

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Videndum Production Solutions, Inc.
Petitioner,

v.

Rotolight Limited,
Patent Owner.

Case: To Be Assigned
U.S. Patent No. 10,197,258

**DECLARATION OF WOODY SMITH
IN SUPPORT OF VIDENDUM PRODUCTION
SOLUTIONS, INC.'S PETITION
FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 10,197,258**

I, Woody Smith, declare:

I. INTRODUCTION

1. I have been retained by Videndum Production Solutions, Inc. (“Videndum”) to offer technical analysis and opinions relating to U.S. Patent No. 10,197,258 (the “’258 Patent”) (Ex. 1001) and certain prior art references relating to its subject matter.

2. As far as I am aware, I have no financial interest in the Petitioner, Patent Owner, the ’258 Patent, or in the outcome of this proceeding. I am being compensated for my work as an expert on an hourly basis at my standard consulting rate. My compensation is not dependent on the outcome of these proceedings or the content of my opinions.

3. I have been informed that the ’258 Patent was challenged by Arnold & Richter Cine Technik GmbH & Co. Betriebs KG (“ARRI”) in 2021-2022. I have reviewed the declarations submitted by Michael Wood in which he opined that the claims of the ’258 Patent are invalid based on the Showline Manual, Pohlert, Choong, and Reinoso. I agree with Mr. Wood’s conclusions regarding whether these claims are anticipated and/or obvious.

4. I present this Declaration in order to present my opinions on ’258 Patent and its relation to the prior art.

II. BACKGROUND AND QUALIFICATIONS

5. After receiving my B.S. in Electrical Engineering in 1975, I became involved in the lighting industry starting with regional (Texas) touring sound and lighting support. PAR cans with gels were commonplace at the time. Automated entertainment lighting was just beginning to impact touring but showed how much more was possible. That led me to design and develop a small, DMX controlled color mixing RGB light fixture. High End Systems, then the largest manufacturer of automated entertainment lighting at the time, must have like it and hired me as Director of R&D and so began 30+ years working in the areas of lighting fixture design and development, LED lighting, controls, electronics and manufacture. My work has included the design and manufacture of automated entertainment lighting fixtures including: High End Systems Studio Color & Technobeam, Hubbell Lighting Entertainment Helix range of entertainment lighting, Affineon Lighting DL, PAL, IG, and other LED lighting fixtures featuring DMX controlled dimming and color mixing, Evolucia Lighting Street Lighting fixtures, and most recently VERTAAG Lighting automated lighting, digital controls, sensors and software for Controlled Environment Agriculture. In addition to the design and development of lighting fixtures I've also provided technical support for automated lighting world-wide for major entertainment events including Singapore National Day (Singapore), Vina del Mar (Chile),

China National Television, as well as numerous concert tours including Van Halen and Britney Spears. While at High End Systems I also assisted in the drafting of patent applications from the technical side and worked with High End's patent attorney. This included the drafting of the High End Systems patent on the Studio Color design where I am listed as the primary inventor.

6. I am familiar with the lighting control systems and controls described and claimed in the '258 Patent. I have been designing lighting fixtures which utilize AMX-192 and DMX-512 ever since the inception of these standards by USITT and ANSI. Starting with my first RGB lighting fixture design I have incorporated microprocessor control of lighting functions with AMX or DMX to control lighting fixture functionality. This includes controlling numerous aspects of the lighting fixtures function from dimming (electronic as well as mechanical), strobe, color selection, color mixing, pattern selection, beam shaping, pattern rotation, beam positioning and more. These functions are typically addressed and implemented through the use of microprocessors within the fixture which translate the digital data (DMX) into a value which is then compared against a predetermined function within the lighting fixture.

7. It is also commonplace that the lighting control device (lighting console) is outfitted with extensive micro processing power and memory. While many special functions can be imbedded within the fixture software a wide range

of effects are implemented by the control console including dimming, color changing, pattern changing, strobe, positioning, flicker effects, chase, ballyhoo, waves, etc. This is only limited by the lighting designer's creativity, knowledge and expertise.

8. My CV is attached to this Declaration as Appendix B.

III. INFORMATION CONSIDERED

9. In forming my opinions as expressed in this Declaration, I have reviewed the '258 Patent and its prosecution history, as well as the other materials referenced in Appendix A. I have also reviewed all of the Exhibits submitted with the Petition.

10. Counsel has informed me that I should consider these materials through the lens of one of ordinary skill in the art related to the '258 Patent at the time of the earliest purported priority date of the '258 Patent, which I understand to be April 8, 2016 (the "Priority Date"). I have done so during my review of these materials.

11. As noted above, I have reviewed the declarations submitted by Michael Wood in IPR2021-01497 and agree with the ultimate conclusion regarding anticipation and obviousness.

12. My analyses are based on my education and practical experience, as well as my inspection and study of relevant materials. In my analyses, I have

considered the materials identified in this Declaration and those listed in Appendix A. I may rely on these materials, additional materials, and this Declaration as a whole in order to respond to arguments raised by the Patent Owner. I may also consider other documents and information in further analyses, including materials that may not yet have been provided to me.

13. My review and assessment of the materials provided in this proceeding are ongoing, and I will continue to consider new materials as they are provided to me. I reserve the right to review, supplement, and amend my analyses to address any new information obtained in the course of this proceeding, on my continuing review of the materials already provided, or based on any new positions taken by Patent Owner.

IV. BACKGROUND OF THE '258 PATENT

14. Independent Claim 1 recites a “lighting system” that includes a “lighting device” (*e.g.*, a light) and a “controller” integrated into a combined unit. Ex. 1001 at 11:59-12:12 (Claim 1). The “controller” is adapted to control the lighting device “to produce a user customisable cinematic lighting special effect selected from a range of different . . . effects.” *Id.* The controller includes a user “input interface” and an “effect simulator.” *Id.* The “input interface” enables “a user to select [an]. . . effect.” *Id.* The “effect simulator” then, according to the independent claims, “calculates” a “time varying lighting value,” based on at least

one “simulation parameter” (like brightness, color, speed, or frequency) depending on that effect, and outputs that value (or data) to the lighting device, “so as to simulate the selected user customisable cinematic lighting special effect.” *Id.*

15. This series of functions is “standard” operating means in most “intelligent” lighting fixtures. As detailed hereafter, it is standard for a lighting fixture to receive a command from an external (or internal) user interface device, such as a lighting controller, to modify a given parameter or operation of the lighting fixture. Change of color, movement of beam, rotation of effects, all are parameters of lighting fixtures which are controlled by the user. On receiving an input from said device the lighting fixture will compare the latest data set versus current data set and calculate any necessary actions to implement same. This could include a change of color by instructing a motor within the fixture to rotate the color wheel to a new location, dimming of the light by closing a shutter slowly, strobe effect by moving the shutter open to close quickly, etc. Strobe effects, for example, may be of variable speed depending upon the value received by the lighting fixture.

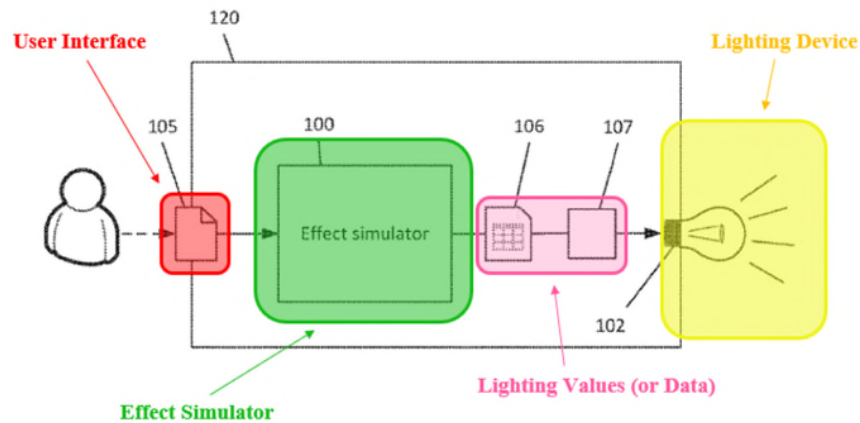


Figure 2

Id. at Fig. 2 (annotated).

16. Figure 2 above, describes how a user can make selections of desired lighting effects on the user interface 105. *Id.* at 6:4-11, 6:47-7:41. Depending on the desired effect wanted by the user, “simulation parameters,” such as “brightness,” “duration,” “colour,” and “frequency,” can be adjusted to customize the effect. *Id.* at 3:48-62, 6:47-7:16, 8:18-25, Fig. 6. These simulation parameters may be random or user-selected, and are used by the “effect simulator” to calculate the data 106, or “time varying lighting values,” that characterize the lighting effect and are used to produce it on the LEDs. *Id.* at 3:50-51, 7:29-46, 8:18-53. The “effect simulator” is described as the component of the controller that “creates data 106 characterising a lighting effect.” *Id.* at 7:51-52; *see also id.* at 5:54-58, 8:41-50. The data 106 is described as being “in the form of “brightness and/or color values that vary over time” (*e.g.*, the claimed “time

varying lighting values”) to produce the desired lighting effects. *Id.* at 8:41-50. Before this data is sent to the lighting device 102 it may be converted by a “converter,” which converts the data into a signal for the particular light elements being controlled. *Id.* at 8:41-53. The lighting device 102 then outputs light simulating the effect.

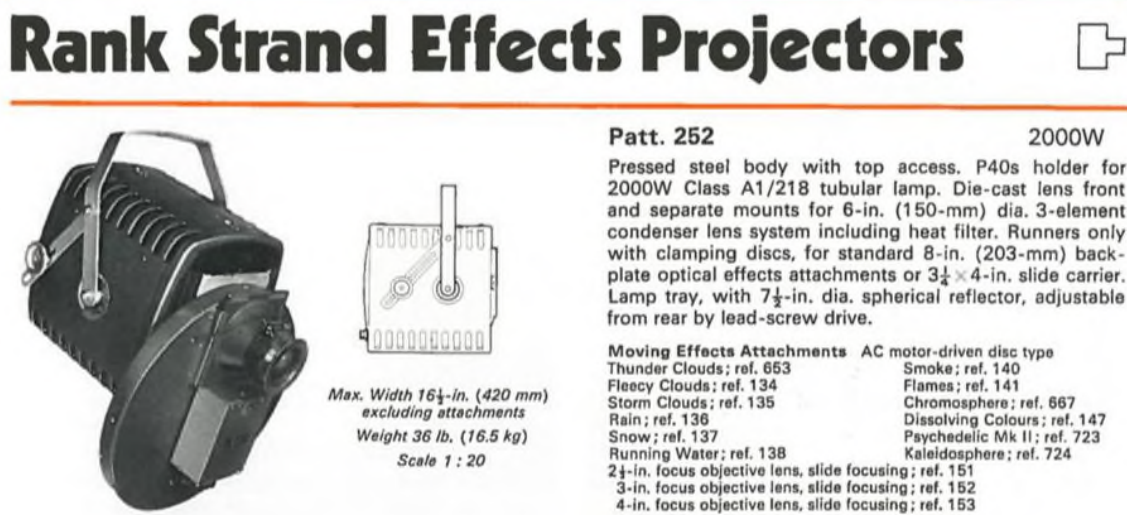
17. I understand the application that matured into the ’258 Patent was filed December 21, 2017, and issued on February 5, 2019. Ex. 1001 at Cover Page. The ’258 Patent claims priority to U.S. Provisional Application No. 62/319,809, filed April 8, 2016. *Id.* I have assumed, for purposes of this Declaration, that the ’258 Patent is entitled to a priority date of April 8, 2016.

18. It is my understanding that during examination of the application that matured into the ’258 Patent, there were no rejections over prior art references prior to allowance. In the Notice of Allowance, the Examiner stated that “the prior art fails to teach or fairly suggest” elements of Claim 1, including “an effect simulator adapted to calculate a time varying lighting value based on at least one simulation parameter, said at least one simulation parameter depending on the selected user customisable cinematic lighting special effect being simulated, and adapted to output said time varying lighting value to said lighting device so as to simulate the selected user customisable cinematic lighting special effect.” Ex. 1002 at 592-599.

V. ENTERTAINMENT LIGHTING EFFECTS LIGHTING SYSTEMS

19. The '258 Patent discusses lighting effects, but this is nothing new. In fact, lighting effects for entertainment industries (e.g., film, broadcast, and TV) have a long history. Directors have long desired realistic lighting arrangements to fully engage the audience into the plot of the movie or program. Effects help complete the illusion for the viewers. Examples include the use of warm, dynamic light to represent a fire, for example.

20. An early example of a lighting device designed to produce these types of effects is shown below.



The above image is an excerpt from Strand Electric's 1971 catalogue, showcasing the Patt 252 Effects Projector. The Patt 252 was an integrated effects projector for use in theatre, film, and TV. The device operates by projecting effects from discs chosen from a long list of options. As listed in the catalogue under "Moving

Effects Attachments,” these options included Flames, Rain, Snow, and Running Water. A user could add atmosphere to a scene by projecting the effects onto performers or backgrounds. The effects were dynamic and moving, controlled by the rotation speed of the disc. The disc speed could be manually varied and adjusted directly from the effects projector through the small box seen under the light output lens in the above figure. This type of effects projector was in standard use throughout the 1960s and is still occasionally seen today, though later models also included remote control options.

21. This kind of unit addressed the need for continuous effects (e.g., fire and light reflected from water), but did not provide the flashes required for other types of effect simulations (e.g., lightning). Further, incandescent filament lamps were not ideal for such lightning simulations because of the time required to heat up and cool down, which may not depict the instantaneous flash of lightning.

22. Instead, many TV and film makers shifted to the xenon strobe technology, which was originally developed for photographic flash and high-power emergency lights. For example, the below pictures show an Optikinetics Super Strobe from the 1980s:



The Super Strobe could be locally operated and the flash rate was controlled by the user through a knob on the rear of the unit (see above image). The unit also had a “Remote Input” connection, allowing the strobe to be remotely operated or linked to other units. This larger banks of strobes could be synchronized to produce larger effects. I have personal experience with these types of products for entertainment applications.

23. Over time, the effects projectors and strobes improved and their functionality was integrated with the automated lighting units that were widely used from the 1990s onwards. Companies like Vari-Lite, High End Systems, Coemar, Clay-Paky, and TAS developed and manufactured sophisticated lighting

instruments capable of producing colored effects, strobing, movement, and pattern projection in a single unit. These devices were adopted throughout the entertainment lighting industry, including applications in film and TV, for the kinds of effects described above and in the '258 Patent.

24. In the mid-1980s, automated lights were remotely controlled through digital communication protocols from a central control desk capable of controlling multiple lights at once. With the 1990s came the introduction of lighting units that added local control via on-board control panels and displays. This improvement allowed for units to be used independently, without a remote controller sending commands to the units. Starting in the early 2000s, the vast majority of automated lights included this local control functionality as a standard feature. This allowed the user to locally control selections of effects and their parameters, such as strobe speed, duration of lightning flashes, and the speed of color-changing effects. In addition, the ability to control effects with a random timing element was introduced. As discussed below, this resulted in more realistic effects, especially for lightning flashes or a candle flickering.

25. One common method of remote control, which is currently widely used, is an industry standard digital communications protocol called DMX-512. This protocol allows a master controller to send individual data to several connected luminaires at once.

26. DMX-512 is a variant of industry standard RS-485 developed by the U.S. Institute for Theatre Technology (“USITT”). The DMX512 standard (512 channels of 8-bit data) was created in 1986, with subsequent revisions in 1990 leading to USITT DMX512/1990. This lighting protocol replaced AMX-192, which was developed by Strand Century in the late 1970s. AMX-192 was an analog-based protocol with severe limitations on data density, volume, and the distance to which the data could be transmitted. DMX-512 is duplex, meaning it allows a larger volume of data, and bi-directional transmission of same, to allow the transmission of data between devices. This allows data to be transmitted from a controller to any number of devices. Those devices to be addressed from 1 to 512 to (i) know what data is relevant for that device and (ii) to communicate back to the data source or to other devices within the network.

27. These methods and effects systems remained as features within the luminaires while manufacturers began to transition from conventional light sources (e.g., incandescent or HID sources) to the more efficient and user-friendly LEDs. Although LEDs had been available prior, white LEDs for lighting were not yet possible. In 1994, Shuji Nakamura invented the ultra-bright blue LEDs that served as the foundation for today’s common commercial LEDs. Blue light can be used to “excite” light emission from phosphors that have been commercially used in fluorescent lighting for decades. In the case of

fluorescents, far blue or ultra-violet energy excites the phosphor compounds, which then release this higher energy in the form of lower-frequency light within the visible spectrum. The specific combination of phosphors controls the spectrum of emitted light at a lower frequency or wavelength, specifically selected to emit in the visible light spectrum. Similarly, blue-emitting LEDs could be used to excite phosphors that “down-convert” the high-frequency blue light to colors within the visible light spectrum.

28. In 1996, the first commercially viable white LEDs were developed and offered for sale from Nichia in Japan. While a variety of colors were possible with prior LEDs, the blue LED was particularly difficult to produce. In the early 2000s LEDs became sufficiently bright enough to be used in film and TV. The availability of a higher power (brighter) LEDs led manufacturers to produce new luminaires that utilized LEDs and included the features of the prior models and new features made possible by LEDs.

29. There are drawbacks of using incandescent lamps as lightning or strobe simulators due to their relatively slow on and off times. However, this does not limit lighting fixtures produced since the 1980s from creating strobing effects, and a wide range of other special effects while using incandescent light sources or much more powerful discharge lamps. The use of mechanical shutters,

mechanical dimming, etc., allowed a wide range of effects to be produced, albeit with major issues related to heating.

30. LEDs do not suffer from this issue, rather, they can be turned on and off almost instantaneously. As a result, LEDs were a clear choice for lighting effects like emergency vehicle strobes or lightning. Further, LEDs were available in multiple colors, eliminating the need for colored gels and filters. Because of these benefits, a single LED luminaire could perform many different tasks.

31. At the time of the '258 Patent, there were several available options for the generation of lighting effects in the entertainment industries. Luminaires could produce effects controlled either locally with a control panel on the luminaire, or remotely through a data connection (e.g., DMX-512 control protocol). Further, luminaires could be connected to produce coordinated or synchronized effects. Coordinated or synchronized effects can be used to produce several lightning bursts coming from different directions, or to mimic the movement of an emergency vehicle. As discussed above, these coordinated effects could be controlled locally from each luminaire individually or in a master-slave relationship.¹ Multiple luminaires could also be controlled from a central lighting control system through a dedicated communication link. For each

¹ In the master-slave relationship, one luminaire is designated as the master and its local control panel controls other connected luminaires.

of the above control methods (local, master-slave, and remote), the ability to control the timing, speed, or rate of effects produced by any of the described control methods is a given.

32. All of these systems, techniques, and products were in common use at the time of the '258 Patent.

VI. CLAIM CONSTRUCTION AND DEFINITION OF THE POSITA

A. Claim Construction

33. It is my understanding that claims in an IPR are generally given their ordinary and customary meaning, which is the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention.

34. I have analyzed the patentability of Claims 1-22 in the '258 Patent based on their ordinary and customary meaning, unless otherwise stated below.

B. Definition of a Person of Ordinary Skill in the Art

35. A person of ordinary skill in the art ("POSITA") in the field of the '258 Patent would have had a good working knowledge of electrical engineering and entertainment lighting systems, controls, and effects. The POSITA would have obtained this through an undergraduate bachelor's degree in electrical engineering, or a comparable field as well as some experience in the field (*e.g.*, in entertainment lighting systems).

36. The more education one has, the less experience needed to attain an ordinary level of skill. Similarly, more experience in the field may serve as a substitute for formal education.

VII. CLAIMS 1-22 OF THE '258 PATENT ARE DISCLOSED IN THE PRIOR ART

37. I have been asked to provide an analysis, and my opinion, as to whether the elements of Claims 1-22 of the '258 Patent (the “Challenged Claims”) are disclosed in two primary prior art references: (a) the Showline SL PAR 155 ZOOM RGBW LED Luminaire Installation & User’s Manual (the “Showline Manual”) and (b) U.S. Patent Application Publication No. 2012/0044374 (“Pohlert”).

38. I was also asked to provide my opinion regarding whether these references in view of U.S. Patent No. 8,632,208 to Choong (“Choong”) and U.S. Patent No. 8,581,513 to Reinoso (“Reinoso”) disclose certain limitations of the Challenged Claims.

VIII. GROUND I: THE SHOWLINE MANUAL ANTICIPATES CLAIMS 1-6, 8-14, AND 16-22

A. The Showline Manual

39. The Showline Manual describes the features and functionality of a lighting system called the SL PAR 155 ZOOM RGBW LED Luminaire (“SL PAR”), used in entertainment, cinematography, and studio lighting systems. The

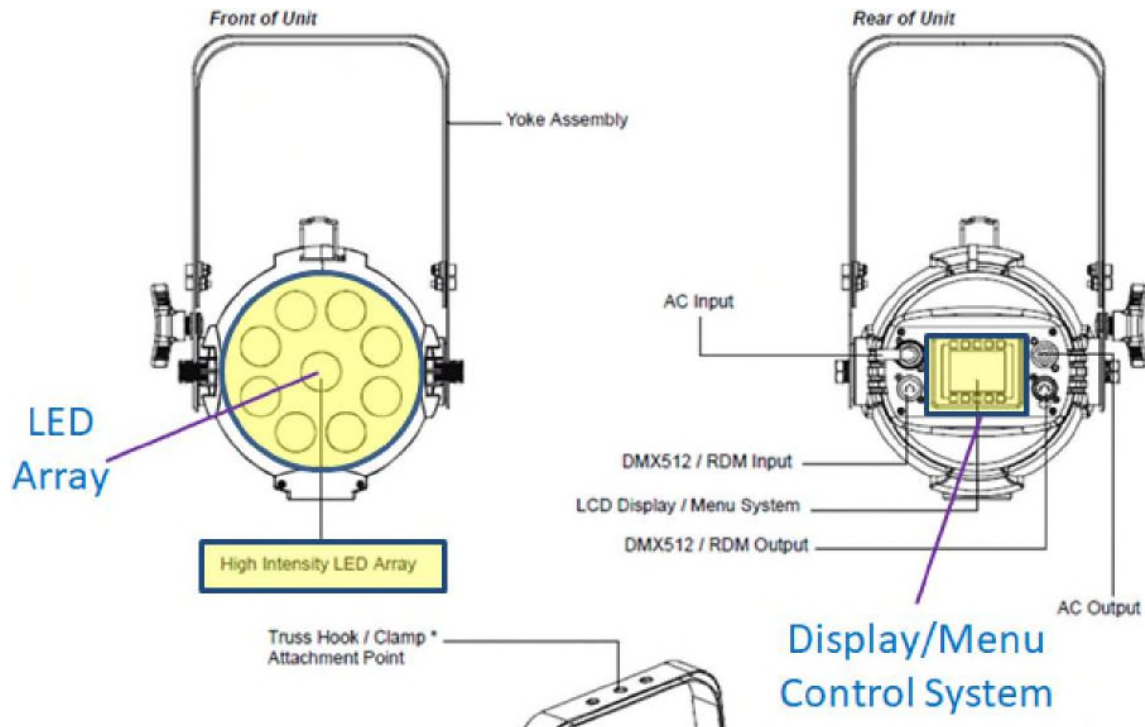
Showline Manual has a date of December 10, 2013. I understand the Showline Manual is prior art to the '258 Patent.

40. Vari-Lite developed the Showline product line. Vari-Lite is a well-known supplier of lighting products in the field of entertainment lighting. A POSITA would be familiar with Vari-Lite's products. Vari-Lite designed and created lighting technology for use in Thomas Group in 2002, which was acquired by Royal Philips Lighting in 2008.

41. I understand that the Showline products were launched in or around the fall of 2012, and originally introduced the SL PAR 150 model. The SL PAR 155 was introduced in 2013. Showline products, like all Vari-Lite products, were and are in use in all areas of the entertainment lighting field, including theatre, television, film, and concert productions.

42. I have reviewed a declaration provided by Martin Palmer (Ex. 1005) regarding the Showline Manual. This Declaration is consistent with my recollection. From Mr. Palmer's declaration, I understand that each SL PAR 155 unit included a Quick Start Guide, and this Quick Start Guide contained a link directing users to a website containing the full SL PAR 155 User Manual. I also understand that this same full User Manual was made available on the website for the SL PAR products starting in late 2013.

43. The Showline Manual describes (a) a “high intensity LED array” on the front of the unit and (b) an integrated “LCD Display / Menu System” and various inputs and outputs on the rear of the unit.



Ex. 1004 at Fig. 2 (annotated).

