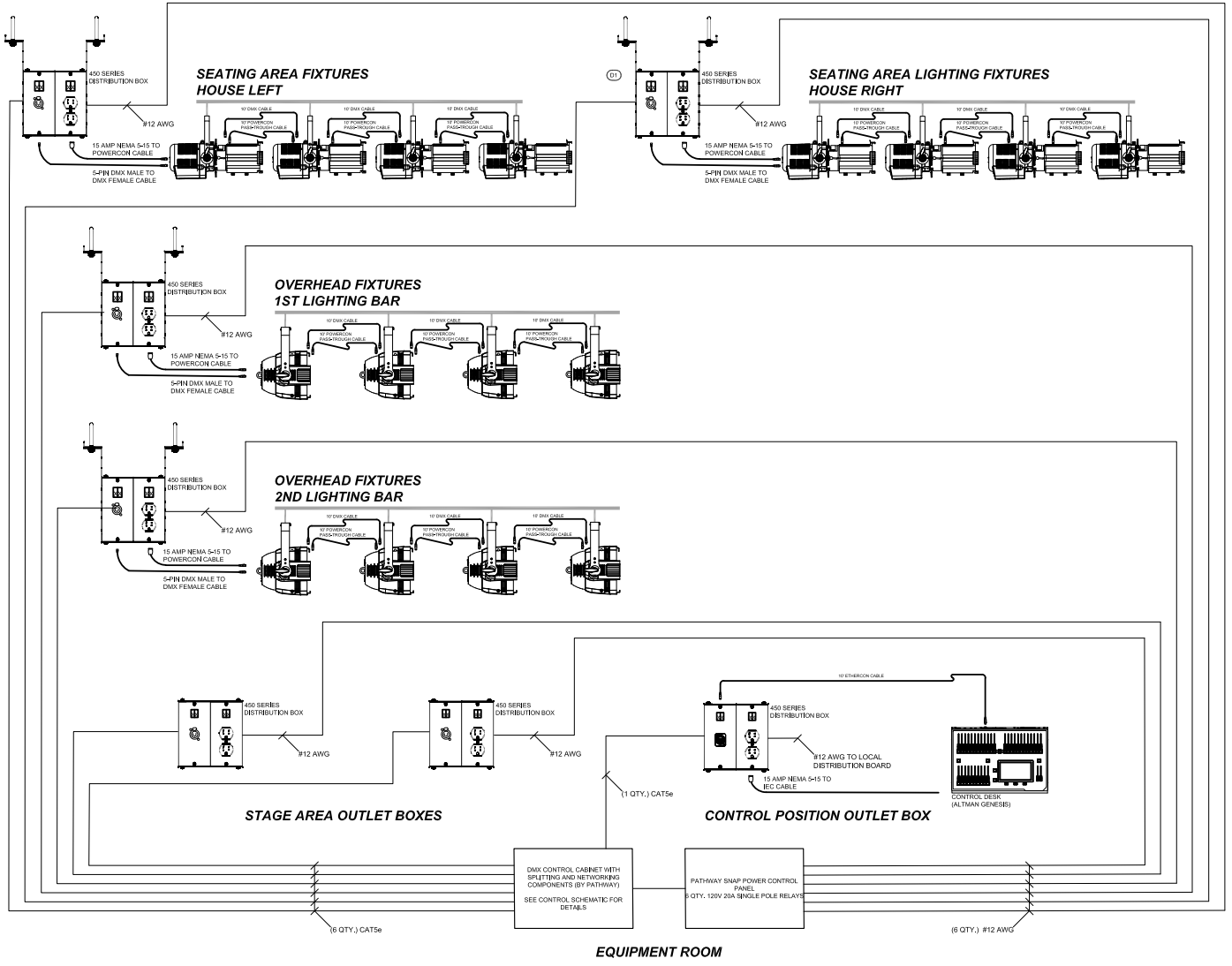


CONNECTION DETAIL - STAGE LIGHTING

1. PIPE MOUNTED PLUG-BOX. ALTMAN 450 SERIES. BLACK POWDER COAT FINISH. 2 QTY. NEMA 5-15 EDISON CONNECTORS AND 2 QTY. DMX OUTPUTS. OUTPUTS SHALL BE 5PIN DMX XLR CONNECTOR
2. ZOOM LENS LED PROFILE WITH MALLEABLE IRON PIPE CLAMP, COLOR FRAME, RIGID STEEL YOKE, SAFETY CABLE, DUAL LOCAKING TILT HANDLES, & 3' 120VAC POWER CABLE

GENERAL NOTES

1. OVERHEAD PIPE, RIGGING AND MECHANICAL CONNECTIONS ARE NOT PART OF THIS PACKAGE.
2. ALL PRODUCTION LIGHTING POWER SHALL BE SWITCHED VIA REMOTE RELAY PANEL.
3. PORTABLE CABLE IS INCLUDED IN THIS PACKAGE. PERMANENTLY INSTALLED CABLING IS NOT PART OF THIS PACKAGE.
4. INSTALLED DMX CABLE CAN BE BELDEN 9729 OR CAT5E. ALL PORTABLE DMX CABLE SHOULD BE DUAL TWISTED PAIR & SHIELD, 22 AWG BLACK POLYURETHANE JACKET.
5. POWERCON CONNECTIONS ARE STANDARD POWERCON, NOT NEUTRIK TRUE 1.
6. ALL DMX CONNECTORS SHOULD BE 5-PIN XLR STYLE.
7. ALL FIXTURES OVER STAGE TO BE MOUNTED 15 FEET ABOVE FINISHED FLOOR LEVEL AT A MINIMUM.
8. ALL FIXTURES TO BE HUNG ON PIPE DRIFTED NO FURTHER THAN 2' FROM FINISHED CEILING HEIGHT.
9. LABELING AND NUMBERING SCHEME TO BE AGREED PER PROJECT.



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ORDER No:	
DRAWN BY:	J Osterman
DATE:	8/26/2020
SCALE: NTS	DWG#
JOB:	School - Large
LOCATION:	
CUSTOMER:	
PROJECT MANAGER:	
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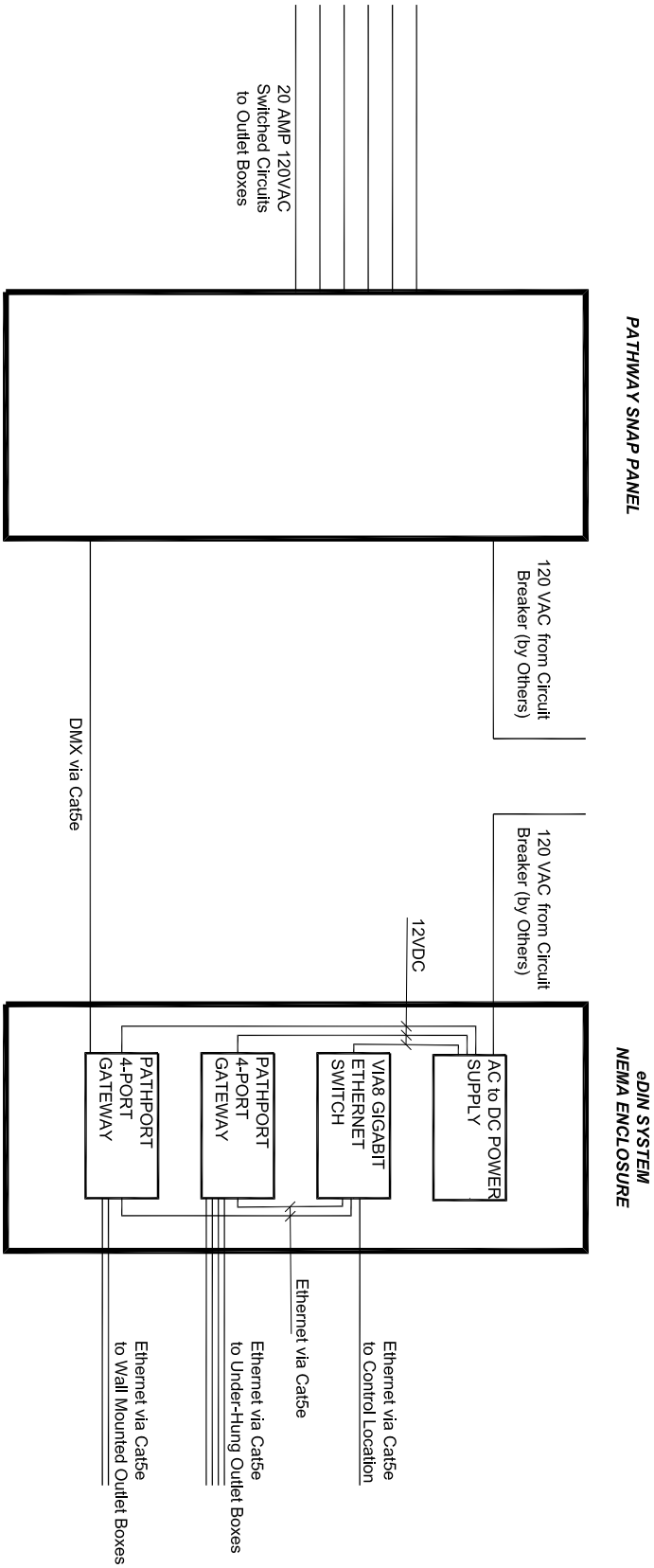
DATE:	
NOTE:	



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			CUSTOMER:	DATE: 8/26/2020	
FILE NAME: layout and schematic.dwg		8/26/2020 3:07:06 PM	PROJECT MANAGER:	SCALE: NTS	DWG#
			TITLE: Control Schematic		

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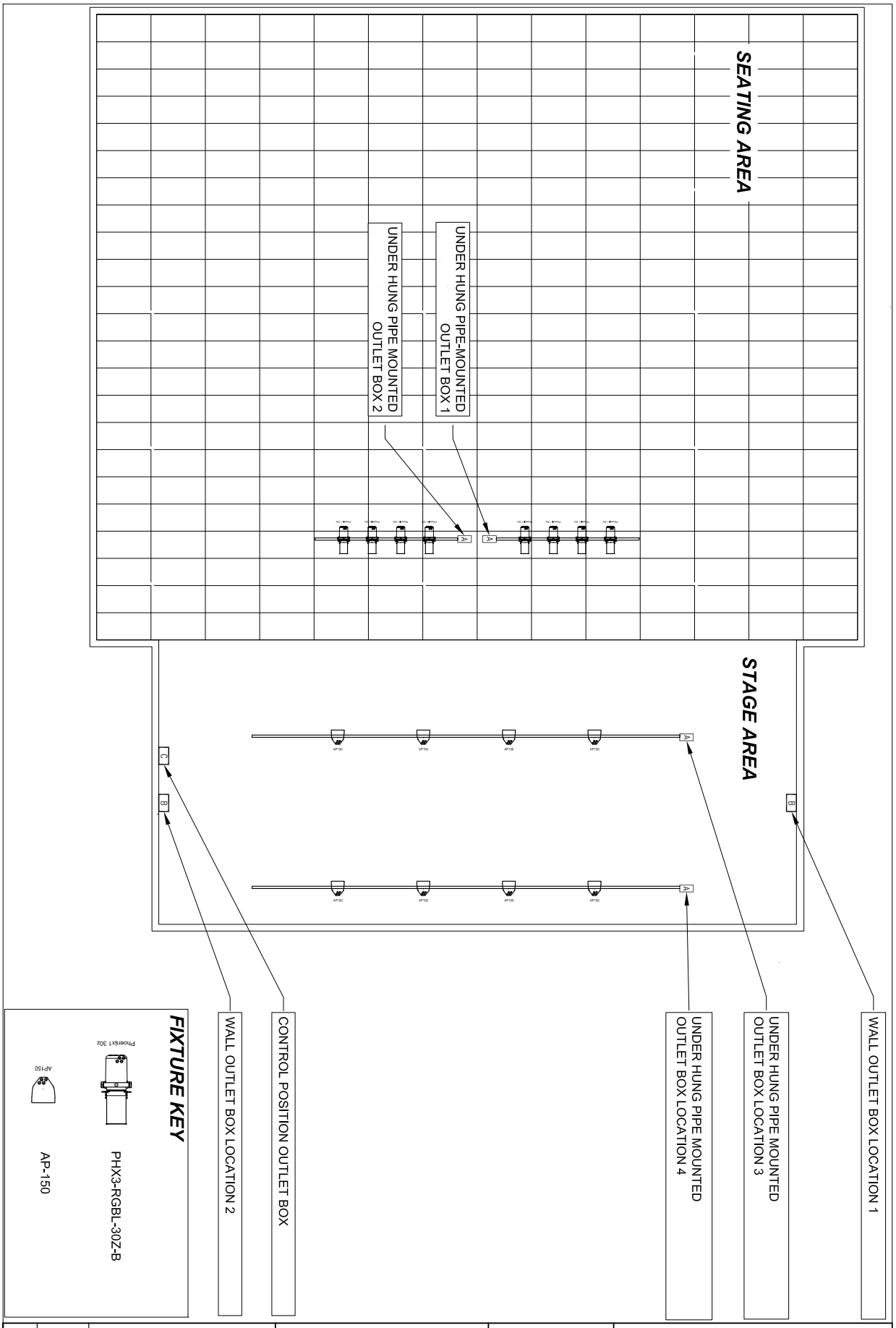