44. The LCD Array is an RGBW (red, green, blue, and white) LED array. *Id.* at 42. The LCD Display and Menu System includes a user interface, with menu buttons allowing a user to navigate, access, and select menu settings. *Id.* at 14-15. The LCD Display and Menu System “provides local control” for features and functionality of the RGBW LED array. Users can select, modify, and create/output desired lighting effects. *Id.* at 14. Including “Presets,” “Effects (Chases – preloaded and user defined),” and “Strobe /Timing.” *Id.* at 14. A

Preset is a set of prerecorded or predetermined outputs and settings for each of the elements in the LED array. A Preset might include different colors, intensities, or patterns of the lights. The effects, or “chases,” are lighting effects implemented by cycling the LEDs in the array on and off in different patterns and timing intervals. This can create different patterns and impressions of output light, including moving, flickering, or pulsing lights. Chases may include different “steps,” with each step in the chase being a different sequence of colors, flashes, and intensities of the LEDs.

45. Strobing and timing relate to the duration that the LEDs are on or off. A user may select any combination of Presets, Chases, and Strobe/Timing from the LCD Display and Menu System.

46. The LCD Display and Menu System includes the below user interface, which includes menu buttons so a user can navigate, access, and select menu settings. *Id.* at 14-15.

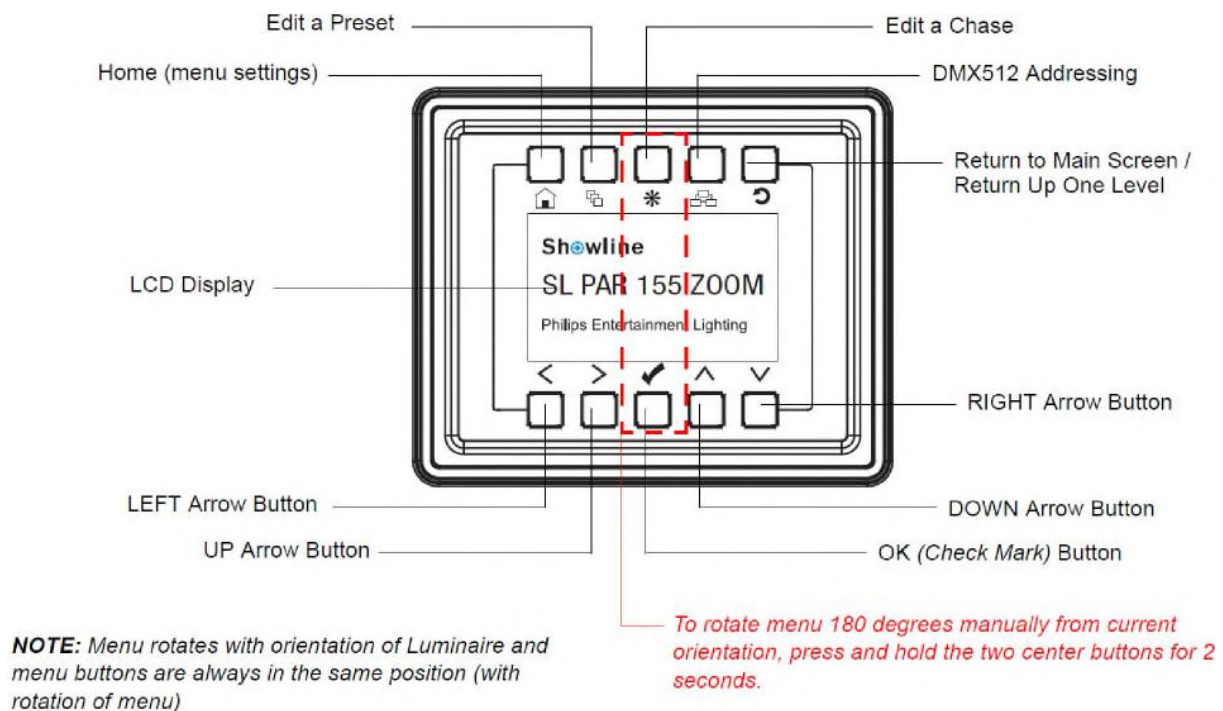


Figure 11: LCD Display and Menu System

Figure 11.

47. Using the LCD display user interface, a user can select and modify lighting effects, and can modify “presets” and “chases” with user selected parameters. *Id.* at 15-17. Chase effects are implemented by cycling the LEDs on and off to create patterns. The patterns give the impression of moving, flashing, or color changing light sources. A user may make customizable changes and edits to any stored preset or chase effect by adjusting user selectable parameter settings. The adjustable parameters include, for example, master intensity, total steps, speed, and fade. *Id.* at 16, Table 3. When a preset or chase is recalled or implemented, the LEDs output light based on the values stored for that effect. *Id.* at 15-17.

48. The Showline Manual also describes a “Strobe / Timing Menu” through which a user can select from additional, adjustable parameters, which are “*instantly* applied to any active Preset, Color Filter, or chase.” *Id.* at 17 (emphasis added). If the luminaire is actively outputting lighting effects from the LED array, such as a preset or chase, the luminaire can modify these parameters in the LCD Display and Menu System and instantly control and adjust the output light values for the effect. The strobe and timing parameters are summarized in Table 4. Ex. 1004 at Table 4.

B. The Showline Manual Discloses Each Limitation of Claims 1-6, 8-14, and 16-22

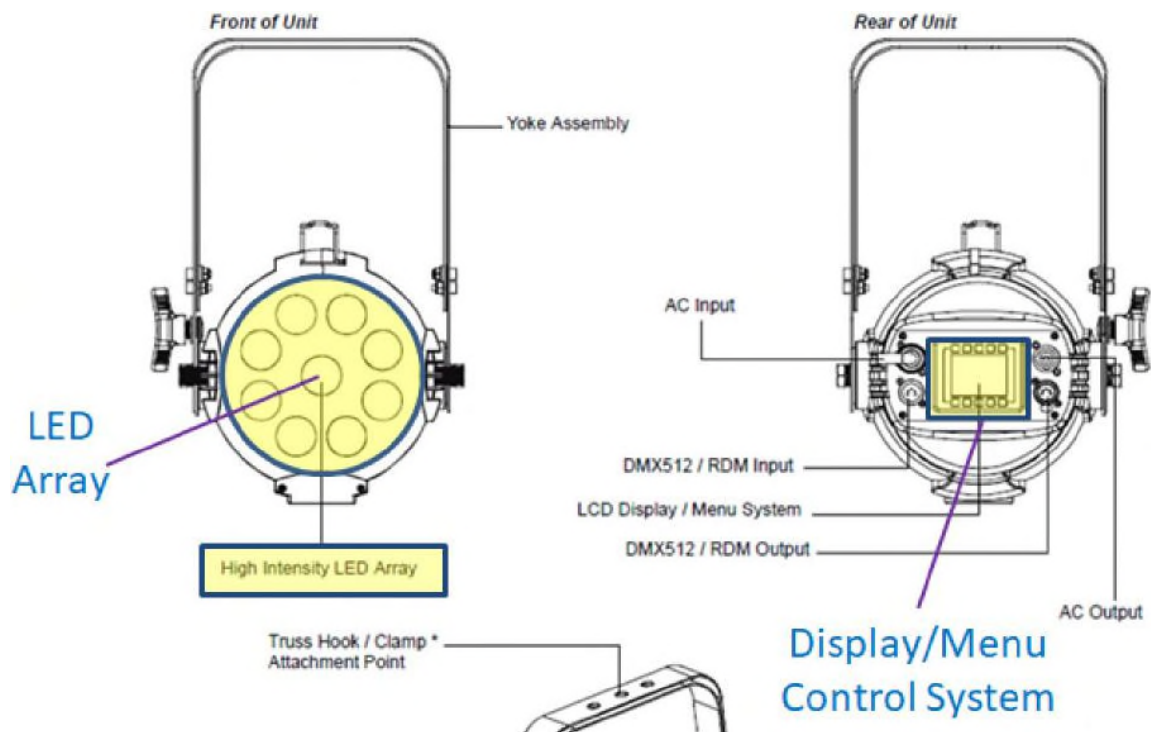
a) Independent Claim 1

49. It is my opinion that the Showline Manual discloses Claim 1.

Claim 1[pre]: A lighting system:

50. The Showline Manual discloses the preamble to Claim 1 as it teaches a lighting system.

51. The Showline Manual discloses a lighting unit having a “high intensity LED array” on the front of the unit. Ex. 1004 at 6, 42. The SL PAR disclosed in the Showline Manual offers a plurality of lighting effects, including presets, effects/chases, and strobe/timing, each of which is controlled through a “Display and Menu System” on the back of the unit. *Id.* at 14-17.



Id. at Fig. 2 (annotated).

Claim 1[a]: a lighting device; and

52. The Showline Manual discloses Claim 1[a].

53. The Showline Manual discloses that the SL PAR include a “high intensity LED array.” *Id.* at 6, 42. The LED array in each SL PAR unit is a “Color RGBW LED Array (x9 – 15 Watt High Power LED Chipsets.” *Id.* at 42. Showline Manual discloses an LED lighting system with an array of nine LEDs containing red, green, blue, and white LEDs. These LEDs are “lighting devices” that provide illumination when running lighting effects, like presets or chases. *Id.* at 14-17.



Id. at Cover.

Claim 1[b]: a controller adapted to control the lighting device to produce a user customisable cinematic lighting special effect selected from a range of different user customisable cinematic lighting special effects, the controller comprising:

54. The Showline Manual discloses Claim 1[b].

55. The Showline Manual discloses an “LCD Display and Menu System” that provides “local control for accessing” fixture settings—namely, that controls the SL PAR and its LEDs. *Id.* at 7, 10, 14-15. The LCD Display and Menu System used with the disclosed lighting system receives inputs from a user interface, as shown in Figure 11 below, and can recall the appropriate settings for the LED array to produce customizable effects, such as editable presets and editable “chases.” *Id.* at 15-16. The LCD Display and Menu System allows users

to select and modify desired lighting effects of these presets and chases. *Id.* at 15-16.

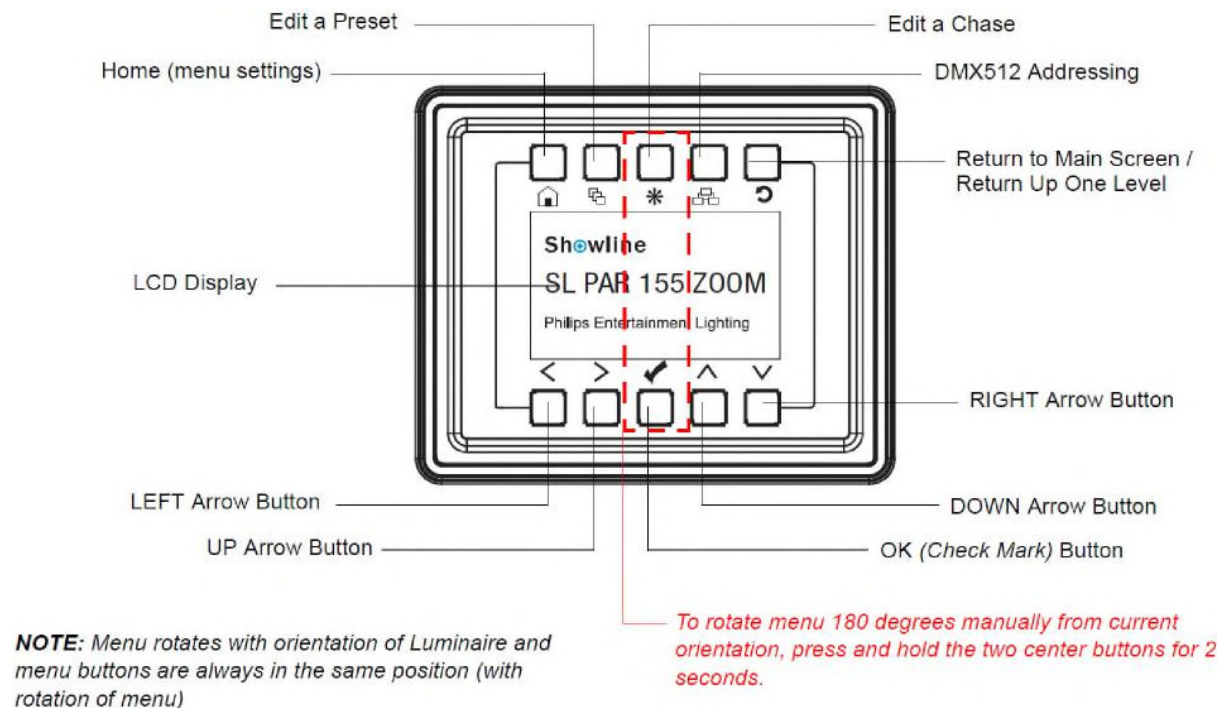
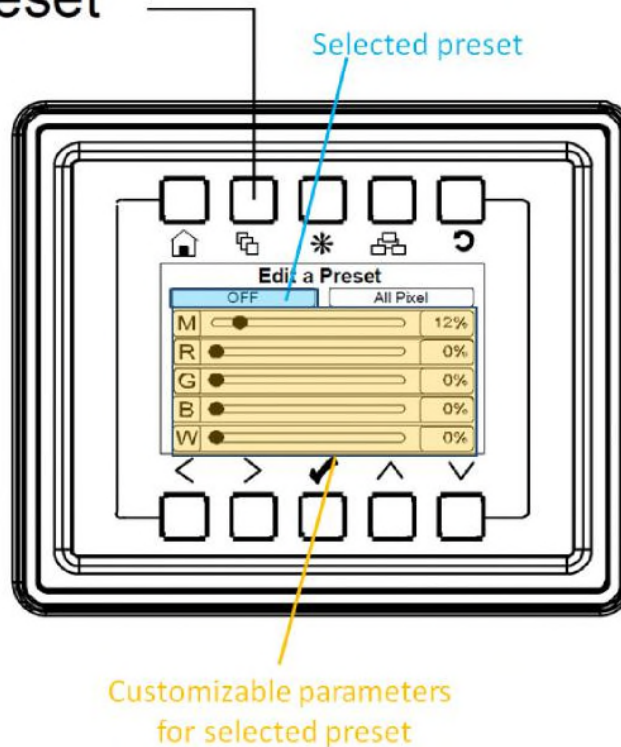


Figure 11: LCD Display and Menu System

Id. at Fig. 11.

56. Showline Manual teaches that a user can customize and modify the lighting effects through an “Edit a Preset” menu that allows users to adjust the master intensity (“M”) and as color values (“RGBW”) for any preset. *Id.* at 15. The system then produces lighting value settings for the LEDs based on the selected preset and parameter adjustments input by the user. *Id.* at 15-16.

Edit a Preset



Id. at 15 (annotated).

57. The chases also allow users to select a desired chase and then “select parameters” to customize “the master intensity, speed, and fade values,” using the buttons on the menu. *Id.* The Display and Menu System produces lighting value settings for the LEDs based on user selections of chases and any parameter adjustments made. *Id.* at 16, Table 3.

58. The Showline Manual teaches that editing the chases includes editing existing steps of a chase or even adding new steps to a chase, with a user selecting parameters and using the buttons on the display to make adjustments to the parameters. *Id.* at 17. The Showline Manual discloses that “[o]nce all values

are adjusted as desired” for any given parameter, the user goes back to the edit chase screen and can further edit the effect or add steps to modify the effect before the chase “is saved and can be recalled via the menu.” *Id.* The lighting system then produces lighting value settings for the LEDs, based on the user selections and parameter adjustments. *Id.* at 16-17, Table 3.

59. Not only can a user adjust an effect as outlined above, but the presets and chase effects can be further customized through a “Strobe/Timing Menu” in the LCD Display and Menu System. *Id.* at 17. Through the “Strobe / Timing Menu”, a user can select from more adjustable parameters, and these parameters, importantly are “**instantly** applied to any active Preset, Color Filter, or chase.” *Id.* at 17 (emphasis added). If a luminaire is outputting lighting effects from the LED array and actively modifying effects live, adjusting these parameters instantly causes the LCD Display and Menu System to adjust the light output to match the new parameter values being input. The strobe and timing parameters can be seen in Table 4:

Table 4: Strobe / Timing Parameters

Parameter	Description
Master Intensity	Overall fixture output intensity level.
Strobe: X	Strobe mode and rate value settings following DMX map (see SL PAR 155 ZOOM RGBW LED Luminaire DMX Mapping for details).
Duration	The time each strobe flash remains ON.
Intensity Timing	The time used to change intensity values when running a chase.
Color Timing	The time used to change color values when running a chase.

Ex. 1004 at Table 4.

Claim 1[c]: an input interface for receiving user input to enable a user to select user customisable cinematic lighting special effect from said range of different user customisable cinematic lighting special effects; and

60. The Showline Manual discloses Claim 1[c].

61. The Showline Manual teaches that the “LCD Display and Menu System” (or controller) includes a user interface that receives user inputs. The user inputs are received through buttons allowing a user to navigate the menus and make the selections. *Id.* at 14-15. The disclosed user interface allows a user to select customizable lighting special effects, such as the previously discussed “Presets” and “chases.” *Id.* at 15-17. The selectable chase effects include “10 factory defined chases and eight user adjustable chases,” as shown below. *Id.* at 14-17.

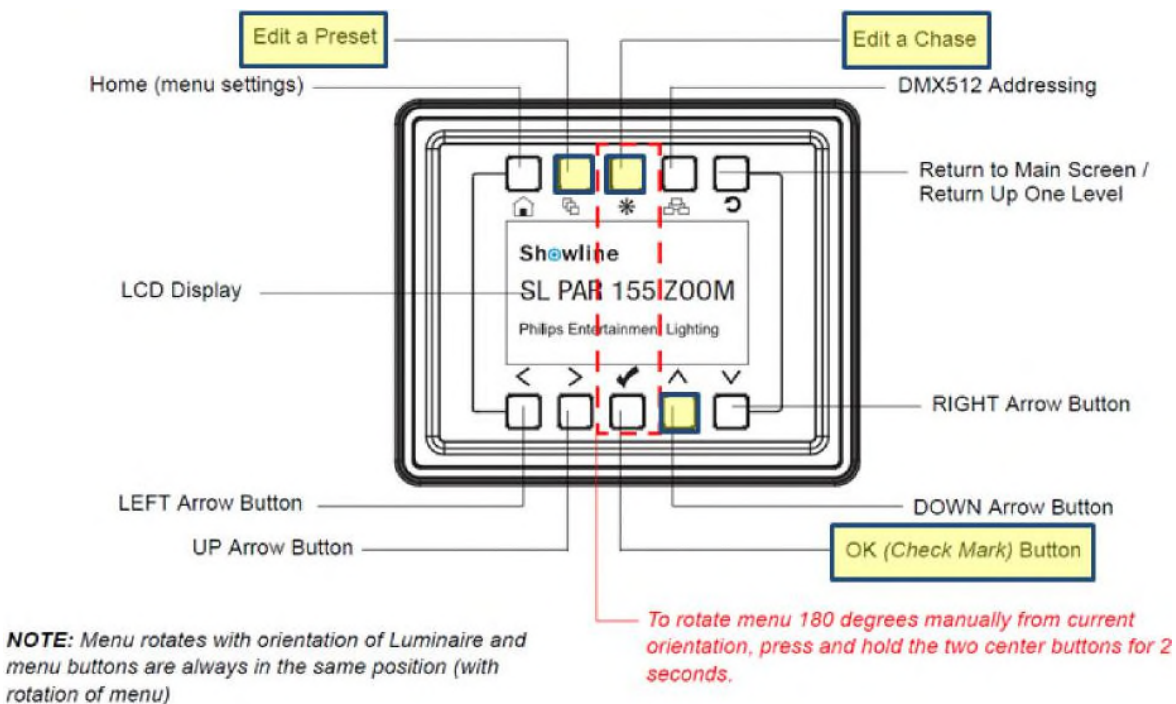


Figure 11: LCD Display and Menu System

Id. at Fig. 11 (annotated).

62. The LCD Display and Menu System interface allows users to customize available effects. If a user selects a preset, the user can customize the preset using the “Edit a Preset” menu to customize the intensity and color values for those presets. *Id.* at 15-16. Selected chase effects can also be customized by selecting adjustable parameters through menus on the interface. This as described in Table 3:

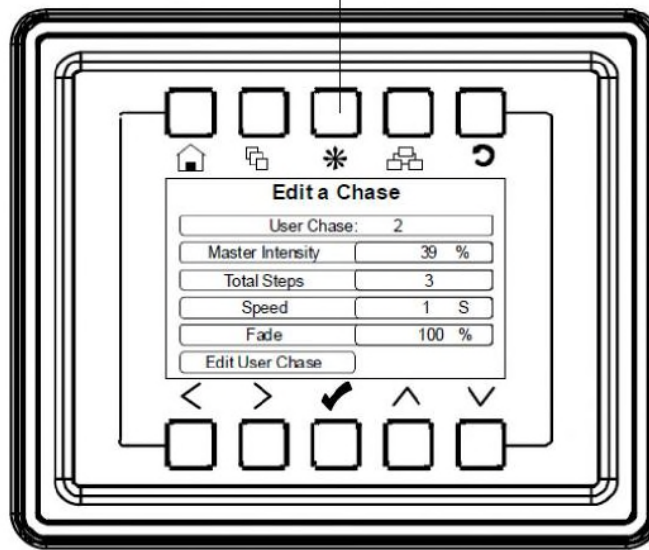
Table 3: Effects Parameters

Parameter	Description
User Chase / Built-in Chase	Select from the 18 different chases.
Master Intensity	Adjust the master intensity for ALL chases.
Total Steps	Displays the total steps used by the chase. This field is not editable.
Speed	The total time each step of the chase will be recalled.
Fade	The percentage of the time assigned by the speed that is crossfaded between steps.

Id. at 16 and Table 3.

63. A user can select the “Edit a Chase” option on the menu screen, and the “Eight User chases can be further customized to create different effects on the fixture.” *Id.* at 17. “To edit a User Chase, first use the up and down arrows to scroll to the Edit User Chase field and then press the Check Mark button. The Edit User Chase window will be displayed. Use the Up and Down buttons to select parameters and the Left and Right buttons to assign the different general fixture settings. When finished, press the Check button to exit the menu level.” *Id.*

Edit a Chase



Id. at 17.

64. The “Strobe / Timing menu” disclosed in the Showline Manual teaches that a user can make customizations to any selected lighting preset or chase effect. *Id.* Users may select and assign “strobe and timing values from the menu system” that are “instantly applied to any active Preset, Color filter, or chase.” *Id.* at 17. The Showline Manual discloses that adjustable strobing/timing parameters may be selected through the user interface, including (a) adjusting the overall intensity level of the SL PAR unit, (b) setting a strobe mode and strobe rate, (c) setting the duration of time each strobe flash remains on, (d) adjusting the time used to change intensity values when running a chase, and (e) adjusting the time used to change color values when running a chase. *Id.* at 17 and Table 4.

Claim 1[d]: an effect simulator adapted to calculate a time varying lighting value based on at least one simulation parameter,

65. The Showline Manual discloses Claim 1[d].

66. The '258 Patent discloses an “effect simulator” (essentially a “black box” depiction and description in the '258 Patent) as a component of the controller that “creates data 106 characterising a lighting effect.” The Showline Manual discloses the “effect simulator” that is claimed in the '258 Patent. For instance, the Showline Manual discloses an interactive LCD Display and Menu System that adjusts and stores data in the form of “values of the luminaire’s LED settings” for the presets and chases. *Id.* at 14-17; *see also supra* ¶¶ 54-64 (Claims 1[b]-[c]). These LED setting values are time-varying data values that characterize the effect wanting to be output, and the time-varying data values that are provided to the LEDs to produce the proper light output over time, *e.g.*, the customized effect selected by the user.

67. If a user adjusts the customizable parameters for a preset or chase, the LCD Display and Menu System calculates and stores new data values for the LED settings based on the adjustments input by the user. Based on the user selections, the Display and Menu System calculates, sets, and stores the time varying “value of the luminaire’s LED settings.”

68. These adjusted parameters control the LED array to produce the desired lighting effects based on the time varying values when the effect is

output. *Id.* at 16-17; *see also supra* ¶¶ 54-64 (Claims 1[b]-[c]). The Showline Manual discloses that the “strobe/timing” menu allows a user to input desired “strobe and timing values from the menu system” that the Display and Menu System instantly applies to “any active Preset, Color Filter, or chase.” For user selected settings to be *instantly* applied to a chase in the process of being run, the Display and Menu System *must* calculate and output the appropriate LED setting values representing the adjusted parameters for the chase to the LEDs.

69. The data values for the LED settings are calculated for each preset and chase based on user-selected parameters, including:

Table 3: Effects Parameters

Parameter	Description
User Chase / Built-in Chase	Select from the 18 different chases.
Master Intensity	Adjust the master intensity for ALL chases.
Total Steps	Displays the total steps used by the chase. This field is not editable.
Speed	The total time each step of the chase will be recalled.
Fade	The percentage of the time assigned by the speed that is crossfaded between steps.

Table 4: Strobe / Timing Parameters

Parameter	Description
Master Intensity	Overall fixture output intensity level.
Strobe: X	Strobe mode and rate value settings following DMX map (see SL PAR 155 ZOOM RGBW LED Luminaire DMX Mapping for details).
Duration	The time each strobe flash remains ON.
Intensity Timing	The time used to change intensity values when running a chase.
Color Timing	The time used to change color values when running a chase.