REV:	DATE:	NOTE:	JOB: School - Large	ORDER No:	ALTMAN LIGHTING 1400 East 66th Avenue. Denver, CO 80229 www.altmanlighting.com +1-303-500-7072
			LOCATION:	DRAWN BY: J Osterman	
			CUSTOMER:	DATE: 8/26/2020	
			PROJECT MANAGER:	SCALE: NTS DWG#	
FILE NAME: layout and schematic.dwg		8/26/2020 3:07:06 PM	TITLE: Sample Light Plot		

SPECIFICATION

PART 1. GENERAL CONDITIONS

1.01 SUMMARY

A. The purpose of this document is to describe the performance criteria of the lighting systems in the Altman Large School Solutions Package to provide a preliminary specification for performance lighting. The lighting equipment will be required to provide flexibility and efficiency while providing powerful tools for lighting in effective and engaging ways. It must include infrastructure with power and data tie lines within the space to provide a complete working system.

B. The lighting systems are based on the Altman Lighting line of products. All equipment shall be of high quality. The lighting systems will be designed to be efficient and configurable.

C. This document is preliminary. The latest set of architectural and HVAC arrangement drawings should be cross referenced to ensure a coordinated functioning system.

D. This document is a performance specification indicating design intent only. The integrator or specialist contractor which is contracted to install and commission the specified equipment shall accept full responsibility for supplying a complete, fit for purpose system which complies with the design intent and performance criteria specified herein.

E. If the integrator / specialist contractor believes any aspect of this performance specification is erroneous, impractical, incomplete or unachievable, this should be explained in writing before the contract is agreed. A detailed list of alternatives and additions shall be produced for the consideration of the design team.

F. This package does not include installation materials such as fasteners, hanging pipes, infrastructure, cabling, and termination equipment. All integration materials shall be furnished by others. Refer to Bill of Materials for details of included materials.

1.02 SCOPE

A. Scope of work in this package includes:

1. Power Control / Relays
2. Electronics Enclosures
3. Control Consoles and Accessories
4. Data Communications Devices and Network
5. Distribution Box facility panels
6. Production Lighting Luminaires and Accessories
7. Cables
8. Accessories

1.03 REFERENCES

A. Technical Reference Standards:

1. ANSI Standards
    a. ANSI E1.11 - 2008 (R2013) Entertainment Technology - USITT DMX512-A, Asynchronous Serial Digital Data Transmission Standard for Controlling Lighting Equipment and Accessories
    b. ANSI E1.17-2010 Entertainment Technology - Architecture for Control Networks

c. E1.20-2006 Entertainment technology – Remote Device Management

d. E1.20-2-2009 Entertainment Technology – Recommended Practice for Installing Control Cables

e. E1.30-7-2009, EP129 - Allocation of Internet Protocol Version 4 Addresses to ACN Hosts

f. E1.31-2009 Entertainment Technology - Lightweight streaming protocol for transport of DMX512 using ACN

2. Institute of Electrical and Electronics Engineers, Inc.:

a. 802.3 Gigabit Ethernet

b. 802.11 b-g-n Specifications for implementation of Wireless Local Area Networks

1.04 CODE REQUIREMENTS

A. Any specialist contractor shall be required to comply with all current statutory requirements, local and national regulations. These shall include but not be limited to:

1. National Fire Protection Association – National Electrical Code 2017
2. Local Authority and National Building Regulations
3. Local Authority and National Licensing Regulations

1.05 LIGHTING SYSTEMS SUMMARY

A. The Worship lighting system describes all lighting used to illuminate people or scenic elements during a service, for the purpose of enhancing their presentation.

1. Lighting - describes all functional luminaires used to illuminate the performers or scenic elements during a performance, for the purpose of enhancing their presentation.
2. Distribution – describes the power and data cabling, and infrastructure needed for the lighting.
3. Control – describes networked control equipment.

1.06 RELIABILITY

A. Equipment shall have a minimum expected useful operating life of 10 years, unless otherwise stated. LEDs shall be rated for a minimum of 50,000 hours to L70. Equipment shall be designed to require only minimal scheduled maintenance. In addition to requirements described elsewhere, the installing contractor shall provide a preventative maintenance and support program.

B. All major line item offered equipment must have a proven track record of reliable operation in a production environment.

C. High quality components and materials with known and predictable performance shall be used throughout. Care shall be taken in the selection of items known to be a frequent cause of reliability problems. Manufacturing, assembly and installation shall take place in a quality-controlled environment with comprehensive records kept of inspection and testing procedures.

D. Systems shall be tolerant of brief fluctuations to power supply and shall shut down in a controlled manner in case of power failure.

E. It is desirable for the system to have fault tolerant features wherever practical.

PART 2. INSTALLED AND PORTABLE EQUIPMENT

2.01 LIGHTING CONSOLE

A. General

1. The lighting control console shall be a microprocessor-based control surface that is purpose-made for controlling entertainment industry type intelligent luminaires. The console shall be the *Altman Genesis as manufactured by Altman Lighting Inc.*
2. The console and shall be based on industry standard protocols, namely DMX-512A, Art-Net, and sACN.
3. Maximum number of intelligent fixtures shall be 24 qty. It shall be possible to increase this qty. with the use if expansion wings.
4. No less than 1,000 cues/animations shall be available across 100 cuelists/chases. Addition of an expansion wing shall increase cuelist/chases by 100.
5. A 7" capacitive "multi-touch" touchscreen shall provide programming and configuration using an app-based structure.
6. Tips and onboard help shall be integrated into the software and guide the user through various operations.
7. An "Undo" history shall be recorded until the show save, a new show is started, an existing show is loaded or power is switched off.
8. Shows shall be able to be recorded internally or via USB drive.

B. Physical

1. Console shall measure no larger than 19.3 W x 13 D x 3.2 H inches and weigh no more than 14 lbs.
2. Console shall be equipped with 24 qty. fixture faders with direct select / bump buttons as well as 12 qty. memory faders with execute buttons.

C. Control

1. Each memory fader shall hold at least 250 cues, with a maximum of 1000 recorded cues possible.
2. Cue shall be able to be adjusted for:
    a. Fade In/Out
    b. Speed
    c. Cross fade time
    d. Tap-To-Beat
3. It shall be possible to page each row of memories. A minimum of 10 pages shall be possible.
4. Operation concept shall be based on Latest Takes Precedence (LTP).
5. The 7" touchscreen shall facilitate all necessary commands and programming features. No external screen or interface shall be necessary.
6. Programming of intelligent fixtures shall be via a combination of fader control for intensity and touchscreen for all other attributes.
7. Touchscreen shall offer "App" based control of fixture attributes for easy end user learning.
8. Touchscreen shall be able to show a "rig plan" based on icons representing individual fixtures. All icons shall be able to be re-arranged to represent physical locations of individual fixtures.
9. It shall be possible to view both cue stacks and rig plans on the same screen at once.
10. Position attributes shall be controlled in the following ways
    a. Dragging a finger on the position pad in the following modes:
        1) Fine
        2) Flip Pan / Flip Tilt

3) Orthogonal

4) Fan

b. The “Shapes” app

c. The “Pan/Tilt” app

11. Color attributes shall be able to be chosen in the following ways:

a. Via a color rainbow screen

b. Preset gel colors

c. Hexadecimal value

d. Via intelligent features such as fanning and fine + course adjustment.

12. Beam attributes shall be able to be chosen in the following ways:

a. Sliders for individual attributes, toggled between fade or snap

b. The “Animate” app

13. An effects engine shall be provided via “Animate” and “Shape” Apps. This shall offer adjustable, dynamic features for intensity, color, and beam for each fixture.

14. Any memory playback shall be able to be:

a. A preset

b. A cue stack

c. A chase

15. Any memory buttons shall be able to be:

a. Go

b. Bump

16. A minimum of 5500 fixture profiles shall come preloaded. It shall be possible to create a new fixture profile using just the console and no external accessories.

D. Electrical and Interfaces

1. The console shall be equipped with 100V to 265V 50/60 Hz AC/DC external power supply.

2. Console shall have an internal UPS providing 5 seconds of power for Auto show save.

3. I/O:

a. Console

1) External power supply input

2) 2 qty. USB connectors

3) 1 qty. Ethernet (RJ45)

4) 1 qty. DMX-512 (5 pin XLR)

5) Kensington lock

b. Wings

1) 1 qty. USB-B

2) 1 qty. DMX-512 (5 pin XLR)

3) Kensington lock

2.02 COLOR MIXING LED ZOOM SPOTLIGHT

A. General

1. The fixture shall be an Altman Phoenix 3 LED Zoom Profile as manufactured by Altman Stage Lighting., or approved equal. Fixtures that do not meet the following performance criteria in this specification will not be acceptable.
2. The fixture shall be an LED based focusable, zoom luminaire with a range of beam angles provided via 2 adjustable lens tubes with differing zoom ranges.
3. The fixture shall utilize a 340-watt maximum multi-LED array for light generation.
4. Unit shall be IP20 rated for indoor use.
5. A push button control interface shall be located on the rear of the fixture for ease of control.
6. The fixture shall be ETL, cETL and CE LISTED, and shall be so labeled when delivered to site. The fixture shall be ETL LISTED under Portable Luminaires (UL Standard 1573) and Surface Mount Luminaires (UL Standard 1598).
7. Ambient operating temperature shall be between -14°F to 104°F (-10°C to 40°C).
8. Power supply, cooling and electronics shall be included inside each unit.
9. Normal operation of optical and control functions of the fixture shall not require tools.