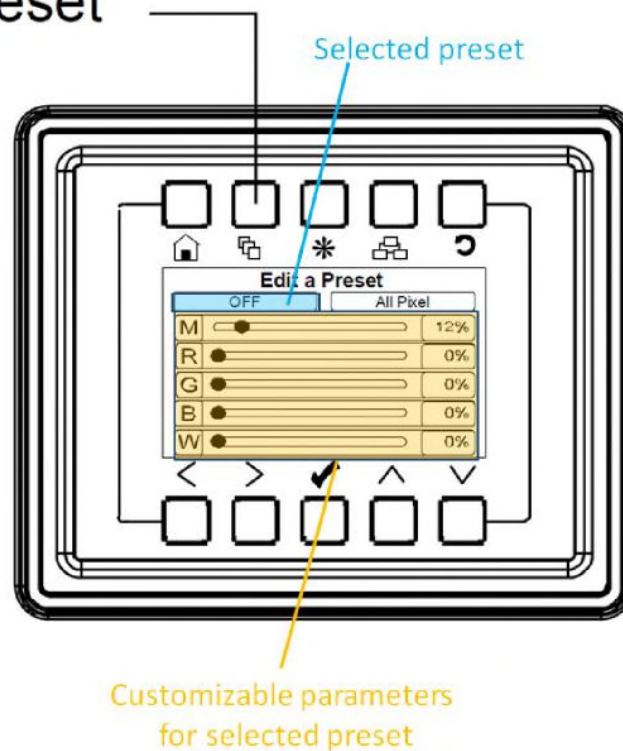
Id. at 16-17, Tables 3-4 (annotated). Tables 3 and 4 show the data values for the LED settings calculated and set by the LCD Display and Menu System, which are based on adjustable simulation parameters, including “intensity” (or brightness), “speed,” “fade,” “duration,” “strobe rate,” and “color timing.” *Id.*

Claim 1[e]: said at least one simulation parameter depending on the selected user customisable cinematic lighting special effect being simulated,

70. The Showline Manual discloses Claim 1[e].

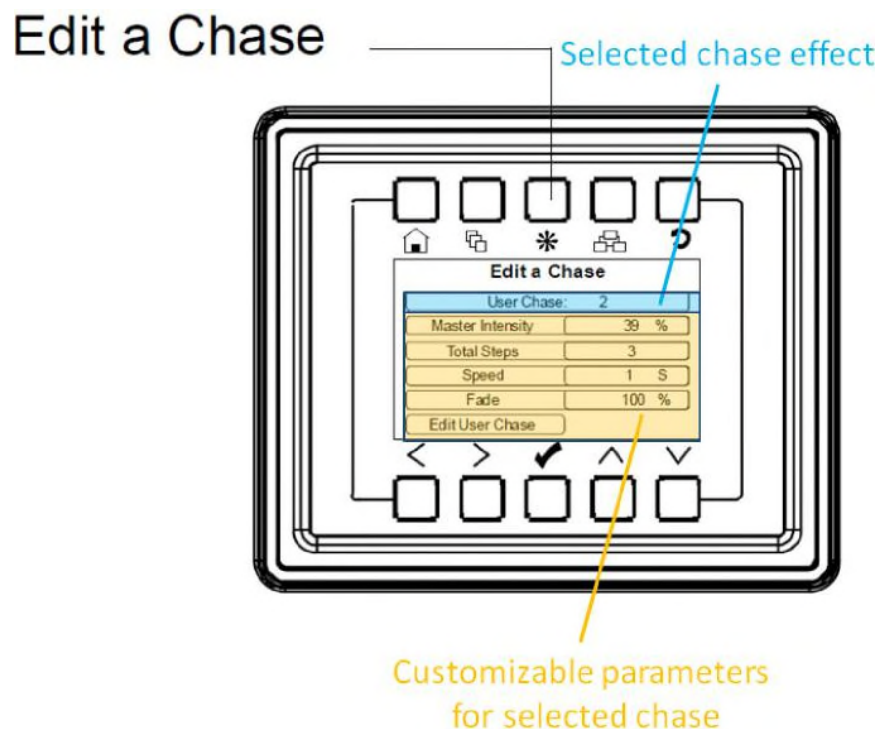
71. The Showline Manual discloses that the “simulation parameters” a user may adjust depend on the selected preset or chase effect a user wants to edit and run. *See supra* ¶¶ 54-69 (Claims 1[b]-1[d]). Users can adjust parameters of presets and chases after selecting a particular preset or chase to edit in the “Edit a Preset” or “Edit a Chase” menus. Ex. 1004 at 15-17. A user can select a preset to edit by using buttons to “scroll through” available presets. *Id.* at 15.

Edit a Preset



Id. at 15 (annotated). A user may “scroll through the parameters” for that preset, and use “left and right arrow buttons to make adjustments.” *Id.* The parameters adjusted depend on the effect being edited.

72. For the editable chases, a user selects a particular chase to edit and is provided an “Edit a Chase” menu allowing the user to make adjustments to parameters to customize that particular chase:



Id. at 17 (annotated). Adjustments to the parameters for editable chases are made by selecting a particular chase to edit, using arrow keys to “scroll through” adjustable parameters, and using “left and right arrow buttons” to adjust selected parameters. *Id.* The adjusted parameters are particular to the particular chase being edited. In the figure above, for example, “User Chase: 2” is being edited,

and adjustments to the intensity, steps, speed, and fade are adjusted and set for this “User Chase: 2.”

73. The “strobe/timing” parameters shown in Table 4 can be assigned to an “active Preset, Color filter, or chase.” Ex. 1004 at 17. Those parameters depend on the particular preset, color filter, or chase that is active and selected for adjustment, allowing a user to customize the particular active preset, color filter, or chase.

Claim 1[f]: and [said effect simulator] . . . adapted to output said time varying lighting value to said lighting device so as to simulate the selected user customisable cinematic lighting special effect;

74. The Showline Manual discloses Claim 1[f].

75. The Showline Manual discloses that the LCD Display Menu System allows a user to “recall” (play) an edited preset or chase effect from the main menu system, with the corresponding “stored values of the luminaire’s LED settings” for that preset or chase being sent to the LEDs so that the preset or chase effect can be “run” or implemented by the LED array. *See supra* ¶¶ 54-69 (Claims 1[b]-[d]). The Showline Manual’s teaching of “recalling” or “running” a preset or chase discloses that the user wishes for the LEDs to output the lighting values and effects that correspond to the preset or chase selected. When a preset or chase is recalled and run, the lighting values for that preset or chase effect, which vary over time to change the light outputs to create the effect, are output

from the LCD Display and Menu System to the LED array and the preset or chase effect is implemented. *Id.* at 15-17.

76. The “strobe/timing” values are “instantly applied to any active Preset, Color filter, or chase.” Ex. 1004 at 17. The lighting system instantly calculates and sends new LED setting values to implement the selected strobe/timing adjustments relating to the lighting effect being run. *Id.* The adjustments to the “Color Timing” parameter are calculated, the lighting effect is generated and output to the LEDs to adjust “[t]he time used to change color values when running a chase.” *Id.*

77. Presets are set values for the lighting, such as a color or intensity of light. *Id.* at 24-25. Presets can be a constant lighting output, for example a continuous output of red light. A “chase” is a standard term in entertainment lighting and refers to an automated progression through a series of lighting steps or states. A simple chase might contain two steps, one in which the LEDs are all emitting red light, and a second in which the LEDs are all emitting blue light. When a chase is triggered, or “run”, the lighting system will first display the red step when it outputs red light, then the blue step when it outputs blue light, and then loop back to the red step again.

78. This pattern continues until the chase is canceled or another chase is selected, or until a timing sequence has run its course. The times that each of the

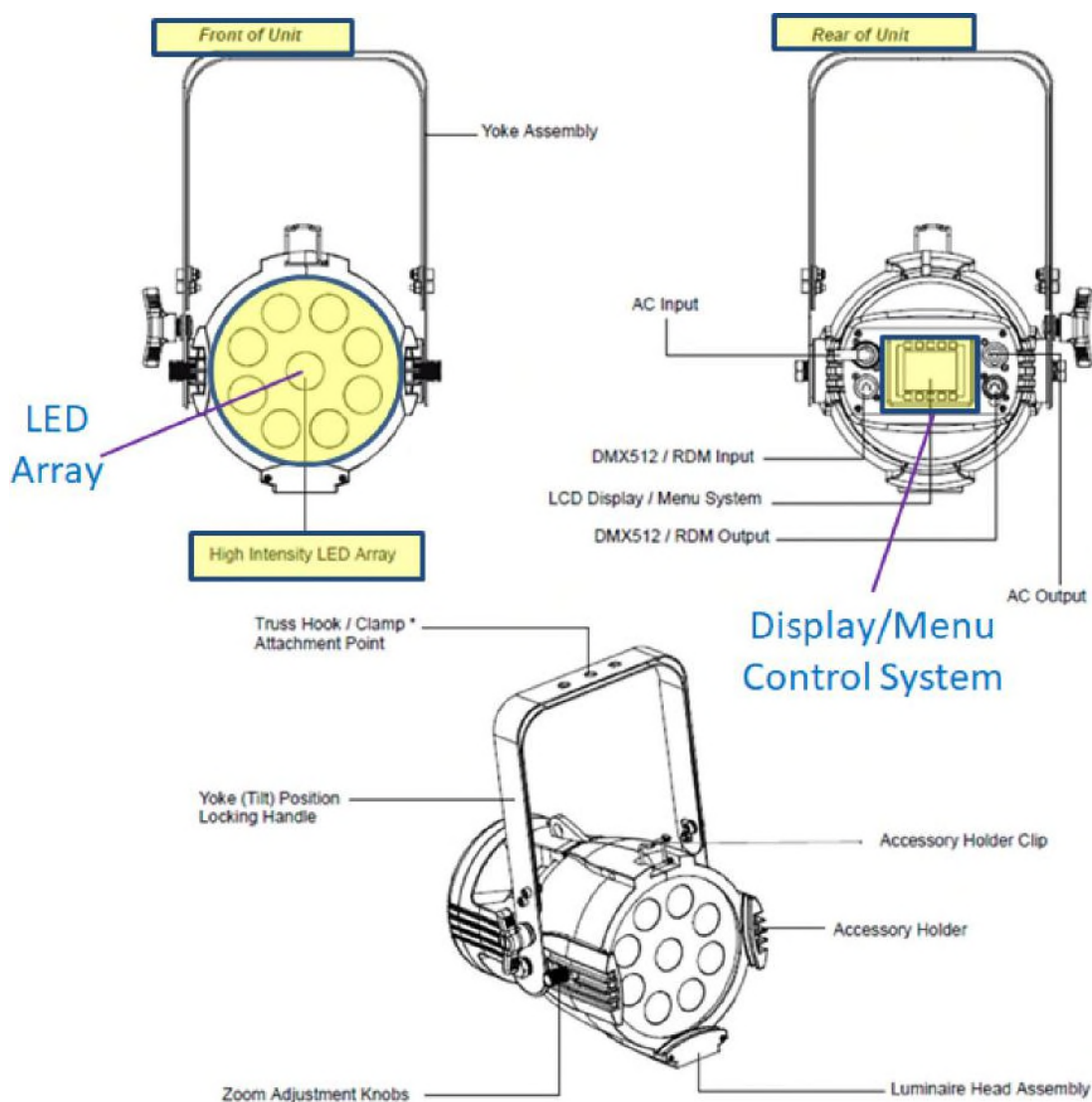
steps shows for and the speed that the chase moves from one step to another are part of the user customizable settings for the chase. For example, a user may select that the chase run for a certain amount of time, or that each color is displayed for a certain amount of time. More complex chases can be used as well. For instance, a chase may contain many steps, each with a different combination of LEDs and LED colors, and variations on the timing, fade, intensity, and duration of light output by each LED in each step.

79. These more complex chases are used in TV and film production to create a dynamic lighting effect. The red/blue chase just described could illuminate a performer to add the atmosphere of that performer being close to the emergency lights on the top of a police car. The lighting can be controlled in intensity and color so as to fit the scene and to be at levels that are captured correctly by the camera.

Claim 1[g]: wherein said lighting device and said controller are integrated in a combined unit.

80. The Showline Manual discloses Claim 1[g].

81. The Showline Manual, at Figure 2, shows that the LED array is located on the “front” of the unit, and the LCD Display/Menu System that provides “local control” of the unit is located on the “rear” of the same unit:



* Truss hooks and clamps are sold separately.

Figure 2: SL PAR 155 ZOOM RGBW LED Luminaire Common Components

Id., Figure 2 (annotated). The LED array (*e.g.*, “lighting devices”) and Display and Menu System (*e.g.*, “controller”) are combined and integrated into a single SL PAR unit. Figure 2 shows the single SL PAR unit includes a housing containing both the LED array and the LCD Display and Menu System. The hardware and software, including processors and wiring, necessary to convert a user input on the

LCD Display and Menu System interface into control signals for the LED, such that the LED array outputs the desired and customized lighting effects, are included within one unit.

b) Dependent Claim 2

Claim 2: The lighting system according to claim 1, wherein the input interface is adapted to receive user input to enable a user to customise said user customisable cinematic lighting special effect.

82. The Showline Manual discloses Claim 2.

83. The Showline Manual discloses that the user interface of the Display and Menu System receives user inputs to enable a user to select and edit presets and chases, and to add strobe/timing adjustments or even to create new desired effects. *See supra* ¶¶ 60-64 (Claim 1[c]). The menu options for allowing a user to edit presets and chases to customize the selected effects are shown in Figure 11:

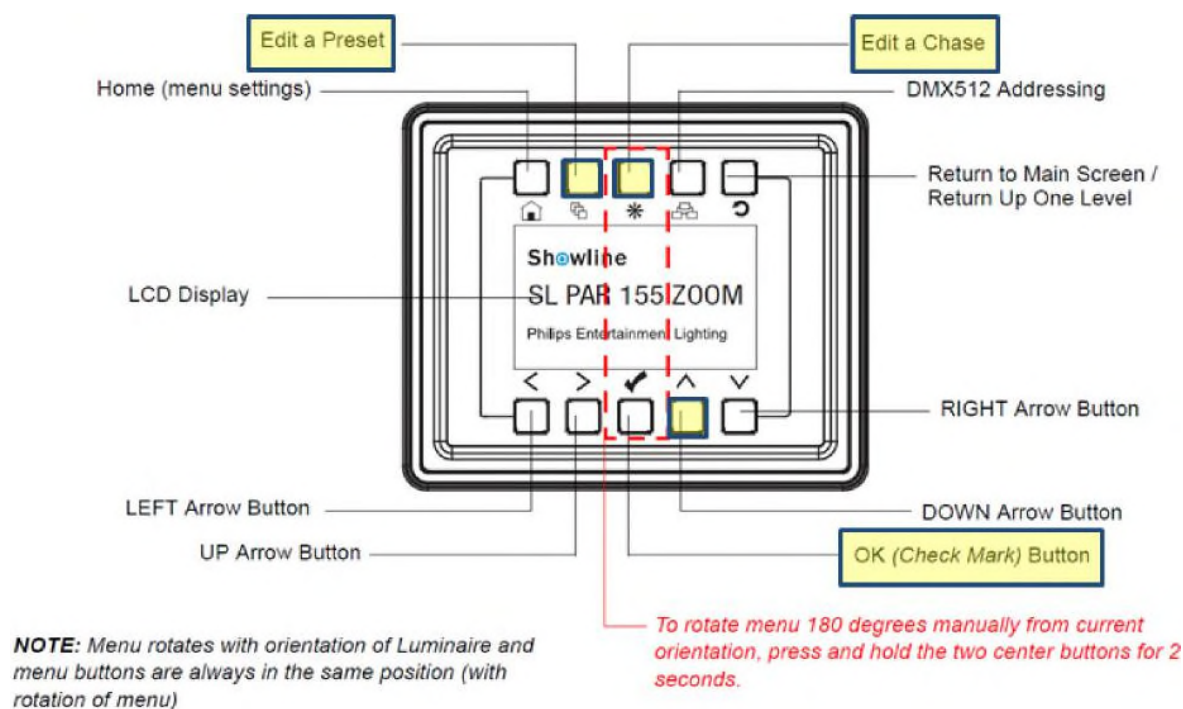


Figure 11: LCD Display and Menu System

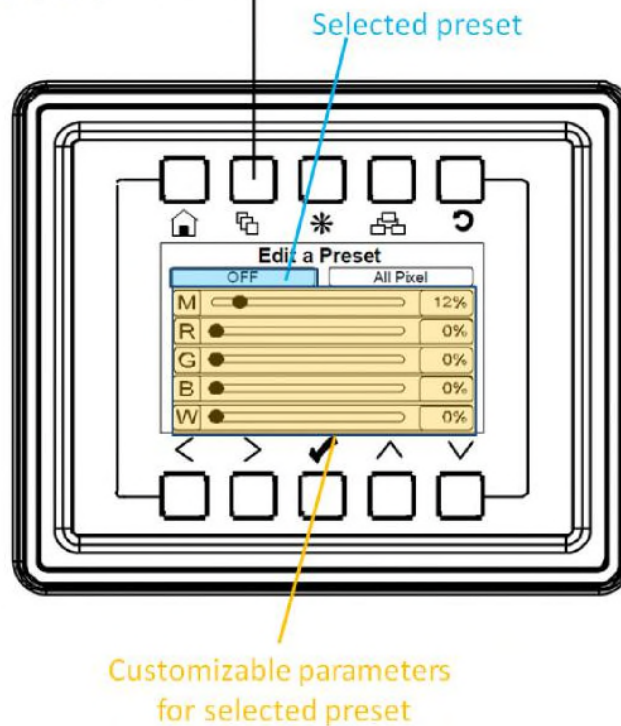
Id. at Fig. 11 (annotated).

84. A user can use the buttons on the LCD Display and Menu System to navigate and make selections to adjust parameters of lighting values for editable presets and chases including intensity, duration, timing and colors. *Id.* at 15-17, Tables 3-4. By using the up, down, left and right arrow buttons on the LCD Display and Menu System (as shown in Figure 11), a user can edit presets and chases to adjust selected parameters and assign and adjust strobe and timing parameters to any preset or effect. *Id.* at 15-17.

85. As one example, a user may select the “Edit a Preset” option from the menu. Within the “Edit a Preset” menu, the preset color parameters can be

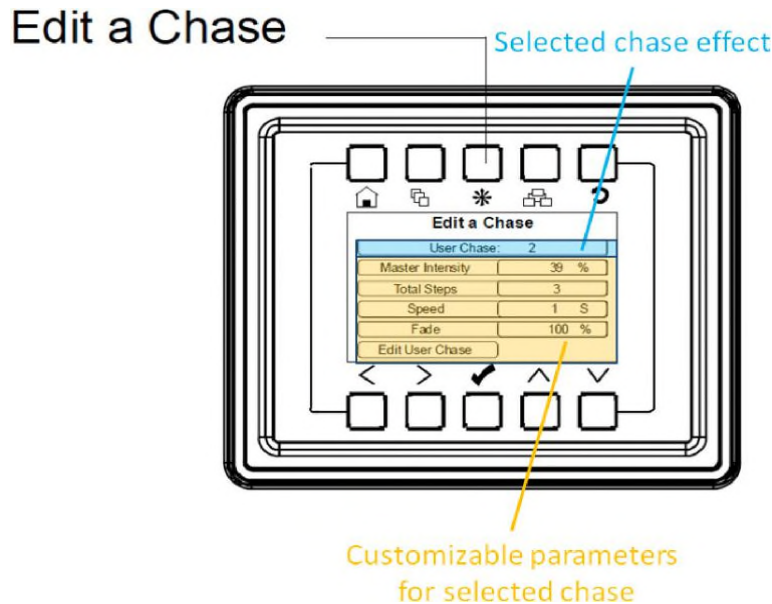
edited by changing “RGBW” (i.e., red, green, blue and white) or “HSIC” (i.e., hue, saturation, intensity, and color correction) parameters. *Id.* at 15.

Edit a Preset



Id. at 15 (annotated). If a user adjusts the “M” percentage value this adjusts the Master Intensity of the preset effect. Similarly, changing the values of the “R,” “G,” “B,” and “W” percentages (parameters) adjusts the amount of red, green, blue, and white light that will make up the preset color. When a user is done making the desired adjustments, the user selects the “check mark” button to save the preset with the adjusted values, and can even assign a particular preset number to save to. *Id.* at 15.

86. The LCD Display and Menu System also provides a user an interface to select and customize chase effects, including adjusting intensity, speed, fade and colors. *Id.* at 16-17.



Id. at 17 (annotated). A user can select a particular chase to edit, and then make changes to the parameters to customize that chase, such as increase or decrease the master intensity level for the chase to make it appear brighter or dimmer. By adjusting the speed and fade, the user can customize how quickly the chase runs through all steps making up the chase, and how the chase transitions (or fades) from one step to another.

c) Dependent Claims 3, 4, 5

Claim 3: *The lighting system according to claim 1, wherein the lighting device comprises at least one LED.*

Claim 4: *The lighting system according to claim 3, wherein the lighting device comprises multiple different coloured LEDs.*

Claim 5: *The lighting system according to claim 4, wherein the multiple different coloured LEDs comprise at least one of a RGB LED, and a RGB+W LED.*

87. The Showline Manual discloses each of Claims 3, 4, and 5.

88. The cover and title of the Showline Manual evidences that the SL PAR is an “RGBW LED Luminaire”:

SL PAR 155 ZOOM RGBW LED Luminaire



89. The Showline Manual teaches that the lighting system includes an array of nine different colored red, green, blue and white LEDs (the “RGBW LEDs”). The Showline Manual discloses that the SL PAR’s LED array is a “Color RGBW LED Array (x9 – 15 Watt High Power LED Chipsets)” *Id.* at 42; *see also id.* at 15, 17, 21, 28-29 (referencing control of Red, Green, Blue and White LEDs.)

90. The Showline Manual describes a lighting unit having an array of nine LEDs, which comprise multiple different colored LEDs, including red, green, blue, and white (RGBW) LEDs.

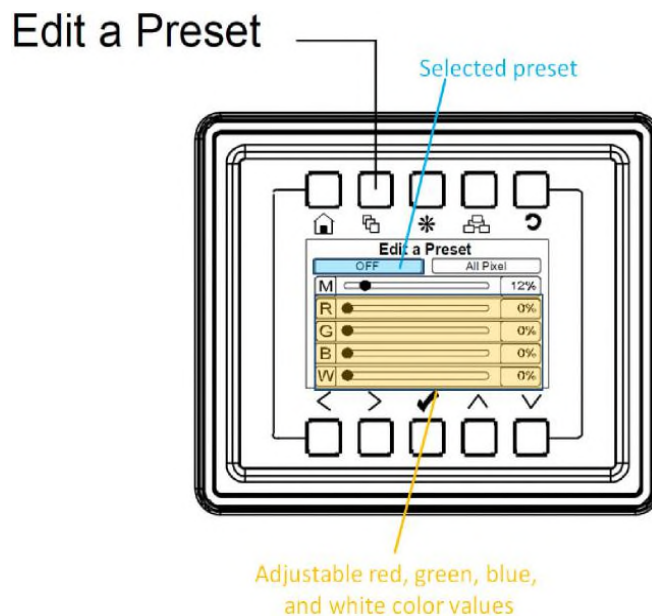
d) Dependent Claim 6

Claim 6: The lighting system according to claim 3, wherein the controller is adapted to control the colour or colour temperature of said LEDs in dependence on a user input received via the input interface.

91. The Showline Manual discloses Claim 6.

92. The Showline Manual discloses that the color LEDs can be controlled based on user inputs. One way that the color LEDs may be controlled is by using the “Edit a Preset,” “Edit a Chase,” and “Strobe / Timing” menus. *Id.* at 15-17.

93. Using the “Edit a Preset” menu, a user can adjust the “RGBW” (*i.e.*, red, green, blue and white) or “HSIC” (*i.e.*, hue, saturation, intensity, and color correction) parameters to change the color that will be output by the LEDs for that particular preset. *Id.* at 15.



Id. at 15 (annotated). The color of the preset can be adjusted by changing the percentage value for each of red, green, blue and white that will contribute to the overall color of the preset. *See supra* ¶¶ 54-59, 82-86 (Claims 1[b], 2). By increasing the percentage using the slider next to the “R” in the menu shown in the figure above, a user can increase the amount of “red” in the output light. Similarly, increasing both the “R” and “B” percentages increases the red and blue light, this could create a purple color for the preset.

94. The “Edit a Chase” menu allows users to select “presets or color filters” to apply to each step in the chase. *Id.* at 17. Allowing for further parameter adjustment, the colors of certain presets may also be adjusted in the “Edit a Preset” menu, giving wider customization. In the “Edit a Chase” menu, assigning a preset or color filter to a step controls the color the LEDs will out for that particular step in

the chase. The Showline Manual discloses that the “Edit a Chase” menu allows adjustments to “RGBW” or “HISC” parameters to change the color. *Id.* at 17. As explained above, a user could create a simple two step chase that alternates between a red color and a blue color. The lighting device will first display the red step when it outputs red light, then the blue step when it outputs blue light, and then loop back to the red step again.