B. Physical

1. The fixture shall have a die cast aluminum housing and major components, free of defects such as burrs, pits and malformations.
2. Finish shall be Epoxy Sandtex black, electrostatic application. Custom colors based on the RAL color system shall be available.
3. Fixture shall not weigh more than 28.85 lbs. (12.81kgs.).
4. Fixture shall have double clutch positive locking yoke locks on both sides of the housing.
5. The unit shall have 4 qty. tool free, stainless steel shutters equipped with insulated handles. The fixture shall include a lever located on each side to facilitate locking the shutters into position.
6. Shutters to be made of high quality steel. Shutter warping and burnout in normal use shall be unacceptable.
7. The focus barrel portion of the body shall be able to rotate 360° without the use of tools.
8. Lens tubes shall incorporate a fully enclosed color filter and front accessory holder with locking accessory slot cover made from die cast aluminum.
9. Fixture shall feature a standard size accessory slot with a sliding cover to eliminate uncontrolled light spill. Accessory slot shall accept the following accessories:
    a. A and B size steel gobo pattern holders.
    b. A and B size glass gobo pattern holders.
    c. Iris.
    d. Rotating gobo holder.
10. Fixture shall be supplied with:
    a. Steel yoke constructed from rigid flat steel and with two mounting positions and indexed tilt angle markings.
    b. Cast iron C-clamp (Altman #510) suitable for use on up to 2” O.D. pipe. Clamp shall incorporate a 360-degree rotational “Safety Stud” with locking bolt.
    c. 18 inch safety cable.
    d. Color frame.
    e. Soft focus pattern holder.
    f. Lens tube and locking hardware.

g. 5 foot power cable with powerCON™ socket outlets and the following options for plug type:

1) Parallel Blade NEMA 5-15 “Edison” Male.

2) 2 pin + ground Stage Pin Male.

3) NEMA L5-20P Twist Lock Male.

4) Bare end cable.

C. Electrical

1. The fixture shall be equipped with 100V to 240V 50/60 Hz auto-ranging internal power supply.
2. Power input and through shall be via lockable and separately keyed powerCON™ type connections.
3. Power supply shall have power factor correction.
4. Power supply outputs shall have resetting current-limiting protection.
5. Maximum power consumption shall be no greater than 340 Watts.

D. Thermal

1. The fixture shall utilize near silent fan cooling and thermal management to maintain LED life to an average of 70% intensity after 50,000 hours of use.
2. There shall be 3 modes of operation for the fan cooling system:
   a. Low
   b. Automatic
   c. On
3. Thermal management shall include multiple temperature sensors within the housing to include:
   a. LED Temperature sensor.
   b. Power supply Temperature sensor.
   c. Display Board Temperature sensor.
   d. Heat Sink interface Temperature sensor.

E. Control

1. The unit shall be controlled using ANSI 1.11 USITT DMX512-A / ANSI E1.20 RDM (Remote Device Management). The DMX-512A device address for each fixture shall be user selectable.
2. Up to 16-bit virtual dimming control of the fixture shall provide full range (0-100%) dimming without exhibiting flicker or stepping. Dimming curves shall be optimized for smooth dimming at low intensities and over longer timed fades.
3. Control input and through function shall be via 5-pin XLR unified d-shell connections.
4. Console free playback options with Primary and Replica modes shall be programmed into the onboard memory on RGB A/W versions. Functions shall include adjustable color fades and strobes.
5. RDM parameters shall include all ESTA defined PIDS plus the following:
   a. Smoothing on / off (tungsten dimming behavior emulation)
   b. DMX loss behavior
   c. Fixture Personality
   d. Dimmer curve
      1) Linear
      2) Square

3) Logarithmic

e. Backlight Timing

f. Dim Mode (PWM Rate)

1) Fast

2) Video

3) Normal

g. Fan Speed Mode

F. Optical

1. LED arrays shall include, Red, Green, Blue, & Lime emitters. (RGBL)
2. LED emitters should be rated for nominal 50,000 hour LED life to L70.
3. Photometric performance of greater than 10,000 lumens shall be possible.
4. Fixtures shall be calibrated at factory to achieve consistent color and intensity output between fixtures built at different times and/or from different LED lots or bins.
5. Fixture shall operate at all times above 19Khz and avoid flicker, flutter, and framing on camera.
6. Color mixing fixtures shall be optimized for low saturate colors (pastels) as well as high saturate colors used in theatrical applications. Fixtures utilizing 3-color (Red, Green, and Blue) mixing systems cannot produce sufficient skin tones or saturate ambers, lavenders, or oranges and shall not be accepted.
7. Manufacturer of LED systems shall utilize an advanced production LED binning process to maintain color consistency.
8. Lenses
   a. Lens tubes shall be available in two sizes:
      1) 15-30 degree field angle (total instrument length without yoke no more than 30” (762mm).
      2) 30-50 degree field angle (total instrument length without yoke no more than 25” (635mm).
   b. Lens tube assemblies shall contain two adjustable and locking heat resistant lenses with anti-reflective coatings.
   c. The 15º - 30º Zoom shall have two bi-convex aspheric lenses with an anti-reflective coating to increase lens transmission.
   d. The 30º - 50º Zoom shall have two plano-convex aspheric lenses with an anti-reflective coating.
   e. Fixture lens tube shall have scale markings on near to the adjustment knobs.
   f. Shutter assembly shall use 3 planes to ensure sharp focusing ability without halation.

2.03 COLOR MIXING LED WASH FIXTURE

A. General

1. The fixture shall be Red, Green, Blue, and White LED luminaire with motorized zoom and DMX control. The fixture shall be the *AP-150 RGBW by Altman Stage Lighting, Inc.* Fixtures that do not meet the following performance criteria in this specification will not be acceptable
2. The fixture shall incorporate a state of the art microprocessor-controlled solid state LED light engine, and on-board power supply.
3. The fixture shall utilize active cooling and feature advanced cooling mitigation and control from either the DMX controller or via an active cooling system on board settings.

4. The fixture shall utilize a high efficiency optics and zoom mechanism to achieve greater than 1,900 lumens of output with a 12°- 65° beam angle motorized zoom.
5. IES photometric files, at multiple beam angles shall be available upon request from the manufacturer to model light output using the industry standard design software.
6. The fixture shall comply with USITT DMX-512 A, ANSI E1.20-2006, and ANSI E1.37-2 (2015) Remote Device Management over USITT DMX 512A Standard (RDM) for DMX controlled models. Luminaires not utilizing E1.37.2 (2015) RDM standard shall not be acceptable.
7. The fixture shall be ETL Listed to UL1573, and UL8750 LED for stage and studio use as well as Portable Electric Luminaires (UL Standard 153) and CE marked.
8. Fixtures which do not comply with this specification shall not be accepted.