95. In the “Strobe/Timing” menu, users can change the “Color Timing,” which are implemented by the LCD Display and Menu System to control timing changes between different colors in a chase effect. *Id.* at 17. When a chase effect includes multiple colors, the “Strobe/Timing” menu controls the timing of changes between these different colors.

96. The “Color Temperature” parameter is also adjustable by a user in the Showline Manual, and can be adjusted between “2700 – 6,500K.” *Id.* at 42.

1. Operational Specifications

Source:	Color RGBW LED Array (x9 - 15 Watt High Power LED Chipsets)
Beam Angle:	8 to 40 Degrees (hand adjustable)
Light Output:	> 3,200 lumens
Color Temperature:	2700 - 6,500K (user adjustable)

Id. at 42 (annotated), 25, 30. The color temperature is a way to describe the appearance of white light output from the light source. Color temperature indicates how “cool” or “hot” the light will appear, and is measured in degrees Kelvin (K).

A “cool” light may be a neutral white light, or have a slight blue tint to the white light. A “warm” white light may have a yellow-white appearance.

97. The Showline Manual discloses variable control of correlated color temperature (CCT) control through DMX settings when in the HSIC (hue, saturation, color, intensity, and color correction) mode on the LCD Display and Menu System. *Id.* at 29-30. This allows users to adjust the color temperature between 2700-6500K when in that mode. *Id.* The use of DMX signals is a common control protocol standard created by and for the entertainment lighting industry, and a POSITA would be very familiar with how DMX operates and can be used to control lighting units for the entertainment industry.

98. The Showline Manual discloses a wide range of preset “white” colors having different temperatures is available in the other operation modes where RGBW control rather than HSIC control is used. *Id.* at 25. The Showline Manual describes color presets for “White” values at temperatures between 2700K and 10000K. *Id.*

99. As taught in the Showline Manual, the user also can control red, green, blue, and white emitters and is able to mix a very broad range of color temperatures in excess of the 2700K to 10000K range. A POSITA would understand how to adjust the red, green, blue, and white emitters individually to produce a CCT of a desired value.

100. A POSITA would understand that user adjustments of color temperature would be done through the LCD Display and Menu System. The LCD Display and Menu System provides “local control” of the fixture settings. *Id.* at 14. A POSITA would recognize that a user-adjustable color temperature would be one of these fixture settings.

101. The Showline Manual also teaches that the LCD Display and Menu System can access RGBW and HSIC parameters based on DMX maps. *Id.* at 15, 17. The Showline Manual, in showing the DMX mapping for the HSIC parameters, indicates that one is “variable control of correlated color temperature (CCT),” which can be adjusted between “2700-6500K.” *Id.* at 30. The Showline Manual indicates that these DMX control settings can be made available to the user through the LCD Display and Menu System.

e) Dependent Claim 8

Claim 8: The lighting system according to claim 6, wherein the lighting device is operable to produce light at a colour temperature typically in the range of 2800-7000 Kelvin.

102. The Showline Manual discloses Claim 8.

103. The Showline Manual discloses the LED array operates at a user adjustable “color temperature” in the range of 2700 – 6500K:

1. Operational Specifications

Source:	Color RGBW LED Array (x9 - 15 Watt High Power LED Chipsets)
Beam Angle:	8 to 40 Degrees (hand adjustable)
Light Output:	> 3,200 lumens
Color Temperature:	2700 - 6,500K (user adjustable)

Id. at 42. A wider range of preset color temperatures are also available. For instance, using a color preset may include “White 10000K,” “White 8000K,” “White 6500K,” “White 5600K,” “White 5000K,” “White 4500K,” “White 4000K,” “White 3200K,” “White 3000K,” and “White 2700K.” *Id.* at 25, 27, 30. The LEDs are capable of producing these different “temperature” “White” color values in the range spanning 2700K to 10000K. The Showline Manual discloses a lighting device that can produce light at a color temperature in the claimed range.

f) Dependent Claim 9

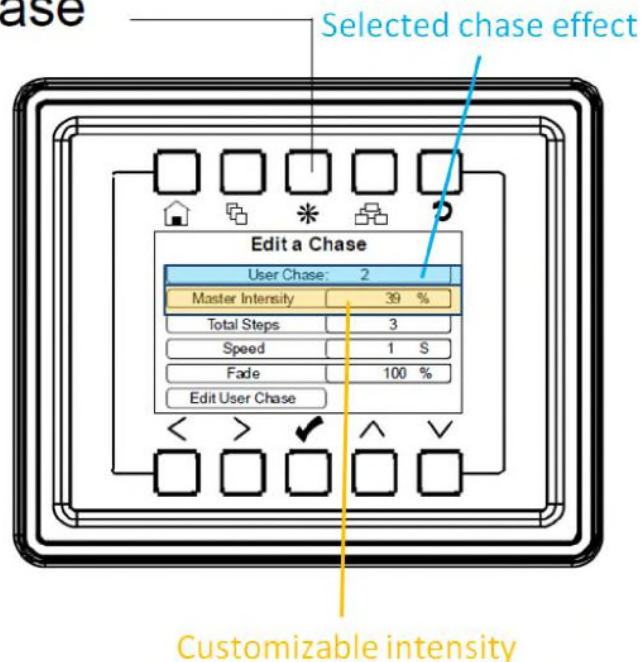
Claim 9: The lighting system according to claim 3, wherein the controller is adapted to control the brightness of said LEDs in dependence on a user input received via the input interface.

104. The Showline Manual discloses Claim 9.

105. The Showline Manual discloses that the Display and Menu System controls the intensity or brightness of the LEDs based on user inputs in the “Edit a Preset,” “Edit a Chase,” and “Strobe/Timing” menus. The Showline Manual discloses that “the master intensity” for any selected chase may be adjusted using “Up and Down” buttons and “Left and Right” buttons on the LCD Display and

Menu System. *Id.* at 16, Table 3. Using the “Edit a Chase” and “Strobe/Timing” menus, users can adjust the “master intensity” of the LED output. *Id.* at 16-17.

Edit a Chase



Id. at 17 (annotated).

g) Dependent Claim 10

Claim 10: The lighting system according to claim 1, wherein the simulation parameter comprises at least one of a colour and a colour temperature.

106. The Showline Manual discloses Claim 10.

107. The Showline Manual discloses that the adjustable parameters include selections of colors, color filters and user adjustable color temperature. See *supra* ¶¶ 91-103 (Claims 6, 8). A user can change the color and color temperature of the LEDs by changing color and temperature control parameters, including for chase effects. These user selections of color or color temperature are

input as parameters that result in control signals provided to the LEDs to run the desired user edited chase effects.

h) Dependent Claim 11

Claim 11: The lighting system according to claim 1, wherein the selected user customisable cinematic lighting special effect is designed to mimic at least one of fire; lightning; police car light; television; a neon flickering sign; a candle; muzzle (gunshot); welding; spark/short circuit; a scan (e.g. fingerprint scanner); paparazzi flashes; fireworks; flashes (strobe); a propeller; a (nuclear) explosion; and a wormhole.

108. The Showline Manual discloses Claim 11.

109. The Showline Manual discloses that the user-selected chase effects include at least flashes (“strobe”). Chase effects can include “[s]trobe mode and rate value settings,” and that “the time each strobe flash remains ON” in a chase effect can be adjusted based on user selections. *Id.* at 17, Table 4; *see also id.* at 28-29.

110. Based on the Showline Manual, a POSITA would understand that the editable chases, which can include various colors, flashing, strobing, steps, and fades between steps, would produce the other claimed effects referenced in Claim 11. A user may edit or create a chase with alternating red and blue lights that would mimic a police car. The highly customizable effects in the Showline Manual would allow a user great latitude in creating and modifying effects.

111. Additionally, a user could create a lightning effect by using a random strobe with an intense white color. Or a paparazzi effect could be created that

mimics the flashing of cameras by using short bursts of strobes. A user would only have to shorten the length of the bursts and intensity. Other adjustments of random strobe, color, intensity and duration allow the simulation of a television (*e.g.*, very fast flickering without ever being completely extinguished), welding or spark/short circuits (*e.g.*, strobing of bright white light at different intervals and speeds), a neon flickering sign (*e.g.*, slow random strobe with a red or orange color), a fire or candle flame (*e.g.*, slow movement of a red/orange color on the LEDs coupled with change of intensity), and many other cinematic effects.

i) Dependent Claims 12 and 21

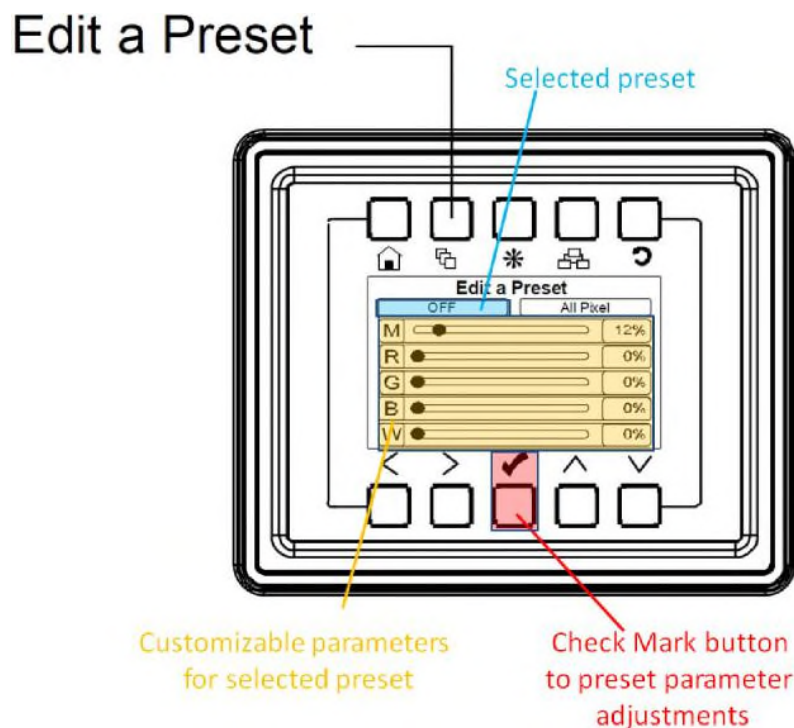
Claim 12: The lighting system according to claim 1, wherein the controller is adapted to store said at least one simulation parameter in memory.

Claim 21: The lighting system according to claim 12, wherein the controller is adapted to recall said stored at least one simulation parameter from said memory.

112. The Showline Manual discloses both Claims 12 and 21.

113. The Showline Manual discloses that the Display and Menu System can be adapted to store simulation parameters in a memory, and, when necessary, recall those simulation parameters from the menu. Users can save and recall simulation parameters with respect to both editable presets and chases.

114. A user may edit presets using the SL PAR's LCD Display and Menu System and save the parameters. *Id.* at 15-16. Once all values are adjusted as desired, a user may press a "Check Mark" button to save the preset. *Id.*



Id. at 15 (annotated). When the “Check Mark” is selected, a “Save Preset Menu” option appears, and the user can “select the preset number to save to.” *Id.* at 15-16. Saved presets can be “recalled via the menu,” meaning that the presets are recalled from the memory. *Id.* at 16.

115. Like the presets, a user can also adjust and save parameters relating to a chase. Users can adjust parameters for the ten factory defined chases and the eight user editable chases. *Id.* at 16. Using the LCD Display and Menu System, a user can select parameters, and then press a “Check button” when done to save the adjustments. *Id.* These chases, with adjusted parameters, can be “recalled” through the menu system. *Id.*

116. A user can also “edit and save” the user-editable chases in the “Edit User Chase” menu. *Id.* at 17. Then, a user pushes a “Return to Main Menu” button and the “user chase is now saved and can be recalled.” *Id.* at 17. The menu system allows to save a chase, and then later recall and play (or further customize and edit instantly while the effect is being generated) that particular chase.

117. A POSITA would understand that the adjusted values and parameters selected by the user for the “presets” and “chases” are “saved” in and “recalled” from a “memory.” The Display and Menu System is operated through a processor in the SL PAR unit, and the programming for the processor as well as the stored user adjustments and stored effects would be contained in memory as computer-readable instructions that can be recalled and implemented through the processor, with selections and operation status shown on Display and Menu System.

j) Dependent Claim 13

Claim 13: The lighting system according to claim 1, wherein the controller is adapted to control a plurality of lighting devices in dependence on the selected user customisable cinematic lighting special effect.

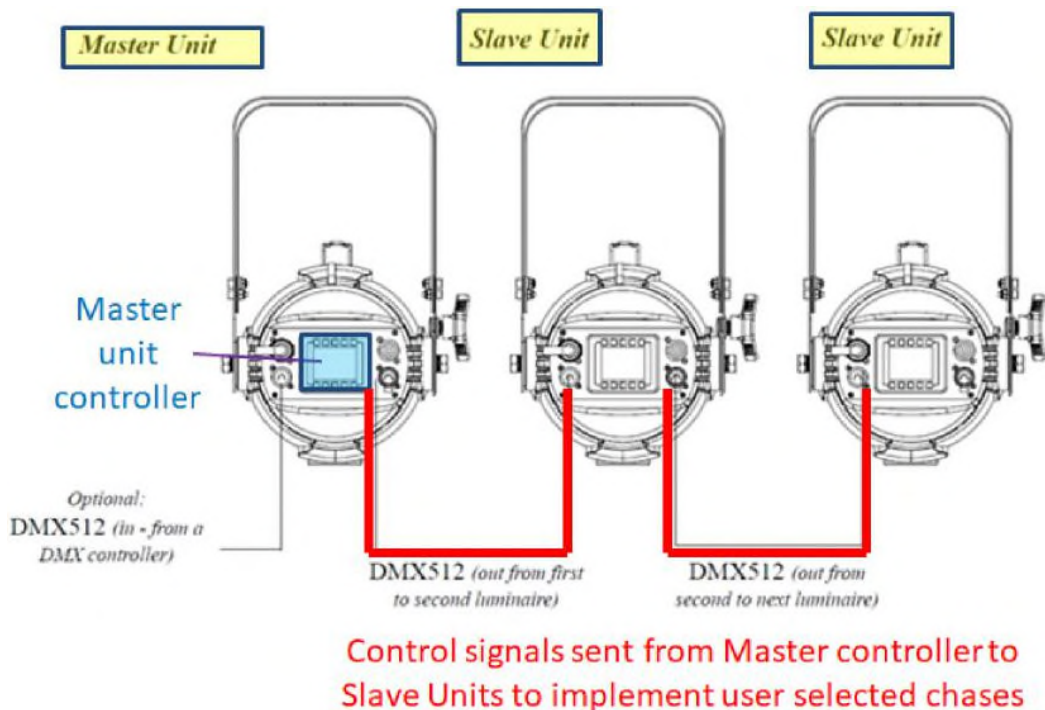
118. The Showline Manual discloses Claim 13.

119. The Showline Manual discloses a lighting device that has an array of nine RGBW LEDs. See ¶¶ 52-53 (Claim 1[a]). Each LED in the array is itself a “lighting device.” The nine LEDs constitute a plurality of lighting devices. The

LCD Display and Menu System controls this plurality of nine LED “lighting devices” in the device. *See supra* ¶¶ 54-79 (Claims 1[b]-[f]).

120. The Showline Manual also discloses that the Display and Menu System in one lighting unit can act as a “Master” controller, to control a plurality of “Slave” devices that include the same LED arrays. *Id.* at 23. For example, the teaching of the “[t]he Master / Slave Operational Mode allows one SL PAR 155 ZOOM RGBW LED Luminaire to act as the ‘Master’ unit and all other connected units are controlled by this unit. When a unit is set to ‘Slave’ mode, it will only listen to and follow any commands sent from a ‘Master’ unit. Only one ‘Master’ unit is allowed in this type of operation” discloses this claim. *Id.*

121. In the “Master/Slave” mode, the “presets and chases” selections made through the LCD Display and Menu System “recalled [*i.e.*, played] on the master will automatically play on the slaves without having to program the slaves.” *Id.* Through this mode, the plurality of “slave” units are controlled by the “master” unit, based on the user-selected, edited, and adjusted chase effects on the master.



Id. at Fig. 13 (annotated), 10, 23.

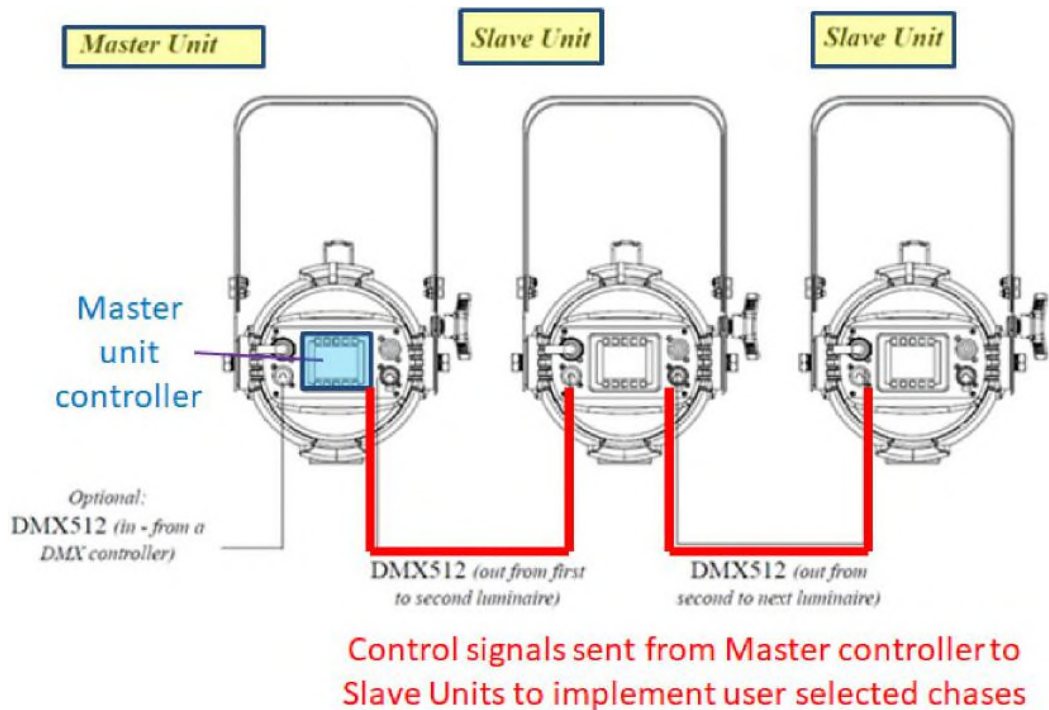
k) Dependent Claim 14

Claim 14: *The lighting system according to claim 1, further comprising a further lighting device, said further lighting device being separate from said controller.*

122. The Showline Manual discloses Claim 14.

123. Again, the “Master/Slave” operational mode, the “slave unit” SL PARs, with their LED arrays, are controlled by and separate from the “master unit” and its Display and Menu System that controls all SL PARs through the commands sent. See ¶¶ 118-121 (Claim 13).

124. The “master unit” (*e.g.*, controller) is separate from the LED arrays in the “slave unit” (*e.g.*, lighting devices) that it is controlling.



Id. at Fig. 13 (annotated), 10, 23.

I) Dependent Claim 16

Claim 16: *The lighting system according to claim 13, wherein the controller is adapted to at least one of: offset and overlap the output of said plurality of lights with one-another so as to simulate a moving light source.*

125. The Showline Manual discloses Claim 16.

126. As discussed in detail above, the Display and Menu System controls the plurality of LEDs in the array of nine LEDs.

127. Each of the LEDs in the array is a lighting device that is controlled by the Display and Menu System. The LCD Display and Menu System can at least offset or overlap these LEDs to simulate a moving light source.

128. In creating and producing chase effects, the LCD Display and Menu System can set the master intensity of the chase, the number of steps in a chase, the speed of implementing all steps in the chase, and the “fade” between steps in the chase. *Id.* at 17. Changing the intensity and fade values for the LEDs in implementing these chases simulates a moving light source.

129. When the light produced by the LEDs in a step fades, it provides the appearance of a light moving farther away until it is no longer visible. A user could set a chase with a step where the light slowly fades from high intensity to zero intensity. This would produce an effect mimicking a light source slowly moving off into the distance until it was no longer visible.

130. As discussed above, the Showline Manual also discloses a “Master/Slave Operational Mode” in which the slave units “mimic the master unit’s operation in all cases.” *Id.* at 24. The Display and Menu System in the master is adapted to overlap the output of the LED arrays in the master and slave units when running a chase effect. This can be used to simulate a moving light source.

m) Dependent Claim 17

Claim 17: *The lighting system according to claim 1, wherein the controller is separable from the lighting device.*

131. The Showline Manual discloses Claim 17.

132. The Showline Manual discloses that the lighting device can be controlled by a separate DMX512 control source. *Id.* at 9-10, 19-20, Figs. 5, 13. The DMX512 control source is physically attached to the unit through a DMX connector. *Id.* at 10. The DMX512 controller and the unit are combined and integrated into one unit. The same selection, adjustment, and recall of chase effects, color filters, and presets that can be made through the Display and Menu System can also be made through the separable DMX512 controller. *Id.* at 15-17. The “[p]resets are stored values of the luminaire's LED settings that can be recalled via the menu system or DMX,” color filters “can be recalled via the menu system or DMX,” and “Effects are chases stored values of the luminaire’s LED settings that can be recalled via the menu system or DMX.” *Id.*

133. A DMX “cable” connector can be used to connect the DMX controller to device. *Id.* at 10. This creates a combined unit physically connected DMX controller. This DMX connector, however, can also be disconnected from the SL PAR unit and its LED array, and is “separable” from the LED lighting devices.

n) **Dependent Claim 18**

Claim 18: *The lighting system according to claim 1, wherein the input interface comprises at least one of: a wireless communication interface; a dial; a slider; a control panel; a display and buttons; and a touch screen.*

134. The Showline Manual discloses Claim 18.

135. The Showline Manual discloses that the LCD Display and Menu System includes an LCD display with selectable menu buttons. See *supra* ¶¶ 60-64 (Claim 1[c]).

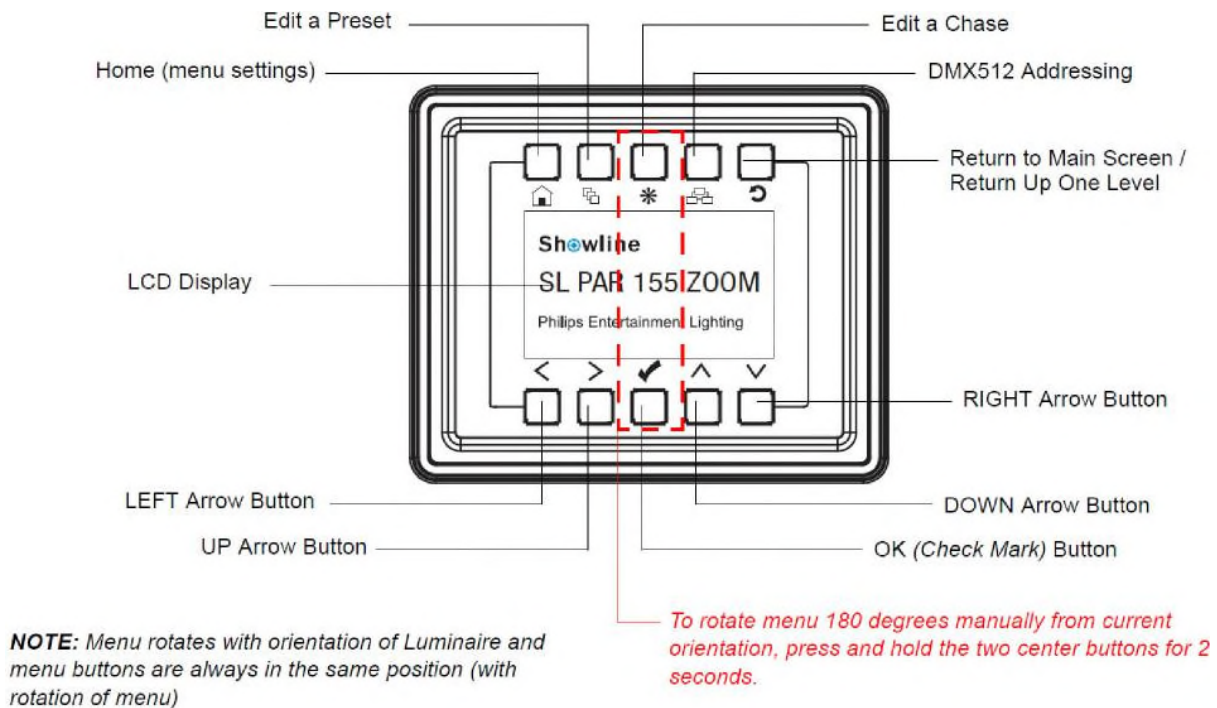


Figure 11: LCD Display and Menu System

Id. at Fig. 11. This is a “control panel” and also is a display with buttons, and could be a touchscreen.

o) Dependent Claim 19

Claim 19: The lighting system according to claim 1, further comprising a converter adapted to convert at least one of brightness and colour data from the simulator into lighting signals for output by the output.

136. The Showline Manual discloses Claim 19.

137. The '258 Patent describes the converter as a component that converts the data into a signal suitable for the particular light elements being controlled. The '258 Patent states the “lighting data converter 107 may convert the data 106 from the lighting effect simulator 100 into a suitable signal for a particular light 102.” Ex. 1001 at 8:41-53.

138. A POSITA would understand that a “converter” (to convert the data into an appropriate signal suitable for the LEDs) is disclosed in the Showline Manual as part of the SL PAR. For instance, as the user adjusts the parameters, and selects presets and chases, to run on the lighting device, the LEDs light accordingly, so as to show the user the effect selected. The LEDs are controlled using suitable signals, for them to turn on and off at the appropriate colors, intensities, times, and fades.

139. The LEDs disclosed in the Showline Manual are “15 Watt High Power LED Chipsets.” *Id.* at 42. A POSITA would understand that the SL PAR includes a converter to change command signals reflecting the desired lighting effects and values into power signals that are provided to these chipsets, such that

the LEDs can output the appropriate lighting colors and intensities over time to produce the desired light output. The color and intensity (brightness) values for the presets and chases (see ¶¶ 65-69, 91-101 (Claims 1[d], 6)), are converted by LED driver circuitry in the SL PAR to lighting signals that are sent to the LED chipsets to cause the red, green, blue and white LEDs thereon to output the appropriate light.

p) Dependent Claim 20

Claim 20: The lighting system according to claim 1, wherein the lighting system is a lighting system for at least one of: videography; broadcast; cinematography; studio filming; and location filming.

140. The Showline Manual discloses Claim 20.

141. The Showline Manual discloses a lighting device that was intended for use, and was used, to create lighting effects for videography, broadcast, cinematography, studio filming, or location filming. The Showline is a product line that is provided by Vari-Lite, a company that manufactured lights for film, TV, and theatrical use. The SL PAR, a real-world product, was designed for such uses. A POSITA would have known that Vari-Lite's products, including the SL PAR as described in Showline Manual, can be used for effects in videography; broadcast; cinematography; studio filming; and location filming.

142. The Showline Manual also expressly discloses mounting SL PAR units to trusses or in hanging applications, and that SL PAR units may be

mounted to the floor. *Id.* at 11-12, Figs. 7-9. A POSITA would understand that these teachings relate to expected lighting set ups for studio filming applications, where a studio stage is illuminated with various luminaires mounted to trusses above the stage, and also from luminaires mounted to the floor that provide light illuminating scenes from below.

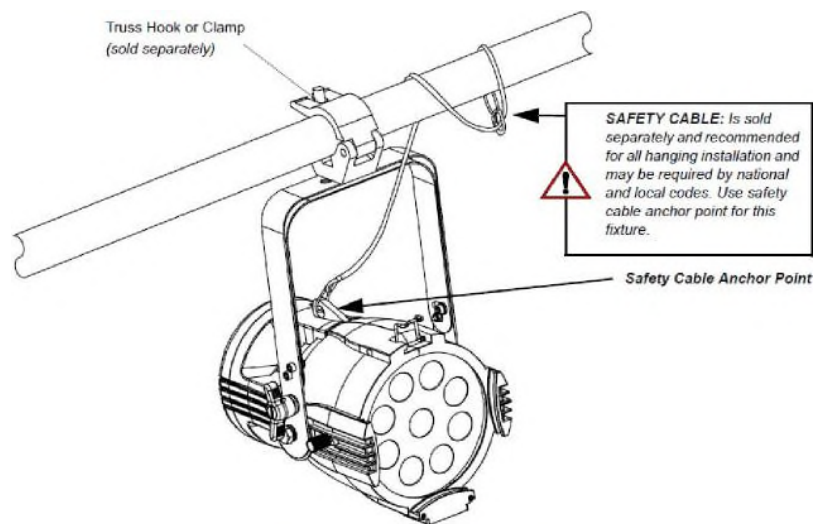


Figure 8: Mounting the Fixture - Hanging Applications

Id. at Fig. 8.

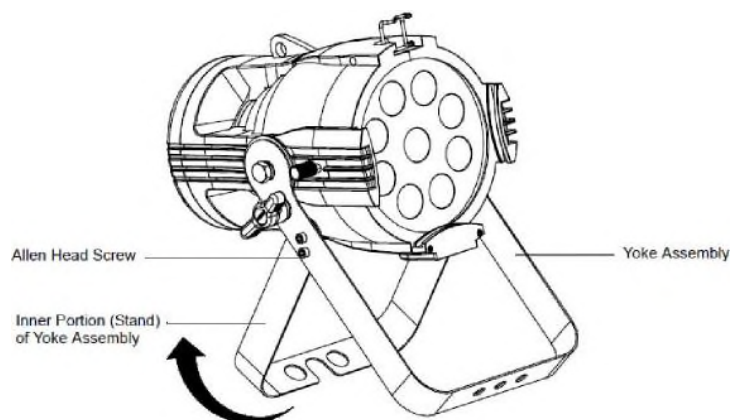


Figure 9: Floor Mounting

Id. at Fig. 9.

143. The teachings relating to the use of DMX512 also would have disclosed to a POSITA that the Showline Manual discloses a lighting device intended for use in TV, cinematography, and studio filming. DMX512 is a common communication standard created by and for the entertainment lighting industry.

144. Lastly, the Showline Manual is shown as being available with a Stagepin connector. *Id.* at 5. The Stagepin connector is used in entertainment lighting venues in the U.S.

q) Dependent Claim 22

Claim 22: The lighting system according to claim 14, wherein said controller is adapted to control said further lighting device in dependence on the selected user customisable cinematic lighting special effect.

145. The Showline Manual discloses Claim 22.

146. The Showline Manual discloses a “master/slave” mode where the Display and Menu System in the master unit controls the LED arrays in the slave units based on the user-selected effects recalled on the master unit.

147. As I mentioned with respect to Claim 14, selecting an effect on the “master unit” causes the effect to be run (or played) on the master unit and all slave units.

IX. GROUND II: CLAIMS 1-6, 8-14, AND 16-22 WOULD HAVE BEEN OBVIOUS TO A POSITA IN VIEW OF THE SHOWLINE MANUAL

148. I incorporate here by reference each of my opinions in the proceeding sections relating to Ground I, as the disclosures from the Showline Manual supporting my opinion that the Showline Manual anticipates Claims 1-6, 8-14, and 16-22 apply equally to my opinion that Claims 1-6, 8-14, and 16-22 would have been obvious to a POSITA in view of the Showline Manual.

149. As I explained in detail in Section VIII, it is my opinion that the Showline Manual expressly discloses, and therefore anticipates, each of Claims 1-6, 8-14, and 16-22. The disclosures from the Showline Manual are nearly identical to, and in most instances more detailed than, the disclosures and claims in the '258 Patent. To the extent the Board finds that Independent Claim 1 is not disclosed by the Showline Manual it, and all of its dependent claims, would have been obvious to a POSITA.

150. For instance, the “calculate” limitation in Claim 1 would have been at least obvious to a POSITA in view of the Showline Manual. Claim limitation 1[d] states as follows: “an effect simulator adapted to calculate a time varying lighting value based on at least one simulation parameter.” Ex. 1001 at Claim 1. The '258 Patent does not provide any details regarding **how** the “calculation” is purportedly performed by the “effect simulator.” The '258 Patent does not disclose a specific algorithm that would be contemplated by the claims, or a

specific way in which a “calculation” is being performed. As I opine in detail in Section VIII.B.a (Claim 1[d]), a POSITA would understand that the “effect simulator” takes the user input parameters and generates or creates the lighting effect by calculating. I agree with Dr. Bretschneider when he testified that a POSITA who knows about color sciences and color mixing and different lighting effects would understand that to produce a lighting effect a POSITA would know a calculation occurs. Ex. 1010 at 149:11-153:9, 153:19-154:18, 155:4-6, 165:9-11, 176:16-19; 150:14-21, 152:10-22, 185:7-188:13 (“[W]hen you set fire temperature or the fire color to 2000 Kelvin, there *has to be a calculation.*”) (emphasis added).

151. This is not new or unique, and a POSITA would have understood that the specific data (i.e., brightness and color values or timing) for an effect is created after the user selects the effect and customizes its parameters. A POSITA would have also understood that performing a calculation to determine how the LED lights will behave to generate a lighting effect is a standard functionality performed by a computer processor in any entertainment lighting device at the time of the invention. In this context, calculating refers to the function of the microprocessor within a lighting fixture.

152. For example, DMX-512 is a stream of 8-bit resolution of data values that are transmitted from a controlling device to a given lighting fixture and

accessed by said fixture through addressing of the fixture. Addressing is accomplished by setting a start value, from 1 to 512. The lighting fixture is set to receive data starting at a specific address (set by the fixture through a user interface) and accepting as many packets of data as needed to control the various functions of the fixture. Simple on/off only needs one data packet and can be linked to any of the 1-512 data channels.

153. A more complex lighting fixture might utilize 8 data packets to control multiple functions.

154. The values of these data packets are then used to “set” certain functional parameters within the lighting fixture. For example, data packet 1 may be dedicated to controlling lighting intensity. This could be used to control a mechanical dimming shutter via a stepper motor in the case of HID-based “intelligent” lighting fixtures or by utilizing Pulse Width Modulation (“PWM”) of an electronic dimming circuit for LEDs. An LED fixture such as Showline, which has multiple colors of LEDs, would utilize multiple data packets to control the intensity of the five colors.

155. One key element is the difference between DMX (a linear control) and the eye/photopic response to lighting (not linear). The sensitivity of the human eye allows for a wide range of sensitivity, 10 billion-fold, allowing us to

see at extremely low light values (e.g., a single candle illuminating a room) to extremely high values (e.g., intense sunlight).

156. This response curve can be thought of as a logarithmic equivalent to 10X log, which requires that we utilize a non-linear curve controlling lighting intensity to better correspond to the sensitivity of human vision. This conversion from the linear values of DMX to logarithmic photopic response of human vision has to be translated.

157. Lighting fixture can adapt to photopic response and generate effects, while the DMX value is fixed or variable to elicit a specific response. The DMX values would not need to be constantly changed to elicit a specific effect.

158. A POSITA would understand that the Showline Manual discloses that the effects, like Chases and Presets, do not exist until a user creates and adds or edits each new step/parameter for the effect. Ex. 1004 at 17 (noting chases are “customized to create different effects”). If the effect does not exist until the user creates it, it is not pre-recorded and a POSITA would understand that the effect is generated as disclosed in the '258 Patent (*i.e.*, the processor uses the numerical parameter data input by a user and calculates how the effect looks). These lighting values would have to be created (*i.e.*, “calculated”) each time a user adjusts the parameters of an effect, adds a new step to a Chase with new

parameters, or adds Strobe/Timing parameter adjustments to an active effect. Ex. 1004 at 14-18.

159. A POSITA would have understood that the specific data (*i.e.*, brightness and color values) for an effect—like a customized Chase—is created *after* the user selects the effect and customizes its parameters. Claim 1, including the “calculate” limitation, would have been obvious to a POSITA. A POSITA would have also understood that the teachings in the Showline Manual relate to expected lighting set ups for studio filming applications, where a studio stage is illuminated with various luminaires mounted to trusses above the stage, and also from luminaires mounted to the floor that provide light illuminating scenes from below. A POSITA would understand that the Showline Manual’s teachings regarding the use of DMX512 disclose a lighting device intended for use in TV, cinematography, and studio filming. DMX512 is a common communication standard created by and for the entertainment lighting industry.

X. GROUND III: THE SHOWLINE MANUAL IN VIEW OF CHOONG DISCLOSES CLAIM 7, AND CLAIM 7 WOULD HAVE BEEN OBVIOUS TO A POSITA

Claim 7: The lighting system according to claim 3, wherein the lighting device comprises at least one ‘warm’ white and at least one ‘cool’ white LED.

160. The Showline Manual in view of Choong discloses Claim 7, and Claim 7 would have been obvious to a POSITA.

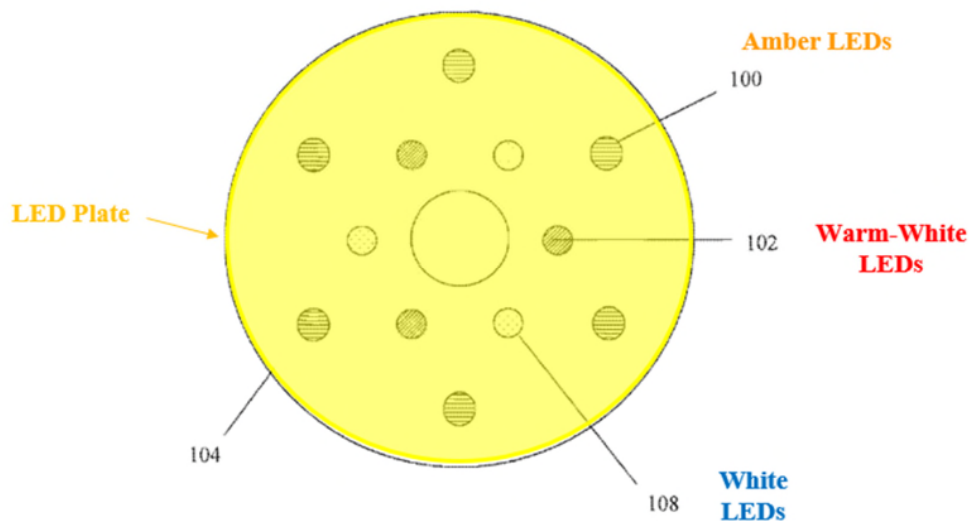
161. The ’258 Patent describes “warm” white LEDs as those having temperatures in the range of 2800 Kelvin and “cool” white LEDs as those having temperatures in the range of 7000 Kelvin. Ex. 1001 at 8:54-64. This is consistent with the understanding of a POSITA.

162. The Showline Manual discloses that the LEDs are RGBW (*i.e.*, red, green, blue, and white) LEDs. Ex. 1004 at 16, 21. These LEDs can produce white light of different color temperatures, from 2700K up to 10000K. *Id.* at 25, 42. The Showline Manual discloses that a “Harmonize Color Calibration” feature, which is “a proprietary, advanced LED color matching system, consisting of 3 correction modules: RGB, RGBW and Cool White/Warm White,” may be used to make color corrections. *Id.* at 21. These corrections in the Showline Manual include corrections to “cool White” and “Warm White” light.

163. U.S. Patent No. 8,632,208 to Choong (“Choong”) (Ex. 1006), titled “Methodology of Providing White Lighting with Colour Combination,” also discloses a controllable LED light source comprising a plurality of LEDs to

produce white light output at different color temperatures. Ex. 1006 at Abstract, 2:56-63. I understand that Choong is prior art to the '258 Patent.

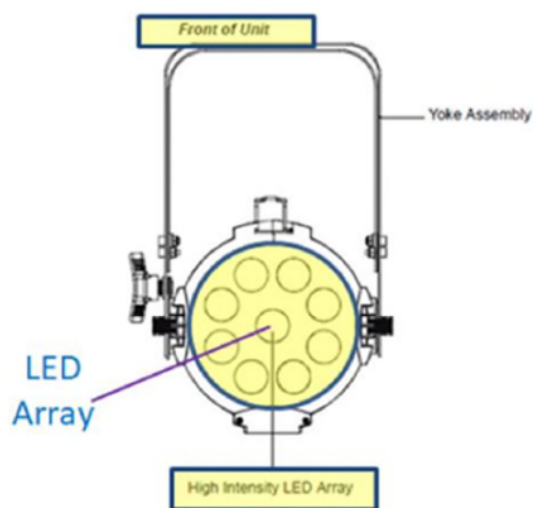
164. Choong discloses using both “warm” white and “cool” light LEDs in its array and teaches “creating lighting of white colour with the intended CCT [correlated color temperature] to ease the user to control CCT of white lighting sources when the lighting source contains a plurality of cool white LEDs (not shown), white LEDs (108), warm white LEDs (102) and amber LEDs (100).” *Id.* at 2:56-63, 4:39-55 (“The second group of LEDs comprises warm-white LEDs (102) with CCT range of 2500K to 3700K.... The fourth group of LEDs comprises cool white LEDs (not shown) with CCT range of 5000K to 7000K.”).



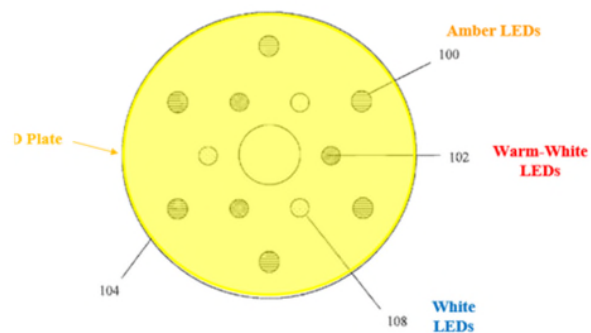
Id. at Fig. 1 (annotated).

165. Choong also teaches that different white LEDs, including warm and cool white LEDs, are controlled to obtain the desired color temperature output. *Id.* at 5:7-12 (“A processing means is included to the LED lamp to control the usage of the LED groups in order to obtain the desired total CCT for the LED lamp.”) A POSITA would recognize this is similar to the type of control used in the Showline Manual.

166. A POSITA would have known to use the “cool” white and “warm” white LEDs disclosed in Choong in the LED array of the Showline Manual. For instance, Choong and the Showline Manual are both in the same technical field of controllable LED lighting arrays. Both of these references disclose groups of LEDs provided in array that are controlled to produce desired white light temperature output:



Showline Manual



Choong

Ex. 1004 at Fig. 2 (annotated), 14-17, 21; Ex. 1006 at Fig. 1 (annotated), 4:39-5:12.

167. Both the Showline Manual and Choong disclose groups of LEDs that provide the same function. That is, producing white light at a particular color temperature. For instance, the Showline Manual discloses a “Cool White/Warm White” correction module that provides “control of color and intensity.” *Id.* at 21. Choong also discloses a “processing means is included to the LED lamp to control the usage of the LED groups in order to obtain the desired total CCT for the LED lamp.” Ex. 1006 at 5:7-12.

168. A POSITA would have expected the warm and cool white LEDs of Choong, when used in the lighting device disclosed in the Showline Manual, to continue to perform the same function of producing white light. A POSITA would have been motivated to use the Choong LEDs with the lighting device disclosed in the Showline Manual.

169. Using the warm and cool white LEDs taught in Choong in the LED array of the Showline Manual would have been the expected use of such well-known LED lights, and would have yielded a predictable result of providing white light of a desired color temperature without requiring mixing of light from red, green, and blue LEDs. It was well-known to create white light through “colour mixing, wherein the usage of a plurality of LEDs with different colours,

combined together in the correct proportion in order to produce white light.” Ex. 1006 at 1:66-2:13.

170. Choong further teaches that “creating lighting of white colour with the intended CCT to ease the user to control CCT of white lighting sources when the lighting source contains a plurality of cool white LEDs (not shown), white LEDs (108), warm white LEDs (102) and amber LEDs (100).” *Id.* at 2:56-62. Therefore, by using combinations of warm and cool white LEDs, the intended white color temperature is obtained with easier user control and without needing extra energy or a higher quantity of LEDs.

171. A POSITA would have been motivated to use the “cool” and “warm” white LEDs taught in Choong in the LED array of the Showline Manual to achieve the same white light output across a range of color temperatures, without needing extra power or increased LEDs of combined colors. A POSITA would have a reasonable expectation of success as this would have been a simple substitution of LEDs. The cool and warm white LEDs disclosed in Choong would continue to perform their same function (*i.e.*, outputting white light at a particular desired temperature under control of a processor). The combination of Choong and the Showline Manual would have involved replacing one known technique of producing white light (mixing light from red, blue and green LEDs) with another

(use of warm and cool white LEDs) to yield a predictable result (controlled white light output in the temperature range from 2500K to 7000K).

XI. GROUND IV: THE SHOWLINE MANUAL IN VIEW OF REINOSO DISCLOSE CLAIM 15, AND CLAIM 15 WOULD HAVE BEEN OBVIOUS TO A POSITA

Claim 15: The lighting system according to claim 14, wherein the controller comprises a wireless communication interface adapted for wireless communication with said further lighting device.

172. The Showline Manual in view of Reinoso discloses Claim 15, and Claim 15 would have been obvious to a POSITA.

173. The Showline Manual discloses a wired communication interface communicate with other SL PAR units. See ¶¶ 118-121 (Claim 13). As previously discussed, the Showline Manual discloses that the interface on the rear of the SL PAR unit includes an interface having connections for wired DMX cables, including “DMX512/RDM” input and output connectors:

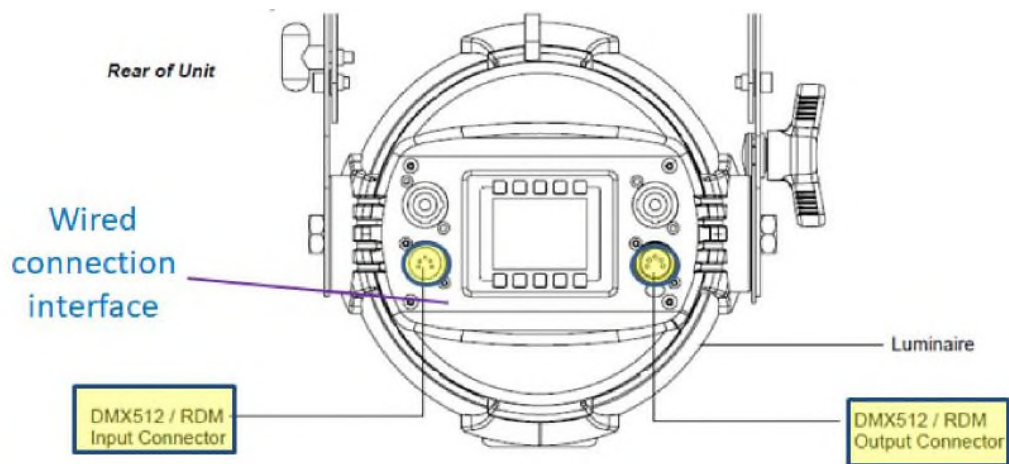
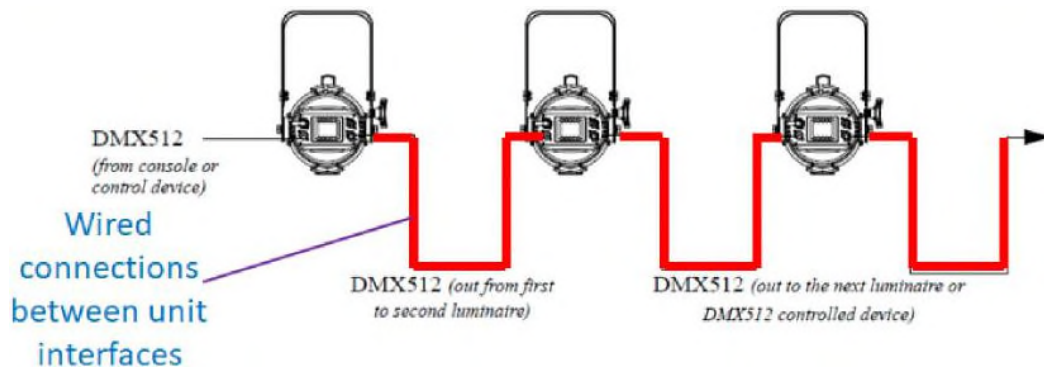


Figure 5: SL PAR 155 ZOOM RGBW LED Luminaire DMX512 Input / Output Connections

Note: For more information on DMX512 networking and systems, refer to ["Additional Resources for DMX512" on page 1](#). For SL PAR 155 ZOOM RGBW LED Luminaire DMX Mapping, refer to ["DMX CONTROL" on page 24](#).



Ex. 1004 at Fig. 5 (annotated), 10, 24.

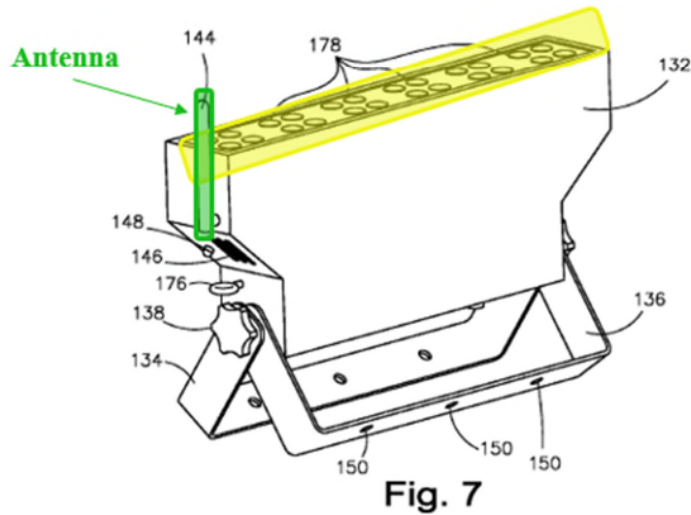
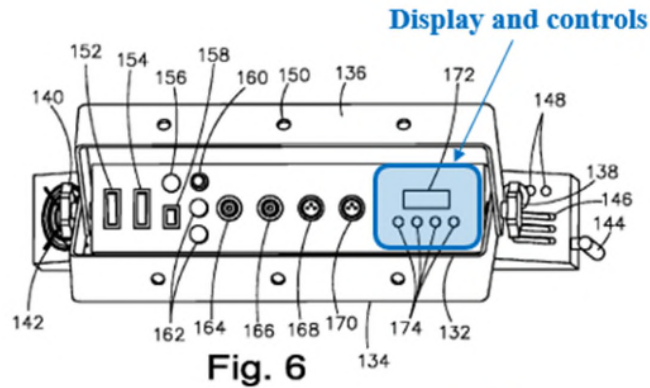
174. In the master/slave mode, the Showline Manual discloses the Display and Menu System on the master unit communicates through the wired DMX512/RDM input and output connectors with slave units. *Id.* at 10, 24, Fig. 13.