B. Physical

1. The fixture shall be constructed in majority of an aluminum die cast shell. Construction shall employ all corrosion-resistant materials and hardware and shall be free of pits and burrs.
2. Standard finish shall be epoxy black, electrostatic application. The fixture shall be available with a black color finish.
3. Power supply, cooling and electronics shall be integral to each unit.
4. Fixture dimensions shall be 10.2” (259mm) L x 13.62” (346mm) H x 9.06” 230m) diameter and weigh 11lbs (5.08 kg) without accessories.
5. The fixture shall include a blending optic to reduce the projection of multiple shadows from the different color sources in the fixture.
6. Fixture shall be equipped with a dual slot accessory holder with tool-free quick release accessory holder clips with self-locking accessory retaining latch.
7. An integrated rigid flat steel kick stand yoke with locking tilt handle shall be available for stand-alone floor and overhead pipe mounting.
    a. Pipe mounted fixtures shall be supplied as an additional accessory, a cast iron C-clamp Altman #510 suitable for use on up to 2” nominal (50.8 mm) outside diameter pipe. Clamp must incorporate a 360-degree rotational “safety stud” with locking bolt. Any clamp not offering this safety feature will not be acceptable.
    b. Fixtures shall be supplied, as an additional accessory, with safety cable for use when securing the fixture to a pipe.

C. Thermal

1. The fixture shall be cooled via an active cooling system and shall be capable of Progressive Output Management (POM): where the fixtures’ logic follows a set of rules based upon the operators operational preferences. This logics shall include:
    a. Direct DMX control: the fixture’s DMX channel will control the fan’s output, in conjunction with the Progressive Output Management when the luminaire is on. This control will enable the end user to silence the fan when low intensity is required.
    b. Static (fixed) fan settings: When the unit is set to a defined “fixed” fan speed - if the LED reaches a maximum threshold temperature, the output of the luminaire will be reduced until thermal equilibrium is reached.
    c. Automatic fan settings: when the unit is set to automatic fan control, fan cooling will slowly increase and decrease based upon the operating temperature.
2. Under normal operating conditions, the LED engine shall be capable of 50,000 hours rated lifespan to LM-70 / 70% maximum calibrated intensity with Progressive Output Management cooling, units not utilizing this style of cooling management shall not be accepted.

3. Ambient operating temperature shall be 32°F to 104°F (0 – 40 °C) non-condensing and IP-20 rated for indoor dry location use.

D. Electrical

1. The fixture shall be equipped with 100V to 240V 50/60 Hz auto-ranging internal power supply and requires power from a constant “non-dim” power source for.
2. The fixture shall receive power via a PowerCon™ blue power inlet and thru power via a PowerCon™ grey power outlet.

E. Control and User Interface

1. A local control keypad with a graphical user LCD display shall be provided for configuration, control, and review of:
    a. DMX-512A Device Address
    b. Status
    c. Manual settings
    d. Zoom Control
    e. Fan Control
    f. General Settings
2. It shall be possible to lock out the control keypad at the fixture to prevent accidental change in fixture configuration during operation. Locking and unlocking the control keypad shall be via predefined keypad lock.
3. Each fixture shall be compatible with the USITT DMX512-A control protocol, ANSI E1.20-2006 and ANSI E1.37-2 (2015) Remote Device Management over DMX512-A (RDM) standards.
4. The DMX-512A device address for each fixture shall be user selectable.
5. It shall be possible to set the DMX-512A device address for the fixture both locally and while the fixture is installed and connected to the system via the RDM (ANSI E1.20-2006 protocol) and an appropriate device such as a PC, lighting console, or a handheld programmer.
6. Fixtures which do not allow for setting of the DMX address via both local controls at the fixture and remotely while installed via RDM shall not be accepted.
7. The fixture shall have an available “Master Channel” function to provide control of intensity without changing the color of the output of the fixture. The master shall operate in either 8-bit or 16-bit resolution as defined by the configuration of the fixture.
8. The fixture shall have user selected personalities to correctly match response to the application and control system utilized. Personalities shall provide the following options which may be combined as desired:
    a. RGB, HSIC, 8 or 16 Bit DMX operation
    b. On board preset color operation
    c. Strobe (up to 30 hz)
    d. Stand-alone effects
    e. Stand-alone fixed output
9. The fixture shall be capable of standalone operation, activated and configured at the control keypad. Standalone modes shall include the following:
10. Fixed color temperature defined with local control presets or DMX control.
11. Strobe with user selectable color and speed – up to 30 HZ.

F. Optical

1. A 4:1 matrix of LEDs shall provide color or tunable white light or fixed white light, via an RGBW emitter. Fixtures not utilizing built in white points or color presets shall not be accepted.
2. All lenses to feature cosine beam and field distribution and feature a 4:1 beam to field distribution ratio.
3. The fixture shall feature a motorized zoom from spot (12°) to flood (65°) via DMX or manual settings with five (5) different nominal bean angle stop points of:
    a. VNSP (Very Narrow Spot)
    b. NSP (Narrow Spot)
    c. MFL (Medium Flood)
    d. WFL (Wide Flood)
    e. XWFL (Extra Wide Flood)
4. Fixtures not utilizing a motorized zoom with both manual and Dmx control shall not be accepted.
5. The fixture's optics shall be designed so as not to produce color shadows when used with beam shaping accessories such as barn doors or top-hats.
6. The fixture shall have an available dimming curve settings mode which makes PWM control of LED levels imperceptible to video cameras and related broadcast equipment.
7. A custom color control algorithm shall control the calibration of the colors from luminaire to luminaire. Color calibration shall be able to be turned on or off via the menu system or RDM. Fixtures not employing advanced color control calibration shall not be accepted.