175. Reinoso, in the technical field of networked LED lighting devices as the Showline Manual, discloses that LED light fixtures can communicate over wired or wireless communication interfaces using the DMX protocol. Ex. 1007 at

Abstract (“A DMX based wireless, light emitting device and system including wireless modules that are battery powered and wirelessly receive and transmit DMX to other modules or a controller device. The modules can optionally be hard wired to both a DMX signal and external power supply.”). I understand Reinoso is prior art to the ’258 Patent.

176. Reinoso discloses “a wireless and cordless lighting effects module that is highly functional on its own and also flexible to seamlessly integrates multiple modules and other third-party systems.” *Id.* at 1:41-46. The “battery powered wireless lighting system is especially useful for production companies, event companies, party companies, DJs, hotels, clubs, banquet halls, etc.” *Id.* at 1:52-55.

177. Just like the Showline Manual, each Reinoso light includes RGBW LEDs, electronic dimming, and LED display and function control buttons, and a master/slave synchronization mode. Ex. 1007 at 3:3-28, 5:21-31. The Reinoso lighting modules further comprise a “[b]uilt in receiver/transmitter for wireless DMX operation,” and can communicate via this receiver/transmitter using the wireless DMX protocol. *Id.* at 3:3-28, 6:39-65.



Id. at Figs. 6, 7 (annotated).

178. In the master/slave mode, Reinoso discloses that the lighting modules communicate through wireless DMX512 protocol interfaces, just like in the Showline Manual. *Id.* at 3:3-28, 3:54-4:66. Reinoso also discloses “[an] important feature of the invention is to be able wirelessly relay the DMX signal from any module to a sister-module. Referring now to FIG. 8 where a system of multiple devices is shown with other non-claimed elements. In this example module 182-A is a master module. Module 182-A is connected via DMX cable

192 to a controller 180. Module 182-A then relays the wireless signal 194 to module 182-B which in turn relays the signal 194 to module 182-C and again on to module 182-D. As should now be apparent, this can greatly extend the overall range that a DMX signal can be transmitted. Practically, the signal could be relayed over many miles when there are a series of modules spaced at distance where one module can relay to the next repeatedly.” *Id.* at 9:41-58.

179. A POSITA would have been motivated to use the well-known and standard wireless DMX512 interfaces and protocol taught in Reinoso with the Showline Manual devices. Using the wireless DMX512 protocol would have allowed for extended communication of signals, without the need to run extensive lengths of cable or run cables in areas that may not be readily accessible, and would reduce the risk of communication faults caused by damaged cables. Ex. 1007 at 4:36-54.

180. If a lighting fixture is attached in a remote location, it may be difficult for a lighting engineer to run DMX cables from a DMX control board to the lighting fixture. Further, when using wired communication interfaces connected by cables, there is a risk that the cables themselves become damaged. A POSITA would understand that a wireless communication system would not suffer from these same drawbacks identified in Reinoso.

181. Reinoso also discloses the same DMX512 protocol standard that is discussed in the Showline Manual. A POSITA would understand that this protocol can be used to implement the wireless communications between LED lighting devices. Ex. 1007 at 3:3-28, 3:54-4:66. A POSITA would have expected that using a wireless, as opposed to wired, communications interface to implement the same DMX communications standard would yield predictable results. And changing from a wired interface to a wireless interface would merely be substituting one known communication method for another, as the same DMX512 protocol would simply be transmitted wirelessly through antennas, as shown in Reinoso, as opposed to through cables, as shown in the Showline Manual.

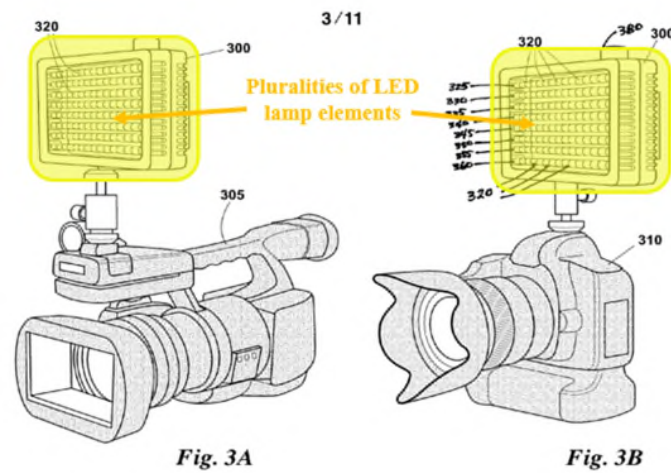
XII. GROUND V: POHLERT ANTICIPATES CLAIMS 1-22

A. Pohlert

182. Pohlert (Ex. 1008) is directed to a professional LED lighting and effects generation system. I understand Pohlert is prior art to the '258 Patent.

183. Pohlert discloses a “lighting and effects generation system” (Figs. 3A and 3B) that include LED lamps in a lighting frame. Ex. 1008 at Abstract, [0051], [0057]. The lighting frame may be large, comprising multiple panels, or may be smaller and attached to a video or still camera. The LED lamps in the frame have a connected and dedicated “power controller.” *Id.* The power

controller includes: (1) a user interface to select and customize lighting effects, (2) an “effects generator” that generates the selected effects, and (3) switches that convert the generated effects into power control signals output to the LEDs.



Id. at Figs. 3A-3B (annotated).

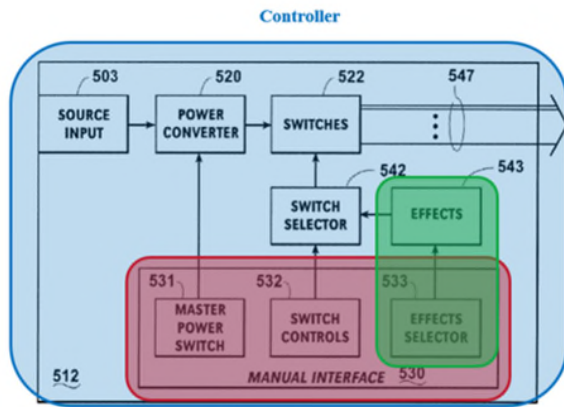


Fig. 5A

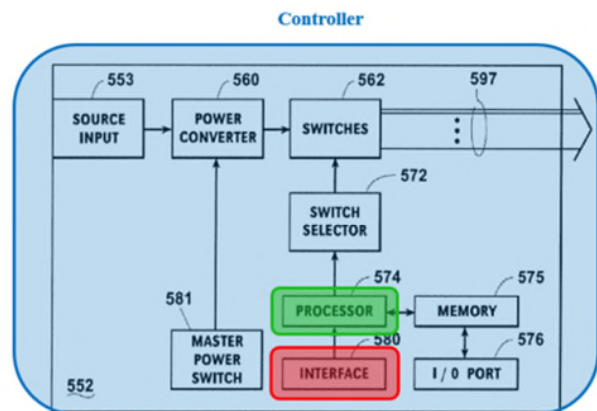


Fig. 5B

Id. at Figs. 5A-5B (annotated). The power controllers are used in the configurations shown in Figures 3A and 3B. *Id.* at [0059-0063].

B. Pohlert Discloses Claims 1-22

a) Independent Claim 1

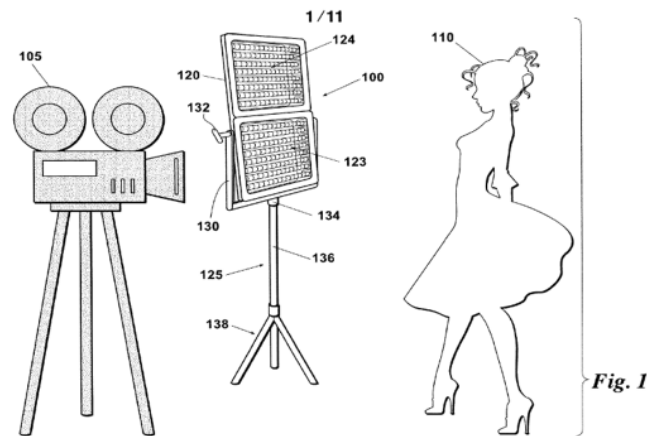
184. As viewed by a Person of Ordinary Skill, Pohlert discloses Claim 1.

Claim 1[pre]: A lighting system comprising:

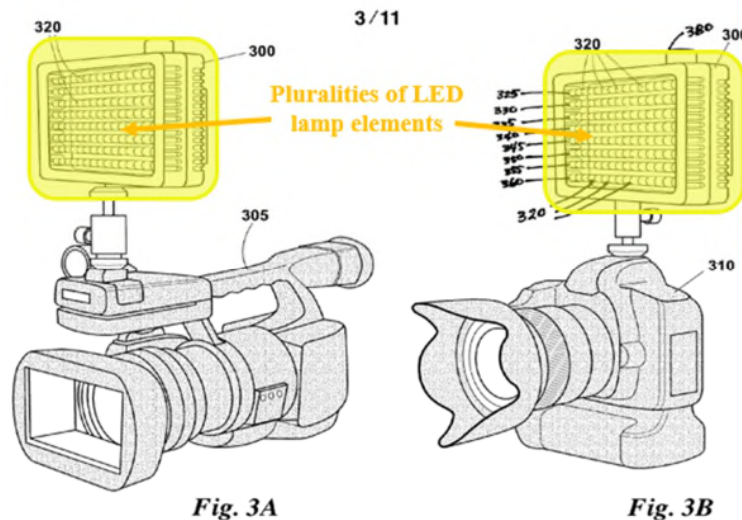
185. Pohlert discloses the preamble to Claim 1.

186. Pohlert discloses a lighting system including LED “light panels” controlled by a “power controller.” The power controller includes a user interface that enables a user to select and modify lighting special effects, such as patterns of strobing, flashing, dimming and brightening the lights. *Id.* at Abstract, [0020],

[0050], [0063], [0067]. The lighting system “may provide a variety of lighting patterns, including programmable patterns by which individual or groups of lights can be controlled for different lighting effects.” *Id.* at [0103]. Pohlert also discloses that its lighting system can be used to provide illumination for “a subject during video photography.” *Id.* at [0020].



Id. at Fig. 1.

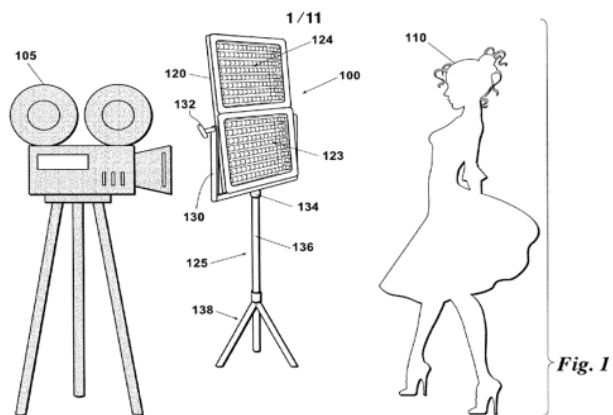


Id. at Figs. 3A, 3B (annotated).

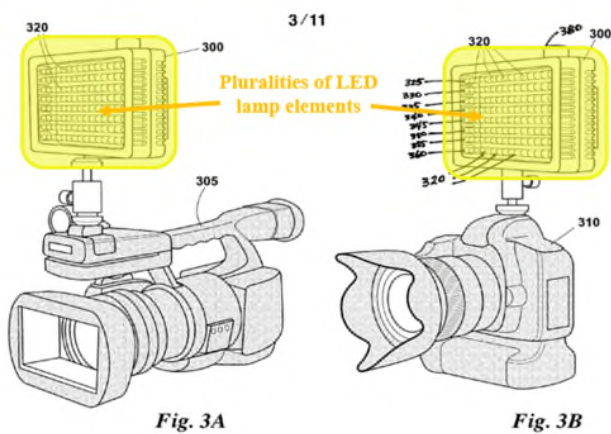
Claim 1[a]: a lighting device; and

187. Pohlert discloses Claim 1[a].

188. The lighting system disclosed in Pohlert includes “a light panel having a panel frame, and a plurality of LEDs or other light elements secured to the panel frame.” *Id.* at Abstract. The “lighting effects system” comprises “an arrangement of lamp elements on a panel or frame,” and that the “lamp elements may be embodied as low power lights such as light emitting diodes (LEDs) or light emitting electrochemical cells (LECs), for example, and may be arranged on the panel or frame in a pattern so as to provide relatively even, dispersive light.” *Id.* at [0050]. The LED lights disclosed in Pohlert are “lighting devices” that provide “illumination” and desired effects, such as a “flash or strobe,” during video capture or still photography. *Id.* at [0020]-[0021], [0050]-[0053], [0057].



Id. at Fig. 1.

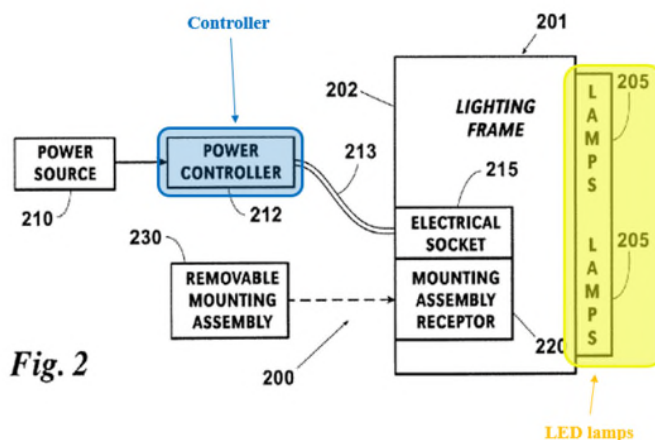


Id. at Figs. 3A, 3B (annotated).

Claim 1[b]: a controller adapted to control the lighting device to produce a user customisable cinematic lighting special effect selected from a range of different user customisable cinematic lighting special effects, the controller comprising:

189. Pohlert discloses Claim 1[b].

190. The LED lamps are “controlled by a power controller 212 such as is generally shown in FIG. 2.” *Id.* at [0057]. Figures 5A and 5B show two examples of power controllers in more detail. *Id.* at [0058]-[0067].



Id. at Fig. 2 (annotated).

191. The power controller sends control signals to the lighting elements to produce different special effects that can be captured, for example, by a “motion picture-type camera.” *Id.* at [0052], [0057]-[0059].

192. Pohlert discloses a user interface on the controller. A user can select from a range of effects using the user interface, including patterns of strobing, flashing, and dimming and brightening the light elements. *Id.* at [0059]-[0061].

These user selections are converted into control signals sent to the LED lamps to generate and output the effects. *Id.* at [0057]-[0059], [0061], [0063], [0067], Figs. 2, 5A-5B. The user can “customize” the generated effects by, for example, selecting different combinations of patterns or adjusting the controls for dimming or brightening individual or groups of LEDs. *Id.* at [0061]-[0063], [0067].

193. Figures 5A and 5B show two examples of power controllers in more detail. *Id.* at [0058]-[0067].

194. In annotated Figure 5A, below, this power controller is depicted:

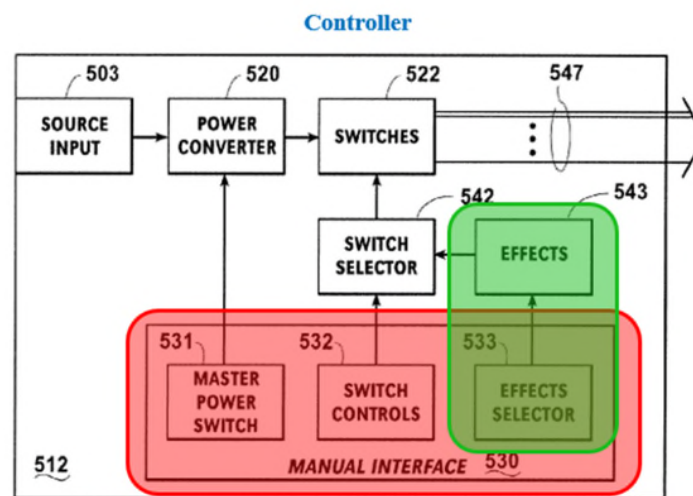


Fig. 5A

Id. at Fig. 5A (annotated). The controller in Figure 5A includes a manual user interface, where user selections are made through knobs, switches, buttons, and other inputs to provide control signals to switches, which switches, in turn, control power supplied to the LEDs to implement the desired lighting effects. *Id.* at [0059].

195. The controller in Figure 5A includes a “switch selector 542” that converts “each knob setting to a set of control signals to the appropriate switches 522, which in turn would control power to the wires 547 supplying power to the light segments.” *Id.* at [0059]. The controller converts user selections, made through knobs and other inputs, to power control signals that are sent to the LEDs, or light segments. The controller also includes “[a]n effects generator 543 (FIG. 5A) . . . along with an effects selector 533 which forms part of the manual interface 530. The effects generator 543 may provide the ability to create various lighting effects, such as, e.g., dimming, strobing, pulsation, or pattern generation. The effects selector 543 may affect all of the switches 522 simultaneously, or else may affect individual switches or groups of switches 522, depending upon the desired complexity of the lighting effects.” *Id.* at [0061].

196. The controller shown in Figure 5B is similar to the controller in Figure 5A, but rather than manually implementing switch selectors through a user interface, the same controls and effect selections are provided through a user interface communicating with a processor within the controller. *Id.* at [0065]-[0066].

197. Figure 5B depicts a “processor 574” through which the controller implements instructions received through “interface 580” “to control the switch selector by, e.g., setting various digital values in registers whose outputs control

the switches 562. The programming instructions may various lighting effects, such as dimming, strobing, pulsation, or pattern generation, for example.” *Id.* at [0067], [0060], [0062]-[0066].

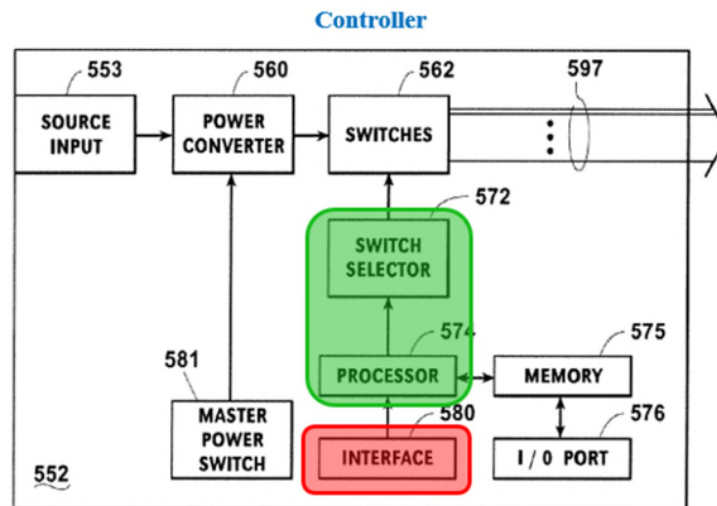


Fig. 5B

Id. at Fig. 5B (annotated).

Claim 1[c]: *an input interface for receiving user input to enable a user to select user customisable cinematic lighting special effect from said range of different user customisable cinematic lighting special effects; and*

198. Pohlert discloses Claim 1[c].

199. The power controllers (*e.g.*, Figures 5A-5B shown above) include a user interface. The user interface allows a user to choose combinations of customizable special effects, including patterns, strobing, flashing, dimming and brightening. Ex. 1008 at [0059], [0066], Figs. 5A, 5B.

200. The controller in Figure 5A includes a “manual interface 530 is provided to allow operation of the switches 522 according to manual selection.

The manual interface 530 may include a master power switch 531, switch controls 532, and, optionally, an effects selector 533. The switch controls 532 may include an individual manual switch, button or other selection means for each individual switch provided in the set of switches 522, or else may comprise a control mechanism (such as knob or reduced number of manual switches, buttons or other selection means) for selecting groups of switches 522 according to predesignated arrangements.” *Id.* at [0059].

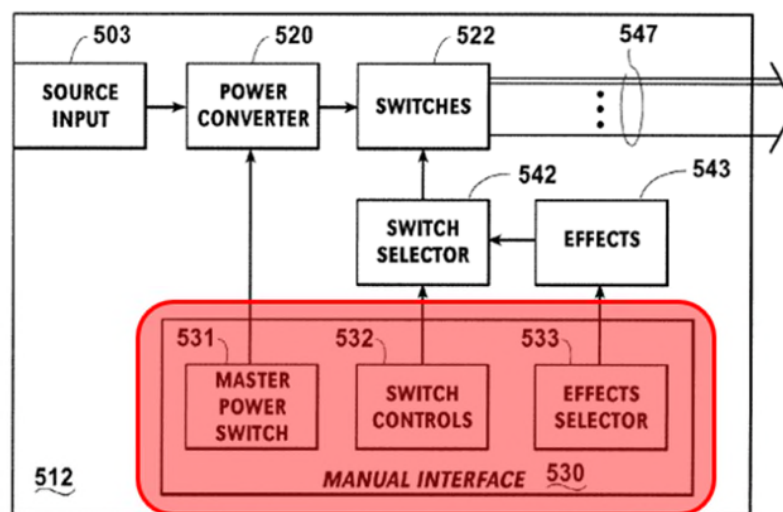


Fig. 5A

Id. at Fig. 5A (annotated).

201. The user interface in Figure 5A allows a user to make selections that are then sent to an “effects generator 543,” which provides “the ability to create various lighting effects, such as, e.g., dimming, strobing, pulsation, or pattern generation.” *Id.* at [0061]. The effects selector in the user interface allows a user

to adjust frequency of the “[s]trob ing” effect “via a manual knob, switch or other selection means.” *Id.* at [0062].

202. The controller can generate “[p]attern generation” by “manual selection from a number of predefined patterns, or else through an interface allowing different pattern sequencing.” *Id.* at [0063]. The patterns a user can select through the user interface include “strob ing or flashing different groups of light segments . . . in a predefined sequence (which may be a pseudo-random sequence, if desired), strob ing or flashing different light elements 320 of the light segments 325-360 in a predefined (or pseudo-random) sequence, gradually dimming or brightening light segments 325-360 (individually, in groups, or collectively), or various combinations of these effects.” *Id.*

203. Figure 5B includes “[a]n interface 580 . . . for programming or otherwise interfacing with the processor 574, or manually selecting various lighting effects options through selectable knobs, switches or other selection means, as generally explained previously with respect to FIG. 5A.” *Id.* at [0066].

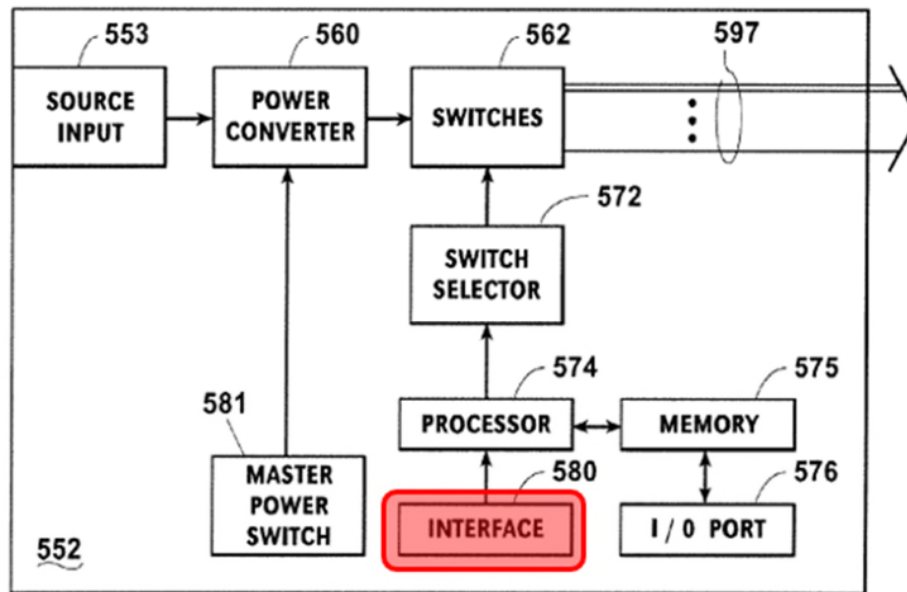


Fig. 5B

Id. at Fig. 5B (annotated).