G. Light Emitting Diodes

1. The fixture shall use a specific 4:1 LEDs for a wide range of color mixing or tuning for color models the standard configuration shall be Red, Green, Blue, and White LEDs with a white point of 6,500° Kelvin.
2. The fixtures led's shall be discretely binned in concert with the color calibration system to ensure color consistency from fixture to fixture.

H. Dimming Engine

1. The fixture shall provide full range dimming performance based upon its DMX input control signal and configuration and shall be equipped with an LED system compatible with standard 8-bit and 16-bit input, with high resolution dimming.
2. Dimming curves shall be optimized for smooth dimming at low intensities and over longer timed fades. Dimming curve settings to include:
    a. Standard
    b. Incandescent
    c. Linear
3. LEDs shall be driven by Pulse Width Modulation. (PWM)
4. Additional smoothing algorithms shall be available to augment the high resolution dimming engine.

2.04 LED FOLLOW SPOT

A. General - Luminaire

1. The luminaire shall be a 11000K fixed white LED - 490 watt Followspot luminaire capable of producing over 10,000 lumens. The luminaire shall be *the AFS-500 LED Follow Spot from Altman Lighting* Inc. or approved equal.

2. The luminaire shall incorporate a microprocessor-controlled solid-state LED light engine, and on-board power supply.
3. The luminaire shall incorporate quiet active cooling no greater than 34 dBA at .5m to maintain luminous intensity.
4. The luminaire shall utilize high efficiency and patented optics to render a homogenized shade of white at the focal plane.
5. Photometric files shall be available upon request from the manufacturer.
6. The luminaire shall comply with USITT DMX-512 A.
7. Luminaire shall be rated ETL or equally accredited 3rd party compliance certification and be CE listed.
8. The luminaire shall be UL1573 and UL8750 LED listed for stage and studio use.
9. The luminaire shall ship with:
    a. AFS-500 Control Module - Integrated
    b. Adjustable and collapsible black Tripod
    c. 5' Neutrik PowerCon™ to Edison power cable as standard.
    d. AFS-500 Manual
    e. AFS-500 LED Follow spot containing:
        1) Internal Five (5) facet automated Dichroic color wheel
        2) Internal three (3) facet automated Dichroic CTO Wheel
        3) Internal eighteen (18) Leaf automated iris
        4) Internal 7°-13° Manual Zoom Lens
        5) Internal Manual Focus Lens
10. Available connector options shall include but not be limited to:
    a. Raw cable-end
    b. 20A Stage-Pin
    c. 20A Twist-lock
    d. 16A CEE type equipped power leads.
11. Luminaire shall be rated IP20
12. Warranty to include a minimum of 3 years on all components of the luminaire.

B. General – Control Panel

1. The luminaire control panel shall be located on the rear housing of the luminaire. The control panel will be rendered inactive when under DMX control. Luminaires not employing local and DMX control shall not be accepted. Each luminaire control panel shall have the ability to control one or more AFS700 follow spots thought a DMX daisy chain between luminaires.
2. The control panel will employ back lit indicator lights for each color and led on/off status.
3. The controller shall have control of:
    1) LED on/off
    2) Dimmer – Slider for controlling output intensity
    3) Strobe – Slider for controlling strobe rate.
    4) CTO - Slider for controlling Color Temperature.

5) Iris – Slider for opening and closing luminaires iris.

6) Color (8) Eight Back lit buttons

C. Physical

1. The luminaire shall be constructed of extruded aluminum, refined and without burrs, pits, or rough edges. Plastic and steel components shall be used within the luminaire.
2. Luminaire shall weigh no more than 25.5 pounds (11.5kg).
3. Luminaire shall feature an integrated rear handle.
4. The luminaire shall contain a specialized LED array light engine, optimized specifically for this luminaire's optical system.
5. Overall dimensions of the luminaire shall not be larger than the following dimensions:
   a. 11.75" (298.5mm) tall (inc. yoke)
   b. 10.38" (263.7 mm) wide
   c. 30.5" (774.7 mm) long
6. All major parts and components shall be black. Luminaire body shall be anodized, not painted.
7. An additional accessory holder for standard 7.5" x 7.5" shall be completely boxed in on three (3) sides, guarding filter frames from damage. Filter frame shall be capable of supporting industry standard 7.5" x 7.5" accessories.
8. All system components (including electronics, power supply, and cooling shall be integral to each unit. Units utilizing external power supplies, ballasts, or transformers shall not be accepted.

D. Electrical

1. The luminaire shall be equipped with 100V to 240V 50/60 Hz universal power supply.
2. Luminaire shall feature up to a 490 watt long-life LED emitter matrix. Luminaire shall not consume more than 500W in normal operation.
3. Power input shall be via Neutrik Powercon.
4. Automatic power correction power supply shall be standard.
5. Quiescent power load shall be no more than 47 watts.
6. PWM frequency shall be variable, based upon dimming timing - with an upper limit of 15 kHz.

E. Thermal

1. Under normal operating conditions, the LED engine shall be capable of 50,000 hours rated lifespan to LM-70 / 70% maximum calibrated intensity with active cooling.
2. Ambient operating temperature 32°F to 104°F (0 – 40 °C).
3. Active cooler shall consist of a pulse width modulation-controlled fan.
4. Fan shall automatically adjust for lowest possible noise output for a given luminance output.
5. Luminaire shall employ temperature sensors on all temperature sensitive equipment to ensure to ensure stated LM rating.

F. Control and User Interface

1. The luminaire shall provide full range (0-100%) dimming without exhibiting flicker or stepping to both the eye and HD camera. Dimming curves shall be optimized for smooth dimming at low intensities and over longer timed fades.
2. A local control keypad with LCD display shall be provided for configuration and control of:
   a. DMX-512A Device Address

b. Luminaire Personality

c. Stand Alone Operation

3. Each luminaire shall be compatible with the USITT DMX512-A control protocols.

4. DMX or Local Control shall be connected via integral flush mount 5-Pin XLR input and output connectors.

5. Luminaire shall include integral flush mount 5-pin XLR output connector for DMX pass through or “Daisy Chain”. Luminaires not including an output receptacle for DMX pass through shall not be acceptable.