204. Selections made using the user interface in Figure 5B are converted to instructions for the processor, and these instructions “provide for various lighting effects, such as dimming, strobing, pulsation, or pattern generation, for example.” *Id.* at [0067]. The programming instructions “may provide that the switches 562 are turned on and off according to designated sequences, thus allowing the capability of pattern generation via the processor 574. Patterns may include, for example, strobing or flashing all or different groups of light segments 325-360 (given the example of FIG. 3) in a predefined (or pseudo-random) sequence, strobing or flashing different low power lamps 320 of the light segments 325-360 in a predefined (or pseudo-random) sequence, gradually

dimming or brightening the light segments 325-360 (individually, in groups, or collectively), or various combinations of these effects is contemplated.” *Id.*

Claim 1[d]: an effect simulator adapted to calculate a time varying lighting value based on at least one simulation parameter,

205. Pohlert discloses Claim 1[d].

206. The '258 Patent describes the “effect simulator” as a component of the controller that “creates data 106 characterising a lighting effect.” Ex. 1001 at 7:51-52, 5:54-58. As previously explained, the “effect simulator” is described as nothing more than a black box that performs functions without any recitation as to how the functions are performed. Pohlert, however, discloses how its lighting system generates an effect using an “effects selector” and “effects generator” (Figure 5A) or “processor” (Figure 5B) in the “power controller” and how it calculates time varying lighting values in the form of data signals characterizing the desired lighting effect. Ex. 1008 at [0059], [0061]-[0062], [0065]-[0067].

207. The outputs from the “effects selector” and “effects generator” (Figure 5A) or “processor” (Figure 5B) are data and signals characterizing the desired lighting effect, which are converted to power control signals supplied to the LEDs to generate the desired light output. *Id.* at [0059], [0061]-[0062], [0065]-[0067].

208. These power control signals provide time-varying signals (described in the '258 Patent as data or signals that contain brightness or color values that

vary over time to produce desired colors of intensities (Ex. 1001 at 8:41-50; 8:60-62)) for “controlling the intensities” of the LEDs to generate the desired light output patterns and effects. Ex. 1008 at [0050]-[0051]. The power controls signals are based on user-selected parameters for the desired lighting effects, including brightness (or dimming), duration, frequency, whether a sequence will be pseudo-random, and color. *Id.* at [0051], [0061]-[0063], [0066]-[0067], [0089]-[0091].

209. Pohlert further discloses generating a strobing effect by creating, and outputting, an oscillating signal and applying it as a control signal. *Id.* at [0062]. The oscillating signal is a “time varying” signal that is applied as a control signal to control the intensities of the LEDs.

210. Pohlert also discloses that a user can adjust the frequency parameter of the strobing effect “via a manual knob, switch, or other selection means as part of the effects selector 533” in the user interface. *Id.* at [0062]. Adjusting the oscillation frequency causes the controller to calculate and create a new output time varying power control signal, changing the frequency of the strobe effect output by the LEDs. Importantly, this is an active adjustment to the light effect that is based on the user’s input parameters.

211. Pohlert discloses generating light effect patterns where light segments are strobed, flashed, or dimmed in sequences, requiring the controller to

calculate signals that are time varying, as some lights are on and some off at different times to generate the patterns. *Id.* at [0063], [0067]. The brightness and frequency of these light effect patterns are customized by user-selected parameters, including the brightness and dimming of different groups of light elements during the pattern and whether the sequences will be pseudo-random. *Id.* at [0063], [0067]. Patterns like this requires the LEDs to be controlled by signals that are “time varying,” such that at different times in the sequence some LEDs will be on, some off.

212. Additionally, Pohlert teaches that adjusting the color or color temperature of the LEDs allows the user to input “intensity control” and “ratio control” adjustments through “manual control knobs, dials, switches, or other such means, or alternatively may be embodied as a digital keypad, a set of digital buttons, or the like” on a user interface. *Id.* at [0088], [0089]-[0092]. The “intensity control” and “ratio control” adjustments are received by “intensity control circuits” and “ratio control circuits” in the controller, which calculates and generates signals to modify the power supply to the different LEDs to generate the desired color and color temperature. *Id.* at [0089]; *see also id.* at [0090]-[0091].

213. The generation and output of control signals, or time varying lighting values, representing the desired effect disclosed in Pohlert is the same as the

effect simulator and output lighting values disclosed in the '258 Patent. *See* Ex. 1001 at Fig. 2; Ex. 1008 at Fig. 5B.

214. The “effects selector” and “effects generator” (Figure 5A) or “processor” (Figure 5B) of Pohlert calculate data signals that are converted to power control signals supplied to the LEDs based on user input parameters such as brightness, duration, or sequence that allow the output from the LEDs to “simulate” the desired lighting effect or pattern. *Id.* at [0059], [0061], [0065]-[0067]. Controllers generate lighting values that are provided to appropriate switches to control power to the wires supplying power to light elements. *Id.*

Claim 1[e]: said at least one simulation parameter depending on the selected user customisable cinematic lighting special effect being simulated,

215. Pohlert discloses Claim 1[e].

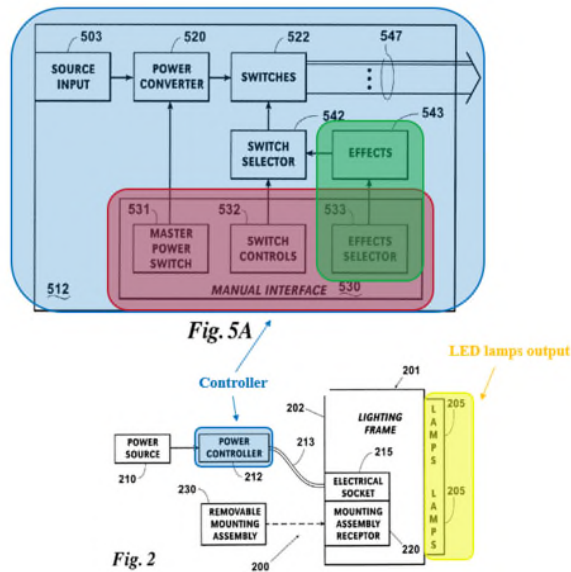
216. The “simulation parameters” disclosed in Pohlert are based on user-selected customizable lighting effects selected through the user interface on the power controller. *See* ¶¶ 198-214 (Claims 1[c]-[d]). Pohlert discloses different effects, such as “strobing” effects and light “pattern” effects, that are used in “photography, film, television, and other applications.” Ex. 1008 at [0003], [0005], [0061]. The strobing effect is created based on simulation parameters related to the “frequency” of an oscillation signal controlling the “flashes” or pulses of light making up the strobe effect. The strobe effect depends on the user selecting parameters to determine how the device simulates a “strobing” effect.

Id. at [0061]-0063], [0066]-[0067]. Adjusting the parameters for the “frequency” of strobing allows a user to modify the production of a strobing effect. And the simulation parameters of dimming or brightening different groups of light elements, and selecting whether the sequences used to generate light patterns will be pseudo-random, depend on a user first selecting to generate a pattern effect on the user interface. *Id.* at [0063], [0067].

Claim 1[f]: and [said effect simulator] . . . adapted to output said time varying lighting value to said lighting device so as to simulate the selected user customisable cinematic lighting special effect;

217. Pohlert discloses Claim 1[f].

218. The power controller in Pohlert sends control signals via wires supplying power to the disclosed lights, which cause the lights to simulate the user’s selected effect, like strobing, dimming, or pattern generation. *See* ¶¶ 189-214 (Claims 1[b]-[d]). Pohlert discloses that the output from the “effects selector” and “effects generator” or “processor,” and switches, in the controllers shown in Figures 5A-5B are provided to the LED lamps through a cable or wires. Ex. 1008 at [0058]-[0059].

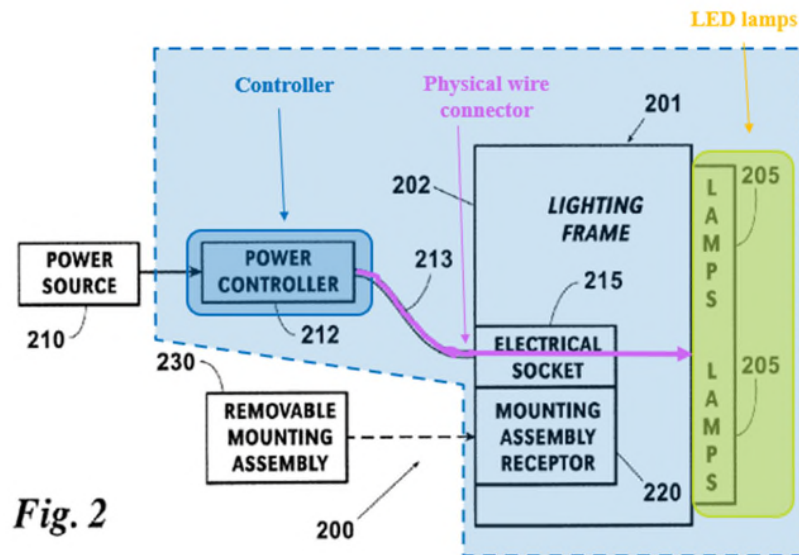


Id. at Figs. 2, 5A (annotated), Fig. 5B.

Claim 1[g]: *wherein said lighting device and said controller are integrated in a combined unit.*

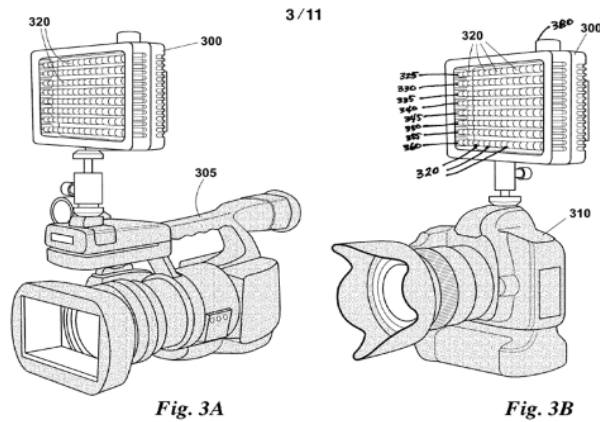
219. Pohlert discloses Claim 1[g].

220. Pohlert discloses power controllers and LED lamps that are physically connected and combined into one device. *Id.* at [0020], [0050]-[0051]. Figure 2, for example, shows a dedicated “power controller” can be physically connected by a cable to the lighting elements on the lighting frame, making them one combined unit:



Id. at Fig. 2 (annotated).

221. Pohlert also discloses that the “power source 210” in Figure 2 may be either “a standard electrical outlet” or “a battery having sufficient current to drive the LEDs.” *Id.* at [0057]. Where a battery is used to supply power to the lighting device, “the light panel and self-contained battery unit function as an integrated lighting apparatus.” *Id.* at [0018]. Figures 3A and 3B also depict the lighting system in a stand-alone unit mounted directly to a video or photography camera:



Id. at Figs. 3A, 3B. The LEDs and controller in Pohlert can be mounted to a camera or a frame, and may be “provided in the form of a kit, with one or more of a light panel, self-contained battery unit, compact stand, connecting cable(s), adapter(s), lenses or color gels, and so on, being provided in a single package to allow flexibility and versatility to users in the field.” *Id.* at [0024], [0050], [0094], Abstract.

b) Dependent Claim 2

Claim 2: The lighting system according to claim 1, wherein the input interface is adapted to receive user input to enable a user to customise said user customisable cinematic lighting special effect.

222. Pohlert discloses Claim 2.

223. By using the user interface on the Pohlert power controller (see Figures. 5A and 5B), a user can input selections to request customized effects, including patterns, strobing, flashing, dimming, brightening, and combinations thereof. See *supra* ¶¶ 198-214 (Claim 1[c]-[d]).

224. If a user wants to create a strobing effect, the strobing “may be accomplished by generating an oscillating signal and applying it as a control signal either upstream or downstream from the switch selector 542,” with the frequency of oscillation being “selectable via a manual knob, switch or other selection means as part of the effects selector 533.” Ex. 1008, [0062]. The user inputs parameters that can change the oscillation frequency allow customization of the strobing effect, with a higher oscillation frequency causing more frequent flashes. Different groups of light elements can contain different numbers of lights that randomly turn on/off; thus, each activated light grouping has a different, random peak brightness. Different combinations of lights may be selected, and those selections impact the total light output. Ex. 1008 at [0059]. For example, a pseudo-random sequence with all light segments selected would result in a 100% total light output (i.e., brightness). *Id.* However, this maximum light output would decrease to 50% if every other light segment is randomly selected and would further decrease to 25% if every fourth light segment is randomly selected. *Id.* at [0059], [0063], [0067]. The peak brightness generated will also randomly change depending on the number of light segments activated based on the pseudo-random sequence. *Id.*

c) Dependent Claims 3, 4, 5

Claim 3: *The lighting system according to claim 1, wherein the lighting device comprises at least one LED.*

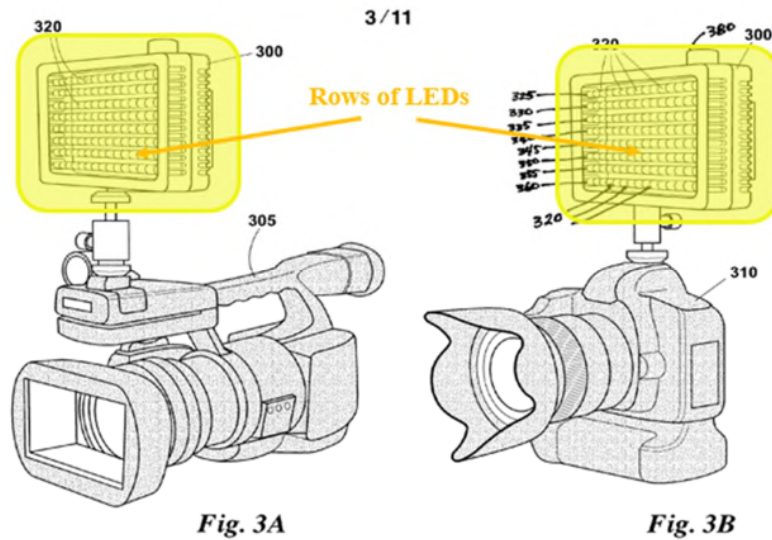
Claim 4: *The lighting system according to claim 3, wherein the lighting device comprises multiple different coloured LEDs.*

Claim 5: *The lighting system according to claim 4, wherein the multiple different coloured LEDs comprise at least one of a RGB LED, and a RGB+W LED.*

225. Pohlert discloses Claims 3, 4, and 5.

226. “RGB” in Claim 5 refers to red, green, and blue, and “RGB+W” refers to red, green, and blue, plus white. This is common nomenclature to a POSITA.

227. The lighting system in Pohlert includes multiple LEDs, and the disclosed LEDs can be RGB LEDs. *Id.* at [0081], [0084]. The lamp elements also comprise “high output LEDs” that “are available in white as well as colors such as green, blue, red, amber, and cyan.” *Id.* at [0111].



Id. at Figs. 3A, 3B (annotated).

d) Dependent Claim 6

Claim 6: *The lighting system according to claim 3, wherein the controller is adapted to control the colour or colour temperature of said LEDs in dependence on a user input received via the input interface.*

228. Pohlert discloses Claim 6.

229. Pohlert discloses selective combinations of RGB LEDs used to “generate virtually any desired color.” *Id.* at [0084]. The lighting systems provide for control of “color temperature” in the lighting apparatus, and refers to color temperatures of “tungsten” for light in the range of 1000 to 4200° Kelvin and “daylight” for temperatures in the range of 4200 to 9500° Kelvin. *Id.* at [0049].

230. Users can adjust the color or color temperatures of the LEDs by manipulating the “intensity control” and “ratio control” adjustments through “manual control knobs, dials, switches, or other such means, or alternatively may be embodied as a digital keypad, a set of digital buttons, or the like” on a user interface. *Id.* at [0088], [0089]-[0092]. The “intensity control” and “ratio control” adjustments are received by “intensity control circuits” and “ratio control circuits” in the controller, and these parameters modify the effect and the LEDs generate the desired color and color temperature. *Id.* at [0086]-[0089], [0090]-[0091], Fig. 10.

e) Dependent Claim 7

Claim 7: *The lighting system according to claim 3, wherein the lighting device comprises at least one ‘warm’ white and at least one ‘cool’ white LED.*

231. Pohlert discloses Claim 7.

232. The '258 Patent describes “warm” white LEDs as a temperature in the range of 2800K and “cool” white LEDs as 7000K. Ex. 1001 at 8:54-64. Pohlert discloses the use of “tungsten” and “daylight” LEDs, which, respectively, have color temperature in the ranges of 2000K to 4200K, and 4200K to 9500K. See ¶¶ 228-230 (Claim 6). A POSITA would understand that the “tungsten” temperature range produces a “warm” white light, and the daylight temperature range produces a “cool” white light.

f) Dependent Claim 8

Claim 8: The lighting system according to claim 6, wherein the lighting device is operable to produce light at a colour temperature typically in the range of 2800-7000 Kelvin.

233. Pohlert discloses Claim 8.

234. Pohlert's lighting system includes LEDs that can be controlled to produce light spanning the tungsten color temperature range ("1000° Kelvin to about 4200° Kelvin") and daylight color temperature range ("4200° Kelvin to about 9500° Kelvin"). Ex. 1008 at [0049]. This discloses color temperature range between 1000-9500° Kelvin.

g) Dependent Claim 9

Claim 9: The lighting system according to claim 3, wherein the controller is adapted to control the brightness of said LEDs in dependence on a user input received via the input interface.

235. Pohlert discloses Claim 9.

236. The user interface can be used to generate different patterns or effects. See ¶¶ 205-214 (Claim 1[d]). Pohlert teaches that these effects, which are generated by the "power controller," can include "gradually dimming or brightening" the LED elements—*i.e.*, controlling their brightness." Ex. 1008 at [0063], [0067], [0050].

h) Dependent Claim 10

Claim 10: *The lighting system according to claim 1, wherein the simulation parameter comprises at least one of a colour and a colour temperature.*

237. Pohlert discloses Claim 10.

238. The simulation parameters that are selected by the user to produce the desired effect include color and color temperature. *See supra* ¶¶ 228-230, 233-234 (Claims 6, 8). A user can select to control the color and color temperature of the LED elements in the lighting system, the lighting device then simulates the effects. Ex. 1008 at [0087]. By using “intensity control” and “ratio control” adjustments with “manual control knobs, dials, switches, or other such means, or alternatively may be embodied as a digital keypad, a set of digital buttons, or the like” on the user interface, the user controls the intensities of LEDs to control the overall color output. *Id.* at [0088], [0089]-[0092].

i) Dependent Claim 11

Claim 11: *The lighting system according to claim 1, wherein the selected user customisable cinematic lighting special effect is designed to mimic at least one of fire; lightning; police car light; television; a neon flickering sign; a candle; muzzle (gunshot); welding; spark/short circuit; a scan (e.g. fingerprint scanner); paparazzi flashes; fireworks; flashes (strobe); a propeller; a (nuclear) explosion; and a wormhole.*

239. Pohlert discloses Claim 11.

240. Pohlert’s effects and patterns include “strobing or flashing different groups of light segments . . . in a predefined sequence (which may be a pseudo-

random sequence, if desired), strobing or flashing different light elements 320 of the light segments 325-360 in a predefined (or pseudo-random) sequence, gradually dimming or brightening light segments 325-360 (individually, in groups, or collectively), or various combinations of these effects.” Ex. 1008 at [0063], [0062], [0067]. One of the effects included in Pohlert include “flashes (strobe).” *Id.*

241. A POSITA would understand that Pohlert teaches that a user can generate the other effects listed in Claim 11, such as a pseudo-random sequence flash or strobe of light for simulating lightning and welding or spark/short circuit effects. *Id.* at [0063], [0062], [0067]. To generate an effect to look like lightning or sparking, if the timing is too regular the effect will look artificial, and more like an ordinary strobing light. Pohlert therefore discloses generating random flashes of light in the pseudo-random sequences. *Id.* at [0063], [0067].

242. Pohlert also discloses controlling different color LEDs in different groups through the effects generator, such as alternating between red and blue, to simulate a police car light. *Id.* at [0088], [0063], [0067], [0089]-[0092].

j) **Dependent Claims 12 and 21**

Claim 12: *The lighting system according to claim 1, wherein the controller is adapted to store said at least one simulation parameter in memory.*

Claim 21: *The lighting system according to claim 12, wherein the controller is adapted to recall said stored at least one simulation parameter from said memory.*

243. Pohlert discloses Claims 12 and 21.

244. A memory disclosed in Pohlert is used to store programming instructions, which comprise the “simulation parameters” for the power control signals controlling the intensities of the LED elements for implementing the user-selected effects. *Id.* at [0066]-[0067].

245. The processor in the “power controller” shown in Figure 5B accesses a memory and “reads instructions from the memory 575 and executes them in a conventional manner. The instructions will generally cause the processor 574 to control the switch selector by, e.g., setting various digital values in registers whose outputs control the switches 562. The programming instructions may also provide for various lighting effects, such as dimming, strobing, pulsation, or pattern generation, for example.” *Id.* at [0067].

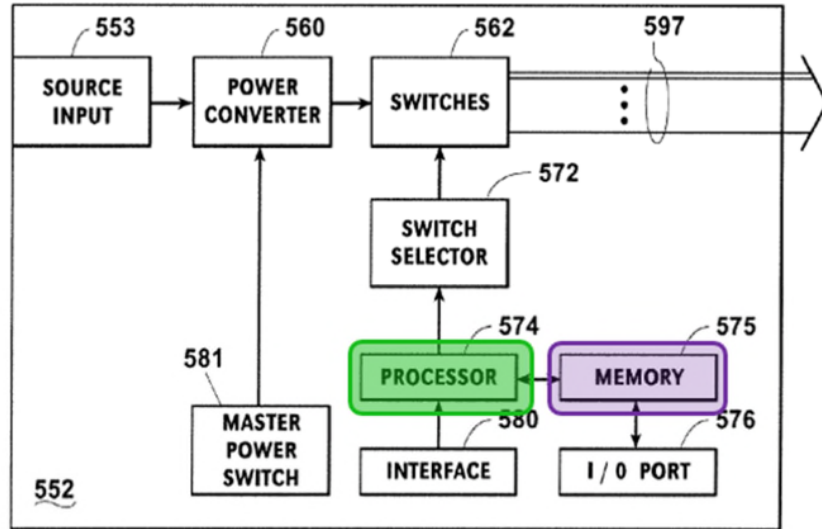


Fig. 5B

Id. at Fig. 5B (annotated).

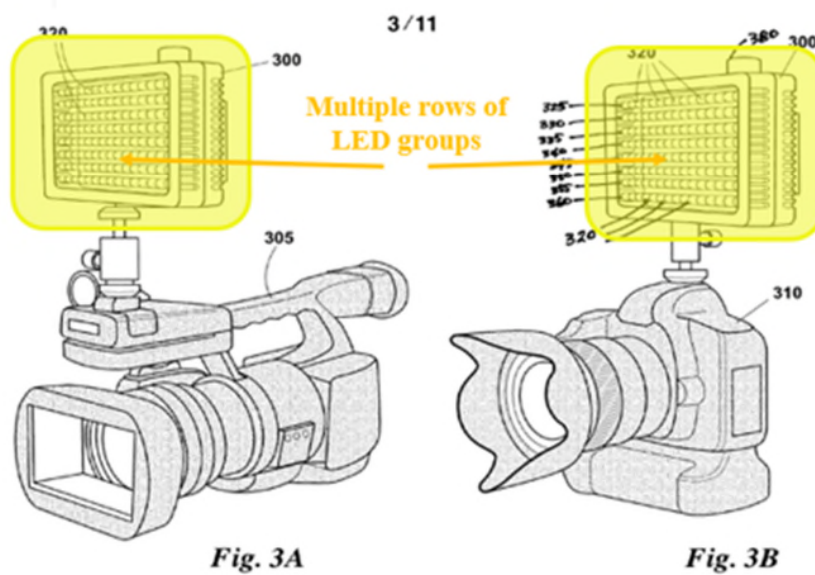
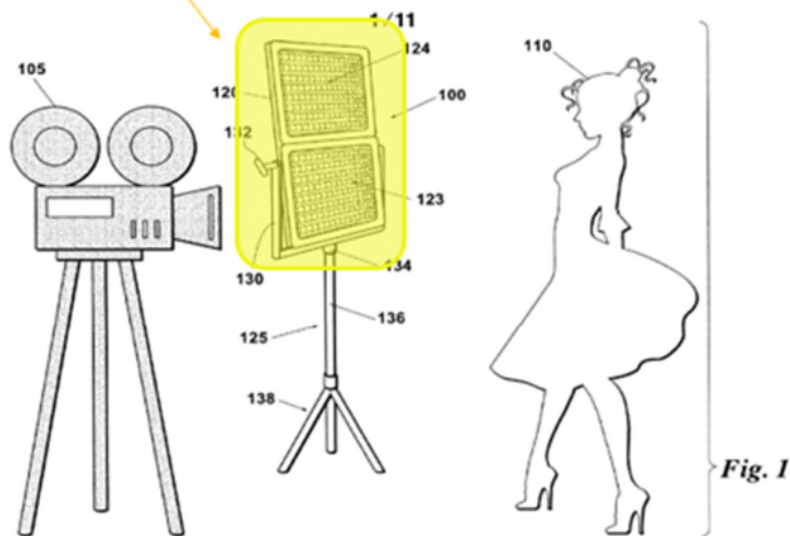
k) Dependent Claim 13

Claim 13: *The lighting system according to claim 1, wherein the controller is adapted to control a plurality of lighting devices in dependence on the selected user 115ustomizable cinematic lighting special effect.*

246. Pohlert discloses Claim 13.

247. The controller disclosed in Pohlert can be used to control a plurality of groups of LEDs. A plurality of LEDs may be included as lamp elements in an “arrangement” on a panel or frame, and that the power controller “may be provided for controlling the intensities of the various lamp elements, either collectively, individually, or in designated groups, and, in some embodiments, through preprogrammed patterns.” *Id.* at [0050], [0053], [0059], [0067]. These plurality of LEDs or groups of LEDs are a “lighting device.”

Multiple lighting elements in multiple panels



Id. at Figs. 1, 3A, 3B (annotated).

248. The lighting system (like that in Figure 1) may include “multiple panel light sections 123, 124” and the lighting arrangements are controlled by the controller to produce effects using multiple light segments. *Id.* at [0053], [0059].

The controller shown in Figure 5B “may be programmed to turn the switches 562 on and off according to a predesignated pattern dictated by the programming instructions. . . . As mentioned before, patterns may include, for example, strobing or flashing all or different groups of light segments 325-360 (given the example of FIG. 3) in a predefined (or pseudo-random) sequence, strobing or flashing different low power lamps 320 of the light segments 325-360 in a predefined (or pseudo-random) sequence, gradually dimming or brightening the light segments 325-360 (individually, in groups, or collectively), or various combinations of these effects is contemplated.” *Id.* at [0067].

249. Pohlert discloses “slave flashes” that can be controlled by radio frequency, infrared, and optical signals. *Id.* at [0022]-[0023]. These may be “optical slave flashes” that are “triggered by light,” including light pulses from another device. *Id.* at [0023].

250. The lighting and effect generation system in Pohlert is “particularly suited for use with such” optical slave flashes. *Id.* The “power controller” in the lighting system cause the LEDs to produce the light pulse that then triggers the optical slave flashes. When the power controller causes the LEDs flash, any slave flashes in the vicinity that register that flash caused by control signals from the power controller would be triggered, producing their own flashes of light. Each of

these slave flashes are a “lighting device” triggered by the LEDs controlled by the controller to produce desired lighting effects.

l) Dependent Claim 14

Claim 14: The lighting system according to claim 1, further comprising a further lighting device, said further lighting device being separate from said controller.

251. Pohlert discloses Claim 14.

252. A plurality of light elements in Pohlert can be controlled based on the output power control signals resulting from user input of desired combinations of effects. See ¶¶ 198-204, 217-218 (Claims 1[c], 1[f]). Panels of lights are not directly connected to the controller, but are connected to each other through cables, with one panel being directly connected to the controller. Ex. 1008 at [0113]. As for the panels not directly connected to the controller, these panels include battery power supply and are separate. A POSITA would understand that when using multiple light panels, the panels should be connected with the “power jumper cables” and these panels connect “the power between the panel(s) 702 and battery unit(s).” Ex. 1008 at [0113]. A panel connected to another panel through a power jumper cable is only indirectly connected to the power controller, and therefore is “separate” from the power controller.

253. The “optical slave flashes” in Pohlert are also separate from the controller can be triggered through light pulses, including those produced by the LED light elements operated by the controller. See *supra* ¶¶ 246-250 (Claim 13).

The “optical slave flashes” are “separate” from the controller, as they are “self-contained electronic flash units” that respond to external triggers, including in IR, RF, and optical signals.

m) Dependent Claim 15

Claim 15: The lighting system according to claim 14, wherein the controller comprises a wireless communication interface adapted for wireless communication with said further lighting device.

254. Pohlert discloses Claim 15.

255. The controller in Figure 5B of Pohlert includes an “I/O port” that may be wireless (infrared) for obtaining digital information. Ex. 1008 at [0066]. Pohlert also discloses that “slave flashes” can be controlled by RF, infrared (IR), or optical signals (such as the flashes generated by the LEDs directly connected to the controller). *Id.* at [0022]. The lighting effects and generation system are “particularly suited for use with such optical, IR or RF slave flash systems.” *Id.* at [0023].

256. A POSITA would have understood that the Figure 5B power controller in Pohlert’s lighting system, having an IR “I/O port,” could generate the signals to be used to trigger the external slave flash units. A POSITA would have understood that the I/O port could both receive (input) and generate (output) IR signals. When outputting IR signals, these IR signals from the controller could be received by any slave flash units near the controller. A POSITA would have

been motivated to use the wireless IR I/O port in the power controller to communicate with the slave flashes, so that a user could coordinate and control all lights being used from one controller.

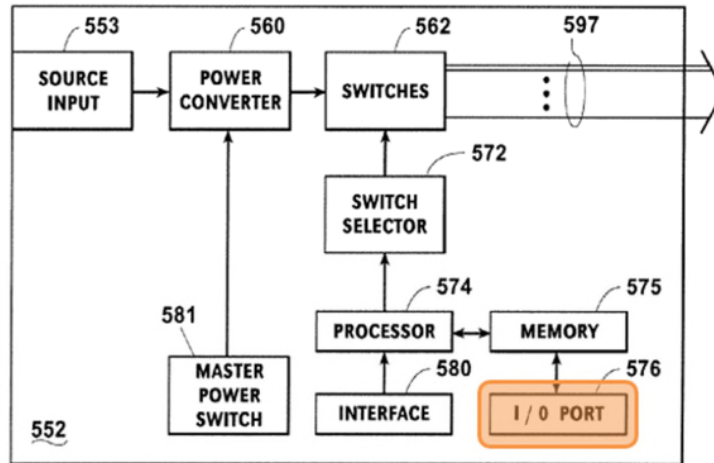


Fig. 5B

Ex. 1008 at Fig. 5B (annotated).

n) Dependent Claim 16

Claim 16: *The lighting system according to claim 13, wherein the controller is adapted to at least one of: offset and overlap the output of said plurality of lights with one-another so as to simulate a moving light source.*

257. Pohlert discloses Claim 16.

258. A power controller in Pohlert can individually control groups of light elements, including to generate the selected predetermined patterns. *Id.* at [0063], [0067]. Pohlert discloses strobing or flashing all, or different, groups of light elements in sequences, which would encompass “offsetting” the lights (flashing them at different times in sequences) and “overlapping” the lights (flashing groups

or elements together, or in sequences where different groups are “on” for some of the same time). Ex. 1008 at [0063], [0067].

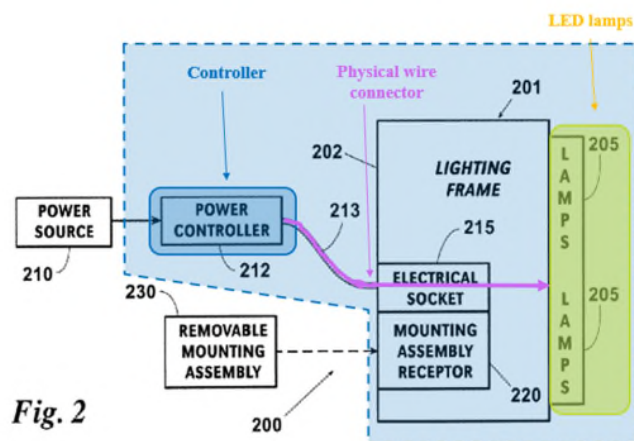
259. By strobing, flashing, or gradually dimming or brightening the different groups of light elements, the generated effect would be one of a moving light. Strobing different light segments in sequence would create the effect of a light moving in position from where the flashes originate. Pohlert discloses creates moving light simulation through controlling different groups of LED light elements with the pattern sequences, as discussed.

o) Dependent Claim 17

Claim 17: *The lighting system according to claim 1, wherein the controller is separable from the lighting device.*

260. Pohlert discloses Claim 17.

261. The power controller is physically connected to the lighting frame containing the LED lamps by a cable 213. Ex. 1008 at [0058]. A cable is used “for connection” of the power controller “to the lighting frame.” *Id.* The power controller is “separable” from the lighting device, in that it can be disconnected when the cable is disconnected from the electrical socket 215:



Id. at Fig. 2 (annotated).

p) Dependent Claim 18

Claim 18: *The lighting system according to claim 1, wherein the input interface comprises at least one of: a wireless communication interface; a dial; a slider; a control panel; a display and buttons; and a touch screen.*

262. Pohlert discloses Claim 18.

263. Pohlert discloses that the user interface in the controllers shown in Figures 5A and 5B may include dials, control panels, and buttons. *See supra* ¶¶ 198-204 (Claim 1[c]).

q) Dependent Claim 19

Claim 19: *The lighting system according to claim 1, further comprising a converter adapted to convert at least one of brightness and colour data from the simulator into lighting signals for output by the output.*

264. Pohlert discloses Claim 19.

265. The '258 Patent describes the claimed converter as a component that converts data into a signal suitable for the particular light elements being

controlled, stating that “lighting data converter 107 may convert the data 106 from the lighting effect simulator 100 into a suitable signal for a particular light 102.” Ex. 1001 at 8:41-53.

266. Like the '258 Patent, Pohlert discloses “switches” and a “switch selector” that convert signals from the power controller into control signals provided to the lighting elements to change the output brightness, and further discloses “intensity control circuits” and “ratio control circuits” that convert signals representing desired colors to signals that are sent to the LEDs for generating such colors. *See supra* ¶¶ 217-218 (Claim 1[f]), ¶¶ 228-230 (Claim 6).

267. Pohlert discloses that the “switch selector 542 would then convert each knob setting to a set of control signals to the appropriate switches 522, which in turn would control power to the wires 547 supplying power to the light segments.” Ex. 1008 at [0059]. The power controller shown in Figure 5B also “includes a set of switches 562 receiving power from the power converter 560, and providing power to individual wires 597 which are conveyed, preferably by cable, to the lighting frame assembly 201 of the lighting effects system 200. The power controller 552 also includes a switch selector 572, which may comprise, for example, a set of registers which provide digital signals to the switches 562 to control their on/off state.” *Id.* at [0065].

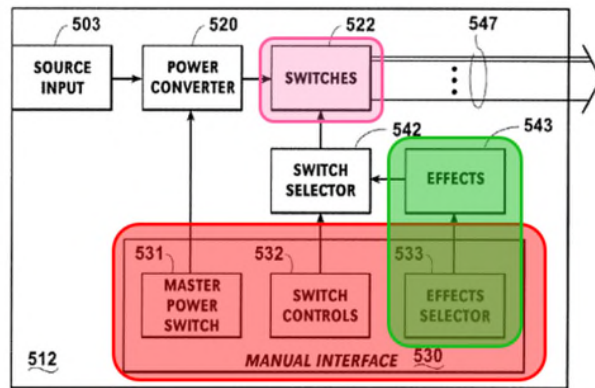


Fig. 5A

Id. at Fig. 5A (annotated).

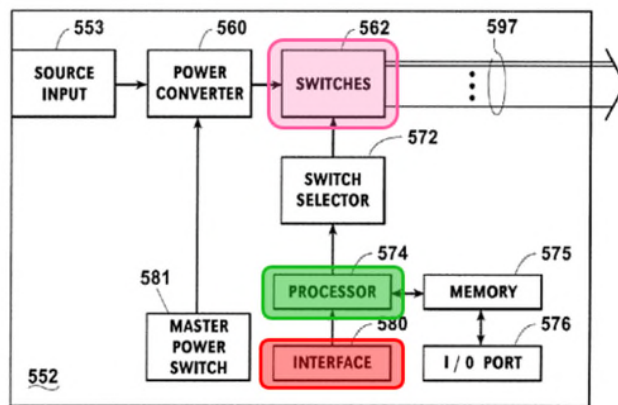


Fig. 5B

Id. at Fig. 5B (annotated).

268. Control of the switches provides for the “pattern generation” to produce effects such as changes in brightness. *Id.* at [0063], [0066]-[0067].

269. As for color signals, Pohlert discloses intensity control circuits and ratio control circuits that modify the power supply to each LED to generate the desired light. *Id.* at [0089]-[0091].

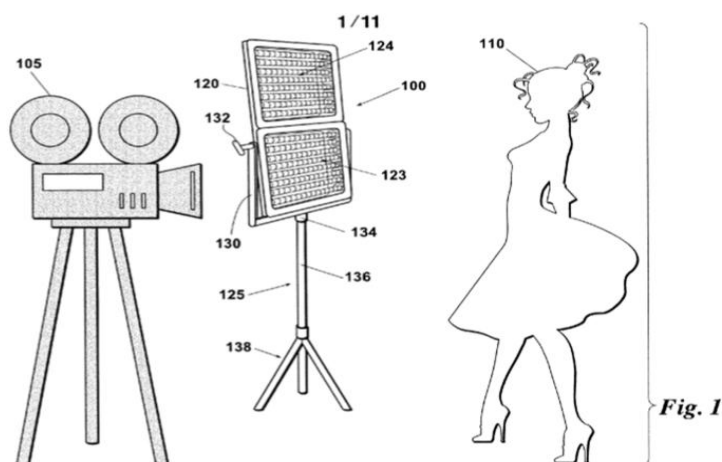
r) Dependent Claim 20

Claim 20: The lighting system according to claim 1, wherein the lighting system is a lighting system for at least one of: videography; broadcast; cinematography; studio filming; and location filming.

270. Pohlert discloses Claim 20.

271. The lighting system can be used to create effects and provide lighting in “photography, film, television, and other applications.” *Id.* at [0003]. Pohlert teaches that lighting systems are “an integral part of the film and photography industries,” providing essential proper illumination “when filming movies, television shows, or commercials, when shooting video clips, or when taking still photographs.” *Id.* at [0005]. A POSITA would have understood that the pattern generation, strobing, flashing, and dimming effects described in Pohlert were regularly used in videography, broadcast, cinematography, and studio and location filming. *Id.* at [0063], [0066].

272. Figure 1 shows the use of the lighting and effects generation system with a video camera that may be “a motion picture-type camera.” *Id.* at [0052].



Id. at Fig. 1.

s) Dependent Claim 22

Claim 22: The lighting system according to claim 14, wherein said controller is adapted to control said further lighting device in dependence on the selected user customisable cinematic lighting special effect.

273. Pohlert discloses Claim 22.

274. A plurality of light elements, such as different panels of lights in a frame or individually controllable rows of lights, can be controlled based on the output power control signals resulting from user input of desired combinations of effects. See ¶¶ 251-253 (Claim 14).

XIII. GROUND VI: CLAIMS 1-22 WOULD HAVE BEEN OBVIOUS TO A POSITA IN VIEW OF POHLERT

275. I incorporate here by reference each of my opinions in the proceeding sections relating to Ground V, as the disclosures from Pohlert supporting my opinion that Pohlert anticipates Claims 1-22 apply equally to my

opinion that Claims 1-22 would have been obvious to a POSITA in view of Pohlert.

276. As I explained in detail in Section XII, it is my opinion that Pohlert expressly discloses, and therefore anticipates, each of Claims 1-22. The disclosures from Pohlert are nearly identical to, and in most instances more detailed than, the disclosures and claims in the '258 Patent. To the extent, however, that the Board finds Independent Claim 1 is not disclosed by Pohlert, Claim 1, and all of its dependent claims, would have been obvious to a POSITA.

277. For instance, the “calculate” limitation in Claim 1 would have been at least obvious to a POSITA. Claim limitation 1[d] states as follows: “an effect simulator adapted to calculate a time varying lighting value based on at least one simulation parameter.” Ex. 1001 at Claim 1. The '258 Patent does not provide any details regarding *how* the “calculation” is purportedly performed by the “effect simulator.” The '258 Patent does not disclose a specific algorithm that would be contemplated by the claims, or a specific way in which a “calculation” is being performed. As I opine in detail in Section 205-214 (Claim 1[d]), a POSITA would understand that the “effect simulator” takes the user input parameters and generates or creates the lighting effect by calculating (*i.e.*, taking the sum of the parameter values and averaging them to generate a lighting effect matching those numeric parameters). I agree with Dr. Bretschneider when he

testified that a POSITA who knows about color sciences and color mixing and different lighting effects would understand that to produce a lighting effect a POSITA would know a calculation occurs. Dr. Bretschneider Depo., 149:11-153:9, 153:19-154:18, 155:4-6, 165:9-11, 176:16-19; 150:14-21, 152:10-22, 185:7-188:13 (“[W]hen you set fire temperature or the fire color to 2000 Kelvin, there *has to be a calculation.*”) (emphasis added).

278. This is not new or unique, and a POSITA would have understood that the specific data (i.e., brightness and color values or timing) for an effect is created after the user selects the effect and customizes its parameters. A POSITA would have also understood that performing a calculation to determine how the LED lights will behave to generate a lighting effect is a standard functionality performed by a computer processor in any entertainment lighting device at the time of the invention. In this context, calculating refers to the function of the microprocessor within a lighting fixture.

279. For example, a lighting fixture like that disclosed in Pohlert utilizes a “microprocessor” to translate numerical value data relating to user input simulation parameters to output an effect. *See, e.g.*, Ex. 1008 at [0066] (“The processor 574 may interface with a memory 575 . . . To accomplish dimming, the processor 574 may be programmed select binary-encoded values to load into registers of the switch selector 572”), (“An interface 580 may also be provided for programming or otherwise interfacing with the processor 574, or manually selecting various lighting effects options through selectable knobs, switches or other selection means.”). It would have been obvious to a POSITA that the microprocessor disclosed in Pohlert would have been used to calculate and output the lighting effect based on the input parameters.

280. A POSITA would understand that Pohlert discloses that the effects, such as a strobe effect, do not exist until a user creates and adds or edits each new step/parameter for the effect. A POSITA would understand that Pohlert’s “effect generator 543” of Figure 5A or “processor 574” of Figure 5B must generate effects by doing “calculations” (or data creation). Just like the ’258 Patent, inputs received through manual or digital interfaces in Pohlert are used by either the effects generator 534 or processor 574 to calculate time varying data signals representing the desired effect. Ex. 1008 at [0059]-[0067]. If the effect does not exist until the user creates it, it is not pre-recorded and a POSITA would

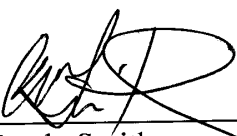
understand that the effect is generated as disclosed in the '258 Patent (*i.e.*, the processor uses the numerical parameter data input by a user and calculates how the effect looks). These lighting values would have to be created (*i.e.*, “calculated”) by a microprocessor or controller each time a user adjusts the parameters of an effect, which adds a new step.

281. For instance, a POSITA would understand that a “calculation” is needed for Pohlert’s “strobing” effect. Users can adjust oscillator frequency for the strobing effect by, for example, adjusting a knob or switch. When these adjustments are made, the controllers calculate new oscillating signals changing the frequency of the strobing. Whether “conventional electronic components” or a “conventional” computer program implements changes to oscillation frequency does not negate that some calculation was performed to arrive at the adjusted oscillating frequency.

282. A POSITA would have understood that the specific data (*i.e.*, brightness and color values or timing) for an effect is created ***after*** the user selects the effect and customizes its parameters. Claim 1, including the “calculate” limitation, would have been obvious to a POSITA. Additionally, to the extent Claim 7 is found not to be expressly disclosed in Pohlert (a finding that I would disagree with), then the invention in Claim 7 would have at least been obvious to a POSITA.

283. Pohlert’s lighting system can use “tungsten” and “daylight” LEDs, which, respectively, have color temperature in the ranges of 2000-4200 degrees Kelvin and 4200- 9500 degrees Kelvin, overlapping with the description of “warm” and “cool” white LEDs in the ’258 Patent. A POSITA would understand that the “tungsten” temperature range produces a “warm” white light, and the daylight temperature range produces a “cool” white light.

I declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true and, further, that these statements were made with the knowledge that willful false statements and the like are punishable by fine, imprisonment, or both, under Section 1001 of Title 18 of the U.S. Code.


Woody Smith
Dated: July 15, 2023

APPENDIX A

Materials Considered

Exhibit	Description
1001	U.S. Patent No. 10,197,258 to Gammons <i>et al</i>
1002	File History for U.S. Patent No. 10,197,258
1004	Showline SL PAR 155 Manual (“Showline”)
1005	Declaration of Martin Palmer (“Palmer Decl.”)
1006	U.S. Patent No. 8,632,208 to Choong (“Choong”)
1007	U.S. Patent No. 8,581,513 to Reinoso (“Reinoso”)
1008	U.S. Patent Application Publication No. 2012/0044374 to Pohlert (“Pohlert”)
1009	Institution Decision in IPR2021-01497 challenging the ‘258 Patent
1010	Transcript of August 17, 2022 Deposition of Dr. Bretschneider
1011	Patent Owner’s First Amended Complaint Filed Against Petitioner
1012	Gottuso January 14, 2023 Email to the Board
1013	Board’s Dismissal of IPR2021-01497

Appendix B

W O O D Y S M I T H
P R O F E S S I O N A L E X P E R I E N C E

Summary:

Twenty-five years' experience in automated system design for industrial, commercial and arena lighting, processing equipment and automation for vertical farming applications. Product development from concept, market research, design and development through production and release to market. Managed teams of 40+ engineers with budgets > \$2.5 million. CEO, COO, CTO, VP Engineering, Director R&D, Lean/Six-Sigma, International Sales and Technical Support, Hydroponics, Aeroponics, Automation, Vertical Farming, Renewable Energy

Digital Lighting, Engineering & Design, LLC

January 2015 – Present

Designed automated horticultural growing system (CEA: Controlled Environment Agriculture) for vertical farming applications including software, digital control, sensors, solar, wind and geothermal energy and advanced digitally controlled LED lighting technology. Specific emphasis on resource conservation, specific lighting spectrum to achieve highest photosynthetic efficiency, utilization of UV-LED to enhance Vitamin D levels in mushrooms and means and methods of determining nutritional value of produce. Developed significant technology implementing automation and AI in these applications.

Evolucia Lighting, Sarasota, FL

CTO, January 2012 – April 2014

Provided design, engineering, and manufacturing support for all Evolucia and Affineon LED products. Expanded LED streetlight offering while improving design for manufacturing. Engineering lead with Asian manufacturing partner.

Affineon Digital Lighting, Coral Springs, FL

CEO, August 2005 – January 2012

Founded Affineon in 2005 to integrate emerging LED technology into commercial, industrial, theatrical and house of worship applications. Designed over 20 products focusing on high power applications for LED. Worked with Disney, US Army, Sloan-Kettering, Osram, Siemens, etc. Acquired by Evolucia in 2012.

Coemar, Spa, Castel Goffredo, MN, Italy

DIRECTOR, INTERNATIONAL SALES, TECHNICAL SUPPORT *March 2003 to August, 2005*

Provided worldwide sales and technical support on concert lighting products utilized for theatrical, concert, TV/film and entertainment applications. Worked with Genesis, Van Halen, Singapore National Day, etc. Travel included Italy, Germany, US, Australia, China, Hong Kong, Korea, Singapore, and Japan.

Hubbell Entertainment Division, Hubbell Inc. Sunrise, Florida
V.P. ENGINEERING, DIRECTOR *August, 1999 to January, 2003*

Developed a new line of automated lighting fixtures for entertainment, commercial and architectural markets. These products utilized modular production techniques to produce 64 variants from 12 main component sub-assemblies. ISO-9000.

Martin Professional, Aarhus, Denmark

CHIEF OPERATING OFFICER *September, 1995 to August, 1998*

COO of US division of Martin Professional A/S of Denmark the world's leading manufacturer of automated lighting fixtures for entertainment applications with >\$100 million in annual sales. Handled Operations, QC, major account sales, and technical support.

High End Systems, Lightwave Research, Austin, TX

DIRECTOR, RESEARCH & DEVELOPMENT *March, 1992 to September, 1995*

Designed Studio Color and Technobeam automated lighting fixtures. Managed R&D team of 40+ engineers and support staff with oversight of budgets >\$2.5M. Product sales > \$30 million.

E D U C A T I O N / C E R T I F I C A T I O N

EDUCATION:

Trinity University, San Antonio, Texas, B.S., Electrical Engineering

CERTIFICATIONS:

Pro/Engineer Basic, Advanced, Detail, Sheet metal, and Surface Training
3D Systems SLA Rapid Prototype Basic and Advanced Training
LEAN and Six Sigma Master Black Belt
AGI Lighting Design

PATENTS:

US 5,515,254 Automated Color Mixing Wash Luminaire
US 5,580,164 Power Lens for an Automated Luminaire
US D 446,204 Portion of an Audio Amplifier
US D 489,145 Light Fixture
US D 492,436 Light Fixture
US D 496,744 Light Fixture

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