6. The DMX-512A device address for each luminaire shall be user selectable.

7. The luminaire shall be capable of standalone operation, activated and configured at the control keypad. Standalone functions shall include the following:

   a. Fixed Color defined with local controls

   b. Strobe

   c. CTO

   d. Iris

   e. Dimmer

   f. Led on/off

   g. Primary and Replica

G. Optical

1. Luminaire shall feature a custom matrix of LEDs to provide fixed color temperature white light. Variations of LED matrices to produce a 11000K native white beam with color and CCT variations via integrated color and CTO wheels.

2. Luminaire shall feature a fully homogenized output at the focal plane to enable color temperature changes without visible colors at the lens.

3. Lenses to feature cosine beam and field distribution and feature a 2:1 beam to field distribution ratio.

4. Zoom range shall be manually controlled and shall provide a range no less than 7 – 13 degrees in beam angle.

5. Focus Lens system shall be automated and controlled from either DMX or via the onboard AFS-700 controller and shall provide a crisp concise beam with a sharp edge and allow for a soft edged beam with out affecting the previously set zoom.

6. An automated 18 facet iris shall be capable of shaping the beam edge to reduce the over all beam diameter allowing for a 2.5 degree beam when fully closed.

7. An automated CTO wheel capable of thee (3) different CTO settings shall be integral to the AFS-500 and shall be able to achieve 7400K, 6000K, and 4200K color temperatures. Luminaires with out CTO capability shall not be accepted.

8. A five (5) position color wheel capable of adding color to the beam in conjunction with the CTO wheel shall be capable of full or split colors.

9. A LED ON/OFF button (DMX Channel) shall allow for instant ON/OFF of the LED array following the luminaires initial calibration start up.

10. A variable strobe function up to 20hz (20 times a second) shall be available standard on the luminaire. Any luminaire not offering strobe functionality shall not be accepted.

11. A range of accessories shall be available from the manufacturer including but not limited to:

    a. Cylindrical hood (top hat)

b. Front accessory holder 7.5” x 7.5”

c. Color frame

d. Accessory color boomerang (6 Color)

e. Extended Zoom / Focus Handles

H. Light Emitting Diodes

1. The luminaire shall utilize a proprietary mix of white LEDs to produce the output as specified.
2. LEDs shall be from reputable manufacturers with a proven track record for quality.
3. All LEDs shall be subject to rigorous single binning and mixing procedures.
4. LEDs shall be calibrated to an absolute nm wavelength CIE1931 X & Y coordinates.
5. Burn-in procedure to be no less than 8 hours.

I. Dimming Engine

1. LEDs shall be driven by Pulse Width Modulation. (PWM)
2. PWM rates shall be variable and above 9800hz, ensuring no camera phasing, image flip or roll.
3. Dimming curves shall be smooth with no perceptible steps over long fades. Follow spots utilizing flag or chop mechanical dimmers shall not be accepted.
4. Luminous Output: Shall meet or exceed 10,000 lumens output at narrow beam and produce no less than 95fc (1025 LUX) at 100’-0” (30.48M)

2.05 NETWORK EQUIPMENT

A. Equipment Enclosure

1. Enclosure shall be the *Pathway 1107 eDIN system enclosure*.
2. Enclosure shall be an ETL-Listed NEMA1 Enclosure for eDIN modules with a power supply.
3. Dimensions
   a. 10” x 23” x 4.5”

B. Power Supply

1. Power supply shall be the *Pathway 1001-100-48-DIN 100 Watt, 48VDC Power Supply, DIN-Mountable*
2. Power supply shall be a permanent install applications product for NEMA1 enclosures.

C. DIN Mount Ethernet Switch

1. Switch shall be the *Pathway 6708 VIA8 Gigabit Ethernet Switch, 8 Port, eDIN*
2. Switch shall be a Gigabit Ethernet switch with eight copper ports and two gigabit mini-GBIC ports for SFP/SFP+ modules.
3. Switch shall be designed to mount to 35mm DIN rail, and be engineered specifically for sACN data distribution.

D. Ethernet to DMX Gateway / Node

1. Gateway shall be the *6824 Pathport 4-Port Gateway, eDIN (8”)*
2. Gateway shall be a DIN mounted compact gateway for encoding, routing and decoding DMX512 data over a standard Ethernet network.
3. The gateway shall support ANSI E1.20 Remote Device Management (RDM) discovery and configuration data transport.

2.06 POWER CONTROL

A. Relay Panel

1. Relay panel shall be the *Pathway 4850-8 Snap Relay Lighting Control Panel*
2. Relay panel shall provide control of relay switching via ANSI E1.11 DMX512-A
3. A minimum of eight (8) qty. 20A @ 120VAC relays shall be provided.
4. Dimensions
    a. 12.0”W x 18.0”H x 6.0”D (305mm x 460mm x 150mm)
    b. 27.0 lbs (12.25 kg)

2.07 POWER AND DATA DISTRIBUTION BOXES

A. General

1. Materials shall be
    a. 18-gauge mild steel backbox and faceplates
    b. Steel and black oxide fasteners
2. Knock outs on each side of the back box for permanent installation.
3. All mounting hardware included with pipe-mount devices
4. Flush mounted receptacles wired directly
5. 1-inch die-cut white numbering standard
6. PBU and PBO provided with U-bolt clamps, pipe clamp is optional
7. Baked epoxy sandtex, electrostatic application finish

B. Type A

1. 450-PBU-4-520R-HW-1-XLR5F-SDR – Altman 450 Series underhung distribution box.

C. Type B

1. 450-PBS-4-520R-HW-1-XLR5F-SDR – Altman 450 Series surface mount wall distribution box

D. Type C

1. 450-PBS-4-520R-HW-1-XLR5M-SDR – Altman 450 Series surface mount control position distribution box.

END